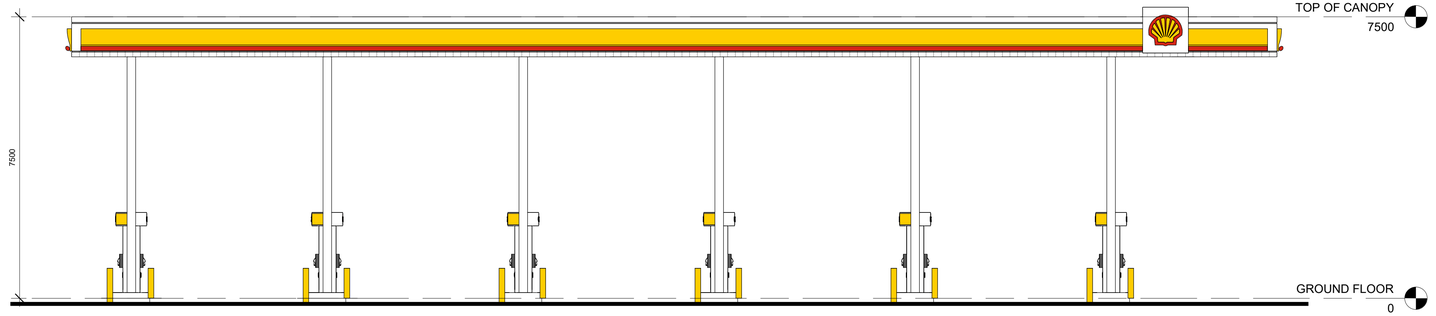
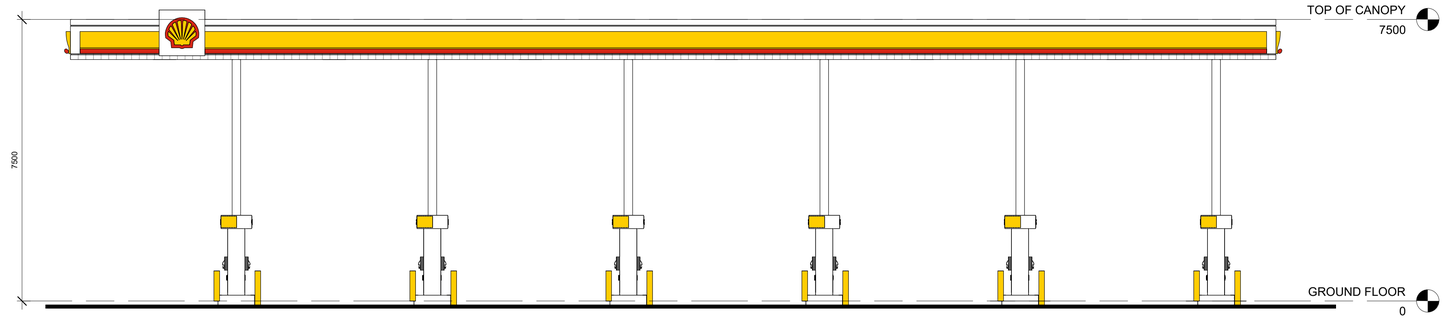


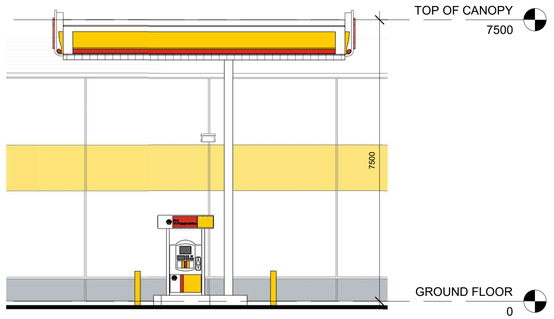
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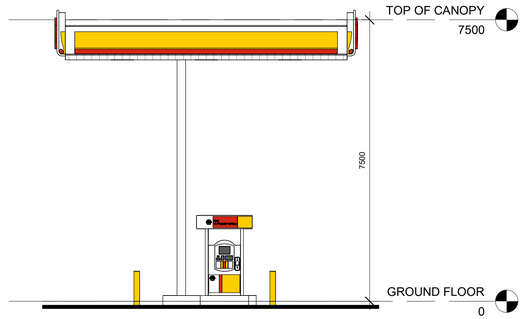
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1 : 75



2 A203 **WEST ELEV. @ TRUCK GAS BAR**

1 : 75



1 A203 **EAST ELEV. @ TRUCK GAS BAR**

1 : 75

RICHARD ZIEGLER ARCHITECT INC.
39 POLSON STREET TORONTO, ONTARIO M5A 1A4
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NO.	ISSUANCE	DATE
2	REV. & ISSUED FOR PLANNING APPROVALS	2026.02.11
1	ISSUED FOR PLANNING APPROVALS	2025.08.05

THE GENERAL CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECT. DO NOT SCALE THE DRAWINGS. DO NOT USE THIS DRAWING FOR CONSTRUCTION UNLESS SIGNED AND SEALED BY THE ARCHITECT.

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ONTARIO ASSOCIATION OF ARCHITECTS
RICHARD E. ZIEGLER
LICENCE
4462

PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

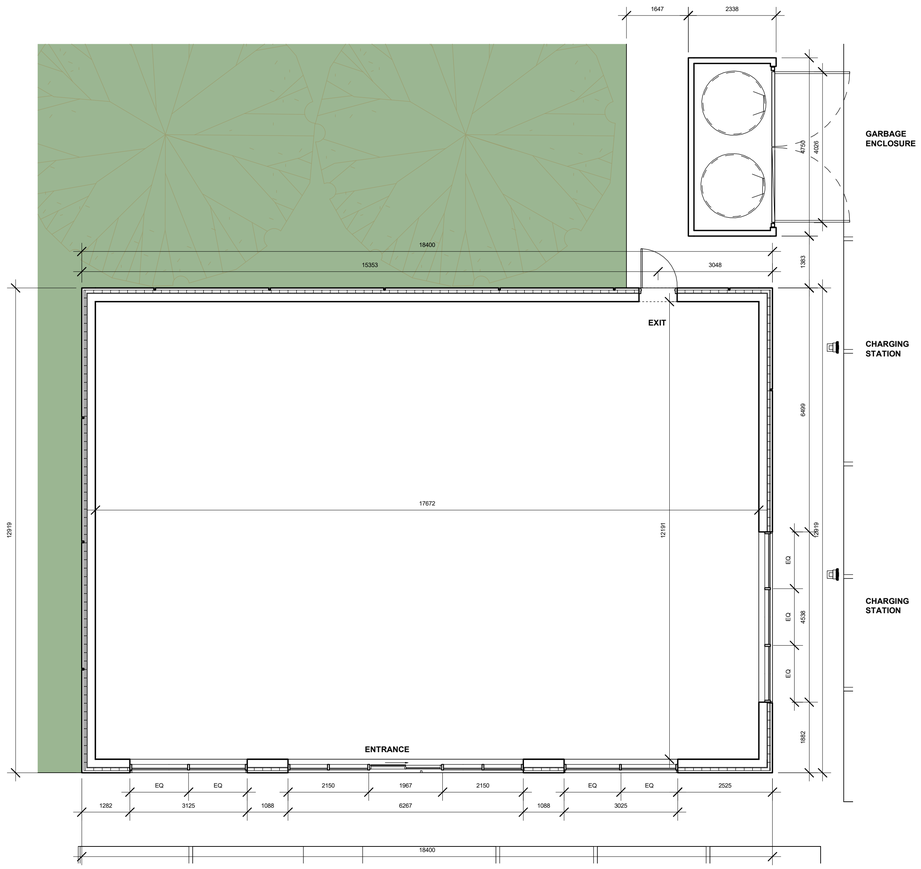
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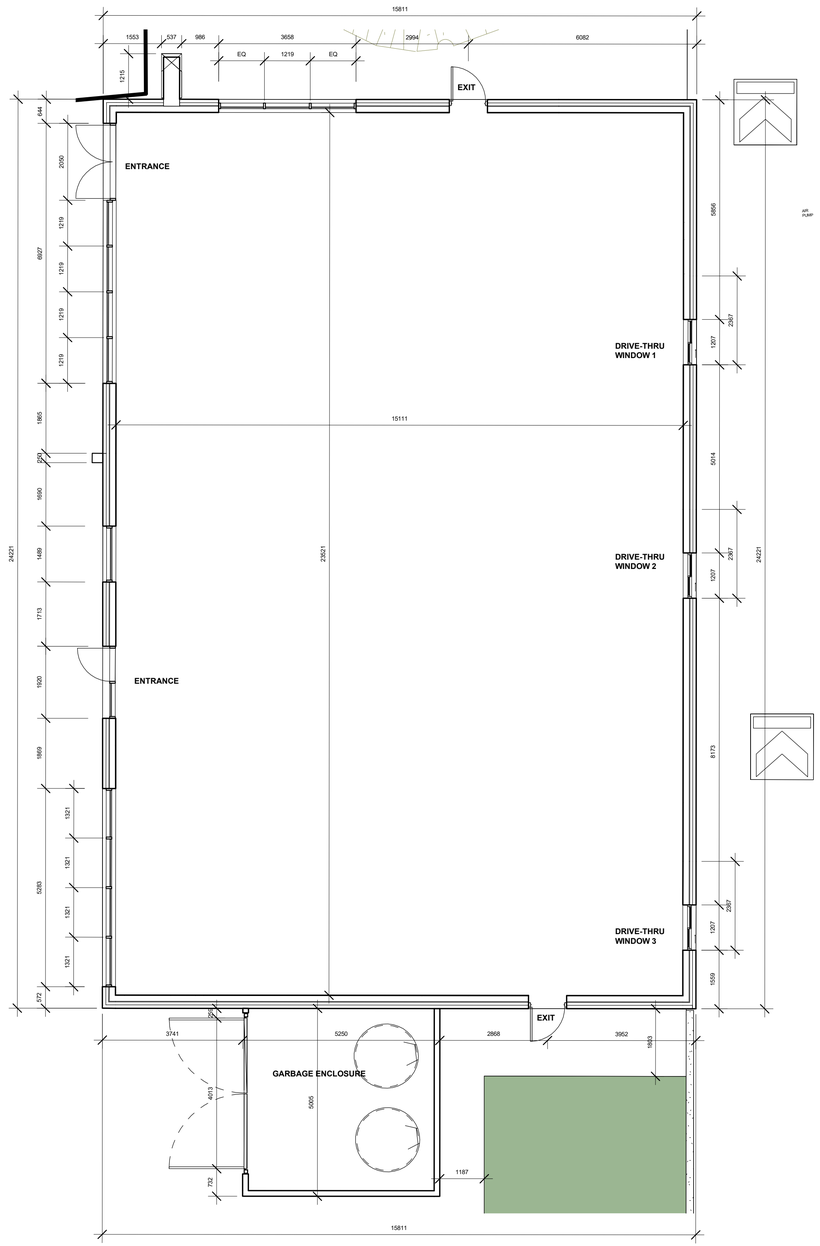
REVISION

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PLOT DATE: 2026-02-11 8:38:58 AM



2 A102 **FLOOR PLAN @ CONVENIENCE STORE**

1 : 75



1 A102 **FLOOR PLAN @ RESTAURANT**

1 : 75

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PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

FLOOR PLANS

SCALE	1 : 75	PROJECT NUMBER
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PLOT DATE: 2026-02-13 1:49:19 PM

FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

7456 MCLEAN ROAD WEST & 197 BROCK ROAD SOUTH

TOWNSHIP OF PUSLINCH COUNTY OF WELLINGTON

PREPARED FOR:

DAAZ INC.

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
55 WYNDHAM STREET NORTH, SUITE 215
GUELPH, ON N1H 7T8

FEBRUARY 2026

CFCA FILE NO. 2792-7289

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.

CROZIER

Revision Number	Date	Comments
Rev. 0	October 2023	Issued for 1st Submission (ZBA)
Rev. 1	August 2025	Issued for 2nd Submission (ZBA)
Rev. 2	February 2026	Issued for 3rd Submission (ZBA)

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Daaz 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 (Township) 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:

- Geotechnical Investigation Report (CMT, July 2023) – Provided under separate cover.
- 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 (October 2023)
- The Township of Puslinch - Municipal Development Standards (September 2019).
- The Township of Puslinch - Stormwater Management Report Carroll Pond Municipal Drain (March 2007)
- The Ministry of Transportation Drainage Management Manual (1997).
- Topographic survey (Tarasick McMillan Kubicki Limited, November 2022).
- Well Record Database, Ministry of the Environment, Conservation and Parks, accessed July 2023.

This report has been prepared to address the second submission comments received from the reviewing agencies and to support the third submission of the Zoning By-Law Amendment for the proposed mixed-use commercial development.

2.0 Site Description

The site encompasses an area of approximately 1.62 ha and currently consists 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 Richard Ziegler Architect Inc. dated February 10, 2026, the proposed mixed-use commercial development will consist of the following elements:

- A 1-storey convenience store (235 m^2).
- A 1-storey drive-thru restaurant (379 m^2).
- A car gas bar with 4 double sided pumps and fueling stations.
- A Truck gas bar with 6 pumps.
- 44 standard parking spaces (including 4 accessible parking spaces and 4 electric vehicle charging spaces) and 6 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) boreholes 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). In general, groundwater level elevations ranged from approximately 0.38 to 5.47 mbgs (321.43 to 325.87 masl) in Spring 2023 to 7.51 to 10.75 mgs (316.85 to 321.37 masl) in Winter 2025. A Hydrogeological Investigation Report was prepared by Crozier (February 2026) 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 install 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 Investigation Report (Crozier, February 2026) 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)
7.52	15.04	30.08

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 could produce 8 gallons per minute (GPM) or 30.3 liters per minute (L/min).

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 Investigation Report 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 Investigation Report (February 2026).

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 will be confirmed with the architect (Richard Ziegler Architect Inc.).

- 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** (m^2)	**Height** (m)	**Volume** (m^3)	**K**[1]	**S_{Total}**	**Minimum Water Flow Supply Flow Rate (L/min)**[1]	**Required Fire Storage Volume** (L)
E	235	6.0	1,410	17	1.0	2,700	81,000

[1]Minimum fire protection water supply shall not be less than what is needed to provide the minimum flow rate for a duration of 30 minutes.

As outlined in Table 2, a storage volume of 81,000 L is the required minimum fire storage volume, and it must be supplied at a rate of 2700 L/min 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	235	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	12	6,720
				Total Daily Design Sewage Flow:	21,660
				Design Sewage Flow:	**22,000**

[1]. Two (2) fuel outlets/nozzles per pump

As shown in Table 3, the total maximum day design sanitary sewage flow for the proposed development is 22,000 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 22,000 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 22,000 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 Investigation Report (Crozier, February 2026), 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 Investigation 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 22,000 L/day, a minimum stone area of 440 m^2 is required. The proposed stone area is 468 m^2, which will be equipped with four (4) cells of distribution piping. Each cell will be equipped with eight (8) runs of 12 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 m^2 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 22,000 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 338 m^2. An area of 468 m^2 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 Road West storm sewer network.

- A 300 mm diameter concrete storm sewer transitioning to a 375 mm diameter concrete storm 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 draining to Carroll Pond. Carroll 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 Carroll Pond were designed for the site under pre-development conditions and any development will require on-site controls. Excerpts from the Stormwater Management Report Carroll 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 a vegetated greenfield with treed and brush 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 tree and brush 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 tree and brush 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 draining to Carroll Pond.

Table 4 summarizes the pre-development catchment areas which were delineated based on the Stormwater Management Report - Carroll Pond Municipal Drain (Township of Puslinch, March 2007).

Table 4: Pre-Development Catchment Area Parameters

Catchment ID	Catchment Area (ha)	Land Use(s)	SCS Curve Number	Outlet
101	0.81	Treed and brush area	65 (CN)	Adjacent Western Lands
102	0.81	Treed and brush area	65 (CN)	McLean Road Sewer

Note: These CN Values have been converted to CN Values in Visual OTTHYMO model, which may lead to discrepancies.

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 (Richard Ziegler Architect Inc., February 10, 2026), the proposed development will consist of a one-storey convenience store, one-storey restaurant, car and truck gas bars, parking areas, site access from Brock Road South, and McLean Road West.

The proposed site grading divides the site into four (4) 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 northern 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 gas bars, convenience store and internal paved areas, landscaped areas, and will be collected and conveyed via the internal storm sewer network to the McLean Road West ditch which drains to the storm sewer within Mclean Road West. The emergency overland flow for this catchment is directed towards the McLean Road West right-of-way.

- Catchment 203 consists of uncontrolled drainage from the landscaped areas along the southern and 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 rights-of-way; ultimately draining towards Carroll Pond, consistent with existing conditions.

- Catchment 204 consists of drainage from the rooftop of the proposed restaurant building and is to be conveyed towards an infiltration gallery within the landscaped areas to the south of the building, to promote infiltration and water balance for the site.

Table 5 provides details of the catchment areas and percent imperviousness/SCS Curve Numbers for the post-development conditions.

Table 5: Post-Development Catchment Parameters

Catchment ID	Catchment Area (ha)	Land Use(s)	SCS Curve Number / Percent Impervious[1]	Outlet
201	0.23	Landscaped areas	69 (CN)	Neighbouring Western Lands
202	1.23	Proposed truck gas bar, convenience store, landscaped areas, and paved areas.	93%	McLean Road West ditch
203	0.08	Landscaped areas	69 (CN)	McLean Road West and Brock Road South right-of-ways
204	0.08	Proposed restaurant, landscaped areas.	60%	Infiltration Gallery

[1]SCS Curve Numbers (CN) are used for pervious catchments (NASHYD) and % impervious is for mainly impervious catchments (STANHYD)
Note: These CN Values have been converted to CN Values in Visual OTTHYMO model, which may lead to discrepancies.

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 8.0, stormwater quantity control requirements for the site should include on-site controls to control the post-development flows to the pre-development flows for storms up to and including the 100-year event (i.e. 2, 5, 10, 50, 100-year return period).

The Township of Puslinch Municipal Development Standards (September 2019) and the MTO Drainage Management Manual (1997) were referenced to determine the hydrologic parameters for the catchment areas within the site. The topographic survey prepared by Tarasick McMillan Kubicki Limited (November 3, 2022), was referenced to confirm the land cover and drainage patterns under the existing site conditions. The Geotechnical Report prepared by CMT (July 2023) was reviewed to determine the on-site soil conditions.

Based on the above, the hydrologic parameters for pre-development and post-development conditions were determined and are summarized in Tables 6 and Table 7 below. The detailed hydrologic parameter sheets for each catchment area are included in **Appendix E**.

Table 6: Pre-Development Hydrologic Parameters

Catchment Description	101	102
Drainage Area (ha)	0.81	0.81
Curve Number (CN)[1]	65	65
Time to peak (hrs)[2]	0.17	0.17

[1] These CN Values have been converted to CN* Values in Visual OTTHYMO model, which may lead to discrepancies.
[2] Time to peak used is a minimum of 10 minutes (0.17hrs)

Table 7: Post-Development Hydrologic Parameters

Catchment Description	201	202	203	204
Drainage Area (ha)	0.23	1.23	0.08	0.08
Total Imperviousness (%)	-	93	-	60
Directly Connected Imperviousness (%)	-	93	-	60
Curve Number (CN)[1]	69	-	69	-
Time to peak (hrs)[2]	0.17	-	0.17	-

[1] These CN Values have been converted to CN* Values in Visual OTTHYMO model, which may lead to discrepancies.
[2] Time to peak used is a minimum of 10 minutes (0.17hrs)

McLean Road West – Outlet

Visual OTTHYMO (VO) was used to create pre-development and post-development model scenarios for the hydrology of the existing and proposed site drainage based on the City of Guelph intensity-duration-frequency (IDF) data and hydrologic parameters outlined in Table 6 and 7. The pre-development and post-development stormwater flows directed to the McLean Road West sewer and the storage requirements are summarized below in Table 8. The VO model schematics, modelling results, and output files are included in **Appendix E**.

Table 8: Peak Flows and Target Flows Summary (Discharge Towards McLean Road Sewer)

Storm (Year)	**Pre-Dev. Peak Flow Rate[1]** (m^3/s)	**Post-Dev. Uncontrolled Peak Flow Rate[2]** (m^3/s)	**Post-Dev. Controlled Peak Flow Rate[2]** (m^3/s)	**Storage Volume Required** (m^3)	**Storage Volume Provided[3]** (m^3)
2	0.008	0.268	0.009	266	708
5	0.016	0.361	0.012	363	
10	0.023	0.420	0.013	434	
25	0.034	0.495	0.016	537	
50	0.043	0.548	0.017	611	
100	0.053	0.598	0.019	688	

Notes: 1. Includes runoff from Catchment 102.
2. Includes runoff from Catchment 203 and 204.
3. 708 m^3 of storage is available in the underground storage tank.

The Visual OTTHYMO results summarized in Table 8 indicate that water quantity controls are required to control the post-development peak flows to the pre-development flow rates for all storm events up to and including the 100-year event. A total storage volume of 688 m^3 will be required to provide quantity control for the 100-year storm event. An underground stormwater storage tank has been proposed to provide 708 m^3 of stormwater storage. Based on the orifice sizing calculations, a 100 mm orifice plate will be required. It is noted that the flows under the 2- year design storm increase slightly under post-development conditions, however this increase is considered negligible and will not impact the receiving storm sewer.

Storm Sewers have been sized to convey the 5-year design storm. Storm events exceeding the 5- year design storm will be conveyed overland towards the stormwater management tank and will be collected by the catchbasins which directly connect to the tank. The storm sewer design sheet and catchbasin inlet capacity calculation have been provided in **Appendix E,** and the storm sewer catchments are outlined in **Figure 3**.

Neighbouring Wheel King Trans Haul Inc. Site (7434 McLean Road West) - Outlet

The drainage from Catchment 201 consists of landscaped areas from the western and northern limits of the proposed development. Drainage from this catchment will be directed away from the site towards the neighbouring property surrounding the site. This runoff will drain uncontrolled, consistent with pre-development conditions.

Visual OTTHYMO (VO) was used to create pre-development and post-development model scenarios for the hydrology of the existing and proposed site drainage based on the City of Guelph intensity-duration-frequency (IDF) data and hydrologic parameters outlined in Table 6 and 7. The pre-development and post-development stormwater flows directed to the adjacent western lands are summarized below in Table 9. The VO model schematics, modelling results, and output files are included in **Appendix E**.

Table 9: Peak Flows and Target Flows Summary (Discharge Towards Adjacent Western Lands)

Storm Event (yr)	**Pre-Development 101** (m^3/s)	**Post-Development 201** (m^3/s)	**Difference** (m^3/s)
2	0.008	0.003	-(0.005)
5	0.016	0.006	-(0.010)
10	0.023	0.008	-(0.015)
25	0.034	0.012	-(0.022)
50	0.043	0.014	-(0.029)
100	0.053	0.017	-(0.036)

The Visual OTTHYMO results summarized in Table 9 indicate that water quantity controls are not required for Catchment 201 as post-development peak flow rates are less than the pre-development peak flow rates.

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 Catchments 202 will be provided using an online Jellyfish unit (to be sized at detailed design). An online Jellyfish unit is proposed downstream of the underground stormwater storage tank and will provide water quality before discharging to the McLean Road West ditch and storm sewer. The Jellyfish Filter has been verified through the ISO 14034 Environmental Management – Environmental Technology Verification (ETV) program and has proven to have a percent removal of 89% for TSS.

Refer to the Preliminary Site Servicing Plan (**Drawing C103**) for details on the Jellyfish layout and location.

Catchments 201, 203, and 204 will produce "clean runoff" from pervious landscaped areas and rooftop drainage. Therefore, quality controls have not been provided for these catchments.

8.3 Water Balance

Crozier completed a water balance as part of the Hydrogeological Investigation Report (submitted under separate cover) to determine the potential impact of the development on post-development infiltration. The water balance parameters were established based on the Kitchener/Waterloo climate normals (1991-2020), as well as the site-specific topography, soil type, and land cover infiltration factors. The results of the water balance indicate that there is an infiltration deficit of approximately 2042 m^3/yr or 126 mm/year due to an increase in impervious surfaces. The detailed water balance calculations can be referenced in Hydrogeological Investigation Report (Crozier, February 2026).

LID strategies have not been proposed for Catchment 202 as the major use of the proposed development will be a gas station and LID features could cause hydrocarbons to infiltrate into groundwater.

8.3.1 Mitigation

To promote post-development infiltration and mitigate this deficit, an infiltration gallery has been proposed to infiltrate all available rooftop drainage from Catchment 204. Table 10 below displays the mitigation volume by the infiltration gallery and the total infiltration volume available annually.

Table 10: Mitigation Volume Using LIDs

LID	**Contributing Area** (m^2)	**Available Infiltration Volume** (m^3/yr)	**Storage Required** (m^3)
Infiltration Gallery	757	266	16.6

There are approximately 40 events annually that produce runoff according to the MECP SWM Manual (2012). Given a storage capacity of 40% based on a void ratio of 0.4 and the available runoff volume to the infiltration gallery, the storage required by the infiltration gallery is 16.6 m^3. The proposed infiltration gallery has been sized to store 39 m^3 for stormwater quantity controls, therefore, the infiltration gallery will have sufficient capacity to infiltrate the available 266 m^3 of annually available infiltration volume.

Detailed calculations are provided in **Appendix E**.

This is a best effort approach to mitigate the infiltration deficit for the site. Should the Township require additional LID's to be implemented within the property to meet the infiltration deficit, the following LID opportunities will be assessed 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.

8.3.2 Regional Event (Hurricane Hazel)

The proposed stormwater management system is sized to convey up to the 100-year design event. Storm events larger than the 100-year design event will be conveyed overland and will bypass the proposed SWM Tank and outlet towards McLean Road, consistent with existing conditions. The emergency overland flow route is outlined on the Preliminary Site Grading Plan (**Drawing C102**). Ponding within the site has been limited to a maximum of 0.3m.

After drainage from the site sheets off the property, it will be conveyed along Brock Road South to Carroll Pond.

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.

Sediment Control Device in Catchbasins

A sediment control device will be installed in each new catchbasin as they are installed. This will provide sediment control by preventing silt and sediment from entering the stormwater system. They will also be installed in the existing catchbasins during construction to prevent sediment from entering the existing storm sewer.

Heavy-Duty Silt Fencing

Heavy-Duty Sediment Control Silt Fence will be installed along 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 requirements and standards. Our conclusions and recommendations include:

Proposed Water Services

- The domestic peak hourly water demand for the proposed development is 30.08 L/min. Water servicing will be provided via a private water supply well.
- A minimum storage volume of 81,000 L is required for fire storage, and it must be supplied at a rate of 2700 L/min 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 22,000 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 22,000 L/day.

Stormwater Management

- The site's drainage for the developable area will be split into four (4) catchments. Catchment 202 will be collected and conveyed to the McLean Road West drainage ditch. A proposed underground storage tank and Jellyfish filter will provide the required quantity and quality controls.

- Drainage from the rooftop of the proposed restaurant (Catchment 204) will be conveyed towards an infiltration gallery to promote infiltration and water balance. Catchments from undeveloped catchments (Catchment 201 and 203) will flow uncontrolled towards 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.

[redacted]

Cole Martin
Engineering Intern, Land Development

C.F. CROZIER & ASSOCIATES INC.

[redacted]

Jessica Doherty, P.Eng.
Project Manager, Land Development

C.F. CROZIER & ASSOCIATES INC.

[redacted]



Nick Constantin, P.Eng.
Senior Project Manager, Land Development

CM/cj

J:\2700\2792 - Daaz Inc\7289 - 7456 McLean Rd W & 197 Brock Rd S\Reports\Civil\2026.02.13 _(2792-7289) _FSSWMR _Final.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.

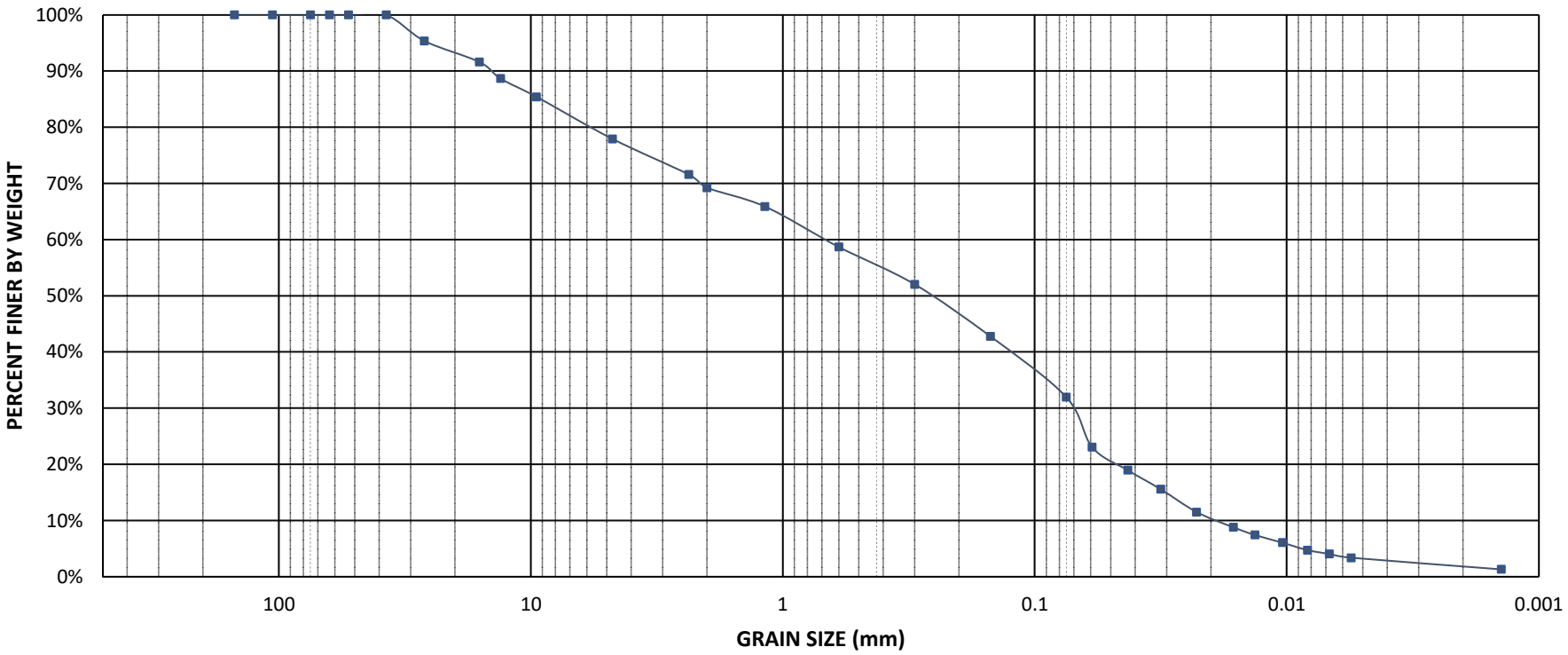
Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

[redacted]

Hugh Arthur
Laboratory Supervisor

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

Material Type:	**Silty Gravelly Sand, trace Clay**
Lab No.:	771
Sampled From:	TP3B (0.7 m - 1.3 m)
Sample No.:	1
Date Sampled:	-
Sampled By:	Client
Date Tested:	Wednesday, June 21, 2023

PROJECT INFORMATION

Project:	7456 Mclean Road
Location:	Puslinch, Ontario
Client:	Crozier Consulting Engineers
File No.:	M22543 (2377-6556)
Encl. No.:	1

APPENDIX B

Water Servicing Calculations

Project: 7456 McLean Road W & 197 Brock Road S

Project No.: 2792-7289

Created By: JD **Date:** 2023.08.22

Checked By: JD **Updated:** 2026.02.13

Domestic Water Demand - Ontario Building Code

Maximum Day Sewage Flow		21,660	L/day
Avg. Daily Demand =		10830	L/day
		7.52	**L/min**
Peaking Factors			
Max Day =		2.00	
Peak Hour =		4.00	
Average Day =		**7.52**	L/min
Max Day =		**15.04**	L/min
Peak Hour =		**30.08**	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	7.52	15.04	30.08

CROZIER CONSULTING ENGINEERS

Project: 7456 McLean Road W & 197 Brock Road S
Project NO.: 2792-7289
Date: 2026.02.13
Designed By: CM
Checked By: JB

Adequate Water Supply Calculations (OFM Version)
Part 3 Fire Protection, Occupant Safety and Accessibility of the Ontario Building Code

Building: E 235 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. (October 4, 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 = 1410 m³
S_{TOT} = 1.0

Exposure	Distance (m)	S_{side}
North	N/A	0.0
East	12.0	0.0
South	17.0	0.0
West	31.0	0.0

Q = 23,970 L

Minimum Water Flow Supply Flow Rate

Required minimum water supply flow rate (L/min) (reference 2.)

Floor area ≤ 600 m²: No
2700 L/min Required flow rate
0.5 hr Required duration

Q = 81,000 L

Conclusion

Therefore, the minimum water supply for proposed Building is **81,000 L**

APPENDIX C

Sanitary Servicing Calculations

ONSITE SEWAGE SYSTEM NON-RESIDENTIAL CALCULATION SHEET

CROZIER CONSULTING ENGINEERS

Project Name: 7456 McLean Rd & 197 Brock Rd S
Project Number: 2792-7289
Date: 2026-02-13
Designed By: JD
Checked By: KR

PRELIMINARY FLOW ESTIMATES

input required

Description	Area (m^2)	Unit	Unit Flow	Number of Units	Total Flow (L/day)	References/Notes
Convenience Store	235	per m^2 floor area, or	5	235	1,175	
	n/a	water closet	1230	2	2,460	
Restaurant, 24-hr	379	per seat	200	40	8,000	
Service Station						
Car Gas Bar	n/a	fuel outlet	560	8	4,480	Assume 2 nozzles per pump
Truck Gas Bar	n/a	fuel outlet, and	560	12	6,720	Assume 1 nozzle per pump
					21,660	

Design Sewage Flow: 22,000

Pre-Treatment Options

Required septic tank size = 66000 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

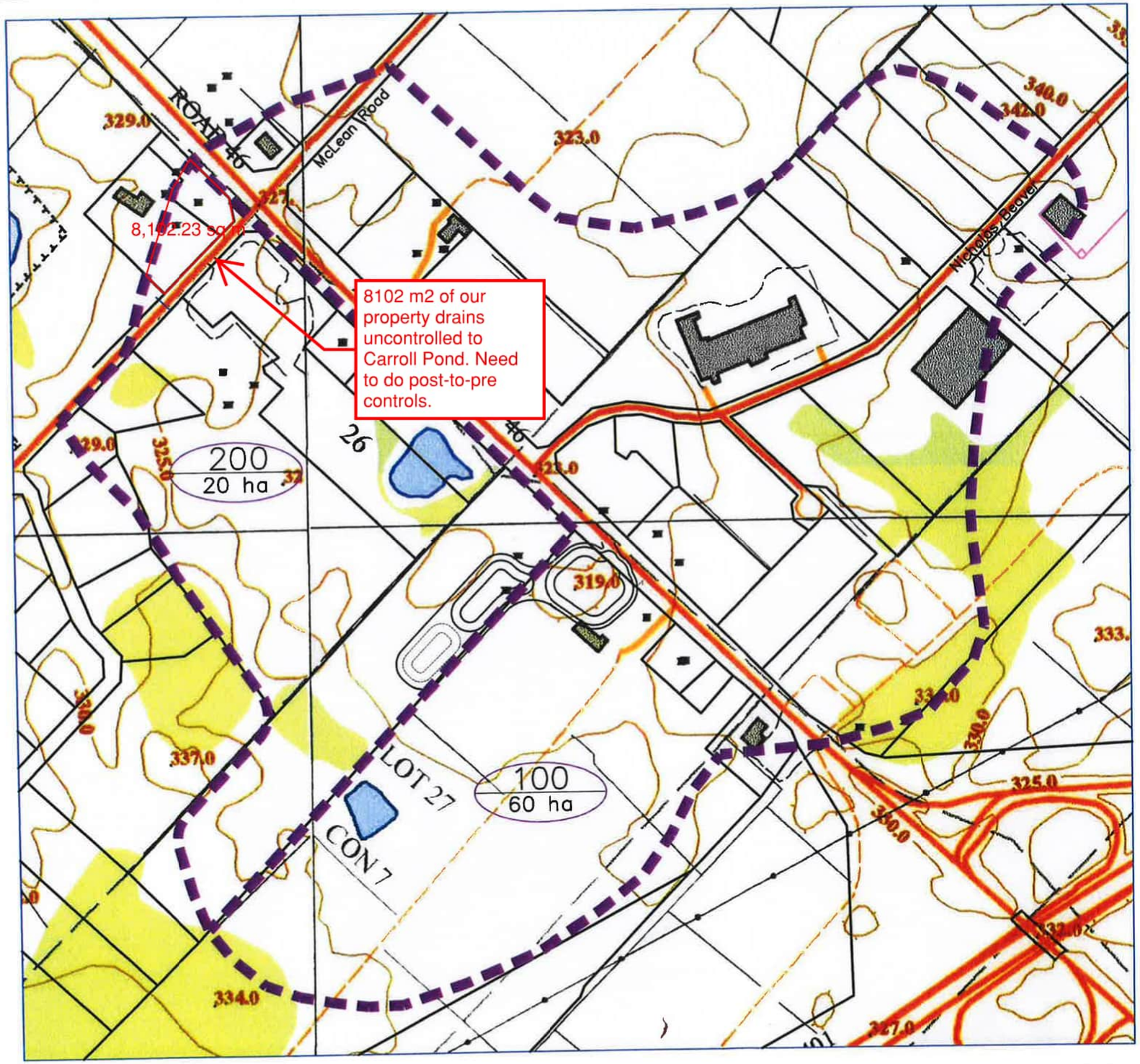
Stone area required = 440 m^2

Sand area required = 388 m^2

APPENDIX D

As-Constructed Drawings & Background Material

Carroll Pond Municipal Drain
Stormwater Management Report
Township of Puslinch



LEGEND

DRAINAGE CATCHMENT BOUNDARY

100 / 20.0 ha — CATCHMENT; APPROXIMATE DRAINAGE AREA

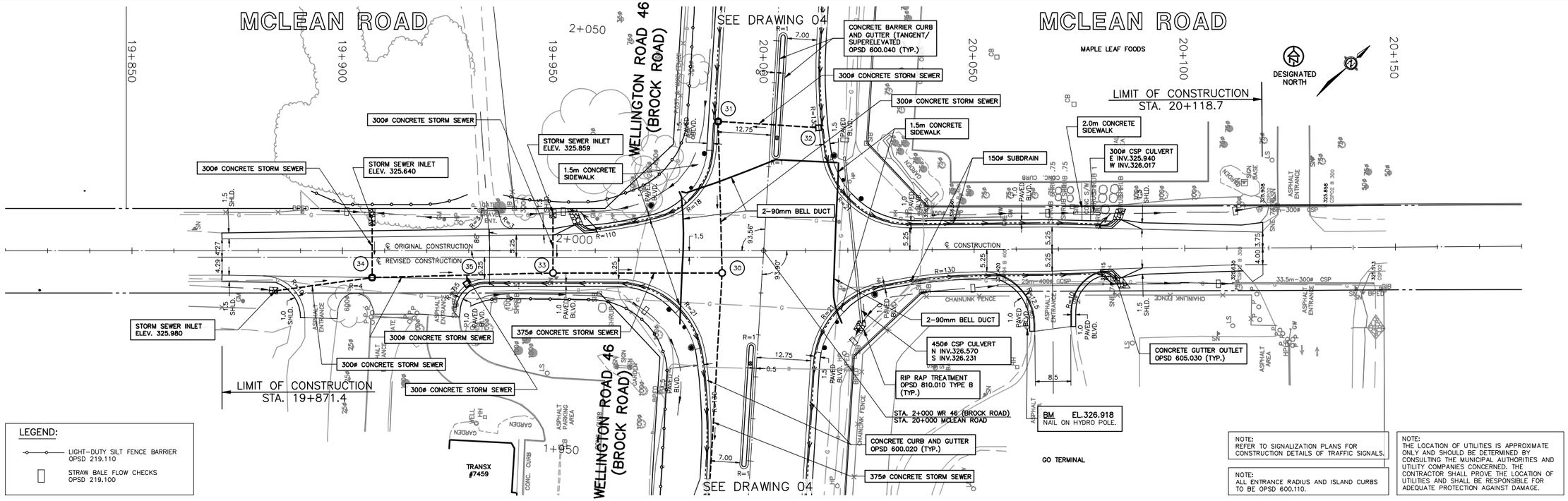
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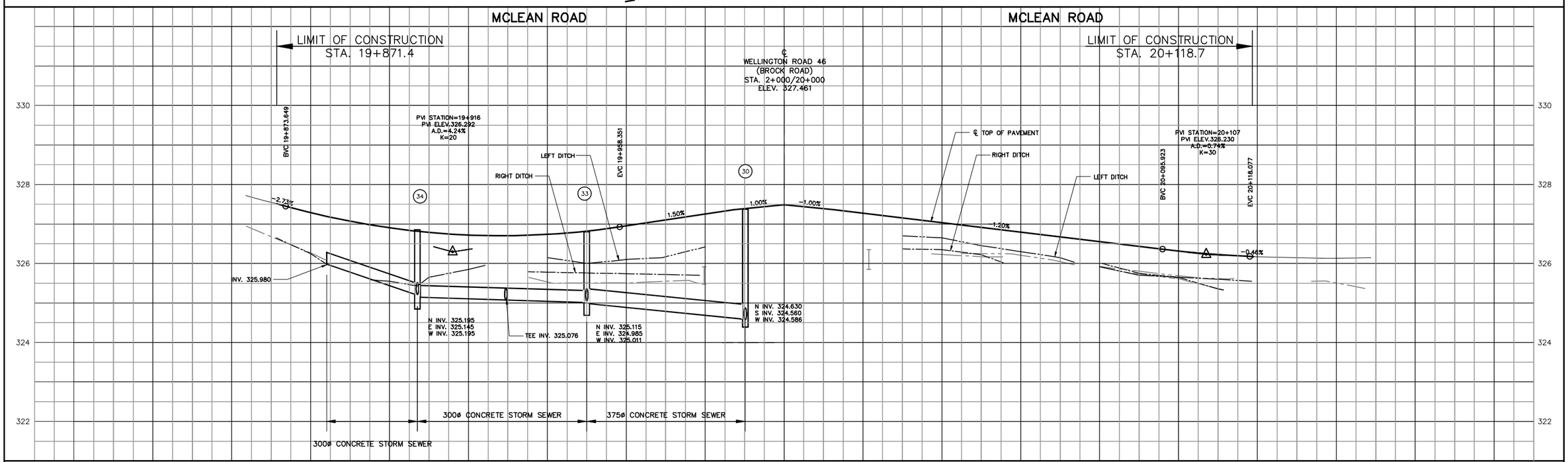
DRAINAGE CATCHMENTS

Figure No. 1

Gamsby and Mannerow ENGINEERS

Plotted On: MAR 22 2007 105026FIG-1.DWG





NOTES

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.

LICENCED PROFESSIONAL ENGINEER — H.W. WRAY — PROVINCE OF ONTARIO

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

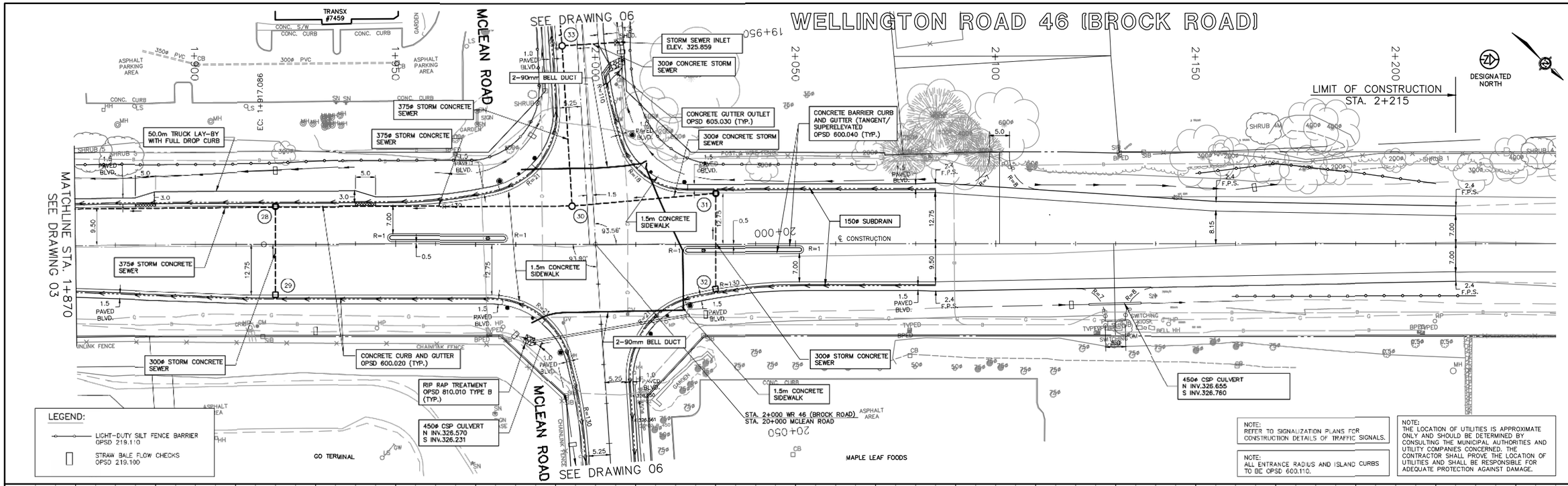
PROJECT No.	CW2015-039
TRITON FILE No.	M6386
DRAWN BY:	K.J.G.
CHECKED BY:	G.J.K.
APPROVED BY:	H.W.W.
DATE:	APRIL 2015

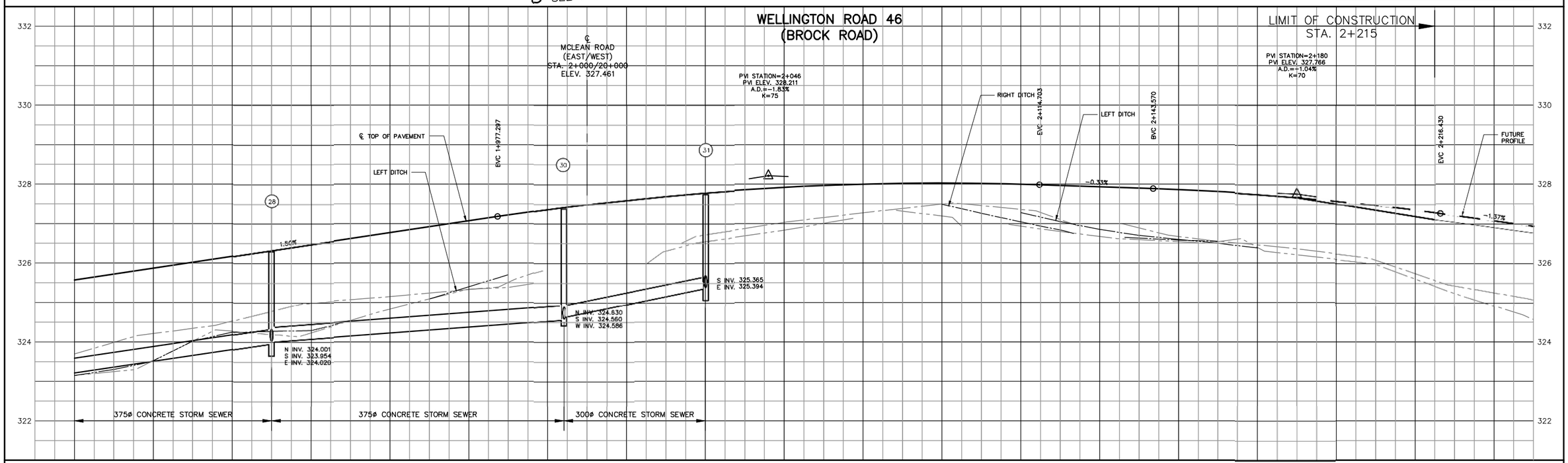
TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
HORIZONTAL 1:500
VERTICAL 1:50

DRAWING NUMBER **06**

WELLINGTON ROAD 46 (BROCK ROAD)





NOTES

No	DATE	REVISION	INITIAL
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.

LICENCED PROFESSIONAL ENGINEER — H.W. WRAY — PROVINCE OF ONTARIO

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

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
HORIZONTAL 1:500
VERTICAL 1:50

DRAWING NUMBER **04**

APPENDIX E

Stormwater Servicing Calculations

Project Name: 7456 McLean Road and 197 Brock Road South
Project Number: 2792-7289
Created By: MI
Reviewed By: CM

D.A. NAME 101
D.A. AREA (ha) 0.81

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 101

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Guelph Loam	GI	B	100	0.81
				0
				0
				0
Total Area				0.81

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		House		SWMF		Subtotals	
Soils	Area (ha)	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
GI											0.00	0.00
Subtotal Area												

Pervious Landuses Present:												
	Woodland		Meadow		Dirt Area		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
GI			0.81	65						85	0.81	52.65
Subtotal Area												

	Composite Area Calculations	Total Pervious Area	0.81
		Total Impervious Area	0.00
		% Impervious	0.00%
		Composite Curve Number	65.0
		Total Area Check	0.81

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
Landuse	IA (mm)	Area (ha)	A * IA	Guelph Loam		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.00	0.00		0		0		0		0	0.00
Meadow	8	0.81	6.48	0.30	1		0		0		0	0
Dirt Area	3	0.00	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	0.00	0		0		0		0		0	0
Impervious	2	0.00	0		0.00		0		0		0	0.00
Composite IA		0.81	8.00	Composite Runoff Coefficient								0.30

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	93.6	6.74	7.20%	2.3	0.62	0.04	0.03	0.03	0.06	0.04	0.22	0.15

Appropriate calculated time to peak:	0.17	Appropriate Method:	Airport

Project Name: 7456 McLean Road and 197 Brock Road South
Project Number: 2792-7289
Created By: MI
Reviewed By: CM

D.A. NAME 102
D.A. AREA (ha) 0.81

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 102

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Guelph Loam	GI	B	100	0.81
				0
				0
				0
Total Area				0.81

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		House		SWMF		Subtotals	
Soils	Area (ha)	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
GI											0.00	0.00
Subtotal Area												

Pervious Landuses Present:												
	Woodland		Meadow		Dirt Area		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
GI			0.81	65						85	0.81	52.65
Subtotal Area												

	Composite Area Calculations	Total Pervious Area	0.81
		Total Impervious Area	0.00
		% Impervious	0.00%
		Composite Curve Number	65.0
		Total Area Check	0.81

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
Landuse	IA (mm)	Area (ha)	A * IA	Guelph Loam		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.00	0.00		0		0		0		0	0.00
Meadow	8	0.81	6.48	0.25	1		0		0		0	0
Dirt Area	3	0.00	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	0.00	0		0		0		0		0	0
Impervious	2	0.00	0		0.00		0		0		0	0.00
Composite IA		0.81	8.00	Composite Runoff Coefficient								0.25

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	62.8	2.85	4.54%	2.3	0.49	0.04	0.02	0.02	0.05	0.03	0.22	0.15

Appropriate calculated time to peak:	0.17	Appropriate Method:	Airport

Project Name: 7456 McLean Road and 197 Brock Road South
Project Number: 2792-7289
Created By: MI
Reviewed By: CM

D.A. NAME 201
D.A. AREA (ha) 0.23

Hydrologic Parameters: CALIB NASHYD Command
Post Development Drainage Area: Catchment 201

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Guelph Loam	GI	B	100	0.23
				0
				0
				0
Total Area				0.23

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		House		SWMF		Subtotals	
Soils	Area (ha)	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
GI											0.00	0.00
Subtotal Area												

Pervious Landuses Present:												
	Woodland		Meadow		Dirt Area		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
GI							0.23	69			0.23	15.74
Subtotal Area												

	Composite Area Calculations	Total Pervious Area	0.23
		Total Impervious Area	0.00
		% Impervious	0.00%
		Composite Curve Number	69.0
		Total Area Check	0.23

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
Landuse	IA (mm)	Area (ha)	A * IA	Guelph Loam		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.00	0.00		0.00		0		0		0	0.00
Meadow	8	0.00	0		0.00		0		0		0	0
Dirt Area	3	0.00	0		0.00		0		0		0	0
Lawn	5	0.23	1.14	0.20	0.23		0		0		0	0
Cultivated	7	0.00	0		0.00		0		0		0	0
Impervious	2	0.00	0		0.00		0		0		0	0.00
Composite IA		0.23	5.00	Composite Runoff Coefficient								0.20

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	65.6	6.13	9.35%	2.3	0.70	0.03	0.02	0.02	0.05	0.03	0.19	0.13

Appropriate calculated time to peak:	0.17	Appropriate Method:	Airport

Project Name: 7456 McLean Road and 197 Brock Road South

Project Number: 2792-7289

Created By: MI

Reviewed By: CM

D.A. NAME 202

D.A. AREA (ha) 1.23

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 202

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Guelph Loam	GI	B	100	1.23
				0
				0
				0
Total Area Check				1.23

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		Channel		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
GI					1.10	98	0.04	98			1.14	112.06
Subtotal Area												

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
GI							0.09	69			0.09	5.97
Subtotal Area												

	Pervious Area Calculations	Total Pervious Area	0.09
		Composite Pervious Curve Number	69
	Impervious Area Calculations	Total Directly Connected Area	1.14
		Total Indirectly Connected Area	0.00
		Total Impervious Area	1.14
		% X imp	92.96
		% T imp	92.96
		Total Area Check	1.23

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	15	0	0
Lawn	5	0.09	0.43
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	9.40	24	0.25
Impervious	2.0	0.70	107	0.013

Project Name: 7456 McLean Road and 197 Brock Road South

Project Number: 2792-7289
Created By: MI
Reviewed By: CM

D.A. NAME 203

D.A. AREA (ha) 0.08

Hydrologic Parameters: CALIB NASHYD Command
Post Development Drainage Area: Catchment 203

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Guelph Loam	GI	B	100	0.08
				0
				0
				0
Total Area				0.08

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		House		SWMF		Subtotals	
Soils	Area (ha)	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
GI											0.00	0.00
Subtotal Area												

Pervious Landuses Present:												
	Woodland		Meadow		Dirt Area		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
GI							0.08	69			0.08	5.59
Subtotal Area												

	Composite Area Calculations	Total Pervious Area	0.08
		Total Impervious Area	0.00
		% Impervious	0.00%
		Composite Curve Number	69.0
		Total Area Check	0.08

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
Landuse	IA (mm)	Area (ha)	A * IA	Guelph Loam		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.00	0.00		0.00		0		0		0	0.00
Meadow	8	0.00	0		0.00		0		0		0	0
Dirt Area	3	0.00	0		0.00		0		0		0	0
Lawn	5	0.08	0.41	0.20	0.08		0		0		0	0
Cultivated	7	0.00	0		0.00		0		0		0	0
Impervious	2	0.00	0		0.00		0		0		0	0.00
Composite IA		0.08	5.00	Composite Runoff Coefficient								0.20

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	11.8	1.25	10.58%	2.3	0.75	0.00	0.00	0.00	0.01	0.01	0.08	0.05

Appropriate calculated time to peak:	0.17	Appropriate Method:	Airport

Project Name: 7456 McLean Road and 197 Brock Road South
Project Number: 2792-7289
Created By: MI
Reviewed By: CM

D.A. NAME **204**
D.A. AREA (ha) **0.08**

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 204

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Guelph Loam	GI	B	100	0.08
				0
				0
				0
Total Area Check				0.08

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		Channel		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha	CN	Area (ha	CN	Area (ha)	CN	Area	A*CN
GI							0.05	98			0.05	4.47
Subtotal Area												

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha	CN	Area (ha	CN	Area (ha)	CN	Area	A*CN
GI							0.03	69			0.03	2.08
Subtotal Area												

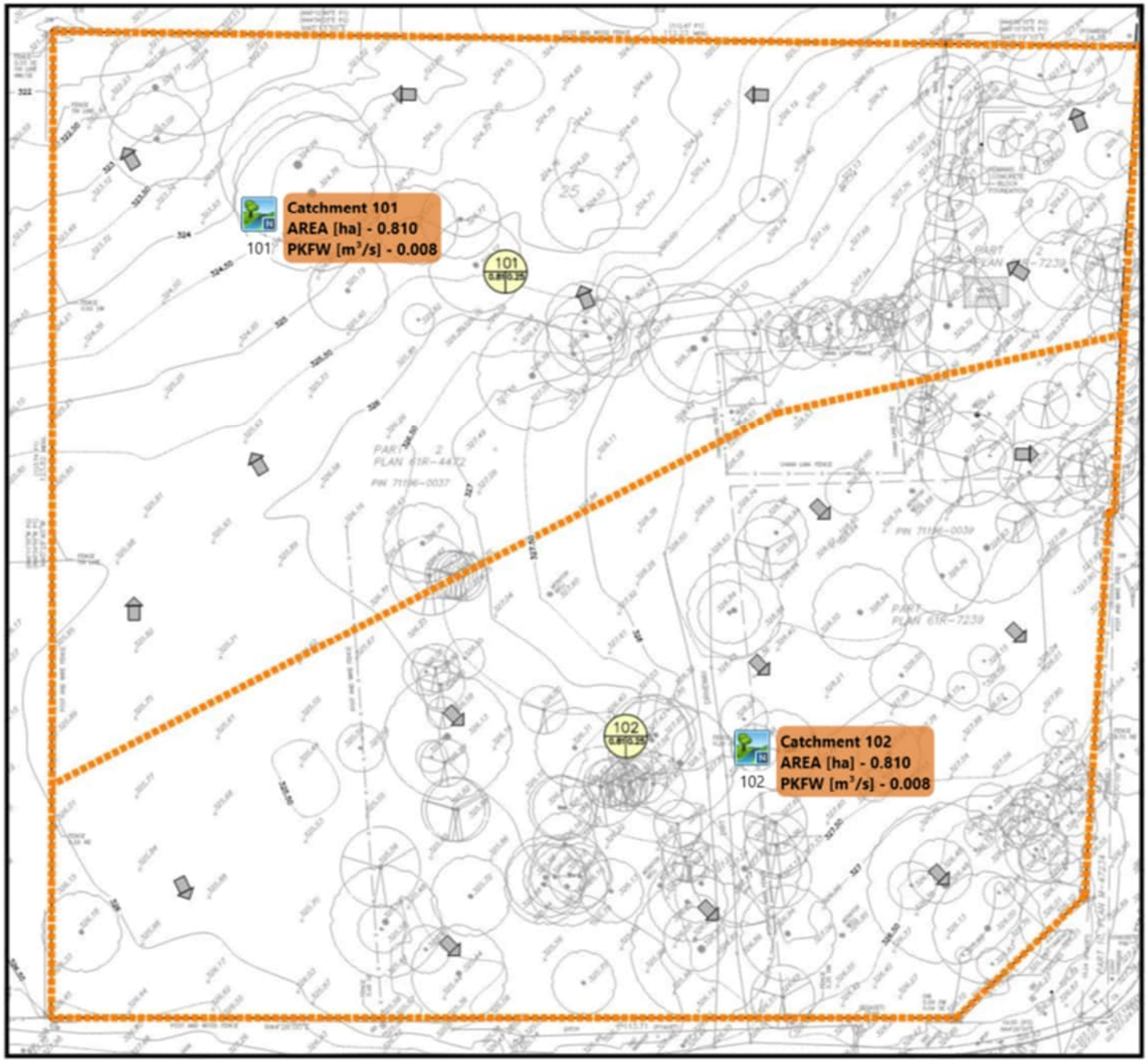
Pervious Area Calculations	Total Pervious Area	0.03
	Composite Pervious Curve Number	69
Impervious Area Calculations	Total Directly Connected Area	0.05
	Total Indirectly Connected Area	0.00
	Total Impervious Area	0.05
	% X imp	60.22
	% T imp	60.22
	Total Area Check	0.08

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	15	0	0
Lawn	5	0.03	0.15
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	-	-	-	0.25
Impervious	2.0	1.00	25	0.013

Pre-Development Visual-Otthymo Schematic



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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 02-12-2025                          TIME: 10:26:49

USER:


COMMENTS: _____________________________________________________


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  ************************************************
  ** SIMULATION : 100yr 3hr 10min Chicago       **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 953.290
| Ptotal= 71.21 mm |                          B=   0.000
--------------------                          C=   0.711
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    8.02 |  0.83  185.45 |  1.67   12.53 |  2.50    7.73
                0.17    9.47 |  1.00   37.49 |  1.83   11.04 |  2.67    7.23
                0.33   11.77 |  1.17   23.45 |  2.00    9.92 |  2.83    6.80
                0.50   16.19 |  1.33   17.80 |  2.17    9.04 |
                0.67   30.45 |  1.50   14.61 |  2.33    8.32 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area     (ha)=   0.81   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    8.02 | 0.833   30.45 | 1.583   14.61 |  2.33    9.04
               0.167    8.02 | 0.917  185.45 | 1.667   14.61 |  2.42    8.32
               0.250    9.47 | 1.000  185.45 | 1.750   12.53 |  2.50    8.32
               0.333    9.47 | 1.083   37.49 | 1.833   12.53 |  2.58    7.73
               0.417   11.77 | 1.167   37.49 | 1.917   11.04 |  2.67    7.73
               0.500   11.77 | 1.250   23.45 | 2.000   11.04 |  2.75    7.23
               0.583   16.19 | 1.333   23.45 | 2.083    9.92 |  2.83    7.23
               0.667   16.19 | 1.417   17.80 | 2.167    9.92 |  2.92    6.80
               0.750   30.45 | 1.500   17.80 | 2.250    9.04 |  3.00    6.80

    Unit Hyd Qpeak  (cms)=   0.182

    PEAK FLOW       (cms)=   0.053 (i)
    TIME TO PEAK    (hrs)=   1.083
    RUNOFF VOLUME    (mm)=  19.320
    TOTAL RAINFALL   (mm)=  71.214
    RUNOFF COEFFICIENT   =   0.271

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area     (ha)=   0.81   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    8.02 | 0.833   30.45 | 1.583   14.61 |  2.33    9.04
               0.167    8.02 | 0.917  185.45 | 1.667   14.61 |  2.42    8.32
               0.250    9.47 | 1.000  185.45 | 1.750   12.53 |  2.50    8.32
               0.333    9.47 | 1.083   37.49 | 1.833   12.53 |  2.58    7.73
               0.417   11.77 | 1.167   37.49 | 1.917   11.04 |  2.67    7.73
               0.500   11.77 | 1.250   23.45 | 2.000   11.04 |  2.75    7.23
               0.583   16.19 | 1.333   23.45 | 2.083    9.92 |  2.83    7.23
               0.667   16.19 | 1.417   17.80 | 2.167    9.92 |  2.92    6.80
               0.750   30.45 | 1.500   17.80 | 2.250    9.04 |  3.00    6.80

    Unit Hyd Qpeak  (cms)=   0.182

    PEAK FLOW       (cms)=   0.053 (i)
    TIME TO PEAK    (hrs)=   1.083
    RUNOFF VOLUME    (mm)=  19.320
    TOTAL RAINFALL   (mm)=  71.214
    RUNOFF COEFFICIENT   =   0.271

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 FINISH
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 02-12-2025                          TIME: 10:26:49

USER:


COMMENTS: _____________________________________________________


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  ************************************************
  ** SIMULATION : 10yr 3hr 10min Chicago        **
  ************************************************
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--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 721.920
| Ptotal= 47.37 mm |                          B=   0.000
--------------------                          C=   0.736
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.00    4.90 |  0.83  132.58 |  1.67    7.77 |  2.50    4.72
              0.17    5.82 |  1.00   24.19 |  1.83    6.82 |  2.67    4.40
              0.33    7.29 |  1.17   14.88 |  2.00    6.10 |  2.83    4.13
              0.50   10.14 |  1.33   11.18 |  2.17    5.54 |
              0.67   19.52 |  1.50    9.12 |  2.33    5.09 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area     (ha)=   0.81   Curve Number    (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                        ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.90 | 0.833   19.52 | 1.583    9.12 |  2.33    5.54
             0.167    4.90 | 0.917  132.58 | 1.667    9.12 |  2.42    5.09
             0.250    5.82 | 1.000  132.58 | 1.750    7.77 |  2.50    5.09
             0.333    5.82 | 1.083   24.19 | 1.833    7.77 |  2.58    4.72
             0.417    7.29 | 1.167   24.19 | 1.917    6.82 |  2.67    4.72
             0.500    7.29 | 1.250   14.88 | 2.000    6.82 |  2.75    4.40
             0.583   10.14 | 1.333   14.88 | 2.083    6.10 |  2.83    4.40
             0.667   10.14 | 1.417   11.18 | 2.167    6.10 |  2.92    4.13
             0.750   19.52 | 1.500   11.18 | 2.250    5.54 |  3.00    4.13

    Unit Hyd Qpeak  (cms)=   0.182

    PEAK FLOW       (cms)=   0.023 (i)
    TIME TO PEAK    (hrs)=   1.083
    RUNOFF VOLUME    (mm)=   8.473
    TOTAL RAINFALL   (mm)=  47.366
    RUNOFF COEFFICIENT   =   0.179

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area     (ha)=   0.81   Curve Number    (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                        ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.90 | 0.833   19.52 | 1.583    9.12 |  2.33    5.54
             0.167    4.90 | 0.917  132.58 | 1.667    9.12 |  2.42    5.09
             0.250    5.82 | 1.000  132.58 | 1.750    7.77 |  2.50    5.09
             0.333    5.82 | 1.083   24.19 | 1.833    7.77 |  2.58    4.72
             0.417    7.29 | 1.167   24.19 | 1.917    6.82 |  2.67    4.72
             0.500    7.29 | 1.250   14.88 | 2.000    6.82 |  2.75    4.40
             0.583   10.14 | 1.333   14.88 | 2.083    6.10 |  2.83    4.40
             0.667   10.14 | 1.417   11.18 | 2.167    6.10 |  2.92    4.13
             0.750   19.52 | 1.500   11.18 | 2.250    5.54 |  3.00    4.13

    Unit Hyd Qpeak  (cms)=   0.182

    PEAK FLOW       (cms)=   0.023 (i)
    TIME TO PEAK    (hrs)=   1.083
    RUNOFF VOLUME    (mm)=   8.473
    TOTAL RAINFALL   (mm)=  47.366
    RUNOFF COEFFICIENT   =   0.179

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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================================================================================================================================

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                 *****  D E T A I L E D   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\vO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\44ae6dcf-27
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\44ae6dcf-27

DATE: 02-12-2025                          TIME: 10:26:49

USER:


COMMENTS: _____________________________________________________________

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  ************************************************
  ** SIMULATION : 25yr 3hr 10min Chicago        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 822.740
| Ptotal= 57.15 mm |                          B=   0.000
--------------------                          C=   0.725
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.00    6.14 |  0.83  154.98 |  1.67    9.68 |  2.50    5.92
              0.17    7.28 |  1.00   29.61 |  1.83    8.51 |  2.67    5.53
              0.33    9.09 |  1.17   18.34 |  2.00    7.63 |  2.83    5.19
              0.50   12.58 |  1.33   13.85 |  2.17    6.94 |
              0.67   23.97 |  1.50   11.32 |  2.33    6.38 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area     (ha)=   0.81   Curve Number    (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                        ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    6.14 | 0.833   23.97 | 1.583   11.32 |  2.33    6.94
             0.167    6.14 | 0.917  154.98 | 1.667   11.32 |  2.42    6.38
             0.250    7.28 | 1.000  154.98 | 1.750    9.68 |  2.50    6.38
             0.333    7.28 | 1.083   29.61 | 1.833    9.68 |  2.58    5.92
             0.417    9.09 | 1.167   29.61 | 1.917    8.51 |  2.67    5.92
             0.500    9.09 | 1.250   18.34 | 2.000    8.51 |  2.75    5.53
             0.583   12.58 | 1.333   18.34 | 2.083    7.63 |  2.83    5.53
             0.667   12.58 | 1.417   13.85 | 2.167    7.63 |  2.92    5.19
             0.750   23.97 | 1.500   13.85 | 2.250    6.94 |  3.00    5.19

    Unit Hyd Qpeak  (cms)=   0.182
```

```
     PEAK FLOW       (cms)=   0.034 (i)
     TIME TO PEAK    (hrs)=   1.083
     RUNOFF VOLUME    (mm)=  12.536
     TOTAL RAINFALL   (mm)=  57.153
     RUNOFF COEFFICIENT   =   0.219

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area     (ha)=   0.81   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.14 | 0.833   23.97 | 1.583   11.32 |  2.33    6.94
               0.167    6.14 | 0.917  154.98 | 1.667   11.32 |  2.42    6.38
               0.250    7.28 | 1.000  154.98 | 1.750    9.68 |  2.50    6.38
               0.333    7.28 | 1.083   29.61 | 1.833    9.68 |  2.58    5.92
               0.417    9.09 | 1.167   29.61 | 1.917    8.51 |  2.67    5.92
               0.500    9.09 | 1.250   18.34 | 2.000    8.51 |  2.75    5.53
               0.583   12.58 | 1.333   18.34 | 2.083    7.63 |  2.83    5.53
               0.667   12.58 | 1.417   13.85 | 2.167    7.63 |  2.92    5.19
               0.750   23.97 | 1.500   13.85 | 2.250    6.94 |  3.00    5.19

     Unit Hyd Qpeak  (cms)=   0.182

     PEAK FLOW       (cms)=   0.034 (i)
     TIME TO PEAK    (hrs)=   1.083
     RUNOFF VOLUME    (mm)=  12.536
     TOTAL RAINFALL   (mm)=  57.153
     RUNOFF COEFFICIENT   =   0.219

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\a4f56e50-9a
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\a4f56e50-9a


DATE: 02-12-2025                          TIME: 10:26:49

USER:


COMMENTS: _____


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  ************************************************
  ** SIMULATION : 2yr 3hr 10min Chicago         **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 475.610
| Ptotal= 30.88 mm |                          B=   0.000
--------------------                          C=   0.738
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  3.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00     3.17 |  0.83   86.95 |  1.67    5.04 |  2.50    3.05
               0.17     3.77 |  1.00   15.73 |  1.83    4.42 |  2.67    2.85
               0.33     4.72 |  1.17    9.66 |  2.00    3.95 |  2.83    2.67
               0.50     6.58 |  1.33    7.25 |  2.17    3.59 |
               0.67    12.69 |  1.50    5.91 |  2.33    3.30 |

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area     (ha)=   0.81   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.17 | 0.833   12.69 | 1.583    5.91 |  2.33    3.59
               0.167    3.17 | 0.917   86.95 | 1.667    5.91 |  2.42    3.30
               0.250    3.77 | 1.000   86.95 | 1.750    5.04 |  2.50    3.30
               0.333    3.77 | 1.083   15.73 | 1.833    5.04 |  2.58    3.05
               0.417    4.72 | 1.167   15.73 | 1.917    4.42 |  2.67    3.05
               0.500    4.72 | 1.250    9.66 | 2.000    4.42 |  2.75    2.85
               0.583    6.58 | 1.333    9.66 | 2.083    3.95 |  2.83    2.85
               0.667    6.58 | 1.417    7.25 | 2.167    3.95 |  2.92    2.67
               0.750   12.69 | 1.500    7.25 | 2.250    3.59 |  3.00    2.67

     Unit Hyd Qpeak  (cms)=   0.182

     PEAK FLOW       (cms)=   0.008 (i)
     TIME TO PEAK    (hrs)=   1.167
     RUNOFF VOLUME    (mm)=   3.147
     TOTAL RAINFALL   (mm)=  30.883
     RUNOFF COEFFICIENT   =   0.102

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area     (ha)=   0.81   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.17 | 0.833   12.69 | 1.583    5.91 |  2.33    3.59
               0.167    3.17 | 0.917   86.95 | 1.667    5.91 |  2.42    3.30
               0.250    3.77 | 1.000   86.95 | 1.750    5.04 |  2.50    3.30
               0.333    3.77 | 1.083   15.73 | 1.833    5.04 |  2.58    3.05
               0.417    4.72 | 1.167   15.73 | 1.917    4.42 |  2.67    3.05
               0.500    4.72 | 1.250    9.66 | 2.000    4.42 |  2.75    2.85
               0.583    6.58 | 1.333    9.66 | 2.083    3.95 |  2.83    2.85
               0.667    6.58 | 1.417    7.25 | 2.167    3.95 |  2.92    2.67
               0.750   12.69 | 1.500    7.25 | 2.250    3.59 |  3.00    2.67

     Unit Hyd Qpeak  (cms)=   0.182

     PEAK FLOW       (cms)=   0.008 (i)
     TIME TO PEAK    (hrs)=   1.167
     RUNOFF VOLUME    (mm)=   3.147
     TOTAL RAINFALL   (mm)=  30.883
     RUNOFF COEFFICIENT   =   0.102

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
```

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\27116e56-a8
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\27116e56-a8

DATE: 02-12-2025                          TIME: 10:26:49

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 50yr 3hr 10min Chicago        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 893.800
| Ptotal= 64.05 mm |                          B=   0.000
--------------------                          C=   0.719
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    7.02 |  0.83  170.70 |  1.67   11.03 |  2.50    6.77
                 0.17    8.31 |  1.00   33.42 |  1.83    9.71 |  2.67    6.33
                 0.33   10.36 |  1.17   20.79 |  2.00    8.71 |  2.83    5.95
                 0.50   14.30 |  1.33   15.73 |  2.17    7.93 |
                 0.67   27.09 |  1.50   12.89 |  2.33    7.29 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0101)|   Area     (ha)=   0.81   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    7.02 | 0.833   27.09 | 1.583   12.89 |  2.33    7.93
                0.167    7.02 | 0.917  170.70 | 1.667   12.89 |  2.42    7.29
                0.250    8.31 | 1.000  170.70 | 1.750   11.03 |  2.50    7.29
                0.333    8.31 | 1.083   33.42 | 1.833   11.03 |  2.58    6.77
                0.417   10.36 | 1.167   33.42 | 1.917    9.71 |  2.67    6.77
                0.500   10.36 | 1.250   20.79 | 2.000    9.71 |  2.75    6.33
                0.583   14.30 | 1.333   20.79 | 2.083    8.71 |  2.83    6.33
                0.667   14.30 | 1.417   15.73 | 2.167    8.71 |  2.92    5.95
                0.750   27.09 | 1.500   15.73 | 2.250    7.93 |  3.00    5.95

    Unit Hyd Qpeak  (cms)=   0.182

    PEAK FLOW       (cms)=   0.043 (i)
    TIME TO PEAK    (hrs)=   1.083
    RUNOFF VOLUME    (mm)=  15.738
    TOTAL RAINFALL   (mm)=  64.054
    RUNOFF COEFFICIENT   =   0.246

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0102)|   Area     (ha)=   0.81   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    7.02 | 0.833   27.09 | 1.583   12.89 |  2.33    7.93
                0.167    7.02 | 0.917  170.70 | 1.667   12.89 |  2.42    7.29
                0.250    8.31 | 1.000  170.70 | 1.750   11.03 |  2.50    7.29
                0.333    8.31 | 1.083   33.42 | 1.833   11.03 |  2.58    6.77
                0.417   10.36 | 1.167   33.42 | 1.917    9.71 |  2.67    6.77
                0.500   10.36 | 1.250   20.79 | 2.000    9.71 |  2.75    6.33
                0.583   14.30 | 1.333   20.79 | 2.083    8.71 |  2.83    6.33
                0.667   14.30 | 1.417   15.73 | 2.167    8.71 |  2.92    5.95
                0.750   27.09 | 1.500   15.73 | 2.250    7.93 |  3.00    5.95

    Unit Hyd Qpeak  (cms)=   0.182

    PEAK FLOW       (cms)=   0.043 (i)
    TIME TO PEAK    (hrs)=   1.083
    RUNOFF VOLUME    (mm)=  15.738
    TOTAL RAINFALL   (mm)=  64.054
    RUNOFF COEFFICIENT   =   0.246

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\aceb4de6-44
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\aceb4de6-44

DATE: 02-12-2025                          TIME: 10:26:49

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 5yr 3hr 10min Chicago         **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 632.750
| Ptotal= 40.45 mm |                          B=   0.000
--------------------                          C=   0.741
```

used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	4.11	0.83	114.88	1.67	6.54	2.50	3.95
0.17	4.88	1.00	20.52	1.83	5.73	2.67	3.69
0.33	6.13	1.17	12.57	2.00	5.13	2.83	3.46
0.50	8.55	1.33	9.43	2.17	4.65		
0.67	16.54	1.50	7.68	2.33	4.27		

CALIB					
NASHYD (0101)	Area (ha)=	0.81	Curve Number (CN)=	64.0	
ID= 1 DT= 5.0 min	Ia (mm)=	8.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.17			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	4.11	0.833	16.54	1.583	7.68	2.33	4.65
0.167	4.11	0.917	114.88	1.667	7.68	2.42	4.27
0.250	4.88	1.000	114.88	1.750	6.54	2.50	4.27
0.333	4.88	1.083	20.52	1.833	6.54	2.58	3.95
0.417	6.13	1.167	20.52	1.917	5.73	2.67	3.95
0.500	6.13	1.250	12.57	2.000	5.73	2.75	3.69
0.583	8.55	1.333	12.57	2.083	5.13	2.83	3.69
0.667	8.55	1.417	9.43	2.167	5.13	2.92	3.46
0.750	16.54	1.500	9.43	2.250	4.65	3.00	3.46

Unit Hyd Qpeak (cms)= 0.182

PEAK FLOW (cms)= 0.016 (i)
TIME TO PEAK (hrs)= 1.167
RUNOFF VOLUME (mm)= 5.985
TOTAL RAINFALL (mm)= 40.451
RUNOFF COEFFICIENT = 0.148

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0102)	Area (ha)=	0.81	Curve Number (CN)=	64.0	
ID= 1 DT= 5.0 min	Ia (mm)=	8.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.17			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

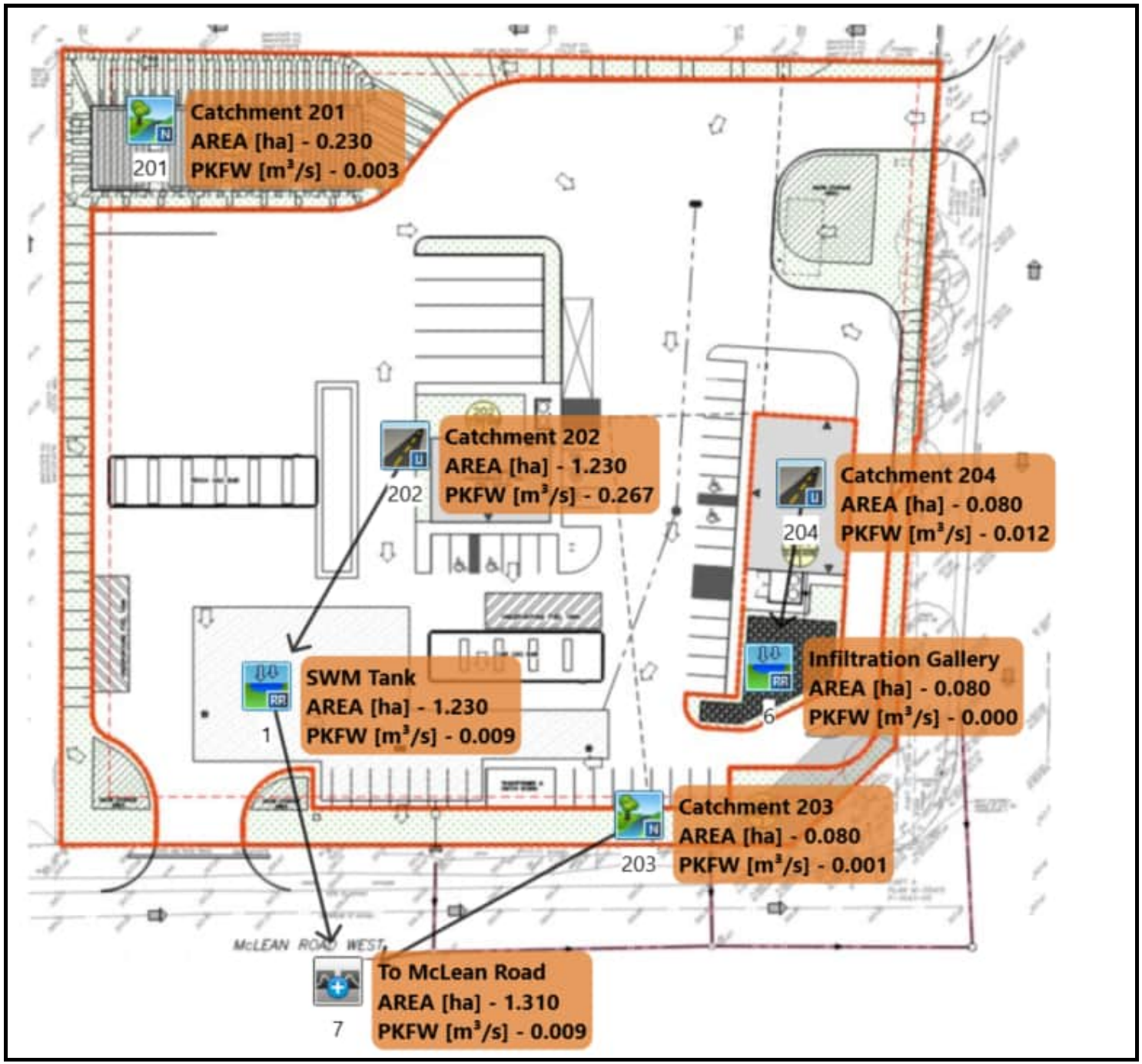
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	4.11	0.833	16.54	1.583	7.68	2.33	4.65
0.167	4.11	0.917	114.88	1.667	7.68	2.42	4.27
0.250	4.88	1.000	114.88	1.750	6.54	2.50	4.27
0.333	4.88	1.083	20.52	1.833	6.54	2.58	3.95
0.417	6.13	1.167	20.52	1.917	5.73	2.67	3.95
0.500	6.13	1.250	12.57	2.000	5.73	2.75	3.69
0.583	8.55	1.333	12.57	2.083	5.13	2.83	3.69
0.667	8.55	1.417	9.43	2.167	5.13	2.92	3.46
0.750	16.54	1.500	9.43	2.250	4.65	3.00	3.46

Unit Hyd Qpeak (cms)= 0.182

PEAK FLOW (cms)= 0.016 (i)
TIME TO PEAK (hrs)= 1.167
RUNOFF VOLUME (mm)= 5.985
TOTAL RAINFALL (mm)= 40.451
RUNOFF COEFFICIENT = 0.148

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

Post-Development Visual-Otthymo Schematic



```
================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\1e74defe-ce
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\1e74defe-ce


DATE: 02-11-2026                          TIME: 11:21:13

USER:


COMMENTS: _____________________________________________________


----------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 100yr 3hr 10min Chicago       **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 953.290
| Ptotal= 71.21 mm |                          B=   0.000
--------------------                          C=   0.711
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    8.02 |  0.83  185.45 |  1.67   12.53 |  2.50    7.73
                0.17    9.47 |  1.00   37.49 |  1.83   11.04 |  2.67    7.23
                0.33   11.77 |  1.17   23.45 |  2.00    9.92 |  2.83    6.80
                0.50   16.19 |  1.33   17.80 |  2.17    9.04 |
                0.67   30.45 |  1.50   14.61 |  2.33    8.32 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0201)|   Area     (ha)=   0.23   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.052

     PEAK FLOW       (cms)=   0.017 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=  21.223
     TOTAL RAINFALL   (mm)=  71.214
     RUNOFF COEFFICIENT   =   0.298

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=   0.08
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.22   Dir. Conn.(%)=  60.22
--------------------

                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.05          0.03
     Dep. Storage     (mm)=       2.00          5.00

     Average Slope     (%)=       1.00          2.00
     Length            (m)=      25.00         45.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     185.45         26.26
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       0.87 (ii)    13.80 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.17          0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02          0.00          0.026 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.17           1.00
     RUNOFF VOLUME    (mm)=      69.21         18.06          48.79
     TOTAL RAINFALL   (mm)=      71.21         71.21          71.21
     RUNOFF COEFFICIENT   =       0.97          0.25           0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0000      0.0002

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0204)      0.080     0.026      1.00      48.79
   OUTFLOW: ID= 1 (  0006)      0.080     0.000      3.17      20.85

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.60
                  TIME SHIFT OF PEAK FLOW          (min)=130.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0036

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0203)|   Area     (ha)=   0.08   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.018

     PEAK FLOW       (cms)=   0.006 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=  21.218
     TOTAL RAINFALL   (mm)=  71.214
     RUNOFF COEFFICIENT   =   0.298

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0202)|   Area     (ha)=   1.23
|ID= 1 DT=10.0 min |   Total Imp(%)=  92.96   Dir. Conn.(%)=  92.96
--------------------

                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.14          0.09
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       0.70          9.40
     Length            (m)=     107.00         24.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     185.45         50.12
               over (min)        10.00         10.00
     Storage Coeff.  (min)=       2.31 (ii)     6.62 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.17          0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.58          0.01          0.592 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.00           1.00
     RUNOFF VOLUME    (mm)=      69.21         22.25          65.90
     TOTAL RAINFALL   (mm)=      71.21         71.21          71.21
     RUNOFF COEFFICIENT   =       0.97          0.31           0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0132     0.0472
                          0.0050     0.0118   |   0.0149     0.0590
                          0.0086     0.0236   |   0.0165     0.0708
                          0.0111     0.0354   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     1.230     0.592      1.00      65.90
   OUTFLOW: ID= 1 (  0001)     1.230     0.016      3.08      65.42

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.74
                  TIME SHIFT OF PEAK FLOW         (min)=125.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0688

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     1.23   0.016     3.08    65.42
     + ID2= 2 (  0203):     0.08   0.006     1.00    21.22
       ================================================
       ID = 3 (  0007):     1.31   0.019     1.17    62.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\8c133243-de
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\8c133243-de


DATE: 02-11-2026                          TIME: 11:21:14

USER:


COMMENTS: _____________________________________________________


--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 10yr 3hr 10min Chicago        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 721.920
| Ptotal= 47.37 mm |                          B=   0.000
--------------------                          C=   0.736
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  3.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.00    4.90 |  0.83  132.58 |  1.67    7.77 |  2.50    4.72
                  0.17    5.82 |  1.00   24.19 |  1.83    6.82 |  2.67    4.40
                  0.33    7.29 |  1.17   14.88 |  2.00    6.10 |  2.83    4.13
                  0.50   10.14 |  1.33   11.18 |  2.17    5.54 |
                  0.67   19.52 |  1.50    9.12 |  2.33    5.09 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0201)|   Area    (ha)=   0.23   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.052

     PEAK FLOW       (cms)=   0.008 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=   9.882
     TOTAL RAINFALL   (mm)=  47.366
     RUNOFF COEFFICIENT   =   0.209

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   0.08
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.22   Dir. Conn.(%)=  60.22
--------------------

                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.05          0.03
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      25.00         45.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     132.58         12.19
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       0.99 (ii)   18.57 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.17          0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02          0.00          0.018 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.17           1.00
     RUNOFF VOLUME    (mm)=      45.37          8.20          30.46
     TOTAL RAINFALL   (mm)=      47.37         47.37          47.37
     RUNOFF COEFFICIENT   =       0.96          0.17           0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0000     0.0002

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0204)     0.080     0.018      1.00      30.46
   OUTFLOW: ID= 1 (  0006)     0.080     0.000      3.17       2.55

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.42
                  TIME SHIFT OF PEAK FLOW         (min)=130.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0023

--------------------------------------------------------------------------------
--------------------
| CALIB            |
```

```
| NASHYD   (  0203)|   Area    (ha)=   0.08   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.018

     PEAK FLOW       (cms)=   0.003 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=   9.882
     TOTAL RAINFALL   (mm)=  47.366
     RUNOFF COEFFICIENT   =   0.209

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   1.23
|ID= 1 DT=10.0 min |   Total Imp(%)=  92.96   Dir. Conn.(%)=  92.96
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.14         0.09
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      0.70         9.40
     Length            (m)=    107.00        24.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    132.58        23.75
               over (min)      10.00        10.00
     Storage Coeff.  (min)=     2.65 (ii)    8.45 (ii)
     Unit Hyd. Tpeak (min)=     10.00        10.00
     Unit Hyd. peak  (cms)=      0.17         0.12
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.41         0.00         0.417 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.00          1.00
     RUNOFF VOLUME    (mm)=     45.37        10.36         42.90
     TOTAL RAINFALL   (mm)=     47.37        47.37         47.37
     RUNOFF COEFFICIENT   =      0.96         0.22          0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0132     0.0472
                          0.0050     0.0118   |   0.0149     0.0590
                          0.0086     0.0236   |   0.0165     0.0708
                          0.0111     0.0354   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     1.230     0.417      1.00      42.90
   OUTFLOW: ID= 1 (  0001)     1.230     0.013      3.00      42.41

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.00
                  TIME SHIFT OF PEAK FLOW         (min)=120.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0434

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     1.23   0.013     3.00    42.41
     + ID2= 2 (  0203):     0.08   0.003     1.00     9.88
       ================================================
       ID = 3 (  0007):     1.31   0.013     1.17    40.42

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\466ceea3-29
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\466ceea3-29

DATE: 02-11-2026                          TIME: 11:21:14

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 25yr 3hr 10min Chicago        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 822.740
| Ptotal= 57.15 mm |                          B=   0.000
--------------------                          C=   0.725
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    6.14 |  0.83  154.98 |  1.67    9.68 |  2.50    5.92
               0.17    7.28 |  1.00   29.61 |  1.83    8.51 |  2.67    5.53
               0.33    9.09 |  1.17   18.34 |  2.00    7.63 |  2.83    5.19
               0.50   12.58 |  1.33   13.85 |  2.17    6.94 |
               0.67   23.97 |  1.50   11.32 |  2.33    6.38 |

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0201)|   Area    (ha)=   0.23   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.052

     PEAK FLOW       (cms)=   0.012 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=  14.178
     TOTAL RAINFALL   (mm)=  57.153
     RUNOFF COEFFICIENT   =   0.248

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   0.08
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.22   Dir. Conn.(%)=  60.22
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.05         0.03
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     25.00        45.00
     Mannings n           =     0.013        0.250
```

```
     Max.Eff.Inten.(mm/hr)=     154.98        17.54
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       0.93 (ii)   16.13 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.021 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.17           1.00
     RUNOFF VOLUME    (mm)=      55.15        11.90          37.80
     TOTAL RAINFALL   (mm)=      57.15        57.15          57.15
     RUNOFF COEFFICIENT   =       0.97         0.21           0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0000     0.0002

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0204)      0.080     0.021      1.00      37.80
   OUTFLOW: ID= 1 (  0006)      0.080     0.000      3.17       9.86

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.50
                  TIME SHIFT OF PEAK FLOW         (min)=130.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0028

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0203)|   Area    (ha)=   0.08   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.018

     PEAK FLOW       (cms)=   0.004 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=  14.175
     TOTAL RAINFALL   (mm)=  57.153
     RUNOFF COEFFICIENT   =   0.248

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   1.23
|ID= 1 DT=10.0 min |   Total Imp(%)=  92.96   Dir. Conn.(%)=  92.96
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.14         0.09
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       0.70         9.40
     Length            (m)=     107.00        24.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     154.98        33.91
               over (min)        10.00        10.00
     Storage Coeff.  (min)=       2.49 (ii)    7.52 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.48         0.01          0.491 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      55.15        14.86          52.31
     TOTAL RAINFALL   (mm)=      57.15        57.15          57.15
     RUNOFF COEFFICIENT   =       0.97         0.26           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0132     0.0472
                          0.0050     0.0118   |   0.0149     0.0590
                          0.0086     0.0236   |   0.0165     0.0708
                          0.0111     0.0354   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)      1.230     0.491      1.00      52.31
   OUTFLOW: ID= 1 (  0001)      1.230     0.014      3.00      51.83

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.88
                  TIME SHIFT OF PEAK FLOW         (min)=120.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0537

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):      1.23   0.014     3.00    51.83
     + ID2= 2 (  0203):      0.08   0.004     1.00    14.17
       ================================================
       ID = 3 (  0007):      1.31   0.016     1.17    49.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\2e7c3b1a-16
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\2e7c3b1a-16

DATE: 02-11-2026                          TIME: 11:21:13

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 2yr 3hr 10min Chicago         **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 475.610
| Ptotal= 30.88 mm |                          B=   0.000
--------------------                          C=   0.738
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33
```

```
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                0.00     3.17 |  0.83    86.95 |  1.67     5.04 |  2.50     3.05
                0.17     3.77 |  1.00    15.73 |  1.83     4.42 |  2.67     2.85
                0.33     4.72 |  1.17     9.66 |  2.00     3.95 |  2.83     2.67
                0.50     6.58 |  1.33     7.25 |  2.17     3.59 |
                0.67    12.69 |  1.50     5.91 |  2.33     3.30 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0201)|   Area    (ha)=   0.23   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.052

     PEAK FLOW       (cms)=   0.003 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=   4.076
     TOTAL RAINFALL   (mm)=  30.883
     RUNOFF COEFFICIENT   =   0.132

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   0.08
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.22   Dir. Conn.(%)=  60.22
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.05          0.03
     Dep. Storage     (mm)=        2.00          5.00
     Average Slope     (%)=        1.00          2.00
     Length            (m)=       25.00         45.00
     Mannings n           =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=       86.95          3.65
               over (min)         10.00         30.00
     Storage Coeff.  (min)=        1.18 (ii)    29.66 (ii)
     Unit Hyd. Tpeak (min)=       10.00         30.00
     Unit Hyd. peak  (cms)=        0.17          0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.01          0.00          0.012 (iii)
     TIME TO PEAK    (hrs)=        1.00          1.33           1.00
     RUNOFF VOLUME    (mm)=       28.88          3.31          18.52
     TOTAL RAINFALL   (mm)=       30.88         30.88          30.88
     RUNOFF COEFFICIENT   =        0.94          0.11           0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0000     0.0002

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0204)     0.080     0.012      1.00      18.52
   OUTFLOW: ID= 1 (  0006)     0.080     0.000      3.08       1.38

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.34
                  TIME SHIFT OF PEAK FLOW         (min)=125.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0014

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0203)|   Area    (ha)=   0.08   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.018

     PEAK FLOW       (cms)=   0.001 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=   4.071
     TOTAL RAINFALL   (mm)=  30.883
     RUNOFF COEFFICIENT   =   0.132

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   1.23
|ID= 1 DT=10.0 min |   Total Imp(%)=  92.96   Dir. Conn.(%)=  92.96
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.14          0.09
     Dep. Storage     (mm)=        2.00          5.00
     Average Slope     (%)=        0.70          9.40
     Length            (m)=      107.00         24.00
     Mannings n           =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=       86.95          8.84
               over (min)         10.00         20.00
     Storage Coeff.  (min)=        3.13 (ii)    11.75 (ii)
     Unit Hyd. Tpeak (min)=       10.00         20.00
     Unit Hyd. peak  (cms)=        0.16          0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.27          0.00          0.267 (iii)
     TIME TO PEAK    (hrs)=        1.00          1.17           1.00
     RUNOFF VOLUME    (mm)=       28.88          4.27          27.14
     TOTAL RAINFALL   (mm)=       30.88         30.88          30.88
     RUNOFF COEFFICIENT   =        0.94          0.14           0.88

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0132     0.0472
                         0.0050     0.0118   |   0.0149     0.0590
                         0.0086     0.0236   |   0.0165     0.0708
                         0.0111     0.0354   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     1.230     0.267      1.00      27.14
   OUTFLOW: ID= 1 (  0001)     1.230     0.009      2.83      26.65

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.46
                  TIME SHIFT OF PEAK FLOW         (min)=110.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0266

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     1.23   0.009     2.83    26.65
      + ID2= 2 (  0203):     0.08   0.001     1.00     4.07
        ================================================
        ID = 3 (  0007):     1.31   0.009     2.58    25.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL
```

```
       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\9b627641-ff
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\9b627641-ff

DATE: 02-11-2026                          TIME: 11:21:15

USER:


COMMENTS: _____________________________________________________________

--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 50yr 3hr 10min Chicago        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 893.800
| Ptotal= 64.05 mm |                          B=   0.000
--------------------                          C=   0.719
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    7.02 |  0.83  170.70 |  1.67   11.03 |  2.50    6.77
               0.17    8.31 |  1.00   33.42 |  1.83    9.71 |  2.67    6.33
               0.33   10.36 |  1.17   20.79 |  2.00    8.71 |  2.83    5.95
               0.50   14.30 |  1.33   15.73 |  2.17    7.93 |
               0.67   27.09 |  1.50   12.89 |  2.33    7.29 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0201)|   Area    (ha)=   0.23   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.052

     PEAK FLOW       (cms)=   0.014 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=  17.518
     TOTAL RAINFALL   (mm)=  64.054
     RUNOFF COEFFICIENT   =   0.273

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   0.08
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.22   Dir. Conn.(%)=  60.22
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.05          0.03
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      25.00         45.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     170.70         21.75
               over (min)       10.00         20.00
     Storage Coeff.  (min)=       0.90 (ii)   14.84 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.17          0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02          0.00          0.023 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.17           1.00
     RUNOFF VOLUME    (mm)=      62.05         14.80          43.18
     TOTAL RAINFALL   (mm)=      64.05         64.05          64.05
     RUNOFF COEFFICIENT   =       0.97          0.23           0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0000     0.0002

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0204)       0.080     0.023      1.00      43.18
   OUTFLOW: ID= 1 (  0006)       0.080     0.000      3.17      15.23

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.55
                  TIME SHIFT OF PEAK FLOW         (min)=130.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0032

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0203)|   Area    (ha)=   0.08   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.018

     PEAK FLOW       (cms)=   0.005 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=  17.513
     TOTAL RAINFALL   (mm)=  64.054
     RUNOFF COEFFICIENT   =   0.273

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   1.23
|ID= 1 DT=10.0 min |   Total Imp(%)=  92.96   Dir. Conn.(%)=  92.96
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.14          0.09
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       0.70          9.40
     Length            (m)=     107.00         24.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     170.70         41.81
               over (min)       10.00         10.00
     Storage Coeff.  (min)=       2.39 (ii)    7.02 (ii)
     Unit Hyd. Tpeak (min)=      10.00         10.00
     Unit Hyd. peak  (cms)=       0.17          0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.54          0.01          0.543 (iii)
     TIME TO PEAK    (hrs)=       1.00          1.00           1.00
     RUNOFF VOLUME    (mm)=      62.05         18.36          58.97
     TOTAL RAINFALL   (mm)=      64.05         64.05          64.05
     RUNOFF COEFFICIENT   =       0.97          0.29           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  66.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
```

```
--------------------
| RESERVOIR(  0001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |  0.0132      0.0472
                         0.0050     0.0118   |  0.0149      0.0590
                         0.0086     0.0236   |  0.0165      0.0708
                         0.0111     0.0354   |  0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)      1.230     0.543      1.00      58.97
   OUTFLOW: ID= 1 (  0001)      1.230     0.015      3.00      58.48

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.80
                  TIME SHIFT OF PEAK FLOW         (min)=120.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0611

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):      1.23   0.015     3.00    58.48
     + ID2= 2 (  0203):      0.08   0.005     1.00    17.51
       ================================================
       ID = 3 (  0007):      1.31   0.017     1.17    55.98

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

 FINISH
================================================================================================================

================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\786a5ce5-4f
  Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\786a5ce5-4f


DATE: 02-11-2026                          TIME: 11:21:14

USER:


COMMENTS: _____________________________________________________


--------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 5yr 3hr 10min Chicago         **
  ************************************************


--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 632.750
| Ptotal= 40.45 mm |                           B=   0.000
--------------------                           C=   0.741
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  3.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33
```

```
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    4.11 |  0.83  114.88 |  1.67    6.54 |  2.50    3.95
                0.17    4.88 |  1.00   20.52 |  1.83    5.73 |  2.67    3.69
                0.33    6.13 |  1.17   12.57 |  2.00    5.13 |  2.83    3.46
                0.50    8.55 |  1.33    9.43 |  2.17    4.65 |
                0.67   16.54 |  1.50    7.68 |  2.33    4.27 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0201)|   Area    (ha)=   0.23   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.052

     PEAK FLOW       (cms)=   0.006 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=   7.208
     TOTAL RAINFALL   (mm)=  40.451
     RUNOFF COEFFICIENT   =   0.178

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0204)|   Area    (ha)=   0.08
|ID= 1 DT=10.0 min |   Total Imp(%)=  60.22   Dir. Conn.(%)=  60.22
--------------------

                                    IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=           0.05          0.03
     Dep. Storage     (mm)=           2.00          5.00
     Average Slope     (%)=           1.00          2.00
     Length            (m)=          25.00         45.00
     Mannings n            =          0.013         0.250

     Max.Eff.Inten.(mm/hr)=         114.88          6.82
               over (min)           10.00         30.00
     Storage Coeff.  (min)=           1.05 (ii)   23.23 (ii)
     Unit Hyd. Tpeak (min)=          10.00         30.00
     Unit Hyd. peak  (cms)=           0.17          0.04
                                                              *TOTALS*
     PEAK FLOW       (cms)=           0.02          0.00          0.015 (iii)
     TIME TO PEAK    (hrs)=           1.00          1.33           1.00
     RUNOFF VOLUME    (mm)=          38.45          5.93          25.34
     TOTAL RAINFALL   (mm)=          40.45         40.45          40.45
     RUNOFF COEFFICIENT   =           0.95          0.15           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |  0.0000      0.0002

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0204)      0.080     0.015      1.00      25.34
   OUTFLOW: ID= 1 (  0006)      0.080     0.000      3.17       2.04

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.38
                  TIME SHIFT OF PEAK FLOW         (min)=130.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0019

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0203)|   Area    (ha)=   0.08   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17
```

```
     Unit Hyd Qpeak  (cms)=   0.018

     PEAK FLOW       (cms)=   0.002 (i)
     TIME TO PEAK    (hrs)=   1.000
     RUNOFF VOLUME    (mm)=   7.201
     TOTAL RAINFALL   (mm)=  40.451
     RUNOFF COEFFICIENT   =   0.178

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=   1.23
|ID= 1 DT=10.0 min |   Total Imp(%)=  92.96   Dir. Conn.(%)=  92.96
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.14         0.09
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       0.70         9.40
     Length            (m)=     107.00        24.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     114.88        17.06
               over (min)       10.00        10.00
     Storage Coeff.  (min)=       2.80 (ii)    9.43 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.36         0.00          0.359 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.00           1.00
     RUNOFF VOLUME    (mm)=      38.45         7.56          36.27
     TOTAL RAINFALL   (mm)=      40.45        40.45          40.45
     RUNOFF COEFFICIENT   =       0.95         0.19           0.90

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  66.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0132     0.0472
                          0.0050     0.0118   |   0.0149     0.0590
                          0.0086     0.0236   |   0.0165     0.0708
                          0.0111     0.0354   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     1.230     0.359      1.00      36.27
   OUTFLOW: ID= 1 (  0001)     1.230     0.011      3.00      35.79

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.14
                  TIME SHIFT OF PEAK FLOW          (min)=120.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0363

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     1.23   0.011     3.00    35.79
     + ID2= 2 (  0203):     0.08   0.002     1.00     7.20
       ================================================
       ID = 3 (  0007):     1.31   0.012     2.58    34.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
```

CROZIER
CONSULTING ENGINEERS

Project: 7456 McLean Road W and 197 Brock Road S
Project No.: 2124-6029
Design by: CM
Reviewed by: JB
Date: 2024-05-28
Updated: 2026-02-13

7456 McLean Road W and 197 Brock Road S, Township of Puslinch
Stage-Storage-Discharge for Catchment 202 Underground Storage Tank

Primary Orifice Diameter: 0.100
Primary Orifice Invert Elevation: 0.00
Outlet Orifice Diameter - Tank Area (m^2) = 1180
Outlet Orifice Invert Elevation: -

Elev.	**Depth**	**Storage Volume**	Orifice Discharge	Total Discharge	Storage
(m)	(m)	(cu.m)	(cu.m/s)	(cu.m/s)	(ha-m)
0.00	0.00	0	0.0000	0.0000	0.0000
0.10	0.10	118	0.0050	0.0050	0.0118
0.20	0.20	236	0.0086	0.0086	0.0236
0.30	0.30	354	0.0111	0.0111	0.0354
0.40	0.40	472	0.0132	0.0132	0.0472
0.50	0.50	590	0.0149	0.0149	0.0590
0.60	0.60	708	0.0165	0.0165	0.0708

NOTE: Rating curve used to model the Underground Storage Tank Outflows in Visual Otthymo.
All elevations and depths are relative to the invert of the Underground Storage Tank.

CROZIER CONSULTING ENGINEERS

Mitigation Analysis

Project: 7456 McLean Road West
Project No: 2792-7289
Date: 13-Feb-26
Created by: CM
Checked by: JB

DESIGN PARAMETERS

LID Identity	Approximate Land Area[1] (m^2)	Annual Percipitation (mm/yr)	Approximate Evapotranspiration[2] (mm/yr)	Design Percipitation (mm/yr)	Runoff (mm/yr)	Total Available Infiltration Volume (m^3/yr)
Infiltration Gallery	757	851	500	351	351	266
TOTAL WITH MITIGATION	**757**					266

REQUIRED STORAGE

Available Infiltration Volume (m^3/yr)	Annual Events Producing Runoff[3]	Capacity	Storage Required (m^3)
266	40	0.4	16.6

UNDERGROUND STORAGE VOLUME OF PROPOSED LIDS

LID Identity	Area (m2)	Depth (m)	Total Underground Volume (m^3)	Void Ratio	Underground Storage Volume (m^3)
Infiltration Gallery	193	0.5	96.5	0.4	38.6
				Storage Required (m^3)	**16.6**
				Underground Storage Provided (m^3)	**38.6**

1. Area contributing to the proposed Infiltration Gallery from the Post-Development Drainage Plan (Figure 2).
2. Evapotranspiration adjusted to reflect the increased imperviousness and increased runoff.
3. LID should be sized to capture 90 % of rainfall events or 20 mm storm event. There are approximately 40 events per year that produce runoff (1994 MOE SWM Manual)

7456 McLean Road W &197 Brock Road S

0912-7186

STORM SEWER DESIGN SHEET

CROZIER CONSULTING ENGINEERS

FREQUENCY - 5 YEAR - City of Guelph IDF			
Coef. A=	632.75	Coef. B=	-0.741
FREQUENCY - 100 YEAR - City of Guelph IDF			
Coef. A=	953.29	Coef. B=	-0.711

MATERIAL	MANNINGS "n"
PVC	0.009
CONC.	0.013
CSP	0.024

DESIGNED BY: CM
CHECKED BY: CM
DATE: 2026-02-11

INITIAL TIME OF CONCENTRATION (minutes) = 10.00

CATCHMENT I.D.	FROM MH	TO MH	AREA (A) (Ha)	5 YEAR RUN-OFF COEFF (C_5)	100 YEAR RUN-OFF COEFF (C_{100})	DESIGN STORM	A x C	5 YEAR CUMUL. A x C_5	100 YEAR CUMUL. A x C_{100}	TIME OF CONC. (min.)	5 YEAR I (mm/hr)	100 YEAR I (mm/hr)	Q (RUNOFF) (L/sec)	5 YR DESIGN FLOW (L/sec)	100 YR DESIGN FLOW (L/sec)	SLOPE (%)	PIPE DIA. (mm)	MANNING'S "n"	VEL. (m/sec)	LENGTH (m)	TIME OF FLOW (min)	PIPE CAPACITY (L/sec)	5 yr CAPACITY (%)	*100 yr CAPACITY (%)
1	DCB5	CBMH4	0.59	0.81	0.81	5 year	0.48	0.48	0.48	10.00	114.88	185.45	**400.05**	**153.02**	**247.03**	0.50%	375	0.009	1.6	47.9	0.49	**179.08**	**85%**	138%
2	CBMH4	SWM Tank	0.17	0.88	0.88	5 year	0.15	0.63	0.63	10.49	110.86	179.22	**505.31**	**193.11**	**312.20**	0.64%	375	0.009	1.8	33.0	0.30	**202.60**	**95%**	154%
3	CB3	SWM Tank	0.09	0.89	0.89	5 year	0.08	0.08	0.08	10.00	114.88	185.45	**67.84**	**25.95**	**41.89**				NO PIPE PROPOSED					
4	DCB1	SWM Tank	0.21	0.90	0.90	5 year	0.19	0.19	0.19	10.00	114.88	185.45	**154.73**	**59.18**	**95.54**				NO PIPE PROPOSED					
5	CB2	SWM Tank	0.17	0.90	0.90	5 year	0.15	0.15	0.15	10.00	114.88	185.45	**126.84**	**48.52**	**78.32**				NO PIPE PROPOSED					

*Note: Pipes are sized to the 5-year design storm event as per Township of Puslinch standards. Flows exceeding the 5-year storm will be conveyed overland towards the proposed catchbasins located on top of the SWM Tank.

7456 McLean Road W &197 Brock Road S

0912-7186

STORM CATCHBASIN INLET CAPACITY

CROZIER CONSULTING ENGINEERS

DESIGNED BY:	CM
CHECKED BY:	CM
DATE:	2026-02-11

Coef. A= 632.75 — **FREQUENCY - 5 YEAR - City of Guelph IDF** — **Coef. B=** -0.741

Coef. A= 953.29 — **FREQUENCY - 100 YEAR - City of Guelph IDF** — **Coef. B=** -0.711

MATERIAL	MANNINGS "n"
PVC	0.009
CONC.	0.013
CSP	0.024

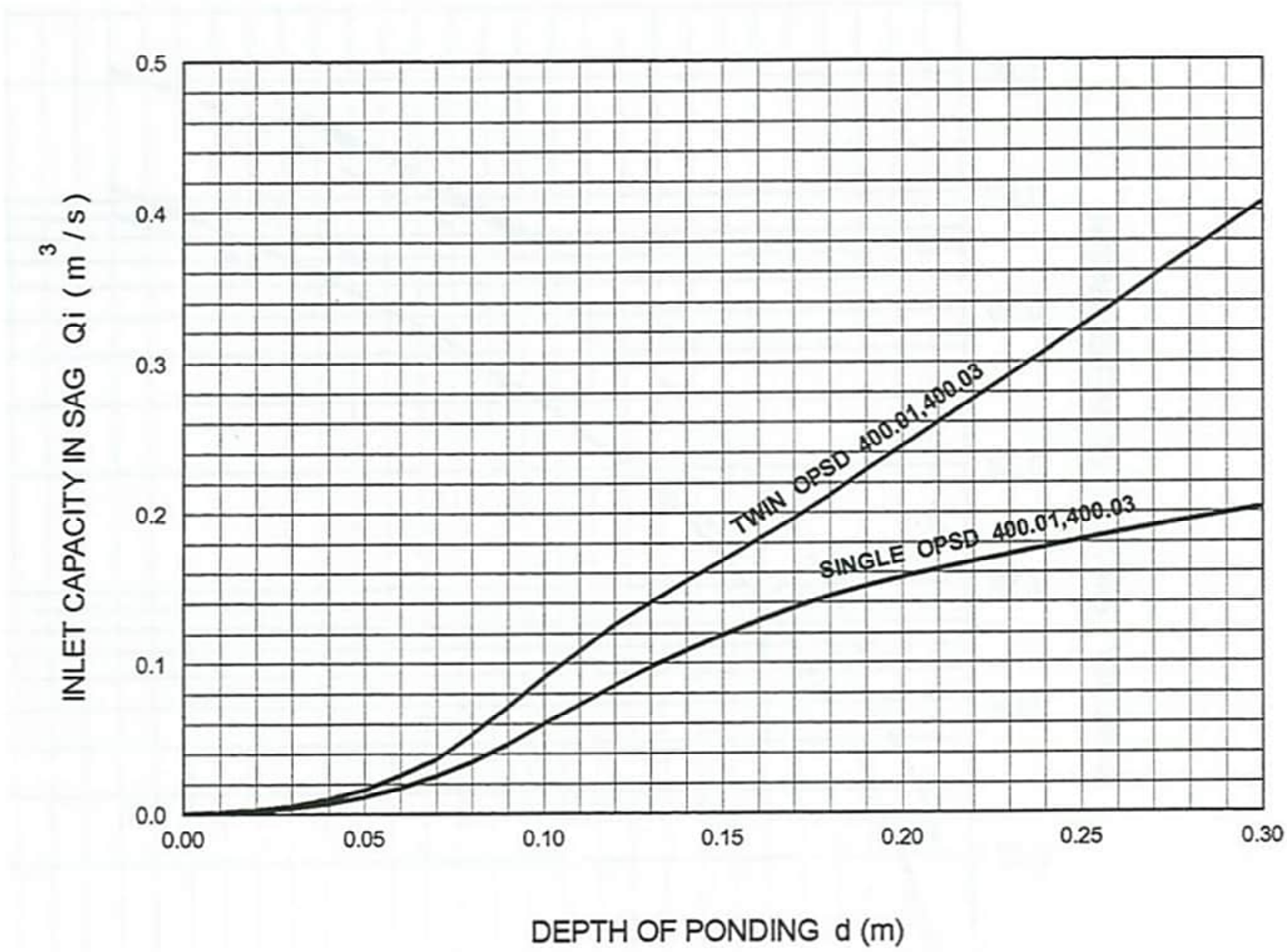
INITIAL TIME OF CONCENTRATION (minutes) = 10.00

CATCHMENT I.D.	FROM MH	TO MH	AREA (A) (Ha)	5 YEAR RUN-OFF COEFF (C_5)	100 YEAR RUN-OFF COEFF (C_{100})	DESIGN STORM	A x C	5 YEAR CUMUL. A x C_5	100 YEAR CUMUL. A x C_{100}	TIME OF CONC. (min.)	5 YEAR I (mm/hr)	100 YEAR I (mm/hr)	Q (RUNOFF) (L/sec)	5 YR DESIGN FLOW (L/sec)	100 YR DESIGN FLOW (L/sec)	SLOPE (%)	PIPE DIA. (mm)	*PIPE CAPACITY (L/sec)	100 yr Overland Flow (L/s)	**CB Inlet Capacity (L/s)	Headwater Elevation (m)	*Remaining Overland Flow (L/s)
1	DCB5	CBMH4	0.59	0.81	0.81	100 year	0.48	0.48	0.48	10.00	114.88	185.45	**400.05**	**153.02**	**247.03**	0.50%	375	179.08	67.95	-	-	**67.95**
2	CBMH4	SWM Tank	0.17	0.88	0.88	100 year	0.15	0.63	0.63	10.49	110.86	179.22	**505.31**	**193.11**	**312.20**	0.64%	375	202.60	109.59	-	-	**109.59**
3	CB3	SWM Tank	0.09	0.89	0.89	100 year	0.08	0.08	0.08	10.00	114.88	185.45	**67.84**	**25.95**	**41.89**	N/A	N/A	N/A	151.49	75.00	0.11	**76.49**
4	DCB1	SWM Tank	0.21	0.90	0.90	100 year	0.19	0.19	0.19	10.00	114.88	185.45	**154.73**	**59.18**	**95.54**	N/A	N/A	N/A	172.03	410.00	0.30	**0.00**
5	CB2	SWM Tank	0.17	0.90	0.90	100 year	0.15	0.15	0.15	10.00	114.88	185.45	**126.84**	**48.52**	**78.32**	N/A	N/A	N/A	78.32	150.00	0.18	**0.00**

*Note: Pipes are sized to the 5-year design storm event as per Township of Puslinch standards. Flows exceeding the 5-year storm will be conveyed overland towards the proposed catchbasins located on top of the SWM Tank.

**Note: CB Inlet capacity are based on MTO Design Chart 4.19 based on the headwater elevation from the lowest spill point of each CB.

Design Chart 4.19: Inlet Capacity at Road Sag

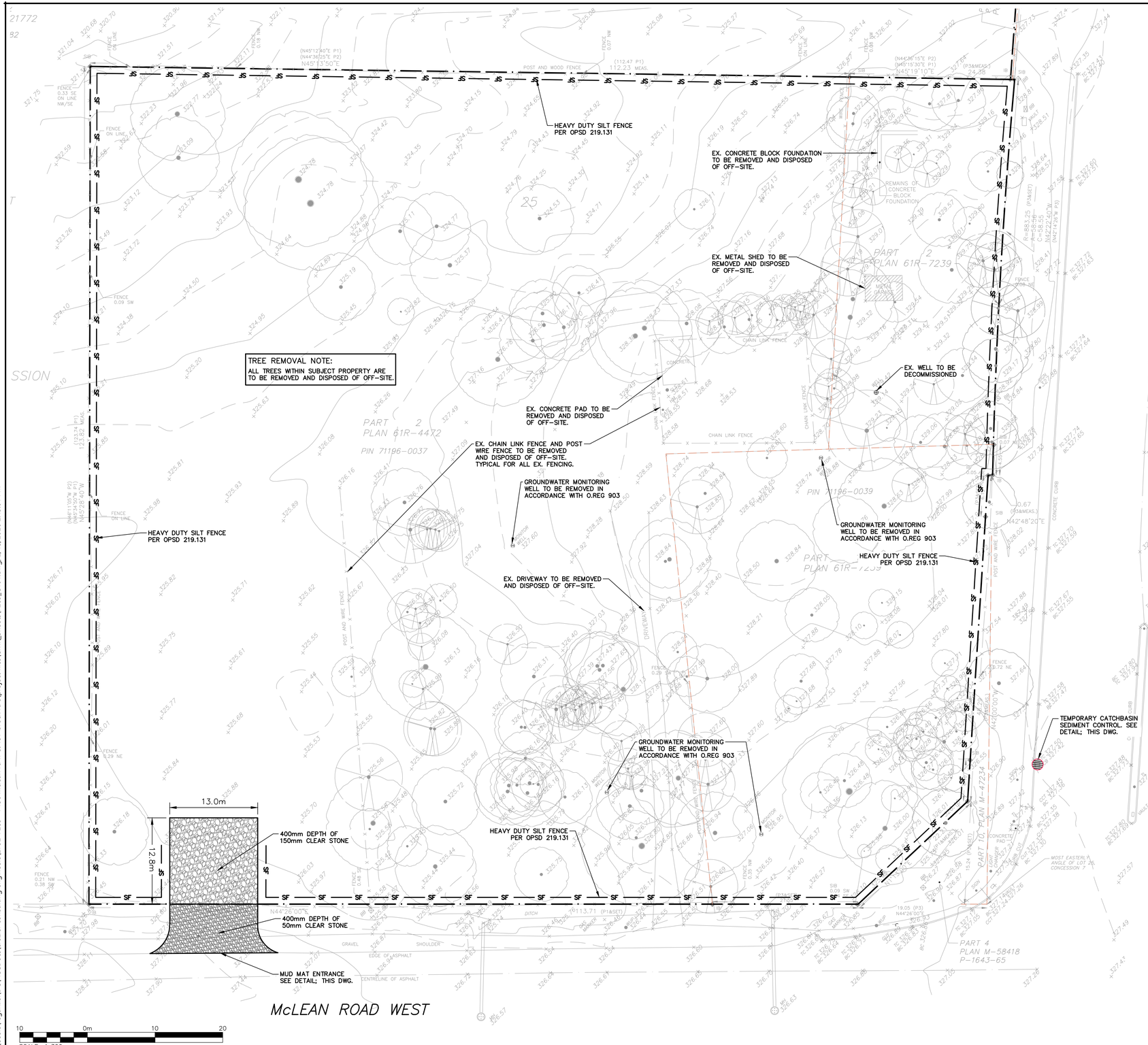


DRAWINGS

Drawing C101: Preliminary Erosion, Sediment Control, and Removals Plan

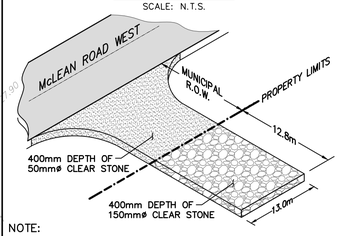
Drawing C102: Preliminary Site Servicing Plan

Drawing C103: Preliminary Site Grading Plan



MUD-MAT DETAIL

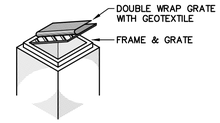
SCALE: N.T.S.



NOTE:
GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.

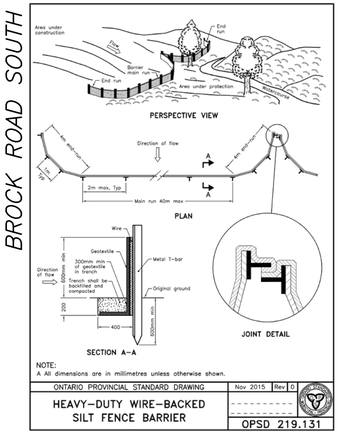
CATCHBASIN SEDIMENT CONTROL DETAIL

SCALE: N.T.S.



NOTES:
1. TO BE INSTALLED IN ALL AFFECTED EXISTING & PROPOSED CATCHBASIN & CATCHBASIN MANHOLES UNDER APPROPRIATE DRAINAGE CIRCUMSTANCES, BETWEEN APRIL AND DECEMBER.
2. WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm OR A NON-WOVEN GEOTEXTILE TO BE CONSIDERED BASED ON SOIL PARAMETERS AND SITE CONDITIONS.
3. GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERE WITH DRAINAGE, OR AS DIRECTED BY THE MUNICIPALITY.

BROCK ROAD SOUTH



NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 0
HEAVY-DUTY WIRE-BACKED SILT FENCE BARRIER		OPSD 219.131

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
- HEAVY DUTY SILT FENCE; SEE DETAIL
- PROPOSED SEDIMENT CONTROL DEVICE IN EX. CATCHBASIN PER

No.	ISSUE / REVISION	YYYY/MMM/DD
3	ISSUED FOR THIRD SUBMISSION (ZBA)	2026/FEB/13
2	ISSUED FOR SECOND SUBMISSION (ZBA)	2025/AUG/01
1	ISSUED FOR COORDINATION	2025/JUL/18
0	ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20

ELEVATION NOTE:

ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD28:78, 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-SRPRT
COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC.
DATED: FEB. 09, 2026
DRAWING No. A101

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 TOWNSHIP OF PUSLINCH

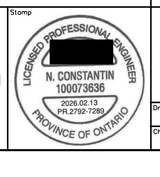
Drawing

PRELIMINARY EROSION, SEDIMENT CONTROL AND REMOVALS PLAN

Stamp



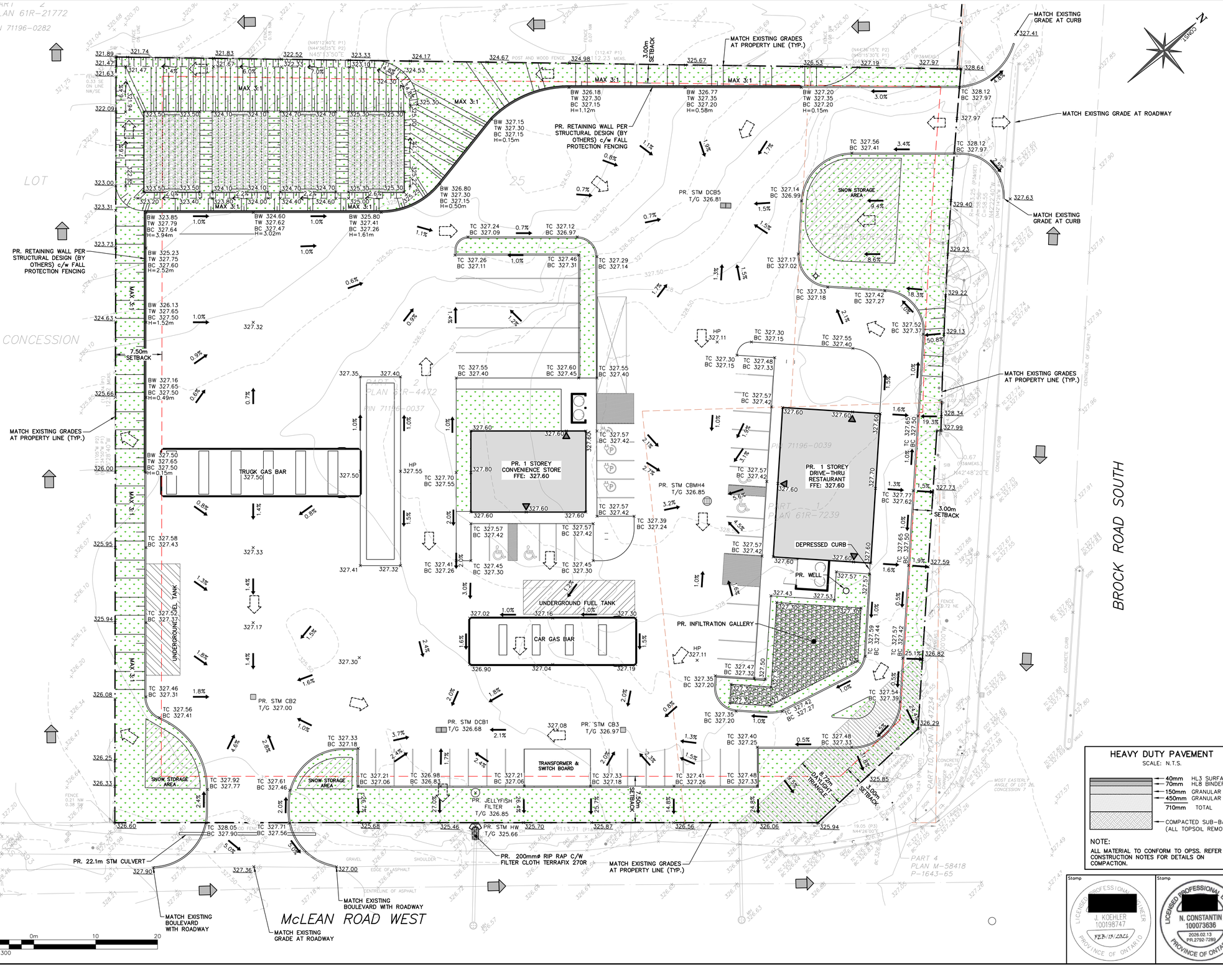
Stamp



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.	2792-7289
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 101

c:\Users\vegan.lie\DCACCDocs\crozier consulting engineers\2792-7289 - 7456 mclean rd w & 197 brock rd s\project files\Civil_Sheets\7289_C101.dwg, 2/13/2026 2:43:01 PM





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING FENCE
- 215.00 EXISTING GRADE
- 215.00 PROPOSED GRADE
- 215.00 PROPOSED GRADE (TO MATCH EXISTING)
- 2.0% PROPOSED MINOR FLOW DIRECTION
- 2.0% PROPOSED GRASSED SWALE
- PROPOSED RETAINING WALL
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED DEPRESSED CURB
- SETBACK LIMIT
- PROPOSED LANDSCAPE AREA

HEAVY DUTY PAVEMENT

SCALE: N.T.S.

40mm	HL3 SURFACE
70mm	HL8 BINDER
150mm	GRANULAR 'A'
450mm	GRANULAR 'B'
710mm	TOTAL
	COMPACTED SUB-BASE (ALL TOPSOIL REMOVED)

NOTE:
ALL MATERIAL TO CONFORM TO OPSS. REFER TO CONSTRUCTION NOTES FOR DETAILS ON COMPACTION.

No.	ISSUE / REVISION	YYYY/MMM/DD
3	ISSUED FOR THIRD SUBMISSION (ZBA)	2026/FEB/13
2	ISSUED FOR SECOND SUBMISSION (ZBA)	2025/AUG/01
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SURVEY NOTES:

SURVEY COMPLETED BY TARASICK McMILLAN KUBICKI LIMITED.
PROJECT FILE No. 9625-SRPRT
COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:

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DATED: FEB. 09, 2026
DRAWING No. A101

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Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWNSHIP OF PUSLINCH

Drawing
PRELIMINARY SITE GRADING PLAN

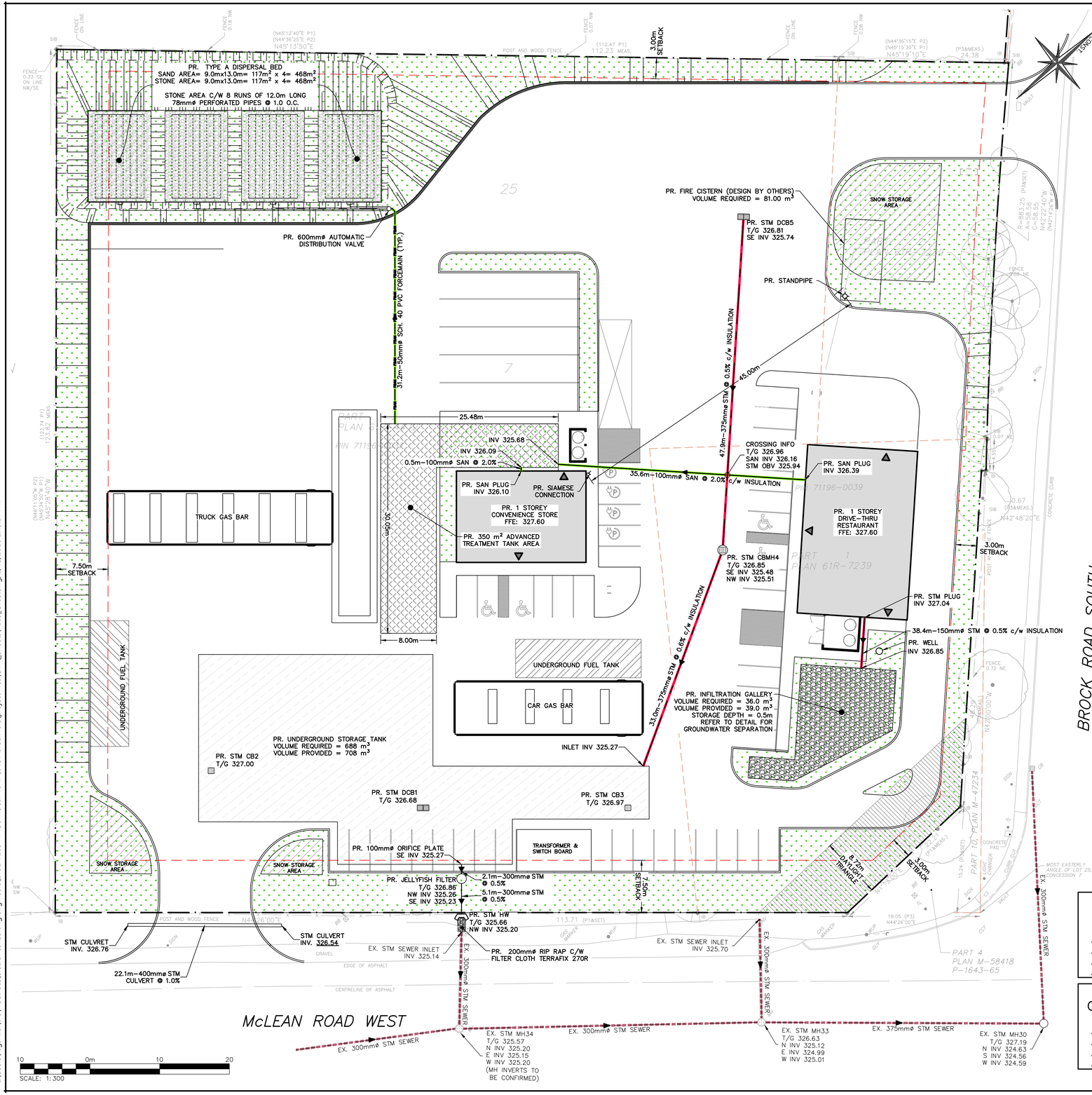
Stamp
LICENSED PROFESSIONAL ENGINEER
J. KOEHLER
100198747
FEB/13/2026
PROVINCE OF ONTARIO

Stamp
LICENSED PROFESSIONAL ENGINEER
N. CONSTANTIN
100073636
2026.02.13
PR.2792-7289
PROVINCE OF ONTARIO

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.	2792-7289
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 102

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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 ONSITE 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 1.2M 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.
10. 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.
11. ALL PIPES SUBJECT TO VEHICULAR TRAFFIC SHALL BE ADEQUATELY PROTECTED.
12. ALL METAL IN TANKS OR PUMP CHAMBERS TO BE GLAVANIZED OR STAINLESS STEEL.
13. ALL JOINTS BELOW THE HIGH WATER LEVEL IN PRECAST TANKS TO BE SEALED WITH MASTIC SEALANT IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS FOR WATERTIGHT 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 SEEDED COMPLETE WITH FERTILIZER AND MULCH IN ACCORDANCE WITH OPSS
21. THE INSTALLING CONTRACTOR SHALL INSTALL THE SEWAGE SYSTEM USING A TRANSIT/LEVEL AND SHALL PROVIDE SAME FOR INSPECTION OF ANY COMPONENT.
22. 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.
23. 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.
24. 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.
25. SEWAGE SYSTEM HAS BEEN DESIGNED TO RECEIVED 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
- TP# TEST PIT LOCATION
- SETBACK LIMIT
- PROPOSED LANDSCAPE AREA

ON–SITE SEWAGE DESIGN

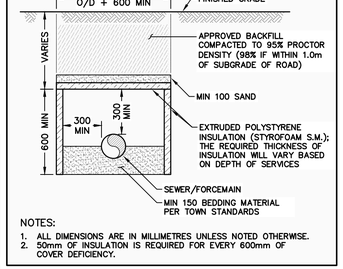
DAILY DESIGN FLOW REFER TO FSR REPORT FOR DETAILS	TOTAL DESIGN FLOW = 22,000 L/DAY
ADVANCED TREATMENT SYSTEM	TO BE DETERMINED DURING DETAILED DESIGN
SOIL PERCOLATION RATE	T = 15 min/cm (DETERMINED BY C.F. CROZIER)
TYPE A DISPESAL BED STONE AREA	Q/50 =22,000/50 REQUIRED = 440 m² PROVIDED = 468 m²
TYPE A DISPERSAL BED SAND AREA	QT/850= 22,000*15/850 REQUIRED = 389 m² PROVIDED = 468 m²

AUTOMATIC DISTRIBUTING VALVE DETAIL

SCALE: N.T.S.

INSULATION FOR SHALLOW SERVICES

SCALE: N.T.S.



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. 50mm OF INSULATION IS REQUIRED FOR EVERY 600mm OF COVER DEFICIENCY.

SWM TANK SECTION

SCALE: N.T.S.

GROUND SURFACE=326.68
TOP OF TANK=325.87
BOTTOM OF TANK=325.27
GROUNDWATER=324.19

INFILTRATION GALLERY SECTION

SCALE: N.T.S.

GROUND SURFACE=327.30
TOP OF GALLERY=327.15
BOTTOM OF GALLERY=326.65
GROUNDWATER=321.48

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PROJECT FILE No. 9625–SRPRT
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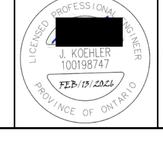
Project

7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWNSHIP OF PUSLINCH

Drawing

PRELIMINARY SITE SERVICING PLAN

Stamp



Stamp



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.	2792–7289
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				Dwg.	C 103

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SCALE: 1: 300

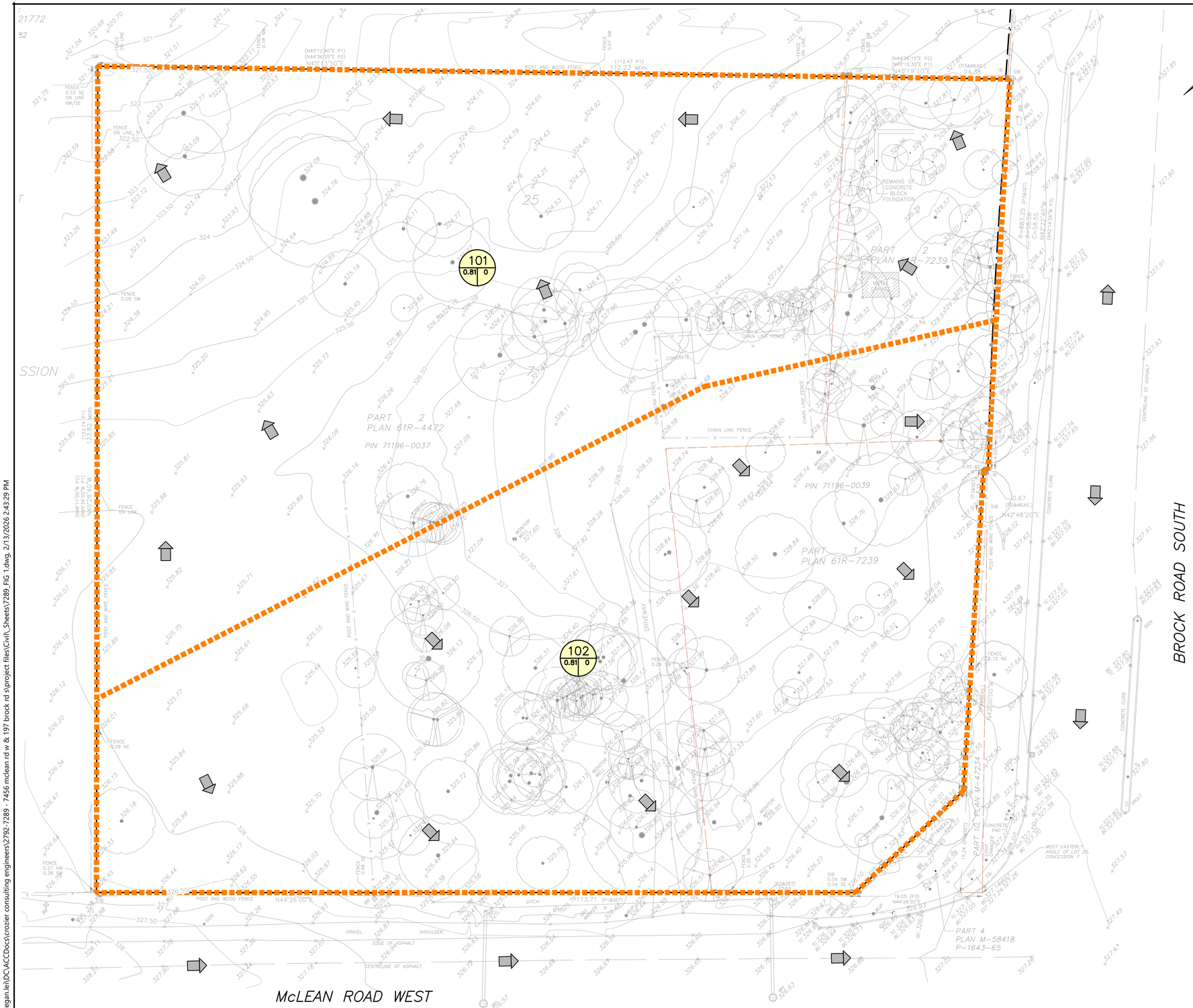
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FIGURES

Figure 1: Preliminary Pre-development Drainage Plan

Figure 2: Preliminary Post-development Drainage Plan

Figure 3: Preliminary Storm Sewer Drainage Plan



PRE-DEVELOPMENT CATCHMENT AREAS PER THE STORMWATER MANAGEMENT REPORT - CARROLL POND MUNICIPAL DRAIN (TOWNSHIP OF PUSLINCH, MARCH 2007)

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7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH

Drawing
PRELIMINARY PRE-DEVELOPMENT DRAINAGE PLAN

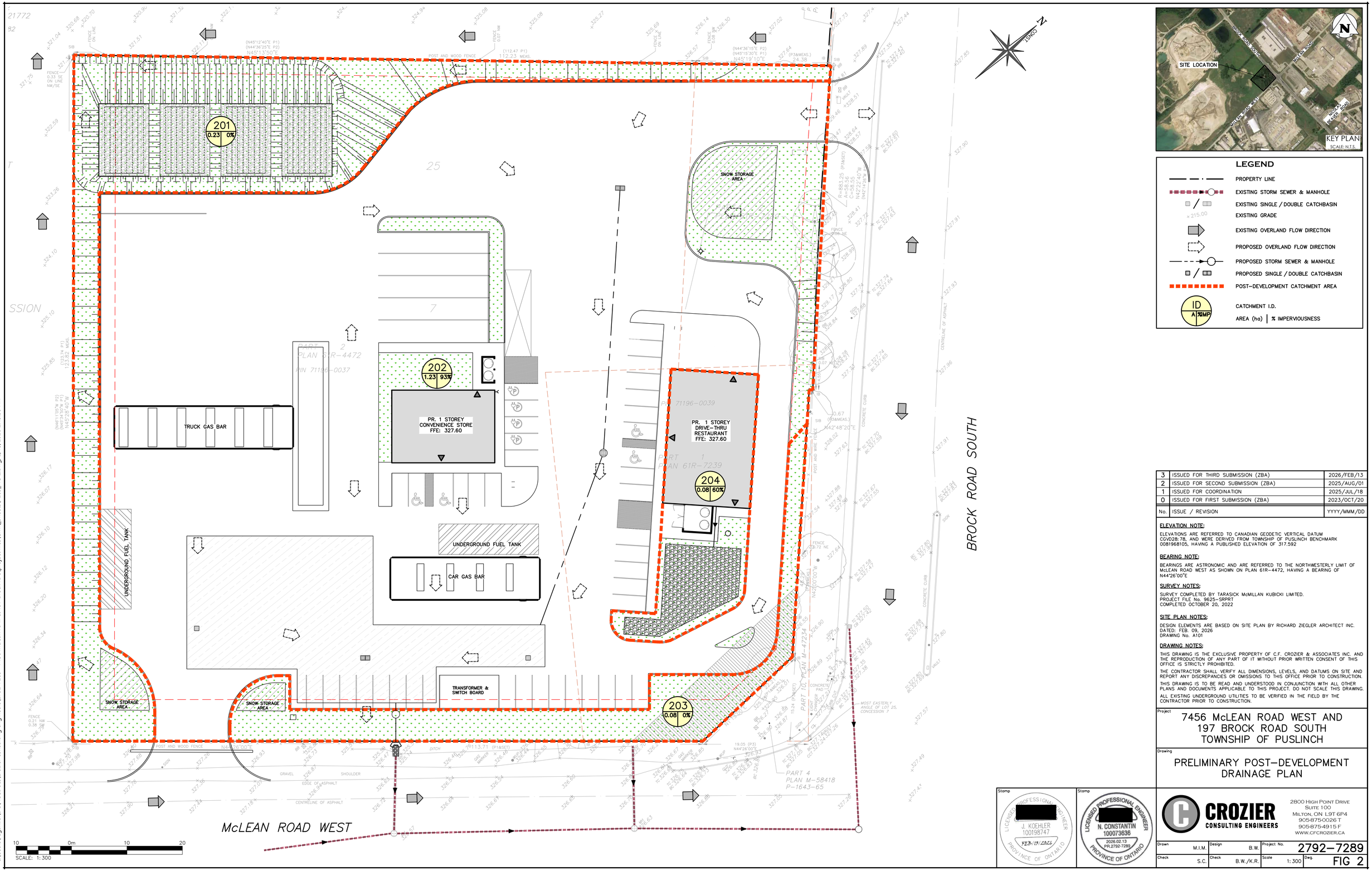
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100198747
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Stamp
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2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
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Drawn	Design	Project No.	
M.I.M.	B.W.	2792-7289	
Check	Check	Scale	Dwg.
S.C.	B.W./K.R.	1:300	FIG 1

C:\Users\regan.le\DCVACCDocs\crozier consulting engineers\2792-7289 - 7456 mclean rd w & 197 brock rd s\project files\Civil_Sheets\7289_FIG 1.dwg, 2/13/2026 2:43:29 PM



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Project

7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWNSHIP OF PUSLINCH

Drawing

PRELIMINARY POST-DEVELOPMENT DRAINAGE PLAN

Stamp

LICENSED PROFESSIONAL ENGINEER
[redacted]
J. KOEHLER
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FEB/13/2026
PROVINCE OF ONTARIO

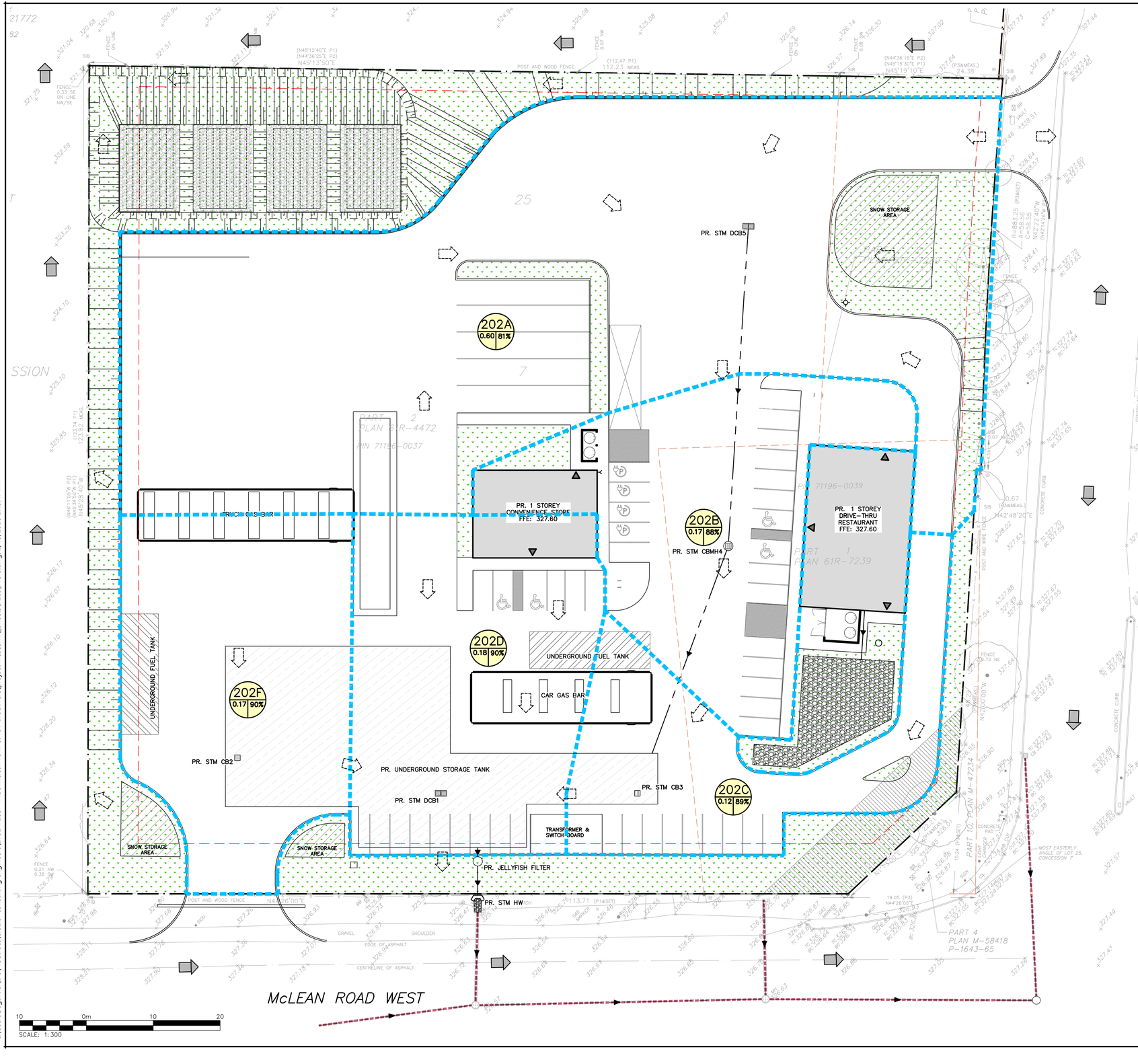
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Drawn	M.I.M.	Design	B.W.	Project No.	2792-7289
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	FIG 2

c:\Users\regan.len\DC\ACCDocs\crozier consulting engineers\2792-7289 - 7456 mclean rd w & 197 brock rd s\project files\Civil_Sheets\7289_FIG 2.dwg, 2/13/2026 2:43:38 PM


PR. STM DCB5
SNOW STORAGE AREA
202A
0.60 81%
202B
0.17 88%
PR. STM CBMH4
PR. 1 STOREY CONVENIENCE STORE FFE: 327.60
PR. 1 STOREY DRIVE-THRU RESTAURANT FFE: 327.60
202D
0.18 90%
UNDERGROUND FUEL TANK
CAR GAS BAR
202F
0.17 90%
PR. STM CB2
PR. UNDERGROUND STORAGE TANK
PR. STM CB3
PR. STM DCB1
202C
0.12 89%
TRANSFORMER & SWITCH BOARD
PR. JELLYFISH FILTER
PR. STM HW
SNOW STORAGE AREA
SNOW STORAGE AREA
TRUCK GAS BAR
UNDERGROUND FUEL TANK
PART 2 PLAN 61R-4472 PIN 71196-0037
PART 1 PLAN 61R-7239
PART 4 PLAN M-58418 P-1643-65
PART 10, PLAN M-47234
PIN 71196-0039
McLEAN ROAD WEST
BROCK ROAD SOUTH
MOST EASTERLY ANGLE OF LOT 25, CONCESSION 7
POST AND WOOD FENCE
GRAVEL SHOULDER
EDGE OF ASPHALT
CENTRELINE OF ASPHALT
CONCRETE CURB
CONCRETE PAD
CHAINLINK FENCE
SIB
IB
GAS HAMMER
(N45°12'40"E P1) (N44°36'25"E P2) N45°13'50"E
(112.47 P1) 112.23 MEAS
(N44°36'15"E P2) (N45°15'30"E P1) N45°19'10"E
(P3&MEAS.) 24.38
(123.24 P1) 123.82 MEAS
(N46°11'05"W P2) (N45°28'40"W P1) N45°28'40"W
113.71 (P1&SET)
19.05 (P3) N44°26'00"E
0.67 (P3&MEAS.) N42°48'20"E
(P=881.26 (P1&SET)) R=881.26 A=58.56 C=58.55 (N42°22'40"W P1) (N42°24'40"W P2)
N42°00'00"W
15.24 (P1&SET)
FENCE 0.09 NE
FENCE 0.72 NE
FENCE 0.21 NW 0.38 SW
FENCE 0.33 SE ON LINE NW/SE
FENCE ON LINE
FENCE 0.07 NW
FENCE 0.08 NW
FENCE 0.08 SW
FENCE 0.06 SE
FENCE 0.06 NE
FENCE 0.06 SW
FENCE 0.09 SW
FENCE 0.08 NE
FENCE 0.08 SE
FENCE 0.09 NW
FENCE 0.09 SE
FENCE 0.09 NE
FENCE 0.08 NW
FENCE 0.08

GEOTECHNICAL INVESTIGATION

PROPOSED DEVELOPMENT
7456 MCLEAN ROAD
PUSLINCH, ONTARIO

CMT Project 23-133.R01

Prepared for:

Blackhart Construction

July 13, 2023

CMT Engineering Inc.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Tel: 519-699-5775
Fax: 519-699-4664
www.cmtinc.net

July 13, 2023 23-133.R01

Blackhart Construction
2526 Speers Road
Unit 17
Oakville, Ontario
L6H 5R9

Attention: Ken Johnson

Dear Ken:

Re: Geotechnical Investigation
Proposed Development
7456 McLean Road
Puslinch, Ontario

As requested, CMT Engineering Inc. conducted a geotechnical investigation at the above-referenced site, and we are pleased to present the enclosed report.

We trust that this information meets your present requirements, and we thank you for allowing us to undertake this project. Should you have any questions, please do not hesitate to contact our office.

Yours truly,

[redacted]
Brittany Lingelbach, C.Tech., rcji

ht

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

2.0 EXISTING SITE CONDITIONS 1

3.0 FIELD AND LABORATORY PROCEDURES 2

4.0 SUBSOIL CONDITIONS 3

4.1. Topsoil/Fill 3
4.2. Sandy Silt/Silty Sand 4
4.3. Sand and Gravel 4
4.4. Silt 4
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1.0 INTRODUCTION

The services of CMT Engineering Inc. (CMT Inc.) were retained by Ken Johnson of Blackhart Construction to conduct a geotechnical investigation for the proposed commercial development to be located at 7456 McLean Road near Puslinch, Ontario. The geotechnical investigation was carried out in conjunction with a hydrogeological study by Crozier Consulting Engineers (Crozier) which will be provided under separate cover. The location of the site is shown on Drawing 1.

Based on the concept plan provided by the client, it is understood that the project will comprise the construction of a single-storey commercial building for a new fast-food restaurant and convenience store, as well as new gas bars for cars and trucks, a truck scale, and parking for both cars and trucks throughout. A stormwater management pond is proposed in the West corner of the site. The proposed buildings will be serviced by a new on-site sewage disposal system (OSSDS). The proposed concept plan with the borehole locations overlaid is provided on Drawing 2.

The purpose of the geotechnical investigation was to assess the existing soil and groundwater conditions encountered in the boreholes and monitoring wells. Included in the assessment are the soil classification and groundwater observations, as well as comments and recommendations regarding the estimated geotechnical resistance (bearing capacity); estimated serviceability limit states (anticipated settlement); dewatering considerations; site classification for seismic site response; recommendations for site grading, site servicing, excavations and backfilling; recommendations for slab-on-grade construction; stormwater infiltration; pavement design/drainage; soil design properties; and a summary of the laboratory results.

The recommendations in this report are solely based on the soil conditions encountered in the boreholes advanced by CMT Inc. on the subject site.

2.0 EXISTING SITE CONDITIONS

Currently, the site is comprised of two parcels, however for the purposes of this report, both parcels will be referenced together as 7456 McLean Road.

The majority of the site is covered in low-lying vegetation, shrubs, and mature trees. A gravel-surfaced laneway is located in the approximate centre of the site, with access from McLean Road. At the end of the laneway is a gravel-surfaced parking area within a chain-link fence. An abandoned transport truck and trailer was noted in this area, along with many abandoned household items such as shelving, mattresses, televisions, etc. An existing storage shed was also noted near the North corner of the site with a nearby dug well. The dug well was reportedly installed in 1982 to provide water for livestock.

The site is bounded McLean Road to the Southeast, Brock Road to the Northeast, vacant land as well as gravel pits to the Northwest and Southwest. In general, the site topography slopes down toward the West corner, with the overall topography differing by at least 7.0 m (23.0 ft) from the highest to lowest elevations.

The uneven ground surface in Eastern portion of the site suggests that fill may have been previously placed, although the extent of previous site work such as fill placement or excavation is unknown.

3.0 FIELD AND LABORATORY PROCEDURES

It was noted that previous investigations/site work has been conducted for the site, including the following:

- Phase I Environmental Site Assessment by AEL Environment, April 12, 2019;
- Installation of three (3) monitoring wells by Aardvark Drilling Inc. (referenced as Monitoring Wells 1 to 3), 2021; and
- Phase I Environmental Site Assessment by Bluewater Geoscience Consultants Inc., March 30, 2023.

The geotechnical field investigation was conducted by CMT Inc. on April 12 and 13, 2023 in conjunction with a hydrogeological study by Crozier, and comprised the advancement of seven (7) boreholes utilizing a Geoprobe 7822DT drillrig operated by employees of CMT Drilling Inc. At the request of Crozier, the boreholes are referenced as Boreholes 4 to 10 to remain consistent with the existing monitoring wells that are referenced as Monitoring Wells 1 to 3.

Boreholes 4 and 5 were advanced to depths of approximately 6.71 m (22.0 ft) below the existing ground surface; Borehole 6 was advanced to a depth of approximately 12.19 m (40.0 ft), Boreholes 7 and 8 were advanced to depths of approximately 5.18 m (17.0 ft) below the existing ground surface; while Boreholes 9 to 10 were advanced to depths of approximately 5.18 m (17.0 ft).

Boreholes 4, 5 and 6 were equipped with 38 mm diameter PVC monitoring wells comprising 3.0 m long screens backfilled with filter sand and then riser pipe, backfilled with bentonite. The monitoring wells were installed according to the Ontario Water Resources Act, Regulation 903 (O.Reg. 903) by well technicians licensed by the Ministry of the Environment, Conservation and Parks (MECP), working for a contractor also licensed by the MECP. The boreholes that were not instrumented with monitoring wells were backfilled with bentonite in accordance with O.Reg. 903. The monitoring wells are registered with the MECP and must be decommissioned in accordance with O.Reg. 903 prior to future construction. The MECP well log records are provided in Appendix C.

Standard penetration testing (SPT) and sampling was carried out in all boreholes using 38 mm inside diameter split spoon sampling equipment and an automatic hammer, in accordance with ASTM D 1586 "Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils". SPT soil sampling was generally conducted at 0.76 m (2.5 ft) intervals to approximately 3.0 m (10.0 ft) and every 1.52 m (5.0 ft) thereafter to borehole. Macro core (MC5) direct push sampling was generally conducted between the SPT samples obtained below 3.0 m (10.0 ft) in the boreholes.

Technical staff from CMT Inc. observed the drilling operation and collected and logged the recovered soil samples. A small portion of each sample was placed in a sealed, marked jar for moisture content determinations. Representative samples from the boreholes at the following depths were submitted to the CMT Inc. laboratory in St. Clements, Ontario for grain size analyses:

- Borehole 4 - depth 1.52 m to 2.13 m (5.0 ft to 7.0 ft);
- Borehole 4 - depth 3.66 m to 4.57 m (12.0 ft to 15.0 ft);
- Borehole 5 - depth 1.52 m to 2.13 m (5.0 ft to 7.0 ft);
- Borehole 5 - depth 2.29 m to 2.90 m (7.5 ft to 9.5 ft); and
- Borehole 6 - depth 1.52 m to 2.13 m (5.0 ft to 7.0 ft).

The borehole logs are provided in Appendix A and the grain size analyses are provided in Appendix B.

The ground surface elevations at the borehole locations were surveyed by CMT Inc. personnel, using laser surveying equipment. The existing monitoring wells located on the site were used as temporary benchmarks with a variety of known geodetic elevations. The ground surface elevations at the borehole locations ranged from approximately 321.81 m at Borehole 4 to 328.84 m at Borehole 6. The locations of the boreholes are shown on Drawing 2.

4.0 SUBSOIL CONDITIONS

The soils encountered in Boreholes 4 to 10 are described briefly below and a more detailed stratigraphic description is provided on the borehole logs in Appendix A. The following paragraphs have been simplified into terms of major soil strata. The soil boundaries indicated have been inferred from non-continuous samples and observations of sampling and drilling resistance and typically represent transitions from one soil type to another rather than exact planes of geological change. Further, the subsurface conditions are anticipated to vary between and beyond the borehole locations.

4.1. Topsoil/Fill

Loose, moist, dark brown, silty topsoil/fill was encountered at the surface of all borehole locations. The surface of Boreholes 4, 5 and 7 in the Western parcel of the site appear to comprise undisturbed, native topsoil, ranging in thickness from about 80 mm to 100 mm. Boreholes 6, 8, 9, and 10 in the Eastern parcel of the site, however, appear to comprise a mix of topsoil and fill at the surface, ranging in thickness from about 610 mm to 2,390 mm. The fill generally consisted of dark brown sand fill to grey-brown silty sand and gravel fill, with occasional black staining and intermixed wood pieces. The dark-brown colour of the fill made it difficult to distinguish the topsoil and the fill soils in some areas. The fill was considered to be very loose to loose at the borehole locations, with SPT N-values ranging from 1 to 9 blows per 0.3 m (average 5 blows per 0.3 m).

The topsoil thickness, and particularly the fill thickness should be expected to vary throughout the site, especially in areas where previous grading and/or fill placement has taken place. Materials noted as topsoil in this report were classified based on visual and textural evidence. Testing of organic content or for other nutrients was not carried out.

4.2. Sandy Silt/Silty Sand

Brown to grey sandy silt/silty sand, with trace to some clay and gravel was encountered at all of the borehole locations. Trace intermixed topsoil and rootlets were occasionally encountered in the upper extent of the sandy silt/silty sand soils. The sandy silt/silty sand was considered to be loose to very dense, with SPT N-values ranging from 3 to 65 blows per 0.3 m (average 19 blows per 0.3 m). The sandy silt/silty sand was considered to be moist to wet, with moisture contents ranging from about 6.1% to 23.9% (average 12.2%).

4.3. Sand and Gravel

Brown silty sand and gravel with trace clay was encountered in the lower extents off Boreholes 4, 5, 7 and 9. The sand and gravel was considered to be compact to dense, with SPT N-values ranging from 10 to 50 blows per 0.3 m (average 25 blows per 0.3 m). The sand and gravel was considered to be moist to wet, with moisture contents ranging from about 8.1% to 18.3% (average 12.6%).

4.4. Silt

Brown silt with some clay and trace sand and gravel was encountered in Borehole 5, underlying the topsoil. Trace intermixed topsoil and rootlets were encountered in the upper extent of the soils. The silt was considered to be very loose to loose, with SPT N-values ranging from 0 to 9 blows per 0.3 m (average 6 blows per 0.3 m). The silt was considered to be moist to very moist, with moisture contents ranging from about 12.2% to 22.4% (average 18.0%).

4.5. Groundwater

Three (3) monitoring wells were installed as part of the geotechnical and hydrogeological investigation (Boreholes 4 to 6). The monitoring wells were installed and registered in accordance with the Ontario Water Resources Act, Regulation 903 (O.Reg. 903) by well technicians licensed by the Ministry of the Environment (MECP), working for a contractor also licensed by the MECP.

Additionally, three (3) monitoring wells were previously installed on the site (Monitoring Wells 1 to 3).

The following table provides groundwater elevations in the monitoring wells, measured by Crozier on April 19, 2023 and June 7, 2023:

Borehole/ Monitoring Well No.	Ground Surface Elevation (m)	Measured Elevation and Depth of Water in Monitoring Well April 19, 2023 (m)	Measured Elevation and Depth of Water in Monitoring Well June 7, 2023 (m)	Approximate Bottom of Monitoring Well Elevation (m)
1	327.60	324.19 (3.41)	323.73 (3.87)	312.36
2	328.88	325.87 (3.01)	--	318.21
3	326.95	321.48 (5.47)	321.20 (5.75)	311.71
4	321.81	321.43 (0.38)	320.67 (1.14)	315.71
5	325.82	325.40 (0.42)	324.55 (1.27)	319.72
6	328.84	323.76 (5.08)	322.28 (6.56)	316.65

It should be noted that groundwater conditions (particularly perched water) are generally dependent on the amount of precipitation, control of surface water, as well as the time of year, and can fluctuate significantly in elevation and volume.

Recommendations with respect to dewatering conditions are provided in Section 5.8 this report.

5.0 DISCUSSION AND RECOMMENDATIONS

The following sections of the report provide an interpretation of the factual geotechnical data obtained during the investigation and is intended for the guidance of the design engineer. Where comments are made on construction, they are provided only to highlight those aspects which could affect the design of the project. Contractors bidding on or undertaking the work should make their own independent interpretation of the factual subsurface information provided as it affects their proposed construction means and methods, equipment selection, scheduling, pricing, and the like.

Utilizing the information gathered during the geotechnical investigation and assuming that the borehole information is representative of the subsoil conditions throughout the site, the following comments and recommendations are provided.

5.1. Serviceability and Ultimate Limit Pressure

Based on the information obtained from Boreholes 4 to 10, the following table provides the estimated geotechnical reaction at the Serviceability Limit State (SLS) and the factored geotechnical resistance at the Ultimate Limit State (ULS) pressures at the various elevations, including soil types:

Borehole/ Monitoring Well No.	Ground Surface Elevation (m)	SLS kPa (psf)	ULS kPa (psf)	Estimated Highest Founding Elevation (m)	Depth to Highest Founding Elevation (m)	Soil Type
4	321.81	150 (3,000)	225(4,500)	320.29 to 315.10 (termination)	1.52 to 6.71 (termination)	Silty Sand/ Sand and Gravel
5	325.82	75 (1,500)	112 (2,250)	325.06 to 322.64	0.76 to 3.18	Silt
		150 (3,000)	225(4,500)	322.64 to 319.11 (termination)	3.18 to 6.71 (termination)	Sand and Gravel/ Silty Sand
6	328.84	150 (3,000)	225(4,500)	327.77 to 316.65 (termination)	1.07 to 12.19 (termination)	Sandy Silt
7	325.55	75 (1,500)	112 (2,250)	324.79 to 322.50	0.76 to 3.05	Silty Sand
		150 (3,000)	225(4,500)	322.50 to 320.37	3.05 to 5.18 (termination)	Sand and Gravel
8	328.35	150 (3,000)	225(4,500)	327.13 to 323.17 (termination)	1.22 to 5.18 (termination)	Silty Sand
9	328.30	150 (3,000)	225(4,500)	327.69 to 323.12 (termination)	0.61 to 5.18 (termination)	Silty Sand/ Sand and Gravel
10	327.93	150 (3,000)	225(4,500)	325.54 to 322.75 (termination)	2.39 to 5.18 (termination)	Silty Sand

The proposed founding elevation(s) for the various structures were not available at the time of report preparation. Based on the information provided in the table above, suitable founding soils capable of supporting conventional foundations designed with a bearing capacity of at least 150 kPa (3,000 psf) at SLS were generally encountered between approximate depths of 0.61 m and 3.18 m below the existing ground surface.

Should footings be designed to be constructed at elevations higher than the elevations indicated in the table above, then structural fill will be required in order to achieve the design grades for the proposed foundations. The serviceability limit pressure for good quality granular structural fill placed on suitable subgrade soils and compacted in accordance with Section 5.4.4 of this report is estimated to be at least 150 kPa (3,000 psf) at SLS and 225 kPa (4,500 psf) at ULS. Alternatively, lean mix concrete fill could be used, or footings could be stepped down to bear on approved undisturbed founding soils. Given the presence of fill and loose soils, it is imperative that the founding soils be assessed at the time of construction by qualified geotechnical personnel in order to confirm their founding suitability.

With respect to the Serviceability Limit State (SLS), the total and differential footing settlements are not expected to exceed the generally acceptable limits of 25 mm (1") and 19 mm (3/4") respectively.

Should wet to saturated soils be encountered during excavation, it is recommended that widened footings are considered for the support of the structure.

Footings founded on soil may be placed at a higher elevation relative to another footing provided that the slope between the outside face of the footings is separated by a minimum slope of 10 horizontal to 7 vertical (10H:7V) with an imaginary line projected from the underside of the footings.

It is recommended that structural foundation drawings be cross-referenced with site servicing drawings to ensure that service pipes do not conflict with building foundations (including the zone of influence down and away from the footings).

All exterior footings must be provided with a minimum of 1.2 m of soil cover or equivalent thermal insulation (sufficient thermal insulation is required to protect all footings and slab-on-grades during construction until such a time that the structure is heated) in order to provide protection against frost action.

5.2. Seismic Site Classification

The site classification for seismic response in Table 4.1.8.4 of the 2012 Ontario Building Code relates to the average properties of the upper 30.0 m of strata. The information obtained in the geotechnical field investigation was gathered from the upper 5.18 m to 12.19 m (17.0 ft to 40.0 ft) of strata. Based on the information gathered in the geotechnical field investigation, the site classification for seismic site response would be considered Site Class D (stiff soils) for structures founded on the native soils at the recommended founding elevations provided in Section 5.1 of this report as well as structures founded on structural fill placed in accordance with Section 5.4.4 of this report. The structural engineer responsible for the design of the structure should review the earthquake loads and effects.

5.3. Soil Design Parameters

The following table provides estimated soil design parameters for imported granular fill, as well as the native soils encountered on the subject site. It should be noted that earth pressure coefficients (Ka, Kp, Ko) provided are for flat ground surface conditions and will differ for areas with slopes or embankments.

The estimated soil design parameters can be utilized for the design of perimeter shoring, foundations and retaining walls, as required:

Soil Type	Soil Density (kg/m^3)	Friction Angle (Degree)	Coefficient of Active Pressure (K_a)	Coefficient of Passive Pressure (K_p)	Coefficient of At-Rest Pressure (K_o)	Coefficient of Friction (μ)	Cohesion (Undrained) (kPa)
Imported Granular 'A' (OPSS 1010)	2,100	34°	0.28	3.54	0.44	0.45	0
Imported Granular 'B' (OPSS 1010)	2,050	32°	0.31	3.25	0.47	0.41	0
Silty Sand/ Sandy Silt	1,750	30°	0.33	3.00	0.50	0.38	0
Sand and Gravel	1,950	33°	0.29	3.39	0.46	0.43	0
Silt	1,700	30°	0.33	3.00	0.50	0.38	5

5.4. Site Preparation

The site preparation for the proposed commercial development is anticipated to consist of the removal of all existing on-site structures, removal of existing trees, stripping of topsoil, the subexcavation of any loose/soft fill or native soils deemed not capable of supporting the design bearing capacity, removal or relocation of any existing services and buried piping (including any drainage tiles), followed by the placement of structural fill or lean mix concrete (as required) and site grading to achieve proposed grades.

5.4.1. Topsoil Stripping, Vegetation Removal, Fill/Loose Soil Subexcavation

All topsoil and vegetation (trees, shrubs) must be removed from the proposed construction area prior to site grading. The volume of topsoil removed during the stripping process is also relative to the equipment utilized for the stripping process as well as the moisture conditions at the time of stripping. If an excavator with a smooth bucket is utilized for stripping, there would generally be less potential for topsoil to become intermixed with the underlying (relatively loose) subsoil and therefore less concern of over-excavation to remove all topsoil. If the topsoil is stripped with wheeled equipment or bulldozers, then there is an increased potential for the topsoil and subsoil to become intermixed, subsequently requiring additional excavation to remove all topsoil. This can be further influenced by rutting which is often worse during wet conditions. The stripped topsoil may be used in landscaped areas where some settlement can be tolerated; otherwise, it should be properly disposed of off-site.

Any existing fill that is present, as well as any native soils that are considered unsuitable to support foundations, or soils with intermixed organics (including roots and all loose/disturbed soils associated with the roots) must be removed from within the proposed building envelopes and paved areas to expose approved competent subgrade soils. The subexcavated soils may be used in landscaped areas where some settlement can be tolerated; otherwise, it should be properly disposed of off-site.

5.4.2. Removal of Existing Structures

It is assumed that the existing structures such as the storage shed and fences will be removed to make way for the proposed development. Additionally, the abandoned truck and debris throughout the site should be removed prior to construction.

All concrete foundations (if applicable), backfill and any other subsurface infrastructure should be removed prior to the subgrade preparation for the proposed development. All excavations must be inspected and then backfilled as required according to the procedures outlined in Section 5.4.4 of this report. It is recommended that good quality imported sand and gravel (OPSS 1010 Type I, II or III Granular 'B' or an approved alternative) be placed as structural fill as required. Provided any concrete on-site (if encountered) is reduced to a maximum size of 100 mm, and all reinforcing steel and any deleterious materials are removed, the reduced concrete material may be combined with imported granular fill to be utilized as fill on-site. The reuse of this material, or any other site material, will be subject to approval from qualified geotechnical personnel.

5.4.3. Removal/Relocation of Existing Services and Buried Piping

Any existing services and buried pipes (including drainage tiles) that may be located within the proposed building envelopes must be removed/relocated. Any piping that is left in place that is no longer active must be completely sealed with watertight mechanical covers, concrete, or grout at termination points to prevent the migration of soils into pipe voids, which may result in potential settlement. All existing trench backfill material associated with any existing buried pipes must be subexcavated and the subsequent excavation must be backfilled with approved soils placed in accordance with Section 5.4.4 of this report.

It is a requirement of the Ontario Water Resources Act, Regulation 903, that any wells be decommissioned by an MECP licensed well contractor if they are no longer required. The six (6) monitoring wells that have been installed to determine static water levels and/or collect environmental samples can be decommissioned by an MECP licensed well contractor with a Class 1, Class 2, or Class 3 license in accordance with Reg. 903. The existing dug well near the existing shed must be decommissioned by an MECP licensed well contractor with a Class 1 license in accordance with Reg. 903. Alternatively, all of the wells can be decommissioned by an MECP licensed well contractor with a Class 1, license, as required.

5.4.4. Site Grading/Structural Fill

Following the removal of trees, stripping of topsoil/vegetation, as well as the subexcavation of all existing fill and any relatively loose native soils that are not considered suitable to support foundations, the exposed subgrade soils must be proof-rolled, and any observed soft or unstable areas must be further subexcavated and replaced with approved fill materials.

Any fill materials required to achieve the design site grades should be placed according to the following procedures:

- Prior to placement of any structural fill or bulk fill, the subgrade for the proposed new buildings and associated paved areas must be prepared large enough to accommodate a 1:1 slope commencing a distance of 1.0 m beyond the outside edge of the proposed foundations or pavement/concrete edge down to the approved competent founding soils;

- Soils approved for use as structural fill must be placed in loose lifts not exceeding 0.3 m (12") in depth for granular soils (recommended fill material) and 0.2 m (8") in depth for clayey or silty soils (not recommended for this application), or the capacity of the compactor (whichever is less);

- Approved imported granular fill materials (OPSS 1010 Type III Granular 'B' recommended for this application) can be compacted utilizing adequate heavy vibratory smooth drum or padfoot compaction equipment;

- Fine-grained silt and clay soils (not recommended for structural fill) must be compacted utilizing adequate heavy padfoot vibratory compaction equipment. It is imperative that if any stiff clayey soils (cohesive soils) are utilized for structural fill, the material must be broken down (pulverized) to minimize voids and reduce the potential for settlement;

- Approved fill materials must be at suitable moisture contents (at or near to the optimum moisture content as determined by laboratory Proctor testing) to achieve the specified compaction. Soil moisture will also be dependent on weather conditions at the time of construction. Granular soils may require the addition of water in order to achieve the specified compaction;

- Approved structural fill materials that will support structures (including building foundations, interior slab-on-grades, sidewalks, large expansive exterior slabs, and decks) must be compacted to a minimum of 100% standard Proctor maximum dry density (SPMDD).

- Approved bulk fill (foundation wall backfill, bulk fill under slab-on-grades that will not support footings or heavy point loading, bulk fill for parking areas) must be compacted to a minimum 95% SPMDD. It would be expected that the existing on-site native soils, free of any deleterious materials, would be suitable for use as bulk fill; however, depending on the time of year and weather conditions when construction takes place, some of the soils may require air-drying (or the addition of water) in order to achieve the specified density;

- Granular 'B' subbase and Granular 'A' base materials for any proposed parking areas and entrances must be compacted to 100% SPMDD.

It is possible that some of the wet soils may require significant air-drying along with working of the soils in order to achieve the specified compaction requirements of 100% SPMDD in the building areas (including 1:1 as required) and 95% SPMDD for bulk fill for any paved areas. Utilizing the existing soils during site grading may be more achievable if work is completed during the generally drier summer months. It should be noted, however, that due to the nature of some soils, during hot dry weather, the addition of water might be required in order to achieve the specified compaction. Reuse of excavated soils on-site will be subject to approval from qualified geotechnical personnel.

Due to the fine-grained nature of the native, typically silty soils encountered in the boreholes, they can be easily disturbed and subject to strength losses, making travel on this material somewhat difficult with conventional rubber-tired construction equipment such as dump trucks and even smooth drum vibratory compactors. Conditions should be expected to worsen if the subgrade soils are in a wet condition. Therefore, it is recommended that construction traffic be minimized, where possible, from driving on the subgrade soils. Depending on the time of year, it may be required to construct a haul road utilizing a Granular 'B' base.

5.5. Foundation Subgrade Preparation

The soils encountered in the boreholes are sensitive to changes in moisture content and can become loose/soft if the soils are subjected to additional water or precipitation, as well as severe drying conditions. The soils could also be easily disturbed if traveled on during construction. Once they become disturbed, they are no longer considered adequate for the support of foundations.

To ensure and protect the integrity of the founding soils during construction operations, the following is recommended:

- During construction, the subgrade should be sloped/ditched to a sump (as required) located outside the building footprints (if feasible) in the excavations to promote surface drainage of rainwater or seepage and the collected water should be pumped out of the excavation. It is critical that all water be controlled (not allowed to pond) and that the subgrade and foundation preparation commence in dry conditions;

- Should the native soils at the design founding elevation in the proposed building envelopes be comprised of wet/saturated soils, then a granular drainage layer, constructed in accordance with Section 9.14.4 of the current Ontario Building Code (OBC) may be required. Alternatively, a lean mix concrete mud mat may be placed over top of the subgrade soils to provide a stable base;

- Construction equipment travel and foot traffic on the founding soils should be minimized;

- If construction is to be undertaken during subzero weather conditions, the founding native soils and any potential fill materials must be maintained above freezing;

- Prior to placing concrete for the footings, the footing area must be cleaned of all disturbed or caved materials;

- The foundation formwork and concrete should be installed as soon as practical following the excavation, inspection and approval of the founding soils. The longer that the excavated soils remain open to weather conditions and groundwater seepage, the greater the potential for construction problems to occur;

- If it is expected that the founding soils will be left open to exposure for an extended period of time, it is recommended that a 75 mm concrete mud slab be placed in order to protect the structural integrity of the founding soils.

If wet soils are encountered at the founding elevations, pumping from properly constructed and filtered sumps located in the base of the excavation and outside of the bearing areas of any footings may be required to remove water from the excavation.

5.6. Slab-on-Grade/Modulus of Subgrade Reaction

Prior to the placement of the granular base material for any slab-on-grade construction, the subgrade soils should be proof-rolled. Any soft or weak zones, as well as the unsuitable fill in the subgrade, should be subexcavated and backfilled with approved fill materials (see Sections 5.4.4 and 5.10 of this report).

The following table provides the estimated modulus of subgrade reaction (k) for imported granular fill, as well as the native soils encountered on-site:

Soil Type	Estimated Modulus of Subgrade Reaction (k)
Imported Sand and Gravel (OPSS 1010)	81,000 kN/m^3 (300 lb/in^3)
Sandy Silt/Silty Sand (moist)	67,900 kN/m^3 (250 lb/in^3)
Sandy Silt/Silty Sand (wet)	40,700 kN/m^3 (150 lb/in^3)
Sand and Gravel	67,900 kN/m^3 (250 lb/in^3)
Silt	33,900 kN/m^3 (125 lb/in^3)

In dry conditions, the floor slabs/slabs-on-grade can be founded on a minimum thickness of 150 mm (6") of Granular 'A' (OPSS 1010) and compacted to 100% SPMDD. Alternatively, (particularly in wet conditions), 150 mm (6") of 19 mm clear crushed stone (OPSS 1004) could be utilized instead of Granular 'A'. The use of 19 mm clear crushed stone assists in creating a moisture barrier by reducing/preventing capillary rise of moisture from the subgrade. Compactive effort is required to consolidate the clear stone. The 19 mm clear crushed stone should meet the physical property and gradation requirements of OPSS 1004.

It is recommended that areas of extensive exterior slab-on-grade (including any entrance slabs, concrete loading areas and other large expansive slabs such as sidewalks and accessibility ramps) be constructed with a Granular 'B' subbase (450 mm) and a Granular 'A' base (150 mm), as well as incorporating subdrains, to promote rapid drainage and reduce the effects of frost heaving. This is particularly critical at barrier-free access points and at the location of swinging doors. Alternatively, structural frost slabs could be designed and constructed, or sufficient thermal insulation could be provided, at all door entrances and areas of barrier-free access.

5.7. Excavations

All excavations must be carried out in accordance with Ontario Regulation 213/91 (Reg 213/91) of the Occupational Health and Safety Act and Regulations for Construction Projects.

Type 3 Soils - In general, the native and fill soils in a drained state (not wet or saturated), would be classified as Type 3 soils under Reg 213/91. The Type 3 soils must be sloped from the bottom of the excavation at a minimum gradient of 1 horizontal to 1 vertical. Soils underlain by Type 4 soils that are exposed in the excavation must be treated Type 4 soils (see below). All saturated soils encountered must be treated as Type 4 soils, as described below.

Type 4 Soils - In general, any wet to saturated soils (if encountered) would be classified as Type 4 soils under Reg 213/91. Type 4 soils must be sloped from the bottom of the excavation at a minimum gradient of 3 horizontal to 1 vertical.

If it is not practical to excavate according to the above requirements, then a trench support system (designed in accordance with the Ontario Health and Safety Act Regulations) may be utilized. When using a temporary trench support system consisting of trench boxes to reduce the lateral extent of the excavations, it should be noted that the support system is intended primarily to protect workers as opposed to controlling lateral soil movement. Any voids between the excavation walls and the support system should be immediately filled to reduce the potential for loss of ground and to provide support to existing adjacent utilities and structures, and it is recommended that the excavation be carried out in short sections, with the support system installed immediately upon excavation completion. If the excavation is not a trench, no worker should be required to be closer to a wall of the excavation than the height of the excavated wall.

Sloughing/caving of the excavation walls should be expected when excavating into any wet to saturated soils. As such, it may be necessary to increase the width of the excavation to accommodate sloughing/caving soils.

5.8. Construction Dewatering Considerations

A total of six (6) monitoring wells are located on the site to measure static groundwater levels. Some of the fine-grained silty soils encountered throughout the site have the potential to create perched water conditions in any overlying soils. It should be noted that groundwater conditions (particularly perched water) are generally dependent on the amount of precipitation, control of surface water, as well as the time of year, and can fluctuate significantly in elevation and volume. As such, provisions for site dewatering should be part of the site development and construction process.

Seepage control requirements during construction will depend upon the area of work on the site, the depth of the excavations, the time of year, the amount of precipitation and the control of surface water. As required, seepage should generally be adequately controlled using conventional construction dewatering techniques such as pumping from sump pits. However, if heavy seepage occurs, it may be necessary to increase the number of pumps during construction.

Dewatering should be performed in accordance with OPSS 517 and the control of water must be in accordance with OPSS 518. It is the responsibility of the contractor to propose a suitable dewatering system based on the groundwater elevation at the time of construction. Collected water should discharge a sufficient distance away from the excavation to prevent re-entry. Sediment control measures must be installed at the discharge point of the dewatering system to avoid any potential adverse impacts on the environment.

5.9. Service Pipe Bedding

The native soils encountered in the geotechnical investigation are generally considered suitable for indirect support of the site service pipes. Should instability due to wet soil conditions be encountered, it may be necessary to increase the thickness of the granular base and utilize 19 mm clear stone to create an adequate supporting base for the service pipes and/or manholes. Pipe embedment, cover and backfill for both flexible and rigid pipes should be in accordance with all current and applicable OPSD, OPSS and OBC standards and guidelines and as follows.

Flexible Pipes – The pipe bedding should be shaped to receive the bottom of the pipe. If necessary, pipe culvert frost treatment should be undertaken in accordance with OPSD-803.031. The trench excavations should be symmetrical with respect to the centreline of the pipe. The granular material placed under the haunches of the pipe must be compacted to 95% SPMDD prior to the continued placement and compaction of the embedment material. The homogeneous granular material used for embedment should be placed and compacted uniformly around the pipe. Should wet conditions be encountered at the base of the trench, then the pipe bedding should consist of 19 mm clear stone (meeting OPS Specifications) wrapped completely in a geotextile fabric such as Terrafix 270 or equivalent.

Rigid Pipes - In general, the pipe installation recommendations for rigid pipes are the same as those for flexible pipes, except that the minimum bedding depth below a rigid pipe should be 0.15*D* (where *D* is the pipe diameter). In no case should this dimension be less than 150 mm or greater than 300 mm.

Any service pipes that are not provided with sufficient frost coverage must be protected with the necessary equivalent thermal insulation. The general contractor is responsible for protecting service piping from damage by heavy equipment.

5.10. Perimeter Building Drainage, Foundation Wall Backfill and Trench Backfill

In order to assist in maintaining dry buildings with respect to surface water seepage, it is recommended that exterior grades around the buildings be sloped down and away at a 2% gradient or more, for a distance of at least 1.5 m. Any surface discharge rainwater leaders must be constructed with solid piping that discharges with positive drainage at least 1.5 m away from the building foundations and/or beyond external slab-on-grades such as loading areas, sidewalks and accessibility ramps to a drainage swale or appropriate storm drainage system.

Depending on the design, founding elevations and groundwater conditions at the time of construction, it may be necessary to install a granular drainage layer to provide a suitable base for the foundations. The granular drainage layer must conform to the general requirements listed in Section 9.14.4 of the OBC 2012.

Due to some of the existing wet subsoil conditions observed, an exterior perimeter drainage system comprising perforated drainage pipe with a factory installed filter sock, bedded in 19 mm clear crushed stone, and wrapped in a geotextile filter fabric such as Terrafix 270R (or equivalent), is recommended to improve drainage around the buildings. The drainage system should be installed at the founding elevation and be constructed with positive drainage into a sump pit or other suitable outlet that provides positive drainage away from the structures. The portion of the piping that connects any exterior drainage system into an interior sump pit must comprise solid piping to prevent exterior water from being introduced into the interior subslab stone. It may be prudent to install perforated drainage pipe in the interior area as well as to provide an outlet for any water that may collect in the subslab stone. It is also recommended that a capped cleanout port(s) be extended up to the ground surface elevation to provide future access (if required). Rainwater leaders must not be connected to the perimeter drainage system. Foundation wall and slab-on-grade damp proofing and/or waterproofing must conform to current OBC regulations (as required).

In order to reduce the effects of surficial frost heave in areas that will be hard surfaced, it is recommended that the exterior foundation backfill consist of free-draining granular material such as imported sand or Granular 'B' Type I, or Type III (OPSS 1010), with a maximum aggregate size not exceeding 100 mm, and that it extend a minimum lateral distance of 600 mm out from the foundation walls and/or beyond perimeter sidewalks and entranceway slabs. It is critical that particles greater than 100 mm in diameter are not in contact with the foundation wall to prevent point loading and overstressing. The backfill material used against the foundation walls must be placed so that the allowable lateral capacities of the foundation walls are not exceeded. Where only one side of a foundation wall will be backfilled, and the height of the wall is such that lateral support is required, or where the concrete strength has not been achieved, the wall must be braced or laterally supported prior to backfilling. In situations where both sides of the wall are backfilled, the backfill should be placed in equal lifts, not exceeding 200 mm differential on each side during backfill operations and the backfill should be compacted to a minimum of 98% SPMDD.

It is recommended that frost tapers be constructed (refer to OPSD 3101.150 for typical details) in order to minimize differential frost action between the foundation wall backfill and the granular base of any adjacent paved areas. The frost taper must be constructed utilizing the OPSS 1010 granular material that is used for the foundation wall backfill.

The native soils, free of organics, are generally considered suitable for reuse as trench backfill and bulk fill in the paved areas; however, any wet soils encountered may require air-drying in order to achieve the specified compaction. Air-drying cannot typically be achieved during winter construction; therefore, depending on the time of year that construction takes place, it may be more feasible to utilize an imported granular fill for this project (keeping in mind that frost tapers, as noted above, would be recommended to minimize differential frost heave).

Backfilling operations should be carried out with the following minimum requirements:

- Adequate heavy padfoot vibratory compaction equipment should be used for the compaction and to break down any large blocky pieces of soil;

- Loose lift thicknesses should not exceed 0.3 m (12") for granular soils (sand and gravel) or 0.2 m (8") for clay and silt soils (cohesive) or the capacity of the compactor (whichever is less);

- The soils must be at suitable moisture contents to achieve compaction to a minimum 95% SPMDD in non-structural bulk fill areas. Service trenches excavated within the zone of influence of footings for structures must be compacted to a minimum of 100% SPMDD;

- It is recommended that inspection and testing be carried out during construction to confirm backfill quality, thickness and to ensure that compaction requirements are achieved;

- Service trench backfill materials may consist of approved excavated soils with no particles greater than 100 mm and no topsoil or other deleterious materials;

- If construction operations are undertaken in the winter, strict consideration should be given to the condition of the backfill material to make certain that frozen material is not used.

5.11. Pavement Design/Drainage

Any soils containing organics or other deleterious material must be subexcavated from within the proposed parking areas and entrances. It is recommended to either subexcavate any existing loose subgrade materials or provide further consolidation with vibratory compaction equipment in order to prepare a proper, stable subgrade. Prior to placement of the granular base, the subgrade must be proof-rolled, and any soft or unstable areas should be subexcavated and replaced with suitable approved materials. The subgrade should be graded smooth (free of depressions) and properly crowned to ensure positive drainage, with a minimum grade of 3% toward the drainage outlet or curb line. When service pipes are installed, pipe bedding and backfilling should be undertaken as indicated in Sections 5.9 and 5.10 of this report.

Rapid drainage of the pavement structure is critical to ensure long-term performance. As such, it is recommended to install subdrains for this project (provided gravity drainage to a suitable outlet can be provided). Subdrains should be designed and installed in accordance with OPSS 405 and OPSD 216.021. If Granular 'A' bedding (OPSS 1010) is utilized, the subdrains should be equipped with a factory installed filter sock. If 19 mm clear stone (OPSS 1004) is utilized as bedding for the subdrain (recommended for this application), then the bedding must be wrapped completely with geotextile filter fabric such as Terrafix 270R (or equivalent). Installation of rigid subdrains allows for better grade control and less potential for damage during installation or service. Positive drainage through grade control of subdrains is critical, as improperly installed subdrains can turn drainage systems into reservoirs, which can fuel frost action. The subdrains will hasten the removal of water, thereby reducing the risk and effects of frost heaving and load transfer in saturated conditions. It is suggested that subdrains be installed at regular intervals (to be designed based on layout of catch basins and storm sewers) through paved parking areas. It is also recommended to install subdrains through any areas that cannot tolerate differential frost heave such as accessibility ramps/sidewalks. The subdrains should be installed in a 0.3 m (1.0 ft) by 0.3 m (1.0 ft) trench in the subgrade and bedded approximately 50 mm (2") above the bottom of the trench. The subgrade must be prepared with positive drainage to the subdrains and the subdrains must be installed with positive drainage into a catch basin structure or other suitable outlet.

The native, typically silty subgrade soils are highly sensitive to changes in moisture content and can become loose or soft if the soils are subject to inclement weather and seepage or severe drying. Furthermore, the subgrade soils could be easily disturbed if traveled on during construction. As such, where this material will be exposed, it is recommended that the granular subbase be placed immediately upon completion of the subgrade preparation to protect the integrity of the subgrade soils.

Should wet conditions be encountered during construction, site assessments may be required to determine what options can be undertaken to construct a modified pavement base. These options may include subexcavation of loose/soft soils, increasing the thickness of the granular base, the use of reinforcing geotextiles or geogrids, or a combination of all.

It is expected that the parking areas will experience both light traffic (cars) and heavy traffic (transport trucks, maintenance/delivery vehicles). Based on the anticipated vehicle loading and frost-susceptibility of the subgrade soils, the following pavement design is provided:

Material		**Recommended Thickness for Light Traffic**	**Recommended Thickness for Heavy Traffic**	**Compaction Requirements**
Asphaltic Concrete (OPSS 1150 and OPSS 310)	HL3 Surface Coarse	40 mm (1.5")	40 mm (1.5")	92% MRD
	HL4 or HL8 Binder Coarse	50 mm (2.0")	70 mm (2.75")	
Granular 'A' Base (OPSS 1010)		150 mm (6.0")	150 mm (6.0")	100% SPMDD
Granular 'B' Subbase (OPSS 1010 Type III)		300 mm (12.0")	450 mm (18.0")	

Construction joints in the surface and binder asphalt must be offset a minimum of 150 mm to 300 mm (6" to 12") from construction joints in the binder asphalt so that longitudinal joints do not coincide.

Should any new asphalt be joined into existing asphalt, it is recommended that the existing asphalt be sawcut in a straight line prior to being milled to a depth of 80 mm and a width of 300 mm as per OPSD 509.010. It is recommended that a tackcoat in conformance with OPSS 308 be applied to the edge and surface of all milled asphalt prior to placement of new asphalt.

The granular base and subbase materials must conform to the physical property and gradation requirements of OPSS 1010 and must be compacted to 100% SPMDD. Asphaltic concrete should be supplied, placed, and compacted to a minimum 92.0% Marshall maximum relative density, in accordance with OPSS 1150 and OPSS 310.

The pavement should be designed to ensure that water will not pond on the pavement surface. If the surface asphalt is not placed within a reasonable time following placement of the binder asphalt, it is recommended that the catch basin lids are set at a lower elevation or apertures provided to allow surface water to drain into the catch basins and not accumulate around the catch basins. The strength of the pavement structure relies on all of the components to be in place in order to provide the design strength; therefore, it is strongly recommended that the surface asphalt be placed shortly after placement of the binder asphalt so as to avoid undue stress on the binder asphalt by not having the complete pavement structure in place.

It should be noted that, currently, asphalt mixes tend to be more flexible and, as such, there is a tendency for damage to occur from vehicles turning their steering wheels or applying excessive brake pressure. The condition is further intensified during hot weather. In high traffic areas or areas subjected to frequent turning of heavy vehicles, it is recommended that rigid Portland cement pavement be considered.

5.12. Stormwater Infiltration

It is understood that the project will include a stormwater management pond. As such, laboratory grain size analyses were performed on representative samples of the native soils from the boreholes. Based on the grain size distribution curves for the samples, the estimated coefficient of permeability values (k) are provided in the following table:

Borehole/ Monitoring Well No.	Depth (m)	Estimated Coefficient of Permeability (cm/sec)	Soil Type (USCS)
4	1.52 to 2.13	1.3×10^{-5}	Silty sand, some gravel, trace clay (SM)
4	3.66 to 4.57	1.8×10^{-5}	Sandy, silty gravel, Trace clay (GM)
5	1.52 to 2.13	$<1.0 \times 10^{-6}$	Silt, some clay, trace sand and gravel (ML)
5	2.29 to 2.90	$<1.0 \times 10^{-6}$	Silt, some clay, trace sand and gravel (ML)
6	1.52 to 2.13	1.3×10^{-5}	Sandy silt, some gravel, trace clay (ML)

It should be expected that potential infiltration rates will be reduced where dense soils as well as groundwater are encountered.

5.13. T-time for On-Site Sewage Disposal System

It is proposed that a new on-site sewage disposal system (OSSDS) be constructed on the property to service the proposed development. As such, Boreholes 4 and 5 were advanced in the general vicinity of the proposed OSSDS. Representative soil samples were collected and submitted to the CMT Inc. laboratory for grain size analyses and percolation rate determinations, shown in the following table:

Borehole/ Monitoring Well No.	Depth (m)	Estimated Percolation Rate T-time (min/cm)	Soil Type (USCS)
4	1.52 to 2.13	15	Silty sand, some gravel, trace clay (SM)
4	3.66 to 4.57	12	Sandy, silty gravel, trace clay (GM)
5	1.52 to 2.13	40	Silt, some clay, trace sand and gravel (ML)
5	2.29 to 2.90	40	Silt, some clay, trace sand and gravel (ML)

The above table can be referenced for the design of the leaching bed. Additionally, the groundwater elevations must be considered if a Class 4 sewage disposal system is installed.

The OSSDS must be installed by a qualified designer and installer in accordance with the current Ontario Building Code.

It should be noted that the test results are based on small samples collected throughout the site and does not constitute a guarantee for the entire septic bed area. It is the responsibility of the contractor and/or qualified inspector to ensure that the prepared subgrade and underlying soils are consistent with the soil tested. Additional test samples should be obtained and tested to see if there is a variation observed.

5.14. Radon

According to information provided by Health Canada, radon is a radioactive gas that is naturally formed through the breakdown of uranium in soil, rock, and water. When radon escapes the earth in the outdoors, it mixes with fresh air, resulting in concentrations that are too low to be of concern. However, when radon enters an enclosed space, such as a building, high concentration of radon can accumulate and become a health concern. Health Canada indicates that most buildings and homes have some level of radon in them. Unfortunately, it is not possible to predict before construction whether or not a new building will have high radon levels as radon can only be detected by radon measurement devices, which would be installed in a building, post construction. Section 9.13.4.1 Soil Gas Control of the current 2012 Ontario Building Code (OBC) states that *"Where methane or radon gases are known to be a problem, construction shall comply with the requirements for soil gas control in MMAH Supplementary Standard SB-9, Requirements for Soil Gas Control"*.

5.15. Chemical Analysis/Excess Soil Management

As per Ontario Regulation 406/19, if surplus/excess soils are to be exported off-site, it is typically necessary to undertake some environmental reporting and chemical analyses of the soils. Chemical analysis was **NOT** undertaken by CMT Inc. as part of this geotechnical investigation. Should chemical analysis tests be required, the required tests vary and will be dependent on the disposal site utilized by the general contractor.

At this time there are no estimates available for the volume of excess soil that may be removed from this site (if any). O. Reg. 406/19 indicates that the minimum amount of testing required based on a volume of excess soil of less than 600 m^3 would be three (3) soil samples plus one (1) duplicate (total of four (4) soil samples required) and that one (1) additional sample be tested for every additional 200 m^3 (for volumes of excess soils between the range of 600 m^3 and 10,000 m^3). This testing can be undertaken at the time of construction; however please keep in mind that the testing is currently taking in excess of ten (10) business days to complete which could lead to contractor delays at the time of construction).

It should be noted that additional samples and testing parameters may be required based on the disposal site chosen by the contractor; as well, if any of the soils sampled are found to be impacted then additional parameters and leachate testing (TCLP/SPLP) may be required.

5.15.1. Leachate Testing Requirement

If soils are transported to a landfill facility, additional chemical testing in accordance with Ontario Regulation 347, Schedule 4, as amended to Ontario Regulation 558/00, dated March 2001, leaching testing will be required. When transporting soils off-site, the following is recommended:

- All chemical analyses and environmental assessment reports must be fully disclosed to the receiving site owners/authorities, whom must agree to receive the material;
- An environmental consultant must confirm the land use at the receiving site is compatible to receive the material;
- An environmental consultant must monitor the transportation and placement of the materials to ensure that the material is placed appropriately at the preapproved site;
- The excess materials may not be transported to a site that has previously had a Record of Site Condition (RSC) filed, unless the material meets the criteria outlined in the RSC.

It should be noted that landfill sites will generally only accept laboratory test results that have been completed within 30 days of exporting. Therefore, it is recommended that provisions for chemical analysis be included in the tender documents.

6.0 SITE INSPECTION

Qualified geotechnical personnel should supervise excavation inspections as well as compaction testing for structural filling, site grading and site servicing. This will ensure that footings are founded in the proper strata and that proper material and techniques are used and the specified compaction is achieved. CMT Engineering Inc. would be pleased to review the design drawings and provide an inspection and testing program for the construction of the proposed commercial development.

7.0 LIMITATIONS OF THE INVESTIGATION

This report is intended for the Client named herein and for their Client. The report should be read in its entirety, and no portion of this report may be used as a separate entity. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review our recommendations when the drawings and specifications are complete, or if the proposed construction should differ from that mentioned in this report.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments are based on the results obtained at the test locations only. It is therefore assumed that these results are representative of the subsoil conditions across the site. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations.

It should be noted that this report specifically addresses geotechnical aspects of the project and does not include any investigations or assessments relating to potential subsurface contamination. As such, there should be no assumptions or conclusions derived from this report with respect to potential soil or water contamination. This geotechnical investigation was carried out in conjunction with a hydrogeological study completed by HCS, provided under separate cover.

The samples obtained during the geotechnical investigation will be stored for a period of three months, after which time they will be disposed of unless alternative arrangements are made.

We trust that this report meets with your present requirements. Should you have any questions, please do not hesitate to contact our office.

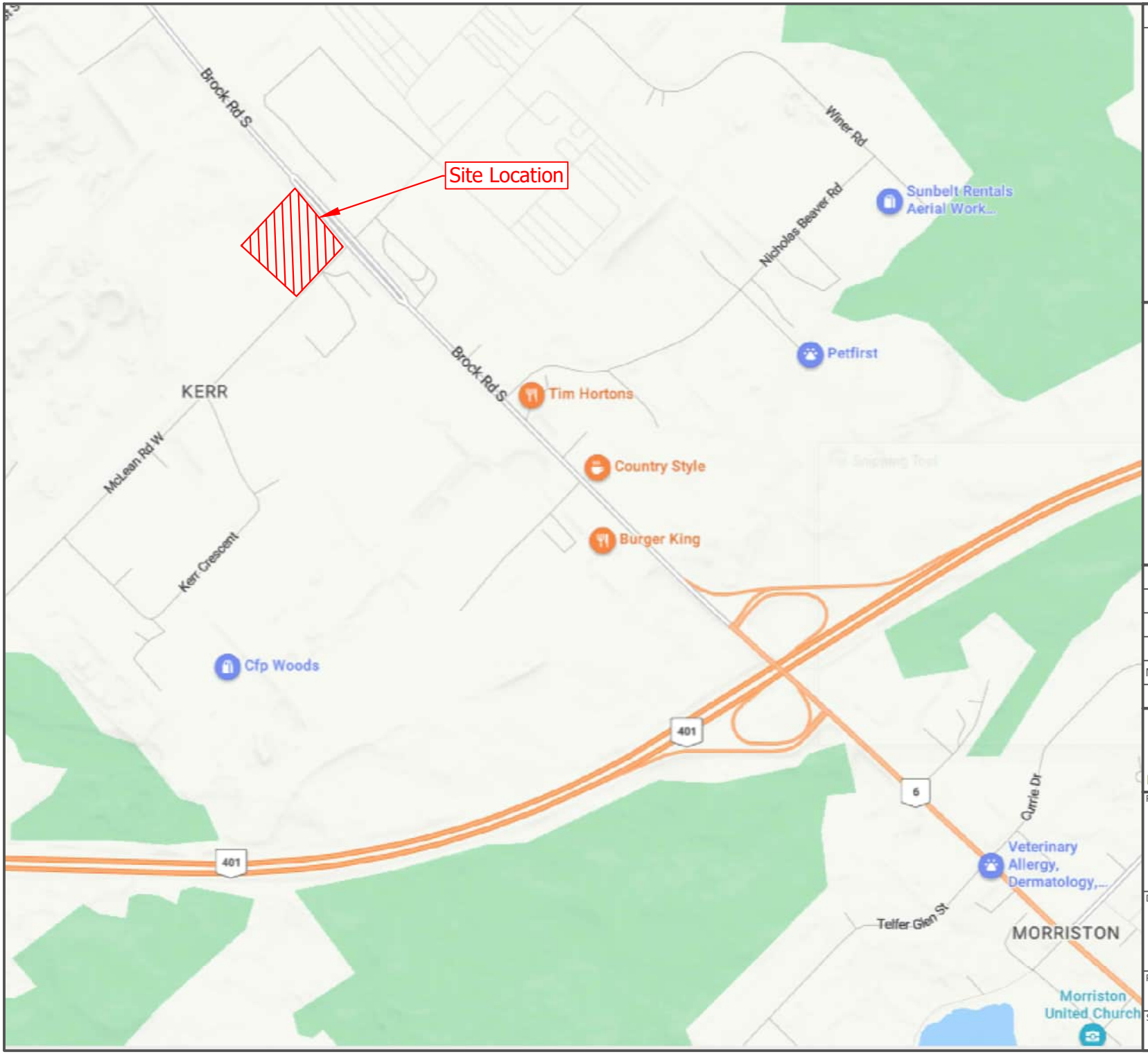
Prepared by: Reviewed by:

[redacted]

Brittany Lingelbach, C. Tech., rcji [redacted] Nathan Chortos, P.Eng.
Senior Geotechnical Engineer

ht





NOTES:

Base map provided by Bing Maps.

N

NO.	DESCRIPTION	DATE

REVISIONS

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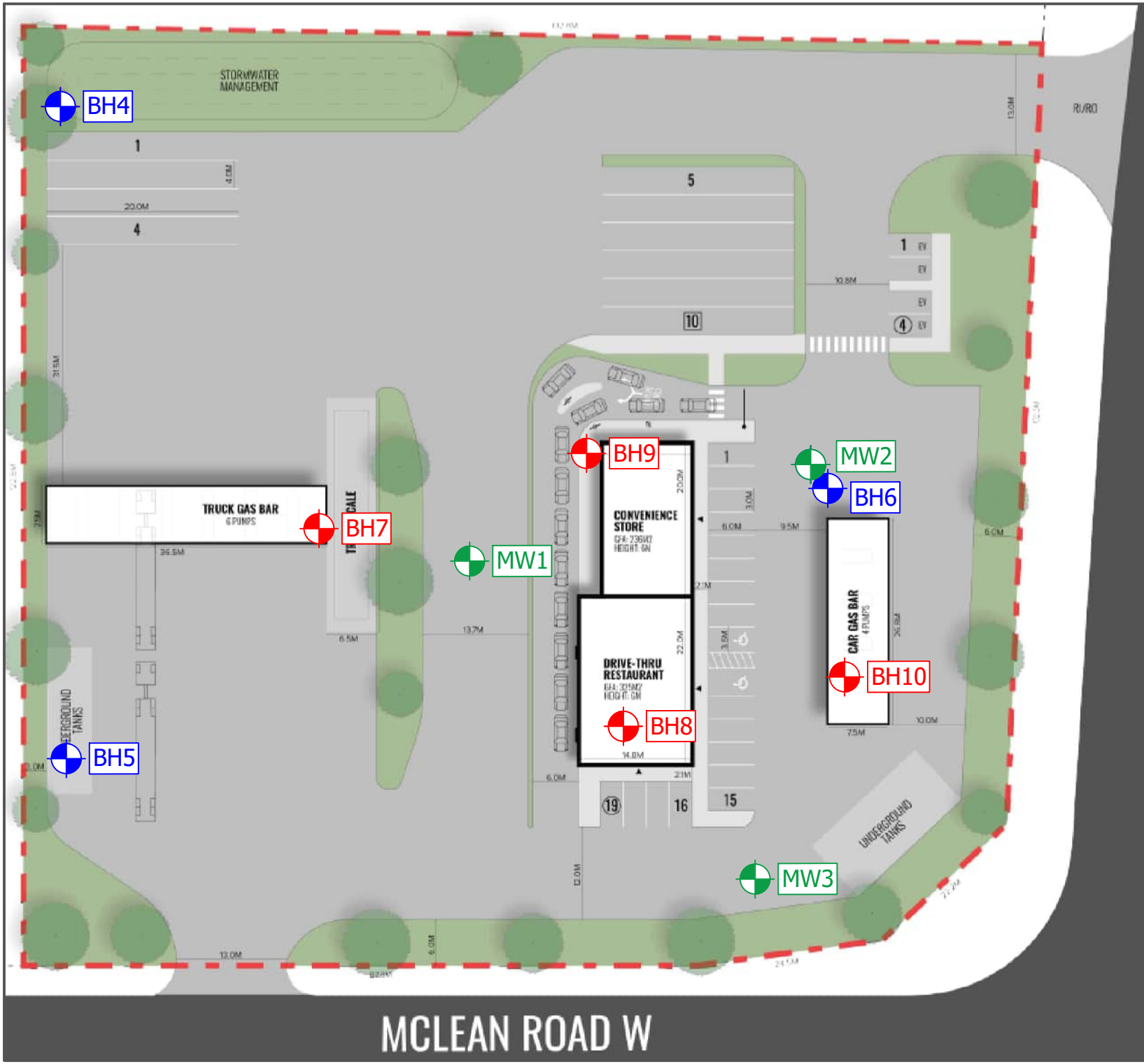
PROJECT:

Geotechnical Investigation
7456 McLean Road
Puslinch, Ontario

DRAWING TITLE:

SITE LOCATION

PROJECT NO.:	DATE:
23-133	May 8, 2023
SCALE:	DRAWING NO.
N.T.S.	1



NOTES:

Base map provided by Client.

Legend

- CMT Borehole
- CMT Borehole with Monitoring Well
- Existing Monitoring Well

N

NO.	DESCRIPTION	DATE

REVISIONS

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Geotechnical Investigation
7456 McLean Road
Puslinch, Ontario

DRAWING TITLE:

AERIAL VIEW SHOWING BOREHOLE LOCATIONS

PROJECT NO.:	DATE:
23-133	May 8, 2023
SCALE:	DRAWING NO.
N.T.S.	2

APPENDIX A

BOREHOLE LOGS

CMT Engineering Inc.
1011 Industrial Crescent
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Telephone: 519-699-5775
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BOREHOLE NUMBER 4

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

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
0	**TOPSOIL:** Loose, dark brown silty topsoil, moist (100 mm)	0.00, 321.81					
		0.10, 321.71	SPT 1	10	2-4-4-4 (8)	8, 21.4	
	SILTY SAND: Loose, brown silty sand, some gravel, trace clay, trace intermixed topsoil/rootlets, moist						
1	no intermixed topsoil/rootlets observed becoming compact, very moist to wet	0.76, 321.05					
		0.81, 321.00	SPT 2	50	5-6-5-8 (11)	11, 11.7	
			SPT 3	50	13-11-8-8 (19)	19, 12.8	Bentonite Seal 38mm Riser
2	becoming moist	2.44, 319.37	SPT 4	75	9-15-10-8 (25)	25, 10.7	
3	**SAND AND GRAVEL:** Compact, brown sandy, silty gravel, trace clay, moist	3.05, 318.76	SPT 5	75	10-13-14-27 (27)	27, 8.3	
4			MC5 6	100		8.7	#2 Sand Pack
			SPT 7	100	9-8-7-10 (15)	15, 11.9	38mm Screen
5							Water Level measured at 1.14m (Elev. 320.67m) on June 7, 2023
6			MC5 8	100		10.5	

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

BOREHOLE NUMBER 5

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

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
0	**TOPSOIL:** Loose, dark brown silty topsoil, moist (100 mm)	0.00, 325.82	SPT 1	10	1-0-0-00 (0)
	SILT: Very loose to loose, brown silt, some clay, trace sand and gravel, trace intermixed topsoil/rootlets, moist	0.10, 325.72			
1	no intermixed topsoil/rootlets observed, very moist	0.76, 325.06	SPT 2	50	4-5-4-3 (9)
2			SPT 3	75	3-3-4-4 (7)
			SPT 4	100	3-4-4-8 (8)
3	**SAND AND GRAVEL:** Dense, brown silty sand and gravel, trace clay, very moist	3.18, 322.64	SPT 5	100	11-17-20-42 (37)
4	wet sand seam encountered	3.81, 322.01	MC5 6	100	
			SPT 7	100	11-12-14-16 (26)
5	wet sand seam encountered	5.49, 320.33	MC5 8	100	
6	**SILTY SAND:** Very dense, brown silty sand, some gravel, trace clay, moist	5.59, 320.23	SPT 9	100	37-36-29-49 (65)

SPT N VALUE
10 20 30 40
POCKET PEN. (kPa)
90 180 270 360
MOISTURE CONTENT (%)
12 24 36 48

9, 22.4, 7, 19.5, 8, 12.2, 37, 8.1, 15.8, 26, 14.6, 18.2, >>, 8.5

WELL DIAGRAM
Bentonite Seal
38mm Riser
#2 Sand Pack
38mm Screen
Water Level measured at 1.27m (Elev. 324.55m) on June 7, 2023

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.

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

BOREHOLE NUMBER 6

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

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)
	TOPSOIL: Loose, dark brown silty topsoil, moist (80 mm)	0.00, 328.84				
	FILL: Compact, brown to dark brown sand fill, trace intermixed topsoil/rootlets, moist	0.08, 328.76	SPT 1	50	3-4-11-17 (15)	15; 6.1
1	**SANDY SILT:** Loose to compact, brown sandy silt, some gravel, trace clay, moist	0.76, 328.08	SPT 2	50	3-8-5-6 (13)	13; 13.1
2			SPT 3	75	5-6-7-8 (13)	13; 11.8
3			SPT 4	75	8-11-10-10 (21)	21; 9.9
	occasional wet seams	3.35, 325.49	SPT 5	100	10-9-11-12 (20)	20; 10
4			MC5 6	100		11.6
5			SPT 7	100	12-11-13-18 (24)	24; 11.5
6			MC5 8	100		11.1
7	becoming dense, grey-brown	6.86, 321.98	MC5 9	100		10.6
8						
9			MC5 10	100		9

WELL DIAGRAM: 38mm Riser; #2 Sand Pack; Bentonite Seal

(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: Proposed Development

PROJECT ADDRESS: 7456 McLean Road

PROJECT NUMBER: 23-133

PROJECT LOCATION: Puslinch, Ontario

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
		becoming dense, grey-brown *(continued)*	6.86, 321.98 *(continued)*					
10				MC5 11	100		8.5	Water Level measured at 6.56m (Elev. 322.28m) on June 7, 2023
11								38mm Screen
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.

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

BOREHOLE NUMBER 7

PROJECT: Proposed Development
PROJECT ADDRESS: 7456 McLean Road
PROJECT NUMBER: 23-133
PROJECT LOCATION: Puslinch, Ontario
DRILLING DATE: 23-4-13
GROUND ELEVATION: 325.55 m
DRILLING CONTRACTOR: CMT DRILLING INC.
LOGGED BY: BL
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
		TOPSOIL: Loose, dark brown silty topsoil, moist (80 mm)	0.00, 325.55					
			0.08, 325.47	SPT 1	25	0-1-3-3 (4)	4; 21.7	
1		**SILTY SAND:** Loose, brown silty sand, trace gravel and clay, moist		SPT 2	100	3-4-4-5 (8)	8; 9.8	
				SPT 3	75	3-3-2-2 (5)	5; 20.6	
2		becoming wet	2.29, 323.26	SPT 4	100	1-1-2-2 (3)	3; 23.9	
3		**SAND AND GRAVEL:** Compact, brown silty sand and gravel, trace clay, wet	3.05, 322.50	SPT 5	75	5-6-8-8 (14)	14; 18.3	
4				MC5 6	100		16.1	
5				SPT 7	100	8-8-11-27 (19)	19; 16	

Bottom of borehole at 5.18 m, Elevation 320.37 m.

Borehole caved at approximately 3.35 m below the ground surface.

Accumulated groundwater encountered upon completion.

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

BOREHOLE NUMBER 8

PROJECT: Proposed Development
PROJECT ADDRESS: 7456 McLean Road
PROJECT NUMBER: 23-133
PROJECT LOCATION: Puslinch, Ontario
DRILLING DATE: 23-4-13
GROUND ELEVATION: 328.35 m
DRILLING CONTRACTOR: CMT DRILLING INC.
LOGGED BY: BL
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
		TOPSOIL/FILL: Loose, dark brown silty topsoil/silty sand fill, moist (860 mm)	0.00, 328.35	SPT 1	50	1-2-2-2 (4)	4	
1		**SILTY SAND:** Loose to compact, brown silty sand, some gravel and clay, moist	0.86, 327.49	SPT 2	50	5-4-6-8 (10)	10, 8.9	
		becoming compact	1.22, 327.13					
2				SPT 3	50	6-6-10-8 (16)	16, 15.7	
				SPT 4	75	8-6-7-9 (13)	13, 7.7	
3				SPT 5	100	6-8-10-14 (18)	18, 9.2	
4				MC5 6	100		9.6	
				SPT 7	100	12-13-20-17 (33)	33, 9	
5								

Bottom of borehole at 5.18 m, Elevation 323.17 m.

Borehole caved at approximately 3.35 m below the ground surface.

Accumulated groundwater encountered upon completion.

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

BOREHOLE NUMBER 9

PROJECT: Proposed Development
PROJECT ADDRESS: 7456 McLean Road
PROJECT NUMBER: 23-133
PROJECT LOCATION: Puslinch, Ontario
DRILLING DATE: 23-4-13
GROUND ELEVATION: 328.30 m
DRILLING CONTRACTOR: CMT DRILLING INC.
LOGGED BY: BL
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
		FILL: Loose, grey-brown silty sand and gravel fill, moist	0.00, 328.30	SPT 1	25	8-5-4-3 (9)	9, 4	
1		**SILTY SAND:** Compact, brown silty sand, some gravel and clay, moist	0.61, 327.69	SPT 2	50	10-7-7-5 (14)	14, 9.8	
2		**SAND AND GRAVEL:** Compact to dense, brown silty sand and gravel, trace clay, very moist	1.52, 326.78	SPT 3	50	4-5-5-5 (10)	10, 12.2	
				SPT 4	50	10-13-16-21 (29)	29, 10.8	
3				SPT 5	50	12-11-13-12 (24)	24, 10.9	
4				MC5 6	100		10.7	
5				SPT 7	100	14-23-27-21 (50)	50, 10.6	

Bottom of borehole at 5.18 m, Elevation 323.12 m.

Borehole open to termination.

No accumulated groundwater encountered upon completion.

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

BOREHOLE NUMBER 10

PROJECT: Proposed Development
PROJECT ADDRESS: 7456 McLean Road
PROJECT NUMBER: 23-133
PROJECT LOCATION: Puslinch, Ontario
DRILLING DATE: 23-4-13
GROUND ELEVATION: 327.93 m
DRILLING CONTRACTOR: CMT DRILLING INC.
LOGGED BY: BL
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
0	**TOPSOIL:** Very loose, dark brown silty topsoil, moist (130 mm)	0.00, 327.93	SPT 1	50	1-0-1-1 (1)
		0.13, 327.80			
	FILL: Very loose to loose, dark brown silty sand fill, occasional black staining, wood pieces, moist				
1			SPT 2	100	1-2-2-2 (4)
2			SPT 3	100	2-3-5-2 (8)
	SILTY SAND: Compact, brown silty sand, some gravel and clay, moist	2.39, 325.54	SPT 4	50	7-10-11-11 (21)
3			SPT 5	100	10-12-14-13 (26)
	occasional wet sand seams encountered	3.66, 324.27	MC5 6	100	
4			SPT 7	100	9-18-27-12 (45)
5					

SPT N VALUE: 10 20 30 40
POCKET PEN. (kPa): 90 180 270 360
MOISTURE CONTENT (%): 12 24 36 48

SPT 1: 1
SPT 2: 4
SPT 3: 8
SPT 4: 21
MOISTURE CONTENT: 21.1
SPT 5: 26
MOISTURE CONTENT: 9.6
MC5 6: 14.3
SPT 7: 45
MOISTURE CONTENT: 10

WELL DIAGRAM

Bottom of borehole at 5.18 m, Elevation 322.75 m.

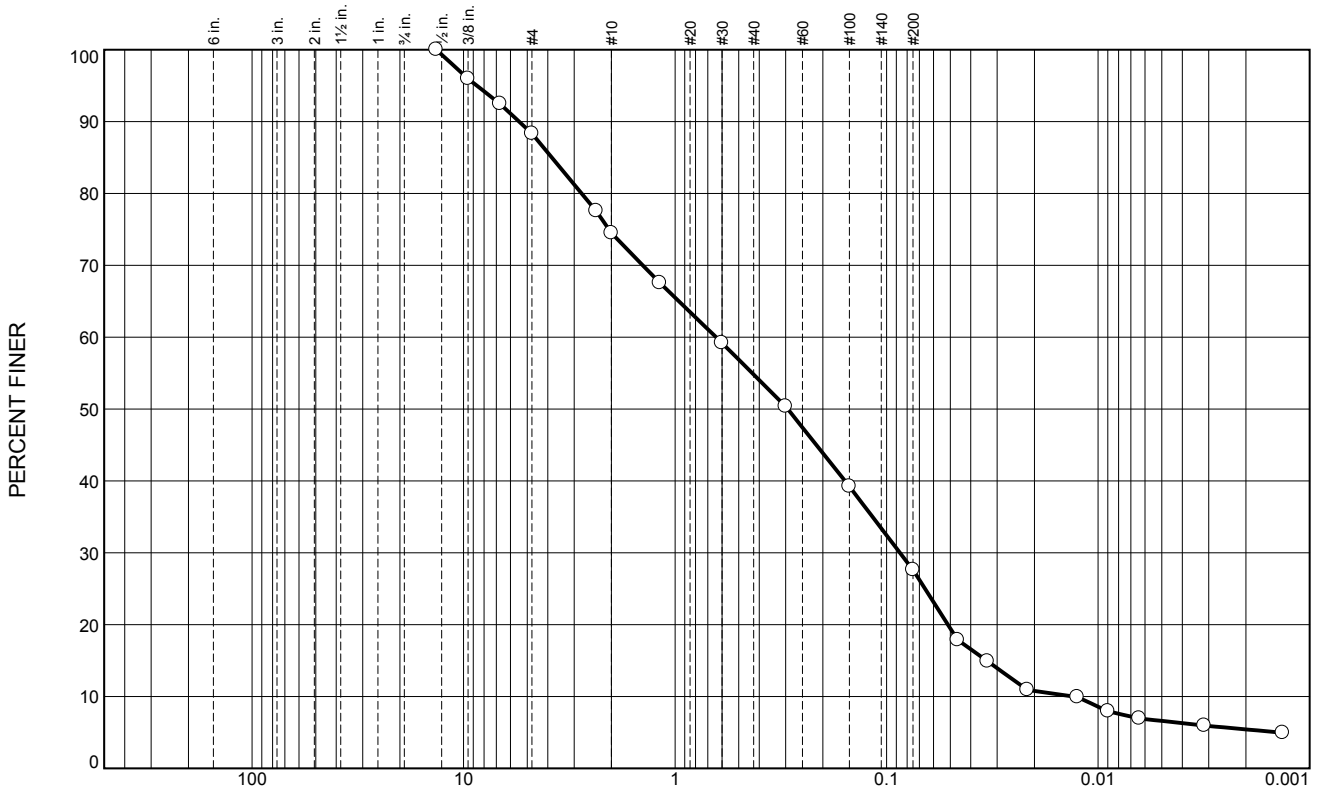
Borehole open to termination.

No accumulated groundwater encountered upon completion.

APPENDIX B

GRAIN SIZE ANALYSES

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	11.7	13.8	19.7	27.2	22.2	5.4

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH4	3	1.52-2.13m	silty sand, some gravel, trace clay	SM
				Estimated Percolation Rate; T = 15 min/cm	
				Sampled by BL of CMT Engineering Inc. April 12, 2023	
				Tested by JM of CMT Engineering Inc. April 27, 2023	

CMT Engineering Inc.

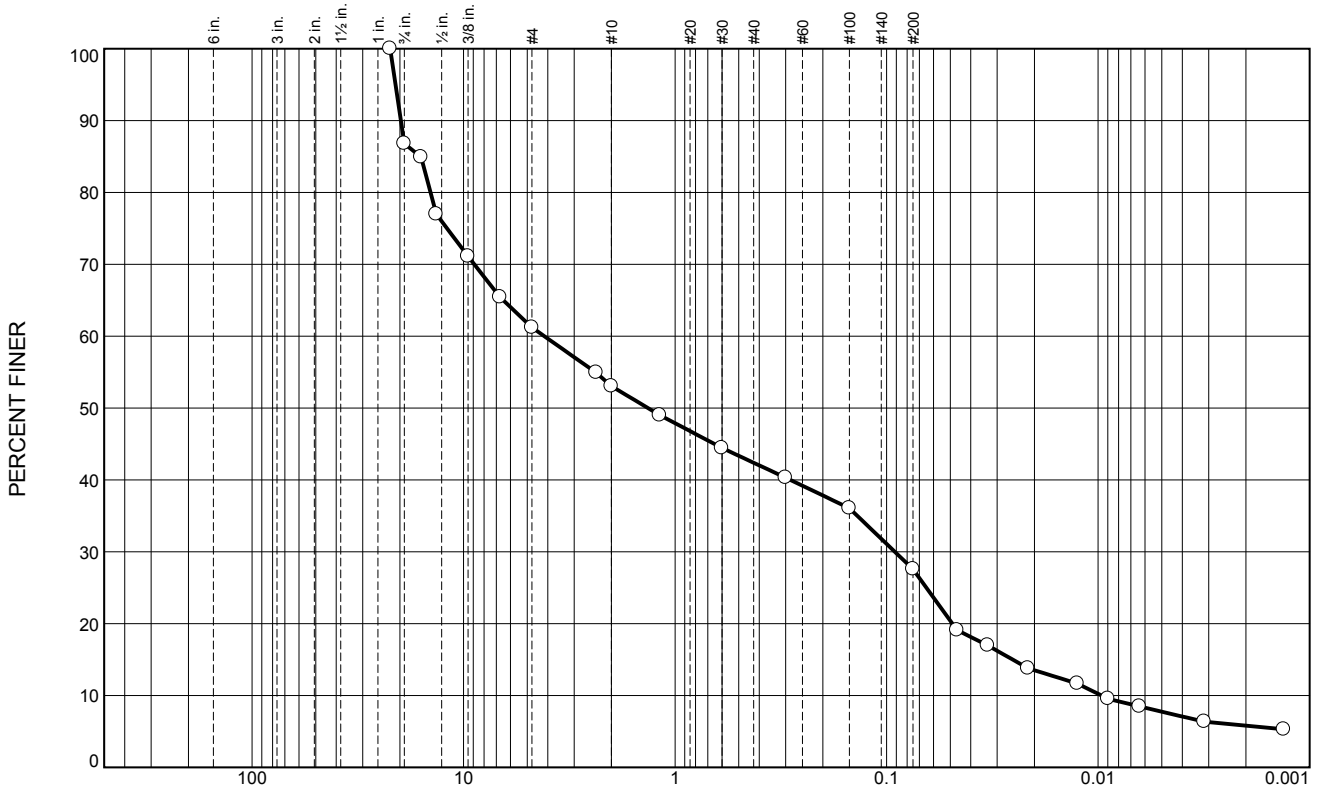
St. Clements, ON

Client: Blackhart Construction

Project: Proposed Development
7456 McLean Road, Puslinch, Ontario

Project No.: 23-133 **Figure** 1

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	13.2	25.6	8.2	10.6	14.8	21.8	5.8

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH4	6	3.66-4.57m	sandy, silty gravel, trace clay	GM
				Estimated Percolation Rate; T = 12 min/cm	
				Sampled by BL of CMT Engineering Inc. April 12, 2023	
				Tested by JM of CMT Engineering Inc. April 27, 2023	

CMT Engineering Inc.

St. Clements, ON

Client: Blackhart Construction

Project: Proposed Development
7456 McLean Road, Puslinch, Ontario

Project No.: 23-133 **Figure** 2

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.2	0.2	0.1	4.9	78.7	15.9

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH5	3	1.52-2.13m	silt, some clay, trace sand and gravel	ML
				Estimated Percolation Rate; T = 40 min/cm	
				Sampled by BL of CMT Engineering Inc. April 12, 2023	
				Tested by JM of CMT Engineering Inc. April 27, 2023	

CMT Engineering Inc.

St. Clements, ON

Client: Blackhart Construction

Project: Proposed Development
7456 McLean Road, Puslinch, Ontario

Project No.: 23-133 **Figure** 3

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.1	0.4	0.8	6.1	73.7	18.9

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH5	4	2.29-2.90	silt, some clay, trace sand and gravel	ML
				Estimated Percolation Rate; T = 40 min/cm	
				Sampled by BL of CMT Engineering Inc. April 12, 2023	
				Tested by JM of CMT Engineering Inc. April 27, 2023	

CMT Engineering Inc.

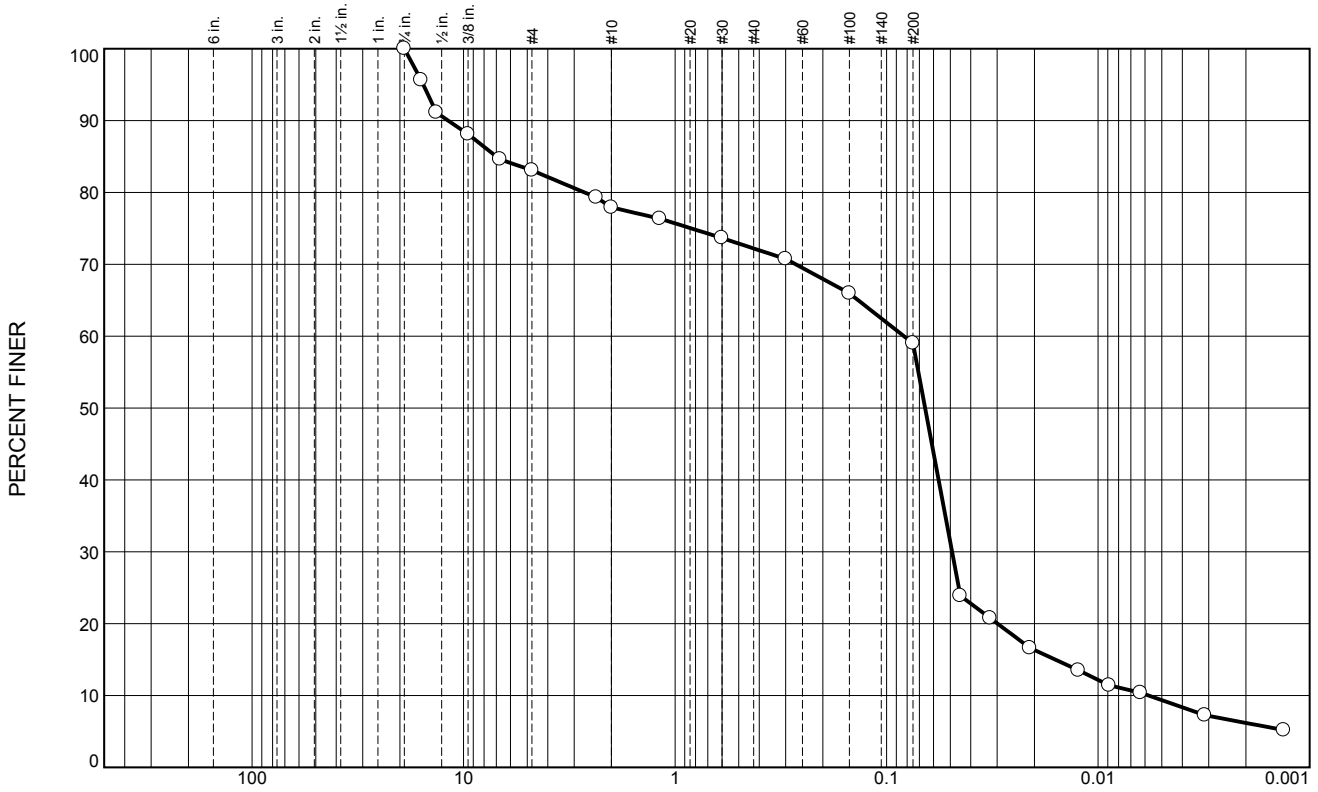
St. Clements, ON

Client: Blackhart Construction

Project: Proposed Development
7456 McLean Road, Puslinch, Ontario

Project No.: 23-133 **Figure** 4

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	16.9	5.2	5.7	13.2	52.8	6.2

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH6	3	1.52-2.13m	sandy silt, some gravel, trace clay	ML
				Sampled by BL of CMT Engineering Inc. April 12, 2023	
				Tested by JM of CMT Engineering Inc. April 27, 2023	

CMT Engineering Inc.

St. Clements, ON

Client: Blackhart Construction

Project: Proposed Development
7456 McLean Road, Puslinch, Ontario

Project No.: 23-133 **Figure** 5

APPENDIX C

WELL RECORDS

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

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 360521

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
Wadhwa	Harry
Organization	**Email Address**
DAAZ inc	harry@hwtg.ca

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village	
	8920	17th Sideroad East	Acton	
Country	**Province**	**Postal Code**	**Telephone Number**	
Can	ON	L7J 2M1	647-314-0690	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	7456	Mclean Rd	
Lot	**Concession**	**County/District/Municipality**	
City/Town	**Province**	**Postal Code**	
Puslinch	Ontario		

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	569751	4812369	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 20 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Silt	Sand	Loose	0	10
Brown	Sand	Gravel		10	20

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	8	3/8 Holeplug	0.17
8	20	#2 Sand	0.26

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)
1.5	Plastic	0.145	-3	10

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
1.9	Plastic	10	10	20

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	20	3.5

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? * ☐ Yes ☑ 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	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		2023/04/12

Comments
Mw-04 on attached Map

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
CMT DRILLING INC	7366

Business Address

Unit Number	Street Number	Street Name *
1	1011	INDUSTRIAL CRES

City/Town/Village *	Province	Postal Code *
ST CLEMENTS	ON	N0B 2M0

Business Telephone Number	Business Email Address
519-699-5775	info@cmtinc.net

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
BLACK	CHRIS	3711

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
BLACK	CHRIS	cblack@cmtinc.net

Signature		Date Submitted (yyyy/mm/dd)
Chris Black	Digitally signed by Chris Black Date: 2023.06.22 14:38:44 -04'00'	2023/06/22

17. Ministry Use Only

Audit Number
MBJ7 SEA9

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

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 360522

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
Wadhwa	Harry
Organization	**Email Address**
DAAZ inc	harry@hwtg.ca

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village	
	8920	17th Sideroad East	Acton	
Country	**Province**	**Postal Code**	**Telephone Number**	
Can	ON	L7J 2M1	647-314-0690	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	7456	Mclean Rd	
Lot	**Concession**	**County/District/Municipality**	
City/Town	**Province**	**Postal Code**	
Puslinch	Ontario		

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	569826	4812295	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 20 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Silt	Sand	Loose	0	10
Brown	Sand	Gravel		10	20

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	8	3/8 Holeplug	0.17
8	20	#2 Sand	0.26

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)
1.5	Plastic	0.145	-3	10

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
1.9	Plastic	10	10	20

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	20	3.5

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? * ☐ Yes ☑ 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	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		2023/04/12

Comments
Mw-04 on attached Map

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
CMT DRILLING INC	7366

Business Address

Unit Number	Street Number	Street Name *
1	1011	INDUSTRIAL CRES

City/Town/Village *	Province	Postal Code *
ST CLEMENTS	ON	N0B 2M0

Business Telephone Number	Business Email Address
519-699-5775	info@cmtinc.net

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
BLACK	CHRIS	3711

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
BLACK	CHRIS	cblack@cmtinc.net

Signature		Date Submitted (yyyy/mm/dd)
Chris Black	Digitally signed by Chris Black Date: 2023.06.22 14:40:23 -04'00'	2023/06/22

17. Ministry Use Only

Audit Number
UM63 PLX3

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

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 360523

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
Wadhwa	Harry
Organization	**Email Address**
DAAZ inc	harry@hwtg.ca

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village	
	8920	17th Sideroad East	Acton	
Country	**Province**	**Postal Code**	**Telephone Number**	
Can	ON	L7J 2M1	647-314-0690	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	7456	Mclean Rd	
Lot	**Concession**	**County/District/Municipality**	
City/Town	**Province**	**Postal Code**	
Puslinch	Ontario		

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	569868	4812415	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 40 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Fill		Loose	0	5
Brown	Silt	Sand		5	25
Grey	Silt	Sand		25	40

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	25	3/8 Holeplug	0.54
25	40	#2 Sand	0.32

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)
1.5	Plastic	0.145	-3	30

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
1.9	Plastic	10	30	40

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	40	3.5

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? * ☐ Yes ☑ 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	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		2023/04/12

Comments
Mw-04 on attached Map

15. Well Contractor and Well Technician Information

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CMT DRILLING INC	7366

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Unit Number	Street Number	Street Name *
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Business Telephone Number	Business Email Address
519-699-5775	info@cmtinc.net

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
BLACK	CHRIS	3711

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
BLACK	CHRIS	cblack@cmtinc.net

Signature		Date Submitted (yyyy/mm/dd)
Chris Black	Digitally signed by Chris Black Date: 2023.06.22 14:45:40 -04'00'	2023/06/22

17. Ministry Use Only

Audit Number
CF9L S6R9

HYDROGEOLOGICAL INVESTIGATION REPORT

7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH

TOWNSHIP OF PUSLINCH COUNTY OF WELLINGTON

PREPARED FOR:

DAAZ INC.

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
GUELPH, ON N1H 7T8
55 WYNDHAM ST N, SUITE 215

FEBRUARY 2026

CFCA FILE NO. 2792-7289

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.

CROZIER

Revision Number	Date	Comments
Rev.0	July 23, 2025	Issued for first submission.
Rev.1	February 13, 2026	Issued for second submission.

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) has been retained by Daaz Inc. to prepare a comprehensive Hydrogeological Investigation to support the planning applications for the proposed commercial development at 7456 McLean Road and 197 Brock Street South in the Township of Puslinch (the Site).

The purpose of the Hydrogeological Investigation is to characterize the hydrogeological regime in the vicinity of the subject lands, outline applicable source water protection policies, identify seasonally high groundwater elevations and determine the impact of the proposed development. This report also includes a groundwater impact assessment for the proposed onsite sewage system.

2.0 Background Information

2.1 Site Description

The subject lands (herein referred to as the Site) include two properties—7456 McLean Road and 197 Brock Road South—and covers a total area of 1.62 ha. The Site currently hosts vegetated and landscaped areas and is bounded by a Dufferin aggregate pit to the north, Brock Road South to the east, McLean Road West to the south and a St. Mary's aggregate pit and vacant property to the west. Please refer to **Figure 1** and **Figure 2** for a Site location plan and an overview of existing Site conditions.

2.2 Proposed Development

According to the Site Plan prepared by Richard Ziegler Architect Inc. dated February 10, 2026, the proposed mixed-use commercial development will consist of the following elements:

- A 1-storey convenience store (235 m^2).
- A 1-storey drive-thru restaurant (379 m^2).
- A 4-pump car gas bar and a 6-pump truck gas bar.
- 44 standard parking spaces (including 4 accessible parking spaces and 4 electric vehicle charging spaces) and 6 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 Source Protection

The Site is located within the Grand River Source Protection Area according to the Province of Ontario's Source Protection Information Atlas. Therefore, the Grand River Source Protection Plan and the policies contained within all have legal effect on the property per Section 31 of the Clean Water Act.

The Site is located atop a Significant Groundwater Recharge Area (SGRA) of undefined vulnerability. Based on the Approved Grand River Source Protection Area Source Protection Plan (June 25, 2025), no specific policies nor do any significant drinking water threats apply to the Site.

However, since the Site is located atop a SGRA and the intended use of the property is a gas station, it is recommended that the Owner connect with the Township or County's Source Protection Officials to determine if there are any special considerations.

In general, in a SGRA, the following best management practices are recommended to protect source water in the area.

Table 1: Activities of Concern for Source Water Protection and Recommended Best Management Practices

Activity	Possible Best Management Practices
The application, handling and storage of road salt.	- Utilize alternatives to NaCl (Road Salt), such as sand where possible - Use Smart about Salt contractors - Direct runoff to stormwater infrastructure and avoid areas of ponding such that ice formation is minimized in high traffic areas
Storage of snow	- Provide near impervious snow storage locations to direct melted runoff into storm water infrastructure - Snow disposal areas should be located at least 500 ft from storm drain inlets, drainage ditches, and surface water to minimize transport of pollutants from snowmelt - Snow storage areas should be maintained to reduce erosion and promote easy removal of accumulated pollutants or sediment
Storage of Fuel	- Spill management plans shall be kept on site and up to date to manage small gasoline or other liquid fuel spills - Tanks shall be inspected regularly for cracks or leaks
An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body. An activity that reduces the recharge of an aquifer.	- Based on the location of the SGRA and the vulnerability score of 6 or lower, activity 19 and 20 do not have the potential to incur Significant Drinking Water Threats to quantity by way of alternations to the local groundwater recharge.

Crozier also acknowledges that the Site is located within a draft Wellhead Protection Area for Quantity (WHPA-Q). As part of the Site Plan Application process, Crozier will review and evaluate the applicable WHPA-Q policies. Based on a preliminary review, the preparation of a Winter Maintenance Plan and a Spill Response Procedure Plan is anticipated to be required. Policies related to activities that could reduce aquifer recharge are not expected to apply, as the proposed development will not involve the use of substantial water quantities that could adversely affect the local groundwater aquifer. All relevant policies will be reviewed in detail during the Site Plan Application process.

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 A**. 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 records, 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 metres below ground surface (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 2** below.

Table 2: 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, Catfish 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.

4.5 Regional Groundwater Quality

Groundwater quality within the Grand River Watershed is obtained from monitoring wells within the Provincial Groundwater Monitoring Network (PGMN) and municipal data. Groundwater sampling results are compared to the Ontario Drinking Water Quality Standards and any exceedances are flagged and investigated to determine the potential source, impact, and mitigation of that parameter.

The Grand River Watershed has experienced rising chloride levels due to runoff from urban areas that rely heavily on road salt and water softeners. This increased chloride load has been documented in the Grand River downstream of major urban centers since the 1970s (GRCA, 2024).

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 test pits in the potential leaching bed areas to a maximum depth of 2.10 mbgs. 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 B**.

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 mbgs. 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 mbgs. The test pit was dug to a maximum depth of 1.30 m and the test pit walls caved in at 1.30 mbga. 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 C**.

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 the MECP well records, these monitoring wells were installed as part of a 2021 investigation by Aardvark Drilling Inc. **Table 3** below provides a summary of the construction details for each well.

Table 3: 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 D**. Well records for the 2021 monitoring wells are also included in **Appendix D**.

5.3 Groundwater Monitoring

Manual groundwater measurements were collected from April 2023 to December 2025. In addition, automatic water-level loggers were installed in monitoring wells MW4-23 and MW5-23, providing continuous groundwater level data from April 2023 to July 2025. Hydrographs generated from the continuous monitoring data are included in **Appendix E**.

A summary table of the groundwater measurements collected is provided as **Table 4** below.

Table 4: Groundwater Measurements (2023 -2025)

Date		April 19, 2023		June 7, 2023		July 21, 2023		July 22, 2025		December 11, 2025	
Well ID	Ground Elevation (masl)	Static Level (mbgs)	GW Elevation (masl)	Static Level (mbgs)	GW Elevation (masl)	Static Level (mbgs)	GW Elevation (masl)	Static Level (mbgs)	GW Elevation (masl)	Static Level (mbgs)	GW Elevation (masl)
MW1-21	327.60	3.41	324.19	3.87	323.73	5.27	322.33	4.27	323.33	10.75	316.85
MW2-21	328.88	3.01	325.87	-[1]	-[1]	4.03	324.85	3.93	324.95	7.51	321.37
MW3-21	326.95	5.47	321.48	5.75	321.20	5.88	321.07	5.99	320.96	7.92	319.03
MW4-23	321.81	0.38	321.43	1.14	320.67	1.04	320.77	1.44	320.37	3.20	318.61
MW5-23	325.82	0.42	325.40	1.27	324.55	1.77	324.05	1.91	323.91	4.63	321.19
MW6-23	328.84	5.08	323.76	6.56	322.28	6.04	322.80	5.70	323.14	8.79	320.05

1. Not captured due to field conditions in the area of the well.

Both MW4-23 and MW5-23 display a response to precipitation events as shown in **Appendix E**, MW5-23 demonstrating greater fluctuation than MW4-23. Due to the coarse nature of the materials on Site, significant response to precipitation is expected. Similarly, seasonal change impacts groundwater levels on the property significantly, fluctuating approximately 2 m at MW4-23 and 3.5 m at MW5-23.

In general, groundwater levels on Site have ranged seasonally from a peak of 325.87 masl at MW2-21 in Spring 2023 to a low of 316.85 at MW1-21 in Winter 2025. From the hydrographs, groundwater reaches a low point on Site from late summer to the end of fall, consistent with seasonal trends in Ontario. It is interpreted that seasonally high groundwater conditions on Site are experienced in the Spring following the freshet. It is assumed that the water levels captured during Spring 2023 are representative of seasonally high groundwater conditions and can be used for design purposes.

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 and seasonally high groundwater conditions are shown in **Figure 8**.

Please note that, given the proposed use of the Site as a gas station and the proximity of existing groundwater users, it is critical that all existing on-site monitoring wells be properly decommissioned in accordance with Ontario Regulation 903, once the use of monitoring wells is no longer required.

5.4 Groundwater Quality

In December 2025, three (3) groundwater samples were collected from MW2-21, MW4-23, and MW5-23. The samples were submitted to an accredited third-party laboratory for general chemistry analysis. Detailed laboratory results are provided in **Appendix F**.

6.0 Water Balance

A water balance assessment was conducted to assess potential impacts of the proposed development on the local groundwater conditions. The following subsections below outline 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 5** below.

Table 5: Site Water Balance Summary

Site Water Balance Summary							
Scenario	*Area*	*Evapotranspiration*		*Infiltration*		*Runoff*	
	(ha)	*(m^3)*	*(mm)*	*(m^3)*	*(mm)*	*(m^3)*	*(mm)*
Pre-Dev.	1.62	8998	555	2870	177	1913	118
Post-Dev.	1.62	3646	225	827	51	9308	575
Difference	0	-5352	-330	-2042	-126	7394	456
% Difference	0%	-59%	-59%	-71%	-71%	386%	386%

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 nearest climate station with available 1991–2020 data is the Kitchener/Waterloo Composite Climate Station. Long-term monthly average precipitation and climate data from 1991–2020 were used to support the Site's water balance calculations. The long-term monthly averages are presented in **Table 6** below.

Table 6: Climate Data Summary (1991-2020) for Kitchener/Waterloo Climate Station

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Precipitation (mm)	66.3	46.1	57	81.2	80.2	80.5	96.2	67.2	75.2	71	74.9	54.9	**850.7**[1]
Temperature (°C)	-6.3	-5.9	-0.8	5.9	12.6	17.8	20.2	19.1	15.2	8.8	2.6	-2.8	**7.2**[2]

1. Total average annual precipitation from 1991 – 2020.
2. Average annual temperature from 1991 – 2020.

Therefore, based on the data above, the long-term annual average precipitation for the area is **850.7 mm/year** and the long-term average temperature for the subject area is **7.2 °C**.

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 (a) is determined using the following equation:

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

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

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

For ΔP < 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 150 mm for silty sand soils for within pasture/shrubs.

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**.

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 150 mm, using Table 3.1 of the Ontario Stormwater Management and Design Manual (Government of Ontario, 2003. 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 Analysis

Using the pre and post development catchments provided in the Functional Servicing Report (submitted under separate cover, the pre- and post-development evapotranspiration, runoff and infiltration were determined. **Table 7** summarize the water balance analysis.

Table 7: Pre- to Post- Water Balance Analysis

Pre-Development Water Balance							
Catchment ID	*Area*	*Evapotranspiration*		*Infiltration*		*Runoff*	
	(ha)	*(m^3/yr)*	*(mm/yr)*	*(m^3/yr)*	*(mm/yr)*	*(m^3/yr)*	*(mm/yr)*
101	0.81	4499	555	1435	177	957	118
102	0.81	4499	555	1435	177	957	118
Total	**1.62**	**8998**	**555**	**2870**	**177**	**1913**	**118**

Post-Development Water Balance							
Catchment ID	*Area*	*Evapotranspiration*		*Infiltration*		*Runoff*	
	(ha)	*(m^3/yr)*	*(mm/yr)*	*(m^3/yr)*	*(mm/yr)*	*(m^3/yr)*	*(mm/yr)*
201	0.23	1069	465	424	184	464	202
202	1.23	1919	156	191	16	8353	679
203	0.08	427	534	152	190	101	127
204	0.06	231	289	61	76	389	486
Total	**1.62**	**3646**	**225**	**827**	**51**	**9308**	**575**

An infiltration deficit of 2,042 m^3/yr or 126 mm/yr annually is anticipated due to the development. LID strategies have not been proposed in catchment 202 to mitigate the deficit since the proposed development will operate as a gas station and infiltration features could cause contaminate migration to groundwater. However, clean runoff from the rooftop drainage in catchment 204 is proposed to accommodate some post-development infiltration. It is noted that this is a best-efforts approach, and it is recommended that the Township be consulted at the detailed design stage to discuss potential mitigation or compensation strategies for maintaining pre- to post- water balance. For further details, please refer to the Functional Servicing and Stormwater Management Report (Crozier, February 2026).

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, 2026), the calculated water demands for the proposed development is 7.52 L/min (average day), 15.04 L/min (maximum day), and 30.08 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, 2026) 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.

The proposed water supply well shall be constructed by a licensed well contractor in accordance with Ontario Regulation 903, and the existing on-site well shall be decommissioned in compliance with the same regulation. The new well must be located upgradient of the proposed onsite sewage system and gas storage area. Additionally, in accordance with Township of Puslinch requirements, the new well shall be completed within the upper bedrock aquifer or be properly cased into the lower bedrock, as wells that penetrate multiple aquifers are not permitted. 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 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 967 m^2 (0.1 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:

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

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/m^2/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 the leaching bed is 22,000 L/day. Applying a peaking factor of 2, the average value is expected to be 11,000 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)	0.1 ha[1]
Average volume of effluent (L/day)	11,000[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)	**2.66**

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 2.66 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 Impacts to Nearby Features

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 the associated attenuation zone. Due to the depth (29 mbgs) and location (hydraulically upgradient of the leaching bed), we do not anticipate the onsite 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, 2025), 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.

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.

8.4 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 & Recommendations

Based on the foregoing, Crozier offers the following conclusions:

- 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 316.85 masl in December 2025 to 325.87 masl in April 2023. In Crozier's opinion, seasonally high groundwater level conditions were observed in Spring 2023, and these conditions should be used for design purposes.
- 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 site wide water balance was completed for the Site. Using the Thornthwaite and Mather method pre-development infiltration was determined to be 177 mm/yr and post-development infiltration was determined to be 51 mm/yr. Therefore, the infiltration deficit is calculated to be 126 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.

Recommendations

Based on the above study, Crozier is prepared to make the following recommendations regarding water quality and quantity for the proposed development:

- Onsite grading should consider the well such that surface water runoff is not directed to or is able to pond around the well. Any storage of gasoline, chemicals, paints, domestic de-icing agents, and other contaminants should be contained and stored away from the wellhead.
- Given the proposed use of the Site as a gas station and the proximity of existing groundwater users, it is important to ensure that all existing wells (including monitoring wells and the existing water supply well) are properly decommissioned in accordance with Ontario Regulation 903 once no longer required.

- The new well must be constructed in accordance with the Ontario Regulation 903 at a minimum and consider all local regulations. The well must be constructed upgradient from the proposed onsite sewage system and be sited following all setbacks outlined in the Ontario Building Code. The well must be installed within the upper bedrock or properly cased into the lower bedrock. Multiple aquifer penetrating wells are not permitted.

- For educational purposes on well ownership, the Owner should refer to the MECP's Water Supply Wells: Requirements and the local health unit for resources. Additional resources for the owner can be accessed through the Walkerton Clean Water Centre, Green Communities Canada and the Government of Canada website.

- It is recommended that the onsite well be pumped, disinfected and tested following approval to inform the design of the water treatment system.

- The Owner should follow the regulatory well maintenance requirements as outlined in the MECP's Water Supply Wells: Requirements and Best Practices. The well must be accessible for maintenance purposes permanently.

- It is recommended that the new well water be tested on roughly an annual basis for bacterial parameters. Public Health Ontario offers free well water testing for E.Coli and total coliforms bacteria through the local Health Unit. Additional water quality testing for the full suite of potable water testing parameters should occur on a biannual basis.

- It is recommended that a water treatment systems expert be consulted such that specific water treatment systems be recommended following sampling.

- To address aesthetic and/or operational objectives, a water softener can be explored to reduce hardness, and additional filters can improve colour, pH and sodium content in water.

- It is recommended that the Owner consult the Province of Ontario's "SepticSmart" document and the Ontario Onsite Wastewater Association's "A Homeowner's Guide to a Healthy Sewage (Septic) System" for educational purposes. The Township of Puslinch may also provide a number of resources for homeowners on maintenance and care of their septic systems.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

[redacted]

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10.0 References

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APPENDIX A

MECP Well Records

MECP WATER WELL RECORDS

Project Number: 2377-6556 | Address: 7456 McLean, Puslinch

Prepared by: A.C/A.L | 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	Monitoring	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	16.46	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		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 B

Test Pit Logs

CROZIER CONSULTING ENGINEERS

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 569773 4812353	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
		0.2 m - 0.9 m	**SILTY SAND:** Brown silty sand, trace gravel with cobbles, trace clay, moist, medium grain	TP-1A		
		0.9 m - 1.3 m	**FILL:** silty sand fill, trace gravel stones, bricks found, damp,	TP-1B		
Test Pit No. 2	17T 569751 4812353	0 m - 0.2 m	**TOPSOIL:** Dark brown silty sand, moist, minor rootlets			No groundwater observed. Test pit sidewalls relatively stable
		0.2 m - 0.40 m	**SILTY SAND:** brown silty sand, trace stones	TP-2A		
		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 569885 4812416	0 m - 0.3 m	**TOPSOIL:** Dark brown silty sand, moist, minor rootlets			No groundwater observed. Testpit sidewalls stable
		0.3 m - 0.70 m	**SILTY SAND:** Dark brown silty sand, coarse grain, minor rootlets	TP-3A		
		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 C

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.

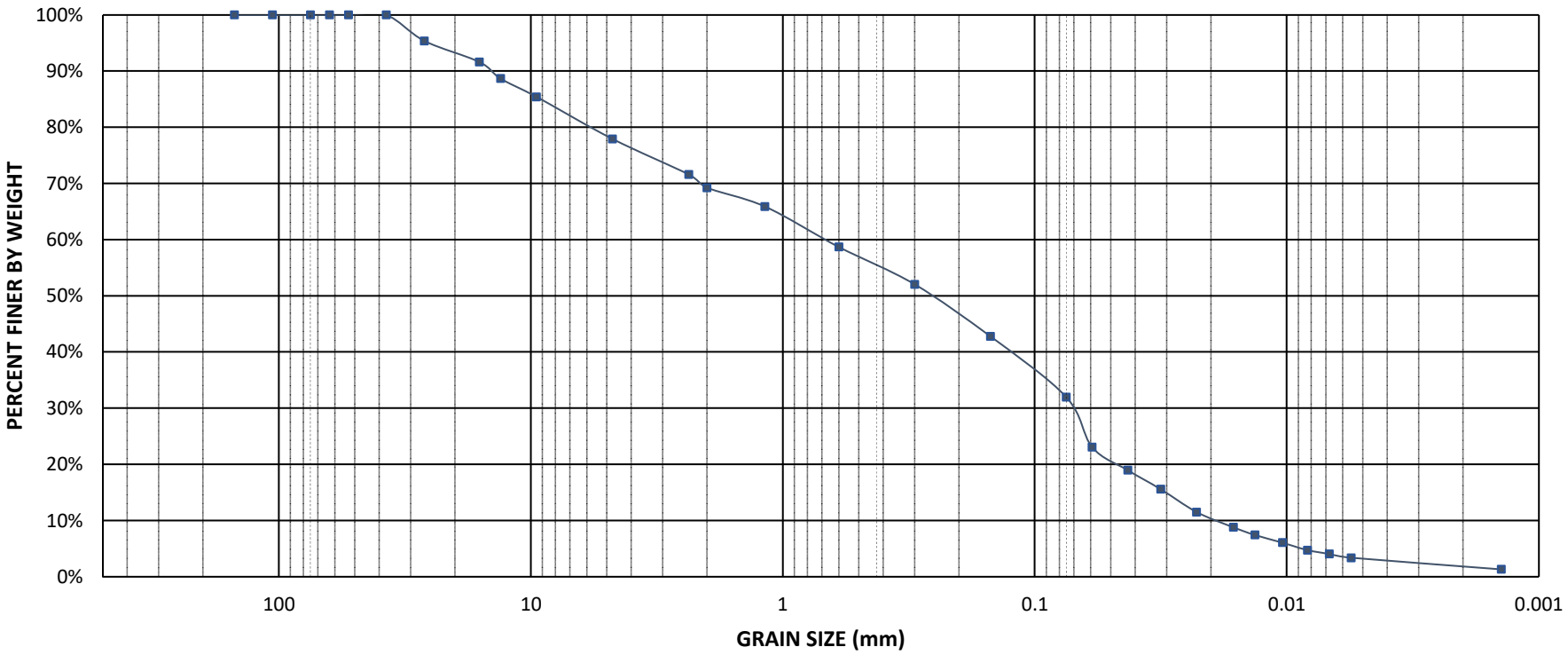
Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

[redacted]

Hugh Arthur
Laboratory Supervisor

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

Material Type:	**Silty Gravelly Sand, trace Clay**
Lab No.:	771
Sampled From:	TP3B (0.7 m - 1.3 m)
Sample No.:	1
Date Sampled:	-
Sampled By:	Client
Date Tested:	Wednesday, June 21, 2023

PROJECT INFORMATION

Project:	7456 Mclean Road
Location:	Puslinch, Ontario
Client:	Crozier Consulting Engineers
File No.:	M22543 (2377-6556)
Encl. No.:	1

APPENDIX D

Borehole Logs and Monitoring Well Records

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
GROUND ELEVATION: 321.81 m
DRILLING CONTRACTOR: CMT DRILLING INC.
LOGGED BY: BL
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
0	**TOPSOIL:** Loose, dark brown silty topsoil, moist (100 mm)	0.00, 321.81					
		0.10, 321.71	SPT 1	10	2-4-4-4 (8)	8, 21.4	
	SILTY SAND: Loose, brown silty sand, some gravel, trace clay, trace intermixed topsoil/rootlets, moist						
1	no intermixed topsoil/rootlets observed becoming compact, very moist to wet	0.76, 321.05					
		0.81, 321.00	SPT 2	50	5-6-5-8 (11)	11, 11.7	
			SPT 3	50	13-11-8-8 (19)	19, 12.8	Bentonite Seal
2							38mm Riser
	becoming moist	2.44, 319.37	SPT 4	75	9-15-10-8 (25)	25, 10.7	
3							
	SAND AND GRAVEL: Compact, brown sandy, silty gravel, trace clay, moist	3.05, 318.76	SPT 5	75	10-13-14-27 (27)	27, 8.3	
4			MC5 6	100		8.7	#2 Sand Pack
			SPT 7	100	9-8-7-10 (15)	15, 11.9	38mm Screen
5							
6			MC5 8	100		10.5	Water Level measured at 1.14m (Elev. 320.67m) on June 7, 2023

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.

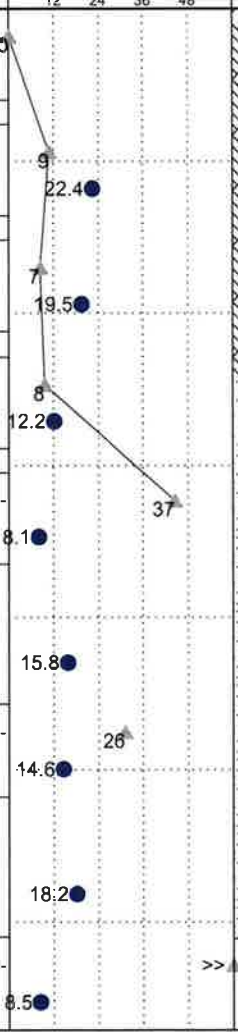
BOREHOLE LOG WITH WELL2 23-133 - MW.GPJ CMT_TEMPLATE 2020-05-15.GDT 23-7-12

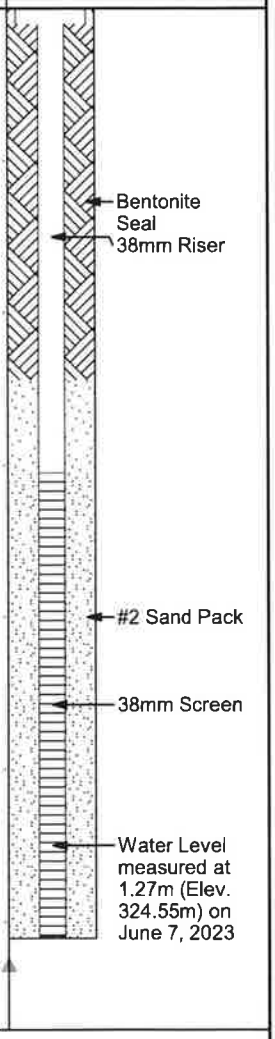
CMT Engineering Inc.
1011 Industrial Crescent
St. Clements, Ontario, N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER 5

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

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
0	**TOPSOIL:** Loose, dark brown silty topsoil, moist (100 mm)	0.00, 325.82	SPT 1	10	1-0-0-0 (0)
	SILT: Very loose to loose, brown silt, some clay, trace sand and gravel, trace intermixed topsoil/rootlets, moist	0.10, 325.72			
1	no intermixed topsoil/rootlets observed, very moist	0.76, 325.06	SPT 2	50	4-5-4-3 (9)
2			SPT 3	75	3-3-4-4 (7)
3			SPT 4	100	3-4-4-8 (8)
	SAND AND GRAVEL: Dense, brown silty sand and gravel, trace clay, very moist	3.18, 322.64	SPT 5	100	11-17-20-42 (37)
4	wet sand seam encountered	3.81, 322.01	MC5 6	100	
5			SPT 7	100	11-12-14-16 (26)
	wet sand seam encountered	5.49, 320.33	MC5 8	100	
6	**SILTY SAND:** Very dense, brown silty sand, some gravel, trace clay, moist	5.59, 320.23	SPT 9	100	37-36-29-49 (65)





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.

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

BOREHOLE NUMBER 6

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

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
	TOPSOIL: Loose, dark brown silty topsoil, moist (80 mm)	0.00, 328.84					
	FILL: Compact, brown to dark brown sand fill, trace intermixed topsoil/rootlets, moist	0.08, 328.76	SPT 1	50	3-4-11-17 (15)	6.1	
1	**SANDY SILT:** Loose to compact, brown sandy silt, some gravel, trace clay, moist	0.76, 328.08	SPT 2	50	3-8-5-6 (13)	13.1	
2			SPT 3	75	5-6-7-8 (13)	11.8	38mm Riser
3			SPT 4	75	8-11-10-10 (21)	9.9	
	occasional wet seams	3.35, 325.49	SPT 5	100	10-9-11-12 (20)	10	
4			MC5 6	100		11.6	#2 Sand Pack Bentonite Seal
5			SPT 7	100	12-11-13-18 (24)	11.5	
6			MC5 8	100		11.1	
7	becoming dense, grey-brown	6.86, 321.98	MC5 9	100		10.6	
8							
9			MC5 10	100		9	

(Continued Next Page)

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

BOREHOLE NUMBER 6

PROJECT: Proposed Development
PROJECT ADDRESS: 7456 McLean Road
PROJECT NUMBER: 23-133
PROJECT LOCATION: Puslinch, Ontario

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
		becoming dense, grey-brown *(continued)*	6.86, 321.98 *(continued)*					
10				MC5 11	100		8.5	Water Level measured at 6.56m (Elev. 322.28m) on June 7, 2023
11								38mm Screen
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.

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

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

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	**Email Address**
2701267 Ontario Inc.	

Current Address

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

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	7456	McLeanRd W	Puslinch

Lot	Concession	County/District/Municipality	
		WELLINGTON	
City/Town		**Province**	**Postal Code**
Puslinch		Ontario	N0B 2J0

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	569893	4812360	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	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? * ☐ Yes ☑ 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	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		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

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

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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	**Email Address**
2701267 Ontario Inc.	

Current Address

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

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	7456	McLeanRd W	Puslinch

Lot	Concession	County/District/Municipality	
		WELLINGTON	
City/Town		**Province**	**Postal Code**
Puslinch		Ontario	N0B 2J0

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	569853	4812349	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? * ☐ Yes ☑ 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	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		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 14:32:26 -04'00'	2021/08/09

17. Ministry Use Only

Audit Number

JKO8 VKOA

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

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 323497

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	**Email Address**
2701267 Ontario Inc.	

Current Address

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

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	7456	McLeanRd W	Puslinch

Lot	Concession	County/District/Municipality	
		WELLINGTON	
City/Town		**Province**	**Postal Code**
Puslinch		Ontario	N0B 2J0

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	569861	4812403	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? * ☐ Yes ☑ 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	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		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

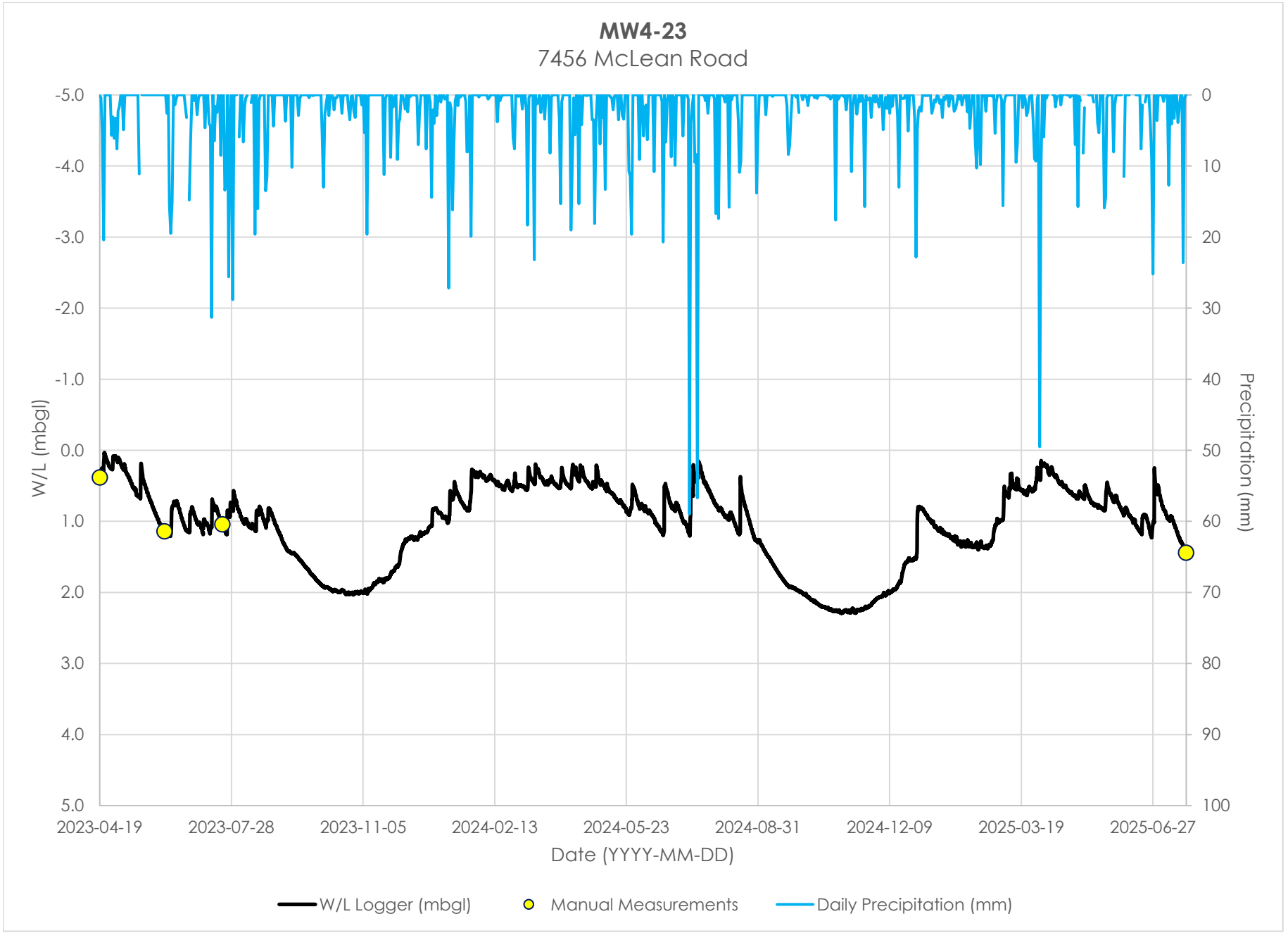
17. Ministry Use Only

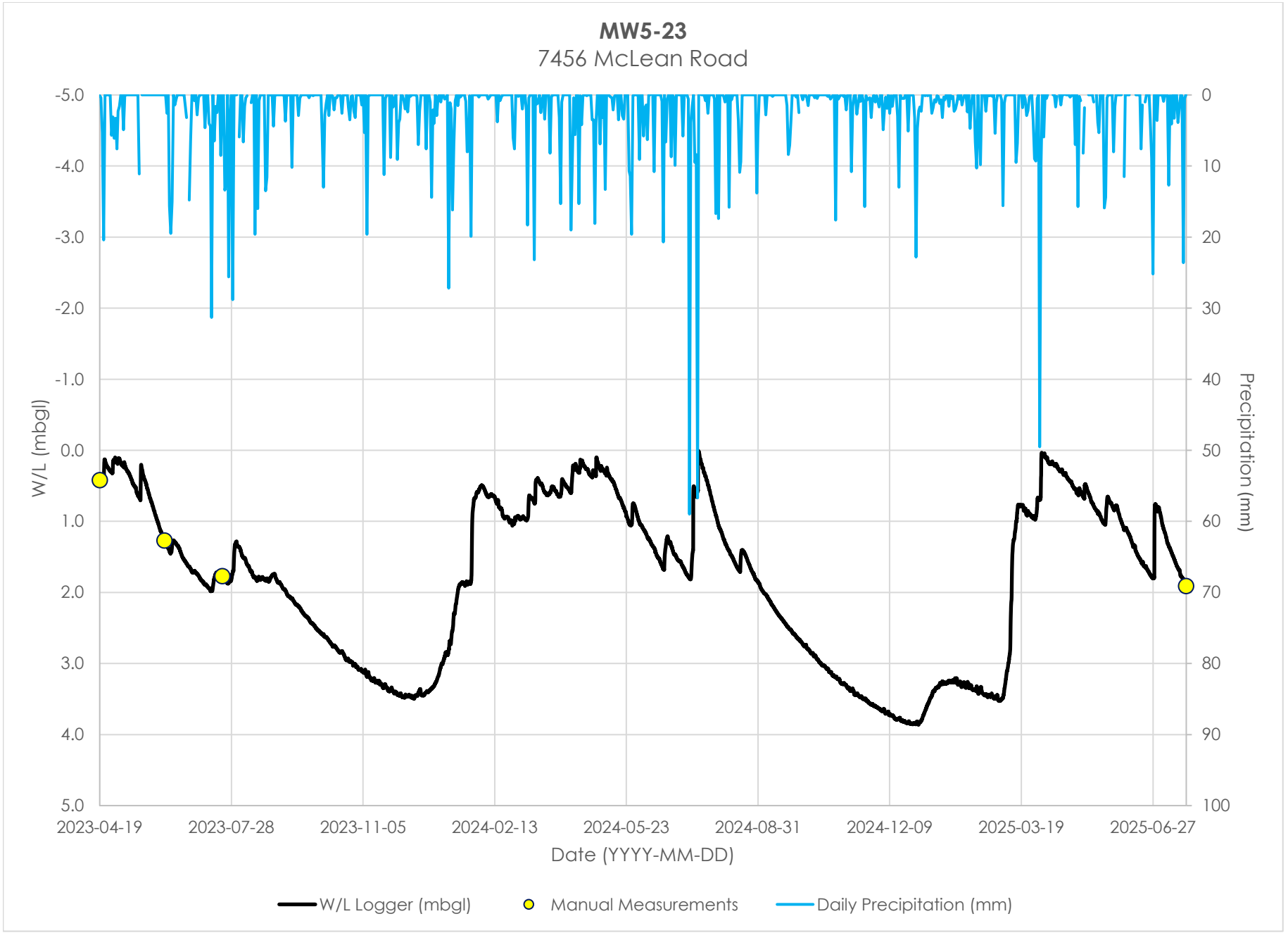
Audit Number

MIIO HQ93

APPENDIX E

Hydrographs


MW4-23
7456 McLean Road
-5.0
-4.0
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
W/L (mbgl)
0
10
20
30
40
50
60
70
80
90
100
Precipitation (mm)
2023-04-19
2023-07-28
2023-11-05
2024-02-13
2024-05-23
2024-08-31
2024-12-09
2025-03-19
2025-06-27
Date (YYYY-MM-DD)
W/L Logger (mbgl)
Manual Measurements
Daily Precipitation (mm)


MW5-23
7456 McLean Road
-5.0
-4.0
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
W/L (mbgl)
0
10
20
30
40
50
60
70
80
90
100
Precipitation (mm)
2023-04-19
2023-07-28
2023-11-05
2024-02-13
2024-05-23
2024-08-31
2024-12-09
2025-03-19
2025-06-27
Date (YYYY-MM-DD)
W/L Logger (mbgl)
Manual Measurements
Daily Precipitation (mm)

APPENDIX F

Groundwater Analytical Reports

CERTIFICATE OF ANALYSIS

Work Order	:	**WT2536070**			
Client	:	**C.F. Crozier & Associates Inc.**	Laboratory	:	ALS Environmental - Waterloo
Contact	:	Victoria Mazur	Account Manager	:	Colby Coutu
Address	:	100-2800 High Point Dr. Milton Ontario Canada L9T 6P4	Address	:	60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	:	548 708 0039	E-mail	:	colby.coutu@alsglobal.com
Project	:	2792-7289	Telephone	:	+1 519 886 6910
PO	:	----	Date Samples Received	:	11-Dec-2025 14:00
C-O-C number	:	----	Date Analysis Commenced	:	12-Dec-2025
Sampler	:	Client	Issue Date	:	19-Dec-2025 14:14
Site	:	----			
Quote number	:	2024/2025 SOA			
No. of samples received	:	3			
No. of samples analysed	:	3			

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Greg Pokocky	Manager - Inorganics	Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Metals, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
CU	colour units (1 cu = 1 mg/l pt)
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units
µS/cm	microsiemens per centimetre

<: less than.
>: greater than.
Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

<1 or Not Detected with LOR of 1 equals Zero (0).

Not Detected = Absent; Detected = Present.

alsglobal.com

Qualifiers

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLUI	Detection Limit Raised: Unknown interference generated an apparent false positive test result.
TMV	Turbidity exceeded upper limit of the nephelometric method. Minimum value reported.

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	MW2-21 ----	MW4-23 ----	MW5-23 ----	----	----
					Client sampling date / time	11-Dec-2025 00:00	11-Dec-2025 00:00	11-Dec-2025 00:00	----	----
						WT2536070-001	WT2536070-002	WT2536070-003	----	----
						Result	Result	Result	----	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/WT	1.0	mg/L		1020	3060	1160	----	----
Colour, apparent	----	E330/WT	2.0	CU		17700	56800	10500	----	----
Conductivity	----	E100/WT	1.0	µS/cm		953	717	525	----	----
Hardness (as CaCO3), dissolved	----	EC100/WT	0.50	mg/L		566	489	320	----	----
pH	----	E108/WT	0.10	pH units		7.82	7.79	7.88	----	----
Solids, total dissolved [TDS]	----	E162/WT	10	mg/L		655 DLDS	2780 DLDS	705 DLDS	----	----
Solids, total suspended [TSS]	----	E160/WT	3.0	mg/L		12600	79300	9390	----	----
Turbidity	----	E121/WT	0.10	NTU		>4000 TMV	>4000 TMV	>4000 TMV	----	----
Anions and Nutrients										
Phosphorus, total dissolved	7723-14-0	E375-T/WT	0.0020	mg/L		0.0055	0.0069	<0.0020	----	----
Ammonia, total (as N)	7664-41-7	E298/WT	0.0050	mg/L		0.582	0.0507	0.0234	----	----
Chloride	16887-00-6	E235.Cl/WT	0.50	mg/L		24.2 DLDS	19.5	33.9	----	----
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L		0.108 DLDS	0.063	0.056	----	----
Nitrate (as N)	14797-55-8	E235.NO3/WT	0.020	mg/L		<0.100 DLDS	0.114	0.044	----	----
Nitrite (as N)	14797-65-0	E235.NO2/WT	0.010	mg/L		<0.050 DLDS	<0.010	<0.010	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	0.0010	mg/L		0.0081	0.0062	0.0012	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	0.30	mg/L		116 DLDS	23.1	4.13	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E423A/WT	0.0030	mg/L		1.45	1.41	1.09	----	----
Antimony, dissolved	7440-36-0	E423A/WT	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Arsenic, dissolved	7440-38-2	E423A/WT	0.00010	mg/L		0.00534	0.00160	0.00122	----	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	MW2-21 ----	MW4-23 ----	MW5-23 ----	----	----
					Client sampling date / time	11-Dec-2025 00:00	11-Dec-2025 00:00	11-Dec-2025 00:00	----	----
						WT2536070-001	WT2536070-002	WT2536070-003	----	----
						Result	Result	Result	----	----
Dissolved Metals										
Barium, dissolved	7440-39-3	E423A/WT	0.00010	mg/L		0.116	0.122	0.0225	----	----
Beryllium, dissolved	7440-41-7	E423A/WT	0.000020	mg/L		0.000070	0.000073	0.000049	----	----
Bismuth, dissolved	7440-69-9	E423A/WT	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
Boron, dissolved	7440-42-8	E423A/WT	0.010	mg/L		0.035	0.058	0.012	----	----
Cadmium, dissolved	7440-43-9	E423A/WT	0.0000050	mg/L		0.000100	0.000138	0.0000976	----	----
Calcium, dissolved	7440-70-2	E423A/WT	0.050	mg/L		124	116	86.5	----	----
Cesium, dissolved	7440-46-2	E423A/WT	0.000010	mg/L		0.000126	0.000112	0.000116	----	----
Chromium, dissolved	7440-47-3	E423A/WT	0.00010	mg/L		0.00463	0.00248	0.00193	----	----
Cobalt, dissolved	7440-48-4	E423A/WT	0.00010	mg/L		0.00136	0.00118	0.00075	----	----
Copper, dissolved	7440-50-8	E423A/WT	0.00050	mg/L		0.00440	0.00666	0.00637	----	----
Iron, dissolved	7439-89-6	E423A/WT	0.010	mg/L		2.73	2.60	1.78	----	----
Lead, dissolved	7439-92-1	E423A/WT	0.000050	mg/L		0.00540	0.00750	0.00456	----	----
Lithium, dissolved	7439-93-2	E423A/WT	0.0010	mg/L		0.0102	0.0047	0.0021	----	----
Magnesium, dissolved	7439-95-4	E423A/WT	0.0050	mg/L		62.3	48.4	25.2	----	----
Manganese, dissolved	7439-96-5	E423A/WT	0.00010	mg/L		0.251	0.242	0.104	----	----
Molybdenum, dissolved	7439-98-7	E423A/WT	0.000050	mg/L		0.00369	0.000435	0.000236	----	----
Nickel, dissolved	7440-02-0	E423A/WT	0.00050	mg/L		0.00278	0.00251	0.00163	----	----
Phosphorus, dissolved	7723-14-0	E423A/WT	0.050	mg/L		0.235	0.197	0.099	----	----
Potassium, dissolved	7440-09-7	E423A/WT	0.050	mg/L		14.9	24.8	0.888	----	----
Rubidium, dissolved	7440-17-7	E423A/WT	0.00020	mg/L		0.00274	0.00285	0.00244	----	----
Selenium, dissolved	7782-49-2	E423A/WT	0.000050	mg/L		0.000091	0.000215	0.000169	----	----

Analytical Results

Sub-Matrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	MW2-21 ----	MW4-23 ----	MW5-23 ----	----	----
					Client sampling date / time	11-Dec-2025 00:00	11-Dec-2025 00:00	11-Dec-2025 00:00	----	----
						WT2536070-001	WT2536070-002	WT2536070-003	----	----
						Result	Result	Result	----	----
Dissolved Metals										
Silicon, dissolved	7440-21-3	E423A/WT	0.10	mg/L		7.56	6.58	4.73	----	----
Silver, dissolved	7440-22-4	E423A/WT	0.000010	mg/L		0.000010	<0.000010	<0.000010	----	----
Sodium, dissolved	7440-23-5	E423A/WT	0.050	mg/L		39.3	14.8	26.2	----	----
Strontium, dissolved	7440-24-6	E423A/WT	0.00020	mg/L		0.179	0.158	0.0978	----	----
Sulfur, dissolved	7704-34-9	E423A/WT	0.50	mg/L		30.3	6.36	1.64	----	----
Tellurium, dissolved	13494-80-9	E423A/WT	0.00020	mg/L		<0.00020	<0.00020	<0.00020	----	----
Thallium, dissolved	7440-28-0	E423A/WT	0.000010	mg/L		0.000026	0.000035	0.000022	----	----
Thorium, dissolved	7440-29-1	E423A/WT	0.00010	mg/L		0.00055	0.00033	0.00032	----	----
Tin, dissolved	7440-31-5	E423A/WT	0.00010	mg/L		0.00060	0.00026	0.00044	----	----
Titanium, dissolved	7440-32-6	E423A/WT	0.00030	mg/L		0.0358	0.0439	<0.0300 DLUI	----	----
Tungsten, dissolved	7440-33-7	E423A/WT	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
Uranium, dissolved	7440-61-1	E423A/WT	0.000010	mg/L		0.00314	0.000560	0.000245	----	----
Vanadium, dissolved	7440-62-2	E423A/WT	0.00050	mg/L		0.00361	0.00288	0.00215	----	----
Zinc, dissolved	7440-66-6	E423A/WT	0.0030	mg/L		0.0384	0.0610	0.0432	----	----
Zirconium, dissolved	7440-67-7	E423A/WT	0.00020	mg/L		0.00064	0.00061	0.00053	----	----
Dissolved metals filtration location	----	EP423/WT	-	-		Field	Field	Field	----	----
Dissolved metals filtration location	----	EP421/WT	-	-		N/A	N/A	N/A	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: **WT2536070**	Page	: 1 of 13
Client	: C.F. Crozier & Associates Inc.	Laboratory	: ALS Environmental - Waterloo
Contact	: Victoria Mazur	Account Manager	: Colby Coutu
Address	: 100-2800 High Point Dr. Milton ON Canada L9T 6P4	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 548 708 0039	Telephone	: +1 519 886 6910
Project	: 2792-7289	Date Samples Received	: 11-Dec-2025 14:00
PO	: ----	Date Analysis Commenced	: 12-Dec-2025
C-O-C number	: ----	Issue Date	: 19-Dec-2025 14:14
Sampler	: Client		
Site	: ----		
Quote number	: 2024/2025 SOA		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Greg Pokocky	Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Waterloo Metals, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 2382500)											
WT2536043-003	Anonymous	Turbidity	----	E121	0.10	NTU	17.0	16.7	1.78%	15%	----
Physical Tests (QC Lot: 2386387)											
WT2536070-001	MW2-21	pH	----	E108	0.10	pH units	7.82	7.89	0.891%	4%	----
Physical Tests (QC Lot: 2386388)											
WT2536070-001	MW2-21	Conductivity	----	E100	1.0	µS/cm	953	945	0.843%	10%	----
Physical Tests (QC Lot: 2386389)											
WT2536070-001	MW2-21	Alkalinity, total (as CaCO3)	----	E290	5.0	mg/L	1020	884	14.4%	20%	----
Physical Tests (QC Lot: 2386651)											
WT2536049-001	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 2386652)											
WT2536049-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	679	683	0.514%	20%	----
Physical Tests (QC Lot: 2389363)											
WT2536043-002	Anonymous	Colour, apparent	----	E330	2.0	CU	2.3	<2.0	0.3	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2385452)											
HA2505466-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0250	mg/L	1.67	1.69	0.958%	20%	----
Anions and Nutrients (QC Lot: 2385717)											
HA2505594-003	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0923	0.0951	2.99%	20%	----
Anions and Nutrients (QC Lot: 2386390)											
WT2536331-003	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.112	0.112	0.0005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2386391)											
WT2536331-003	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2386392)											
WT2536331-003	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2386393)											
WT2536331-003	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	1.05	1.04	0.02	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2386394)											
WT2536331-003	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	6.77	6.76	0.140%	20%	----
Anions and Nutrients (QC Lot: 2386396)											
WT2536070-001	MW2-21	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0081	0.0074	0.0007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2387399)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 2387399) - continued											
WT2535887-001	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	0.0200	mg/L	8.18	8.21	0.257%	20%	----
Dissolved Metals (QC Lot: 2385550)											
WT2536070-001	MW2-21	Aluminum, dissolved	7429-90-5	E423A	0.0030	mg/L	1.45	1.49	2.60%	20%	----
		Antimony, dissolved	7440-36-0	E423A	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E423A	0.00010	mg/L	0.00534	0.00534	0.103%	20%	----
		Barium, dissolved	7440-39-3	E423A	0.00010	mg/L	0.116	0.114	1.01%	20%	----
		Beryllium, dissolved	7440-41-7	E423A	0.000020	mg/L	0.000070	0.000071	0.0000009	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E423A	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E423A	0.010	mg/L	0.035	0.035	0.00007	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E423A	0.0000050	mg/L	0.000100	0.000120	18.1%	20%	----
		Calcium, dissolved	7440-70-2	E423A	0.050	mg/L	124	123	0.253%	20%	----
		Cesium, dissolved	7440-46-2	E423A	0.000010	mg/L	0.000126	0.000130	2.82%	20%	----
		Chromium, dissolved	7440-47-3	E423A	0.00010	mg/L	0.00463	0.00468	1.08%	20%	----
		Cobalt, dissolved	7440-48-4	E423A	0.00010	mg/L	0.00136	0.00136	0.0147%	20%	----
		Copper, dissolved	7440-50-8	E423A	0.00050	mg/L	0.00440	0.00441	0.000006	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E423A	0.010	mg/L	2.73	2.74	0.371%	20%	----
		Lead, dissolved	7439-92-1	E423A	0.000050	mg/L	0.00540	0.00544	0.714%	20%	----
		Lithium, dissolved	7439-93-2	E423A	0.0010	mg/L	0.0102	0.0102	0.119%	20%	----
		Magnesium, dissolved	7439-95-4	E423A	0.0050	mg/L	62.3	61.5	1.25%	20%	----
		Manganese, dissolved	7439-96-5	E423A	0.00010	mg/L	0.251	0.248	1.24%	20%	----
		Molybdenum, dissolved	7439-98-7	E423A	0.000050	mg/L	0.00369	0.00383	3.78%	20%	----
		Nickel, dissolved	7440-02-0	E423A	0.00050	mg/L	0.00278	0.00279	0.000006	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E423A	0.050	mg/L	0.235	0.235	0.0005	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E423A	0.050	mg/L	14.9	14.8	1.00%	20%	----
		Rubidium, dissolved	7440-17-7	E423A	0.00020	mg/L	0.00274	0.00279	2.09%	20%	----
		Selenium, dissolved	7782-49-2	E423A	0.000050	mg/L	0.000091	0.000085	0.000006	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E423A	0.10	mg/L	7.56	7.68	1.61%	20%	----
		Silver, dissolved	7440-22-4	E423A	0.000010	mg/L	0.000010	0.000012	0.000001	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E423A	0.050	mg/L	39.3	38.9	1.25%	20%	----
		Strontium, dissolved	7440-24-6	E423A	0.00020	mg/L	0.179	0.179	0.188%	20%	----
		Sulfur, dissolved	7704-34-9	E423A	0.50	mg/L	30.3	29.6	2.15%	20%	----
		Tellurium, dissolved	13494-80-9	E423A	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E423A	0.000010	mg/L	0.000026	0.000026	0.0000002	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E423A	0.00010	mg/L	0.00055	0.00058	0.00002	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 2385550) - continued											
WT2536070-001	MW2-21	Tin, dissolved	7440-31-5	E423A	0.00010	mg/L	0.00060	0.00063	0.00003	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E423A	0.00030	mg/L	0.0358	0.0394	9.62%	20%	----
		Tungsten, dissolved	7440-33-7	E423A	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E423A	0.000010	mg/L	0.00314	0.00316	0.622%	20%	----
		Vanadium, dissolved	7440-62-2	E423A	0.00050	mg/L	0.00361	0.00362	0.00001	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E423A	0.0030	mg/L	0.0384	0.0450	15.8%	20%	----
		Zirconium, dissolved	7440-67-7	E423A	0.00020	mg/L	0.00064	0.00064	0.000007	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 2382500)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 2386388)						
Conductivity	----	E100	1	µS/cm	1.5	----
Physical Tests (QCLot: 2386389)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 2386651)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 2386652)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 2389363)						
Colour, apparent	----	E330	2	CU	<2.0	----
Anions and Nutrients (QCLot: 2385452)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 2385717)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 2386390)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2386391)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2386392)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 2386393)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 2386394)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 2386396)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 2387399)						
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Dissolved Metals (QCLot: 2385550)						
Aluminum, dissolved	7429-90-5	E423A	0.003	mg/L	<0.0030	----
Antimony, dissolved	7440-36-0	E423A	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 2385550) - continued						
Arsenic, dissolved	7440-38-2	E423A	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E423A	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E423A	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E423A	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E423A	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E423A	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E423A	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E423A	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E423A	0.0001	mg/L	<0.00010	----
Cobalt, dissolved	7440-48-4	E423A	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E423A	0.0005	mg/L	<0.00050	----
Iron, dissolved	7439-89-6	E423A	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E423A	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E423A	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E423A	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E423A	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E423A	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E423A	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E423A	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E423A	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E423A	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E423A	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E423A	0.1	mg/L	<0.10	----
Silver, dissolved	7440-22-4	E423A	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E423A	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E423A	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E423A	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E423A	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E423A	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E423A	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E423A	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E423A	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E423A	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E423A	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E423A	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 2385550) - continued						
Zinc, dissolved	7440-66-6	E423A	0.003	mg/L	<0.0030	----
Zirconium, dissolved	7440-67-7	E423A	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 2382500)									
Turbidity	----	E121	0.1	NTU	200 NTU	92.0	85.0	115	----
Physical Tests (QCLot: 2386387)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 2386388)									
Conductivity	----	E100	1	µS/cm	1410 µS/cm	103	90.0	110	----
Physical Tests (QCLot: 2386389)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	150 mg/L	96.1	85.0	115	----
Physical Tests (QCLot: 2386651)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	106	85.0	115	----
Physical Tests (QCLot: 2386652)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	100	85.0	115	----
Physical Tests (QCLot: 2389363)									
Colour, apparent	----	E330	2	CU	25 CU	101	85.0	115	----
Anions and Nutrients (QCLot: 2385452)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 2385717)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 2386390)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.8	90.0	110	----
Anions and Nutrients (QCLot: 2386391)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	96.8	90.0	110	----
Anions and Nutrients (QCLot: 2386392)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	94.0	90.0	110	----
Anions and Nutrients (QCLot: 2386393)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 2386394)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 2386396)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.05 mg/L	104	80.0	120	----
Anions and Nutrients (QCLot: 2387399)									
Phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.333 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 2385550)									
Aluminum, dissolved	7429-90-5	E423A	0.003	mg/L	0.1 mg/L	99.5	80.0	120	----
Antimony, dissolved	7440-36-0	E423A	0.0001	mg/L	0.05 mg/L	99.1	80.0	120	----
Arsenic, dissolved	7440-38-2	E423A	0.0001	mg/L	0.05 mg/L	98.8	80.0	120	----
Barium, dissolved	7440-39-3	E423A	0.0001	mg/L	0.012 mg/L	92.1	80.0	120	----
Beryllium, dissolved	7440-41-7	E423A	0.00002	mg/L	0.005 mg/L	101	80.0	120	----
Bismuth, dissolved	7440-69-9	E423A	0.00005	mg/L	0.05 mg/L	100	80.0	120	----
Boron, dissolved	7440-42-8	E423A	0.01	mg/L	0.05 mg/L	101	80.0	120	----
Cadmium, dissolved	7440-43-9	E423A	0.000005	mg/L	0.005 mg/L	96.4	80.0	120	----
Calcium, dissolved	7440-70-2	E423A	0.05	mg/L	2.5 mg/L	91.2	80.0	120	----
Cesium, dissolved	7440-46-2	E423A	0.00001	mg/L	0.002 mg/L	94.1	80.0	120	----
Chromium, dissolved	7440-47-3	E423A	0.0001	mg/L	0.012 mg/L	94.1	80.0	120	----
Cobalt, dissolved	7440-48-4	E423A	0.0001	mg/L	0.012 mg/L	89.1	80.0	120	----
Copper, dissolved	7440-50-8	E423A	0.0005	mg/L	0.012 mg/L	85.5	80.0	120	----
Iron, dissolved	7439-89-6	E423A	0.01	mg/L	0.05 mg/L	91.3	80.0	120	----
Lead, dissolved	7439-92-1	E423A	0.00005	mg/L	0.025 mg/L	101	80.0	120	----
Lithium, dissolved	7439-93-2	E423A	0.001	mg/L	0.012 mg/L	110	80.0	120	----
Magnesium, dissolved	7439-95-4	E423A	0.005	mg/L	2.5 mg/L	105	80.0	120	----
Manganese, dissolved	7439-96-5	E423A	0.0001	mg/L	0.012 mg/L	96.0	80.0	120	----
Molybdenum, dissolved	7439-98-7	E423A	0.00005	mg/L	0.012 mg/L	92.4	80.0	120	----
Nickel, dissolved	7440-02-0	E423A	0.0005	mg/L	0.025 mg/L	92.4	80.0	120	----
Phosphorus, dissolved	7723-14-0	E423A	0.05	mg/L	0.5 mg/L	96.5	80.0	120	----
Potassium, dissolved	7440-09-7	E423A	0.05	mg/L	2.5 mg/L	100	80.0	120	----
Rubidium, dissolved	7440-17-7	E423A	0.0002	mg/L	0.005 mg/L	98.7	80.0	120	----
Selenium, dissolved	7782-49-2	E423A	0.00005	mg/L	0.05 mg/L	92.2	80.0	120	----
Silicon, dissolved	7440-21-3	E423A	0.1	mg/L	0.5 mg/L	97.3	80.0	120	----
Silver, dissolved	7440-22-4	E423A	0.00001	mg/L	0.005 mg/L	92.8	80.0	120	----
Sodium, dissolved	7440-23-5	E423A	0.05	mg/L	2.5 mg/L	95.4	80.0	120	----
Strontium, dissolved	7440-24-6	E423A	0.0002	mg/L	0.012 mg/L	101	80.0	120	----
Sulfur, dissolved	7704-34-9	E423A	0.5	mg/L	2.5 mg/L	98.3	80.0	120	----
Tellurium, dissolved	13494-80-9	E423A	0.0002	mg/L	0.005 mg/L	92.4	80.0	120	----
Thallium, dissolved	7440-28-0	E423A	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
Thorium, dissolved	7440-29-1	E423A	0.0001	mg/L	0.005 mg/L	98.7	80.0	120	----
Tin, dissolved	7440-31-5	E423A	0.0001	mg/L	0.025 mg/L	99.4	80.0	120	----
Titanium, dissolved	7440-32-6	E423A	0.0003	mg/L	0.012 mg/L	92.4	80.0	120	----
Tungsten, dissolved	7440-33-7	E423A	0.0001	mg/L	0.005 mg/L	89.7	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 2385550) - continued									
Uranium, dissolved	7440-61-1	E423A	0.00001	mg/L	0 mg/L	96.8	80.0	120	----
Vanadium, dissolved	7440-62-2	E423A	0.0005	mg/L	0.025 mg/L	96.2	80.0	120	----
Zinc, dissolved	7440-66-6	E423A	0.003	mg/L	0.025 mg/L	93.2	80.0	120	----
Zirconium, dissolved	7440-67-7	E423A	0.0002	mg/L	0.005 mg/L	91.4	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 2385452)										
HA2505466-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 2385717)										
HA2505594-003	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.110 mg/L	0.1 mg/L	110	75.0	125	----
Anions and Nutrients (QCLot: 2386390)										
WT2536331-003	Anonymous	Fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 2386391)										
WT2536331-003	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	2.37 mg/L	2.5 mg/L	94.8	75.0	125	----
Anions and Nutrients (QCLot: 2386392)										
WT2536331-003	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.464 mg/L	0.5 mg/L	92.8	75.0	125	----
Anions and Nutrients (QCLot: 2386393)										
WT2536331-003	Anonymous	Chloride	16887-00-6	E235.Cl	98.6 mg/L	100 mg/L	98.6	75.0	125	----
Anions and Nutrients (QCLot: 2386394)										
WT2536331-003	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	98.9 mg/L	100 mg/L	98.9	75.0	125	----
Anions and Nutrients (QCLot: 2386396)										
WT2536070-001	MW2-21	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0191 mg/L	0.02 mg/L	97.4	70.0	130	----
Anions and Nutrients (QCLot: 2387399)										
WT2535887-001	Anonymous	Phosphorus, total dissolved	7723-14-0	E375-T	ND mg/L	----	ND	70.0	130	----
Dissolved Metals (QCLot: 2385550)										
WT2536073-001	Anonymous	Aluminum, dissolved	7429-90-5	E423A	ND mg/L	----	ND	70.0	130	----
		Antimony, dissolved	7440-36-0	E423A	0.0450 mg/L	0.05 mg/L	90.0	70.0	130	----
		Arsenic, dissolved	7440-38-2	E423A	0.0505 mg/L	0.05 mg/L	101	70.0	130	----
		Barium, dissolved	7440-39-3	E423A	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E423A	0.00512 mg/L	0.005 mg/L	102	70.0	130	----
		Bismuth, dissolved	7440-69-9	E423A	0.0455 mg/L	0.05 mg/L	91.0	70.0	130	----
		Boron, dissolved	7440-42-8	E423A	0.049 mg/L	0.05 mg/L	97.2	70.0	130	----
		Cadmium, dissolved	7440-43-9	E423A	0.00485 mg/L	0.005 mg/L	97.0	70.0	130	----
		Calcium, dissolved	7440-70-2	E423A	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E423A	0.00231 mg/L	0.002 mg/L	92.5	70.0	130	----
		Chromium, dissolved	7440-47-3	E423A	0.0117 mg/L	0.012 mg/L	93.7	70.0	130	----
		Cobalt, dissolved	7440-48-4	E423A	0.0110 mg/L	0.012 mg/L	87.8	70.0	130	----
		Copper, dissolved	7440-50-8	E423A	ND mg/L	----	ND	70.0	130	----
		Iron, dissolved	7439-89-6	E423A	ND mg/L	----	ND	70.0	130	----
		Lead, dissolved	7439-92-1	E423A	ND mg/L	----	ND	70.0	130	----
		Lithium, dissolved	7439-93-2	E423A	0.0118 mg/L	0.012 mg/L	94.4	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 2385550) - continued										
WT2536073-001	Anonymous	Magnesium, dissolved	7439-95-4	E423A	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E423A	ND mg/L	----	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E423A	0.0117 mg/L	0.012 mg/L	93.7	70.0	130	----
		Nickel, dissolved	7440-02-0	E423A	0.0221 mg/L	0.025 mg/L	88.4	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E423A	0.569 mg/L	0.5 mg/L	114	70.0	130	----
		Potassium, dissolved	7440-09-7	E423A	2.35 mg/L	2.5 mg/L	94.0	70.0	130	----
		Rubidium, dissolved	7440-17-7	E423A	0.00511 mg/L	0.005 mg/L	102	70.0	130	----
		Selenium, dissolved	7782-49-2	E423A	0.0479 mg/L	0.05 mg/L	95.7	70.0	130	----
		Silicon, dissolved	7440-21-3	E423A	ND mg/L	----	ND	70.0	130	----
		Silver, dissolved	7440-22-4	E423A	0.00464 mg/L	0.005 mg/L	92.8	70.0	130	----
		Sodium, dissolved	7440-23-5	E423A	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E423A	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E423A	ND mg/L	----	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E423A	0.00423 mg/L	0.005 mg/L	84.6	70.0	130	----
		Thallium, dissolved	7440-28-0	E423A	0.0441 mg/L	0.05 mg/L	88.2	70.0	130	----
		Thorium, dissolved	7440-29-1	E423A	0.00401 mg/L	0.005 mg/L	80.1	70.0	130	----
		Tin, dissolved	7440-31-5	E423A	0.0235 mg/L	0.025 mg/L	94.0	70.0	130	----
		Titanium, dissolved	7440-32-6	E423A	ND mg/L	----	ND	70.0	130	----
		Tungsten, dissolved	7440-33-7	E423A	0.00444 mg/L	0.005 mg/L	88.8	70.0	130	----
		Uranium, dissolved	7440-61-1	E423A	ND mg/L	----	ND	70.0	130	----
		Vanadium, dissolved	7440-62-2	E423A	0.0241 mg/L	0.025 mg/L	96.3	70.0	130	----
		Zinc, dissolved	7440-66-6	E423A	ND mg/L	----	ND	70.0	130	----
		Zirconium, dissolved	7440-67-7	E423A	0.00325 mg/L	0.005 mg/L	65.1	70.0	130	MES

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

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Quality Control Interpretive Report

Work Order	:	**WT2536070**			
Client	:	C.F. Crozier & Associates Inc.	Laboratory	:	ALS Environmental - Waterloo
Contact	:	Victoria Mazur	Account Manager	:	Colby Coutu
Address	:	100-2800 High Point Dr. Milton ON Canada L9T 6P4	Address	:	60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	:	548 708 0039	Telephone	:	+1 519 886 6910
Project	:	2792-7289	Date Samples Received	:	11-Dec-2025 14:00
PO	:	----	Issue Date	:	19-Dec-2025 14:14
C-O-C number	:	----			
Sampler	:	Client			
Site	:	----			
Quote number	:	2024/2025 SOA			
No. of samples received	:	3			
No. of samples analysed	:	3			

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Laboratory Control Sample Duplicate (LCSD) outliers occur
- Matrix Spike outliers occur - please see following pages for full details.
- No Matrix Spike Duplicate (MSD) outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix :**Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result		Limits	Comment
Matrix Spike (MS) Recoveries									
Dissolved Metals	WT2536073--001	Anonymous	Zirconium, dissolved	7440-67-7	E423A	65.1 %	MES	70.0-130%	Recovery less than lower data quality objective

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and/or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: Water

Evaluation: × = Holding time exceedance; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client sample ID	ALS Sample ID	QC Lot	Method	Sampling Date	Extraction / Preparation				Analysis			
					Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence												
Amber glass total (sulfuric acid) [ON MECP]												
MW2-21	001	2385452	E298	11-Dec-2025	15-Dec-2025	28 days	5 days	✓	16-Dec-2025	28 days	5 days	✓
MW4-23	002	2385452	E298	11-Dec-2025	15-Dec-2025	28 days	5 days	✓	16-Dec-2025	28 days	5 days	✓
MW5-23	003	2385717	E298	11-Dec-2025	15-Dec-2025	28 days	5 days	✓	16-Dec-2025	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC												
HDPE [ON MECP]												
MW2-21	001	2386393	E235.Cl	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	6 days	✓
MW4-23	002	2386393	E235.Cl	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	6 days	✓
MW5-23	003	2386393	E235.Cl	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	6 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)												
HDPE [ON MECP]												
MW2-21	001	2386396	E378-U	11-Dec-2025	16-Dec-2025	7 days	5 days	✓	18-Dec-2025	7 days	8 days	✓
MW4-23	002	2386396	E378-U	11-Dec-2025	16-Dec-2025	7 days	5 days	✓	18-Dec-2025	7 days	8 days	✓
MW5-23	003	2386396	E378-U	11-Dec-2025	16-Dec-2025	7 days	5 days	✓	18-Dec-2025	7 days	8 days	✓

Matrix: Water

Evaluation: × = Holding time exceedance; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client sample ID	ALS Sample ID	QC Lot	Method	Sampling Date	Extraction / Preparation				Analysis			
					Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
						Rec	Actual			Rec	Actual	
Anions and Nutrients : Fluoride in Water by IC												
HDPE [ON MECP]												
MW2-21	001	2386390	E235.F	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	6 days	✓
MW4-23	002	2386390	E235.F	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	6 days	✓
MW5-23	003	2386390	E235.F	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	6 days	✓
Anions and Nutrients : Nitrate in Water by IC												
HDPE [ON MECP]												
MW2-21	001	2386391	E235.NO3	11-Dec-2025	16-Dec-2025	7 days	5 days	✓	17-Dec-2025	7 days	6 days	✓
MW4-23	002	2386391	E235.NO3	11-Dec-2025	16-Dec-2025	7 days	5 days	✓	17-Dec-2025	7 days	6 days	✓
MW5-23	003	2386391	E235.NO3	11-Dec-2025	16-Dec-2025	7 days	5 days	✓	17-Dec-2025	7 days	6 days	✓
Anions and Nutrients : Nitrite in Water by IC												
HDPE [ON MECP]												
MW2-21	001	2386392	E235.NO2	11-Dec-2025	16-Dec-2025	7 days	5 days	✓	17-Dec-2025	7 days	6 days	✓
MW4-23	002	2386392	E235.NO2	11-Dec-2025	16-Dec-2025	7 days	5 days	✓	17-Dec-2025	7 days	6 days	✓
MW5-23	003	2386392	E235.NO2	11-Dec-2025	16-Dec-2025	7 days	5 days	✓	17-Dec-2025	7 days	6 days	✓
Anions and Nutrients : Sulfate in Water by IC												
HDPE [ON MECP]												
MW2-21	001	2386394	E235.SO4	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	6 days	✓
MW4-23	002	2386394	E235.SO4	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	6 days	✓
MW5-23	003	2386394	E235.SO4	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	6 days	✓

Matrix: Water

Evaluation: × = Holding time exceedance; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client sample ID	ALS Sample ID	QC Lot	Method	Sampling Date	Extraction / Preparation				Analysis			
					Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
						Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)												
Amber glass dissolved (sulfuric acid) [ON MECP]												
MW2-21	001	2387399	E375-T	11-Dec-2025	17-Dec-2025	28 days	7 days	✓	17-Dec-2025	28 days	7 days	✓
MW4-23	002	2387399	E375-T	11-Dec-2025	17-Dec-2025	28 days	7 days	✓	17-Dec-2025	28 days	7 days	✓
MW5-23	003	2387399	E375-T	11-Dec-2025	17-Dec-2025	28 days	7 days	✓	17-Dec-2025	28 days	7 days	✓
Dissolved Metals : Digested Dissolved Metals by CRC ICPMS												
HDPE dissolved (nitric acid)												
MW2-21	001	2385550	E423A	11-Dec-2025	15-Dec-2025	180 days	4 days	✓	15-Dec-2025	180 days	5 days	✓
MW4-23	002	2385550	E423A	11-Dec-2025	15-Dec-2025	180 days	4 days	✓	15-Dec-2025	180 days	5 days	✓
MW5-23	003	2385550	E423A	11-Dec-2025	15-Dec-2025	180 days	4 days	✓	15-Dec-2025	180 days	5 days	✓
Physical Tests : Alkalinity Species by Titration												
HDPE [ON MECP]												
MW2-21	001	2386389	E290	11-Dec-2025	16-Dec-2025	14 days	5 days	✓	17-Dec-2025	14 days	7 days	✓
MW4-23	002	2386389	E290	11-Dec-2025	16-Dec-2025	14 days	5 days	✓	17-Dec-2025	14 days	7 days	✓
MW5-23	003	2386389	E290	11-Dec-2025	16-Dec-2025	14 days	5 days	✓	17-Dec-2025	14 days	7 days	✓
Physical Tests : Colour (Apparent) by Spectrometer												
HDPE [ON MECP]												
MW2-21	001	2389363	E330	11-Dec-2025	----	----	----		17-Dec-2025	48 hrs	155 hrs	× EHT
MW4-23	002	2389363	E330	11-Dec-2025	----	----	----		17-Dec-2025	48 hrs	155 hrs	× EHT
MW5-23	003	2389363	E330	11-Dec-2025	----	----	----		17-Dec-2025	48 hrs	155 hrs	× EHT

Matrix: Water

Evaluation: × = Holding time exceedance; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client sample ID	ALS Sample ID	QC Lot	Method	Sampling Date	Extraction / Preparation				Analysis			
					Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
						Rec	Actual			Rec	Actual	
Physical Tests : Conductivity in Water												
HDPE [ON MECP]												
MW2-21	001	2386388	E100	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	7 days	✓
MW4-23	002	2386388	E100	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	7 days	✓
MW5-23	003	2386388	E100	11-Dec-2025	16-Dec-2025	28 days	5 days	✓	17-Dec-2025	28 days	7 days	✓
Physical Tests : pH by Meter												
HDPE [ON MECP]												
MW2-21	001	2386387	E108	11-Dec-2025	16-Dec-2025	14 days	5 days	✓	17-Dec-2025	14 days	7 days	✓
MW4-23	002	2386387	E108	11-Dec-2025	16-Dec-2025	14 days	5 days	✓	17-Dec-2025	14 days	7 days	✓
MW5-23	003	2386387	E108	11-Dec-2025	16-Dec-2025	14 days	5 days	✓	17-Dec-2025	14 days	7 days	✓
Physical Tests : TDS by Gravimetry												
HDPE [ON MECP]												
MW2-21	001	2386652	E162	11-Dec-2025	----	----	----		16-Dec-2025	7 days	5 days	✓
MW4-23	002	2386652	E162	11-Dec-2025	----	----	----		16-Dec-2025	7 days	5 days	✓
MW5-23	003	2386652	E162	11-Dec-2025	----	----	----		16-Dec-2025	7 days	5 days	✓
Physical Tests : TSS by Gravimetry												
HDPE [ON MECP]												
MW2-21	001	2386651	E160	11-Dec-2025	----	----	----		16-Dec-2025	7 days	5 days	✓
MW4-23	002	2386651	E160	11-Dec-2025	----	----	----		16-Dec-2025	7 days	5 days	✓
MW5-23	003	2386651	E160	11-Dec-2025	----	----	----		16-Dec-2025	7 days	5 days	✓

Matrix: Water

Evaluation: × = Holding time exceedance; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client sample ID	ALS Sample ID	QC Lot	Method	Sampling Date	Extraction / Preparation				Analysis			
					Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
						Rec	Actual			Rec	Actual	
Physical Tests : Turbidity by Nephelometry												
HDPE [ON MECP]												
MW2-21	001	2382500	E121	11-Dec-2025	----	----	----		12-Dec-2025	48 hrs	34 hrs	✓
MW4-23	002	2382500	E121	11-Dec-2025	----	----	----		12-Dec-2025	48 hrs	34 hrs	✓
MW5-23	003	2382500	E121	11-Dec-2025	----	----	----		12-Dec-2025	48 hrs	34 hrs	✓

Legend & Qualifier Definitions

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: Water

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Conductivity in Water	E100	2386388	1	18	5.6	5.0	✓
pH by Meter	E108	2386387	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	2382500	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	2386651	1	20	5.0	4.8	✓
TDS by Gravimetry	E162	2386652	1	17	5.9	5.0	✓
Chloride in Water by IC	E235.Cl	2386393	1	19	5.3	5.0	✓
Fluoride in Water by IC	E235.F	2386390	1	11	9.1	5.0	✓
Nitrite in Water by IC	E235.NO2	2386392	1	18	5.6	5.0	✓
Nitrate in Water by IC	E235.NO3	2386391	1	18	5.6	5.0	✓
Sulfate in Water by IC	E235.SO4	2386394	1	19	5.3	5.0	✓
Alkalinity Species by Titration	E290	2386389	1	18	5.6	5.0	✓
Ammonia by Fluorescence	E298	2385452	2	40	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	2389363	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	2387399	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2386396	1	18	5.6	5.0	✓
Digested Dissolved Metals by CRC ICPMS	E423A	2385550	1	4	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Conductivity in Water	E100	2386388	1	18	5.6	5.0	✓
pH by Meter	E108	2386387	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	2382500	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	2386651	1	20	5.0	4.8	✓
TDS by Gravimetry	E162	2386652	1	17	5.9	5.0	✓
Chloride in Water by IC	E235.Cl	2386393	1	19	5.3	5.0	✓
Fluoride in Water by IC	E235.F	2386390	1	11	9.1	5.0	✓
Nitrite in Water by IC	E235.NO2	2386392	1	18	5.6	5.0	✓
Nitrate in Water by IC	E235.NO3	2386391	1	18	5.6	5.0	✓
Sulfate in Water by IC	E235.SO4	2386394	1	19	5.3	5.0	✓

Matrix: Water

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	2386389	1	18	5.6	5.0	✓
Ammonia by Fluorescence	E298	2385452	2	40	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	2389363	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	2387399	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2386396	1	18	5.6	5.0	✓
Digested Dissolved Metals by CRC ICPMS	E423A	2385550	1	4	25.0	5.0	✓
Method Blanks (MB)							
Conductivity in Water	E100	2386388	1	18	5.6	5.0	✓
Turbidity by Nephelometry	E121	2382500	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	2386651	1	20	5.0	4.8	✓
TDS by Gravimetry	E162	2386652	1	17	5.9	5.0	✓
Chloride in Water by IC	E235.Cl	2386393	1	19	5.3	5.0	✓
Fluoride in Water by IC	E235.F	2386390	1	11	9.1	5.0	✓
Nitrite in Water by IC	E235.NO2	2386392	1	18	5.6	5.0	✓
Nitrate in Water by IC	E235.NO3	2386391	1	18	5.6	5.0	✓
Sulfate in Water by IC	E235.SO4	2386394	1	19	5.3	5.0	✓
Alkalinity Species by Titration	E290	2386389	1	18	5.6	5.0	✓
Ammonia by Fluorescence	E298	2385452	2	40	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	2389363	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	2387399	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2386396	1	18	5.6	5.0	✓
Digested Dissolved Metals by CRC ICPMS	E423A	2385550	1	4	25.0	5.0	✓
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	2386393	1	19	5.3	5.0	✓
Fluoride in Water by IC	E235.F	2386390	1	11	9.1	5.0	✓
Nitrite in Water by IC	E235.NO2	2386392	1	18	5.6	5.0	✓
Nitrate in Water by IC	E235.NO3	2386391	1	18	5.6	5.0	✓
Sulfate in Water by IC	E235.SO4	2386394	1	19	5.3	5.0	✓
Ammonia by Fluorescence	E298	2385452	2	40	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	2387399	1	14	7.1	5.0	✓

Matrix: Water

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Matrix Spikes (MS)							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2386396	1	18	5.6	5.0	✓
Digested Dissolved Metals by CRC ICPMS	E423A	2385550	1	4	25.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 ALS Environmental - Waterloo	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Colour (Apparent) by Spectrometer	E330 ALS Environmental - Waterloo	Water	APHA 2120 C (mod)	Colour (Apparent) is measured in an unfiltered sample spectrophotometrically using the single wavelength method. The colour contribution of settleable solids are not included in the result. This method is intended for potable waters. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Conductivity in Water	E100 ALS Environmental - Waterloo	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
Conductivity Screen (Internal Use Only)	ES100 ALS Environmental - Waterloo	Water	APHA 2510 (mod)	Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.
Digested Dissolved Metals by CRC ICPMS	E423A ALS Environmental - Waterloo	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Waterloo	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Waterloo	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Fluoride in Water by IC	E235.F ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC	E235.NO2 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

pH by Meter	E108 ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
TDS by Gravimetry	E162 ALS Environmental - Waterloo	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
TSS by Gravimetry	E160 ALS Environmental - Waterloo	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Turbidity by Nephelometry	E121 ALS Environmental - Waterloo	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
Preparation Methods	***Method / Lab***	***Matrix***	***Method Reference***	***Method Descriptions***
Digestion for Dissolved Phosphorus in water	EP375 ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Digestion and Filtration	EP423 ALS Environmental - Waterloo	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Waterloo	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Preparation for Ammonia	EP298 ALS Environmental - Waterloo	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Autotitrator	EP108-TITR ALS Environmental - Waterloo	Water		Sample preparation for parameters analysed by Autotitrator
Preparation for Ion Chromatography	EP235-IC ALS Environmental - Waterloo	Water		Sample preparation for ion chromatography
Preparation for Orthophosphate	EP378-PO4 ALS Environmental - Waterloo	Water	APHA 4500-P E (mod)	Sample preparation for orthophosphate analysis

GC - 365
MM - 800
N - 513

Chain of Custody (COC) / Analytical Request Form

COC Number: 25 -

Page of

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Waterloo
Work Order Reference
WT2536070

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	C.F. Crozier & Associates Inc.
Contact:	Victoria Mazur
Phone:	548 708 0039
	Company address below will appear on the final report
Street:	100-2800 High Point Dr.
City/Province:	Milton, ON
Postal Code:	L9T 6P4
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	Marcy Hatt

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: vmazur@cfcrozier.ca
Email 2:
Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: mhatt@cfcrozier.ca
Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge mini
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge min
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge mir
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge mi
☐ Same day [E2] if received by 10am M-S - 200% rush surcha
Additional fees may apply to rush requests on wee
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, ple

Project Information

ALS Client Code / QUOTE #: WT2023CFCR1000003
Job / Project #: 2792-7289
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#:
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (ALS use only):
ALS Contact: Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	GENCHEM 1 GW	TSS	Dissolved P	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	MW2-21	11/12/2025		GW	4	R	R	R			
	MW4-23	11/12/2025		GW	4	R	R	R			
	MW5-23	11/12/2025		GW	4	R	R	R			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

* Dissolved P and Metals

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☑ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
1.5				3.4			

SHIPMENT RELEASE (client use)

Released by: Victoria Mazur Date: 11/12/2025 Time: 17:45

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: AM Date: 12/11/25 Time: 14:00

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: NTB Date: 11/12/025 Time: 17:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCT 2025 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

APPENDIX G

Water Balance Assessment

CROZIER

Project Information

Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: VM
Checked By: JD
Date: 2026.02.10

Project Name: **7456 McLean Road**
Location: **Township of Puslinch**

Pre-Development Conditions

Catchment ID	**101**	**102**				
Catchment Area (m^2)	8100	8100				
Pervious Area (m^2)	8100	8100				
Impervious Area (m^2)	0	0				
Percent Imperviousness (%)	0%	0%				
Infiltration Factors						
Topography - Description	Rolling	Rolling				
Topography - Infiltration Factor	0.20	0.20				
Soil - Description	Fine Sandy Loam	Fine Sandy Loam				
Soil - Infiltration Factor	0.30	0.30				
Cover - Description	Pasture and Shrubs	Pasture and Shrubs				
Cover - Infiltration Factor	0.10	0.10				
Total Infiltration Factor	0.60	0.60				
Soil Moisture Capacity (mm)	150	150				

Post-Development Conditions

Catchment ID	**201**	**202**	**203**	**204**		
Catchment Area (m^2)	2300	12300	800	800		
Pervious Area (m^2)	1909	861	800	318		
Impervious Area (m^2)	391	11439	0	482		
Percent Imperviousness (%)	17%	93%	0%	60%		
Infiltration Factors						
Topography - Description	Flat	Flat	Rolling	Rolling		
Topography - Infiltration Factor	0.30	0.30	0.20	0.20		
Soil - Description	Fine Sandy Loam	Fine Sandy Loam	Fine Sandy Loam	Fine Sandy Loam		
Soil - Infiltration Factor	0.30	0.30	0.30	0.30		
Cover - Description	Urban Lawns	Urban Lawns	Urban Lawns	Urban Lawns		
Cover - Infiltration Factor	0.10	0.10	0.10	0.10		
Total Infiltration Factor	0.70	0.70	0.60	0.60		
Soil Moisture Capacity (mm)	75	75	75	75		

CROZIER

Climate Parameters

Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: VM
Checked By: JD
Date: 2026.02.10

PROJECT LOCATION PUSLINCH, ON
PROJECT LATITUDE ° **43**

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)	Precipitation (P) (mm)[1]
January	-6.3	0.00		0.0	1.37	0.0	66.3
February	-5.9	0.00		0.0	0.82	0.0	46.1
March	-0.8	0.00		0.0	1.02	0.0	57.0
April	5.9	1.28		27.0	1.12	30.3	81.2
May	12.6	4.05		60.9	1.26	76.8	80.2
June	17.8	6.84		88.3	1.28	113.0	80.5
July	20.2	8.28		101.1	1.29	130.4	96.2
August	19.1	7.61		95.2	1.2	114.2	67.2
September	15.2	5.38		74.5	1.04	77.5	75.2
October	8.8	2.35		41.5	0.95	39.4	71.0
November	2.6	0.37		11.2	0.81	9.1	74.9
December	-2.8	0.00		0.0	0.77	0.0	54.9
TOTAL	7.2	**36.2**	**1.1**	**499.7**		**590.7**	**850.7**

NOTES: 1. Precipitation and temperature data referenced from Environment Canada (Toronto Buttonville (Airport) Weather Station).
2. Latitude adjustment/correction factors determined based on site location assuming 12 hours of sunlight per day for 30 days

CROZIER

Pre-Development Water Balance

Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: VM
Checked By: JD
Date: 2026.02.10

Project Name: **7456 McLean Road**
Location: **Township of Puslinch**

Catchment ID	**101**												
Catchment Parameters	**Pervious Area**			0.81 ha	**Impervious Area**			0.00 ha	**Total Area**			0.81 ha	
	Soil Moisture Holding Capacity			150 mm	**Infiltration Factor**			0.60	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	66	46	57	81	80	81	96	67	75	71	75	55	**851**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	30	77	110	121	93	76	39	9	0	**555**
Storage (mm)	150	150	150	150	150	121	96	70	69	101	150	150	
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	17	55	**295**
Infiltration (mm)	40	28	34	31	2	0	0	0	0	0	10	33	**177**
Surface Water Runoff (mm)	27	18	23	20	1	0	0	0	0	0	7	22	**118**
Impervious Area Water Balance													
Evaporation (mm)	10	7	9	12	12	12	14	10	11	11	11	8	**128**
Surface Water Runoff (mm)	56	39	48	69	68	68	82	57	64	60	64	47	**723**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	245	622	889	979	754	618	319	74	0	**4,499**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	322	224	277	248	17	0	0	0	0	0	81	267	**1,435**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	215	149	185	165	11	0	0	0	0	0	54	178	**957**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Pre-Development Water Balance Summary: Catchment 101				
Pre-Development Evapotranspiration	4499	m^3/yr	555.4	mm/yr
Pre-Development Infiltration	1435	m^3/yr	177.2	mm/yr
Pre-Development Runoff	957	m^3/yr	118.1	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Evapotranspiration does not occur when average temperature is below zero.
- Infiltration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.
- When calculating the water balance, evaporation is subtracted from precipitation, then soil storage is replenished. If any precipitation remains it is considered surplus and divided between infiltration and runoff

CROZIER

Pre-Development Water Balance

Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: VM
Checked By: JD
Date: 2026.02.10

Project Name: **7456 McLean Road**
Location: **Township of Puslinch**

Catchment ID	**102**												
Catchment Parameters	**Pervious Area**			0.81 ha	**Impervious Area**			0.00 ha	**Total Area**			0.81 ha	
	Soil Moisture Holding Capacity			150 mm	**Infiltration Factor**			0.60	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	66	46	57	81	80	81	96	67	75	71	75	55	**851**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	30	77	110	121	93	76	39	9	0	**555**
Storage (mm)	150	150	150	150	150	121	96	70	69	101	150	150	
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	17	55	**295**
Infiltration (mm)	40	28	34	31	2	0	0	0	0	0	10	33	**177**
Surface Water Runoff (mm)	27	18	23	20	1	0	0	0	0	0	7	22	**118**
Impervious Area Water Balance													
Evaporation (mm)	10	7	9	12	12	12	14	10	11	11	11	8	**128**
Surface Water Runoff (mm)	56	39	48	69	68	68	82	57	64	60	64	47	**723**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	245	622	889	979	754	618	319	74	0	**4499**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	322	224	277	248	17	0	0	0	0	0	81	267	**1435**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	215	149	185	165	11	0	0	0	0	0	54	178	**957**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Pre-Development Water Balance Summary: Catchment 102				
Pre-Development Evapotranspiration	4499	m^3/yr	555	mm/yr
Pre-Development Infiltration	1435	m^3/yr	177	mm/yr
Pre-Development Runoff	957	m^3/yr	118	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.

2. Assumptions:

- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.
- When calculating the water balance, evaporation is subtracted from precipitation, then soil storage is replenished. If any precipitation remains it is considered surplus and divided between infiltration and runoff

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: VM
Checked By: JD
Date: 2026.02.10

Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: **7456 McLean Road**
Location: **Township of Puslinch**

Catchment ID	**201**					
Catchment Parameters	**Pervious Area**	0.19 ha	**Impervious Area**	0.04 ha	**Total Area**	0.23 ha
	Soil Moisture Holding Capacity	75 mm	**Infiltration Factor**	0.70	**% Impervious Evaporation**	15%

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	66	46	57	81	80	81	96	67	75	71	75	55	**851**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	30	77	107	114	82	76	39	9	0	**534**
Storage	75	75	75	75	75	49	31	16	16	48	75	75	
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	38	55	**317**
Infiltration (mm)	46	32	40	36	2	0	0	0	0	0	27	38	**222**
Surface Water Runoff (mm)	20	14	17	15	1	0	0	0	0	0	12	16	**95**
Impervious Area Water Balance													
Evaporation (mm)	10	7	9	12	12	12	14	10	11	11	11	8	**128**
Surface Water Runoff (mm)	56	39	48	69	68	68	82	57	64	60	64	47	**723**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	58	147	204	218	156	145	75	17	0	**1019**
Impervious ET (m^3)	4	3	3	5	5	5	6	4	4	4	4	3	**50**
Pervious Infiltration (m^3)	89	62	76	68	5	0	0	0	0	0	51	73	**424**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	38	26	33	29	2	0	0	0	0	0	22	31	**182**
Impervious Runoff (m^3)	22	15	19	27	27	27	32	22	25	24	25	18	**283**

Post-Development Water Balance Summary: Catchment 201				
Post-Development Evapotranspiration	1068.7	m^3/yr	464.7	mm/yr
Post-Development Infiltration	423.6	m^3/yr	184.2	mm/yr
Post-Development Runoff	464.3	m^3/yr	201.9	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.
- When calculating the water balance, evaporation is subtracted from precipitation, then soil storage is replenished. If any precipitation remains it is considered surplus and divided between infiltration and runoff

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: VM
Checked By: JD
Date: 2026.02.10

Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: **7456 McLean Road**
Location: **Township of Puslinch**

Catchment ID	**202**												
Catchment Parameters	**Pervious Area**			0.09 ha	**Impervious Area**			1.14 ha	**Total Area**			1.23 ha	
	Soil Moisture Holding Capacity			75 mm	**Infiltration Factor**			0.70	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	66	46	57	81	80	81	96	67	75	71	75	55	**851**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	30	77	107	114	82	76	39	9	0	**534**
Storage	75	75	75	75	75	49	31	16	16	48	75	75	
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	38	55	**317**
Infiltration (mm)	46	32	40	36	2	0	0	0	0	0	27	38	**222**
Surface Water Runoff (mm)	20	14	17	15	1	0	0	0	0	0	12	16	**95**
Impervious Area Water Balance													
Evaporation (mm)	10	7	9	12	12	12	14	10	11	11	11	8	**128**
Surface Water Runoff (mm)	56	39	48	69	68	68	82	57	64	60	64	47	**723**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	26	66	92	98	70	65	34	8	0	**460**
Impervious ET (m^3)	114	79	98	139	138	138	165	115	129	122	129	94	**1460**
Pervious Infiltration (m^3)	40	28	34	31	2	0	0	0	0	0	23	33	**191**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	17	12	15	13	1	0	0	0	0	0	10	14	**82**
Impervious Runoff (m^3)	645	448	554	790	780	783	935	653	731	690	728	534	**8271**

Post-Development Water Balance Summary: Catchment 202				
Post-Development Evapotranspiration	1919.2	m^3/yr	156.0	mm/yr
Post-Development Infiltration	191.1	m^3/yr	15.5	mm/yr
Post-Development Runoff	8353.4	m^3/yr	679.1	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.
- When calculating the water balance, evaporation is subtracted from precipitation, then soil storage is replenished. If any precipitation remains it is considered surplus and divided between infiltration and runoff

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: VM
Checked By: JD
Date: 2026.02.10

Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: **7456 McLean Road**
Location: **Township of Puslinch**

Catchment ID	**203**					
Catchment Parameters	**Pervious Area**	0.08 ha	**Impervious Area**	0.00 ha	**Total Area**	0.08 ha
	Soil Moisture Holding Capacity	75 mm	**Infiltration Factor**	0.60	**% Impervious Evaporation**	15%

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	66	46	57	81	80	81	96	67	75	71	75	55	**851**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	30	77	107	114	82	76	39	9	0	**534**
Storage	75	75	75	75	75	49	31	16	16	48	75	75	
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	38	55	**317**
Infiltration (mm)	40	28	34	31	2	0	0	0	0	0	23	33	**190**
Surface Water Runoff (mm)	27	18	23	20	1	0	0	0	0	0	15	22	**127**
Impervious Area Water Balance													
Evaporation (mm)	10	7	9	12	12	12	14	10	11	11	11	8	**128**
Surface Water Runoff (mm)	56	39	48	69	68	68	82	57	64	60	64	47	**723**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	24	61	85	91	65	61	32	7	0	**427**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	32	22	27	24	2	0	0	0	0	0	18	26	**152**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	21	15	18	16	1	0	0	0	0	0	12	18	**101**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Post-Development Water Balance Summary: Catchment 203				
Post-Development Evapotranspiration	427.0	m^3/yr	533.7	mm/yr
Post-Development Infiltration	152.2	m^3/yr	190.2	mm/yr
Post-Development Runoff	101.4	m^3/yr	126.8	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.
- When calculating the water balance, evaporation is subtracted from precipitation, then soil storage is replenished. If any precipitation remains it is considered surplus and divided between infiltration and runoff

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: VM
Checked By: JD
Date: 2026.02.10

Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: **7456 McLean Road**
Location: **Township of Puslinch**

Catchment ID	**204**					
Catchment Parameters	**Pervious Area**	0.03 ha	**Impervious Area**	0.05 ha	**Total Area**	0.08 ha
	Soil Moisture Holding Capacity	75 mm	**Infiltration Factor**	0.60	**% Impervious Evaporation**	15%

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	66	46	57	81	80	81	96	67	75	71	75	55	**851**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	30	77	107	114	82	76	39	9	0	**534**
Storage	75	75	75	75	75	49	31	16	16	48	75	75	
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	38	55	**317**
Infiltration (mm)	40	28	34	31	2	0	0	0	0	0	23	33	**190**
Surface Water Runoff (mm)	27	18	23	20	1	0	0	0	0	0	15	22	**127**
Impervious Area Water Balance													
Evaporation (mm)	10	7	9	12	12	12	14	10	11	11	11	8	**128**
Surface Water Runoff (mm)	56	39	48	69	68	68	82	57	64	60	64	47	**723**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	10	24	34	36	26	24	13	3	0	**170**
Impervious ET (m^3)	5	3	4	6	6	6	7	5	5	5	5	4	**61**
Pervious Infiltration (m^3)	13	9	11	10	1	0	0	0	0	0	7	10	**61**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	8	6	7	6	0	0	0	0	0	0	5	7	**40**
Impervious Runoff (m^3)	27	19	23	33	33	33	39	28	31	29	31	22	**348**

Post-Development Water Balance Summary: Catchment 204				
Post-Development evapotranspiration	231.4	m^3/yr	289.2	mm/yr
Post-Development Infiltration	60.6	m^3/yr	75.7	mm/yr
Post-Development Runoff	388.6	m^3/yr	485.8	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.
- When calculating the water balance, evaporation is subtracted from precipitation, then soil storage is replenished. If any precipitation remains it is considered surplus and divided between infiltration and runoff

CROZIER

Site Water Balance Summary

Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: VM
Checked By: JD
Date: 2026.02.10

Pre-Development Water Balance							
Catchment ID	Area	Evapotranspiration		Infiltration		Runoff	
	(ha)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)
101	0.81	4,499	555	1,435	177	957	118
102	0.81	4,499	555	1,435	177	957	118
Total	**1.62**	**8,998**	**555**	**2,870**	**177**	**1,913**	**118**

Post-Development Water Balance							
Catchment ID	Area	Evapotranspiration		Infiltration		Runoff	
	(ha)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)
201	0.23	1069	465	424	184	464	202
202	1.23	1919	156	191	16	8353	679
203	0.08	427	534	152	190	101	127
204	0.08	231	289	61	76	389	486
Total	**1.62**	**3,646**	**225**	**827**	**51**	**9,308**	**575**

Site Water Balance Summary							
Scenario	Area	Evapotranspiration		Infiltration		Runoff	
	(ha)	(m^3)	(mm)	(m^3)	(mm)	(m^3)	(mm)
Pre-Dev.	1.62	8998	555	2870	177	1913	118
Post-Dev.	1.62	3646	225	827	51	9308	575
Difference	0	-5352	-330	-2042	-126	7394	456
% Difference	0%	-59%	-59%	-71%	-71%	386%	386%

Annual Infiltration Deficit **2042 m^3**
126 mm

APPENDIX H

Nitrate Impact Assessment

NITRATE ATTENUATION CALCULATION

Date: 2026.02.12
Completed By:
Checked By: JD

Project Name: 7456 McLean
Project Number: 2377-6556

IMPACT ASSESSMENT

MOE, 2008

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

= Manual Data Entry

Infiltration Volume

Area of Dilution =	0.10	ha
Background Nitrate Quality in Groundwater =	0	mg/L
Annual Infiltration Rate =	250	mm/m2/yr
Annual Infiltration Volume =	250	m^3

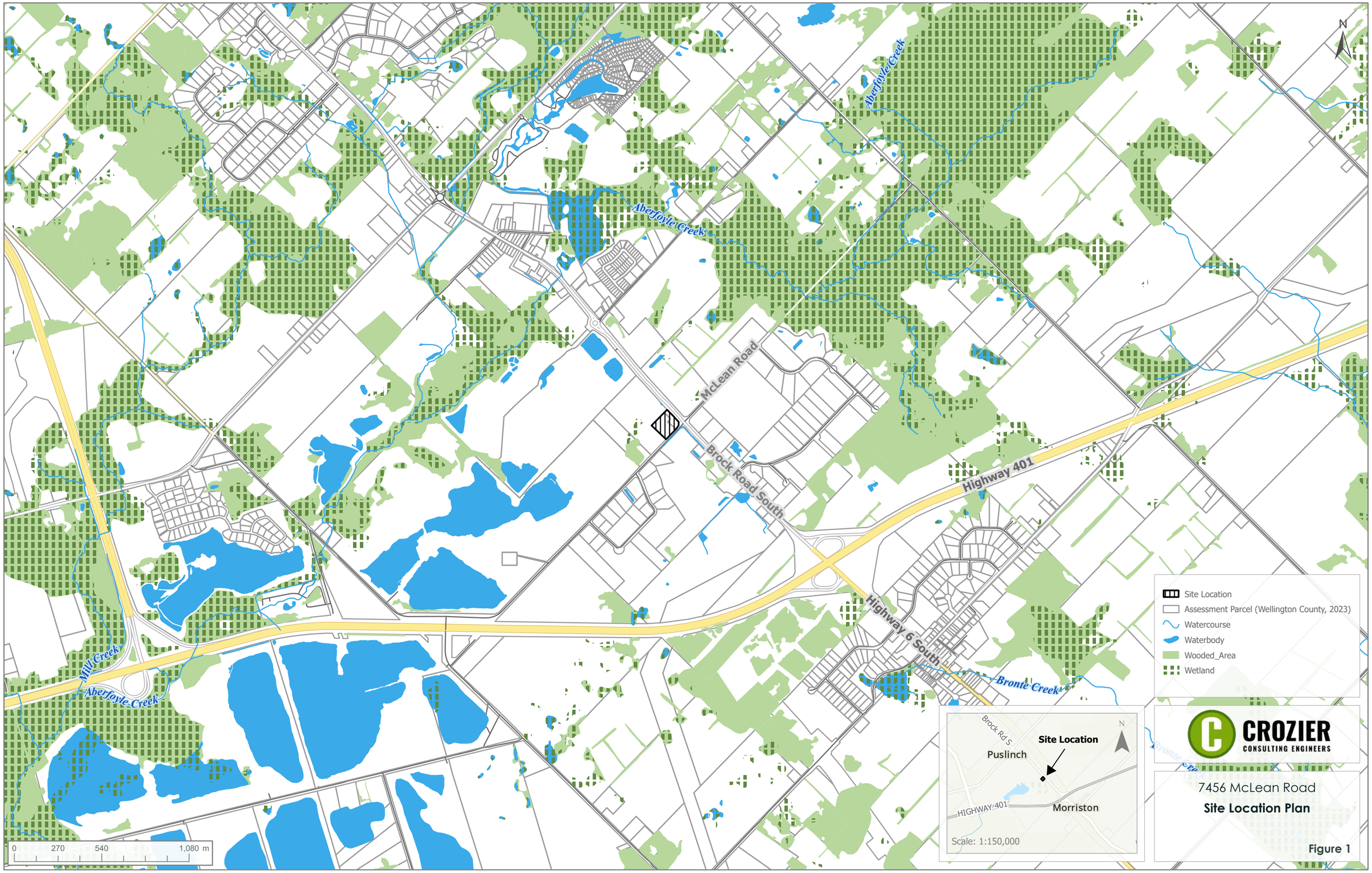
Sewage Effluent Volume

Average Daily Volume of Sewage Effluent =	11,000	L/day
Number of Days of Operation/Use =	365	days/year
Annual Volume of Sewage Effluent =	4,015	m^3
Maximum Nitrate Concentration at Boundary =	2.5	mg/L

Totals

Total Dilutant = wastewater V + infiltration V =	4,265	m^3/year
Maximum Allowable Nitrate Concentration in Effluent	**2.66**	**mg/L**

FIGURES



Crozier Project No. 2377 - 6556 Date Published: 2023-07-31



CROZIER
CONSULTING ENGINEERS

7456 McLean Road

Site Overview

Figure 2



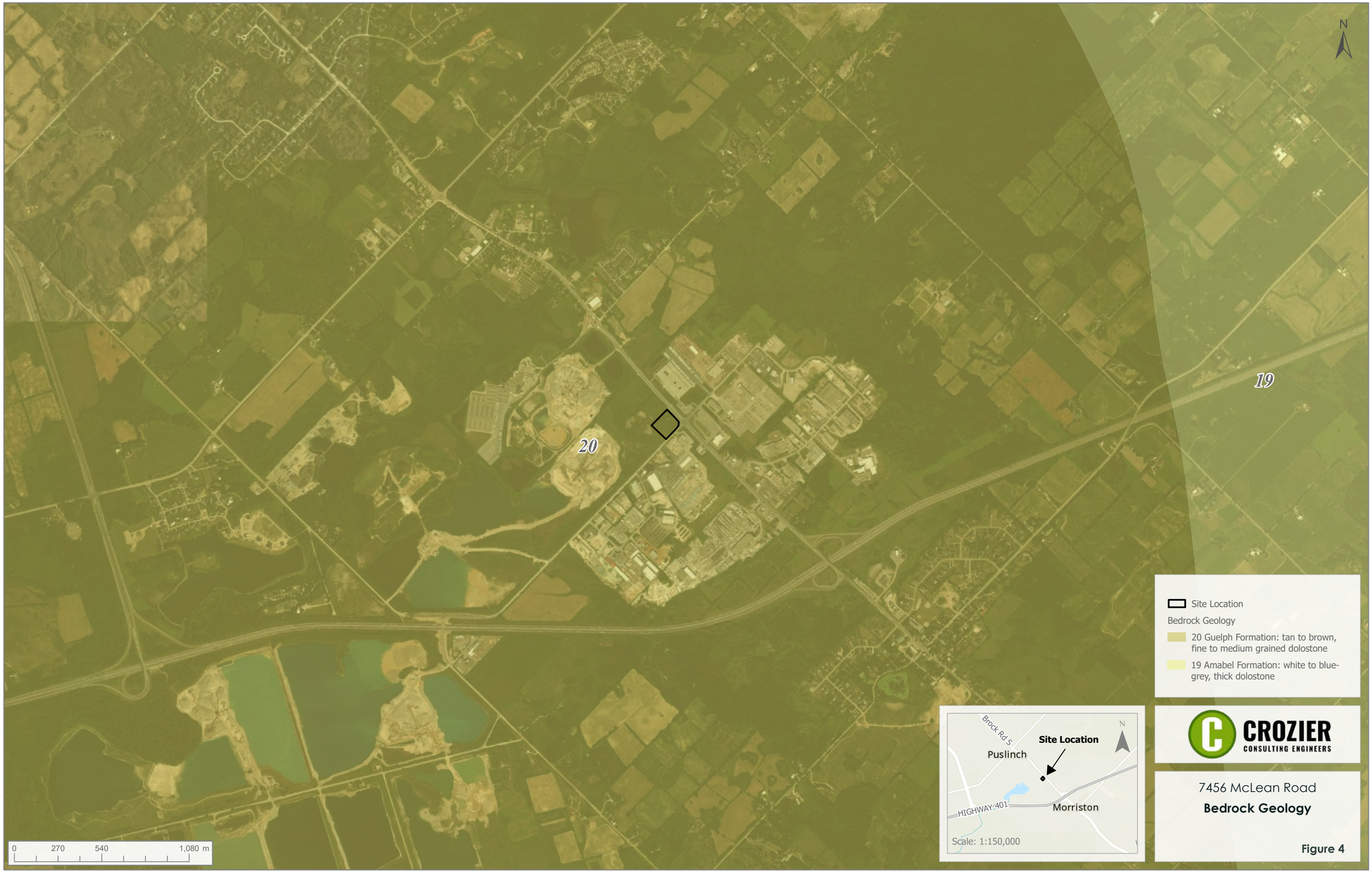
CROZIER CONSULTING ENGINEERS

7456 McLean Road

Physiography

Figure 3

Crozier Project No. 2377 - 6556 Date Published: 2023-07-31



CROZIER CONSULTING ENGINEERS

7456 McLean Road

Bedrock Geology

Figure 4

Crozier Project No. 2377 - 6556 Date Published: 2023-07-31



CROZIER CONSULTING ENGINEERS

7456 McLean Road

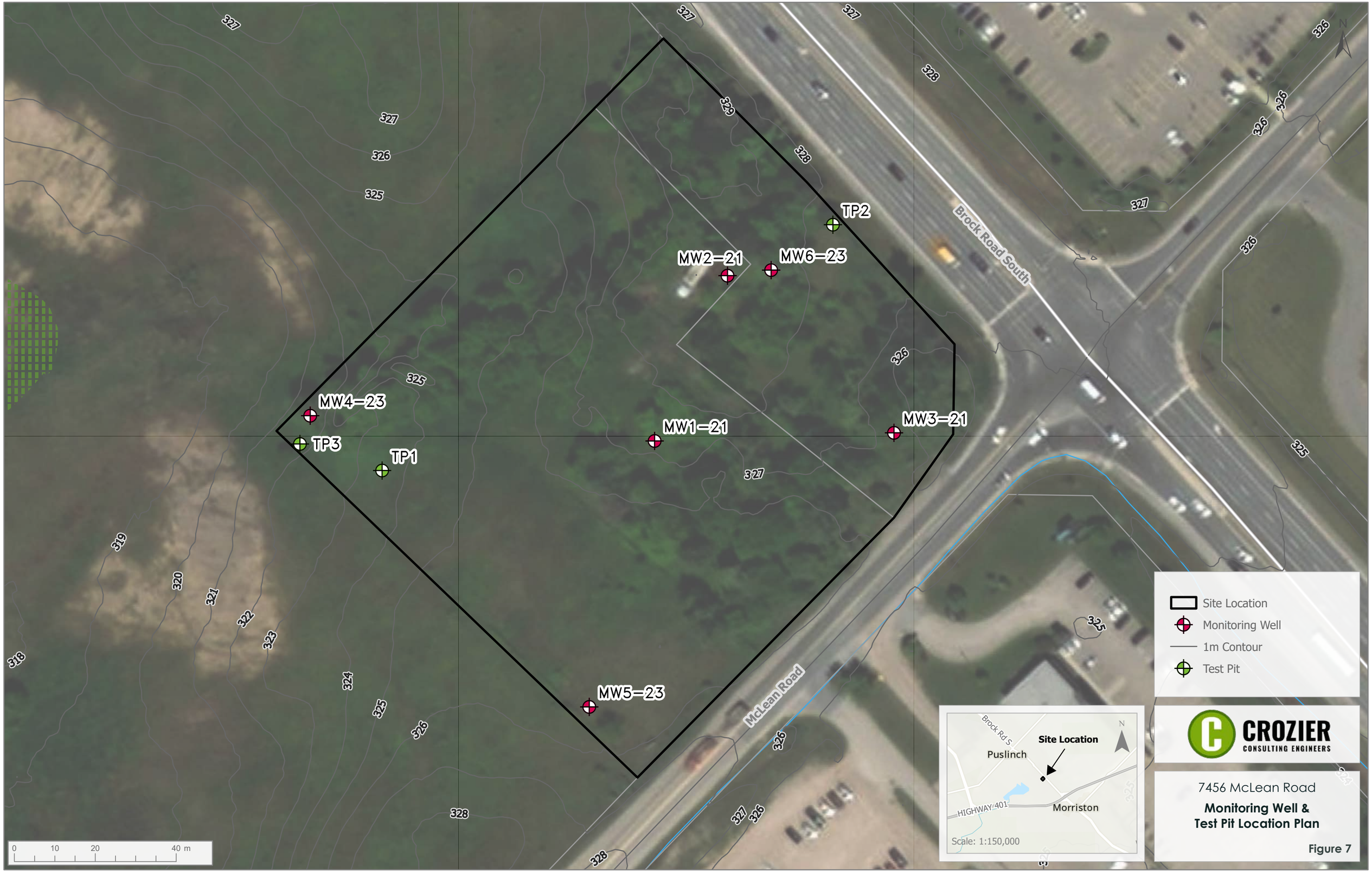
Surficial Geology

Figure 5

Crozier Project No. 2377 - 6556 Date Published: 2023-07-31



Crozier Project No. 2377 - 6556 Date Published: 2023-07-31



CROZIER CONSULTING ENGINEERS

7456 McLean Road

Monitoring Well & Test Pit Location Plan

Figure 7

Crozier Project No. 2377 - 6556 Date Published: 2023-08-10

MW2–21
325.87

MW6–23
323.76

MW4–23
321.43

MW1–21
324.19

MW3–21
321.48

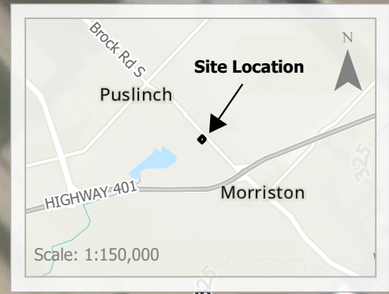
MW5–23
325.40

Brock Road South

McLean Road

0 10 20 40 m

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

Crozier Project No. 2377 - 6556 Date Published: 2023-07-31

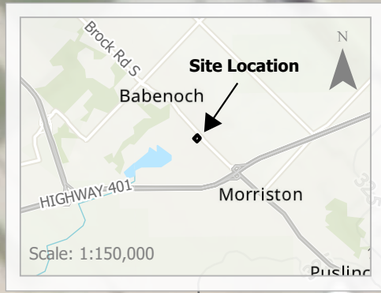
Proposed Leaching Bed
Bed Area = 0.0468 ha
Total Attenuation Area = 0.0967 ha

MW2–21
325.87
MW6–23
323.76
MW4–23
321.43
MW1–21
324.19
MW3–21
321.48
MW5–23
325.40

Brock Road South
McLean Road

0 10 20 40 m

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



CROZIER CONSULTING ENGINEERS

7456 McLean Road
Attenuation Zone

Figure 9

Crozier Project No. 2377 - 6556 Date Published: 2026-02-12

Marton Smith Landscape Architects (**msla**)
170 The Donway West, Suite 206
North York, Ontario. M3C 2G3
Tel. 416 492-9966
Fax. 416 492-0426
e-mail: msla@msla.ca

Attn. **W.E. Oughtred and Associates Inc.**
c/o Arlene Beaumont
2140 Winston Park Drive, Suite 26
Oakville, ON L6H 5V5

Date: February 19, 2026

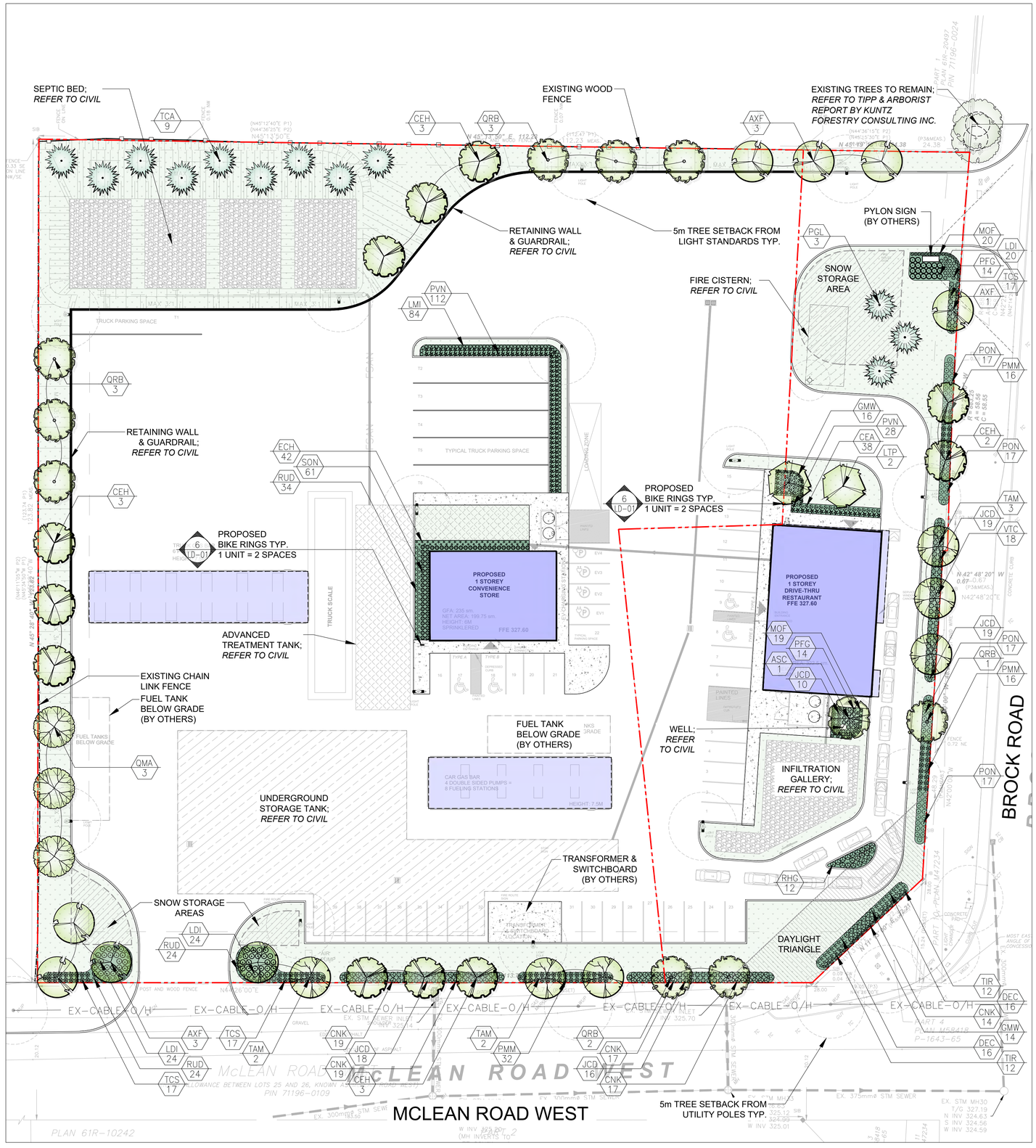
Re.: Landscape Cost Estimate –7456 McLean Rd, Puslinch, ON

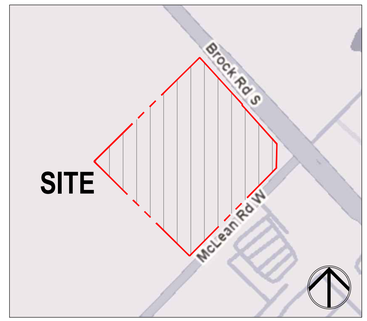
Landscape Cost Estimate

Description	Quantity	Units	Unit Cost	Total
Deciduous Trees	40	ea.	500	20000.00
Coniferous Trees	12	ea.	500	6000.00
Deciduous Shrubs	318	ea.	40	12720.00
Coniferous Shrubs	197	ea.	45	8865.00
Ornamental Grasses	233	ea.	25	5825.00
Perennials	301	ea.	25	7525.00
Planting Soil & Mulch	533	sq. M	12	6396.00
Sodded Area & Topsoil	1	l.s	15,000	15000.00
Bike Rings	2	ea.	900	1800.00
Total				***$ 84,131.00***

This cost estimate has been projected for Landscape letter of credit purposes only, and reflects an approximate installed cost of construction for the Proposed Development at 7456 McLean Rd, Puslinch, ON.

Trinity MacIntyre, B.L.A.
Per. MSLA Landscape Architects





Key Map

Legend

- Existing Deciduous Tree Canopy
- Tree Protection Zone (TPZ)
- Property Line
- Existing Wood Fence
- Existing Chainlink Fence
- Proposed Deciduous Tree
- Proposed Coniferous Tree
- Proposed Shrub/Perennial
- Plant Material Reference Key (AAA 0)
- Proposed Planting Area
- Prop. Sodded Area Typ.
- Prop. Concrete Paving Typ.
- Proposed Bike Ring
- Detail Reference Key (AAA 1-2)

Proposed Plant Material List

KEY	QNTY	BOTANICAL NAME	COMMON NAME	HT/CAL	SPREAD	ROOT	DROUGHT TOLERANT	NATIVE	REMARKS
DECIDUOUS TREES									
ASC	1	Acer saccharum	Sugar Maple	70 mm		B.&B.	Yes	Yes	Full Form
AXF	7	Acer x freemanii 'Jeffersred'	Jefferred Freeman Maple	70 mm		B.&B.	Yes	Yes	Full Form
CEH	11	Celtis occidentalis	Hackberry	70 mm		B.&B.	Yes	Yes	Full Form
LTP	2	Liriodendron tulipifera	Tulip Tree	70 mm	cream	B.&B.	Yes	Yes	Full Form
QMA	3	Quercus macrocarpa	Bur Oak	70 mm		B.&B.	High	Yes	Full Form
QRB	9	Quercus rubra	Red Oak	70 mm		B.&B.	Yes	Yes	Full Form
TAM	7	Tilia Americana	Basswood Linden	70 mm		B.&B.	High	Yes	Full Form
CONIFEROUS TREES									
PGL	3	Picea glauca	White Spruce	200 cm		B.&B.	Yes	Yes	Full Form
TCA	9	Tsuga canadensis	Canadian Hemlock	200 cm		B.&B.	No	Yes	Full Form
DECIDUOUS SHRUBS									
CEA	38	Ceanothus americanus	New Jersey Tea Shrub	60 cm		C.G.	High	Yes	Full Form
CNK	86	Cornus sericea 'Kelseyi'	Kelsey Red Osier Dogwood	60 cm		C.G.	Yes	Yes	Full Form
LDI	68	Diervilla lonicera	Bush Honysuckle	60 cm		C.G.	High	Yes	Full Form
PFG	28	Potentilla fruticosa 'Goldstar'	Goldstar Potentilla	60 cm		C.G.	High	Yes	Full Form
PON	68	Physocarpus opulifolius 'Nanus'	Dwarf Ninebark	60 cm		C.G.	High	Yes	Dwarf
RHG	12	Rhus aromatica 'Gro-Low'	'Gro-Low' Fragrant Sumac	60 cm		C.G.	High	Yes	Full Form
VTC	18	Viburnum trilobum 'Compactum'	Compact High Bush-Cranberry	70 cm		C.G.	Yes	Yes	Full Form
CONIFEROUS SHRUBS									
JCD	82	Juniperus communis var. 'Depressa'	Depressa Juniper (Canadian Juniper)		70 cm	C.G.	High	Yes	Full Form
PMM	64	Pinus mugo var. pumilio	Dwarf Mugho Pine	60 cm		C.G.	High	No	Full Form
TCS	51	Taxus canadensis	Canada Yew		65 cm	C.G.	High	Yes	Full Form
ORNAMENTAL GRASSES									
DEC	32	Deschampsia cespitosa	Tufted Hairgrass			2 Gal.	High	Yes	Full Form – Native
PVN	140	Panicum virgatum 'Northwind'	Northwind Switch Grass			2 Gal.	High	Yes	Full Form – Native
SON	61	Sorghastrum nutan	Indian Grass			2 Gal.	High	Yes	Full Form – Native
PERENNIALS									
ECH	42	Echinacea purpurea	Purple Cone Flower			2 Gal.	High	Yes	Full Form
GMW	30	Geranium maculatum	Wild Geranium			2 Gal.	High	Yes	Spring Bloom
LMI	84	Lilium michiganense	Michigan Lily			2 Gal.	High	Yes	Full Form
MOF	39	Monarda fistula 'Mohawk'	Mohawk Bee Balm			2 Gal.	High	Yes	Full Form
RUD	82	Rudbeckia fulgida var. sullivantii 'Goldsturm'	Black Eyed Susan			2 Gal.	High	Yes	Full Form
TIR	24	Tiarella cordifolia 'Foam Flower'	Foam Flower (creamy white)			2 Gal.	High	Yes	Full Form

ALL QUANTITIES IN THE LIST OF PLANT MATERIALS ARE TO BE CHECKED BY THE LANDSCAPE CONTRACTOR. ANY DISCREPANCIES ARE TO BE REPORTED TO THE LANDSCAPE ARCHITECT. THE QUANTITIES INDICATED ON THE DRAWINGS SUPERCEDE THE TOTAL QUANTITIES

msla
MARTON SMITH LANDSCAPE ARCHITECTS
170 The Donway W Suite 206.
Toronto, Ontario, Canada. M3C 2G3
tel. 416.492.9966 | email. info@msla.ca

Architect:
RZA
RICHARD ZIEGLER ARCHITECT INC.

Client/Owner:

Municipality:
TOWNSHIP OF PUSLINCH

Notes:

No.	Revision	Date
03	Issued for 2nd Submission	02/19/26
02	Issued for Coordination	02/13/26
01	Issued for Submission	08/08/25

North:

Stamp: ASSOCIATION OF LANDSCAPE ARCHITECTS ONTARIO MEMBER OALA

Project:
Proposed Landscape and Site Upgrades
7456 McLean Rd
Puslinch, Ontario

Scale: **1:300** Date: **Aug 2025**
Drawn By: **T.M.** Checked By: **L.M.**

Drawing Title:
Landscape Plan

Project No. **25151** Sheet No. **L1-01**

All information contained in these plans shall be checked by the contractor. All discrepancies shall be reported to the Landscape Architect (L.A.) before commencing with construction. All drawings have copyright and shall remain the property of the Landscape Architect. Copying or any reproduction in part or whole shall only be permitted with written consent of L. A. Drawings shall not be used for construction unless sealed & SIGNED. All drawings patterns must clash positively away from buildings or structures at 0% mod. The position of existing above ground and underground utilities and facilities are not necessarily shown on the drawings, and where shown, the accuracy of the position of utilities or facilities is not guaranteed. Before starting work, the contractor shall confirm the exact location of all existing utilities and facilities, and shall assume liability for damages. All construction shall conform to the requirements of the Ontario Building Code, and all applicable municipal and provincial regulations. ALL WORK SHALL BE APPROVED BY STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION. DO NOT SCALE DRAWINGS • PRELIMINARY NOT FOR CONSTRUCTION • THESE DRAWINGS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL COUNTERSIGNED BY L. ARCHITECT •

SIGNED

DATE

MSLA

REFER TO PLAN FOR LOCATION

LANDSCAPE SPECIFICATIONS

CONTRACTOR MUST CONTACT ALL UTILITY COMPANIES FOR STAKE OUTS PRIOR TO ANY EXCAVATION OR PLANTING.

ROUGH GRADING

ROUGH GRADE AND FILL AREAS TO ESTABLISH SUBGRADE AS REQUIRED. PROVIDE DRAINAGE PATTERN AS INDICATED ON DRAWINGS. ROUND SMOOTHLY ALL TOPS AND TOES OF SLOPES. COMPACT ALL AREAS TO 95% STANDARD PROCTOR DENSITY UNLESS SPECIFIED OTHERWISE. EXISTING TREES TO REMAIN ON SITE ARE TO BE PROTECTED AS DETAILED.

FINE GRADING

FINE GRADE ALL AREAS TO FINISHED GRADES AS SHOWN ON LAYOUT OR GRADING PLAN OR ARCHITECT'S SITE PLAN. PROVIDE UNIFORM SLOPES AWAY FROM THE BUILDING, UNLESS SPECIFIED OTHERWISE. SLOPES MAY NOT EXCEED 33 1/3% (3:1).

SPREADING OF TOPSOIL

SCARIFY THE SUBSOIL PRIOR TO THE SPREADING THE TOPSOIL. REMOVE ALL DEBRIS AND LEAVE A FINE-TEXTURED EVEN SURFACE. ALL TOPSOIL TO BE IMPORTED UNLESS PREVIOUSLY APPROVED BY LANDSCAPE ARCHITECT. OBTAIN APPROVAL FOR THE QUALITY OF ANY IMPORTED TOPSOIL BEFORE DELIVERY TO THE SITE. TOPSOIL IS TO BE COMPACTED TO CREATE A FIRM AND EVEN SURFACE.

SOD

USE NO. 1 GRADE TURFGRASS NURSERY SOD WHICH CONFORMS WITH THE SPECIFICATIONS OF THE NURSERY SOD GROWERS ASSOCIATION OF ONTARIO. ALL LAWN AREAS SHALL RECEIVE A MINIMUM OF 100MM (4") OF COMPACTED TOPSOIL, AND SHALL BE SODDED WITH #1 KENTUCKY BLUEGRASS - FESCUE. NO SOD SLOPES ARE TO EXCEED 3:1. SLOPE IN EXCESS OF 4:1 TO BE PEGGED.

MINERAL FERTILIZER

APPLY THE FOLLOWING MINERAL FERTILIZER UNLESS SOILS TESTS SHOW OTHER REQUIREMENTS:

1. SODDED AREAS - 11% NITROGEN, 8% PHOSPHORUS AND 4% POTASH (11-8-4) AT THE RATE OF 4.5 KG OVER M2 (10 LBS OVER 1000 SQ. FT.).

2. PLANTING BEDS - 7% NITROGEN, 7% PHOSPHORUS AND 7% POTASH (7-7-7) AT THE RATE OF 40 GRAMS (4 OZ.) FOR EVERY BUSHEL OF TOPSOIL.

PREPARATION OF PLANTING BEDS

ALL PLANT BEDS TO BE CONTINUOUS. EXCAVATE ALL PLANTING BEDS TO THE DEPTH AS INDICATED ON THE DRAWINGS AND DETAILS, MIN 450mm(18"). BACKFILL ALL PLANTING BEDS WITH A SOIL MIXTURE CONSISTING OF SIX (6) PARTS OF SAND LOAM, ONE (1) PART OF FINELY PULVERIZED PEAT MOSS, TWO (2) PARTS OF WELL-ROTTED MANURE AND THE MINERAL FERTILIZER AS SPECIFIED ABOVE. ALSO ADD .58 KILOS BONEMEAL/CUBIC METER OF PLANTING SOIL (1 LB./CUBIC YARD). PREPARE THE PLANTING BEDS FOR PLANTING BEFORE THE DELIVERY OF THE PLANT MATERIAL TO THE JOB SITE.

NOTE: IF THE EXISTING SOIL CONDITIONS ARE CLAY OR WET IN NATURE, CONTACT THE LANDSCAPE ARCHITECT FOR INSTRUCTIONS OF A SUITABLE SOIL MIXTURE. FAILURE TO DO THIS MAY RESULT IN DELAY OF APPROVAL AND ACCEPTANCE.

PLANT MATERIALS

ALL PLANT MATERIAL SHALL CONFORM TO THE STANDARDS OF THE CANADIAN NURSERY TRADES ASSOCIATION FOR SIZE AND SPECIES.

ALL SHRUB AND TREE MATERIAL SHALL BE CONTAINER GROWN, POTTED, S/B OR B/B, UNLESS OTHERWISE NOTED. BARE ROOT PLANTING SHALL BE ACCEPTABLE FOR CERTAIN SPECIES DURING EARLY SPRING OR LATE FALL PLANTING SEASON. CONTRACTOR SHALL MAKE REQUESTS FOR ROOT CONDITION SUBSTITUTION IN WRITING TO THE LANDSCAPE ARCHITECT PRIOR TO COMMENCEMENT OF PLANTING OPERATIONS. ALL PLANT MATERIAL TO BE CLAY GROWN STOCK UNLESS OTHERWISE NOTED.

LANDSCAPE SPECIFICATIONS — 1 — LD-01

SCALE: N.T.S. DATE:

MSLA

REFER TO PLAN FOR LOCATION

PLANT MATERIAL INSTALLATION

ALL TREES, SHRUBS AND GROUNDCOVERS SHALL BE PLANTED AS DETAILED & AS SHOWN ON THE PLANTING PLAN. ALL BEDS TO RECEIVE A COVER OF CLEAN MULCH TO A DEPTH OF 100mm(4"). FOR GUYING AND STAKING TREES, REFER TO PLANTING DETAILS. WRAP ALL DECIDUOUS TREES UNDER EXPERIENCED SUPERVISION ONLY TO THE SPECIFICATIONS OF THE ONTARIO LANDSCAPE CONTRACTORS ASSOCIATION.

PLANT MATERIAL SIZES AND CONDITIONS ARE TO BE AS INDICATED ON THE LANDSCAPE DRAWING.

THE INDIVIDUAL PLANT GROUPING TOTAL AS ILLUSTRATED ON THE PLANTING PLAN SUPERSEDES THE ESTIMATED QUANTITY ON THE MASTER PLANT LIST. CONTRACTOR MUST REPORT ANY DISCREPANCIES TO THE LANDSCAPE ARCHITECT IN WRITING BEFORE COMMENCING ANY WORK. CONTRACTOR WILL ASSUME FULL RESPONSIBILITY IF LANDSCAPE ARCHITECT IS NOT NOTIFIED OF DISCREPANCIES.

* MULCH - SHREDDED PINE MULCH BY "GRO BARK" OR APPROVED EQUAL. LANDSCAPE ARCHITECT TO APPROVE MULCH BEFORE INSTALLATION.

GENERAL MAINTENANCE

PROPER MAINTENANCE PROCEDURES ARE TO BE FULLY ADMINISTERED FOR ALL NEWLY CONSTRUCTED LANDSCAPE WORK, IN ACCORDANCE WITH LANDSCAPE ONTARIO SPECIFICATIONS (SECTION 1E - MAINTENANCE WORK). THIS SHALL APPLY ONLY DURING THE CONSTRUCTION PERIOD, UNLESS OTHERWISE SPECIFIED. CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF SOD AND PLANTING UNTIL FINAL ACCEPTANCE BY LANDSCAPE ARCHITECT.

RODENT PROTECTION

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL TREES AND SHRUBS FOR WINTER PROTECTION AND FROM RODENT INJURY FOR THE DURATION OF GUARANTY PERIOD. PROTECTIVE GUARDS SHALL BE EMPLOYED AROUND ALL DECIDUOUS TREES. GUARDS TO BE 150MM DIA. PVC PIPE OR AS MUNICIPAL GUIDELINES. GUARDS SHALL BE INSTALLED PRIOR TO THE APPLICATION OF THE MULCH AND SHOULD BE PLACED A MINIMUM OF 50MM (2") OUT FROM THE TREE TRUNK ON ALL SIDES.

ALL SHRUBS AND CONIFEROUS TREES SHALL HAVE AN APPLICATION OF "SKOOT" OR APPROVED EQUIVALENT RODENT FORMULA, TO BE APPLIED AT THE END OF OCTOBER. FOLLOW MANUFACTURER'S DIRECTIONS FOR APPLICATION.

GENERAL REQUIREMENTS

USE ABOVE SPECIFICATIONS IN CONJUNCTION WITH THE GENERAL LANDSCAPE SPECIFICATIONS OF THE ONTARIO LANDSCAPE CONTRACTORS ASSOCIATION, THE NURSERY SOD GROWERS ASSOCIATION OF ONTARIO AND WITH THE GUIDE SPECIFICATIONS FOR NURSERY STOCK OF THE CANADIAN NURSERY TRADES ASSOCIATION. USE ONLY PLANT MATERIAL TRUE TO NAME, SIZE AND GRADE AS SPECIFIED ON PLANTING PLAN. PROVIDE SUFFICIENT LABELS OR MARKINGS TO INDICATE CLEARLY THE VARIETY, SIZE AND GRADE OF EACH SPECIMEN OR BUNDLE.

OBTAIN APPROVAL FOR SUBSTITUTIONS AS TO VARIETY, SIZE OR GRADE FROM THE LANDSCAPE ARCHITECT. USE ONLY NURSERY STOCK GROWN UNDER PROPER HORTICULTURAL PRACTICES, VIABLE, FREE FROM PEST AND DISEASE AND UNDAMAGED. CHECK LOCATIONS AND OBTAIN STAKEOUTS OF ALL UTILITY LINES BEFORE EXCAVATION. OBTAIN ALL NECESSARY PERMITS BEFORE COMMENCEMENT OF CONSTRUCTION. REPORT IN WRITING ANY DISCREPANCIES IN THE DRAWINGS, SPECIFICATIONS AND CONTRACT DOCUMENTS TO THE LANDSCAPE ARCHITECT BEFORE THE END OF THE BIDDING PROCESS AND COMMENCEMENT OF CONSTRUCTION. THESE SPECIFICATIONS MAY BE SUPERCEDED BY ADDITIONAL SPECIFICATIONS SET OUT IN THE TENDER DOCUMENTS. CONTRACTOR TO REVIEW ALL DOCUMENTS.

GUARANTEE PERIOD

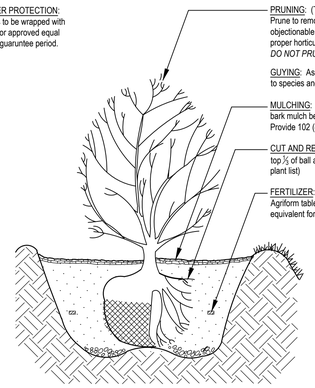
PROVIDE ONE FULL YEAR GUARANTEE ON ALL LANDSCAPE WORK FROM DATE OF FINAL ACCEPTANCE BY LANDSCAPE ARCHITECT. GUARANTEE PERIOD MAY BE EXTENDED TO TWO FULL YEARS DEPENDING ON MUNICIPAL STANDARDS. CONTRACTOR TO VERIFY WITH OWNER AND LANDSCAPE ARCHITECT.

PLANT MATERIAL INSTALLATION — 2 — LD-01

SCALE: N.T.S. DATE:

MSLA

REFER TO PLAN FOR LOCATION



PLANTING SOIL MIXTURE: (Mix thoroughly)
A. For ideal situations mix:
- 6 parts good quality topsoil
- 2 parts well rotted cow manure
- 1 part peat moss

B. For clay or wet situations:
- Contact consultants for proper soil mixture, before proceeding with work

C. Add 0.58 kg (1 lb) of bonemeal per cubic yard of soil
D. Soil mixture should be firmly compacted to eliminate air pockets and prevent settlement.

PREPARATION OF BED: Excavate shrub bed to size outlined on drawings, minimum 457 (18") depth. Remove any subsoil or rubbish off site unless otherwise directed.

SPACING: As directed.

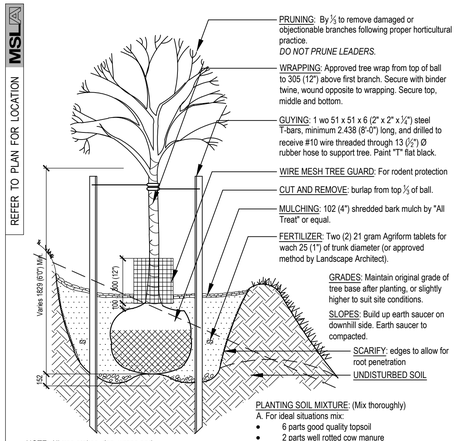
FOR RODENT CONTROL: See landscape specifications or apply "Skoot" at the end of October. Note: All tree stakes, ties and guards are to be removed one year after installation by the landscape contractor.

STANDARD SHRUB PLANTING DETAIL — 3 — LD-01

SCALE: N.T.S. DATE:

MSLA

REFER TO PLAN FOR LOCATION



NOTE: All tree stakes, ties, wraps and guards are to be removed one year after installation by the landscape contractor.

ALL GIVEN DIMENSIONS ARE IN METRIC

WIRE BASKETS OR STRING ON ROOT BALL - CUT AND TOP REMOVE ⅓

PLANTING SOIL MIXTURE: (Mix thoroughly)
A. For ideal situations mix:
- 6 parts good quality topsoil
- 2 parts well rotted cow manure
- 1 part peat moss

B. For clay or wet situations:
- Contact consultants for proper soil mixture, before proceeding with work.

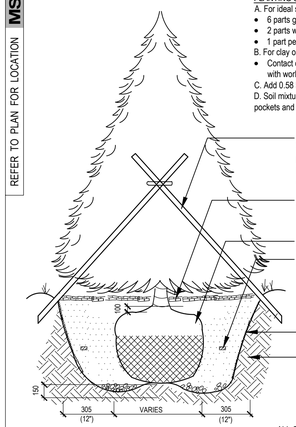
C. Add 0.58 kg (1 lb) of bonemeal per cubic yard of soil
D. Soil mixture should be firmly compacted to eliminate air pockets and prevent settlement.

STANDARD DECIDUOUS TREE DETAIL — 4 — LD-01

SCALE: N.T.S. DATE:

MSLA

REFER TO PLAN FOR LOCATION



PLANTING SOIL MIXTURE: (Mix thoroughly)
A. For ideal situations mix:
- 6 parts good quality topsoil
- 2 parts well rotted cow manure
- 1 part peat moss

B. For clay or wet situations:
- Contact consultants for proper soil mixture, before proceeding with work.

C. Add 0.58 kg (1 lb) of bonemeal per cubic yard of soil
D. Soil mixture should be firmly compacted to eliminate air pockets and prevent settlement.

NOTE: All tree stakes, ties, wraps and guards are to be removed one year after installation by the landscape contractor.

ALL GIVEN DIMENSIONS ARE IN METRIC

WIRE BASKETS OR STRING ON ROOT BALL - CUT AND TOP REMOVE ⅓

STANDARD CONIFEROUS TREE DETAIL — 5 — LD-01

SCALE: N.T.S. DATE:

MSLA

REFER TO PLAN FOR LOCATION

MAGLIN™ SINCE 1895

MAGLIN SITE FURNITURE INC.
27 BYRAM PARK DRIVE
WOODSTOCK, ON N4T 1P1
TOLL FREE: 1-800-718-9306
FAX: 1 (877) 260-9393
www.maglin.com

MATERIALS:
The Bike Rack is made from solid cast aluminum

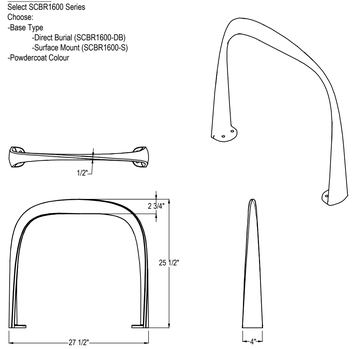
FINISH:
The Maglin Powdercoat System provides a durable finish on all metal surfaces.

INSTALLATION:
The bike rack is delivered pre-assembled. It is available with either a surface mount or direct burial installation option.

TO SPECIFY:
Select SCBR1600 Series
Choose:
-Base Type
-Direct Burial (SCBR1600-DB)
-Surface Mount (SCBR1600-S)
-Powdercoat Colour

☑ SELECT POWDERCOAT COLOR:

FINE TEXTURED COLLECTION	GLOSS COLLECTION
☐ SILVER14 - FINETEX	☐ SILVER14
☐ EVERGREEN - FINETEX	☐ EVERGREEN
☑ BLACK - FINETEX	☐ BLACK
☐ GUNMETAL - FINETEX	☐ GUNMETAL
☐ BRONZE14 - FINETEX	☐ BRONZE14
☐ SLATE - FINETEX	☐ GRAPHITE
☐ TITANIUM - FINETEX	☐ TITANIUM
☐ CORE TEN - FINETEX	☐ PEARL SILVER



BIKE RING BY MAGLIN: MODEL SCBRI 600 SERIES — 6 — LD-01

SCALE: N.T.S. SURFACE MOUNT MODEL

MARTON SMITH LANDSCAPE ARCHITECTS
170 The Donway W Suite 206.
Toronto, Ontario, Canada. M3C 2G3
tel. 416.492.9966 | email. info@msla.ca

Architect:
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www.rzarchitect.com E: mail@rzarchitect.com

Client/Owner:

Municipality:
TOWNSHIP OF PUSLINCH

Notes:

No.	Revision	Date
03	Issued for 2nd Submission	02/19/26
02	Issued for Coordination	02/13/26
01	Issued for Submission	08/08/25

North:

Stamp:
ASSOCIATION OF ONTARIO LANDSCAPE ARCHITECTS MEMBER OALA

Project:
Proposed Landscape and Site Upgrades
7456 McLean Rd
Puslinch, Ontario

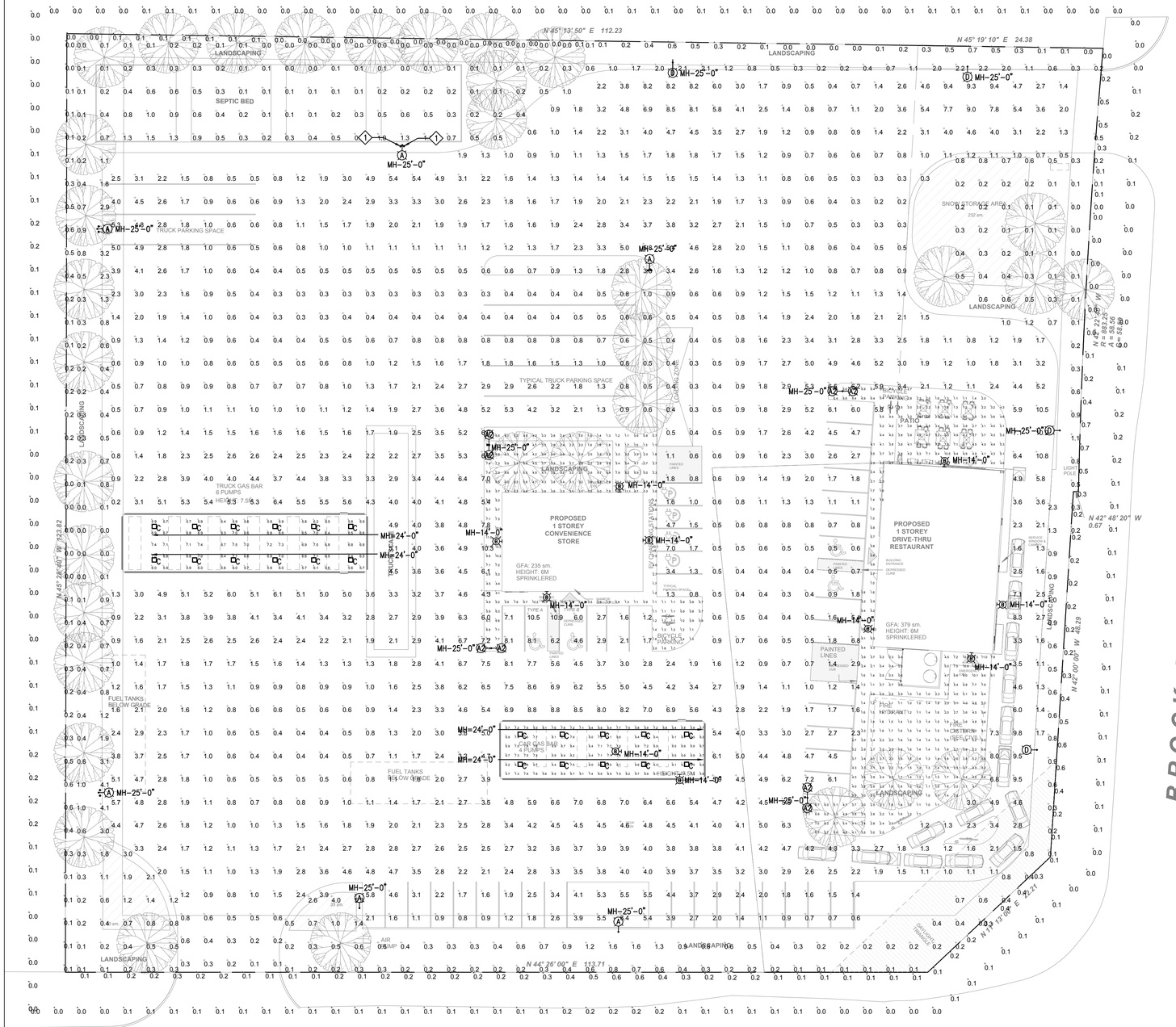
Scale: **As Shown** Date: **Aug 2025**

Drawn By: **T.M.** Checked By: **L.M.**

Drawing Title:
Landscape Details

Project No. **25151** Sheet No. **LD-01**

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SITE LIGHTING LUMINAIRE SCHEDULE

TYPE	LAMPS	MOUNTING	INPUT WATT	VOLTAGE	DESCRIPTION
A	LED 15185LM (A)	25'	180W	347V	TYPE: POLE LAMP HEAD MANUFACTURER: STANPRO SUPPLIER: STANPRO CONTACT: VINOD – T. 1-866-280-2332 Ext: 1842 CATALOG #: ALK-LS5C4-XX-30K-69423 NOTE: MOUNTED 25' AFF ON POLE
A2	LED 2x15185LM (A2) (A2)	25'	2x180W	347V	TYPE: POLE LAMP DOUBLE HEAD MANUFACTURER: STANPRO SUPPLIER: STANPRO CONTACT: VINOD – T. 1-866-280-2332 Ext: 1842 CATALOG #: ALK-LS5C4-XX-30K-69423 NOTE: TWO (2) LUMINAIRES BACK TO BACK MOUNTED 25' AFF ON POLE
B	LED 5706LM (B)	14'	40W	347V	TYPE: WALL PACK MANUFACTURER: STANPRO SUPPLIER: STANPRO CONTACT: VINOD – T. 1-866-280-2332 Ext: 1842 CATALOG #: WFC-PS60A2-Q-3C-40W-30K NOTE: MOUNTED 14' AFF ON WALL (WHITE HOUSING)
C	LED 8545LM (C)	24'	68W	347V	TYPE: CANOPY DOWN LIGHT MANUFACTURER: STANPRO SUPPLIER: STANPRO CONTACT: VINOD – T. 1-866-280-2332 Ext: 1842 CATALOG #: IFO-PS70A-Q-3CXXP-70W-30K NOTE: MOUNTED 24' AFF IN CANOPY
D	LED 16823LM (D)	25'	180W	347V	TYPE: POLE LAMP HEAD MANUFACTURER: STANPRO SUPPLIER: STANPRO CONTACT: VINOD – T. 1-866-280-2332 Ext: 1842 CATALOG #: ALK-LS5C3-XX-30K-69423 NOTE: MOUNTED 10' AFF ON THE POLE

NOTES:
POLE MOUNTED FIXTURES SHALL BE MOUNTED ON 20' POLE. LIGHTING POLES AT REAR PARKING ON THE EAST SIDE OF THE PROPERTY SHALL HAVE A 3' BASE. ALL FIXTURES SHALL BE BLACK FINISH.

PHOTOMETRIC CALCULATION SUMMARY

LABEL	CALCULATION TYPE	UNITS	AVERAGE	MAXIMUM	MINIMUM	AVG/MIN	MAX/MIN
15FT PAST PROPERTY LINE	ILLUMINANCE	Fc	0.07	0.20	0.00	####	####
CAR GAS BAR	ILLUMINANCE	Fc	7.09	9.30	5.40	1.31	1.72
LANDSCAPING	ILLUMINANCE	Fc	0.57	5.30	0.00	####	#####
PARKING	ILLUMINANCE	Fc	2.47	10.90	0.10	24.70	109.00
PROPERTY LINE	ILLUMINANCE	Fc	0.20	0.70	0.00	#####	######
RESTAURANT PERIMETER	ILLUMINANCE	Fc	3.51	12.40	0.00	####	#####
STORE PERIMETER	ILLUMINANCE	Fc	4.54	14.30	0.70	6.49	20.43
TRUCK GAS BAR	ILLUMINANCE	Fc	6.61	7.60	5.50	1.20	1.38

Engineer:

spline

MEP Engineers

#15 - 7015 Tranmere Drive, Mississauga, Ontario L5S 1T7
905.497.8388 | info@splinegroup.ca | www.splinegroup.ca

N.O.	ISSUE DESCRIPTION	DATE (MM/DD/YY)
02	ISSUED FOR SPA	01/27/24
01	ISSUED FOR SPA	09/05/24

NORTH

STAMP

LICENCED PROFESSIONAL ENGINEER
[redacted]
A.S.BHOGAL
100079257
2025-01-27
PROVINCE OF ONTARIO

[redacted]

PROPOSED COMMERCIAL DEVELOPMENT

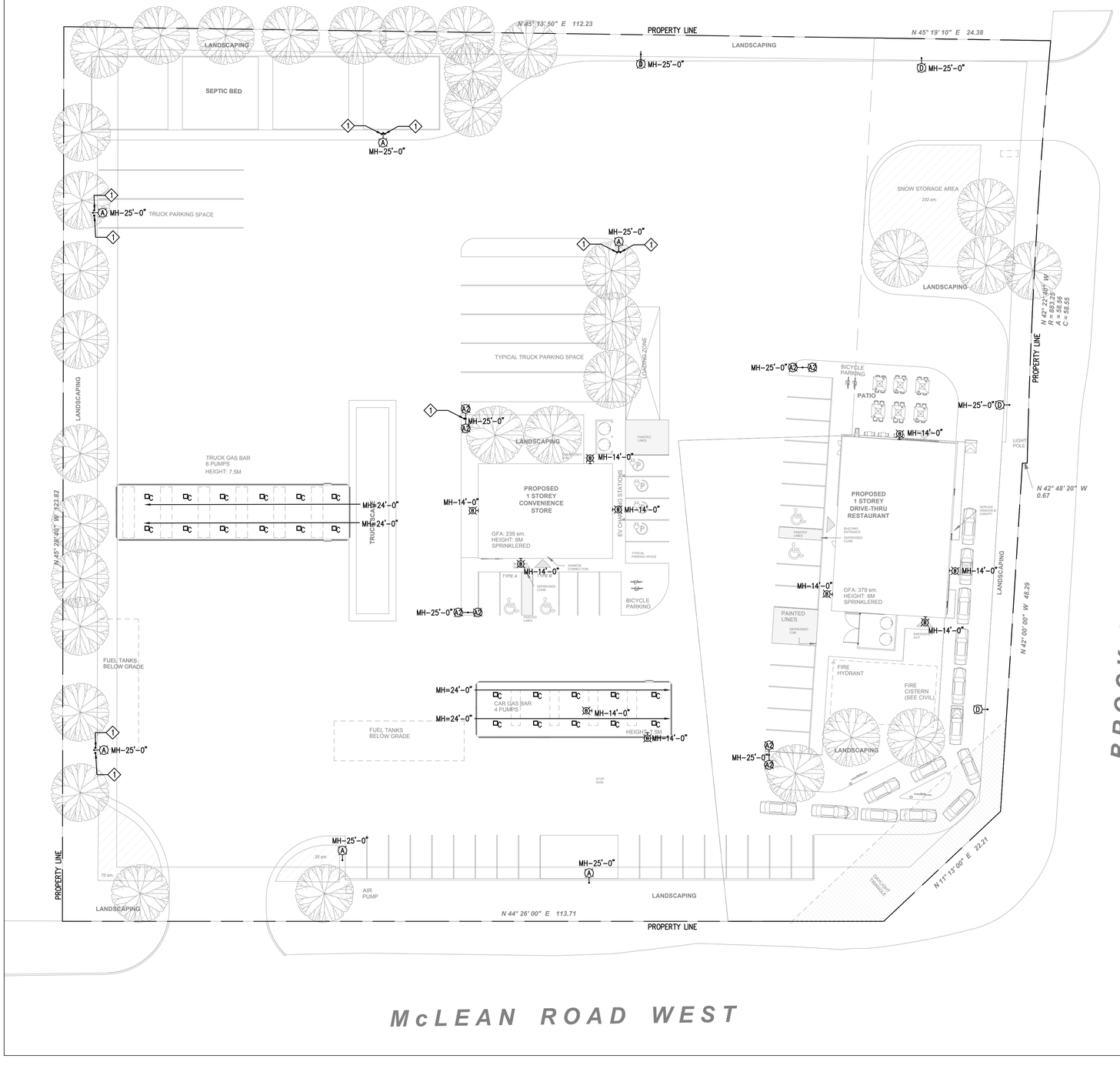
7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

ELECTRICAL SITE PLAN PHOTOMETRIS

SCALE	1:300	PROJECT NUMBER	25-171
DATE	SEPTEMBER 2025		
DRAWN	KS		
CHECKED	AB		
SHEET		REVISION	

E-01

KEY NOTES:	
1	PROTECTION BALLARD



Engineer:

spline

MEP Engineers

#15 - 7015 Tranmere Drive, Mississauga, Ontario L5S 1T7
905.497.8388 | info@splinegroup.ca | www.splinegroup.ca

NO.	ISSUE DESCRIPTION	DATE (MM/DD/YY)
02	ISSUED FOR SPA	01/27/24
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NORTH

STAMP

LICENCED PROFESSIONAL ENGINEER
[redacted]
A.S.BHOGAL
100079257
2025–01–27
PROVINCE OF ONTARIO

[redacted]

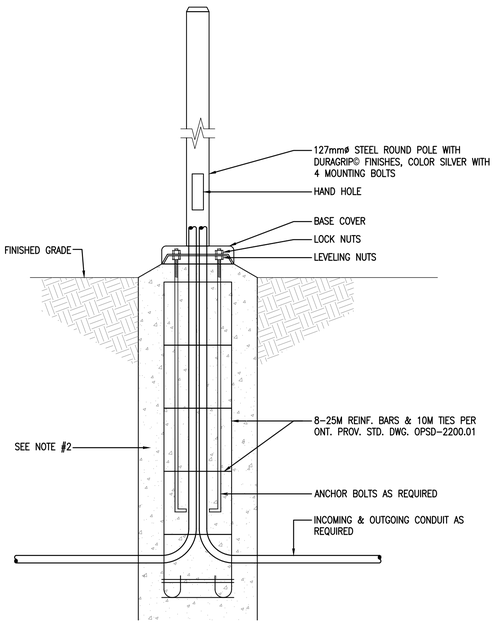
PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

ELECTRICAL LIGHTING SITE PLAN

SCALE	1:300	PROJECT NUMBER
DATE	SEPTEMBER 2025	25-171
DRAWN	KS	
CHECKED	AB	
SHEET		REVISION

E-02

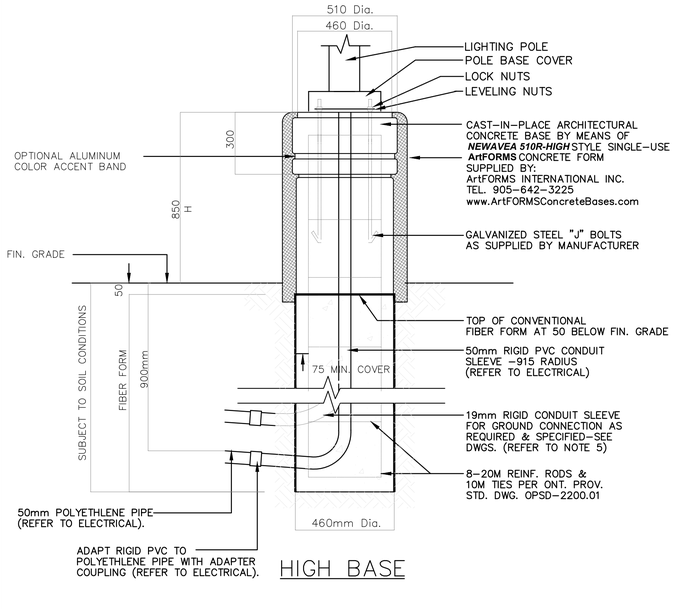


NOTES:

1. ELECTRICAL CONTRACTOR SHALL EXERCISE EXTREME CAUTION IN EXCAVATING AND TRENCHING ON THIS SITE TO AVOID EXISTING CONDUITS, PIPING AND DUCTS, ETC. AND TO PREVENT HAZARD TO PERSONNEL AND DAMAGE TO EXISTING UNDERGROUND UTILITIES OR STRUCTURES. THE ENGINEER IS NOT RESPONSIBLE FOR THE LOCATION OF UNDERGROUND UTILITIES OR STRUCTURES WHETHER OR NOT SHOWN OR DETAILED AND INSTALLED BY THIS OR ANY OTHER CONTRACTS. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER SHOULD SUCH UNIDENTIFIED CONDITIONS BE DISCOVERED. THESE DRAWINGS AND SPECIFICATIONS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.
2. CONTRACTOR TO VERIFY OPENING SIZE IN POLE BASE PLATE PRIOR TO SETTING CONDUIT SLEEVES.
3. INSTALL ANCHOR BOLTS AS PER POLE MANUFACTURER'S RECOMMENDATIONS.
4. REFER TO SITE PLAN FOR EXACT NUMBER OF RECEPTACLES

03 E-03 LIGHT POLE LOW CONCRETE BASE SECTION DETAIL
SCALE: N.T.S.

POLE LENGTH (m)	BASE BURIAL DEPTH "D" (m)	REINF. ROD LENGTH (m)
3.0	1.50	H + 1.35
5.6	2.15	H + 2.00
7.0	2.15	H + 2.00
7.5	2.15	H + 2.00
8.7	2.45	H + 2.30
9.0	2.45	H + 2.30
10.5	2.60	H + 2.45

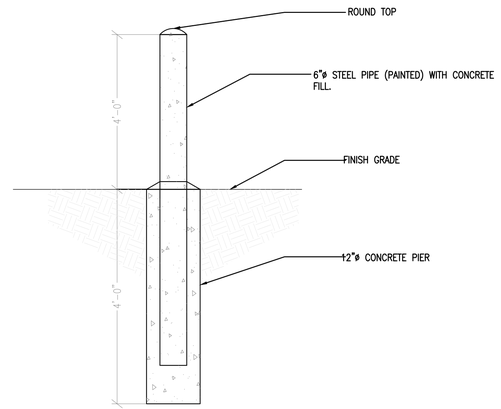


HIGH BASE

NOTES:

1. ELECTRICAL CONTRACTOR SHALL EXERCISE EXTREME CAUTION IN EXCAVATING AND TRENCHING ON THIS SITE TO AVOID EXISTING CONDUITS, PIPING AND DUCTS, ETC. AND TO PREVENT HAZARD TO PERSONNEL AND DAMAGE TO EXISTING UNDERGROUND UTILITIES OR STRUCTURES. THE ENGINEER IS NOT RESPONSIBLE FOR THE LOCATION OF UNDERGROUND UTILITIES OR STRUCTURES WHETHER OR NOT SHOWN OR DETAILED AND INSTALLED BY THIS OR ANY OTHER CONTRACTS. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER SHOULD SUCH UNIDENTIFIED CONDITIONS BE DISCOVERED. THESE DRAWINGS AND SPECIFICATIONS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.
2. CONTRACTOR TO VERIFY OPENING SIZE IN POLE BASE PLATE PRIOR TO SETTING CONDUIT SLEEVES.
3. INSTALL ANCHOR BOLTS AS PER POLE MANUFACTURER'S RECOMMENDATIONS.
4. REFER TO SITE PLAN FOR EXACT NUMBER OF RECEPTACLES

02 E-03 LIGHT POLE HIGH CONCRETE BASE SECTION DETAIL
SCALE: N.T.S.



01 E-03 BOLLARD SECTION DETAIL
SCALE: N.T.S.

Engineer:

spline

MEP Engineers

#15 - 7015 Tranmere Drive, Mississauga, Ontario L5S 1T7
905.497.8388 | info@splinegroup.ca | www.splinegroup.ca

NO.	ISSUE DESCRIPTION	DATE (MM/DD/YY)
02	ISSUED FOR SPA	01/27/24
01	ISSUED FOR SPA	09/05/24

NORTH

STAMP

LICENCED PROFESSIONAL ENGINEER
[redacted]
A.S.BHOGAL
100079257
2025–01–27
PROVINCE OF ONTARIO

[redacted]

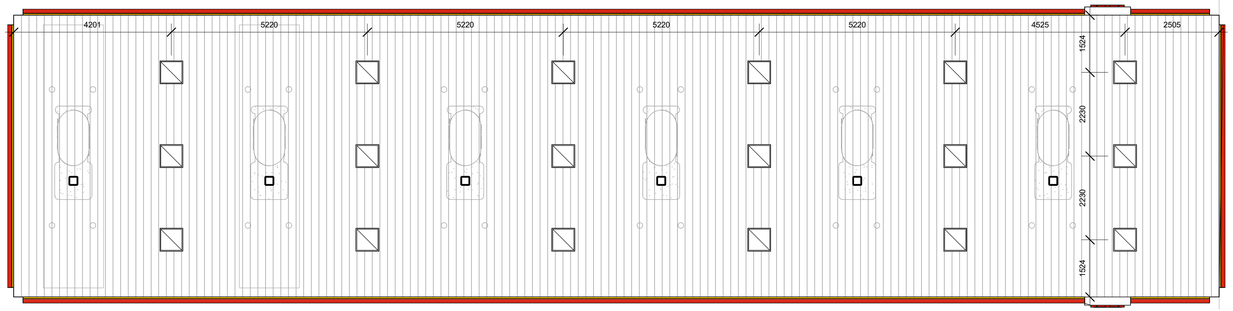
PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

DETAILS

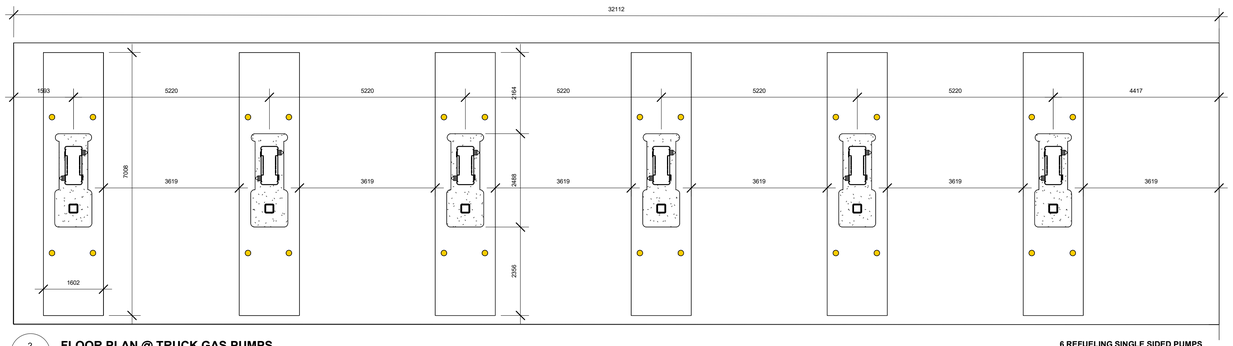
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DATE	SEPTEMBER 2025	25-171
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SHEET		REVISION

E-03



4 A206 **RCP @ TRUCK GAS BAR**

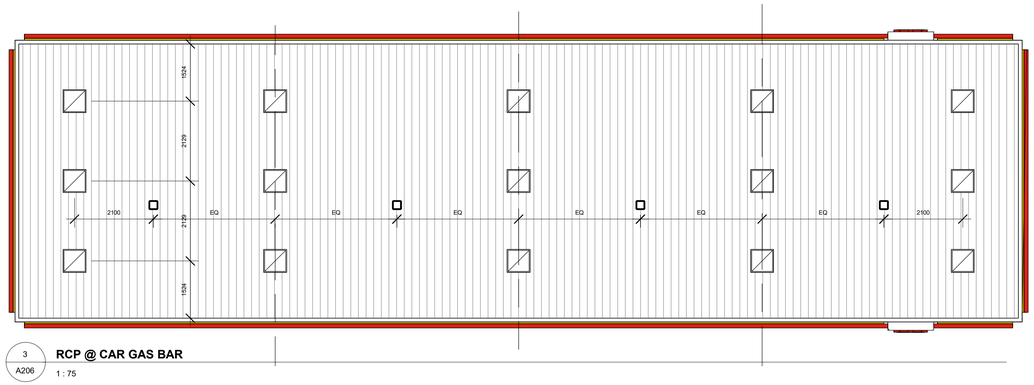
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2 A206 **FLOOR PLAN @ TRUCK GAS PUMPS**

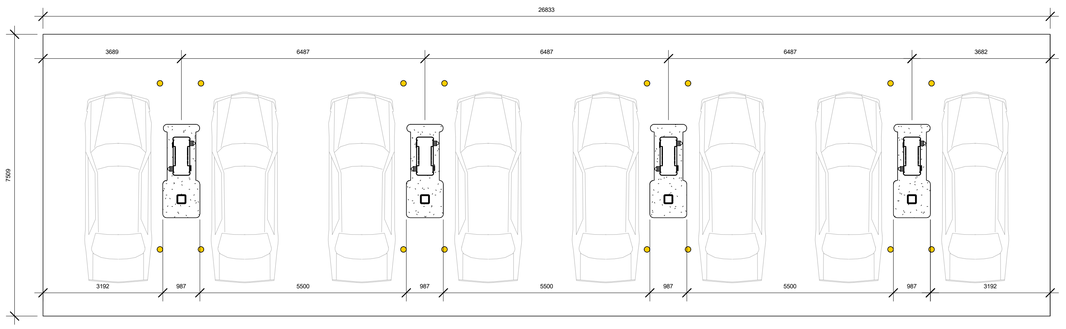
1 : 75

6 REFUELING SINGLE SIDED PUMPS



3 A206 **RCP @ CAR GAS BAR**

1 : 75



1 A206 **FLOOR PLAN @ CAR GAS BAR**

1 : 75

4 REFUELING DOUBLE SIDED PUMPS (8 VEHICLES)

RICHARD ZIEGLER ARCHITECT INC.
39 POLSON STREET TORONTO, ONTARIO M5A 1A4
T: 416 461 1494 or 1 800 413 7992 F: 866 895 1488
www.rzarchitect.com E: mail @ rzarchitect.com

NO.	ISSUANCE	DATE
1	REV. & ISSUED FOR PLANNING APPROVALS	2026.02.11

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ONTARIO ASSOCIATION OF ARCHITECTS
[redacted]
RICHARD E. ZIEGLER
LICENCE
4462

PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

PUMP PLANS

SCALE	1 : 75	PROJECT NUMBER
DATE	2026-02-11 8:39:00 AM	202436
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REVISION

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PLOT DATE: 2026-02-11 8:39:00 AM



VIEW FROM MCLEAN ROAD ENTRANCE



VIEW FROM BROCK ROAD ENTRANCE

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NO.	ISSUANCE	DATE
1	REV. & ISSUED FOR PLANNING APPROVALS	2026.02.11

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RICHARD E. ZIEGLER
LICENCE
4462

PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

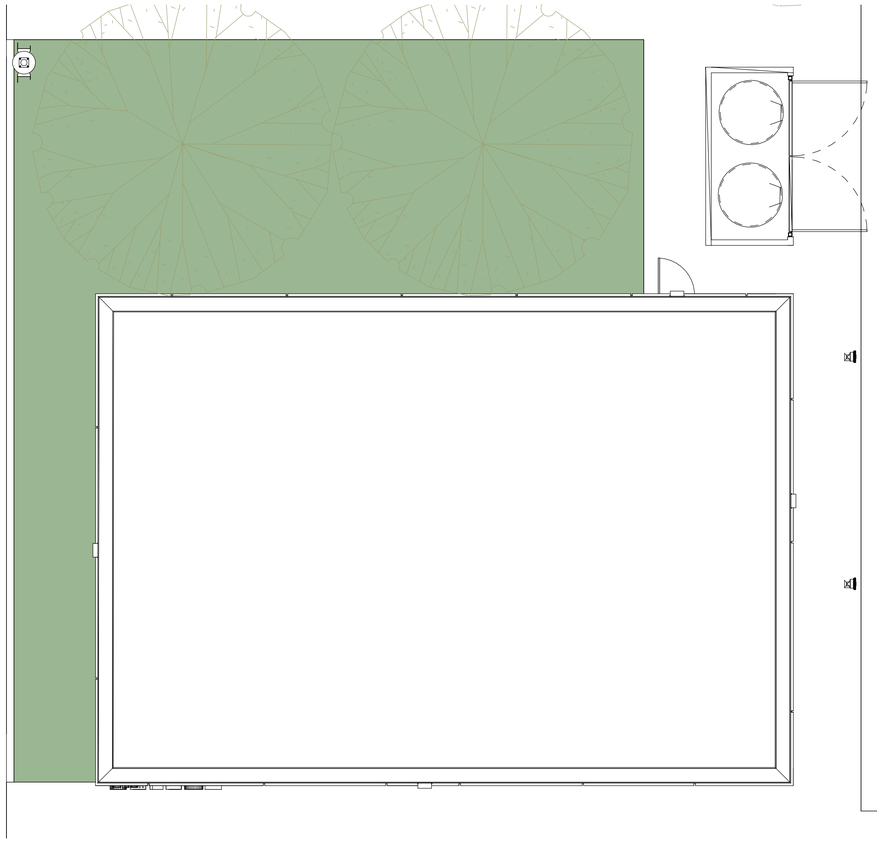
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CHECKED	Checker	

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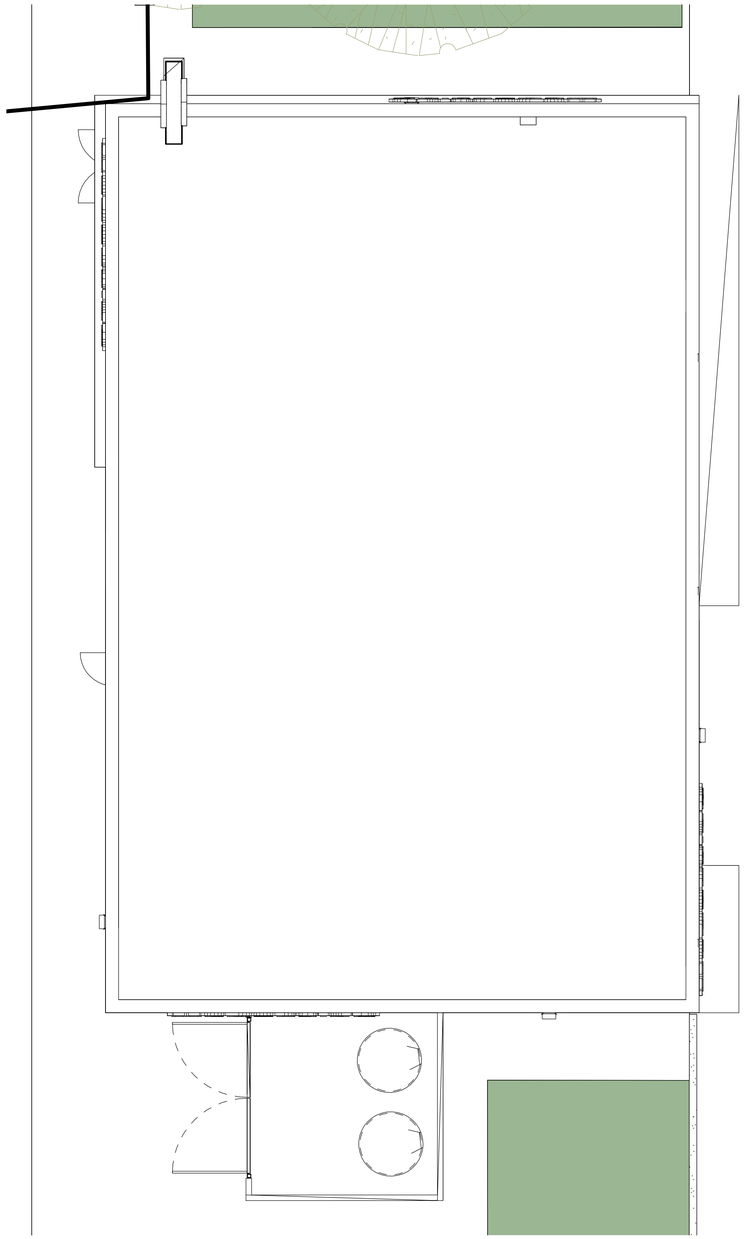
REVISION

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PLOT DATE: 2026-02-11 8:38:59 AM



2 A103 **ROOF PLAN CONVENIENCE STORE**

1 : 75



1 A103 **ROOF PLAN RESTAURANT**

1 : 75

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39 POLSON STREET TORONTO, ONTARIO M5A 1A4

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2	REV. & ISSUED FOR PLANNING APPROVALS	2026.02.11
1	ISSUED FOR PLANNING APPROVALS	2025.08.05

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PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

ROOF PLANS

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PLAN OF SURVEY WITH TOPOGRAPHY OF

PART OF LOT 25
CONCESSION 7
TOWNSHIP OF PUSLINCH
COUNTY OF WELLINGTON

SCALE 1 : 300

5 0 5 10 15 20 metres

TARASICK McMILLAN KUBICKI LIMITED
ONTARIO LAND SURVEYORS

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PROPERTY SUMMARY

PROPERTY DESCRIPTION: 7456 McLEAN ROAD WEST, BEING PART OF LOT 25, CONCESSION 7, DESIGNATED AS PART 2, PLAN 61R–4472, TOWNSHIP OF PUSLINCH, COUNTY OF WELLINGTON, PIN 71196–0037.

PROPERTY DESCRIPTION: 197 BROCK ROAD, BEING PART OF LOT 25, CONCESSION 7, DESIGNATED AS PARTS 1 AND 2, PLAN 61R–7239, TOWNSHIP OF PUSLINCH, COUNTY OF WELLINGTON PIN 71196–0039.

EASEMENTS/RIGHTS–OF–WAY: THERE ARE NO EASEMENTS REGISTERED ON TITLE.

COMMENTS: NOTE LOCATION OF FENCES.

METRIC

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

ELEVATION NOTE

ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM–CGVD28:78, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.592 m.

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.

LEGEND

■	DENOTES	SURVEY MONUMENT FOUND
□	DENOTES	SURVEY MONUMENT PLANTED
IB	DENOTES	IRON BAR
SIB	DENOTES	STANDARD IRON BAR
TC	DENOTES	TOP OF CURB
BC	DENOTES	BOTTOM OF CURB
CCT	DENOTES	CURB CUT
BB	DENOTES	BELL BOX
CB	DENOTES	CATCH BASIN
INV.	DENOTES	INVERT
HM	DENOTES	HYDRO METER
MH	DENOTES	MANHOLE
SLS	DENOTES	STREET LIGHT STANDARD
TL	DENOTES	TRAFFIC LIGHT
WUP	DENOTES	WOOD UTILITY POLE
WV	DENOTES	WATER VALVE
P1	DENOTES	PLAN 61R–4472
P2	DENOTES	PLAN 61R–21772
P3	DENOTES	PLAN 61R–7239

0.20ø D DENOTES DECIDUOUS TREE WITH TRUNK DIAMETER

0.20ø C DENOTES CONIFEROUS TREE WITH TRUNK DIAMETER

TREE CANOPIES ARE DRAWN TO SCALE.

PREPARED FOR:

THIS REPORT WAS PREPARED FOR BLACKHART CONSTRUCTION INC AND THE UNDERSIGNED ACCEPTS NO RESPONSIBILITY FOR USE BY OTHER PARTIES.

PLAN AMENDED NOVEMBER 3, 2025.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON OCTOBER 20, 2022

NOVEMBER 3, 2022
DATE

[redacted]
BORYS KUBICKI
ONTARIO LAND SURVEYOR

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V–37409
THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29(3)

TARASICK McMILLAN KUBICKI LIMITED
ONTARIO LAND SURVEYORS
4181 SLADEVIEW CRESCENT, UNIT 42, MISSISSAUGA, ONTARIO L5L 5R2
TEL: (905) 569–8849 FAX: (905) 569–3160
E–MAIL: office@tmksurveyors.com

DRAWN BY: A.P | FILE No. 9625–25–SRPR–T

D (24"x36")

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	Permitted Uses	Prohibited Uses	Site Specific Special Provision
	HC	Gas Bar(s), Retail Store, Restaurant, Drive-through Service Facility.	N/A	PARKING SPACE REQUIRMENT RESTAURANT (MINIMUM): 1 per 13 m^2 Net Floor Area LOCATION OF LOADING SPACE: Required loading space shall not be required to abut the building for which the loading space is provided.

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.

TRANSPORTATION IMPACT STUDY

7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH

TOWNSHIP OF PUSLINCH
COUNTY OF WELLINGTON

PREPARED FOR:
DAAZ INC.

PREPARED BY:
C.F. CROZIER & ASSOCIATES INC.
4900 PALLADIUM WAY, SUITE 202
BURLINGTON, ON L7M 0W7

FEBRUARY 2026

CFCA FILE NO. 2792-7289

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.

CROZIER

Revision Number	Date	Comments
Rev.0	September 2023	Issued for Client Review
Rev.1	October 2023	Issued for Submission
Rev.2	July 2025	Issued for 2nd Submission
Rev.3	February 2026	Issued for 3rd Submission

Executive Summary

C.F. Crozier & Associates Inc. (Crozier) was retained by Daaz 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 Richard Ziegler Architects Inc., dated November 14, 2024. 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:

- An eight-pump gas station with a 1-storey accessory retail/convenience store (235 m^2)
- A six-pump truck gas station

A 1-storey fast food restaurant (379 m^2) with drive-thru

- 41 vehicle parking spaces including 3 accessible spaces and 4 electric vehicle charging spaces
- 8 truck parking spaces
- 1 loading space
- 2 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

Existing Conditions

Both study intersections are operating adequately with LOS "B" or better during the weekday a.m. and p.m., peak hours.

Under the 2025 existing conditions, the auxiliary storage lengths are not exceeding and have reserve capacity to accommodate future traffic volumes.

Future Background Conditions

The signalized intersection of Brock Road South at McLean Road is expected to continue to operate with a LOS "C" and "C" during the weekday a.m. and p.m. peak hours. A maximum volume-to-capacity ratio of 0.68 and 0.57 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" and "B" during the weekday a.m. and p.m. peak hours, respectively. A maximum volume-to-capacity ratio of 0.54 and 0.56 is expected during the weekday a.m. and weekday p.m. peak hours, respectively.

Under the 2031 future background conditions, the queuing assessment results in an instance where the 95th percentile queues exceed the auxiliary turn lane storage length for the westbound left-turn at Brock Road South and McLean Road during the p.m. peak hour.

Site Generated Traffic

During the weekday a.m. peak hour, the site is expected to generate 172 primary and 222 pass-by trips. In the p.m. peak hour, projections are 173 primary and 202 pass-by trips. The trip distribution for the subject development was determined using existing travel patterns.

Future Total Conditions

In the 2031 horizon year, the intersection of Brock Road South at McLean Road is expected to decrease from operating at a LOS "C" and "C" to operate with a LOS "D" and "C" during the weekday a.m. and p.m. peak hours, respectively, when compared to 2031 Future Background conditions. A maximum volume-to-capacity ratio of 1.01 (0.33 increase from 2031 Future Background) and 0.75 (0.18 increase from 2031 Future Background) is expected during the weekday a.m. and weekday p.m. peak hours, respectively.

In the 2031 horizon year, the 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 0.56 (0.02 increase from 2031 Future Background) and 0.57 (0.02 increase from 2031 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.

Similar to the 2031 future background conditions, the 2031 future total queuing assessment results in an instance where the 95th percentile queues exceed the auxiliary turn lane storage length for the westbound left-turn at Brock Road South and McLean Road during the p.m. peak hour.

Future Total Improvements

Signal timing adjustments were examined in an effort to mitigate projected delays, congestion, and queue concerns for 2031 at Brock Road South and McLean Road in the northbound and westbound left-turn lanes. The timings detailed for the future background scenario were subsequently applied to the 2031 future total scenario.

The results of the signal adjustments indicate that in the 2031 future total scenario, the intersection of Brock Road South at McLean Road operates at capacity with a maximum v/c ratio of 0.88 and 0.67 during the a.m. and p.m. peak hours, respectively.

Queue exceedances are also still present at Brock Road South and Nicholas Beaver Road. However, each instance of queue exceedance remains within 15 meters, or approximately two vehicles, of the designated storage length. This level of excess queuing, when it occurs, can be supported by the auxiliary turn lane taper with limited effect on through traffic. It is recommended that this movement be monitored for future storage lane expansion.

Site Access Review

No issues were identified regarding sight lines and access spacing 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 at 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 pass beside it to the west. It is noted that there is a lane to the east of the truck gas bar for the trucks to park in the designated spots and then traverse the site as needed. These aspects of the Site Plan will be revised as part of the future applications.

Parking and Loading Requirements

The development proposes a parking supply deficiency of six (6) vehicle spaces but meets the remaining spacing requirements when compared to the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18. Several factors support the proposed parking supply. The drive-through for the restaurant helps reduce parking demand by accommodating vehicles in its queue, while convenience store customers are expected to use the gas bar pumps. Additionally, parking requirements in nearby municipalities and ITE's Parking Generation manual standards suggest the proposed number of spaces is sufficient.

Surrogate Survey

The 4 Sinclair Boulevard site is the most representative comparator, reflecting similar land uses, scale, and operating characteristics, and demonstrated a parking surplus, indicating the proposed development is expected to operate within the planned parking supply. In contrast, the 40 Sportsworld Drive site could have elevated parking demand due to shared use with Moose Winooski's and Tranquility Park, its location within a busy commercial node, and its stronger regional draw, conditions that would not be expected at the subject site. Accordingly, the Sinclair findings support the conclusion that sufficient parking is expected to be provided.

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.

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Daaz 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 Township of 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 1.62 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 one-storey mixed-use commercial and gas station development; the proposed site statistics are displayed in **Table 1.**

Table 1: Development Statistics

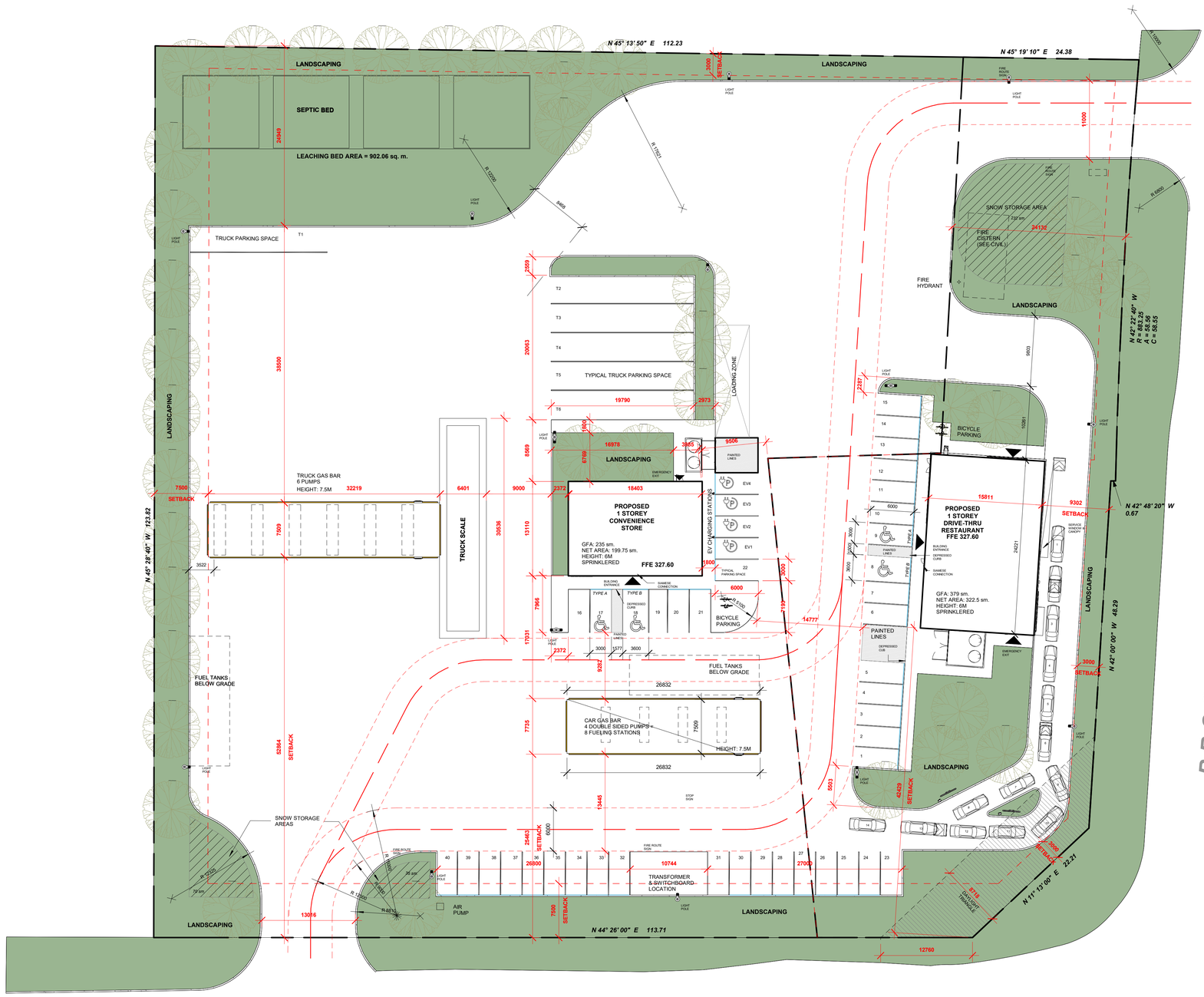
Land Use	Units
Vehicle Gas Pumps	8 Pumps
Truck Gas Pumps	6 Pumps
Convenience Store	235 m^2
Fast Food Restaurant with Drive Thru	379 m^2
Total Building GFA	**572 m^2**
Vehicle Parking Spaces	41 spaces (Including 3 accessible parking spaces and 4 electric vehicle parking spaces)
Truck Parking Spaces	8 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 Richard Ziegler Architects Inc. (dated November 14, 2024) is included as **Figure 2.**



Legend	7456 McLean Road & 197 Brock Road South	CROZIER CONSULTING ENGINEERS	Figure 1
Site Boundary	Site Location		Project No. 2792-7289 Date. 2026.02.13 Analyst. Ramy Kamal



HC ZONE REGULATIONS	REQUIRED	PROPOSED
PERMITTED USES	TABLE 8.1 ZONING BYLAW	GAS BAR(S), CONVENIENCE STORE AND RESTAURANT
LOT AREA (MIN)	0.4 HA	1.62 H
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.)	3 M	3 M
RESTAURANT GFA		379 sm
RESTAURANT NET AREA		322.5 sm
CONVENIENCE STORE GFA		235 sm.
CONVENIENCE STORE NET AREA		199.75 sm.
GAS BAR CANOPY (CARS)		201 sm.
GAS BAR CANOPY (TRUCKS)		241 sm.
TOTAL BUILDING/STRUCTURE AREA		1,056 sm.
LOT COVERAGE (MAX.)	45%	6.50%
LANDSCAPED OPEN SPACE (MIN.)	25%	27%

PARKING REQUIRED		
GAS BAR - CARS	(1 PER PUMP) = 8	SEE BELOW
GAS BAR - TRUCKS	(1 PER PUMP) = 6	6
CONVENIENCE STORE	(1 PER 20 sm.) = 10	SEE BELOW
RESTAURANT	(1 PER 10 sm.) = 33	SEE BELOW
TOTAL	57	50

VEHICLE PARKING SCHEDULE

Per Table 5.3 of Zoning Bylaw

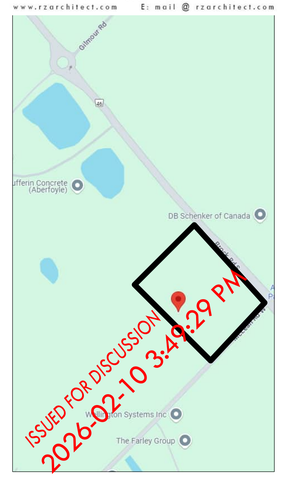
TYPE OF PARKING SPACE	PROVIDED PARKING SPACE
ACCESSIBLE PARKING - TYPE A	2
ACCESSIBLE PARKING - TYPE B	2
TRUCK PARKING	6
TYPICAL PARKING SPACE	36
EV PARKING / CHARGING SPACE	4
TOTAL	50

BICYCLE PARKING SCHEDULE

Per Table 5.6 of Zoning Bylaw

REQUIRED	PROVIDED
2 PER 1,000 sm. = 2	2

RICHARD ZIEGLER ARCHITECT INC.
39 POLSON STREET TORONTO, ONTARIO M5A 1A4
T: 416 461 1494 or 1 800 413 7992 F: 866 895 1488
www.rzarchitect.com E: mail @ rzarchitect.com



SITE CONTEXT

NO.	ISSUANCE	DATE
3	REV. & ISSUED FOR PLANNING APPROVALS	2025.11.12
2	REV. & ISSUED FOR PLANNING APPROVALS	2025.08.08
1	ISSUED FOR PLANNING APPROVALS	2025.08.05

THE GENERAL CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECT. DO NOT SCALE THE DRAWINGS. DO NOT USE THIS DRAWING FOR CONSTRUCTION UNLESS SIGNED AND SEALED BY THE ARCHITECT.

NORTH

STAMP

ONTARIO ASSOCIATION OF ARCHITECTS
RICHARD E. ZIEGLER
LICENCE
4462

PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

SITE PLAN

SCALE	1 : 300	PROJECT NUMBER
DATE	2026-02-10 3:49:29 PM	202436
DRAWN	REZ	
CHECKED	REZ	
SHEET		REVISION

A101

FILE NAME: Y:\2024 Projects\202436 - 7456 Mclean Road, Puslinch\20 Design and Construction Documents (Revit)\7456 Mclean Road 2026.02.09.rvt
PLOT DATE: 2026-02-10 3:49:29 PM

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 a north/south 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 an east/west 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 an east/west roadway with a two-lane cross-section. Nicholas Beaver Road 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.

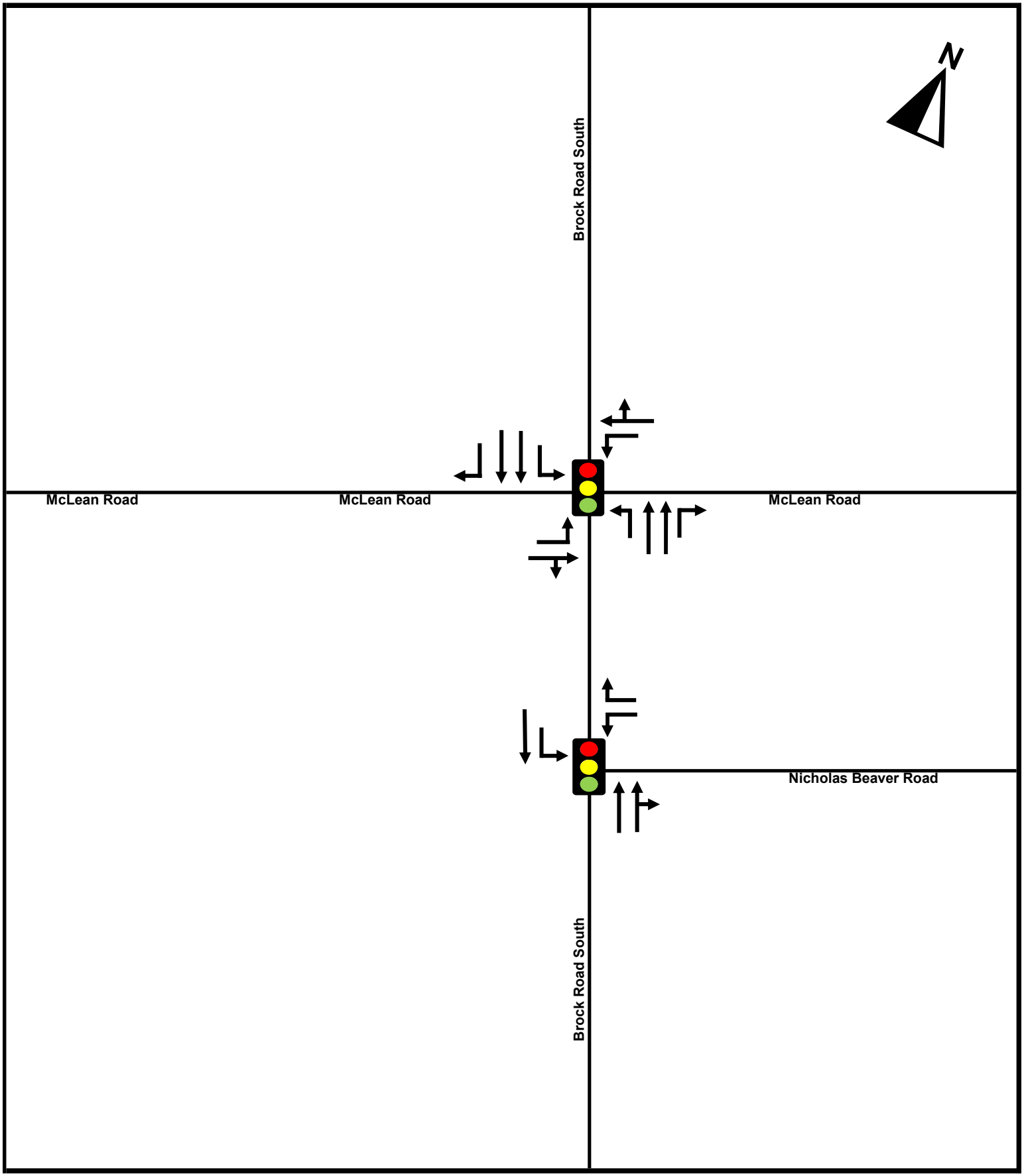
Excerpts of the County of Wellington Road Master Action Plan are included in **Appendix B.**

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	7456 McLean Road & 197 Brock Road South	CROZIER CONSULTING ENGINEERS	Figure 3
Stop Bar	2025 Existing Study Road Network		Project No. 2792-7289 Date. 2026.02.13 Analyst. Ramy Kamal

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 2** outlines the existing transit routes, days of operation, peak hour headways, and the location of bus stops in the study area.

Table 2: Existing Transit Routes

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 3**.

Signal timing plans for the study intersection were provided by Puslinch staff for modelling purposes, also provided in **Table 3**.

Table 3: 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 Establishing Existing Conditions Traffic Volumes

As the turning movement counts were conducted in 2023, the traffic volumes have been projected forward to 2025. This projection utilizes an annual growth rate of 2%, which was established through the terms of reference with both the Township and the County. In line with this updated traffic data, the future analysis horizon years for the study have also been revised to 2026 and 2031 to ensure consistency with the latest planning timelines and forecasted growth.

2.7 Traffic Modelling

The evaluation of intersections within this report is conducted based on the methodology outlined in the Highway Capacity Manual (2010), using Synchro 12 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**.

Additionally, queuing was analyzed in this study using Synchro's queues. The 95th percentile queue length metric, which represents the 95th percentile queue length of the peak hour traffic from Synchro's HCM reports, was considered in this study for the auxiliary turn storage lanes.

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 4**.

Calculations for the Peak Hour factors can be found in **Appendix F**.

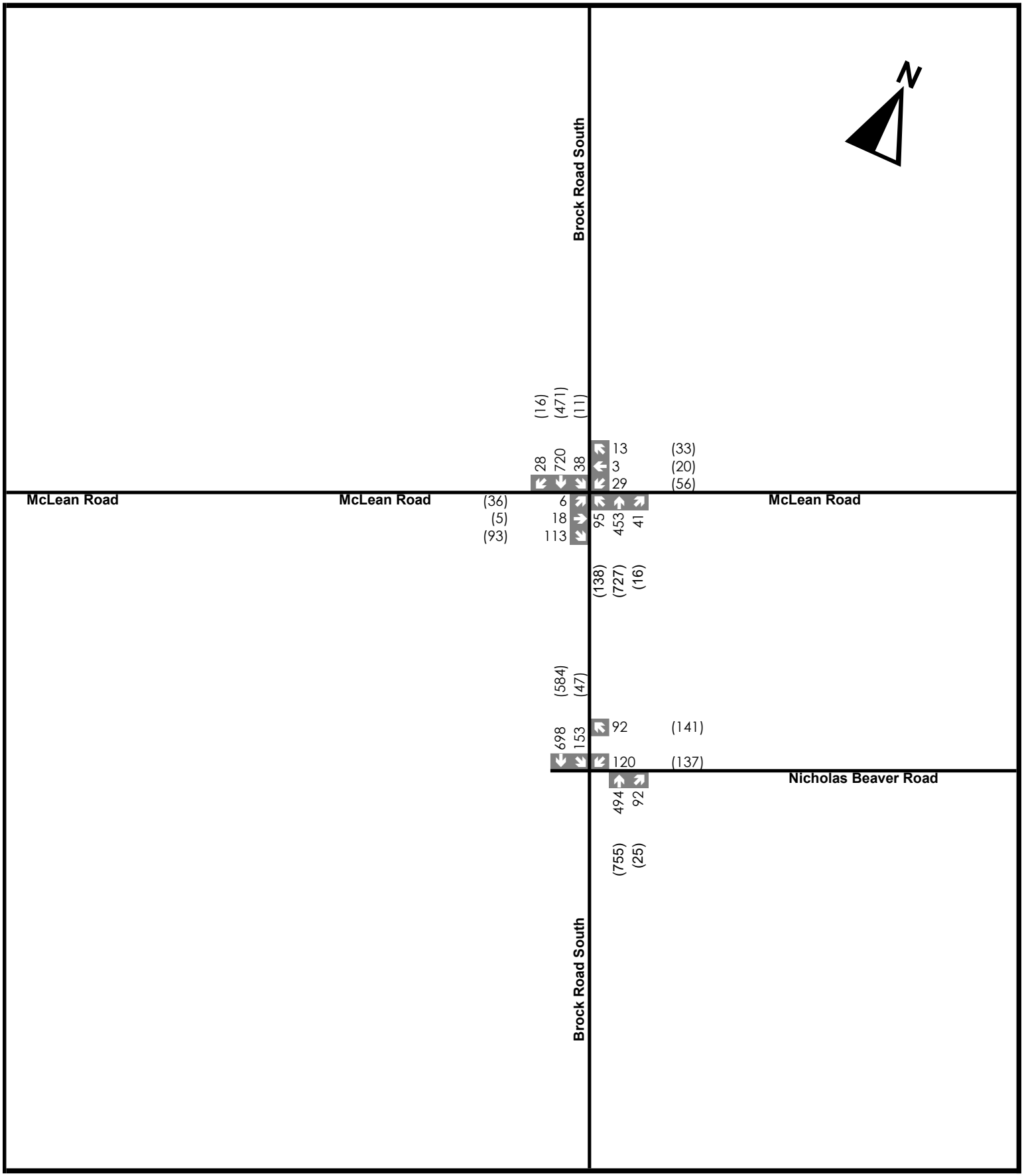
Table 4: Peak Hour Factors

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

2.8 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**. **Table 5** and **Table 6** summarize the existing traffic operations and queuing assessments within the study area, respectively.

Detailed capacity analyses are included in **Appendix G**.



Legend	7456 McLean Road & 197 Brock Road South	CROZIER CONSULTING ENGINEERS	Figure 4
xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes	2025 Existing Volumes		Project No. 2792-7289 Date. 2026.02.13 Analyst. Ramy Kamal

Table 5: 2025 Existing Operations

Intersection (Control)	Movement	Performance Metrics					
		LOS[1]		Control Delay (s)		v/c ratio[2]	
		AM	PM	AM	PM	AM	PM
Brock Road South at McLean Road (Signalized)	**Overall**	**B**	**B**	**19.9**	**17.2**	**0.44**	**0.37**
	EBL	C	C	32.4	34.9	0.04	0.15
	EBTR	D	D	35.2	39.0	0.21	0.11
	WBL	C	C	27.3	31.5	0.17	0.25
	WBTR	C	D	30.0	36.6	0.03	0.11
	NBL	B	A	11.8	8.7	0.42	0.28
	NBT	B	B	15.4	13.2	0.33	0.40
	NBR	B	A	12.7	9.9	0.03	0.01
	SBL	B	B	13.0	13.1	0.10	0.05
	SBT	C	B	21.5	16.5	0.56	0.31
	SBR	B	B	15.1	13.8	0.02	0.01
Brock Road South at Nicholas Beaver Road (Signalized)	**Overall**	**B**	**B**	**13.0**	**14.7**	**0.42**	**0.47**
	WBL	D	D	43.9	46.2	0.54	0.59
	WBR	D	D	36.8	38.1	0.07	0.11
	NBTR	B	B	13.1	12.2	0.39	0.45
	SBL	A	A	5.7	5.5	0.29	0.14
	SBT	A	A	6.2	5.7	0.35	0.29

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 5**, 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 0.44 and 0.37 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 0.42 and 0.47 was observed during the weekday a.m. and weekday p.m. peak hours, respectively.

Table 6 outlines the results of the 2025 existing conditions queuing assessment.

Table 6: 2025 Existing Queuing Assessment

Intersection	Performance Metrics			
	Movement	95th Percentile Queue Length (m)[1]		Auxiliary Lane Storage Length (m)
		AM	PM	
Brock Road South at McLean Road (Signalized)	EBL	3.9	12.3	**54.0**
	WBL	11.2	17.6	**55.0**
	NBL	17.9	23.2	**142.0**
	NBR	0.0	0.0	**66.0**
	SBL	8.2	3.5	**62.0**
	SBR	0.1	0.0	**62.0**
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	45.0	50.4	**56.0**
	SBL	15.7	6.0	**21.0**

Note 1: 95th Percentile Queue Lengths were used from Synchro reports.

Under the 2025 existing conditions, the auxiliary storage lengths are not exceeding and have reserve capacity to accommodate future traffic volumes.

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 2026 (full build-out), 2031 (five-year horizon) was considered to be appropriate for analysis purposes.

3.2 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 in the ToR response. The updated horizon years to reflect the re-submission of the TIS is provided in **Table 7**.

Table 7: Background Growth Rates

Intersection	Growth Rates	
	2025-2026	2026-2031
Brock Road South	2%	
Mclean Road		
Nicholas Beaver Drive		

The 2026 and 2031 future background traffic volumes are also illustrated in **Figure 5** and **Figure 6**, respectively.

3.3 Background Developments

Per consultation with the County of Wellington and the Township of Puslinch, five (5) background developments were identified as part of the study area. The background developments are summarized in **Table 8**.

Table 8: Summary of Background Developments

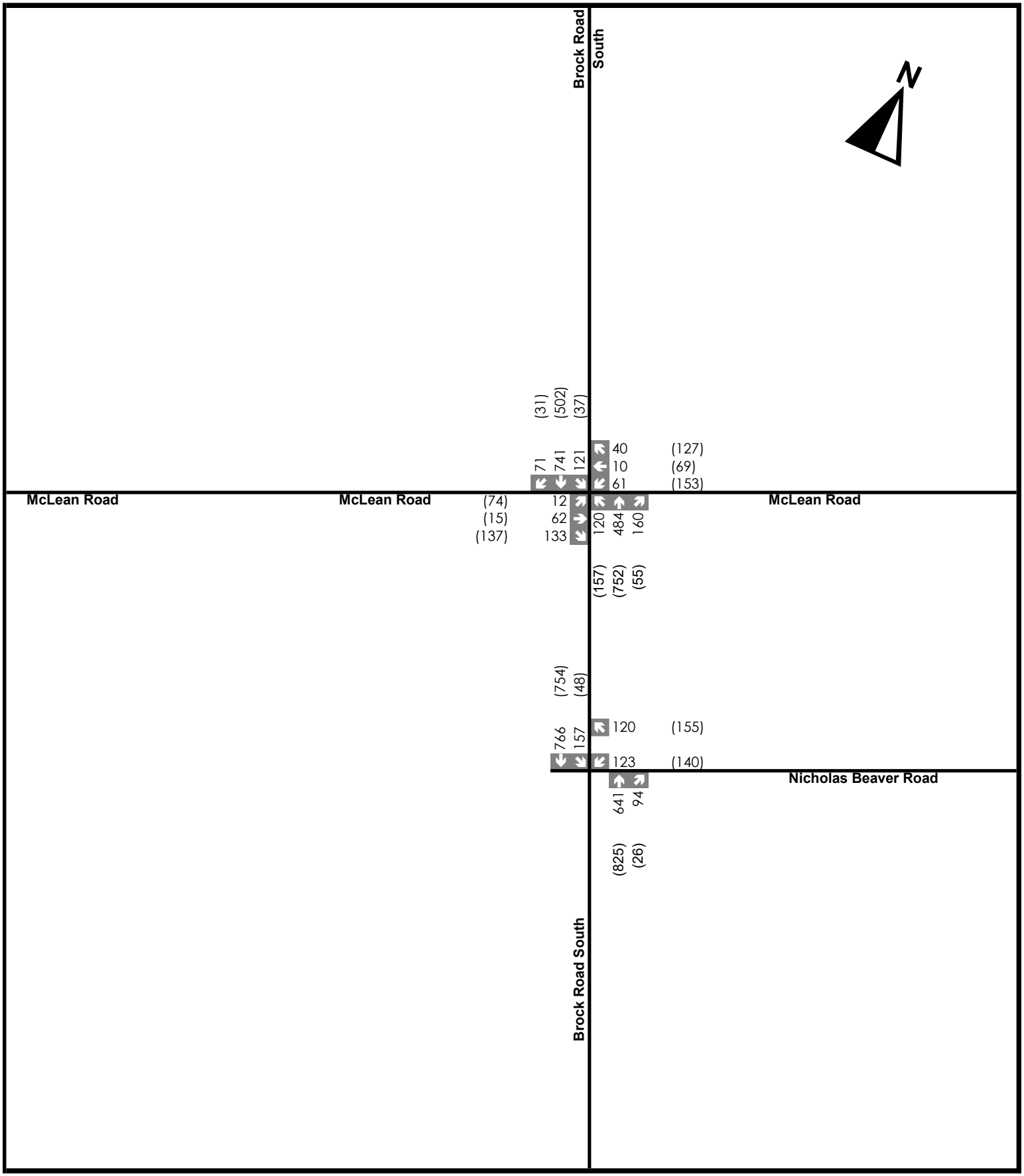
Developments	Land Use	Referenced TIS
7434 McLean Road (Adjacent Wheelking Site)	Industrial	Paradigm
Truckline Site (West of Wheelking)	Truck Distribution Terminal	Paradigm
128 Brock Road South	Manufacturing	Paradigm
7475 McLean Road East	Industrial	GHD
7504 McLean Road East	Industrial	Paradigm

Site generated trip figures for each background development site, as supplied by the Township and their peer reviewer, are available in **Appendix A**.

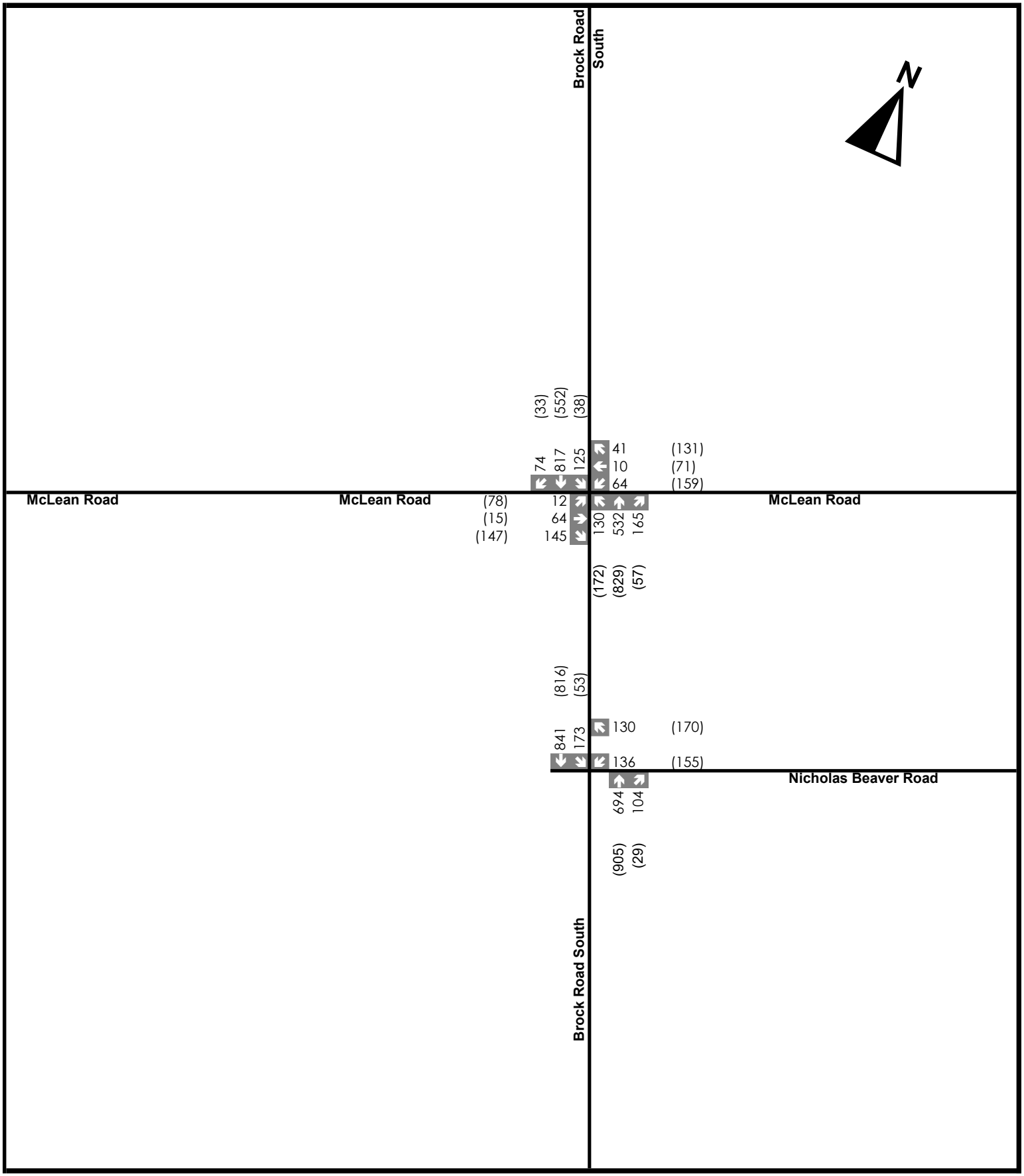
3.4 Future Roadway Improvements

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	7456 McLean Road & 197 Brock Road South		Figure 5
xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes	2026 Future Background Volumes	CROZIER CONSULTING ENGINEERS	Project No. 2792-7289 Date. 2026.02.13 Analyst. Ramy Kamal



Legend	7456 McLean Road & 197 Brock Road South	CROZIER CONSULTING ENGINEERS	Figure 6
xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes	2031 Future Background Volumes		Project No. 2792-7289 Date. 2026.02.13 Analyst. Ramy Kamal

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 2026 and 2031 future background traffic volumes illustrated previously in **Figure 5** and **Figure 6**, respectively.

Table 9 and **Table 10** summarizes the 2026 and 2031 future background Levels of Service, respectively. Detailed capacity analyses are included in **Appendix H**.

Table 9: 2026 Future Background Operations

Intersection (Control)	Performance Metrics						
	Movement	LOS[1]		Control Delay (s)		v/c ratio[2]	
		AM	PM	AM	PM	AM	PM
Brock Road South at McLean Road (Signalized)	**Overall**	**C**	**C**	**25.7**	**25.4**	**0.61**	**0.53**
	EBL	C	C	32.4	33.3	0.07	0.25
	EBTR	D	D	46.3	39.7	0.69	0.20
	WBL	C	C	26.7	28.4	0.33	0.48
	WBTR	C	D	27.7	36.7	0.08	0.47
	NBL	B	B	20.0	14.3	0.60	0.39
	NBT	C	C	22.7	22.7	0.43	0.52
	NBR	B	B	19.2	17.0	0.12	0.05
	SBL	B	B	14.8	17.6	0.33	0.19
	SBT	C	C	26.7	23.8	0.64	0.40
	SBR	B	B	18.6	19.6	0.05	0.03
Brock Road South at Nicholas Beaver Road (Signalized)	**Overall**	**B**	**B**	**13.9**	**14.5**	**0.49**	**0.51**
	WBL	D	D	44.2	46.2	0.56	0.60
	WBR	D	D	36.9	37.9	0.10	0.12
	NBTR	B	B	14.4	12.8	0.48	0.49
	SBL	A	A	6.4	5.9	0.35	0.16
	SBT	A	A	6.5	6.3	0.39	0.37

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 10: 2031 Future Background Operations

Intersection (Control)	**Movement**	**Performance Metrics**					
		LOS[1]		**Control Delay** (s)		**v/c ratio[2]**	
		AM	**PM**	**AM**	**PM**	**AM**	**PM**
Brock Road South at McLean Road (Signalized)	**Overall**	**C**	**C**	**28.0**	**26.1**	**0.68**	**0.57**
	EBL	C	C	32.5	33.5	0.07	0.26
	EBTR	D	D	50.7	40.0	0.74	0.21
	WBL	C	C	27.2	28.7	0.35	0.51
	WBTR	C	D	27.7	37.0	0.08	0.49
	NBL	C	B	27.8	15.1	0.71	0.46
	NBT	C	C	23.7	23.9	0.47	0.57
	NBR	B	B	19.6	17.3	0.13	0.05
	SBL	B	B	15.5	18.2	0.36	0.22
	SBT	C	C	29.5	24.7	0.72	0.44
	SBR	B	B	19.2	19.9	0.05	0.03
Brock Road South at Nicholas Beaver Road (Signalized)	**Overall**	**B**	**B**	**14.6**	**15.3**	**0.54**	**0.56**
	WBL	D	D	46.1	48.2	0.61	0.65
	WBR	D	D	37.0	37.8	0.10	0.13
	NBTR	B	B	15.4	13.7	0.53	0.54
	SBL	A	A	7.2	6.7	0.40	0.19
	SBT	A	A	6.9	6.7	0.43	0.41

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 10,** 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 continue to operate with a LOS "C" during the weekday a.m. and p.m. peak hours. A maximum volume-to-capacity ratio of 0.68 and 0.57 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 0.54 and 0.56 is expected during the weekday a.m. and weekday p.m. peak hours, respectively.

Table 11 and **Table 12** outline the results of the 2026 and 2031 future background queuing assessment, respectively.

Table 11: 2026 Future Background Queuing Assessment

Intersection	Performance Metrics			
	Movement	95th Percentile Queue Length (m)[1]		Auxiliary Lane Storage Length (m)
		AM	PM	
Brock Road South at McLean Road (Signalized)	EBL	6.0	20.8	**54.0**
	WBL	19.5	40.9	**55.0**
	NBL	24.9	31.6	**142.0**
	NBR	13.0	1.1	**66.0**
	SBL	23.8	9.8	**62.0**
	SBR	5.2	0.0	**62.0**
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	46.2	51.4	**56.0**
	SBL	16.2	6.1	**21.0**

Note 1: 95th Percentile Queue Lengths were used from Synchro reports.

Table 12: 2031 Future Background Queuing Assessment

Intersection	Performance Metrics			
	Movement	95th Percentile Queue Length (m)[1]		Auxiliary Lane Storage Length (m)
		AM	PM	
Brock Road South at McLean Road (Signalized)	EBL	6.0	21.6	**54.0**
	WBL	20.4	42.1	**55.0**
	NBL	37.8	35.2	**142.0**
	NBR	13.2	1.6	**66.0**
	SBL	24.7	10.2	**62.0**
	SBR	5.7	0.0	**62.0**
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	50.7	**56.6**	**56.0**
	SBL	17.8	6.5	**21.0**

Note 1: 95th Percentile Queue Lengths were used from Synchro reports.

Under the 2031 future background conditions, queuing assessment results in instances where the 95th percentile queues exceed the auxiliary turn lane storage length for the westbound left-turn at Brock Road South and McLean Road.

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 R^2 values for the fitted curve equations are less than 0.6 or are not provided.

Per discussions with Township and County staff, the number of pumps were assumed to be six (6) for the truck gas station and eight (8) for the regular vehicle gas station.

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

Table 13 summarizes the number of trips forecasted to be generated by the proposed development.

Table 13: 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	8 Pumps	Primary	25	25	**50**	33	33	**50**
		Pass-by	39	39	**71**	41	41	**82**
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**	87	85	**172**	89	84	**173**
		Total Pass-by	111	111	**222**	104	98	**202**
		Total Trips	**198**	**196**	**394**	**193**	**182**	**375**

As shown in **Table 13**, during the weekday a.m. peak hour, the subject site is projected to generate 172 primary trips (87 inbound, 85 outbound) and 222 pass-by trips (111 inbound, 111 outbound). For the weekday p.m. peak hour, trip generation is anticipated to be 173 primary trips (89 inbound, 84 outbound) and 202 pass-by trips (104 inbound, 98 outbound).

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 14 summarizes the primary site trip distribution.

Table 14: 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
North via Brock Road S	44.5%	26.8%	27.7%	44.3%
South via Brock Road S	33.2%	46.6%	43.3%	40.2%
East via McLean Road	2.5%	5.5%	6.1%	1.8%
West via McLean Road	7.8%	7.2%	7.4%	9.7%
East via Nicholas Beaver Road	12.0%	13.9%	15.5%	4.0%
Total	100%	100%	100%	100%

The pass-by percentages for each land use were acquired via ITE's Vehicle Pass-By Rate excel tables. It must be noted that due to the lack of trip rates for Land Use 950, the pass-by percentages for Land Use 944 were utilized.

Table 15 summarizes the pass-by rates for each land use in the development.

Table 15: Vehicle Pass-by Rates by Land Use

Direction	A.M.	P.M.
Truck Gas Station LUC 950 - Truck Stop[1]	63%	57%
Vehicle Gas Station Pumps + Convenience Store LUC 945 - Convenience Store/Gas Station	60%	56%
Fast Food Restaurant with Drive Thru LUC 934 - Fast-Food Restaurant with Drive-Through Window	50%	55%

Note 1: LUC 944's pass-by rate was utilized due to no data being provided for LUC 950.

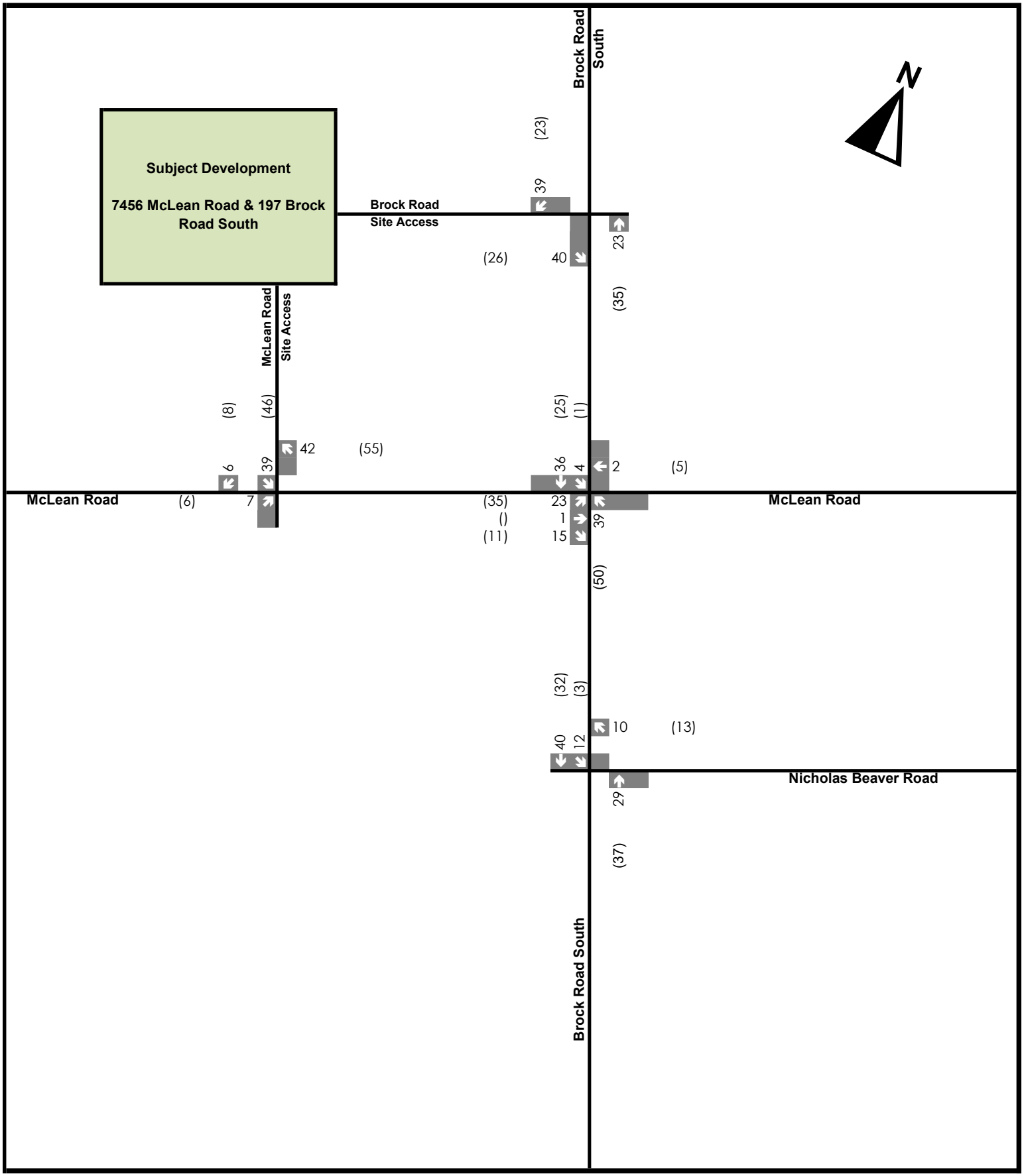
The pass-by trips were distributed to the boundary road network proportionally based on the recorded 2023 Turning Movement Counts at the intersection of Brock Road South at McLean Road using the through movements in each direction. **Table 16** summarizes the pass-by distribution for the proposed development.

Table 16: Pass-by Distribution

Direction	A.M.	P.M.
Northbound via Brock Road S	37.9%	59.5%
Southbound via Brock Road S	60.3%	38.5%
Eastbound via McLean Road	1.5%	0.4%
Westbound via McLean Road S	0.3%	1.6%
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

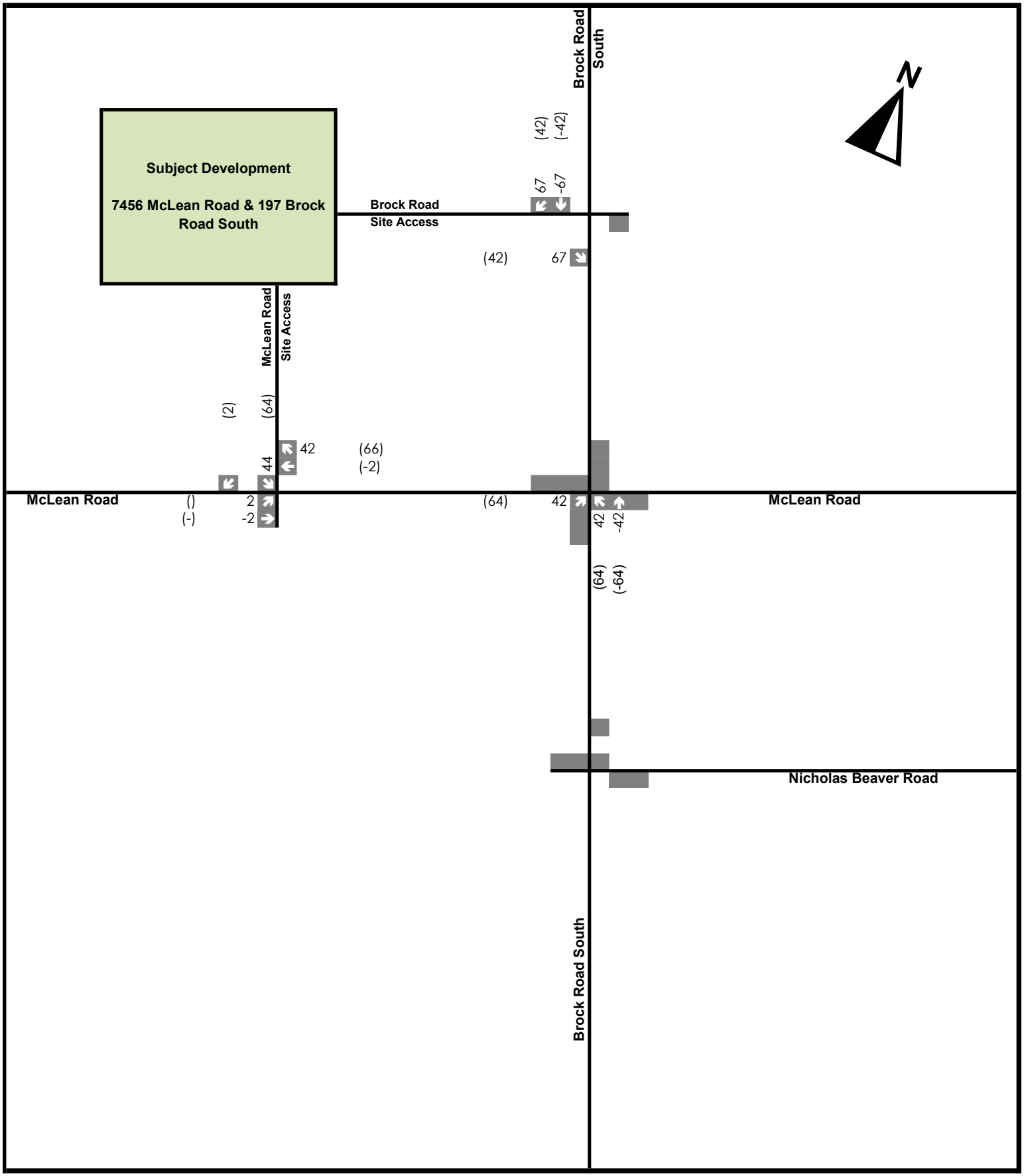
7456 McLean Road & 197 Brock Road South

Primary Trip Assignment

CROZIER CONSULTING ENGINEERS

Figure 7

Project No. 2792-7289
Date. 2026.02.13
Analyst. Ramy Kamal



Legend	7456 McLean Road & 197 Brock Road South		Figure 8
xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes	Pass-By Trip Assignment	CROZIER CONSULTING ENGINEERS	Project No. 2792-7289 Date. 2026.02.13 Analyst. Ramy Kamal

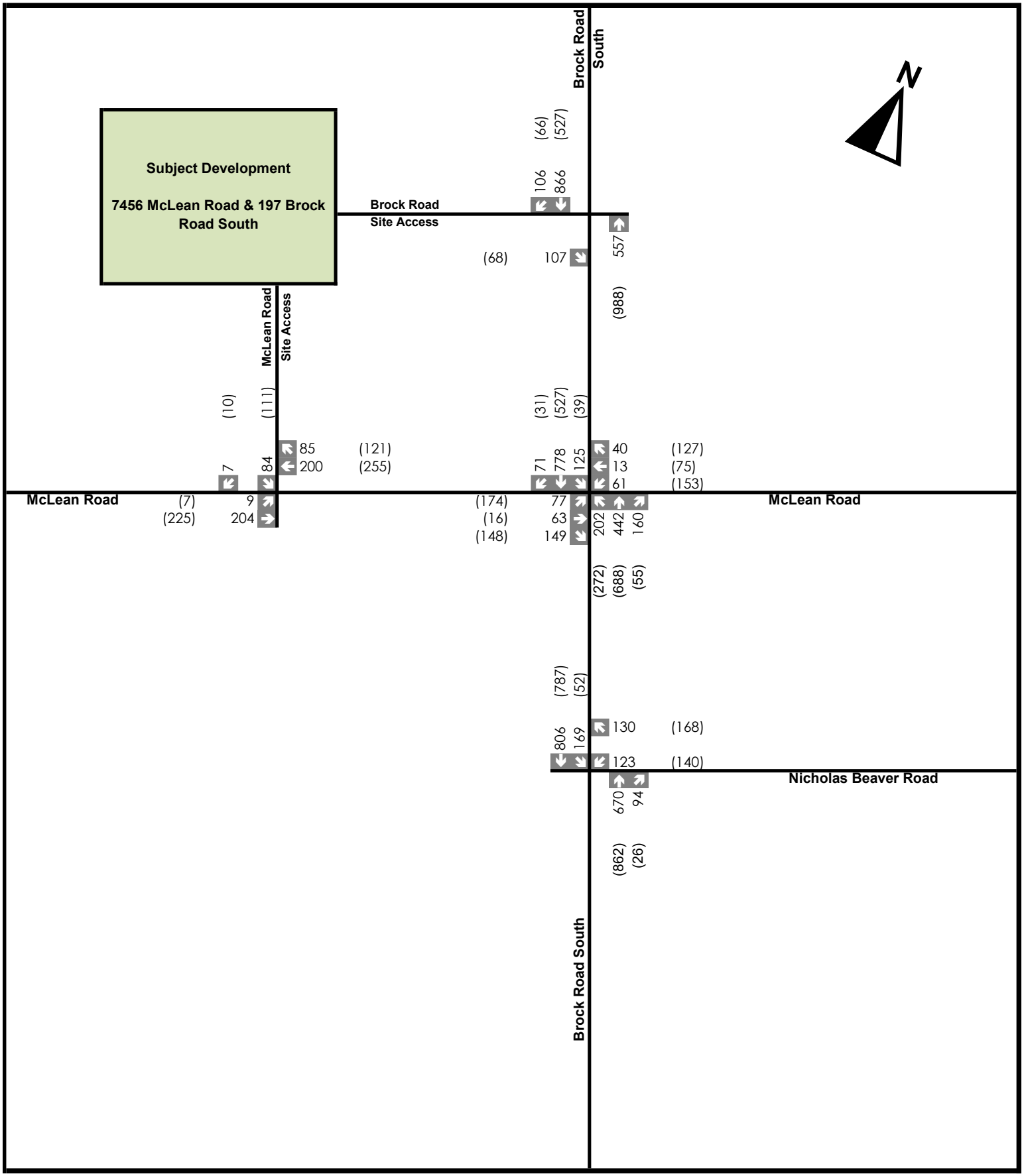
5.0 Future Total Traffic Conditions

5.1 Intersection Operations

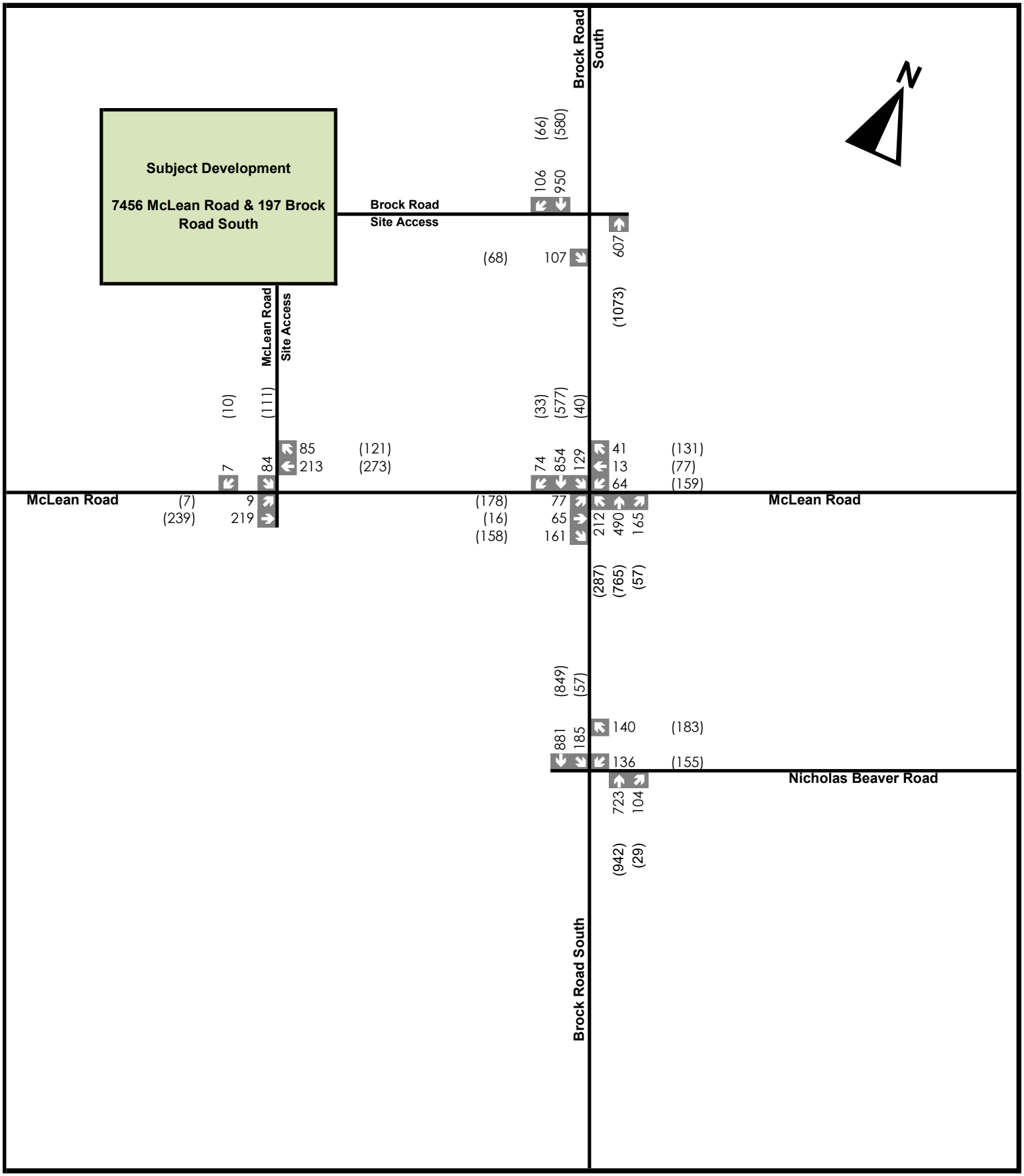
Traffic operations at the study intersections were analyzed with the addition of the site generated traffic to the future background traffic. The total 2026 and 2031 traffic volumes are illustrated in **Figure 9** and **Figure 10**, respectively.

Table 17 and **Table 18** summarizes the 2026 and future total traffic operations for the study intersections, respectively.

Detailed capacity analyses are included in **Appendix J**.



Legend	7456 McLean Road & 197 Brock Road South		Figure 9
xx A.M. Peak Hour Traffic Percent (xx) P.M. Peak Hour Traffic Percent	2026 Future Total Volumes	CROZIER CONSULTING ENGINEERS	Project No. 2792-7289 Date. 2026.02.13 Analyst. Ramy Kamal



Legend	7456 McLean Road & 197 Brock Road South		Figure 10
xx A.M. Peak Hour Traffic Percent (xx) P.M. Peak Hour Traffic Percent	2031 Future Total Volumes	CROZIER CONSULTING ENGINEERS	Project No. 2792-7289 Date. 2026.02.13 Analyst. Ramy Kamal

Table 17: 2026 Future Total Operations

Intersection (Control)	Movement	Performance Metrics					
		LOS[1]		Control Delay (s)		v/c ratio[2]	
		AM	PM	AM	PM	AM	PM
Brock Road South at McLean Road (Signalized)	**Overall**	**C**	**C**	**33.0**	**27.1**	**0.90**	**0.69**
	EBL	C	C	29.2	31.9	0.30	0.49
	EBTR	**E**	D	**61.5**	40.3	0.82	0.21
	WBL	C	C	30.9	31.1	0.36	0.50
	WBTR	D	D	35.3	50.2	0.12	0.69
	NBL	**F**	C	**83.4**	20.2	**1.02**	0.69
	NBT	C	C	21.1	21.8	0.38	0.47
	NBR	B	B	18.4	16.9	0.12	0.05
	SBL	B	B	14.2	17.5	0.31	0.18
	SBT	C	C	26.7	24.1	0.67	0.42
	SBR	B	B	18.1	19.7	0.05	0.03
Brock Road South at Nicholas Beaver Road (Signalized)	**Overall**	**B**	**B**	**14.1**	**14.7**	**0.51**	**0.52**
	WBL	D	D	44.2	46.0	0.56	0.60
	WBR	D	D	37.0	37.9	0.10	0.13
	NBTR	B	B	14.8	13.1	0.51	0.51
	SBL	A	A	6.8	6.2	0.38	0.18
	SBT	A	A	6.6	6.5	0.41	0.39
Brock Road South at Proposed Right-in/Right Out Site Access (Stop)	**Overall**	**B**	**B**	**0.9**	**0.5**	**0.37**	**0.32**
	EBR	B	B	14.5	11.0	0.23	0.11
	NBT	A	A	0.0	0.0	0.18	0.32
	SBT	A	A	0.0	0.0	0.37	0.22
	SBTR	A	A	0.0	0.0	0.25	0.15
McLean Road at Proposed Site Access (Stop)	**Overall**	**B**	**C**	**2.1**	**2.6**	**0.18**	**0.27**
	EBLT	A	A	0.4	0.3	0.01	0.01
	WBTR	A	A	0.0	0.0	0.18	0.24
	SBLR	B	C	12.9	15.1	0.18	0.27

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 18: 2031 Future Total Operations

Intersection (Control)	Movement	Performance Metrics					
		LOS[1]		Control Delay (s)		v/c ratio[2]	
		AM	PM	AM	PM	AM	PM
Brock Road South at McLean Road (Signalized)	**Overall**	**D**	**C**	**39.3**	**28.3**	**1.01**	**0.75**
	EBL	C	C	29.3	32.0	0.30	0.51
	EBTR	**E**	D	**72.9**	40.4	**0.88**	0.22
	WBL	C	C	31.3	31.5	0.39	0.53
	WBTR	D	D	35.3	51.6	0.13	0.71
	NBL	**F**	C	**132.0**	26.1	**1.16**	0.77
	NBT	C	C	21.9	22.9	0.43	0.53
	NBR	B	B	18.6	17.1	0.13	0.05
	SBL	B	B	14.4	17.9	0.34	0.21
	SBT	C	C	28.7	24.9	0.73	0.46
	SBR	B	B	18.2	19.8	0.05	0.03
Brock Road South at Nicholas Beaver Road (Signalized)	**Overall**	**B**	**B**	**14.9**	**15.4**	**0.56**	**0.57**
	WBL	D	D	46.1	47.9	0.61	0.65
	WBR	D	D	37.1	37.8	0.11	0.14
	NBTR	B	B	16.0	14.0	0.55	0.56
	SBL	A	A	7.7	7.1	0.44	0.22
	SBT	A	A	7.1	6.8	0.45	0.42
Brock Road South at Proposed Right-in/Right Out Site Access (Stop)	**Overall**	**C**	**B**	**0.9**	**0.4**	**0.41**	**0.34**
	EBR	C	B	15.4	11.3	0.25	0.11
	NBT	A	A	0.0	0.0	0.19	0.34
	SBT	A	A	0.0	0.0	0.41	0.25
	SBTR	A	A	0.0	0.0	0.27	0.17
McLean Road at Proposed Site Access (Stop)	**Overall**	**B**	**C**	**2.1**	**2.6**	**0.19**	**0.28**
	EBLT	A	A	0.4	0.3	0.01	0.01
	WBTR	A	A	0.0	0.0	0.19	0.25
	SBLR	B	C	13.3	15.8	0.19	0.28

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 18,** in the 2031 future total scenario, the signalized intersection of Brock Road South at McLean Road is expected to decrease from operating at a LOS "C" and "C" to operate with a LOS "D" and "C" during the weekday a.m. and p.m. peak hours, respectively, when compared to 2031 Future Background conditions. A maximum volume-to-capacity ratio of 1.01 (0.33 increase from 2031 Future Background) and 0.75 (0.18 increase from 2031 Future Background) 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 0.56 (0.02 increase from 2031 Future Background) and 0.57 (0.02 increase from 2031 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.

Table 19 and **Table 20** outline the results of the 2026 and 2031 future total queuing assessment.

Table 19: 2026 Future Total Queuing Assessment

Intersection	Performance Metrics			
	Movement	95th Percentile Queue Length (m)[1]		Auxiliary Lane Storage Length (m)
		AM	PM	
Brock Road South at McLean Road (Signalized)	EBL	23.5	43.8	**54.0**
	WBL	19.5	40.6	**55.0**
	NBL	75.9	60.5	**142.0**
	NBR	13.0	1.1	**66.0**
	SBL	24.5	10.3	**62.0**
	SBR	5.2	0.0	**62.0**
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	46.2	51.4	**56.0**
	SBL	17.5	6.5	**21.0**

Note 1: 95th Percentile Queue Lengths were used from Synchro reports.

Table 20: 2031 Future Total Queuing Assessment

Intersection	Performance Metrics			
	Movement	95th Percentile Queue Length (m)[1]		Auxiliary Lane Storage Length (m)
		AM	PM	
Brock Road South at McLean Road (Signalized)	EBL	23.5	44.7	**54.0**
	WBL	20.4	42.1	**55.0**
	NBL	90.8	78.1	**142.0**
	NBR	13.2	1.6	**66.0**
	SBL	25.4	10.8	**62.0**
	SBR	5.7	0.0	**62.0**
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	50.7	**56.5**	**56.0**
	SBL	19.0	7.0	**21.0**

Note 1: 95th Percentile Queue Lengths were used from Synchro reports.

Similar to the 2031 future background conditions, the 2031 future total queuing assessment results in an instance where the 95th percentile queues exceed the auxiliary turn lane storage length for the westbound left-turn at Brock Road South and McLean Road during the p.m. peak hour.

5.2 Future Total Recommendations

In an effort to mitigate projected delays and lower critical v/c ratios, signal timing adjustments were examined at the intersection of Brock Road South and McLean Road in the northbound left-turn and eastbound through/right-turn lanes under the 2031 future total a.m. scenario. A summary of the proposed signal timing plan changes is provided in **Table 18**.

Detailed adjusted signal timing future total capacity analyses are included in **Appendix K**.

Table 21: Proposed Signal Timing Plan

Intersection	Cycle Length	Splits				
		Movement	Minimum Initial	Minimum Split	Total Split	Recall Mode
Brock Road South at McLean Road (Signalized)	120.0	**EBL**	5.0	9.0	14.0	None
		EBTR	15.0	22.0	35.0	None
		WBL	5.0	9.0	16.0	None
		WBTR	15.0	22.0	37.0	None
		NBL	8.0	12.0	21.0	Max
		NBT	40.0	47.0	57.0	Max
		NBR	40.0	47.0	57.0	Max
		SBL	8.0	12.0	12.0	None
		SBT	40.0	47.0	48.0	Min
		SBR	40.0	47.0	48.0	Min
						

The results of the adjusted signal timing at the intersection are shown in **Table 22** and **Table 23**.

Table 22: 2031 Future Total Operations – Signal Timings Adjusted

Intersection (Control)	Movement	Performance Metrics					
		LOS[1]		Control Delay		v/c ratio[2]	
		AM	PM	AM	PM	AM	PM
Brock Road South at McLean Road (Signalized)	**Overall**	**D**	**C**	**35.1**	**27.7**	**0.88**	**0.67**
	EBL	C	D	33.9	42.1	0.32	0.65
	EBTR	**E**	D	**56.1**	41.3	0.76	0.22
	WBL	C	D	34.2	40.2	0.42	0.65
	WBTR	D	D	36.2	46.9	0.11	0.62
	NBL	**E**	B	**73.7**	19.7	**0.96**	0.63
	NBT	C	B	20.7	19.3	0.39	0.47
	NBR	B	B	17.9	14.6	0.13	0.05
	SBL	B	B	19.3	19.3	0.37	0.19
	SBT	D	C	35.0	26.2	0.79	0.47
	SBR	C	C	22.3	21.3	0.05	0.03

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 23: 2031 Future Total Queuing Assessment – Signal Timings Adjusted

Intersection	Movement	Performance Metrics		
		95th Percentile Queue Length (m)[1]		Auxiliary Lane Storage Length (m)
		AM	PM	
Brock Road South at McLean Road (Signalized)	EBL	25.7	50.3	**54.0**
	WBL	22.3	**47.3**	**55.0**
	NBL	95.1	55.1	**142.0**
	NBR	13.2	1.2	**66.0**
	SBL	28.5	9.8	**62.0**
	SBR	0.3	0.0	**62.0**
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	50.7	**56.5**	**56.0**
	SBL	19.0	7.0	**21.0**

Note 1: 95th Percentile Queue Lengths were used from Synchro reports.

The results of the signal adjustments in **Table 22** indicate that in the 2031 future total scenario, the intersection of Brock Road South at McLean Road operates at capacity with a maximum v/c ratio of 0.88 and 0.67 during the a.m. and p.m. peak hours, respectively.

Queue exceedances are also still present at Brock Road South and Nicholas Beaver Road. However, each instance of queue exceedance remains within 15 meters, or approximately two (2) vehicles, of the designated storage length. This level of excess queuing, when it occurs, can be supported by the auxiliary turn lane taper or the two-way left turn lane with limited effect on through traffic. It is recommended that these movements be monitored for future storage lane expansion.

These metrics indicate that the intersection is expected to operate adequately with acceptable delays and reserve capacity to accommodate future increases in traffic volume.

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 (RIRO) access is proposed via Brock Road. This RIRO access is supported by the County's peer reviewer given that the concrete median along Brock Road was extended from the intersection with McLean Road northward beyond the proposed access in order to restrict the movements.

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

$$ISD = 0.278 * V\ major * tg$$

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

Table 24: 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 direction: 145 m Left direction: 170 m	Left direction: 165 m
Available Sight Distance	Left direction[1]: 200 + m Right direction[2]: 145 m	Left direction: 300 + m

Note 1: 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 from Brock Road at speeds much lower than the design speed.
Note 2: This is an approximate value based on field observations. Detailed field survey would confirm exact distance.

As outlined in **Table 24**, Brock Road and McLean Road are, for the most part, straight, relatively flat, with no visible obstructions noted. There are no sightline concerns along Brock Road. There is a relatively small vertical curve to the west of the site along Mclean Road that limits the available sight distance for vehicles that are turning left out of the site. Per a site visit, this sight distance was approximately measured at 145 metres from the approximate location of the site access.

However, three (3) considerations for this sightline are that trucks that use this access will have a higher line of sight which will allow them to see further over the vertical curve, there is an existing access at a similar location on the other side of McLean Road and we have not been made aware of any concerns, and vehicles that are approaching from the west are approaching the Brock Road intersection and would tend to slow down from the assumed speed. The deficit noted above is also based on a design speed of 80 km/h which is 20 km/h higher than the posted speed. If the design speed was examined at 10 km/h over the posted speed, then the required sight distance would be approximately 150 m which is comparable to the approximate field measured distance.

Signage warning vehicles about the trucks exiting could be installed along McLean Road to increase drivers' alertness for vehicles exiting the site. It is also worth noting that this access location is as far away from the Mclean Road and Brock Road intersection as the site will allow. **Figure 11** illustrates the sight lines at the site.

N



Legend

Passenger car

Minimum Sight Distance

Measured Sight Distance

No.	ISSUE	DATE: MMM/DD/YYYY
0	ISSUED FOR 1ST SUBMISSION	10/20/2023
1	ISSUED FOR 2ND SUBMISSION	07/31/2025
2	ISSUED FOR 3RD SUBMISSION	02/13/2026

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

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

Drawn By	Design By	Project	
B.L.			2377–6556
Check By	Check By	Scale	Drawing
T.D.S.	B.B.	N.T.S.	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 RIRO 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 the 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** and **Figure 15** illustrate the WB-20 Truck entering the site and accessing the Truck gas pumps before exiting the site. **Figure 16** shows the 8 Axle Fuel Tanker navigating the proposed tanker route within the site. These figures show the expected maneuvers of the trucks both as they enter or exit the site and as they maneuver throughout the site. Per the comments, the movements for the scale are shown.

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 17** and **Figure 18** illustrates the GFL Garbage Truck entering and exiting the site, as well as entering and exiting the proposed loading space.

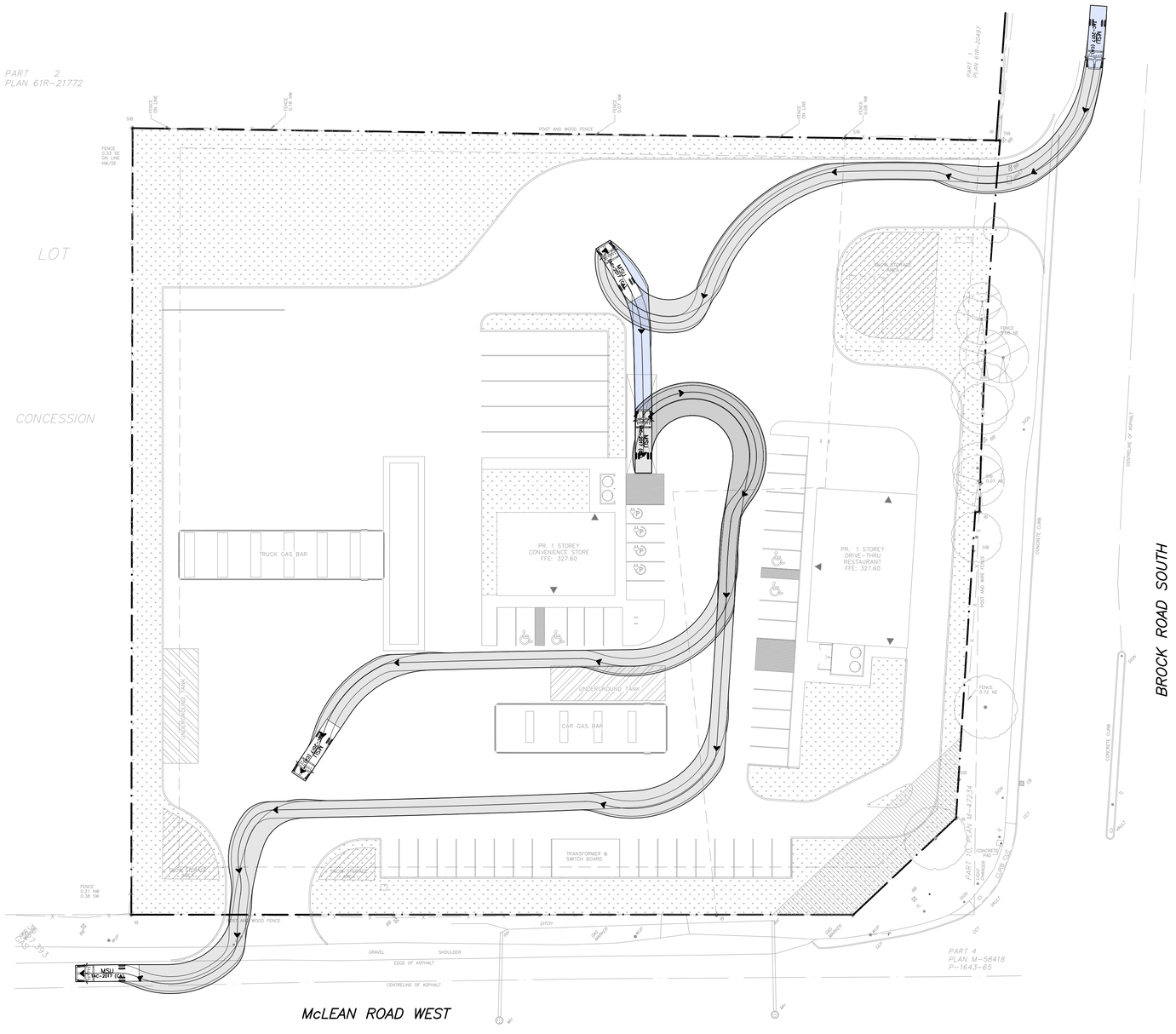
7.2 Emergency Vehicles

A maneuvering assessment was conducted for emergency vehicles using a Pumper Fire Truck 13.4 metres in length. As shown in **Figure 19** and **Figure 20**, 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 21**, 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.

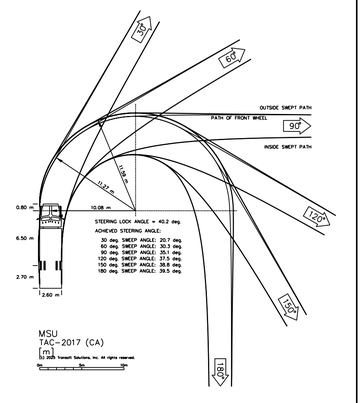


10 0m 10 20 30
SCALE: 1:400

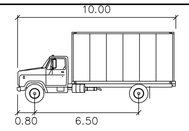


FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

SWEEP PATH



VEHICLE PROFILE



MSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.2

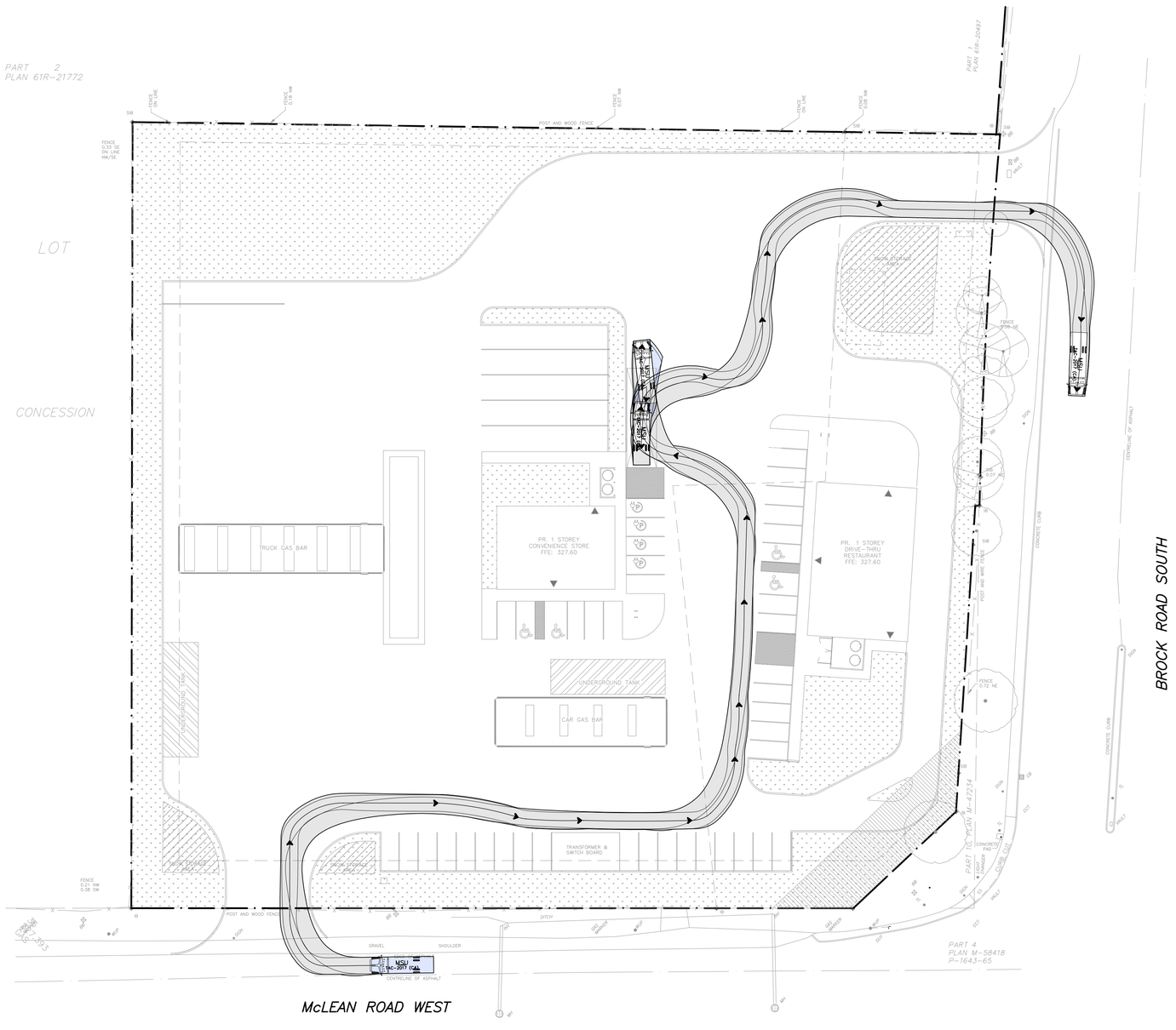
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1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023
3	ISSUED FOR SUBMISSION	08/01/2025
4	ISSUED FOR COORDINATION	12/01/2025
5	ISSUED FOR SUBMISSION	01/26/2026

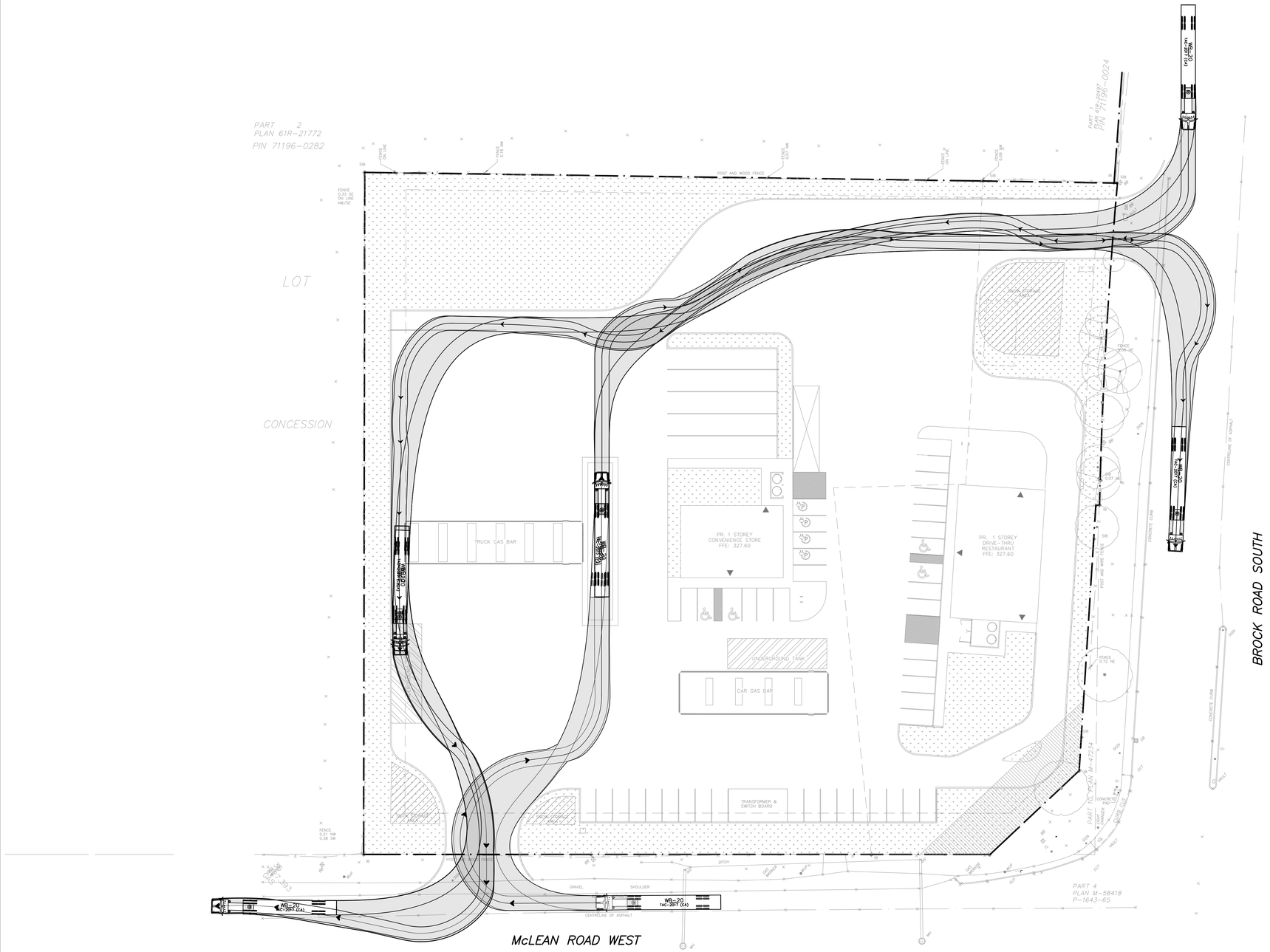
Project
7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH

Drawing
VEHICLE MANEUVERING ANALYSIS
MEDIUM SINGLE UNIT (MSU) TRUCK

CROZIER
CONSULTING ENGINEERS

Drawn	M.P./I.M.	Design	M.P./I.M.	Project No.	2792-7289
Check	R.K./I.L.	Check	R.K./I.L.	Scale	1:400
				Dwg.	FIG12


PART 2
PLAN 61R-21772
LOT
CONCESSION
PART 1
PLAN 61R-20497
POST AND WOOD FENCE
FENCE ON LINE
FENCE 0.18 NW
FENCE 0.08 NW
FENCE 0.33 SE ON LINE NW/SE
SIB
SIB 0.08 NW
HSM
HSM 0.07 NW
HSM 0.07 SW
HSM 0.07 SE
HSM 0.07 NE

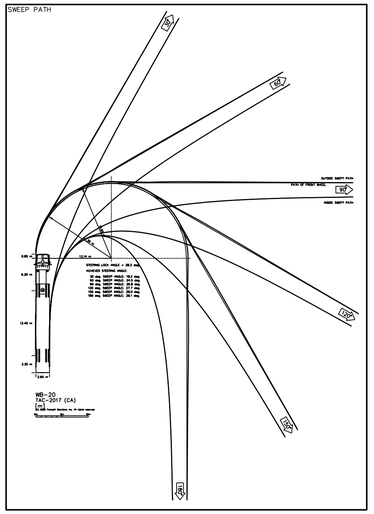


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SCALE: 1:400

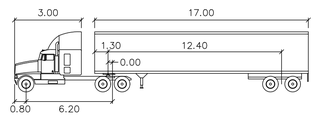


FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

SWEEP PATH



VEHICLE PROFILE



WB-20

meters

Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 28.2
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

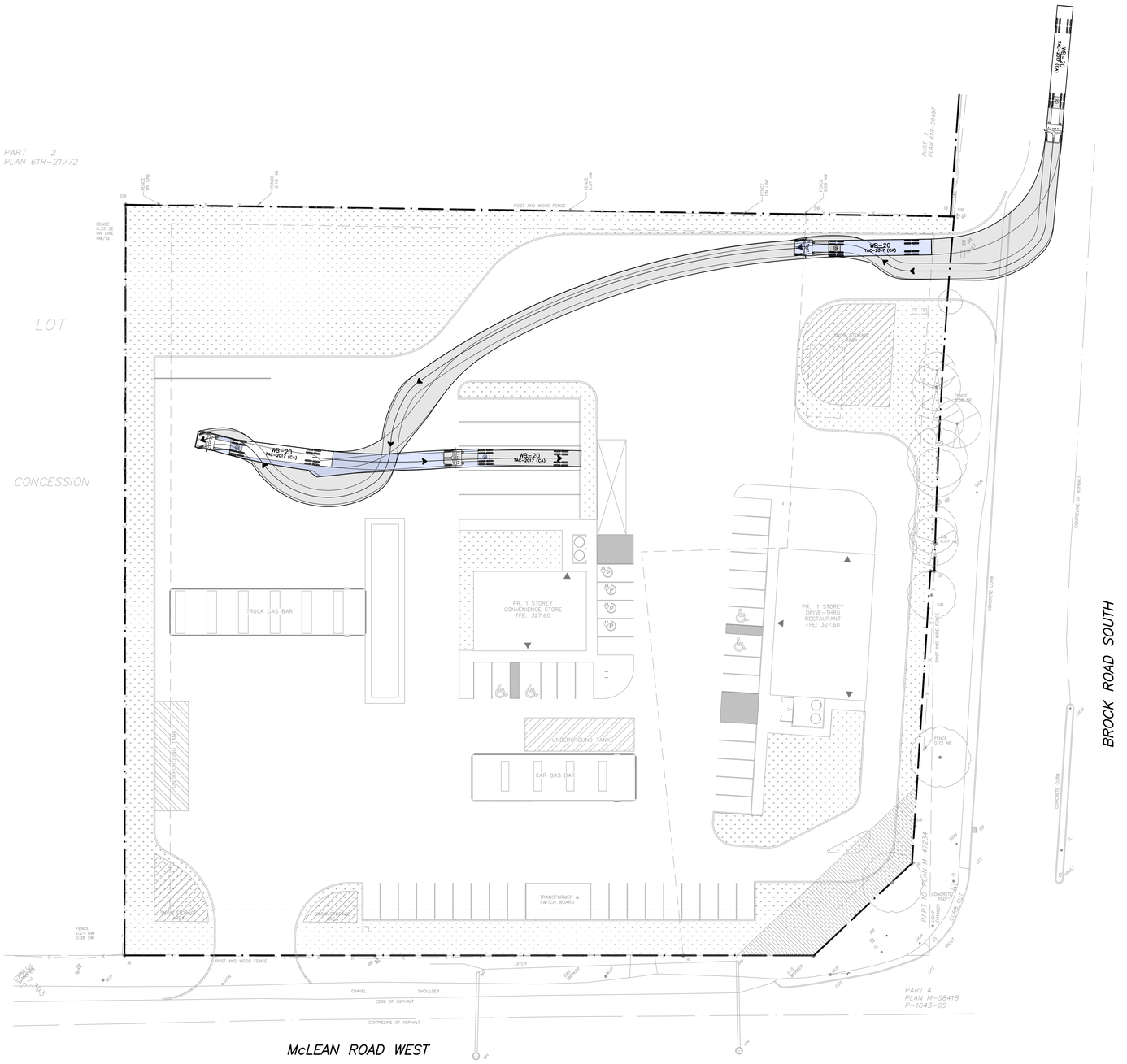
No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023
3	ISSUED FOR SUBMISSION	08/01/2025
4	ISSUED FOR COORDINATION	12/01/2025
5	ISSUED FOR SUBMISSION	01/26/2026

Project
7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH

Drawing
VEHICLE MANEUVERING ANALYSIS
WB-20 TRUCK

CROZIER
CONSULTING ENGINEERS

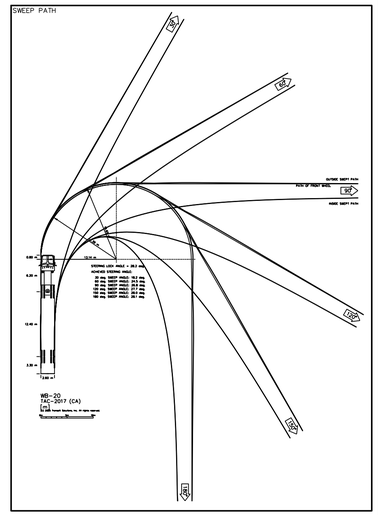
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Check	R.K./I.L.	Check	R.K./I.L.	Scale	1:400
				Dwg.	FIG14

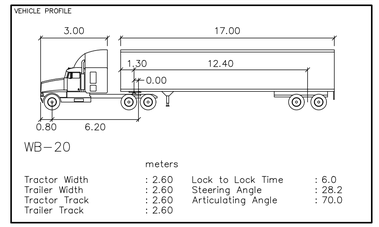


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FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION





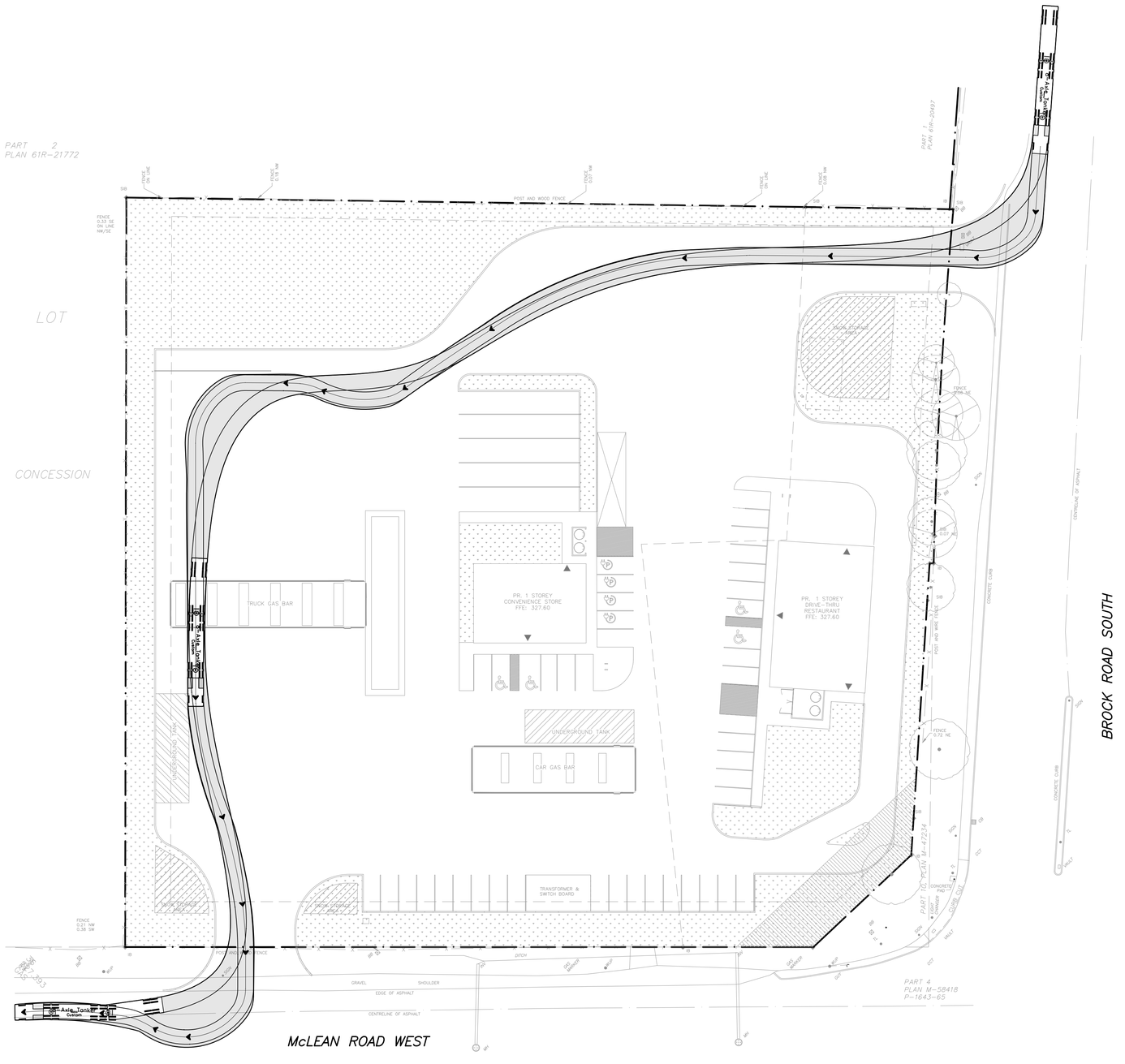
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1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023
3	ISSUED FOR SUBMISSION	08/01/2025
4	ISSUED FOR COORDINATION	12/01/2025
5	ISSUED FOR SUBMISSION	01/26/2026

Project
7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH

Drawing
VEHICLE MANEUVERING ANALYSIS
WB-20 TRUCK

CROZIER
CONSULTING ENGINEERS

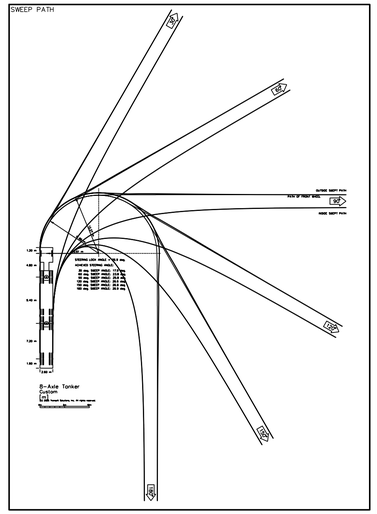
Drawn	Design	Project No.	
M.P./I.M.	M.P./I.M.	2792-7289	
Check	Check	Scale	Dwg.
R.K./I.L.	R.K./I.L.	1:400	FIG15



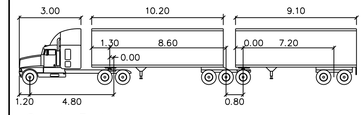


FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

SWEEP PATH



VEHICLE PROFILE



8-Axle Tanker

meters			
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.9
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

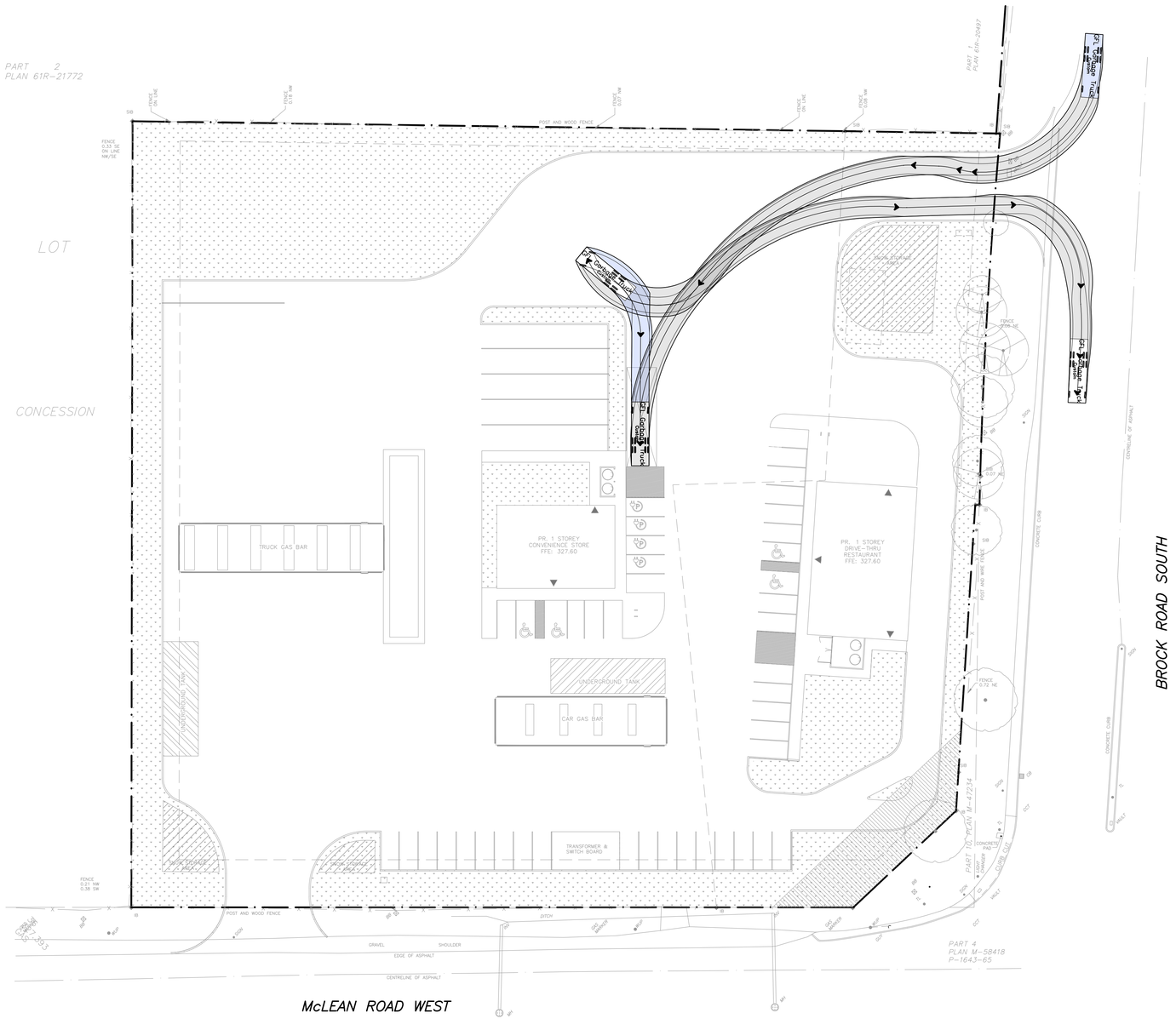
No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023
3	ISSUED FOR SUBMISSION	08/01/2025
4	ISSUED FOR COORDINATION	12/01/2025
5	ISSUED FOR SUBMISSION	01/26/2026

Project
7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH

Drawing
VEHICLE MANEUVERING ANALYSIS
8-AXLE FUEL TANKER

CROZIER
CONSULTING ENGINEERS

Drawn: M.P./I.M.	Design: M.P./I.M.	Project No.	2792-7289
Check: R.K./I.L.	Check: R.K./I.L.	Scale: 1:400	Dwg. FIG16

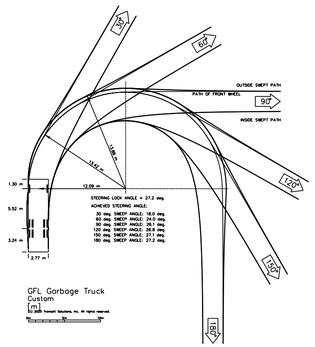


10 0m 10 20 30
SCALE: 1:400

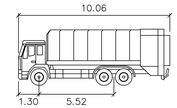


FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

SWEEP PATH



VEHICLE PROFILE



GFL Garbage Truck

	meters
Width	: 2.77
Track	: 2.77
Lock to Lock Time	: 6.0
Steering Angle	: 27.2

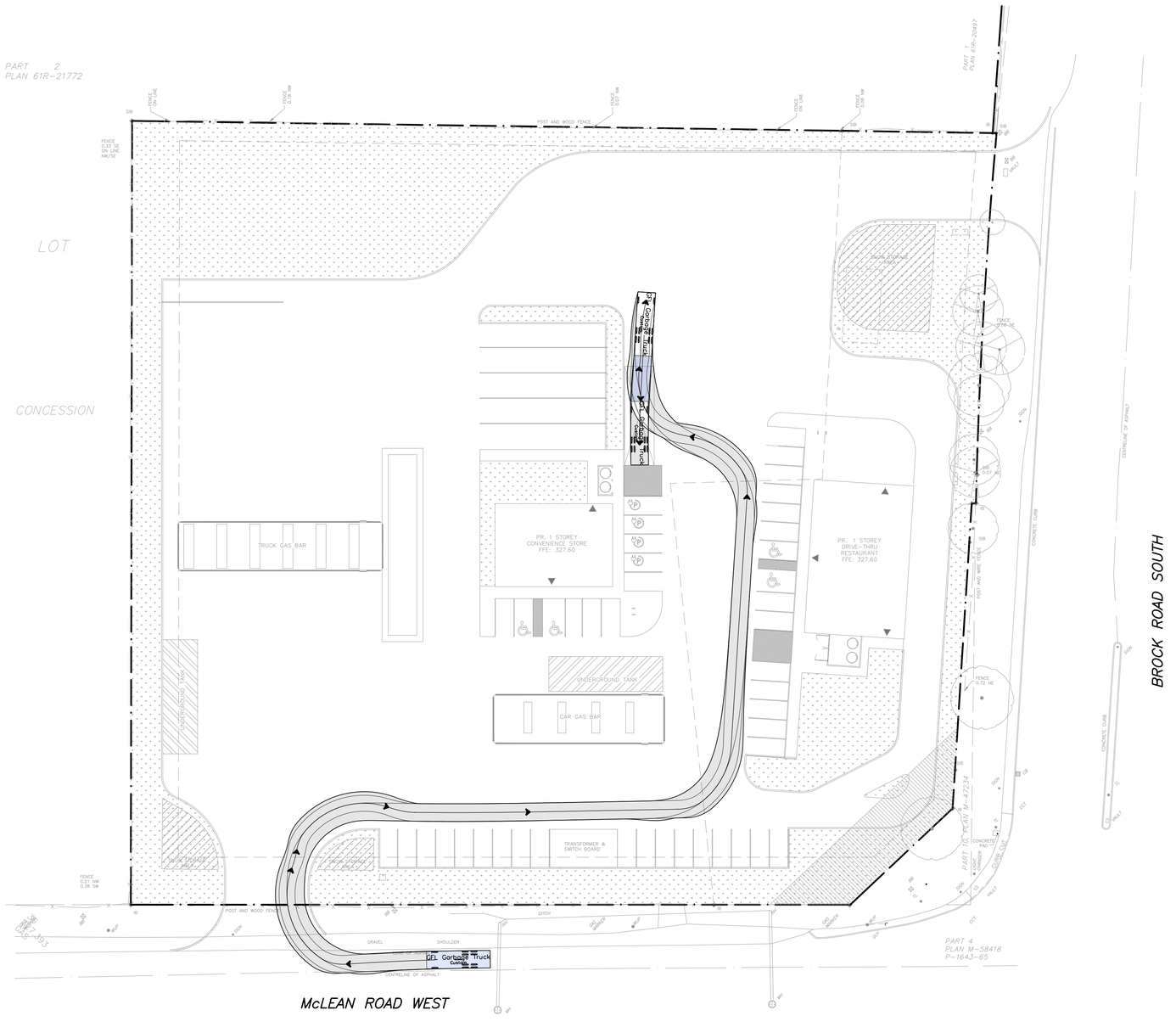
No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023
3	ISSUED FOR SUBMISSION	08/01/2025
4	ISSUED FOR COORDINATION	12/01/2025
5	ISSUED FOR SUBMISSION	01/26/2026

Project
7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH

Drawing
VEHICLE MANEUVERING ANALYSIS
WASTE COLLECTION

CROZIER
CONSULTING ENGINEERS

Drawn: M.P./I.M.	Design: M.P./I.M.	Project No.: 2792-7289	
Check: R.K./L.L.	Check: R.K./L.L.	Scale: 1:400	Dwg.: FIG17



10 0m 10 20 30

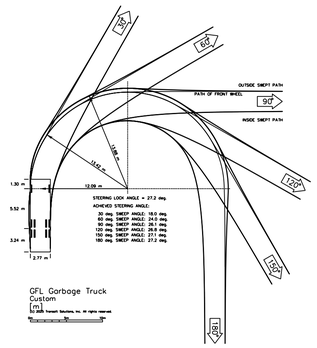
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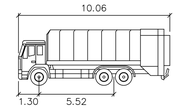
FOR REVIEW

NOT TO BE USED FOR CONSTRUCTION

SWEEP PATH



VEHICLE PROFILE



GFL Garbage Truck

	meters
Width	: 2.77
Track	: 2.77
Lock to Lock Time	: 6.0
Steering Angle	: 27.2

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023
3	ISSUED FOR SUBMISSION	08/01/2025
4	ISSUED FOR COORDINATION	12/01/2025
5	ISSUED FOR SUBMISSION	01/26/2026

Project

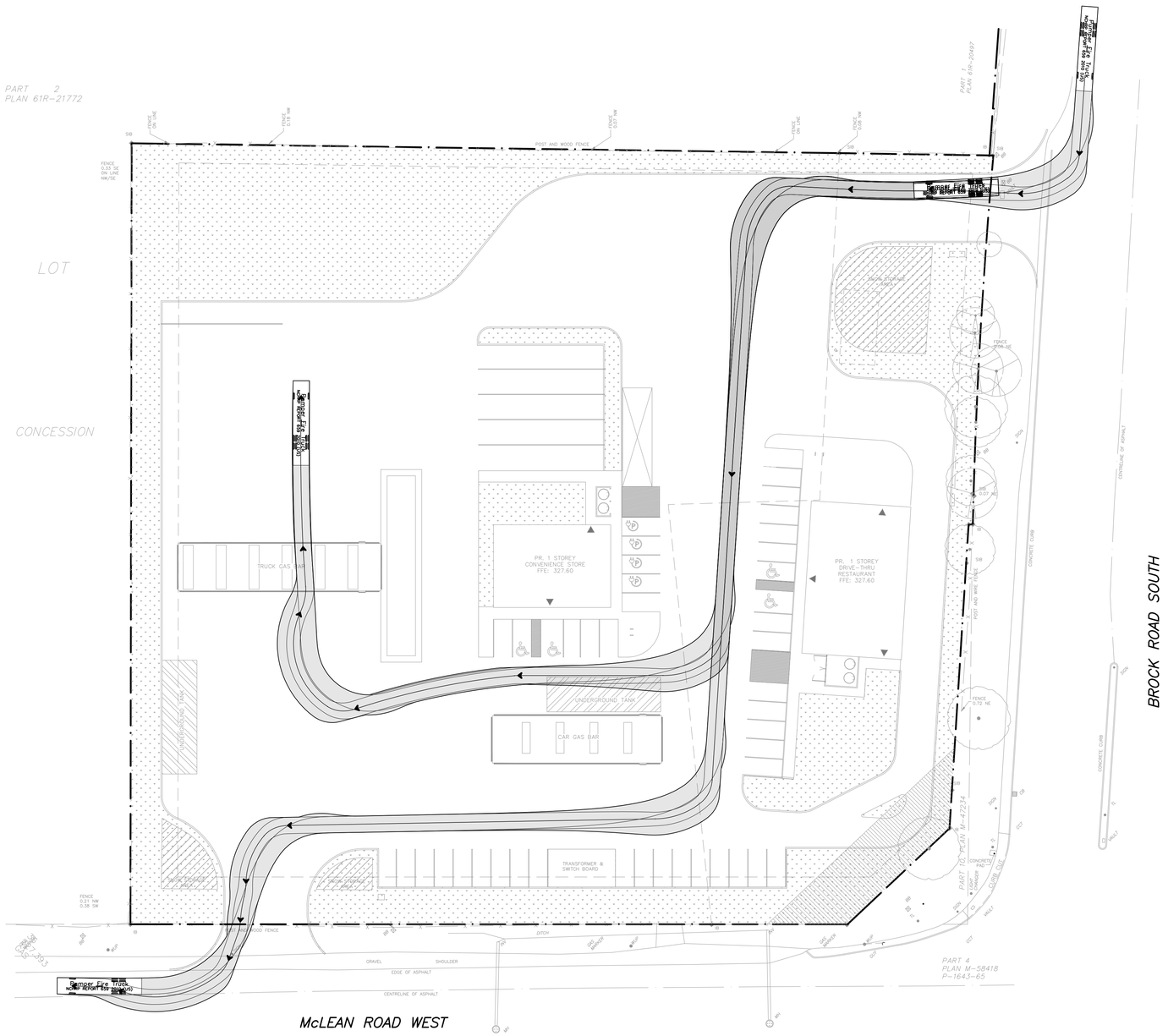
7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH

Drawing

VEHICLE MANEUVERING ANALYSIS
WASTE COLLECTION

CROZIER
CONSULTING ENGINEERS

Drawn	M.P./I.M.	Design	M.P./I.M.	Project No.	2792-7289
Check	R.K./I.L.	Check	R.K./I.L.	Scale	1:400
				Dwg.	FIG18



10 0m 10 20 30

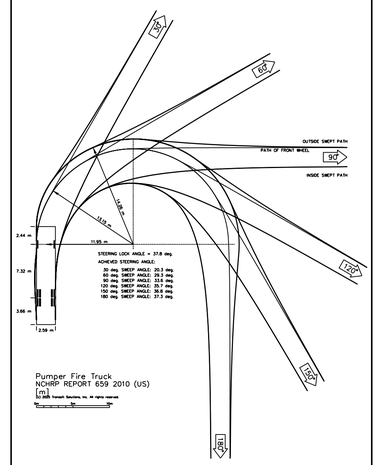
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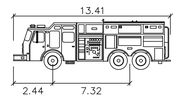
FOR REVIEW

NOT TO BE USED FOR CONSTRUCTION

SWEEP PATH



VEHICLE PROFILE



Pumper Fire Truck

	meters
Width	: 2.59
Track	: 2.59
Lock to Lock Time	: 6.0
Steering Angle	: 37.8

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023
3	ISSUED FOR SUBMISSION	08/01/2025
4	ISSUED FOR COORDINATION	12/01/2025
5	ISSUED FOR SUBMISSION	01/26/2026

Project

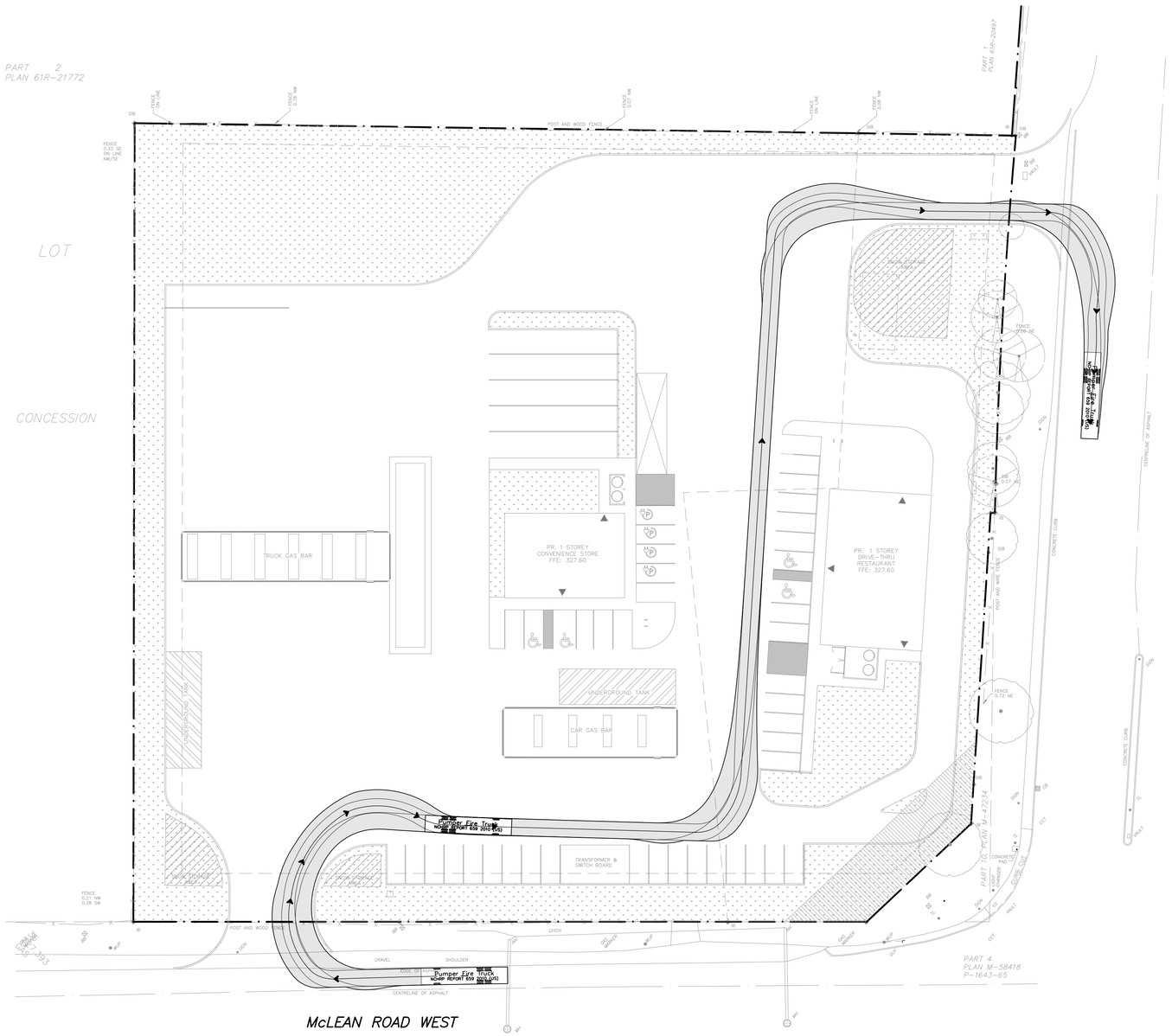
7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH

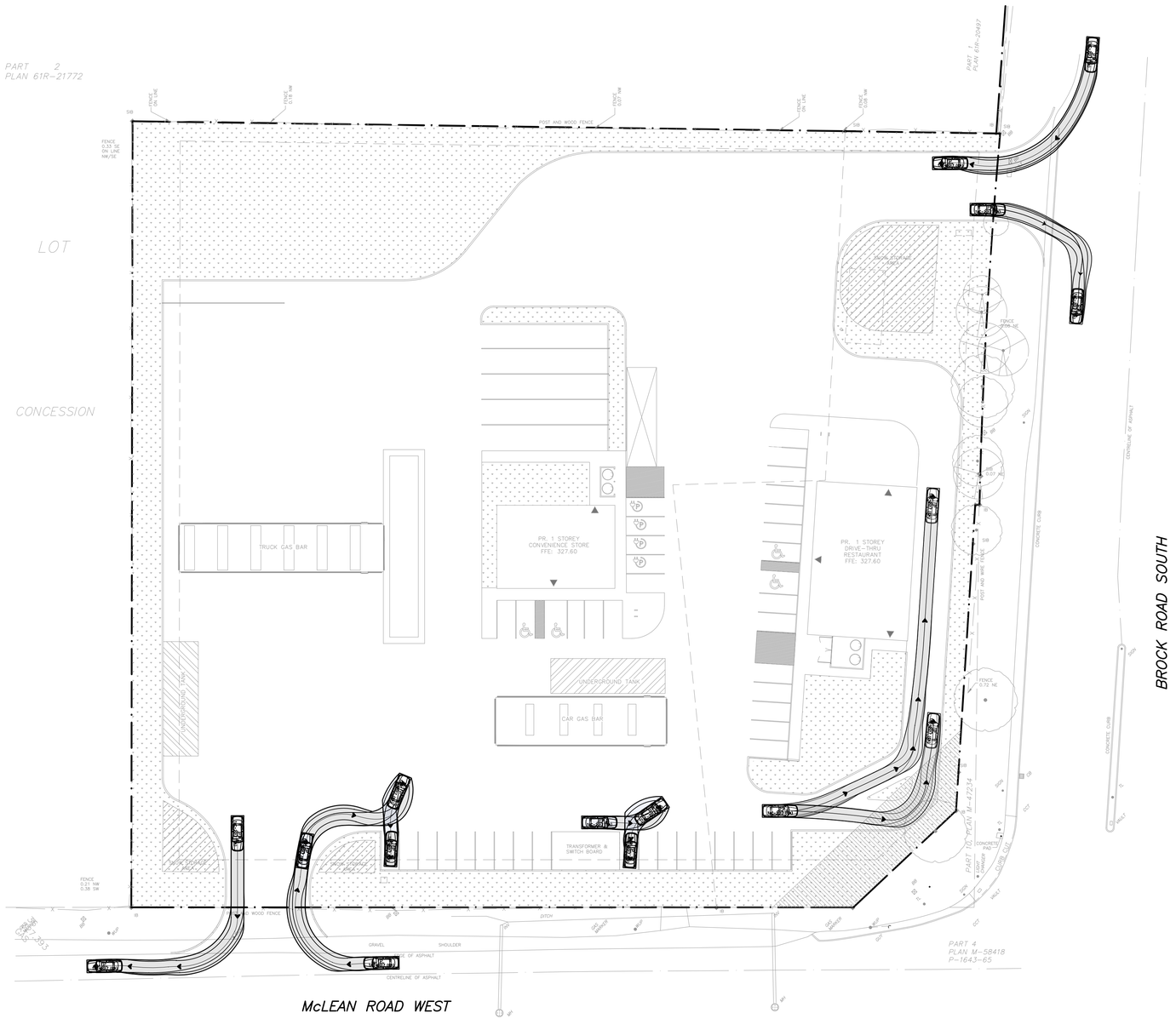
Drawing

VEHICLE MANEUVERING ANALYSIS
FIRE TRUCK

CROZIER
CONSULTING ENGINEERS

Drawn	Design	Project No.	
M.P./I.M.	M.P./I.M.		2792-7289
Check	Check	Scale	Dwg.
R.K./I.L.	R.K./I.L.	1:400	FIG19


PART 2
PLAN 61R-21772
LOT
CONCESSION
FENCE 0.33 SE ON LINE NW/SE
SIB
FENCE ON LINE
FENCE 0.18 NW
POST AND WOOD FENCE
FENCE 0.09 NW
FENCE ON LINE
FENCE 0.08 NW
PART 1
PLAN 61R-20497
SIB
SIB
FENCE 0.09 SE
FENCE 0.09 SE
CENTRELINE OF ASPHALT
CONCRETE CURB
BROCK ROAD SOUTH
PR. 1 STOREY
CONVENIENCE STORE
FFE: 327.60
PR. 1 STOREY
DRIVE-THRU
RESTAURANT
FFE: 327.60
TRUCK GAS BAR
CAR GAS BAR
UNDERGROUND TANK
UNDERGROUND TANK
TRANSFORMER & SWITCH BOARD
ENGINE EXHAUST EXTRACTION
Pumper Fire Truck
NCHRP REPORT 659 2010 (US)
Pumper Fire Truck
NCHRP REPORT 659 2010 (US)
FENCE 0.09 SE
FENCE 0.72 NE
FENCE 0.72 NW
FENCE 0.11 NW 0.38 SW
POST AND WOOD FENCE
DITCH
GRAVEL
SHOULDER
EDGE OF ASPHALT
CENTRELINE OF ASPHALT
CONCRETE CURB
CONCRETE PAD
CONCRETE CURB
CONCRETE CURB
CONCRETE CURB


PART 2
PLAN 61R-21772
LOT
CONCESSION
FENCE 0.33 SE ON LINE NW/SE
SIB
FENCE ON LINE
FENCE 0.18 NW
POST AND WOOD FENCE
FENCE 0.07 NW
FENCE ON LINE
FENCE 0.08 NW
PART 1
PLAN 61R-20497
SIB
FENCE 0.08 NW
FENCE 0.08 SE
FENCE 0.09 SE
FENCE 0.09 NW
FENCE 0.08 NW
FENCE 0.08 SE
FENCE 0.08 NW
FENCE 0.08 SE
FENCE 0.08 NW
FENCE 0.08 SE

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 and Section 5.2.4 of the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 was reviewed to determine the auto parking of the proposed development, respectively. A summary of the proposed parking and required shared auto parking at the development can be found in **Table 25**. Please note that the Zoning By-Law uses the Net Floor Area rather than the Gross Floor Area for its calculations.

Table 25: 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				
Convenience Store	Retail Store	1 space per /20 m^2 GFA	199.75 m^2	10
Drive-Thru Restaurant[1]	Restaurant[1]	1 space per /10 m^2 GFA	322.5 m^2	33
Vehicle Gas Bar	Gas Bar	1 space per gas bar pump	8 pumps	8
Total Vehicle Parking Spaces Required				**51**
Total Vehicle Parking Spaces Proposed (Surplus/Deficit)				**44 (-7)[2]**
Truck Gas Bar	Gas Bar	1 space per gas bar pump	6 pumps	6
Total Truck Gas Bar Parking Spaces Required				**6**
Total Truck Gas Bar Parking Spaces Proposed (Surplus/Deficit)				**6 (0)**

Note 1: The Township of Puslinch does not provide a land use category for a drive-thru restaurant within a gas station as part of its Comprehensive Zoning By-Law No. 023-18. 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 m^2.

Note 2: The number of required car spaces *is lowered as per section 5.2.4 of the zoning by-law. See table 28 for the updated parking requirements.*

Section 5.2.4 of the zoning by-law was examined to assess shared parking needs for the restaurant and convenience store. Parking requirements were calculated for different times of day, as shown in **Table 26**.

It was noted in the comments that some of the parking spaces for the restaurant could be marked to be used for mobile orders or for drive-thru pick-up orders. However, those spaces would stem from the operational requirements of the restaurant operator and would be taken from the proposed supply.

Table 26: Percentage of Required Parking Permitted to be Shared

Period	Weekday			Saturday		
	Restaurant	Retail Store	Parking Required (including Gas requirements)	Restaurant	Retail Store	Parking Required (including Gas requirements)
Morning	20%	75%	**23**	30%	80%	**26**
Noon	90%	80%	**47**	90%	100%	**47**
Afternoon	30%	90%	**27**	50%	100%	**35**
Evening	100%	90%	**50**	100%	50%	**46**
Updated Total Vehicle Parking Space Required (Shared)						**50**
Total Vehicle Parking Spaces Proposed (Surplus/Deficit)						**44 (-6)**

As shown in **Table 26**, the proposed auto parking rate for the mixed-use commercial and gas station development does not meet the Township's Zoning By-law requirements, resulting in a deficit of six (6) parking spaces.

However, several factors help justify the proposed parking supply. The restaurant component of the development is equipped with a 14-vehicle space drive-through, which is expected to reduce on-site parking demand by accommodating a portion of visitors in the drive-through queue rather than in standard parking spaces. Additionally, the convenience store is integrated with the gas station, and it is anticipated that many customers will utilize the gas bar pump areas rather than dedicated parking stalls. It is also noted that comparable municipalities, such as the Township of Guelph/Eramosa, require only one space per 15 m² for restaurant uses, similarly, ITE's Parking Generation manual ascribes a parking weighted average of 31 parking spaces for restaurants with drive-throughs, thus supporting the adequacy of the proposed supply.

The truck parking is sufficient 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 L**.

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 27**.

Table 27: 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	52	41	3 spaces
Total Accessible Parking Spaces Proposed (Surplus/Deficit)			**3 (+0)**

As shown in **Table 27**, 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 L**.

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 28**.

Table 28: Zoning By-Law Bicycle Parking Space Review

Land Use	Zoning By-Law Space Rate	Net Floor Area (m^2)	Required Bicycle Spaces
Convenience Store	The greater of 2 spaces or 1 space/1000 m^2	199.75 m^2	-
Drive-Thru Restaurant		322.5 m^2	-
Total Bicycle Spaces Required		**522.25 m^2**	**2**
Total Bicycle Parking Spaces Proposed (Surplus/Deficit)			**2 (+0)**

As shown in **Table 28**, the proposed bicycle parking space supply for the proposed gas station development is meets the bicycle parking spaces requirement 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 L.**

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 29**.

Table 29: 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 - 1 loading space is required	199.75 m^2	-
Drive-Thru Restaurant[1]		322.5 m^2	-
Total Loading Spaces Required		**522.25 m^2**	**1**
Total Truck Parking Spaces Proposed (Surplus/Deficit)			**1 (+0)**

As shown in **Table 29,** 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 L**.

8.5 Stacking Lanes Requirement

The Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 does not specify stacking lane requirements. As a result, stacking lane requirements from surrounding townships were reviewed for reference. A summary of comparable zoning by-law stacking lane requirements and the proposed site provisions is provided in **Table 30.**

Table 30: Zoning By-Law Stacking Lane Review

Townships (Zoning By-Law)	Zoning By-Law Minimum Stacking Spaces	Total Stacking Lane Proposed (Surplus/Deficit)
Township of Guelph/Eramosa (40/2016)	10	14 **(+4)**
Township of Centre Wellington (2009-045)	10	
Town of Milton (144-2003)	10	

As shown in **Table 30**, the proposed development includes 14 stacking spaces, which represents a surplus of four (4) spaces relative to the 10-space requirement observed across the referenced townships. These 14 spaces represent the spaces that are available in the drive thru before the queues would interfere with the vehicles maneuvering in the site and the stacking queue lengths at other locations are examined in **Section 9.0.**

9.0 Surrogate Demand Survey

The Township of Puslinch and the County of Wellington requested that parking and stacking surveys be undertaken at two comparable sites, including a gas station and McDonald's at 4 Sinclair Boulevard in Brantford and a McDonald's at 40 Sportsworld Drive in Kitchener. The results of the survey analyses are summarized in the sections that follow.

9.1 4 Sinclair Boulevard, Brantford

The site includes an eight-pump gas station with an associated convenience store, as well as a McDonald's restaurant with a dedicated drive-through stacking lane. **Table 31** summarizes the key site statistics.

Table 31: 4 Sinclair Blvd – Site Statistics

Land Use	Units
Vehicle Gas Pumps	8 Pumps
Convenience Store	164 m^2
Fast Food Restaurant with Drive Thru	343 m^2
Total Building GFA	**507 m^2**
Vehicle Parking Spaces	78 spaces Additional: 4 accessible parking spaces; 2 mobile order; 2 waiting for order spaces.

Parking Survey

Parking counts were undertaken by Ontario Traffic Inc. on Friday, January 9, 2026, and Saturday, January 10, 2025, between 6:30 a.m. and 6:30 p.m. The site contains 78 regular parking spaces, 4 accessible spaces, 2 mobile order spaces and 2 waiting for order spaces. **Table 32** summarizes the observed parking demand survey compared to the developments' proposed parking spaces.

Table 32: 4 Sinclair Blvd – Parking Survey

	Friday January 9, 2026	**Saturday January 10, 2026**
Peak Parking Spaces Utilized (4 Sinclair Boulevard)	**36** (11:45 – 12:00 p.m.)	**23** (11:30 – 11:45 a.m.)
Total Parking Spaces Provided	**78 spaces**	
Proposed Parking Spaces (7456 McLean & 197 Brock Rd S)	**44 spaces**	
(Surplus/Deficit)	**+8 spaces**	**+21 spaces**

Per **Table 32**, the peak parking demand observed at the comparable gas station and McDonald's site was 36 vehicles on Friday and 23 vehicles on Saturday. Based on these findings, the proposed development would provide a surplus of 8 parking spaces on Friday and 21 parking spaces on Saturday relative to observed peak demand.

Stacking Survey

Similarly, a stacking survey of the McDonald's drive-through was conducted at the request of the Township and County. The queuing survey recorded the number of vehicles at five-minute intervals at each stage of the drive-through process, including the order kiosk, payment window, and pick-up window. **Table 33** summarizes the maximum observed queues by day and corresponding time period.

Table 33: 4 Sinclair Blvd – Stacking Survey

Establishment	Day	Maximum Queue	Time of the Day	Proposed Queue Length	(Surplus/Deficit)
McDonald's (4 Sinclair Boulevard)	Friday January 9, 2026	14	7:25 a.m.	14	+0
	Saturday January 10, 2026	6	9:30 a.m.; 10:55 a.m.; 12:35 p.m.; 1:10 p.m.; and 1:30 p.m.		+8

As summarized in **Table 33**, the drive-through stacking survey indicates that the maximum queue occurs on Saturday afternoon, with a total of 14 vehicles. This demand is consistent with the proposed development, which is designed to accommodate a maximum drive-through queue of 14 vehicles, thereby adequately addressing anticipated stacking requirements. **Appendix M** contains the parking and queueing survey numbers.

9.2 40 Sportsworld Drive, Kitchener

The McDonald's component consists of a 485 m² gross floor area building and provides a total of 80 parking spaces, including 70 standard spaces, two accessible spaces, six mobile order spaces, and two short-term waiting-for-order spaces.

Parking Survey

Parking counts were undertaken by Ontario Traffic Inc. on Friday, January 9, 2026, and Saturday, January 10, 2025, between 6:30 a.m. and 6:30 p.m. The site contains 70 regular parking spaces, 2 accessible spaces, 6 mobile order spaces and 2 waiting for order spaces. **Table 34** summarizes the observed parking demand survey compared to the developments' proposed parking spaces.

Table 34: 40 Sportsworld Drive – Parking Survey

	Friday January 9, 2026	Saturday January 10, 2026
Peak Parking Spaces Utilized (40 Sportsworld Drive)	**57** (11:45 – 12:00 p.m.)	**59** (1:15 – 1:30 p.m.)
Total Parking Spaces Provided	**70 spaces**	
Proposed Parking Spaces (7456 McLean & 197 Brock Rd S)	**44 spaces**	
(Surplus/Deficit)	**-13 spaces**	**-15 spaces**

Per **Table 34**, the peak parking demand observed at the McDonald's site was 57 vehicles on Friday and 59 vehicles on Saturday. Based on these observations, the proposed development would experience a deficiency of 13 parking spaces on Friday and 15 parking spaces on Saturday relative to the observed peak demand. However, it should be noted that there are other restaurants in the plaza as well as significant retail uses and there is no guarantee that overflow from these other uses did not utilize some of the spaces in the count.

Stacking Survey

Similarly, a stacking survey of the McDonald's drive-through was conducted at the request of the Township and County. The queuing survey recorded the number of vehicles at five-minute intervals at each stage of the drive-through process, including the order kiosk, payment window, and pick-up window. **Table 35** summarizes the maximum observed queues by day and corresponding time period.

Table 35: 40 Sportsworld Drive – Stacking Survey

Establishment	Day	Maximum Queue	Time of the Day	Proposed Queue Length	(Surplus/Deficit)
McDonald's (40 Sportsworld Drive)	Friday January 9, 2026	11	6:30 a.m.; 6:45 a.m.; 7:20 a.m.; and 8:00 a.m.	14	+3
	Saturday January 10, 2026	9	10:20 a.m.; 1:05 p.m.; 2:55 p.m.; and 5:50 p.m.		+5

As shown in **Table 35,** the drive-through stacking survey indicates that the maximum queue occurs on Saturday afternoon, with a total of 11 vehicles. In comparison, the proposed development is designed to accommodate 14 queued vehicles, providing a surplus of 3 stacking spaces beyond the observed peak demand. **Appendix M** contains the parking and queueing survey numbers.

9.3 Summary

Based on the surrogate parking demand surveys, the 4 Sinclair Boulevard site is considered the most representative comparator for the proposed development, as it reflects similar land use components, site scale, and operational characteristics, including a gas station, convenience retail, and a McDonald's with drive-through operating as a single integrated development. The observed parking demand at this location demonstrated a surplus relative to the proposed parking supply, indicating that similar developments are expected to operate within the proposed parking provision. In contrast, the 40 Sportsworld Drive site functions within a larger multi-tenant plaza, where parking demand is influenced by shared parking with adjacent uses, most notably Moose Winooski's and Tranquility Park. This context could result in higher background parking utilization that would not be expected at the proposed site. Accordingly, the Sinclair Boulevard location represents a more appropriate benchmark, supporting the conclusion that the proposed development is expected to provide sufficient on-site parking to accommodate anticipated demand.

10.0 Conclusion

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

Existing Conditions

Both study intersections are operating adequately with LOS "B" or better during the weekday a.m. and p.m., peak hours.

Under the 2025 existing conditions, the auxiliary storage lengths are not exceeding and have reserve capacity to accommodate future traffic volumes.

Future Background Conditions

The signalized intersection of Brock Road South at McLean Road is expected to continue to operate with a LOS "C" and "C" during the weekday a.m. and p.m. peak hours. A maximum volume-to-capacity ratio of 0.68 and 0.57 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" and "B" during the weekday a.m. and p.m. peak hours, respectively. A maximum volume-to-capacity ratio of 0.54 and 0.56 is expected during the weekday a.m. and weekday p.m. peak hours, respectively.

Under the 2031 future background conditions, the queuing assessment results in an instance where the 95th percentile queues exceed the auxiliary turn lane storage length for the westbound left-turn at Brock Road South and McLean Road during the p.m. peak hour.

Site Generated Traffic

During the weekday a.m. peak hour, the site is expected to generate 172 primary and 222 pass-by trips. In the p.m. peak hour, projections are 173 primary and 202 pass-by trips.

Future Total Conditions

In the 2031 horizon year, the intersection of Brock Road South at McLean Road is expected to decrease from operating at a LOS "C" and "C" to operate with a LOS "D" and "C" during the weekday a.m. and p.m. peak hours, respectively, when compared to 2031 Future Background conditions. A maximum volume-to-capacity ratio of 1.01 (0.33 increase from 2031 Future Background) and 0.75 (0.18 increase from 2031 Future Background) is expected during the weekday a.m. and weekday p.m. peak hours, respectively.

In the 2031 horizon year, the 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 0.56 (0.02 increase from 2031 Future Background) and 0.57 (0.02 increase from 2031 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.

Similar to the 2031 future background conditions, the 2031 future total queuing assessment results in an instance where the 95th percentile queues exceed the auxiliary turn lane storage length for the westbound left-turn at Brock Road South and McLean Road during the p.m. peak hour.

Future Total Improvements

Signal timing adjustments were examined in an effort to mitigate projected delays, congestion, and queue length concerns for 2031 at Brock Road South and McLean Road in the northbound and westbound left-turn lanes. The timings detailed for the future background scenario were the same as applied to the 2031 future total scenario.

The results of the signal adjustments indicate that in the 2031 future total scenario, the intersection of Brock Road South at McLean Road operates at capacity with a maximum v/c ratio of 0.88 and 0.67 during the a.m. and p.m. peak hours, respectively.

Queue exceedances are also still present at Brock Road South and Nicholas Beaver Road. However, each instance of queue exceedance remains within 15 meters, or approximately two vehicles, of the designated storage length. This level of excess queuing, when it occurs, can be supported by the auxiliary turn lane taper with limited effect on through traffic. It is recommended that this movement be monitored for future storage lane expansion.

Site Access Review

No issues were identified regarding sight lines and access spacing 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 but the McLean Road access allowed all vehicles to enter the site.

Parking and Loading Requirements

The development proposes a vehicle parking supply deficiency of six (6) spaces but meets the remaining specialized spaces requirements when compared to the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18. Several factors support the proposed parking supply. The drive-through for the restaurant helps reduce parking demand by accommodating vehicles in its queue, while convenience store customers are expected to use the gas bar pumps. Additionally, parking requirements in nearby municipalities and ITE's Parking Generation manual standards suggest the proposed number of spaces is sufficient.

Surrogate Survey

The 4 Sinclair Boulevard site is the most representative comparator, reflecting similar land uses, scale, and operating characteristics, and demonstrated a parking surplus, indicating the proposed development is expected to operate within the planned parking supply. In contrast, the 40 Sportsworld Drive site could have elevated parking demand due to shared use with Moose Winooski's and Tranquility Park, its location within a busy commercial node, and its stronger regional draw, conditions that would not be expected at the subject site. Accordingly, the Sinclair findings support the conclusion that sufficient parking is expected to be provided. Both surrogate surveys support the stacking storage length.

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.

[redacted]

Ian Lindley, MASc., P.Eng.
Project Engineer, Transportation

C.F. CROZIER & ASSOCIATES INC

[redacted]

Ramy Kamal
Engineering Intern, Transportation

RK:IL/cj

J:\2700\2792 - Daaz Inc\7289 - 7456 McLean Rd W & 197 Brock Rd S\Reports\Transportation\2026.02.13 _(2792-7456) McLean and 197 Brock (3rd Submission) _Final.docx

Appendix A

Terms of Reference Correspondence

Ramy Kamal

From: Ramy Kamal
Sent: July 30, 2025 12:11 PM
To: Ramy Kamal
Subject: FW: 7456 McLean Road West & 197 Brock Road South Comment Inquiries
Attachments: Trip Gen 7504 McLean Rd E.pdf; Trip Gen 7545 McLean E.pdf; Trip Gen Truckline TO BE UPDATED.pdf; Trip Gen 128 Brock Rd S.pdf

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From: Lynne Banks <lbanks@puslinch.ca>
Sent: July 25, 2025 10:28 AM
To: Ian Lindley <ilindley@cfcrozier.ca>
Subject: FW: 7456 McLean Road West & 197 Brock Road South Comment Inquiries

Hi Ian -

Please see comments from the Township's traffic consultant, Julia Salvini, below.

If I can assist further, please let me know.

Regards –

Lynne

Lynne Banks
Development and Legislative Coordinator
Township of Puslinch
7404 Wellington Rd 34, Puslinch ON N0B 2J0
519-763-1226 ext. 226 Fax 519-736-5846 www.puslinch.ca

From: Julia Salvini <julia@salviniconsulting.com>
Sent: July 24, 2025 5:11 PM
To: Lynne Banks <lbanks@puslinch.ca>
Cc: Pasquale Costanzo <pasqualec@wellington.ca>
Subject: RE: 7456 McLean Road West & 197 Brock Road South Comment Inquiries

Hi Lynne,

Here is some further information in response to the questions we received from Ian. Pasquale, I welcome anything you may want to add. And Ian is welcome to reach out if he has any questions.

Thanks,
Julia

Queuing Requirement
The Township does not have a zoning by-law queuing requirement for drive-through facilities. Subject to what others at the Township may have to say, I think relying on the Town of Milton bylaw for guidance is a good approach. I think it would also be appropriate for the applicant to ask the operator if they have any standards of their own that they use. For example, I'm sure McDonald's has a standard they generally use for their sites.

Adjacent Parcel
My understanding is that the two landowners are still talking about a joint access of some kind to McLean Road. On March 6 of this year I reviewed a plan with two driveway connections illustrated from this site to a future shared connection on the Wheelking site. At the time I commented that the southerly of the two driveway was very close to

McLean Road and if it was needed for circulation may have to be restricted to right turns. Someone else at the Township may have more current information on those discussions.

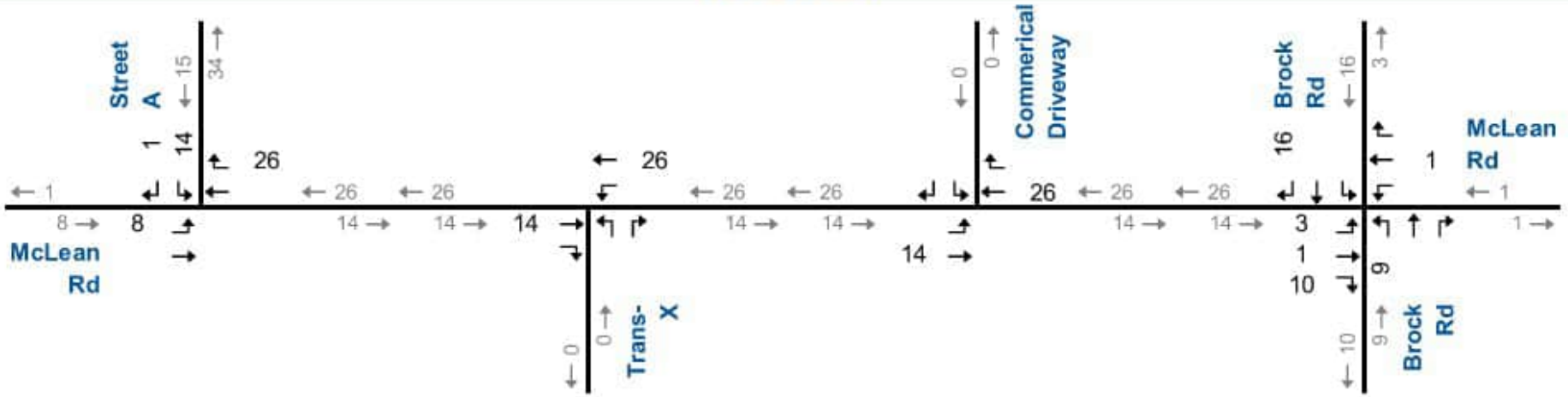
Background Traffic

Background traffic should include the following sites

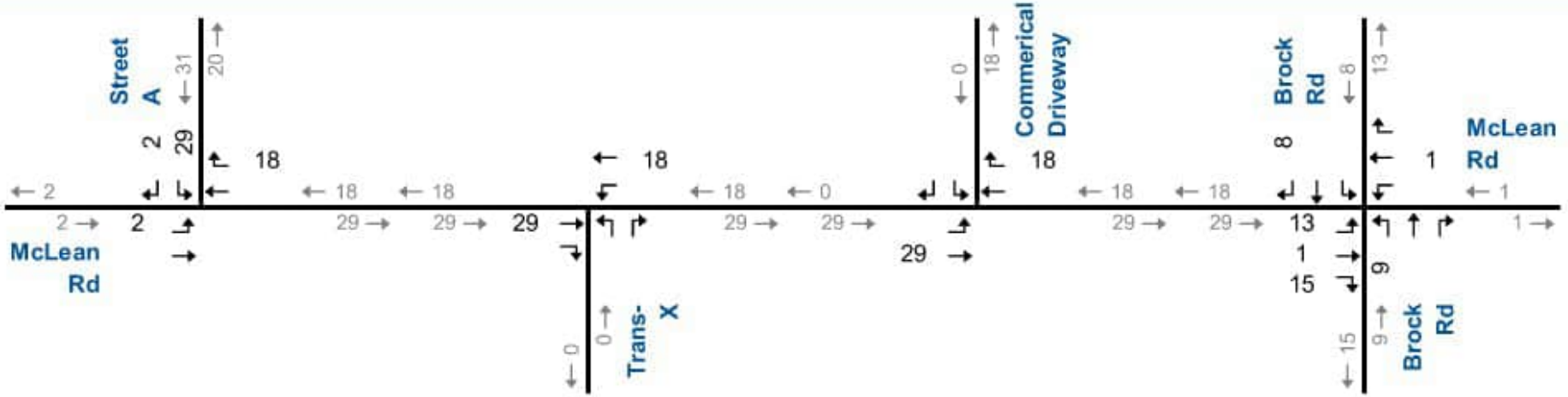
- 7434 McLean Road West (adjacent Wheelking site)
- Truckline site to the west of Wheelking
- 128 Brock Road South
- 7475 McLean Road East
- 7504 McLean Road East

I'm including several attached files illustrating the site traffic for the various developments. Below I've included an excerpt for the Wheelking site at 7434 McLean W.

AM Peak Hour



PM Peak Hour

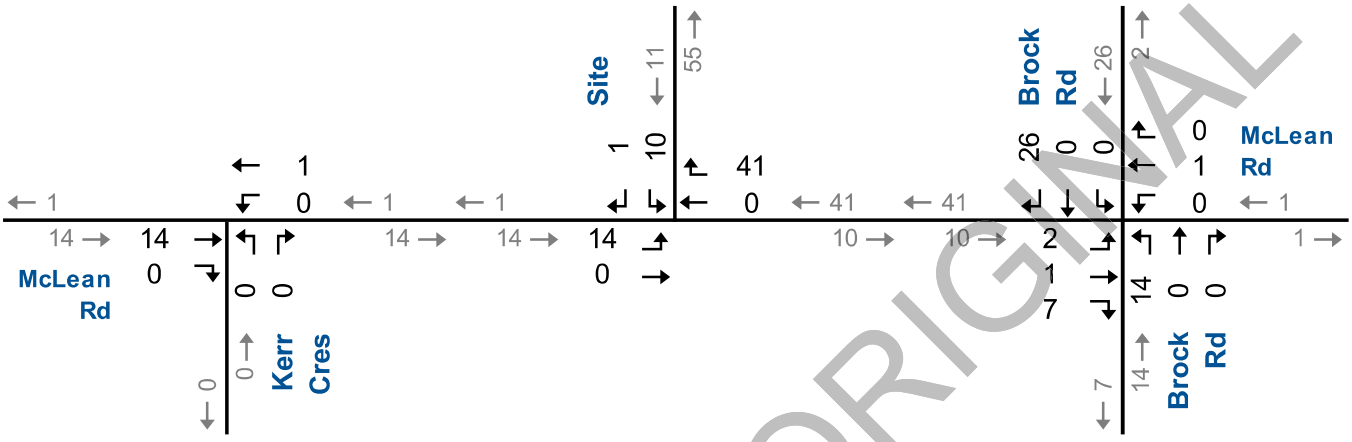


paradigm TRANSPORTATION SOLUTIONS LIMITED

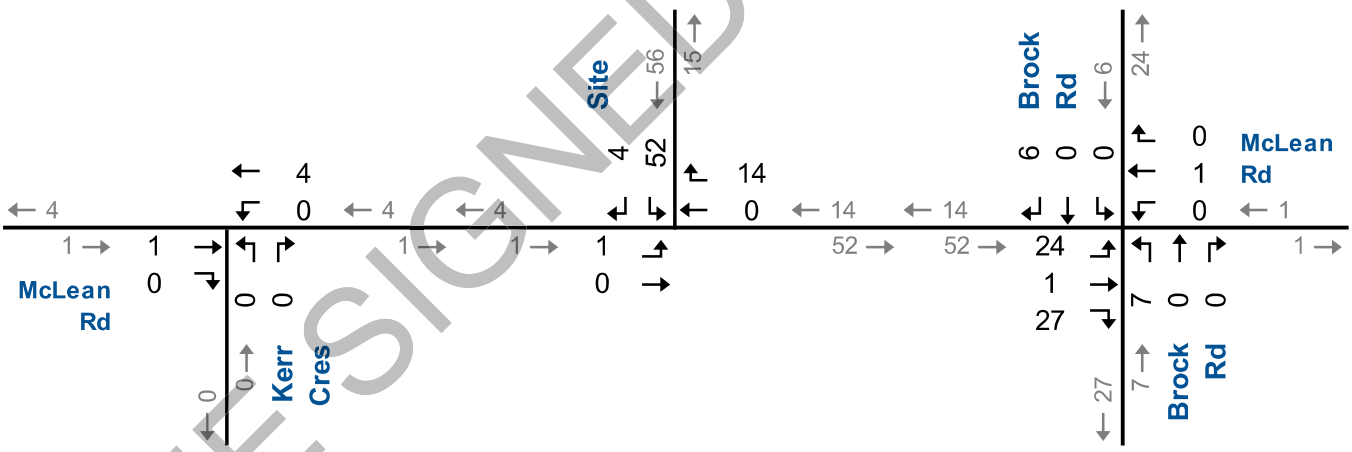
Site Generated Traffic Volumes

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AM Peak Hour



PM Peak Hour

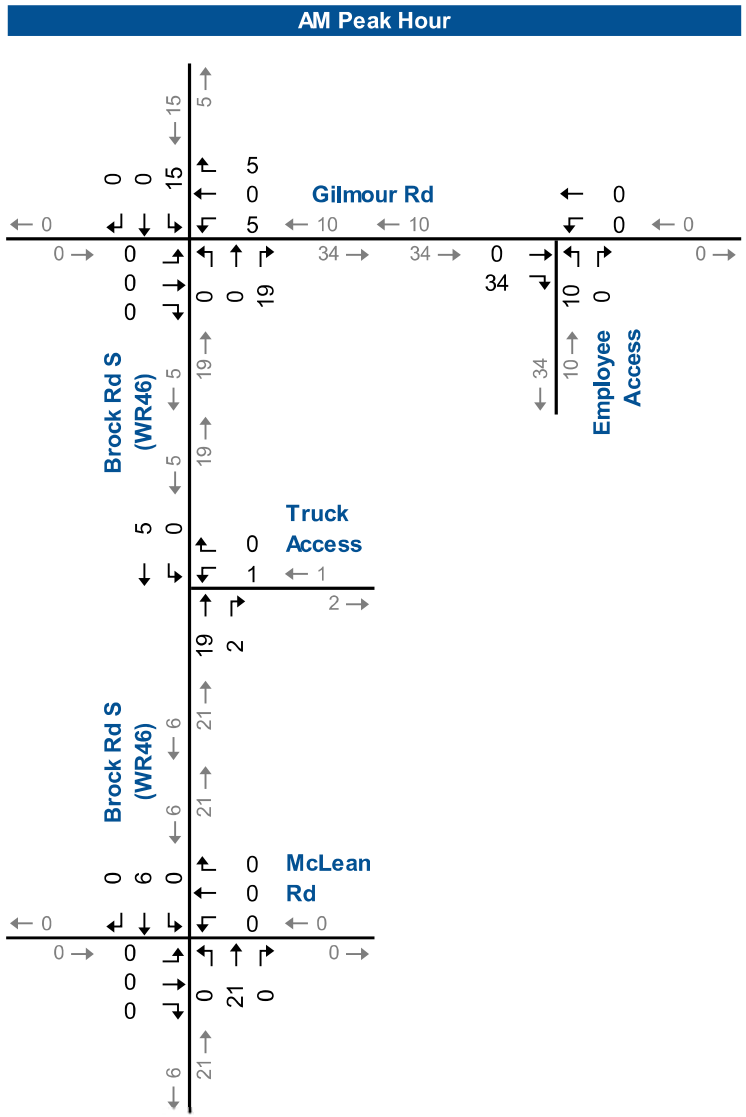


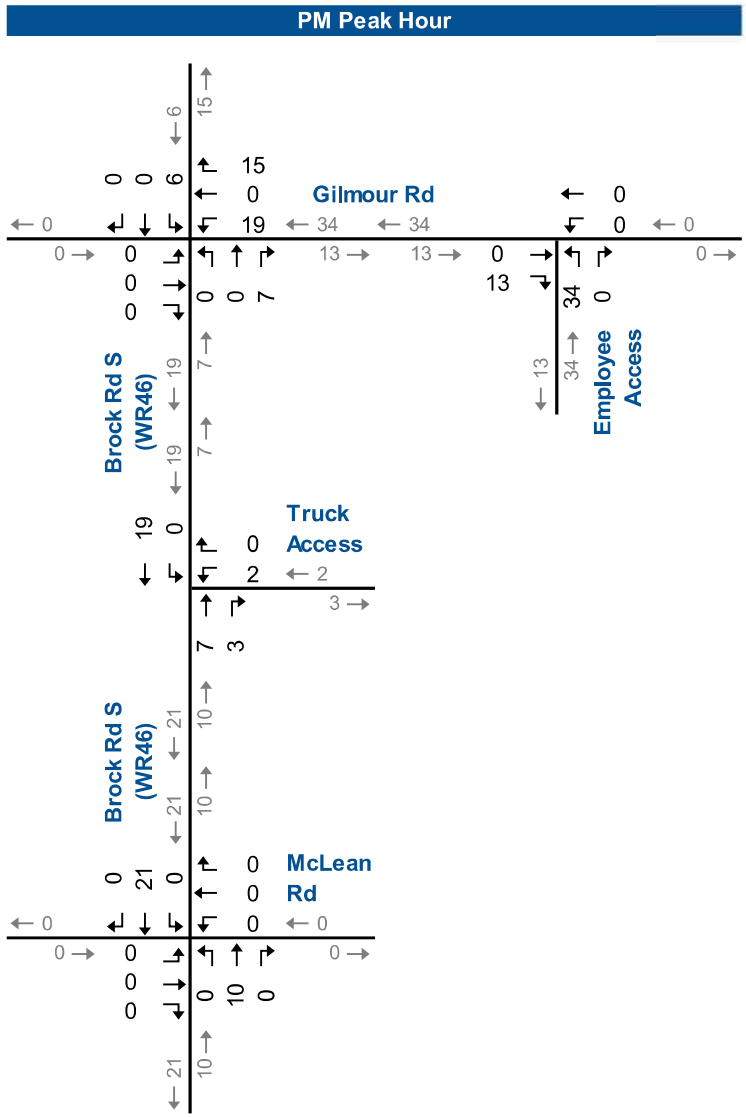
SEE SIGNED ORIGINAL

Site Generated Traffic Volumes

Truck Distribution Terminal, Puslinch TIS
210766

Figure 3.2





Site Generated Traffic Volumes

128 Brock Road South, Puslinch
220579

Figure 3.2

5.3 Site Trip Distribution and Assignment

The site traffic was assigned to the road network based on the existing traffic patterns and local transportation context. The existing travel patterns were derived separately for passenger vehicle and truck trips based on the inbound and outbound movements at the intersection of Brock Street and McLean Road during the a.m. and p.m. peak hours. Taking into consideration that McLean Road dead-ends east of the site, all site traffic was assigned to/from the west to Brock Road South. Both vehicles and trucks were assigned to the study area separately.

Trip distribution percentages for passenger vehicles are shown in **Figure 6** while **Figure 7** shows the distribution percentages for heavy trucks.

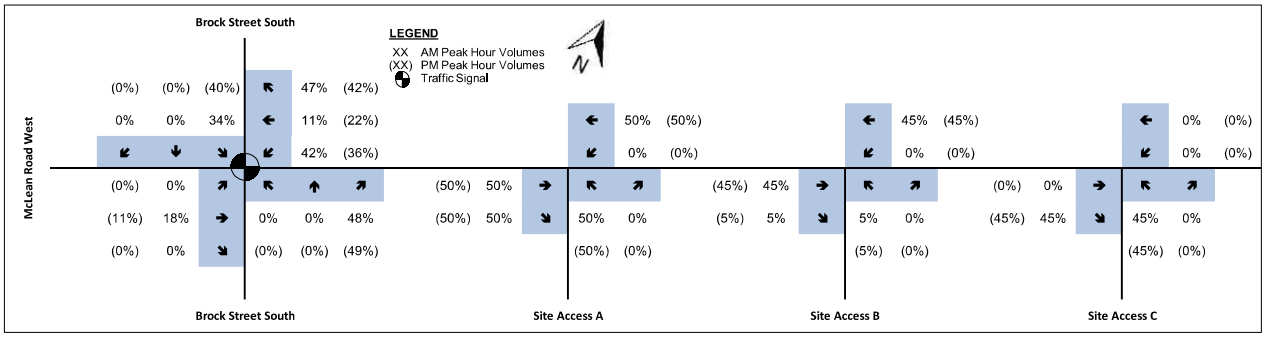


Figure 6 Trip Distribution Percentages (Passenger Vehicles)

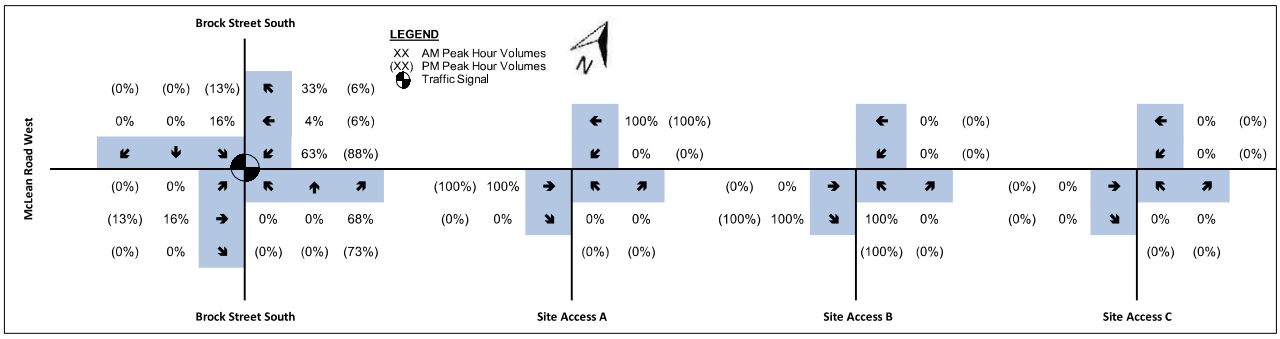


Figure 7 Trip Distribution Percentages (Heavy Trucks)

The estimated site trips generated by the proposed development as assigned to the site accesses and study intersections for the weekday a.m. and p.m. peak hours are provided in **Figure 8, Figure 9,** and **Figure 10**.

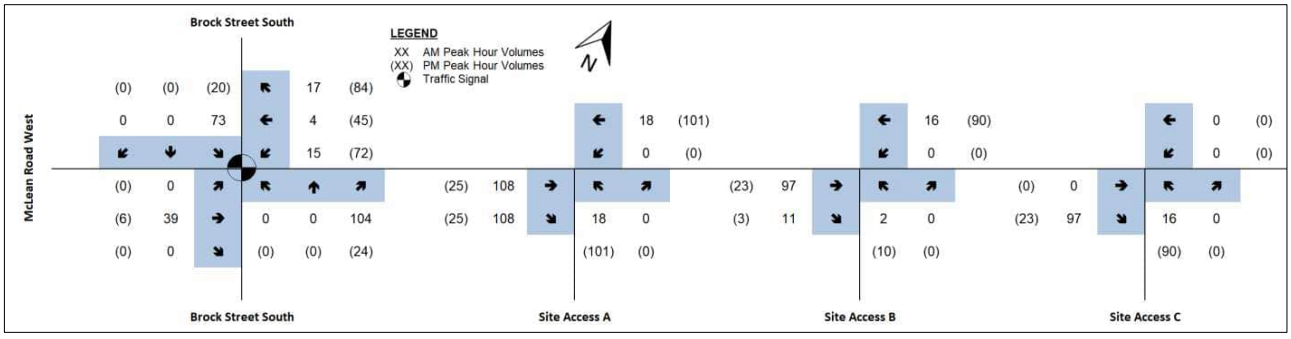


Figure 8 Estimated Site Trips (Passenger Vehicles)

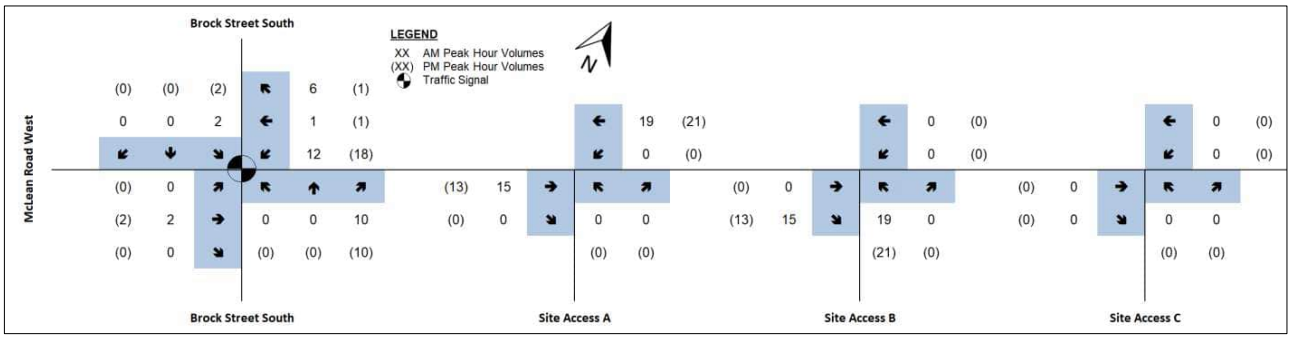


Figure 9 Estimated Site Trips (Heavy Trucks)

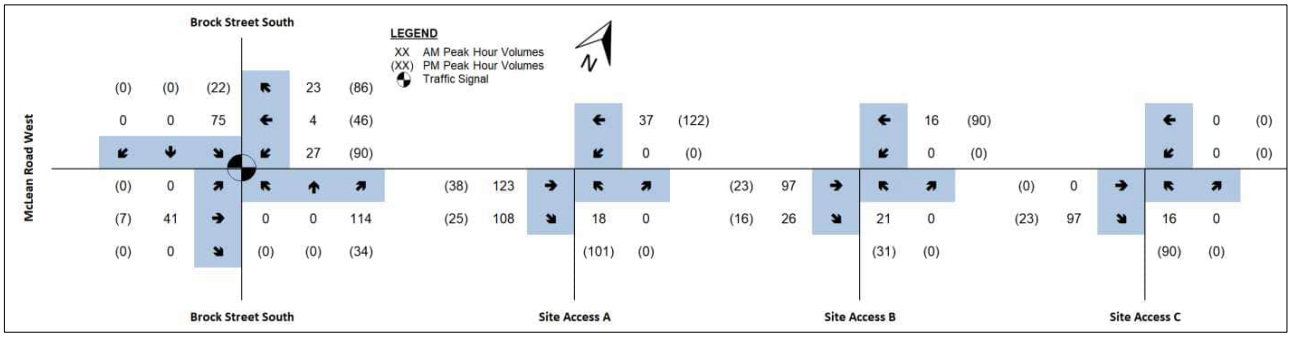


Figure 10 Estimated Site Trips (Combined)

6. Future Total Traffic

6.1 Future Total Traffic

The future total traffic conditions for the study peak hours in the 2027 planning horizon was derived by combining the projected future background traffic with the corresponding estimate of total site generated traffic.

Figure 11 summarizes the future total traffic volumes for the 2027 planning horizon year during the weekday a.m. and p.m. peak hours.

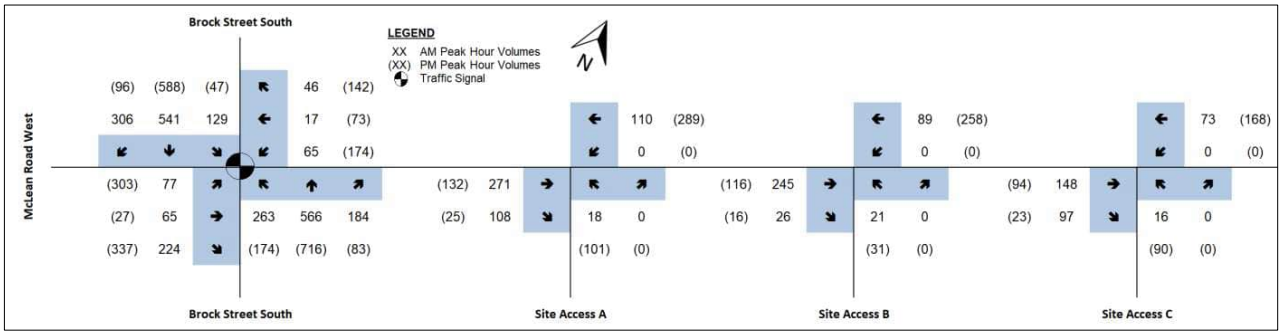
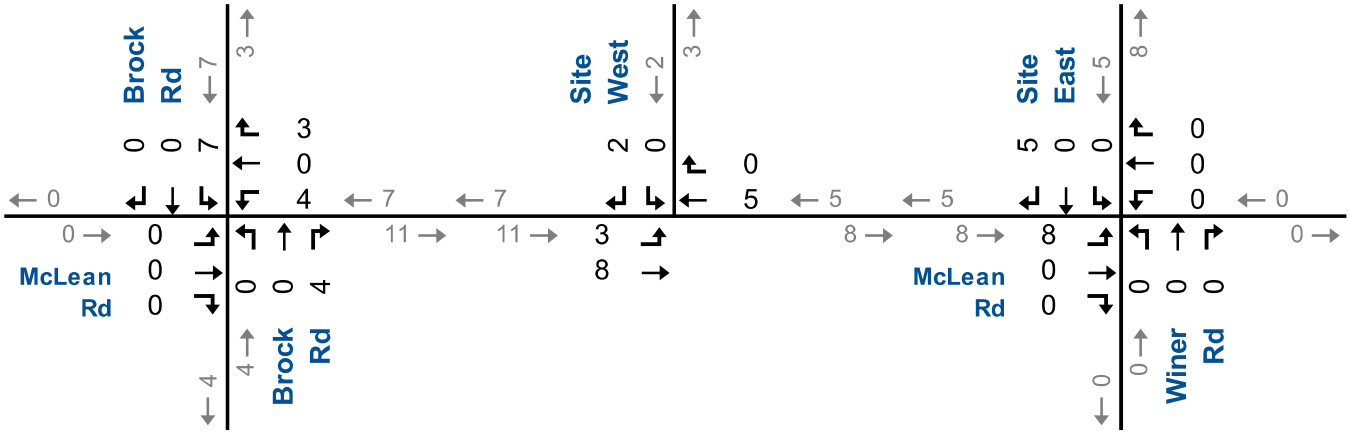


Figure 11 2027 Future Total Traffic

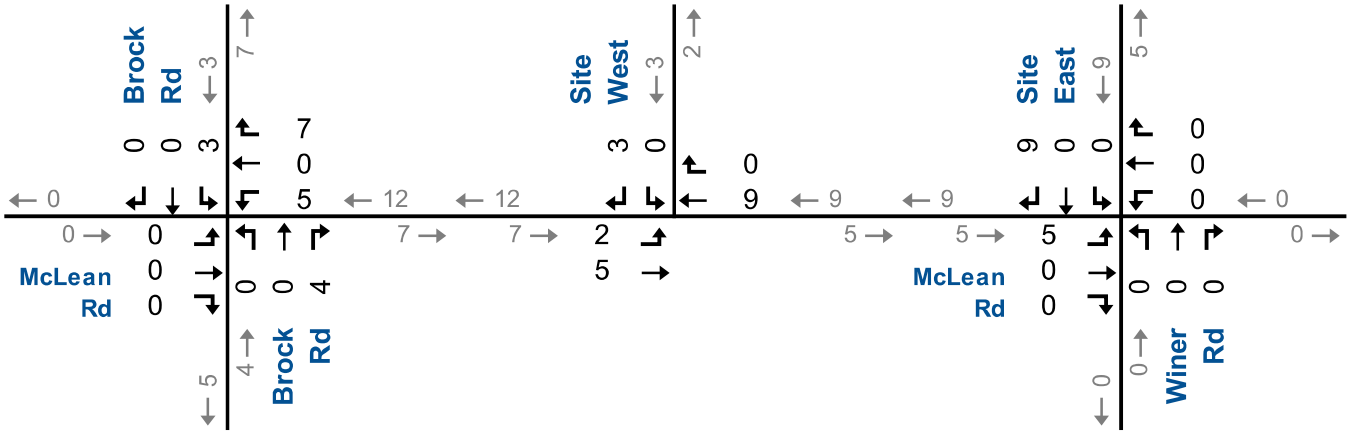
7. Intersection Capacity Analysis

The capacity analysis identifies how well the intersections and driveways are operating and how they are expected to operate in the future. The analysis contained within this report utilized the Highway Capacity Manual (HCM) 2000

AM Peak Hour



PM Peak Hour



Site Generated Traffic Volumes

7504 McLean Road Puslinch
240189

Figure 3.2

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



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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.**

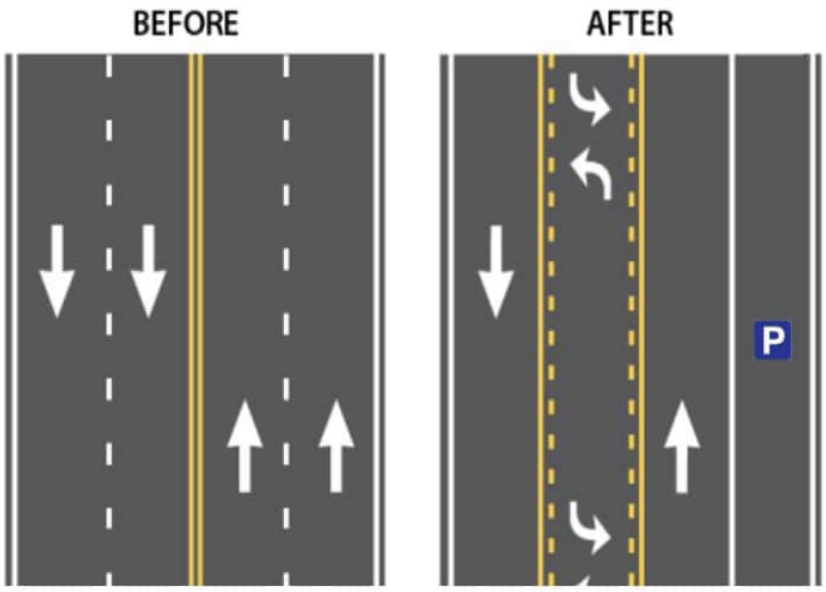


Figure 29: Aberfoyle Road Diet

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).

11.3.3 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

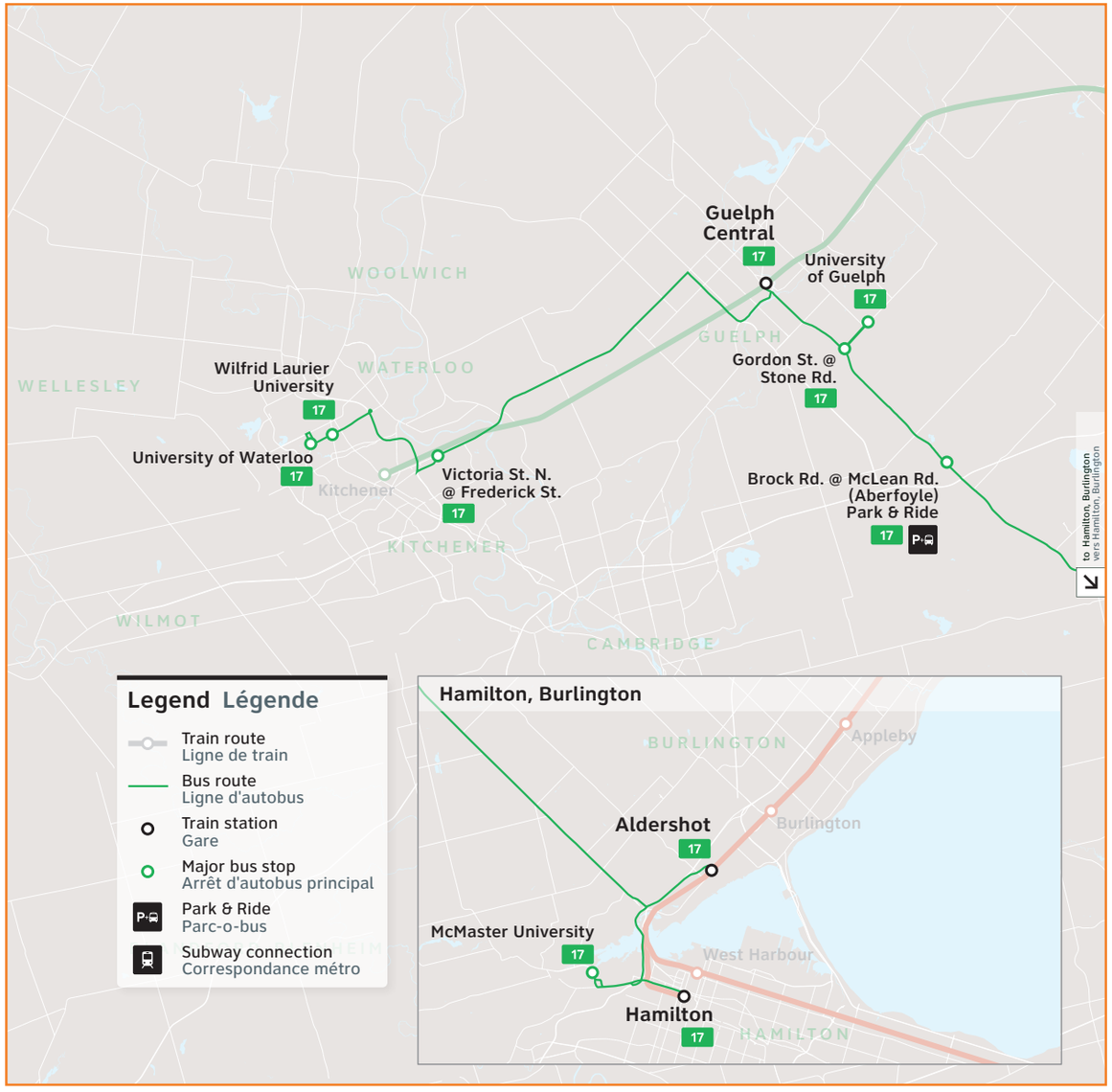
Municipal Class EA where alternative methods and alternative design concepts would be fully explored (i.e., impacts and costs).

Appendix C

Transit Maps and Schedules

17 Route number / Nombre d'itinéraire

Waterloo/Hamilton



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- University of Guelph
- Brock Rd. @ McLean Rd.
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- McMaster University
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8 APRIL AVRIL 2023

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

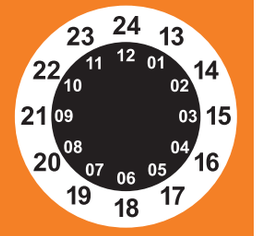
Step 3
Look across the rows for available departure times.

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.

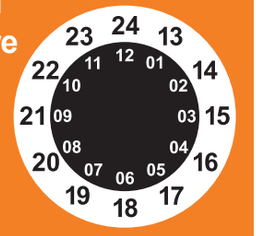
Étape 3
Regardez dans les rangées pour obtenir les heures de départ offertes.

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.

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

SOUTHBOUND / EN DIRECTION SUD

Route Number / Numéro du trajet	Trip Number / Numéro du parcours	Zone→	Waterloo 27 Dp	Waterloo 27	Kitchener 27	Guelph 39	Guelph 39	Puslinch 39	Burlington 17	Hamilton 18	Hamilton 18 Ar
			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**
17	17030		05 00	05 03	05 14	05 47	05 57	06 12	06 43	07 00	07 20
17	17060		05 55	05 58	06 09	06 44	06 54	07 11	07 43	08 00	08 20
17	17120		06 50	06 53	07 05	07 41	07 51	08 11	08 43	09 00	09 20
17	17180		07 55	07 58	08 10	08 46	08 56	09 13	09 45	10 02	10 20
17	17230		08 55	08 58	09 10	09 46	09 56	10 13	10 45	11 02	11 20
17	17270		09 55	09 58	10 10	10 46	10 56	11 13	11 45	12 02	12 20
17	17310		10 55	11 03	11 15	11 49	11 59	12 16	12 47	13 04	13 20
17	17350		11 55	12 03	12 15	12 49	12 59	13 16	13 47	14 04	14 20
17	17390		12 50	12 58	13 10	13 46	13 56	14 13	14 45	15 02	15 20
17	17430		13 45	13 53	14 05	14 41	14 51	15 11	15 43	16 00	16 20
17	17470		14 45	14 53	15 05	15 41	15 51	16 11	16 43	17 00	17 20
17	17520		15 45	15 53	16 05	16 41	16 51	17 11	17 43	18 00	18 20
17	17590		16 50	16 58	17 10	17 46	17 56	18 13	18 45	19 02	19 20
17	17650		17 55	18 03	18 15	18 51	19 01	19 18	19 50	20 05	20 20
17	17700		19 00	19 08	19 20	19 54	20 04	20 19	20 50	21 05	21 20
17	17740		20 00	20 08	20 19	20 50	21 00	21 15	21 45	22 00	22 15

NORTHBOUND / EN DIRECTION NORD

Route Number / Numéro du trajet	Trip Number / Numéro du parcours	Zone→	Hamilton 18 Dp	Hamilton 18	Burlington 17	Puslinch 39	Guelph 39	Guelph 39	Kitchener 27	Waterloo 27	Waterloo 27 Ar
			Hamilton GO Centre	**McMaster University**	**Ⓟ Aldershot GO**	**Ⓟ Brock Rd. @ McLean Rd.**	**University of Guelph**	**Guelph Central GO**	**Victoria St. @ Frederick St.**	**Wilfrid Laurier University**	**University of Waterloo**
17	17071		05 55	06 09	06 22	06 53	07 09	07 19	07 55	08 08	08 20
17	17131		06 55	07 12	07 27	07 58	08 14	08 24	09 00	09 13	09 25
17	17191		08 00	08 17	08 32	09 03	09 19	09 29	10 05	10 18	10 30
17	17241		09 00	09 17	09 32	10 03	10 19	10 29	11 05	11 18	11 30
17	17281		10 00	10 17	10 32	11 03	11 19	11 29	12 05	12 18	12 30
17	17321		11 00	11 17	11 32	12 03	12 19	12 29	13 05	13 18	13 30
17	17361		12 00	12 17	12 32	13 03	13 19	13 29	14 05	14 18	14 30
17	17401		13 00	13 19	13 34	14 06	14 24	14 34	15 10	15 23	15 35
17	17441		14 00	14 19	14 34	15 06	15 24	15 34	16 10	16 23	16 35
17	17481		15 00	15 19	15 34	16 06	16 24	16 34	17 10	17 23	17 35
17	17541		16 00	16 19	16 34	17 06	17 24	17 34	18 10	18 23	18 35
17	17601		17 00	17 19	17 34	18 05	18 21	18 31	19 05	19 18	19 30
17	17661		18 00	18 17	18 32	19 03	19 18	19 28	20 00	20 13	20 25
17	17701		19 00	19 17	19 32	20 03	20 18	20 28	21 00	21 13	21 25
17	17741		20 00	20 17	20 32	21 02	21 17	21 27	21 58	22 10	22 20
17	17781		21 00	21 12	21 27	21 57	22 12	22 22	22 53	23 05	23 15

PRESTO

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

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

For more information please visit

gotransit.com/PRESTO

Pour en savoir davantage, veuillez visiter le site

gotransit.com/fr/PRESTO

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gotransit.com/fr/PRESTO

29 Route number / Numéro du trajet

Guelph/Mississauga



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

METROLINX

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 JANVIER 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.

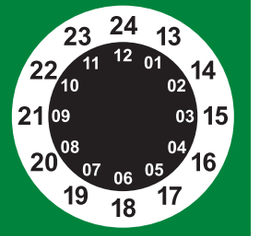
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Step 4
Not all trains or buses stop at every station. If you see → the train or bus will not stop at that station.

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.

Notes

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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.

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Comment lire nos horaires

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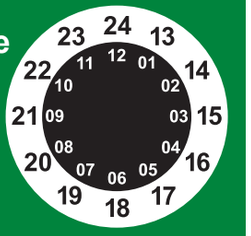
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Indications selon un système horaire de 24 heures

De minuit à midi:
00 01 - 12 00

De midi à minuit:
12 01 - 24 00



Légende

Horaire des autobus

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Stationnement disponible.

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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

Route Number / Numéro du trajet	Trip Number / Numéro du parcours	Zone→	Guelph 39 Dp	Guelph 39	Puslinch 39	Milton 24	Mississauga 21	Mississauga 21	Mississauga 20	Mississauga 25	Mississauga 25	Etobicoke 3 Ar
			Guelph Central GO	University of Guelph	Brock 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
29	29130		05 15	05 25	05 40	05 56	06 17	06 20	06 30	06 37	06 42	06 55
29	29190		06 15	06 25	06 45	07 01	07 22	07 25	07 35	07 42	07 47	08 00
29	29240		07 10	07 20	07 40	07 59	08 22	08 25	08 35	08 42	08 47	09 00
29	29280		08 05	08 15	08 35	08 54	09 17	09 20	09 35	09 42	09 47	10 00
29	29320		09 10	09 20	09 40	09 56	10 17	10 20	10 35	10 42	10 47	11 00
29	29360		10 15	10 25	10 45	11 01	11 17	11 20	11 35	11 42	11 47	12 00
29	29400		11 15	11 30	11 50	12 06	12 22	12 25	12 40	12 47	12 52	13 05
29	29440		12 15	12 30	12 50	13 06	13 22	13 25	13 40	13 47	13 52	14 05
29	29480		13 10	13 25	13 45	14 01	14 17	14 20	14 35	14 42	14 47	15 05
29	29540		14 10	14 25	14 45	15 01	15 17	15 20	15 35	15 42	15 47	16 05
29	29570		14 35	14 50	15 10	15 26	15 47	15 50	16 05	16 12	16 17	16 35
29	29600		15 05	15 20	15 40	15 56	16 17	16 20	16 35	16 42	16 47	17 05
29	29630		15 30	15 45	16 05	16 21	16 42	16 45	17 00	17 07	17 12	17 30
29	29660		16 05	16 20	16 40	16 56	17 17	17 20	17 35	17 42	17 47	18 05
29	29680		16 30	16 45	17 05	17 21	17 42	17 45	18 00	18 07	18 12	18 30
29	29700		17 05	17 20	17 40	17 56	18 17	18 20	18 35	18 42	18 47	19 05
29	29720		17 35	17 50	18 10	18 26	18 47	18 50	19 05	19 12	19 17	19 35
29	29740		18 05	18 20	18 40	18 56	19 17	19 20	19 35	19 42	19 47	20 00
29	29760		18 35	18 50	19 10	19 26	19 47	19 50	20 05	20 12	20 17	20 30
29	29780		19 15	19 25	19 45	20 01	20 22	20 25	20 40	20 47	20 42	21 05
29	29820		20 20	20 30	20 45	21 01	21 17	21 20	21 35	21 42	21 47	22 00
29	29850		21 20	21 30	21 45	22 01	22 17	22 20	22 35	22 42	22 47	23 00
29	29880		22 20	22 30	22 45	23 01	23 17	23 20	23 35	23 42	23 47	00 00

WESTBOUND / EN DIRECTION OUEST

Route Number / Numéro du trajet	Trip Number / Numéro du parcours	Zone→	Etobicoke 3	Mississauga 25	Mississauga 25	Mississauga 20 Dp	Mississauga 21	Mississauga 21	Milton 24	Puslinch 39	Guelph 39	Guelph 39 Ar
			Kipling Bus Terminal	Renforth Transitway Station	Dixie Transitway Station	Square One	Erin Mills Transitway Station	Winston Churchill Transitway Station	Regional Rd. 25 @ Hwy. 401	Brock Rd. @ McLean Rd. (Aberfoyle)	University of Guelph	Guelph Central GO
29	29121		06 25	06 35	06 40	06 50	06 58	07 01	07 23	07 40	07 55	08 10
29	29151		06 55	07 05	07 10	07 20	07 28	07 31	07 53	08 10	08 25	08 40
29	29181		07 25	07 35	07 40	07 50	07 58	08 01	08 23	08 40	08 55	09 10
29	29211		07 55	08 05	08 10	08 20	08 28	08 31	08 53	09 10	09 25	09 40
29	29231		08 25	08 35	08 40	08 50	08 58	09 01	09 23	09 23	09 40	10 10
29	29251		08 55	09 05	09 10	09 20	09 28	09 31	09 53	10 10	10 25	10 35
29	29291		09 55	10 05	10 10	10 20	10 28	10 31	10 53	11 10	11 25	11 35
29	29331		10 55	11 05	11 10	11 20	11 28	11 31	11 53	12 10	12 30	12 40
29	29371		11 55	12 05	12 10	12 20	12 28	12 31	12 53	13 10	13 30	13 40
29	29411		12 55	13 05	13 10	13 20	13 28	13 31	13 55	14 15	14 35	14 45
29	29421		13 25	13 35	13 40	13 50	13 58	14 01	14 25	14 45	15 05	15 15
29	29451		13 55	14 05	14 10	14 20	14 28	14 31	14 55	15 15	15 35	15 45
29	29461		14 25	14 35	14 40	14 50	14 58	15 01	15 25	15 45	16 05	16 15
29	29501		14 55	15 05	15 10	15 20	15 28	15 31	15 55	16 15	16 35	16 45
29	29511		15 20	15 32	15 37	15 50	15 58	16 01	16 25	16 45	17 05	17 15
29	29561		15 50	16 02	16 07	16 20	16 28	16 31	16 55	17 15	17 35	17 45
29	29621		16 50	17 02	17 07	17 20	17 28	17 31	17 55	18 15	18 35	18 45
29	29671		17 50	18 02	18 07	18 20	18 28	18 31	18 55	19 15	19 30	19 40
29	29711		18 55	19 05	19 10	19 20	19 28	19 31	19 53	20 10	20 25	20 35
29	29751		19 55	20 05	20 10	20 20	20 28	20 31	20 53	21 10	21 25	21 35
29	29791		20 55	21 05	21 10	21 20	21 28	21 31	21 53	22 10	22 25	22 35
29	29831		21 55	22 05	22 10	22 20	22 28	22 31	22 53	23 10	23 25	23 35
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

Route Number / Numéro du trajet	Trip Number / Numéro du parcours	Zone→	Guelph 39 Dp	Guelph 39	Puslinch 39	Milton 24	Mississauga 21	Mississauga 20	Mississauga 25	Mississauga 25	Etobicoke 20 Ar
			Guelph Central GO	University of Guelph	Brock 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
29	29190		06 45	06 55	07 10	07 26	07 42	07 45	07 55	08 02	08 07	08 20
29	29240		07 40	07 50	08 05	08 21	08 39	08 42	08 55	09 02	09 07	09 20
29	29280		08 35	08 45	09 05	09 21	09 39	09 42	09 55	10 02	10 07	10 20
29	29320		09 30	09 45	10 05	10 21	10 39	10 42	10 55	11 02	11 07	11 20
29	29360		10 30	10 45	11 05	11 21	11 39	11 42	11 55	12 02	12 07	12 20
29	29400		11 30	11 45	12 05	12 21	12 39	12 42	12 55	13 02	13 07	13 20
29	29440		12 30	12 45	13 05	13 21	13 39	13 42	13 55	14 02	14 07	14 20
29	29480		13 30	13 45	14 05	14 21	14 42	14 45	15 00	15 07	15 12	15 25
29	29540		14 30	14 45	15 05	15 21	15 42	15 45	16 00	16 07	16 12	16 25
29	29600		15 30	15 45	16 05	16 21	16 42	16 45	17 00	17 07	17 12	17 25
29	29660		16 30	16 45	17 05	17 21	17 42	17 45	18 00	18 07	18 12	18 25
29	29700		17 30	17 45	18 05	18 21	18 39	18 42	18 55	19 02	19 07	19 20
29	29740		18 30	18 45	19 05	19 21	19 39	19 42	19 55	20 02	20 07	20 20
29	29780		19 30	19 45	20 05	20 21	20 39	20 42	20 55	21 02	21 07	21 20
29	29820		20 40	20 50	21 05	21 21	21 39	21 42	21 55	22 02	22 07	22 20
29	29880		22 40	22 50	23 05	23 21	23 39	23 42	23 55	00 02	00 07	00 20

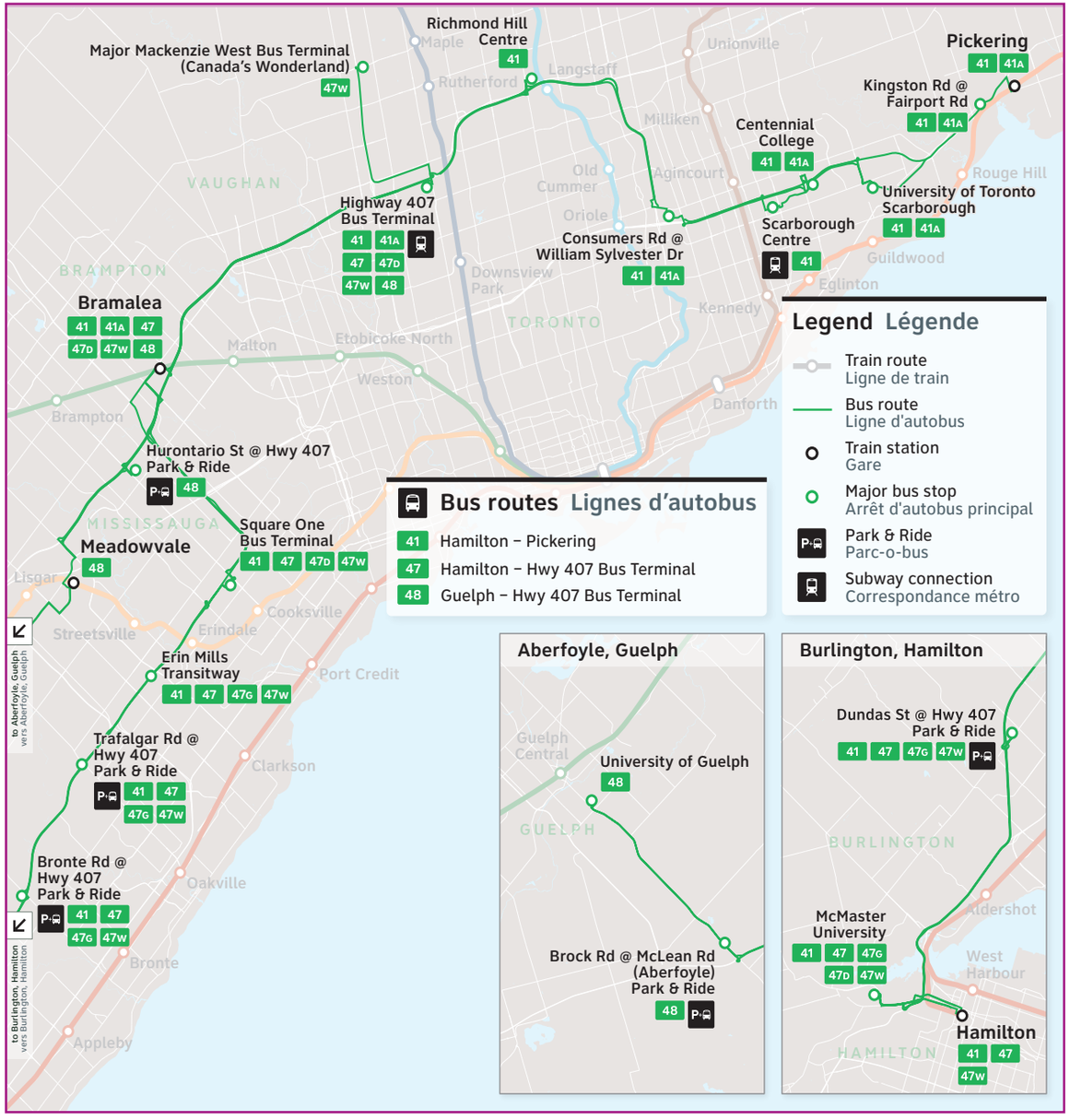
WESTBOUND / EN DIRECTION OUEST

Route Number / Numéro du trajet	Trip Number / Numéro du parcours	Zone→	Mississauga 25 Dp	Mississauga 25	Mississauga 25	Mississauga 20	Mississauga 21	Mississauga 21	Milton 24	Puslinch 39	Guelph 39	Guelph 39 Ar
			Kipling Bus Terminal	Renforth Transitway Station	Dixie Transitway Station	Square One	Erin Mills Transitway Station	Winston Churchill Transitway Station	Regional Rd. 25 @ Hwy. 401 P&R	Brock Rd. @ McLean Rd. (Aberfoyle) P&R	University of Guelph	Guelph Central GO
29	29211		08 00	08 10	08 15	08 25	08 33	08 36	08 58	09 15	09 30	09 40
29	29251		09 00	09 10	09 15	09 25	09 33	09 36	09 58	10 15	10 30	10 40
29	29291		10 00	10 10	10 15	10 25	10 33	10 36	10 58	11 15	11 35	11 45
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29	29371		12 00	12 10	12 15	12 25	12 33	12 36	12 58	13 15	13 35	13 45
29	29411		13 00	13 10	13 15	13 25	13 33	13 36	13 58	14 15	14 35	14 45
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29	29501		15 00	15 10	15 15	15 25	15 33	15 36	15 58	16 15	16 35	16 45
29	29561		16 00	16 10	16 15	16 25	16 33	16 36	16 58	17 15	17 35	17 45
29	29621		17 00	17 10	17 15	17 25	17 33	17 36	17 58	18 15	18 35	18 45
29	29671		18 00	18 10	18 15	18 25	18 33	18 36	18 58	19 15	19 35	19 45
29	29711		19 00	19 10	19 15	19 25	19 33	19 36	19 58	20 15	20 35	20 45
29	29751		20 00	20 10	20 15	20 25	20 33	20 36	20 58	21 15	21 35	21 45
29	29791		21 00	21 10	21 15	21 25	21 33	21 36	21 58	22 15	22 35	22 45
29	29831		22 00	22 10	22 15	22 25	22 33	22 36	22 58	23 15	23 30	23 40
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

METROLINX

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.

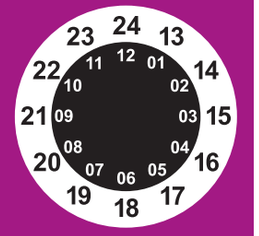
Step 3
Look across the rows for available departure times.

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.

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.

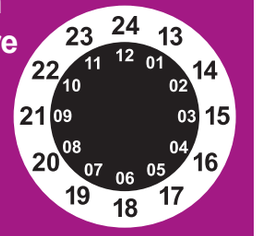
Étape 3
Regardez dans les rangées pour obtenir les heures de départ offertes.

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.

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 →	Guelph 39 Dp	Puslinch 39	Hamilton 18	Hamilton 18	Burlington 16	Oakville 14	Oakville 13	Mississauga 22	Mississauga 22	Mississauga 21	Mississauga 20	Brampton 32	Vaughan 19 Ar	Vaughan 19 Dp	Richmond Hill 60	North York 5	Scarborough 7	Scarborough 89	Scarborough 89	Pickering 91	Pickering 91 Ar
Trip Number / Numéro du parcours		University of Guelph	Brock Rd. @ McLean Rd. (Aberfoyle)	Hamilton GO Centre	McMaster University	Dundas St. @ Hwy. 407	Bronte Rd. @ Hwy. 407	Trafalgar Rd. @ Hwy. 407	Meadowvale GO	Hurontario St. @ Hwy. 407	Erin Mills Transitway Station	Square One	Bramalea GO	Hwy. 407 Bus Terminal	Hwy. 407 Bus Terminal	Richmond Hill Centre	Consumers Rd. Business Park	Scarborough Centre Bus Terminal	Centennial College	University of Toronto Scarborough	Kingston Rd. @ Fairport Rd.	Pickering GO
41	41020			04 40	04 52	05 09	05 16	05 24	→	→	05 32	05 45	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								
41	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											06 20	06 37	06 57	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 →	Guelph 39 Dp	Puslinch 39	Hamilton 18	Hamilton 18	Burlington 16	Oakville 14	Oakville 13	Mississauga 22	Mississauga 22	Mississauga 21	Mississauga 20	Brampton 32	Vaughan 19 Ar	Vaughan 19 Dp	Richmond Hill 60	North York 5	Scarborough 7	Scarborough 89	Scarborough 89	Pickering 91	Pickering 91 Ar
Trip Number / Numéro du parcours		University of Guelph	Brock Rd. @ McLean Rd. (Aberfoyle)	Hamilton GO Centre	McMaster University	Dundas St. @ Hwy. 407	Bronte Rd. @ Hwy. 407	Trafalgar Rd. @ Hwy. 407	Meadowvale GO	Hurontario St. @ Hwy. 407	Erin Mills Transitway Station	Square One	Bramalea GO	Hwy. 407 Bus Terminal	Hwy. 407 Bus Terminal	Richmond Hill Centre	Consumers Rd. Business Park	Scarborough Centre Bus Terminal	Centennial College	University of Toronto Scarborough	Kingston Rd. @ Fairport Rd.	Pickering GO
41	41450			14 25	14 44	15 04	15 12	15 20	→	→	15 30	15 45	16 05	16 25	16 30	16 40	17 03	17 20	17 27	17 42	17 55	18 05
47	47460			14 40	14 59	15 19	15 27	15 35	→	→	15 45	16 00	16 25	16 45								
48	48570	14 35	14 50	→	→	→	→	→	15 40	15 59	→	→	16 10	16 30								
47D	47466				15 15	→	→	→	→	→	→	15 55	16 20	16 40								
41	41470			14 55	15 14	15 34	15 42	15 50	→	→	16 00	16 15	16 40	17 00	17 05	17 15	17 38	17 55	18 02	18 17	18 30	18 40
47D	47482				15 30	→	→	→	→	→	→	16 10	16 35	16 55								
47	47490			15 10	15 29	15 49	15 57	16 05	→	→	16 15	16 30	16 55	17 15								
47D	47492				15 45	→	→	→	→	→	→	16 25	16 50	17 10								
41	41490			15 25	15 44	16 04	16 12	16 20	→	→	16 30	16 45	17 10	17 30	17 35	17 45	18 08	18 25	18 32	18 47	19 00	19 10
47D	47512				16 00	→	→	→	→	→	→	16 40	17 05	17 25								
48	48630	15 35	15 50	→	→	→	→	→	16 40	16 59	→	→	17 10	17 30								
47	47520			15 40	15 59	16 19	16 27	16 35	→	→	16 45	17 00	17 25	17 45								
47D	47522				16 15	→	→	→	→	→	→	16 55	17 20	17 40								
41	41530			15 55	16 14	16 34	16 42	16 50	→	→	17 00	17 15	17 40	18 00	18 05	18 15	18 38	18 55	19 02	19 17	19 30	19 40
47D	47526				16 25	→	→	→	→	→	→	17 05	17 30	17 50								
47	47540			16 10	16 31	16 54	17 02	17 10	→	→	17 20	17 35	18 00	18 20								
47D	47552				16 45	→	→	→	→	→	→	17 25	17 50	18 10								
48	48680	16 35	16 50	→	→	→	→	→	17 35	17 54	→	→	18 05	18 25								
41	41550			16 25	16 46	17 09	17 17	17 25	→	→	17 35	17 50	18 15	18 35	18 40	18 50	19 10	19 25	19 32	19 47	19 58	20 05
47D	47556				17 05	→	→	→	→	→	→	17 45	18 10	18 30								
47	47560			16 40	17 01	17 24	17 32	17 40	→	→	17 50	18 05	18 30	18 50								
47D	47562				17 15	→	→	→	→	→	→	17 55	18 20	18 40								
41	41580			16 55	17 16	17 39	17 47	17 55	→	→	18 05	18 20	18 40	19 00	19 05	19 15	19 35	19 50	19 57	20 12	20 23	20 30
47D	47602				17 35	→	→	→	→	→	18 15	18 35	18 55									
47	47600			17 10	17 31	17 54	18 02	18 10	→	→	18 20	18 35	19 00	19 20								
47G	47604				17 45	18 08	18 16	18 24	→	→	18 35											
47D	47608				17 50	→	→	→	→	→	→	18 30	18 50	19 10								
48	48720	17 40	17 55	→	→	→	→	→	18 40	18 59	→	→	19 07	19 25								
41	41620			17 35	17 56	18 19	18 27	18 35	→	→	18 45	19 00	19 17	19 35	19 40	19 50	20 10	20 25	20 32	20 42	20 53	21 00
47	47620			17 50	18 11	18 34	18 42	18 50	→	→	19 00	19 15	19 32	19 50								
47D	47642				18 25	→	→	→	→	→	→	19 05	19 22	19 40								
41	41650			18 05	18 26	18 46	18 54	19 02	→	→	19 10	19 25	19 42	20 00	20 05	20 15	20 33	20 45	20 52	21 02	21 13	21 20
47	47650			18 20	18 41	19 01	19 09	19 17	→	→	19 25	19 40	19 57	20 15								
41	41680			18 35	18 56	19 16	19 24	19 32	→	→	19 40	19 55	20 12	20 30	20 35	20 45	21 03	21 15	21 22	21 32	21 43	21 50
47	47690			18 50	19 11	19 31	19 39	19 47	→	→	19 55	20 10	20 27	20 45								
48	48760	18 50	19 05	→	→	→	→	→	19 45	19 59	→	→	20 07	20 25								
41	41700			19 00	19 21	19 41	19 49	19 57	→	→	20 05	20 20	20 37	20 55	21 00	21 10	21 28	21 40	21 47	21 57	22 08	22 15
47	47790			19 30	19 47	20 07	20 14	20 22	→	→	20 30	20 45	21 02	21 20								
48	48800	19 50	20 05	→	→	→	→	→	20 45	20 59	→	→	21 07	21 25								
41	41740			20 00	20 17	20 37	20 44	20 52	→	→	21 00	21 15	21 32	21 50	21 55	22 05	22 23	22 35	22 42	22 52	23 03	23 10
48	48830	20 50	21 05	→	→	→	→	→	21 45	21 59	→	→	22 07	22 25								
47	47830			20 30	20 47	21 07	21 14	21 22	→	→	21 30	21 45	22 02	22 20								
41	41780			21 00	21 17	21 37	21 44	21 52	→	→	22 00	22 15	22 32	22 50	22 55	23 05	23 23	23 35	23 41	23 50	00 00	00 05
47	47860			21 30	21 47	22 07	22 14	22 22	→	→	22 30	22 45	23 02	23 20								
48	48860	21 55	22 10	→	→	→	→	→	22 45	22 59	→	→	23 07	23 25								
41	41820			22 00	22 17	22 37	22 44	22 52	→	→	23 00	23 15	23 32	23 50	23 55	00 05	00 20	00 30	00 36	00 45	00 55	01 00
48	48890	22 55	23 10	→	→	→	→	→	23 45	23 59	→	→	00 07	00 25								
47	47910			23 00	23 12	23 32	23 39	23 47	→	→	23 55	00 10	00 27	00 45								

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

WESTBOUND / EN DIRECTION OUEST

Route Number / Numéro du trajet	Trip Number / Numéro du parcours	Zone→	Pickering 91 Dp	Pickering 91	Scarborough 89	Scarborough 89	Scarborough 7	North York 5	Richmond Hill 60	Vaughan 19 Ar	Vaughan 19 Dp	Brampton 32	Mississauga 20	Mississauga 21	Mississauga 22	Mississauga 22	Oakville 13	Oakville 14	Burlington 16	Hamilton 18	Hamilton 18	Puslinch 39	Guelph 39 Ar
			Pickering GO	Pickering GO	Kingston Rd. @ Fairport Rd.	University of Toronto Scarborough	Centennial College	Scarborough Centre Bus Terminal	Consumers Rd. Business Park	Richmond Hill Centre	Hwy. 407 Bus Terminal	Hwy. 407 Bus Terminal	Bramalea GO	Square One	Erin Mills Transitway Station	Hurontario St. @ Hwy. 407	Meadowvale GO	Trafalgar Rd. @ Hwy. 407	Bronte Rd. @ Hwy. 407	Dundas St. @ Hwy. 407	McMaster University	Hamilton GO Centre	Brock Rd. @ McLean Rd. (Aberfoyle)	University of Guelph
47	47021										04 40	04 55	05 20	05 28	→	→	05 35	05 43	05 51	06 10	06 25		
47	47061										05 40	05 55	06 20	06 28	→	→	06 38	06 46	06 56	07 15	07 30		
48	48061										05 45	06 00	→	→	06 12	06 35	→	→	→	→	→	07 05	07 25
47	47071										06 00	06 15	06 40	06 48	→	→	06 58	07 06	07 16	07 40	07 55		
47G	47035													07 00	→	→	07 10	07 18	07 28	07 50			
41	41041		05 00	05 05	05 15	05 25	05 35	05 47	06 02	06 15	06 20	06 35	07 00	07 08	→	→	07 18	07 26	07 36	08 00	08 15		
47D	47043										06 25	06 47	07 10	→	→	→	→	→	→	07 50			
47	47081										06 35	06 50	07 15	07 23	→	→	07 33	07 41	07 51	08 15	08 30		
48	48121										06 45	07 02	→	→	07 17	07 40	→	→	→	→	→	08 20	08 40
47D	47053										06 45	07 02	07 30	→	→	→	→	→	→	08 10			
47G	47055													07 30	→	→	07 40	07 48	07 58	08 20			
41	41061		05 25	05 30	05 40	05 52	06 05	06 17	06 32	06 45	06 50	07 07	07 35	07 43	→	→	07 53	08 01	08 11	08 40	08 55		
47	47091										07 05	07 22	07 50	07 58	→	→	08 08	08 16	08 26	08 55	09 10		
47D	47093										07 10	07 27	07 55	→	→	→	→	→	→	08 35			
41	41091		05 50	05 55	06 05	06 17	06 30	06 42	06 57	07 10	07 15	07 32	08 00	08 08	→	→	08 18	08 26	08 36	09 05	09 20		
47D	47103										07 25	07 42	08 10	→	→	→	→	→	→	08 50			
47	47111										07 30	07 47	08 15	08 23	→	→	08 33	08 41	08 51	09 20	09 35		
48	48181										07 45	08 02	→	→	08 17	08 40	→	→	→	→	→	09 25	09 45
47D	47113										07 45	08 02	08 30	→	→	→	→	→	→	09 10			
41	41111		06 25	06 30	06 40	06 52	07 05	07 17	07 32	07 45	07 50	08 07	08 35	08 43	→	→	08 53	09 01	09 11	09 40	09 55		
47D	47123										08 05	08 22	08 50	→	→	→	→	→	→	09 30			
47	47131										08 15	08 32	09 00	09 08	→	→	09 18	09 26	09 36	10 05	10 20		
41	41141		06 55	07 00	07 12	07 26	07 40	07 55	08 12	08 25	08 30	08 47	09 15	09 23	→	→	09 33	09 41	09 51	10 20	10 35		
47D	47153										08 40	08 55	09 20	→	→	→	→	→	→	10 00			
48	48231										08 45	09 02	→	→	09 17	09 40	→	→	→	→	→	10 15	10 35
47	47181										08 45	09 00	09 25	09 33	→	→	09 43	09 51	10 01	10 25	10 40		
41	41161		07 25	07 30	07 42	07 56	08 10	08 25	08 42	08 55	09 00	09 15	09 40	09 48	→	→	09 58	10 06	10 16	10 40	10 55		
47D	47183										09 10	09 25	09 25	→	→	→	→	→	→	10 30			
47	47201										09 15	09 30	09 55	10 03	→	→	10 13	10 21	10 31	10 55	11 10		
41	41191		07 55	08 00	08 12	08 26	08 40	08 55	09 12	09 25	09 30	09 45	10 10	10 18	→	→	10 28	10 36	10 46	11 10	11 25		
47D	47203										09 40	09 55	10 20	→	→	→	→	→	→	11 00			
48	48271										09 45	10 00	→	→	10 12	10 35	→	→	→	→	→	11 10	11 30
47	47211										09 45	10 00	10 25	10 33	→	→	10 43	10 51	11 01	11 25	11 40		
41	41211		08 25	08 30	08 42	08 56	09 10	09 25	09 42	09 55	10 00	10 15	10 40	10 48	→	→	10 58	11 06	11 16	11 40	11 55		
47	47221										10 15	10 30	10 55	11 03	→	→	11 13	11 21	11 31	11 55	12 10		
41	41241		09 00	09 05	09 15	09 27	09 40	09 52	10 07	10 20	10 25	10 40	11 05	11 13	→	→	11 23	11 31	11 41	12 05	12 20		
47	47251										10 40	10 55	11 20	11 28	→	→	11 38	11 46	11 56	12 20	12 35		
48	48311										10 45	11 00	→	→	11 12	11 35	→	→	→	→	→	12 10	12 30
41	41261		09 35	09 40	09 50	10 02	10 15	10 27	10 42	10 55	11 00	11 15	11 40	11 48	→	→	11 58	12 06	12 16	12 40	12 55		
41	41281		10 10	10 15	10 25	10 37	10 50	11 02	11 17	11 30	11 35	11 50	12 15	12 23	→	→	12 33	12 41	12 51	13 15	13 30		
48	48351										11 45	12 00	→	→	12 12	12 35	→	→	→	→	→	13 10	13 30
41	41301		10 40	10 45	10 55	11 07	11 20	11 32	11 47	12 00	12 05	12 20	12 45	12 53	→	→	13 03	13 11	13 21	13 45	14 00		
41	41321		11 10	11 15	11 25	11 37	11 50	12 02	12 17	12 30	12 35	12 50	13 15	13 23	→	→	13 33	13 41	13 51	14 15	14 30		
48	48391										12 45	13 00	→	→	13 12	13 35	→	→	→	→	→	14 10	14 30
41	41341		11 40	11 45	11 55	12 07	12 20	12 32	12 47	13 00	13 05	13 20	13 45	13 53	→	→	14 03	14 11	14 21	14 45	15 00		
41	41361		12 05	12 10	12 20	12 32	12 45	12 57	13 12	13 25	13 30	13 45	14 10	14 18	→	→	14 28	14 36	14 46	15 10	15 25		
48	48431										13 45	14 00	→	→	14 12	14 35	→	→	→	→	→	15 15	15 35
41	41371		12 30	12 35	12 45	12 57	13 10	13 22	13 37	13 50	13 55	14 10	14 35	14 43	→	→	14 53	15 01	15 11	15 35	15 50		
41	41391		13 00	13 05	13 15	13 27	13 40	13 52	14 07	14 20	14 25	14 40	15 10	15 18	→	→	15 28	15 36	15 46	16 10	16 25		

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

WESTBOUND / EN DIRECTION OUEST

Route Number / Numéro du trajet	Trip Number / Numéro du parcours	Zone→	Pickering 91 Dp	Pickering 91	Scarborough 89	Scarborough 89	Scarborough 7	North York 5	Richmond Hill 60	Vaughan 19 Ar	Vaughan 19 Dp	Brampton 32	Mississauga 20	Mississauga 21	Mississauga 22	Mississauga 22	Oakville 13	Oakville 14	Burlington 16	Hamilton 18	Hamilton 18	Puslinch 39	Guelph 39 Ar
			Pickering GO	Pickering GO	Kingston Rd. @ Fairport Rd.	University of Toronto Scarborough	Centennial College	Scarborough Centre Bus Terminal	Consumers Rd. Business Park	Richmond Hill Centre	Hwy. 407 Bus Terminal	Hwy. 407 Bus Terminal	Bramalea GO	Square One	Erin Mills Transitway Station	Hurontario St. @ Hwy. 407	Meadowvale GO	Trafalgar Rd. @ Hwy. 407	Bronte Rd. @ Hwy. 407	Dundas St. @ Hwy. 407	McMaster University	Hamilton GO Centre	Brock Rd. @ McLean Rd. (Aberfoyle)	University of Guelph
48	48471										14 45	15 05	→	→	15 17	15 40	→	→	→	→	→	16 20	16 40
41	41411		13 25	13 30	13 40	13 52	14 05	14 17	14 32	14 45	14 50	15 05	15 35	15 43	→	→	15 53	16 01	16 11	16 40	16 55		
41A	41423		13 35	13 40	13 50	14 02	→	14 17	→	14 40	14 40	14 55	15 25										
41	41431		13 50	13 55	14 05	14 17	14 30	14 42	14 57	15 10	15 15	15 30	16 05	16 13	→	→	16 23	16 31	16 41	17 10	17 25		
41A	41443		14 20	14 25	14 37	14 51	→	15 06	→	15 30	15 30	15 45	16 20										
48	48531										15 45	16 05	→	→	16 17	16 40	→	→	→	→	→	17 20	17 40
41	41451		14 25	14 30	14 42	14 56	15 10	15 22	15 37	15 50	15 55	16 15	16 50	16 58	→	→	17 08	17 16	17 26	17 55	18 10		
41A	41463		14 45	14 50	15 02	15 16	→	15 32	→	16 00	16 00	16 20	16 55										
47	47561										16 15	16 35	17 10	17 18	→	→	17 28	17 36	17 46	18 15	18 30		
41	41471		14 55	15 00	15 12	15 26	15 40	15 53	16 12	16 25	16 30	16 55	17 30	17 38	→	→	17 48	17 56	18 06	18 35	18 50		
41A	41493		15 20	15 25	15 37	15 51	→	16 10	→	16 40	16 40	17 05	17 35										
47	47591										16 45	17 10	17 45	17 53	→	→	18 03	18 11	18 21	18 50	19 05		
48	48591										16 45	17 10	→	→	17 22	17 45	→	→	→	→	→	18 25	18 45
41	41501		15 25	15 30	15 42	15 56	16 10	16 23	16 42	16 55	17 00	17 25	18 00	18 08	→	→	18 18	18 26	18 36	19 05	19 20		
41A	41513		15 55	16 00	16 12	16 26	→	16 45	→	17 15	17 15	17 40	18 10										
47	47621										17 20	17 45	18 20	18 28	→	→	18 38	18 46	18 56	19 25	19 40		
41	41521		16 00	16 05	16 17	16 31	16 45	16 58	17 17	17 30	17 35	18 00	18 30	18 38	→	→	18 48	18 56	19 06	19 30	19 45		
48	48651										17 45	18 05	→	→	18 17	18 40	→	→	→	→	→	19 15	19 35
41A	41533		16 25	16 30	16 45	17 00	→	17 20	→	17 45	17 45	18 05	18 35										
47	47651										17 50	18 15	18 45	18 53	→	→	19 03	19 11	19 21	19 45	20 00		
41	41541		16 30	16 35	16 50	17 05	17 20	17 33	17 52	18 05	18 10	18 30	19 00	19 08	→	→	19 18	19 26	19 36	19 55	20 10		
41A	41573		16 55	17 00	17 15	17 30	→	17 50	→	18 15	18 15	18 35	19 05										
47	47671										18 25	18 45	19 15	19 23	→	→	19 33	19 41	19 51	20 10	20 25		
41	41601		17 05	17 10	17 25	17 40	17 55	18 07	18 22	18 35	18 40	18 55	19 25	19 33	→	→	19 43	19 51	20 01	20 20	20 35		
48	48691										18 45	19 00	→	→	19 12	19 35	→	→	→	→	→	20 10	20 30
41A	41633		17 30	17 35	17 47	18 01	→	18 20	→	18 45	18 45	19 05	19 30										
41	41641		17 35	17 40	17 52	18 06	18 20	18 32	18 47	19 00	19 05	19 20	19 50	19 58	→	→	20 08	20 16	20 26	20 45	21 00		
41A	41663		18 05	18 10	18 22	18 36	→	18 51	→	19 15	19 15	19 30	19 55										
41	41671		18 10	18 15	18 27	18 41	18 55	19 07	19 22	19 35	19 40	19 55	20 25	20 33	→	→	20 43	20 51	21 01	21 20	21 35		
48	48731										19 45	20 00	→	→	20 12	20 35	→	→	→	→	→	21 05	21 25
41A	41703		19 05	19 10	19 20	19 32	→	19 47	→	20 10	20 10	20 25	20 50										
41	41711		19 10	19 15	19 25	19 37	19 50	20 02	20 17	20 30	20 35	20 50	21 15	21 23	→	→	21 33	21 41	21 51	22 10	22 25		
48	48771										20 45	21 00	→	→	21 12	21 35	→	→	→	→	→	22 05	22 25
41A	41743		20 05	20 10	20 20	20 32	→	20 47	→	21 10	21 10	21 25	21 50										
41	41751		20 10	20 15	20 25	20 37	20 50	21 02	21 17	21 30	21 35	21 50	22 15	22 23	→	→	22 33	22 41	22 51	23 10	23 25		
48	48811										21 45	22 00	→	→	22 12	22 30	→	→	→	→	→	23 00	23 20
41	41781		21 10	21 15	21 25	21 35	21 45	21 55	22 07	22 20	22 25	22 40	23 05	23 13	→	→	23 20	23 28	23 36	23 55	00 10		
48	48841										22 45	23 00	→	→	23 12	23 30	→	→	→	→	→	00 00	00 20
41	41811		22 10	22 15	22 25	22 35	22 45	22 55	23 07	23 20	23 25	23 40	00 05	00 13	→	→	00 20	00 28	00 36	00 55	01 10		
48	48871										23 45	00 00	→	→	00 12	00 30	→	→	→	→	→	01 00	01 20
47	47881										00 10	00 25	00 50	00 58	→	→	01 05	01 13	01 21	01 40	01 55		
48	48901										00 45	01 00	→	→	01 12	01 30	→	→	→	→	→	02 00	02 20
47	47921										01 10	01 25	01 50	01 58	→	→	02 05	02 13	02 21	02 40	02 55		

Saturday and Sunday
Samedi et dimanche

EASTBOUND / EN DIRECTION EST

Route Number / Numéro du trajet	Trip Number / Numéro du parcours	Zone→	Hamilton 18 Dp	Hamilton 18	Burlington 16	Oakville 14	Oakville 13	Mississauga 21	Mississauga 20	Brampton 32	Vaughan 19	Vaughan 19 Ar
			Hamilton GO Centre	**McMaster University**	**Dundas St. @ Hwy. 407**	**Bronte Rd. @ Hwy. 407**	**Trafalgar Rd. @ Hwy. 407**	**Erin Mills Transitway Station**	**Square One**	**Bramalea GO**	**Hwy. 407 Bus Terminal**	**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	Trip Number / Numéro du parcours	Zone→	Vaughan 19 Dp	Vaughan 19	Brampton 32	Mississauga 20	Mississauga 21	Oakville 13	Oakville 14	Burlington 16	Hamilton 18	Hamilton 18 Ar
			Major Mackenzie W. Terminal	**Hwy. 407 Bus Terminal**	**Bramalea GO**	**Square One**	**Erin Mills Transitway Station**	**Trafalgar Rd. @ Hwy. 407**	**Bronte Rd. @ Hwy. 407**	**Dundas St. @ Hwy. 407**	**McMaster University**	**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 55	13 03	13 10	13 18	13 28	13 50	14 05
47W	47391		12 25	12 40	12 55	13 25	13 03	13 40	13 48	13 58	14 20	14 35
47	47411			13 10	13 25	13 55	14 03	14 10	14 18	14 28	14 50	15 05
47W	47431		13 25	13 40	13 55	14 25	14 33	14 40	14 48	14 58	15 20	15 35
47	47451			14 10	14 25	14 55	15 03	15 10	15 18	15 28	15 50	16 05
47W	47471		14 25	14 40	14 55	15 25	15 33	15 40	15 48	15 58	16 20	16 35
47	47491			15 10	15 25	15 55	16 03	16 10	16 18	16 28	16 50	17 05
47W	47521		15 25	15 40	15 55	16 25	16 33	16 40	16 48	16 58	17 20	17 35
47	47551			16 10	16 25	16 55	17 03	17 12	17 20	17 30	17 55	18 10
47W	47581		16 25	16 40	16 55	17 25	17 33	17 42	17 50	18 00	18 25	18 40
47	47611			17 10	17 25	17 55	18 03	18 12	18 20	18 30	18 55	19 10
47W	47641		17 25	17 40	17 55	18 25	18 33	18 42	18 50	19 00	19 25	19 40
47	47671			18 10	18 25	18 55	19 03	19 12	19 20	19 30	19 55	20 10
47W	47691		18 25	18 40	18 55	19 25	19 33	19 42	19 50	20 00	20 25	20 40
47	47711			19 10	19 25	19 55	20 03	20 12	20 20	20 30	20 55	21 10
47W	47731		19 25	19 40	19 55	20 20	20 28	20 37	20 45	20 55	21 20	21 35
47	47751			20 10	20 25	20 50	20 58	21 07	21 15	21 25	21 50	22 05
47W	47781		20 25	20 40	20 55	21 20	21 28	21 37	21 45	21 55	22 20	22 35
47	47791			21 10	21 25	21 50	21 58	22 05	22 13	22 23	22 45	23 00
47W	47811		21 25	21 40	21 55	22 20	22 28	22 35	22 43	22 51	23 10	23 25
47	47831			22 10	22 25	22 50	22 58	23 05	23 13	23 21	23 40	23 55
47W	47841		22 25	22 40	22 55	23 20	23 28	23 35	23 43	23 51	00 10	00 25
47	47851			23 10	23 25	23 50	23 58	00 05	00 13	00 21	00 40	00 55
47	47881			00 10	00 25	00 50	00 58	01 05	01 13	01 21	01 40	01 55
47	47911			01 10	01 25	01 50	01 58	02 05	02 13	02 21	02 40	02 55

Appendix D

Traffic Data

Turning Movement Counts

Spectrum

Turning Movement Count
Location Name: MCLEAN RD W & BROCK RD S (WELLINGTON RD 46)
Date: Tue, May 02, 2023 Deployment Lead: Walter Fugaj

Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

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 %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: MCLEAN RD W & BROCK RD S (WELLINGTON RD 46)
Date: Tue, May 02, 2023 Deployment Lead: Walter Fugaj

Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

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%		**-**

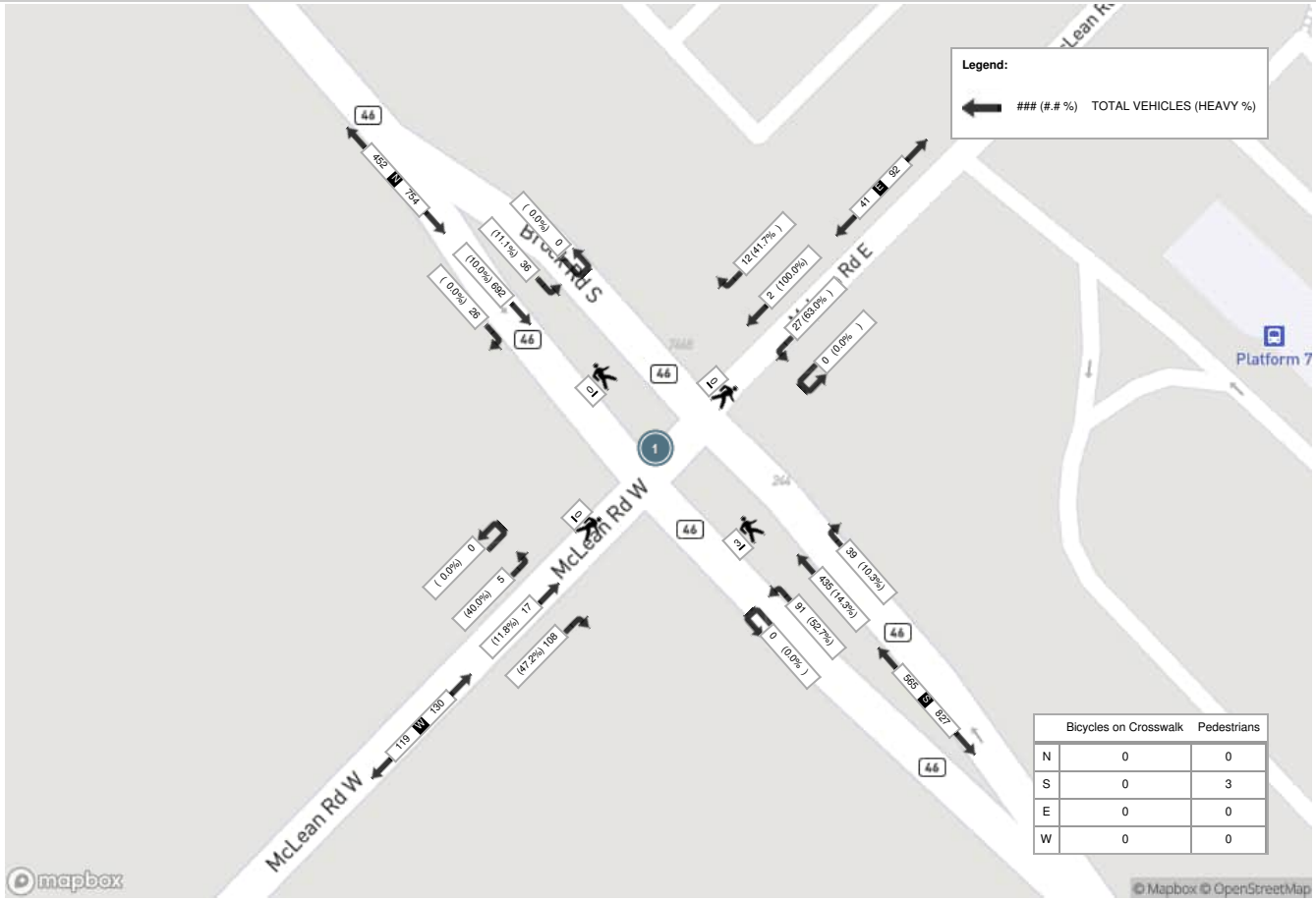
Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

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%		**-**

Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

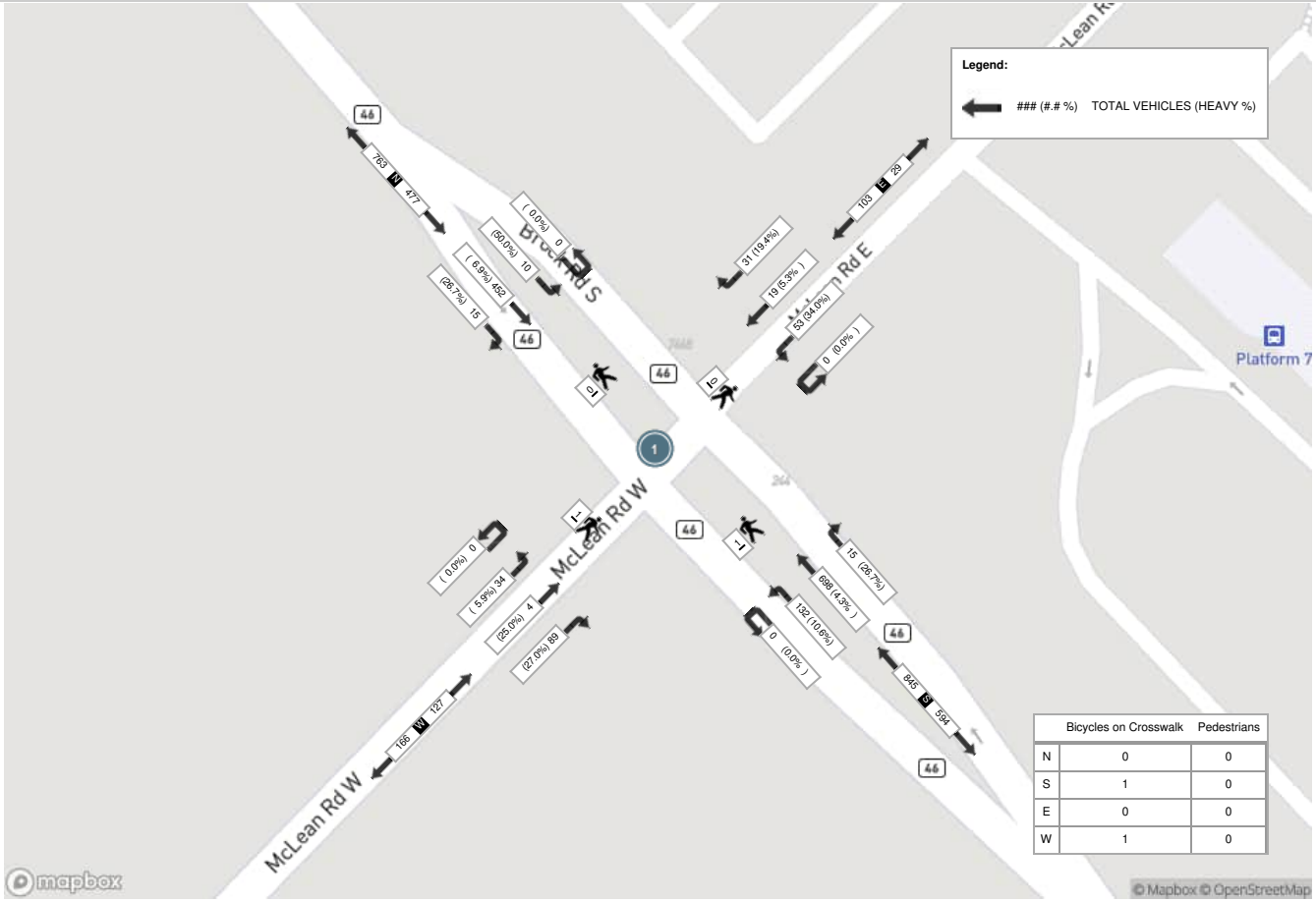
Peak Hour: 07:30 AM - 08:30 AM **Weather: Mist (1.86 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	0
S	0	3
E	0	0
W	0	0

Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

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



	Bicycles on Crosswalk	Pedestrians
N	0	0
S	1	0
E	0	0
W	1	0

Spectrum

Turning Movement Count
Location Name: NICHOLAS BEAVER RD & BROCK RD S (WELLINGTON RD 46)
Date: Tue, May 02, 2023 Deployment Lead: Walter Fugaj

Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

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 %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

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%		**-**

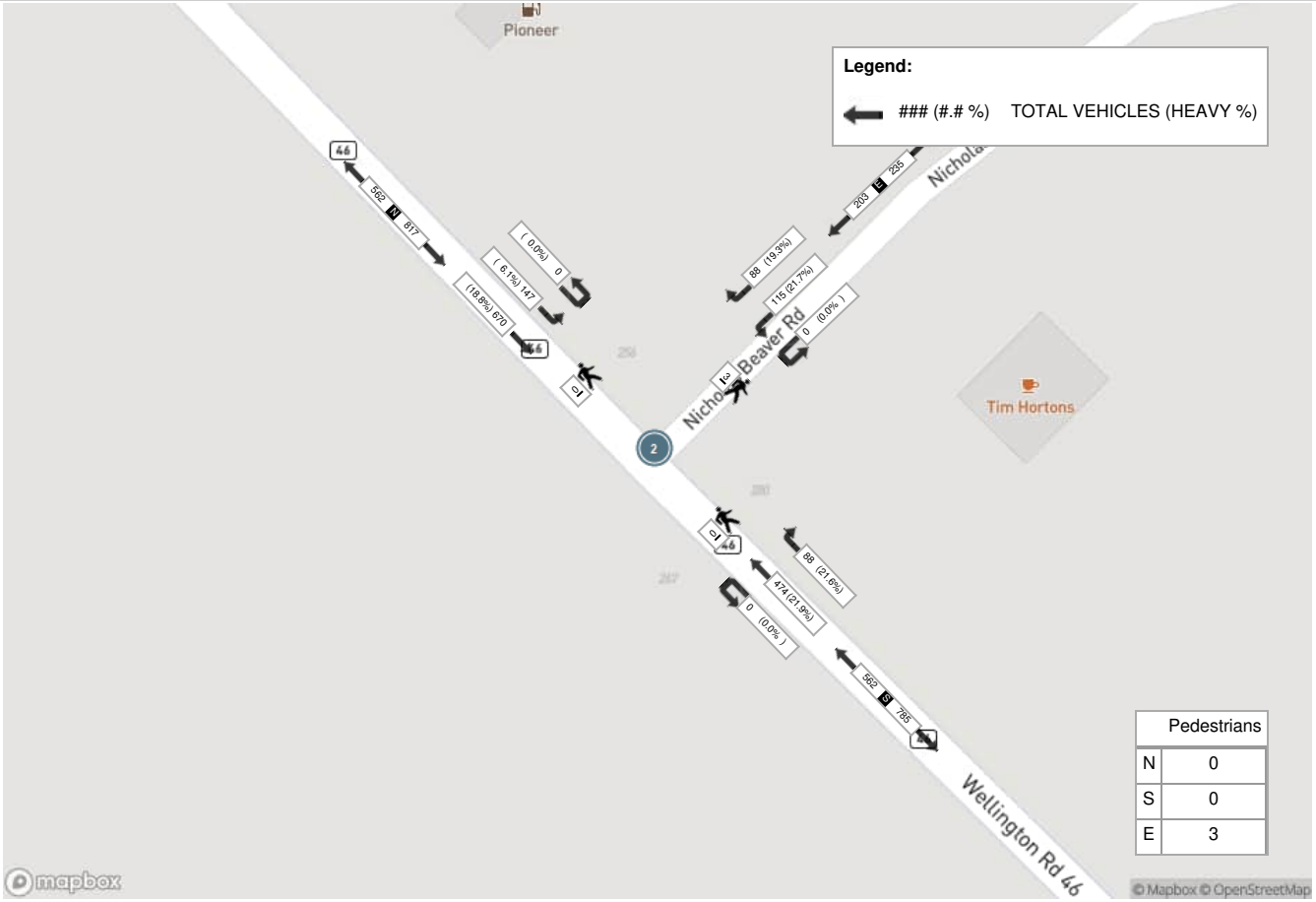
Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

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%		**-**

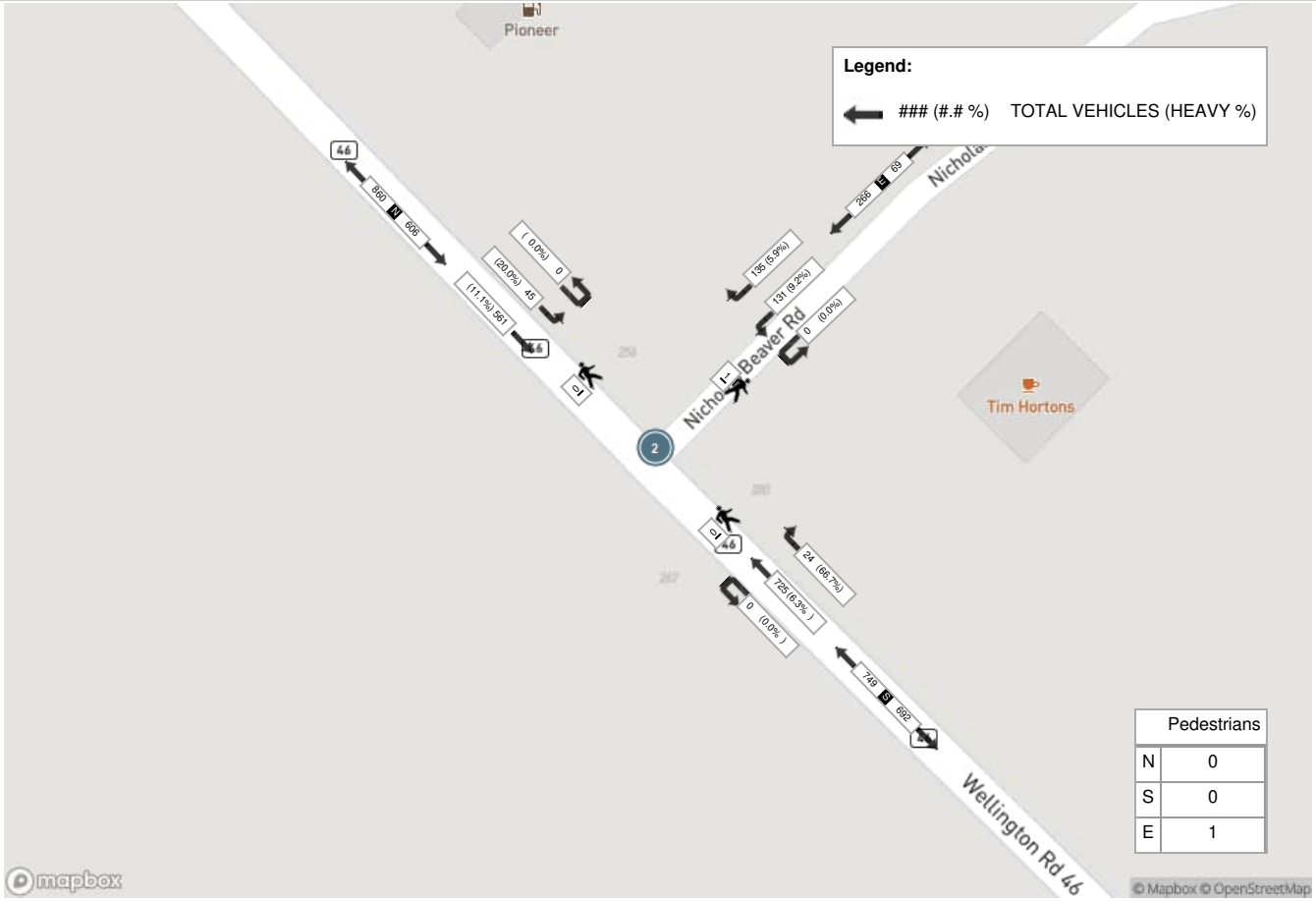
Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

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



Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

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



Signal Timing Plans

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

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	Signal Driver Phase/ Ovlap	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

```
               Enable BIU: 1  2  3  4  5  6  7  8
Terminal/Facilities. . . . . .  .  .  .  .  .  .  .
Detector Rack. . . . . .  .  .  .  .  .  .  .  .

Type 2 Runs as Type 1. . .  .
MMU Disable. . . . . .  X
Diagnostic Enable. . . . .  .
Peer-Peer Comm Enable. . .  .

                             1    2    3    4    5    6    7    8    9   10
Peer To Peer Addresses . . 255  255  255  255  255  255  255  255  255  255
```

Port 2:

```
Port 2 Protocol . . . . . Terminal
Port 2 Enable . . . . . YES
AB3418 Address. . . . . 0
AB3418 Group Address. . . . . 0
AB3418 Response Delay . . . . . 0
AB3418 Single Flag Enable . . . NO
AB3418 Drop-Out Time. . . . . 0
AB3418 TOD SF Select. . . . . 0
Data Rate . . . . . 1200 bps
Data, Parity, Stop. . . . . 8, 0, 1
```

Port 3:

```
Port 3 Protocol . . . . . Telemetry
Port 3 Enable . . . . . NO
Telemetry Address . . . . . 0
System Detector 9-16 Address. . 0
Telemetry Response Delay. . . . 6000
AB3418 Address. . . . . 0
AB3418 Group Address. . . . . 0
AB3418 Response Delay . . . . . 0
AB3418 Single Flag Enable . . . NO
AB3418 Drop-Out Time. . . . . 0
AB3418 TOD SF Select. . . . . 0
Duplex. . . . . Full
Data Rate . . . . . 1200 bps
Data, Parity, Stop. . . . . 8, 0, 1
```

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

Configuration Continued

Event Enabling		Alarm Enabling	
Critical RFE'S (MMU/TF)	.	ALARM 1	.
Non-Critical RFE'S (DET/TEST)	.	ALARM 2	.
Detector Errors	.	ALARM 3	.
Coordination Errors	.	ALARM 4	.
MMU Flash Faults.	.	ALARM 5	.
Local Flash Faults.	.	ALARM 6	.
Preempt	.	ALARM 7	.
Power On/Off.	.	ALARM 8	.
Low Battery	.	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	C000

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

By-Phase Timing Data

	Phase											
Direction	1	2	3	4	5	6	7	8	9	10	11	12
Minimum Green	8	40	5	15	8	40	5	15	5	5	5	5
Bike Min Green	0	0	0	0	0	0	0	0	0	0	0	0
Cond Serv Min Grn	0	0	0	0	0	0	0	0	0	0	0	0
Walk	0	5	0	5	0	5	0	5	0	10	0	10
Ped Clearance	0	7	0	7	0	7	0	7	0	16	0	16
Veh Extension	3.0	5.0	5.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0
Alt Veh Exten	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Extension	0	0	0	0	0	0	0	0	0	0	0	0
Max 1	14	40	35	24	14	40	35	24	35	35	35	35
Max 2	40	40	40	20	40	40	40	20	40	40	40	40
Max 3	0	0	0	0	0	0	0	0	0	0	0	0
Det. Fail Max	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Change	3.0	5.0	3.0	5.0	3.0	5.0	3.0	5.0	3.0	3.0	3.0	3.0
Red Clearance	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	1.0	1.0	1.0	1.0
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Act. B4 Init	0	0	0	0	0	0	0	0	0	0	0	0
Sec/Actuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Initial	30	30	30	30	30	30	30	30	30	30	30	30
Time B4 Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Cars Waiting	0	0	0	0	0	0	0	0	0	0	0	0
Time To Reduce	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Gap	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

No-Serve Phases

	Phase Cannot Serve With Phase										
Phase	12	11	10	9	8	7	6	5	4	3	2
1.	.	.	.	.	.	.	.	.	.	.	.
2.	.	.	.	.	.	.	.	.	.	.	
3.	.	.	.	.	.	.	.	.	.		
4.	.	.	.	.	.	.	.	.			
5.	.	.	.	.	.	.	.				
6.	.	.	.	.	.	.					
7.	.	.	.	.	.						
8.	.	.	.	.							
9.	.	.	.								
10.	.	.									
11.	.										

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

Vehicle/Ped Phase as Overlap

Ped Phase As Overlap
Consists of Ped Phases

Ped Ovlap Phase	1	2	3	4	5	6	7	8	9	10	11	12
1	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	.

Veh Phase As Overlap
Consists of Veh Phases

Veh Ovlap Phase	1	2	3	4	5	6	7	8	9	10	11	12
1	X	.	.	.	.	.	.	.	.	.	.	.
2	.	X	.	.	.	.	.	.	.	.	.	.
3	.	.	X	.	.	.	.	.	.	.	.	.
4	.	.	.	X	.	.	.	.	.	.	.	.
5	.	.	.	.	X	.	.	.	.	.	.	.
6	.	.	.	.	.	X	.	.	.	.	.	.
7	.	.	.	.	.	.	X	.	.	.	.	.
8	.	.	.	.	.	.	.	X	.	.	.	.
9	.	.	.	.	.	.	.	.	X	.	.	.
10	.	.	.	.	.	.	.	.	.	X	.	.
11	.	.	.	.	.	.	.	.	.	.	X	.
12	.	.	.	.	.	.	.	.	.	.	.	X

Overlap Data

Overlap A	Phase: 1	2	3	4	5	6	7	8	9	10	11	12
Standard.	.	.	.	.	.	.	.	.	.	.	.	.
Protected	.	.	.	.	.	.	.	.	.	.	.	.
Permitted	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lag.	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lead	.	.	.	.	.	.	.	.	.	.	.	.
Spare	.	.	.	.	.	.	.	.	.	.	.	.

Advance Green Timer 0.0

	Green	Yellow	Red
Lag/Lead Timers	0.0	0.0	0.0

Overlap B	Phase: 1	2	3	4	5	6	7	8	9	10	11	12
Standard.	.	.	.	.	.	.	.	.	.	.	.	.
Protected	.	.	.	.	.	.	.	.	.	.	.	.
Permitted	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lag.	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lead	.	.	.	.	.	.	.	.	.	.	.	.
Spare	.	.	.	.	.	.	.	.	.	.	.	.

Advance Green Timer 0.0

	Green	Yellow	Red
Lag/Lead Timers	0.0	0.0	0.0

Overlap C	Phase: 1	2	3	4	5	6	7	8	9	10	11	12
Standard.	.	.	.	.	.	.	.	.	.	.	.	.
Protected	.	.	.	.	.	.	.	.	.	.	.	.
Permitted	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lag.	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lead	.	.	.	.	.	.	.	.	.	.	.	.
Spare	.	.	.	.	.	.	.	.	.	.	.	.

Advance Green Timer 0.0

	Green	Yellow	Red
Lag/Lead Timers	0.0	0.0	0.0

Overlap D	Phase: 1	2	3	4	5	6	7	8	9	10	11	12
Standard.	.	.	.	.	.	.	.	.	.	.	.	.
Protected	.	.	.	.	.	.	.	.	.	.	.	.
Permitted	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lag.	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lead	.	.	.	.	.	.	.	.	.	.	.	.
Spare	.	.	.	.	.	.	.	.	.	.	.	.

Advance Green Timer 0.0

	Green	Yellow	Red
Lag/Lead Timers	0.0	0.0	0.0

Power Start, Remote Flash

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

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

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						

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

Recall Data, Dimming

	Phase											
	1	2	3	4	5	6	7	8	9	10	11	12
Locking Detector. . . .	.	.	.	.	.	.	.	.	.	.	.	.
Vehicle Recall.	.	X	.	.	.	X	.	.	.	.	.	.
Pedestrian Recall . . .	.	.	.	.	.	.	.	.	.	.	.	.
Recall To Max	.	.	.	.	.	.	.	.	.	.	.	.
Soft Recall	.	.	.	.	.	.	.	.	.	.	.	.
Don't Rest Here	.	.	.	.	.	.	.	.	.	.	.	.
Ped Dark if No Call . .	.	.	.	.	.	.	.	.	.	.	.	.

Dimming:

	Load Switch															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Green/Walk. . . .	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Yellow/Ped Clear.	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Red/Don't Walk. .	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

Detector Type/Timers

Det.	Locking Memory	Log Enable	Timers Extend	Timers Delay	Don't Reset Extend	Type
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 49: Detector 49
Det 34: Detector 34	Det 50: Detector 50
Det 35: Detector 35	Det 51: Detector 51
Det 36: Detector 36	Det 52: Detector 52
Det 37: Detector 37	Det 53: Detector 53
Det 38: Detector 38	Det 54: Detector 54
Det 39: Detector 39	Det 55: Detector 55
Det 40: Detector 40	Det 56: Detector 56
Det 41: Detector 41	Det 57: Detector 57
Det 42: Detector 42	Det 58: Detector 58
Det 43: Detector 43	Det 59: Detector 59
Det 44: Detector 44	Det 60: Detector 60
Det 45: Detector 45	Det 61: Detector 61
Det 46: Detector 46	Det 62: Detector 62
Det 47: Detector 47	Det 63: Detector 63
Det 48: Detector 48	Det 64: Detector 64

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Detector Phase Assignment

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

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Detector Cross Switching

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

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Detector Cross Switching

	Phase											
Det.	1	2	3	4	5	6	7	8	9	10	11	12
33	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.
37	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	.	.	.	.	.	.	.
40	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.
43	.	.	.	.	.	.	.	.	.	.	.	.
44	.	.	.	.	.	.	.	.	.	.	.	.
45	.	.	.	.	.	.	.	.	.	.	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.
51	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	.	.
56	.	.	.	.	.	.	.	.	.	.	.	.
57	.	.	.	.	.	.	.	.	.	.	.	.
58	.	.	.	.	.	.	.	.	.	.	.	.
59	.	.	.	.	.	.	.	.	.	.	.	.
60	.	.	.	.	.	.	.	.	.	.	.	.
61	.	.	.	.	.	.	.	.	.	.	.	.
62	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	.	.	.	.	.	.	.	.
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

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Diagnostic Plans/Fail Action

	Detector															
Plan	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

	Detector															
Plan	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 Tiime from By-Phase Timing Data

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

Diagnostic Plans/Fail Action

	Detector															
Plan	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	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

	Detector															
Plan	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	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 Tiime from By-Phase Timing Data

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Ped Diagnostic Plans

Plan		1	2	3	4	5	6	7	8	9	10	11	12
1	Diagnostic	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
2	Diagnostic	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
3	Diagnostic	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
4	Diagnostic	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
5	Diagnostic	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
6	Diagnostic	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
7	Diagnostic	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
8	Diagnostic	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

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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.

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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

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

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	.	.	.	.	.	.	.	.	.	.	.	.

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

	A	B	C	D	E	F
Free Alternate Sequence . .	.	.	.	.	.	.

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

Preemptors

Preemptor 3

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

Preemptor 4

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

Preemptors

Preemptor 5

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

Preemptor 6

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

Bus Preemptors

	Bus Preemptor 1	2	3	4
Preemptor Active	.	.	.	.
Detector Lock	.	.	.	.
Maximum Time	0	0	0	0
Reservice Time	0	0	0	0
Delay Time	0	0	0	0
Inhibit Time	0	0	0	0
Entrance Green	0	0	0	0
Entrance Ped Clearance	0	0	0	0
Entrance Yellow	0.0	0.0	0.0	0.0
Entrance Red	0.0	0.0	0.0	0.0
Minimum Hold Time	0	0	0	0

	Hold Phases 1	2	3	4	5	6	7	8	9	10	11	12
Preemptor 1	.	.	.	.	.	.	.	.	.	.	.	.
Preemptor 2	.	.	.	.	.	.	.	.	.	.	.	.
Preemptor 3	.	.	.	.	.	.	.	.	.	.	.	.
Preemptor 4	.	.	.	.	.	.	.	.	.	.	.	.

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

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

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

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Prog	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
Prog	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

NIC Program Steps

Step	Program	Step Begins	Pattern	Override

Wellington County 1-12 46 & Mclean rd 11/4/2013 15:30

TOD Program Steps

Wellington county 12 -24 46 & Nicholas Beaver 7/4/2013 6:19

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	Signal Driver Phase/ Ovlap	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

```
               Enable BIU: 1  2  3  4  5  6  7  8
Terminal/Facilities. . . . . .  .  .  .  .  .  .  .
Detector Rack. . . . . .  .  .  .  .  .  .  .  .

Type 2 Runs as Type 1. . .  .
MMU Disable. . . . . .  X
Diagnostic Enable. . . . .  .
Peer-Peer Comm Enable. . .  .

                             1    2    3    4    5    6    7    8    9   10
Peer To Peer Addresses . . 255  255  255  255  255  255  255  255  255  255
```

Port 2:

```
Port 2 Protocol . . . . . Terminal
Port 2 Enable . . . . . YES
AB3418 Address. . . . . 0
AB3418 Group Address. . . . . 0
AB3418 Response Delay . . . . . 0
AB3418 Single Flag Enable . . . NO
AB3418 Drop-Out Time. . . . . 0
AB3418 TOD SF Select. . . . . 0
Data Rate . . . . . 1200 bps
Data, Parity, Stop. . . . . 8, 0, 1
```

Port 3:

```
Port 3 Protocol . . . . . Telemetry
Port 3 Enable . . . . . NO
Telemetry Address . . . . . 0
System Detector 9-16 Address. . 0
Telemetry Response Delay. . . . 8700
AB3418 Address. . . . . 0
AB3418 Group Address. . . . . 0
AB3418 Response Delay . . . . . 0
AB3418 Single Flag Enable . . . NO
AB3418 Drop-Out Time. . . . . 0
AB3418 TOD SF Select. . . . . 0
Duplex. . . . . Full
Data Rate . . . . . 1200 bps
Data, Parity, Stop. . . . . 8, 0, 1
```

Wellington county 12 -24 46 & Nicholas Beaver 7/4/2013 6:19

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	C000

Wellington county 12 -24 46 & Nicholas Beaver 7/4/2013 6:19

By-Phase Timing Data

	Phase											
Direction	1	2	3	4	5	6	7	8	9	10	11	12
Minimum Green	10	35	5	5	5	35	5	15	5	5	5	5
Bike Min Green	0	0	0	0	0	0	0	0	0	0	0	0
Cond Serv Min Grn	0	0	0	0	0	0	0	0	0	0	0	0
Walk	0	5	0	5	0	5	0	3	0	10	0	10
Ped Clearance	0	7	0	7	0	7	0	7	0	16	0	16
Veh Extension	5.0	0.0	5.0	5.0	0.0	0.0	5.0	5.0	5.0	5.0	5.0	5.0
Alt Veh Exten	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Extension	0	0	0	0	0	0	0	0	0	0	0	0
Max 1	35	45	35	20	35	45	35	25	35	35	35	35
Max 2	40	50	40	40	40	50	40	30	40	40	40	40
Max 3	0	0	0	0	0	0	0	40	0	0	0	0
Det. Fail Max	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Change	3.0	5.0	3.0	3.0	3.0	5.0	3.0	4.0	3.0	3.0	3.0	3.0
Red Clearance	1.0	2.0	1.0	1.0	1.0	2.0	1.0	2.0	1.0	1.0	1.0	1.0
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Act. B4 Init	0	0	0	0	0	0	0	0	0	0	0	0
Sec/Actuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Initial	30	30	30	30	30	30	30	30	30	30	30	30
Time B4 Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Cars Waiting	0	0	0	0	0	0	0	0	0	0	0	0
Time To Reduce	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Gap	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wellington county 12 -24 46 & Nicholas Beaver 7/4/2013 6:19

No-Serve Phases

	Phase Cannot Serve With Phase										
Phase	12	11	10	9	8	7	6	5	4	3	2
1.	.	.	.	.	.	.	.	.	.	.	.
2.	.	.	.	.	.	.	.	.	.	.	
3.	.	.	.	.	.	.	.	.	.		
4.	.	.	.	.	.	.	.	.			
5.	.	.	.	.	.	.	.				
6.	.	.	.	.	.	.					
7.	.	.	.	.	.						
8.	.	.	.	.							
9.	.	.	.								
10.	.	.									
11.	.										

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

Vehicle/Ped Phase as Overlap

Ped Phase As Overlap
Consists of Ped Phases

Ped Ovlap Phase	1	2	3	4	5	6	7	8	9	10	11	12
1	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	.

Veh Phase As Overlap
Consists of Veh Phases

Veh Ovlap Phase	1	2	3	4	5	6	7	8	9	10	11	12
1	X	.	.	.	.	.	.	.	.	.	.	.
2	.	X	.	.	.	.	.	.	.	.	.	.
3	.	.	X	.	.	.	.	.	.	.	.	.
4	.	.	.	X	.	.	.	.	.	.	.	.
5	.	.	.	.	X	.	.	.	.	.	.	.
6	.	.	.	.	.	X	.	.	.	.	.	.
7	.	.	.	.	.	.	X	.	.	.	.	.
8	.	.	.	.	.	.	.	X	.	.	.	.
9	.	.	.	.	.	.	.	.	X	.	.	.
10	.	.	.	.	.	.	.	.	.	X	.	.
11	.	.	.	.	.	.	.	.	.	.	X	.
12	.	.	.	.	.	.	.	.	.	.	.	X

Overlap Data

Overlap A	Phase: 1	2	3	4	5	6	7	8	9	10	11	12
Standard.	.	.	.	.	.	.	.	.	.	.	.	.
Protected	.	.	.	.	.	.	.	.	.	.	.	.
Permitted	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lag.	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lead	.	.	.	.	.	.	.	.	.	.	.	.
Spare	.	.	.	.	.	.	.	.	.	.	.	.

Advance Green Timer 0.0

	Green	Yellow	Red
Lag/Lead Timers	0.0	0.0	0.0

Overlap B	Phase: 1	2	3	4	5	6	7	8	9	10	11	12
Standard.	.	.	.	.	.	.	.	.	.	.	.	.
Protected	.	.	.	.	.	.	.	.	.	.	.	.
Permitted	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lag.	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lead	.	.	.	.	.	.	.	.	.	.	.	.
Spare	.	.	.	.	.	.	.	.	.	.	.	.

Advance Green Timer 0.0

	Green	Yellow	Red
Lag/Lead Timers	0.0	0.0	0.0

Overlap C	Phase: 1	2	3	4	5	6	7	8	9	10	11	12
Standard.	.	.	.	.	.	.	.	.	.	.	.	.
Protected	.	.	.	.	.	.	.	.	.	.	.	.
Permitted	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lag.	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lead	.	.	.	.	.	.	.	.	.	.	.	.
Spare	.	.	.	.	.	.	.	.	.	.	.	.

Advance Green Timer 0.0

	Green	Yellow	Red
Lag/Lead Timers	0.0	0.0	0.0

Overlap D	Phase: 1	2	3	4	5	6	7	8	9	10	11	12
Standard.	.	.	.	.	.	.	.	.	.	.	.	.
Protected	.	.	.	.	.	.	.	.	.	.	.	.
Permitted	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lag.	.	.	.	.	.	.	.	.	.	.	.	.
Enable Lead	.	.	.	.	.	.	.	.	.	.	.	.
Spare	.	.	.	.	.	.	.	.	.	.	.	.

Advance Green Timer 0.0

	Green	Yellow	Red
Lag/Lead Timers	0.0	0.0	0.0

Power Start, Remote Flash

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

Wellington county 12 -24 46 & Nicholas Beaver 7/4/2013 6:19

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						

Wellington county 12 -24 46 & Nicholas Beaver 7/4/2013 6:19

Recall Data, Dimming

	Phase											
	1	2	3	4	5	6	7	8	9	10	11	12
Locking Detector. . . .	.	.	.	.	.	.	.	.	.	.	.	.
Vehicle Recall.	.	X	.	.	.	X	.	.	.	.	.	.
Pedestrian Recall . . .	.	.	.	.	.	.	.	.	.	.	.	.
Recall To Max	.	.	.	.	.	.	.	.	.	.	.	.
Soft Recall	.	.	.	.	.	.	.	.	.	.	.	.
Don't Rest Here	.	.	.	.	.	.	.	.	.	.	.	.
Ped Dark if No Call . .	.	.	.	.	.	.	.	.	.	.	.	.

Dimming:

	Load Switch															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Green/Walk. . . .	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Yellow/Ped Clear.	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Red/Don't Walk. .	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Wellington county 12 -24 46 & Nicholas Beaver 7/4/2013 6:19

Detector Type/Timers

Det.	Locking Memory	Log Enable	Timers Extend	Timers Delay	Don't Reset Extend	Type
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 49: Detector 49
Det 34: Detector 34	Det 50: Detector 50
Det 35: Detector 35	Det 51: Detector 51
Det 36: Detector 36	Det 52: Detector 52
Det 37: Detector 37	Det 53: Detector 53
Det 38: Detector 38	Det 54: Detector 54
Det 39: Detector 39	Det 55: Detector 55
Det 40: Detector 40	Det 56: Detector 56
Det 41: Detector 41	Det 57: Detector 57
Det 42: Detector 42	Det 58: Detector 58
Det 43: Detector 43	Det 59: Detector 59
Det 44: Detector 44	Det 60: Detector 60
Det 45: Detector 45	Det 61: Detector 61
Det 46: Detector 46	Det 62: Detector 62
Det 47: Detector 47	Det 63: Detector 63
Det 48: Detector 48	Det 64: Detector 64

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Detector Phase Assignment

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

Detector Cross Switching

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

Wellington county 12 -24 46 & Nicholas Beaver 7/4/2013 6:19

Detector Cross Switching

	Phase											
Det.	1	2	3	4	5	6	7	8	9	10	11	12
33	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.
37	.	.	.	.	.	.	.	.	.	.	.	.
38	.	.	.	.	.	.	.	.	.	.	.	.
39	.	.	.	.	.	.	.	.	.	.	.	.
40	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.
43	.	.	.	.	.	.	.	.	.	.	.	.
44	.	.	.	.	.	.	.	.	.	.	.	.
45	.	.	.	.	.	.	.	.	.	.	.	.
46	.	.	.	.	.	.	.	.	.	.	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.
51	.	.	.	.	.	.	.	.	.	.	.	.
52	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.
55	.	.	.	.	.	.	.	.	.	.	.	.
56	.	.	.	.	.	.	.	.	.	.	.	.
57	.	.	.	.	.	.	.	.	.	.	.	.
58	.	.	.	.	.	.	.	.	.	.	.	.
59	.	.	.	.	.	.	.	.	.	.	.	.
60	.	.	.	.	.	.	.	.	.	.	.	.
61	.	.	.	.	.	.	.	.	.	.	.	.
62	.	.	.	.	.	.	.	.	.	.	.	.
63	.	.	.	.	.	.	.	.	.	.	.	.
64	.	.	.	.	.	.	.	.	.	.	.	.

Wellington county 12 -24 46 & Nicholas Beaver 7/4/2013 6:19

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

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Diagnostic Plans/Fail Action

	Detector															
Plan	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

	Detector															
Plan	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 Tiime from By-Phase Timing Data

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Diagnostic Plans/Fail Action

		Detector														
Plan		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	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

		Detector															
Plan		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	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 Tiime from By-Phase Timing Data

Ped Diagnostic Plans

Plan		1	2	3	4	5	6	7	8	9	10	11	12
1	Diagnostic	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
2	Diagnostic	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
3	Diagnostic	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
4	Diagnostic	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
5	Diagnostic	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
6	Diagnostic	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
7	Diagnostic	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
8	Diagnostic	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

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.

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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

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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	.	.	.	.	.	.	.	.	.	.	.	.

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

	A	B	C	D	E	F
Free Alternate Sequence . .	.	.	.	.	.	.

Coordination Patterns

Preemptors

Preemptor 1

Active		Det Lock	
Priority Preemption		Yel-Red To Grn	
Outputs Only During Hold		Flash All Outputs	
Terminate Overlap ASAP		Terminate Phases	
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
		Ped Dark	
		Ped Active	
		Zero Ped Clr Time	
		Ped Clr Thru Yel	

	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	
Priority Preemption		Yel-Red To Grn	
Outputs Only During Hold		Flash All Outputs	
Terminate Overlap ASAP		Terminate Phases	
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
		Ped Dark	
		Ped Active	
		Zero Ped Clr Time	
		Ped Clr Thru Yel	

	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

Preemptors

Preemptor 3

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

Preemptor 4

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

Preemptors

Preemptor 5

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

Preemptor 6

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

Bus Preemptors

	Bus Preemptor 1	2	3	4
Preemptor Active	.	.	.	.
Detector Lock	.	.	.	.
Maximum Time	0	0	0	0
Reservice Time	0	0	0	0
Delay Time	0	0	0	0
Inhibit Time	0	0	0	0
Entrance Green	0	0	0	0
Entrance Ped Clearance	0	0	0	0
Entrance Yellow	0.0	0.0	0.0	0.0
Entrance Red	0.0	0.0	0.0	0.0
Minimum Hold Time	0	0	0	0

	Hold Phases 1	2	3	4	5	6	7	8	9	10	11	12
Preemptor 1	.	.	.	.	.	.	.	.	.	.	.	.
Preemptor 2	.	.	.	.	.	.	.	.	.	.	.	.
Preemptor 3	.	.	.	.	.	.	.	.	.	.	.	.
Preemptor 4	.	.	.	.	.	.	.	.	.	.	.	.

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

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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

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Prog	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
Prog	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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

Step 1 Program 1 Step Begins 0615

Flash.	Dimming Enable. . . . .
Red Rest	Alt Veh Extension . . .
Spare 5.	Det Log Enable. . . . .
Spare 3.	Spare 4 . . . . .
Type 0 Dly Enable. . .	Spare 2 . . . . .
Det Diag Plan. . . . 0	

	Phase Number											
	1	2	3	4	5	6	7	8	9	10	11	12
Max 2 Enable	.	.	.	.	.	.	.	.	.	.	.	.
Max 3 Enable	.	.	.	.	.	.	.	.	.	.	.	.
Veh Recall	X	.	.	.	.	.	.	.	.	.	.	.
Veh Max Recall	.	.	.	.	.	.	.	.	.	.	.	.
Ped Recall	.	.	.	.	.	.	.	.	.	.	.	.
Cond Service Inhibit. . . .	.	.	.	.	.	.	.	.	.	.	.	.
Phase Omit	.	.	.	.	.	.	.	.	.	.	.	.
Special Function	.	.	.	.	.	.	.	.				

	A	B	C	D	E	F
Alt Sequence	.	.	.	.	.	.

Step 2 Program 1 Step Begins 0915

Flash.	Dimming Enable. . . . .
Red Rest	Alt Veh Extension . . .
Spare 5.	Det Log Enable. . . . .
Spare 3.	Spare 4 . . . . .
Type 0 Dly Enable. . .	Spare 2 . . . . .
Det Diag Plan. . . . 0	

	Phase Number											
	1	2	3	4	5	6	7	8	9	10	11	12
Max 2 Enable	.	.	.	.	.	.	.	.	.	.	.	.
Max 3 Enable	.	.	.	.	.	.	.	.	.	.	.	.
Veh Recall	.	.	.	.	.	.	.	.	.	.	.	.
Veh Max Recall	.	.	.	.	.	.	.	.	.	.	.	.
Ped Recall	.	.	.	.	.	.	.	.	.	.	.	.
Cond Service Inhibit. . . .	.	.	.	.	.	.	.	.	.	.	.	.
Phase Omit	X	.	.	.	.	.	.	.	.	.	.	.
Special Function	.	.	.	.	.	.	.	.				

	A	B	C	D	E	F
Alt Sequence	.	.	.	.	.	.

TOD Program Steps

Step 3 Program 1 Step Begins 1700

Flash. . . . . . Dimming Enable. . . . .
Red Rest . . . . . . Alt Veh Extension . . .
Spare 5. . . . . . Det Log Enable. . . . .
Spare 3. . . . . . Spare 4 . . . . . .
Type 0 Dly Enable. . . Spare 2 . . . . . .
Det Diag Plan. . . . 0

	Phase Number											
	1	2	3	4	5	6	7	8	9	10	11	12
Max 2 Enable	.	.	.	.	.	.	.	X	.	.	.	.
Max 3 Enable	.	.	.	.	.	.	.	X	.	.	.	.
Veh Recall	.	.	.	.	.	.	.	.	.	.	.	.
Veh Max Recall	.	.	.	.	.	.	.	.	.	.	.	.
Ped Recall	.	.	.	.	.	.	.	.	.	.	.	.
Cond Service Inhibit	.	.	.	.	.	.	.	.	.	.	.	.
Phase Omit	.	.	.	.	.	.	.	.	.	.	.	.
Special Function	.	.	.	.	.	.	.	.				

	A	B	C	D	E	F
Alt Sequence	.	.	.	.	.	.

Step 4 Program 1 Step Begins 1900

Flash. . . . . . Dimming Enable. . . . .
Red Rest . . . . . . Alt Veh Extension . . .
Spare 5. . . . . . Det Log Enable. . . . .
Spare 3. . . . . . Spare 4 . . . . . .
Type 0 Dly Enable. . . Spare 2 . . . . . .
Det Diag Plan. . . . 0

	Phase Number											
	1	2	3	4	5	6	7	8	9	10	11	12
Max 2 Enable	.	.	.	.	.	.	.	.	.	.	.	.
Max 3 Enable	.	.	.	.	.	.	.	.	.	.	.	.
Veh Recall	.	.	.	.	.	.	.	.	.	.	.	.
Veh Max Recall	.	.	.	.	.	.	.	.	.	.	.	.
Ped Recall	.	.	.	.	.	.	.	.	.	.	.	.
Cond Service Inhibit	.	.	.	.	.	.	.	.	.	.	.	.
Phase Omit	.	.	.	.	.	.	.	.	.	.	.	.
Special Function	.	.	.	.	.	.	.	.				

	A	B	C	D	E	F
Alt Sequence	.	.	.	.	.	.

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**

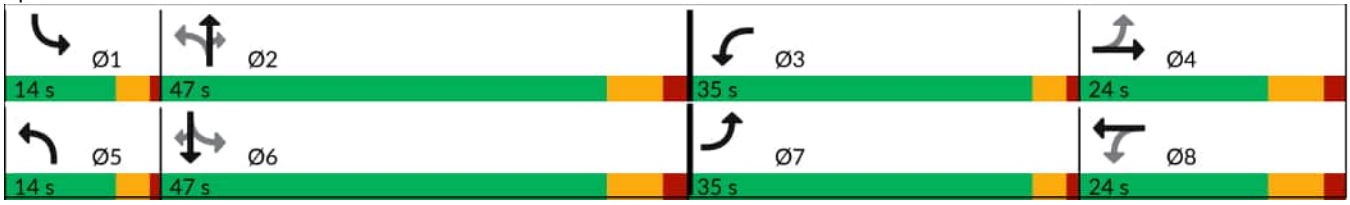
Appendix G

2023 Existing Synchro Reports

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	6	18	29	3	95	453	41	38	720	28
Future Volume (vph)	6	18	29	3	95	453	41	38	720	28
Lane Group Flow (vph)	7	148	33	18	108	515	47	43	818	32
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										
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%
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
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
v/c Ratio	0.03	0.50	0.15	0.07	0.40	0.31	0.06	0.08	0.55	0.04
Control Delay (s/veh)	22.2	16.2	24.2	16.9	13.3	16.1	0.1	9.1	21.8	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 (s/veh)	22.2	16.2	24.2	16.9	13.3	16.1	0.1	9.1	21.8	0.1
Queue Length 50th (m)	0.9	3.4	4.4	0.4	8.8	34.8	0.0	3.3	63.6	0.0
Queue Length 95th (m)	3.9	21.5	11.2	6.5	17.9	49.3	0.0	8.2	86.1	0.0
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	446	315	380	272	280	1645	814	559	1477	786
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.47	0.09	0.07	0.39	0.31	0.06	0.08	0.55	0.04

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 92.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	18	113	29	3	13	95	453	41	38	720	28
Future Volume (vph)	6	18	113	29	3	13	95	453	41	38	720	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.87		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1289	1143		1105	1096		1180	3167	1468	1626	3282	1615
Flt Permitted	0.75	1.00		0.53	1.00		0.24	1.00	1.00	0.46	1.00	1.00
Satd. Flow (perm)	1012	1143		614	1096		301	3167	1468	791	3282	1615
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	7	20	128	33	3	15	108	515	47	43	818	32
RTOR Reduction (vph)	0	106	0	0	12	0	0	0	24	0	0	18
Lane Group Flow (vph)	7	42	0	33	6	0	108	515	23	43	818	14
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	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
Actuated Green, G (s)	18.3	16.7		26.7	21.1		56.5	48.0	48.0	47.8	43.3	43.3
Effective Green, g (s)	18.3	16.7		26.7	21.1		56.5	48.0	48.0	47.8	43.3	43.3
Actuated g/C Ratio	0.19	0.17		0.27	0.22		0.58	0.49	0.49	0.49	0.45	0.45
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	195	196		198	237		258	1563	724	427	1462	719
v/s Ratio Prot	0.00	c0.04		c0.01	0.01		c0.04	0.16		0.00	c0.25	
v/s Ratio Perm	0.01			0.04			0.20		0.02	0.04		0.01
v/c Ratio	0.04	0.21		0.17	0.03		0.42	0.33	0.03	0.10	0.56	0.02
Uniform Delay, d1	32.2	34.6		26.4	30.0		10.7	14.9	12.7	12.9	19.9	15.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.6		0.8	0.0		1.1	0.6	0.1	0.1	1.6	0.1
Delay (s)	32.4	35.2		27.3	30.0		11.8	15.4	12.7	13.0	21.5	15.1
Level of Service	C	D		C	C		B	B	B	B	C	B
Approach Delay (s/veh)		35.0			28.2			14.7			20.8	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	97.2	Sum of lost time (s)	22.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	120	92	494	153	698
Future Volume (vph)	120	92	494	153	698
Lane Group Flow (vph)	130	100	637	166	759
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.54	0.33	0.39	0.28	0.35
Control Delay (s/veh)	48.6	10.8	13.1	5.3	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	48.6	10.8	13.1	5.3	6.4
Queue Length 50th (m)	25.3	0.0	34.2	8.2	27.2
Queue Length 95th (m)	45.0	14.3	52.7	15.7	40.2
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	273	332	1637	798	2157
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.48	0.30	0.39	0.21	0.35

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 102.8
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	120	92	494	92	153	698
Future Volume (vph)	120	92	494	92	153	698
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1480	1357	2875		1701	3034
Flt Permitted	0.95	1.00	1.00		0.36	1.00
Satd. Flow (perm)	1480	1357	2875		649	3034
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	100	537	100	166	759
RTOR Reduction (vph)	0	84	10	0	0	0
Lane Group Flow (vph)	130	16	627	0	166	759
Confl. Peds. (#/hr)				3	3	
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	16.7	16.7	58.3		73.2	73.2
Effective Green, g (s)	16.7	16.7	58.3		73.2	73.2
Actuated g/C Ratio	0.16	0.16	0.57		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	240	220	1628		573	2158
v/s Ratio Prot	c0.09		c0.22		0.03	c0.25
v/s Ratio Perm		0.01			0.18	
v/c Ratio	0.54	0.07	0.39		0.29	0.35
Uniform Delay, d1	39.6	36.5	12.4		5.1	5.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	4.3	0.3	0.7		0.6	0.5
Delay (s)	43.9	36.8	13.1		5.7	6.2
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	40.8		13.1			6.1
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	102.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	36	5	56	20	138	727	16	11	471	16
Future Volume (vph)	36	5	56	20	138	727	16	11	471	16
Lane Group Flow (vph)	38	103	59	56	145	765	17	12	496	17
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										
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%
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
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
v/c Ratio	0.11	0.36	0.21	0.17	0.26	0.36	0.02	0.04	0.31	0.03
Control Delay (s/veh)	22.9	12.9	24.5	19.2	10.6	14.2	0.1	9.6	19.1	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 (s/veh)	22.9	12.9	24.5	19.2	10.6	14.2	0.1	9.6	19.1	0.1
Queue Length 50th (m)	5.1	0.9	8.1	3.6	12.2	42.8	0.0	0.9	34.9	0.0
Queue Length 95th (m)	12.3	16.1	17.6	14.8	23.2	78.2	0.0	3.5	50.6	0.0
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	601	315	472	347	562	2136	824	364	1596	644
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.33	0.13	0.16	0.26	0.36	0.02	0.03	0.31	0.03

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 92.7
Natural Cycle: 90
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	5	93	56	20	33	138	727	16	11	471	16
Future Volume (vph)	36	5	93	56	20	33	138	727	16	11	471	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1266		1346	1514		1625	3471	1272	1203	3374	1241
Flt Permitted	0.72	1.00		0.56	1.00		0.42	1.00	1.00	0.36	1.00	1.00
Satd. Flow (perm)	1291	1266		790	1514		713	3471	1272	458	3374	1241
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	38	5	98	59	21	35	145	765	17	12	496	17
RTOR Reduction (vph)	0	86	0	0	30	0	0	0	8	0	0	9
Lane Group Flow (vph)	38	17	0	59	26	0	145	765	9	12	496	8
Confl. Peds. (#/hr)			1	1			1					1
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
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
Actuated Green, G (s)	17.7	12.2		23.5	15.1		60.7	55.2	55.2	48.7	47.2	47.2
Effective Green, g (s)	17.7	12.2		23.5	15.1		60.7	55.2	55.2	48.7	47.2	47.2
Actuated g/C Ratio	0.18	0.12		0.24	0.15		0.61	0.56	0.56	0.49	0.48	0.48
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	252	155		233	230		523	1929	707	235	1603	589
v/s Ratio Prot	0.01	0.01		c0.02	0.02		c0.03	c0.22		0.00	0.15	
v/s Ratio Perm	0.02			c0.04			0.14		0.01	0.02		0.01
v/c Ratio	0.15	0.11		0.25	0.11		0.28	0.40	0.01	0.05	0.31	0.01
Uniform Delay, d1	34.3	38.7		30.3	36.3		8.4	12.6	9.9	13.0	16.0	13.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.3		1.2	0.2		0.3	0.6	0.0	0.1	0.5	0.0
Delay (s)	34.9	39.0		31.5	36.6		8.7	13.2	9.9	13.1	16.5	13.8
Level of Service	C	D		C	D		A	B	A	B	B	B
Approach Delay (s/veh)		37.9			34.0			12.4			16.4	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	99.3	Sum of lost time (s)	22.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	137	141	755	47	584
Future Volume (vph)	137	141	755	47	584
Lane Group Flow (vph)	157	162	897	54	671
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.59	0.42	0.45	0.13	0.29
Control Delay (s/veh)	49.5	9.6	12.9	4.7	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	49.5	9.6	12.9	4.7	6.0
Queue Length 50th (m)	30.9	0.0	53.8	2.6	23.5
Queue Length 95th (m)	50.4	16.2	69.6	6.0	32.3
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	301	409	2012	630	2319
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.52	0.40	0.45	0.09	0.29

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 104.4
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	137	141	755	25	47	584
Future Volume (vph)	137	141	755	25	47	584
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1656	1524	3325		1504	3252
Flt Permitted	0.95	1.00	1.00		0.26	1.00
Satd. Flow (perm)	1656	1524	3325		413	3252
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	157	162	868	29	54	671
RTOR Reduction (vph)	0	136	2	0	0	0
Lane Group Flow (vph)	157	26	895	0	54	671
Confl. Peds. (#/hr)				1	1	
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	16.9	16.9	63.2		75.3	75.3
Effective Green, g (s)	16.9	16.9	63.2		75.3	75.3
Actuated g/C Ratio	0.16	0.16	0.60		0.72	0.72
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	266	244	1997		379	2327
v/s Ratio Prot	c0.09		c0.27		0.01	c0.21
v/s Ratio Perm		0.02			0.09	
v/c Ratio	0.59	0.11	0.45		0.14	0.29
Uniform Delay, d1	40.9	37.7	11.5		5.2	5.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.2	0.4	0.7		0.4	0.3
Delay (s)	46.2	38.1	12.2		5.5	5.7
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	42.1		12.2			5.7
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	105.2	Sum of lost time (s)	17.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Appendix H

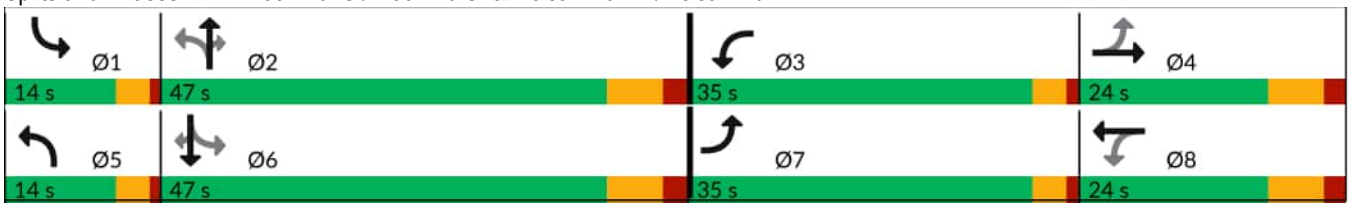
2026 Future Background Synchro Reports

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	12	62	61	10	120	484	160	121	741	71
Future Volume (vph)	12	62	61	10	120	484	160	121	741	71
Lane Group Flow (vph)	14	221	69	56	136	550	182	138	842	81
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										
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%
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
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
v/c Ratio	0.05	0.81	0.30	0.17	0.56	0.42	0.25	0.30	0.62	0.11
Control Delay (s/veh)	21.8	50.6	25.9	13.0	21.2	22.6	4.2	12.7	26.5	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	21.8	50.6	25.9	13.0	21.2	22.6	4.2	12.7	26.5	2.4
Queue Length 50th (m)	1.9	29.5	9.7	1.5	12.9	42.3	0.0	12.7	72.6	0.0
Queue Length 95th (m)	6.0	#70.4	19.5	12.2	24.9	60.0	13.0	23.8	97.2	5.2
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	456	278	375	338	248	1322	719	472	1355	731
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.79	0.18	0.17	0.55	0.42	0.25	0.29	0.62	0.11

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 97.7
Natural Cycle: 90
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	62	133	61	10	40	120	484	160	121	741	71
Future Volume (vph)	12	62	133	61	10	40	120	484	160	121	741	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1289	1238		1106	1089		1180	3167	1468	1626	3282	1615
Flt Permitted	0.72	1.00		0.39	1.00		0.23	1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)	978	1238		457	1089		282	3167	1468	687	3282	1615
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	14	70	151	69	11	45	136	550	182	138	842	81
RTOR Reduction (vph)	0	61	0	0	33	0	0	0	108	0	0	49
Lane Group Flow (vph)	14	160	0	69	23	0	136	550	74	138	842	32
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	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
Actuated Green, G (s)	20.8	19.0		32.8	27.0		50.4	40.8	40.8	49.6	40.4	40.4
Effective Green, g (s)	20.8	19.0		32.8	27.0		50.4	40.8	40.8	49.6	40.4	40.4
Actuated g/C Ratio	0.21	0.19		0.33	0.27		0.50	0.40	0.40	0.49	0.40	0.40
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	207	233		211	291		226	1281	594	423	1315	647
v/s Ratio Prot	0.00	c0.13		c0.03	0.02		c0.06	0.17		0.03	c0.26	
v/s Ratio Perm	0.01			0.07			0.24		0.05	0.13		0.02
v/c Ratio	0.07	0.69		0.33	0.08		0.60	0.43	0.12	0.33	0.64	0.05
Uniform Delay, d1	32.1	38.1		24.9	27.6		15.5	21.6	18.8	14.3	24.3	18.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	8.2		1.9	0.1		4.5	1.1	0.4	0.5	2.4	0.1
Delay (s)	32.4	46.3		26.7	27.7		20.0	22.7	19.2	14.8	26.7	18.6
Level of Service	C	D		C	C		B	C	B	B	C	B
Approach Delay (s/veh)		45.5			27.2			21.5			24.6	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.8	Sum of lost time (s)	22.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	123	120	641	157	766
Future Volume (vph)	123	120	641	157	766
Lane Group Flow (vph)	134	130	799	171	833
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.56	0.39	0.49	0.34	0.39
Control Delay (s/veh)	49.0	10.5	14.8	5.9	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	49.0	10.5	14.8	5.9	6.7
Queue Length 50th (m)	26.2	0.0	47.4	8.6	31.3
Queue Length 95th (m)	46.2	16.4	71.1	16.2	45.4
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	273	356	1639	741	2154
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.49	0.37	0.49	0.23	0.39

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 102.8
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	123	120	641	94	157	766
Future Volume (vph)	123	120	641	94	157	766
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1480	1357	2890		1702	3034
Flt Permitted	0.95	1.00	1.00		0.29	1.00
Satd. Flow (perm)	1480	1357	2890		519	3034
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	130	697	102	171	833
RTOR Reduction (vph)	0	109	7	0	0	0
Lane Group Flow (vph)	134	21	792	0	171	833
Confl. Peds. (#/hr)				3	3	
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	16.8	16.8	58.1		73.0	73.0
Effective Green, g (s)	16.8	16.8	58.1		73.0	73.0
Actuated g/C Ratio	0.16	0.16	0.57		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	241	221	1633		493	2154
v/s Ratio Prot	c0.09		c0.27		0.04	c0.27
v/s Ratio Perm		0.02			0.21	
v/c Ratio	0.56	0.10	0.48		0.35	0.39
Uniform Delay, d1	39.6	36.5	13.4		5.6	6.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	4.7	0.4	1.0		0.9	0.5
Delay (s)	44.2	36.9	14.4		6.4	6.5
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	40.6		14.4			6.5
Approach LOS	D		B			A

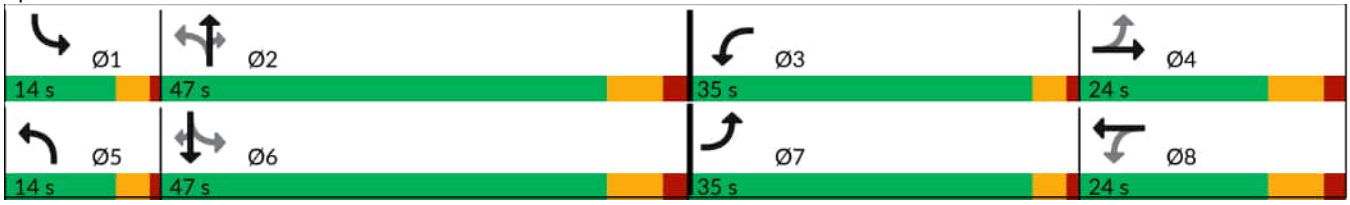
Intersection Summary			
HCM 2000 Control Delay (s/veh)	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	102.8	Sum of lost time (s)	17.0
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	74	15	153	69	157	752	55	37	502	31
Future Volume (vph)	74	15	153	69	157	752	55	37	502	31
Lane Group Flow (vph)	78	160	161	207	165	792	58	39	528	33
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										
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%
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
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
v/c Ratio	0.21	0.52	0.45	0.53	0.38	0.51	0.09	0.15	0.40	0.06
Control Delay (s/veh)	23.2	15.8	27.5	30.9	15.2	23.5	0.7	13.5	24.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	23.2	15.8	27.5	30.9	15.2	23.5	0.7	13.5	24.7	0.2
Queue Length 50th (m)	10.7	3.0	24.0	27.3	16.5	66.3	0.0	3.6	41.9	0.0
Queue Length 95th (m)	20.8	23.8	40.9	53.4	31.6	96.5	1.1	9.8	62.2	0.0
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	593	331	452	391	435	1562	632	276	1311	548
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.48	0.36	0.53	0.38	0.51	0.09	0.14	0.40	0.06

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 103.1
Natural Cycle: 90
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	15	137	153	69	127	157	752	55	37	502	31
Future Volume (vph)	74	15	137	153	69	127	157	752	55	37	502	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.87		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1279		1346	1504		1625	3471	1272	1203	3374	1241
Flt Permitted	0.63	1.00		0.47	1.00		0.37	1.00	1.00	0.30	1.00	1.00
Satd. Flow (perm)	1126	1279		661	1504		633	3471	1272	381	3374	1241
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	78	16	144	161	73	134	165	792	58	39	528	33
RTOR Reduction (vph)	0	122	0	0	50	0	0	0	32	0	0	20
Lane Group Flow (vph)	78	38	0	161	157	0	165	792	26	39	528	13
Confl. Peds. (#/hr)			1	1			1					1
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
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
Actuated Green, G (s)	24.7	15.9		36.2	23.4		55.3	46.4	46.4	46.6	41.7	41.7
Effective Green, g (s)	24.7	15.9		36.2	23.4		55.3	46.4	46.4	46.6	41.7	41.7
Actuated g/C Ratio	0.23	0.15		0.34	0.22		0.52	0.44	0.44	0.44	0.40	0.40
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	311	192		332	333		422	1526	559	206	1333	490
v/s Ratio Prot	0.02	0.03		c0.07	0.10		c0.04	c0.23		0.01	0.16	
v/s Ratio Perm	0.04			c0.09			0.17		0.02	0.07		0.01
v/c Ratio	0.25	0.20		0.48	0.47		0.39	0.52	0.05	0.19	0.40	0.03
Uniform Delay, d1	32.4	39.2		26.0	35.7		13.7	21.4	16.9	17.2	22.9	19.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.5		2.3	1.1		0.6	1.3	0.2	0.4	0.9	0.1
Delay (s)	33.3	39.7		28.4	36.7		14.3	22.7	17.0	17.6	23.8	19.6
Level of Service	C	D		C	D		B	C	B	B	C	B
Approach Delay (s/veh)		37.6			33.1			21.0			23.1	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	105.5	Sum of lost time (s)	22.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	140	155	825	48	754
Future Volume (vph)	140	155	825	48	754
Lane Group Flow (vph)	161	178	978	55	867
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.60	0.45	0.49	0.14	0.37
Control Delay (s/veh)	49.9	9.6	13.5	4.8	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	49.9	9.6	13.5	4.8	6.6
Queue Length 50th (m)	31.7	0.0	61.3	2.7	33.2
Queue Length 95th (m)	51.4	16.8	78.0	6.1	44.1
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	302	423	2009	610	2314
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.53	0.42	0.49	0.09	0.37

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 104.1
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	140	155	825	26	48	754
Future Volume (vph)	140	155	825	26	48	754
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1656	1524	3329		1504	3252
Flt Permitted	0.95	1.00	1.00		0.23	1.00
Satd. Flow (perm)	1656	1524	3329		368	3252
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	161	178	948	30	55	867
RTOR Reduction (vph)	0	149	1	0	0	0
Lane Group Flow (vph)	161	29	977	0	55	867
Confl. Peds. (#/hr)				1	1	
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.0	17.0	62.8		74.8	74.8
Effective Green, g (s)	17.0	17.0	62.8		74.8	74.8
Actuated g/C Ratio	0.16	0.16	0.60		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	268	247	1994		349	2321
v/s Ratio Prot	c0.10		c0.29		0.01	c0.27
v/s Ratio Perm		0.02			0.10	
v/c Ratio	0.60	0.12	0.49		0.16	0.37
Uniform Delay, d1	40.7	37.5	11.9		5.5	5.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.5	0.4	0.9		0.4	0.5
Delay (s)	46.2	37.9	12.8		5.9	6.3
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	41.9		12.8			6.3
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	104.8	Sum of lost time (s)	17.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	12	64	64	10	130	532	165	125	817	74
Future Volume (vph)	12	64	64	10	130	532	165	125	817	74
Lane Group Flow (vph)	14	238	73	58	148	605	188	142	928	84
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										
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%
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
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
v/c Ratio	0.05	0.86	0.32	0.17	0.67	0.46	0.26	0.33	0.69	0.12
Control Delay (s/veh)	21.7	56.2	26.4	12.7	29.4	23.5	4.2	13.2	28.6	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	21.7	56.2	26.4	12.7	29.4	23.5	4.2	13.2	28.6	2.7
Queue Length 50th (m)	1.9	32.9	10.3	1.6	14.3	47.8	0.0	13.1	83.3	0.0
Queue Length 95th (m)	6.0	#78.6	20.4	12.2	#37.8	67.1	13.2	24.7	110.7	5.7
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	453	278	369	340	220	1317	720	442	1337	722
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.86	0.20	0.17	0.67	0.46	0.26	0.32	0.69	0.12

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 98.7
Natural Cycle: 90
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	64	145	64	10	41	130	532	165	125	817	74
Future Volume (vph)	12	64	145	64	10	41	130	532	165	125	817	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1289	1232		1106	1091		1180	3167	1468	1626	3282	1615
Flt Permitted	0.72	1.00		0.36	1.00		0.18	1.00	1.00	0.37	1.00	1.00
Satd. Flow (perm)	976	1232		422	1091		225	3167	1468	631	3282	1615
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	14	73	165	73	11	47	148	605	188	142	928	84
RTOR Reduction (vph)	0	64	0	0	34	0	0	0	112	0	0	51
Lane Group Flow (vph)	14	174	0	73	24	0	148	605	76	142	928	33
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	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
Actuated Green, G (s)	21.3	19.5		33.6	27.8		51.2	41.1	41.1	49.4	40.2	40.2
Effective Green, g (s)	21.3	19.5		33.6	27.8		51.2	41.1	41.1	49.4	40.2	40.2
Actuated g/C Ratio	0.21	0.19		0.33	0.27		0.50	0.40	0.40	0.48	0.39	0.39
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	209	235		206	297		207	1277	592	395	1294	637
v/s Ratio Prot	0.00	c0.14		c0.03	0.02		c0.07	0.19		0.03	0.28	
v/s Ratio Perm	0.01			0.08			c0.29		0.05	0.14		0.02
v/c Ratio	0.07	0.74		0.35	0.08		0.71	0.47	0.13	0.36	0.72	0.05
Uniform Delay, d1	32.2	38.8		25.0	27.5		16.7	22.4	19.1	15.0	26.0	19.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	11.9		2.2	0.1		11.1	1.3	0.4	0.6	3.4	0.2
Delay (s)	32.5	50.7		27.2	27.7		27.8	23.7	19.6	15.5	29.5	19.2
Level of Service	C	D		C	C		C	C	B	B	C	B
Approach Delay (s/veh)		49.7			27.4			23.5			27.0	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	101.9	Sum of lost time (s)	22.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	136	130	694	173	841
Future Volume (vph)	136	130	694	173	841
Lane Group Flow (vph)	148	141	867	188	914
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.61	0.41	0.53	0.39	0.43
Control Delay (s/veh)	51.2	10.4	15.8	6.6	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	51.2	10.4	15.8	6.6	7.1
Queue Length 50th (m)	29.2	0.0	55.2	10.0	37.1
Queue Length 95th (m)	50.7	16.9	80.4	17.8	51.4
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	272	365	1626	717	2149
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.54	0.39	0.53	0.26	0.43

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 103.1
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	136	130	694	104	173	841
Future Volume (vph)	136	130	694	104	173	841
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1480	1357	2889		1703	3034
Flt Permitted	0.95	1.00	1.00		0.26	1.00
Satd. Flow (perm)	1480	1357	2889		469	3034
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	141	754	113	188	914
RTOR Reduction (vph)	0	118	8	0	0	0
Lane Group Flow (vph)	148	23	859	0	188	914
Confl. Peds. (#/hr)				3	3	
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.0	17.0	57.8		73.0	73.0
Effective Green, g (s)	17.0	17.0	57.8		73.0	73.0
Actuated g/C Ratio	0.17	0.17	0.56		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	244	223	1621		466	2150
v/s Ratio Prot	c0.10		c0.30		0.04	c0.30
v/s Ratio Perm		0.02			0.24	
v/c Ratio	0.61	0.10	0.53		0.40	0.43
Uniform Delay, d1	39.9	36.5	14.1		6.0	6.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.2	0.4	1.2		1.2	0.6
Delay (s)	46.1	37.0	15.4		7.2	6.9
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	41.6		15.4			6.9
Approach LOS	D		B			A

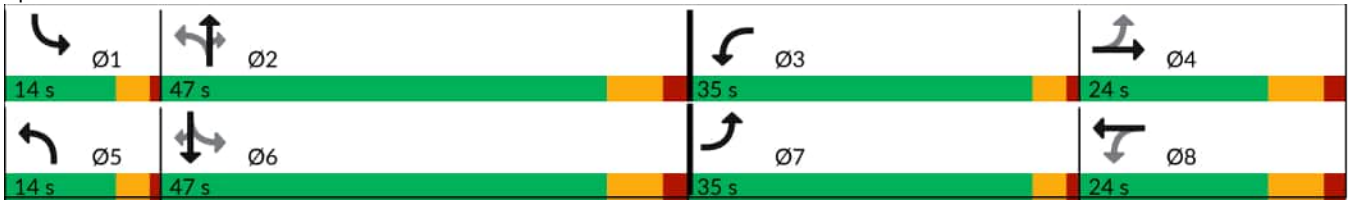
Intersection Summary			
HCM 2000 Control Delay (s/veh)	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	103.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	78	15	159	71	172	829	57	38	552	33
Future Volume (vph)	78	15	159	71	172	829	57	38	552	33
Lane Group Flow (vph)	82	171	167	213	181	873	60	40	581	35
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										
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%
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
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
v/c Ratio	0.22	0.54	0.48	0.54	0.45	0.56	0.10	0.17	0.45	0.06
Control Delay (s/veh)	23.2	15.7	27.9	31.5	16.6	24.8	0.9	14.2	25.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	23.2	15.7	27.9	31.5	16.6	24.8	0.9	14.2	25.6	0.2
Queue Length 50th (m)	11.3	3.0	25.0	28.6	18.4	75.7	0.0	3.8	47.3	0.0
Queue Length 95th (m)	21.6	24.8	42.1	55.1	35.2	110.5	1.6	10.2	69.9	0.0
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	594	339	450	393	409	1557	630	251	1304	546
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.50	0.37	0.54	0.44	0.56	0.10	0.16	0.45	0.06

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 103.7
Natural Cycle: 90
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	15	147	159	71	131	172	829	57	38	552	33
Future Volume (vph)	78	15	147	159	71	131	172	829	57	38	552	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1277		1346	1504		1626	3471	1272	1203	3374	1241
Flt Permitted	0.62	1.00		0.44	1.00		0.34	1.00	1.00	0.26	1.00	1.00
Satd. Flow (perm)	1120	1277		623	1504		576	3471	1272	327	3374	1241
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	82	16	155	167	75	138	181	873	60	40	581	35
RTOR Reduction (vph)	0	132	0	0	50	0	0	0	34	0	0	21
Lane Group Flow (vph)	82	39	0	167	163	0	181	873	26	40	581	14
Confl. Peds. (#/hr)			1	1			1					1
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
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
Actuated Green, G (s)	25.0	16.0		36.7	23.7		55.4	46.5	46.5	46.6	41.7	41.7
Effective Green, g (s)	25.0	16.0		36.7	23.7		55.4	46.5	46.5	46.6	41.7	41.7
Actuated g/C Ratio	0.24	0.15		0.35	0.22		0.52	0.44	0.44	0.44	0.39	0.39
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	313	192		329	335		396	1521	557	184	1326	487
v/s Ratio Prot	0.02	0.03		c0.08	0.11		c0.04	c0.25		0.01	0.17	
v/s Ratio Perm	0.04			c0.10			0.20		0.02	0.09		0.01
v/c Ratio	0.26	0.21		0.51	0.49		0.46	0.57	0.05	0.22	0.44	0.03
Uniform Delay, d1	32.6	39.5		26.2	35.9		14.3	22.4	17.1	17.6	23.6	19.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.5		2.6	1.1		0.8	1.6	0.2	0.6	1.1	0.1
Delay (s)	33.5	40.0		28.7	37.0		15.1	23.9	17.3	18.2	24.7	19.9
Level of Service	C	D		C	D		B	C	B	B	C	B
Approach Delay (s/veh)		37.9			33.4			22.2			24.0	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	106.1	Sum of lost time (s)	22.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	155	170	905	53	816
Future Volume (vph)	155	170	905	53	816
Lane Group Flow (vph)	178	195	1073	61	938
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.65	0.47	0.54	0.18	0.41
Control Delay (s/veh)	52.0	9.5	14.4	5.2	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	52.0	9.5	14.4	5.2	7.0
Queue Length 50th (m)	35.5	0.0	72.3	3.1	38.7
Queue Length 95th (m)	56.6	17.4	88.5	6.5	48.7
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	302	438	1999	588	2303
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.59	0.45	0.54	0.10	0.41

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 103.9
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	170	905	29	53	816
Future Volume (vph)	155	170	905	29	53	816
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1656	1524	3329		1504	3252
Flt Permitted	0.95	1.00	1.00		0.20	1.00
Satd. Flow (perm)	1656	1524	3329		318	3252
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	178	195	1040	33	61	938
RTOR Reduction (vph)	0	163	1	0	0	0
Lane Group Flow (vph)	178	32	1072	0	61	938
Confl. Peds. (#/hr)				1	1	
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.3	17.3	62.4		74.4	74.4
Effective Green, g (s)	17.3	17.3	62.4		74.4	74.4
Actuated g/C Ratio	0.17	0.17	0.60		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	273	251	1984		316	2310
v/s Ratio Prot	c0.11		c0.32		0.01	c0.29
v/s Ratio Perm		0.02			0.12	
v/c Ratio	0.65	0.13	0.54		0.19	0.41
Uniform Delay, d1	40.9	37.3	12.6		6.1	6.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	7.3	0.5	1.1		0.6	0.5
Delay (s)	48.2	37.8	13.7		6.7	6.7
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	42.7		13.7			6.7
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	104.7	Sum of lost time (s)	17.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Appendix I

ITE Trip Generation Manual Excerpts

Land Use: 934
Fast-Food Restaurant with Drive-Through Window

Description

This land use includes any fast-food restaurant with a drive-through window. This type of restaurant is characterized by a large drive-through and large carry-out clientele, long hours of service (some are open for breakfast, all are open for lunch and dinner, some are open late at night or 24 hours a day) and high turnover rates for eat-in customers. The restaurant does not provide table service. A patron generally orders from a menu board and pays before receiving the meal. A typical duration of stay for an eat-in patron is less than 30 minutes. Fast casual restaurant (Land Use 930), high-turnover (sit-down) restaurant (Land Use 932), fast-food restaurant without drive-through window (Land Use 933), and fast-food restaurant with drive-through window and no indoor seating (Land Use 935) are related uses.

Additional Data

Users should exercise caution when applying statistics during the AM peak periods, as the sites contained in the database for this land use may or may not be open for breakfast. In cases where it was confirmed that the sites were not open for breakfast, data for the AM peak hour of the adjacent street traffic were removed from the database.

If the restaurant has outdoor seating, its area is not included in the overall gross floor area. For a restaurant that has significant outdoor seating, the number of seats may be more reliable than GFA as an independent variable on which to establish a trip generation rate.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alaska, Alberta (CAN), California, Colorado, Florida, Indiana, Kentucky, Maryland, Massachusetts, Minnesota, Montana, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Dakota, Texas, Vermont, Virginia, Washington, and Wisconsin.

Source Numbers

163, 164, 168, 180, 181, 241, 245, 278, 294, 300, 301, 319, 338, 340, 342, 358, 389, 438, 502, 552, 577, 583, 584, 617, 640, 641, 704, 715, 728, 810, 866, 867, 869, 885, 886, 927, 935, 962, 977, 1050, 1053, 1054

Fast-Food Restaurant with Drive-Through Window (934)

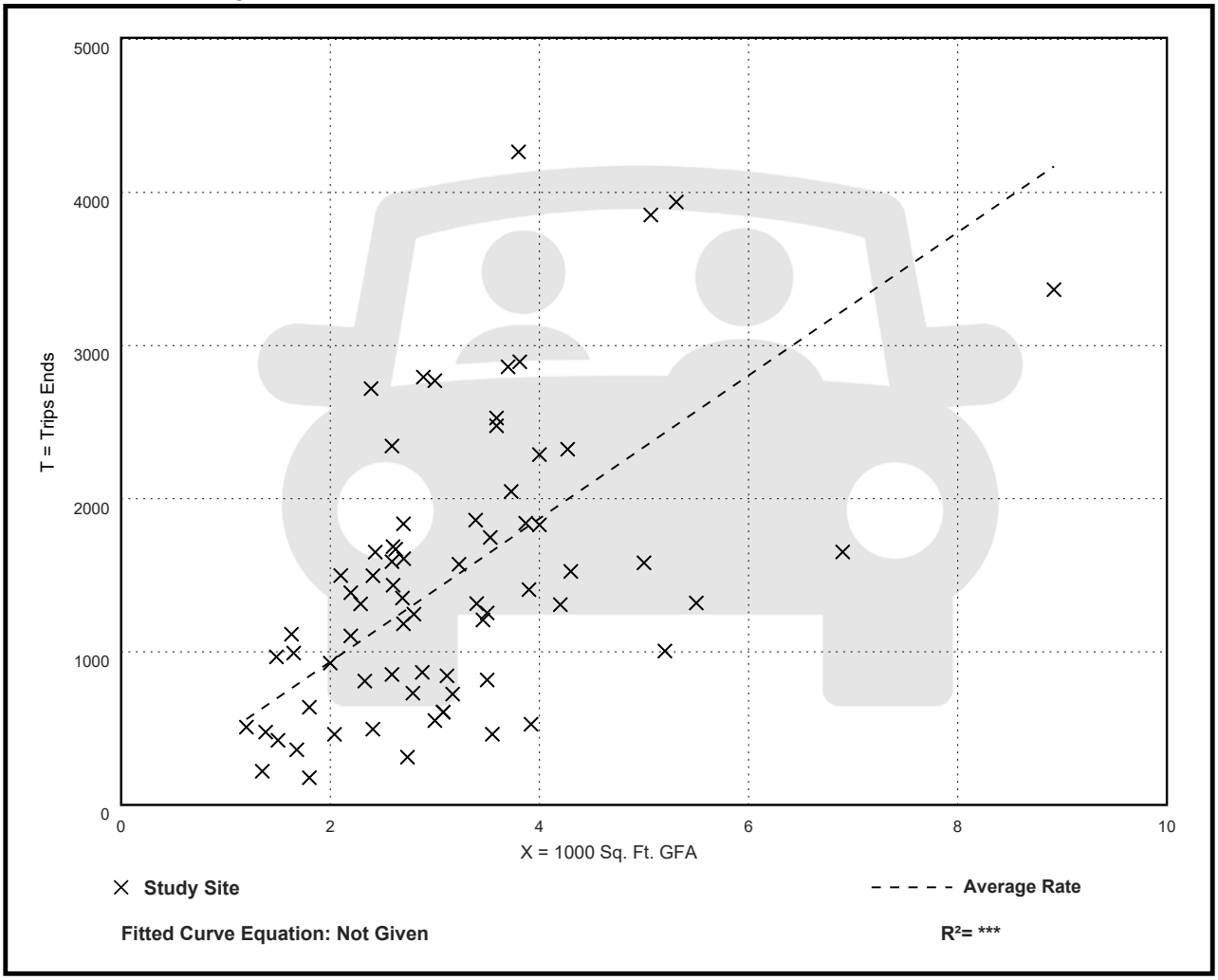
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 71
Avg. 1000 Sq. Ft. GFA: 3
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
467.48	98.89 - 1137.66	238.62

Data Plot and Equation



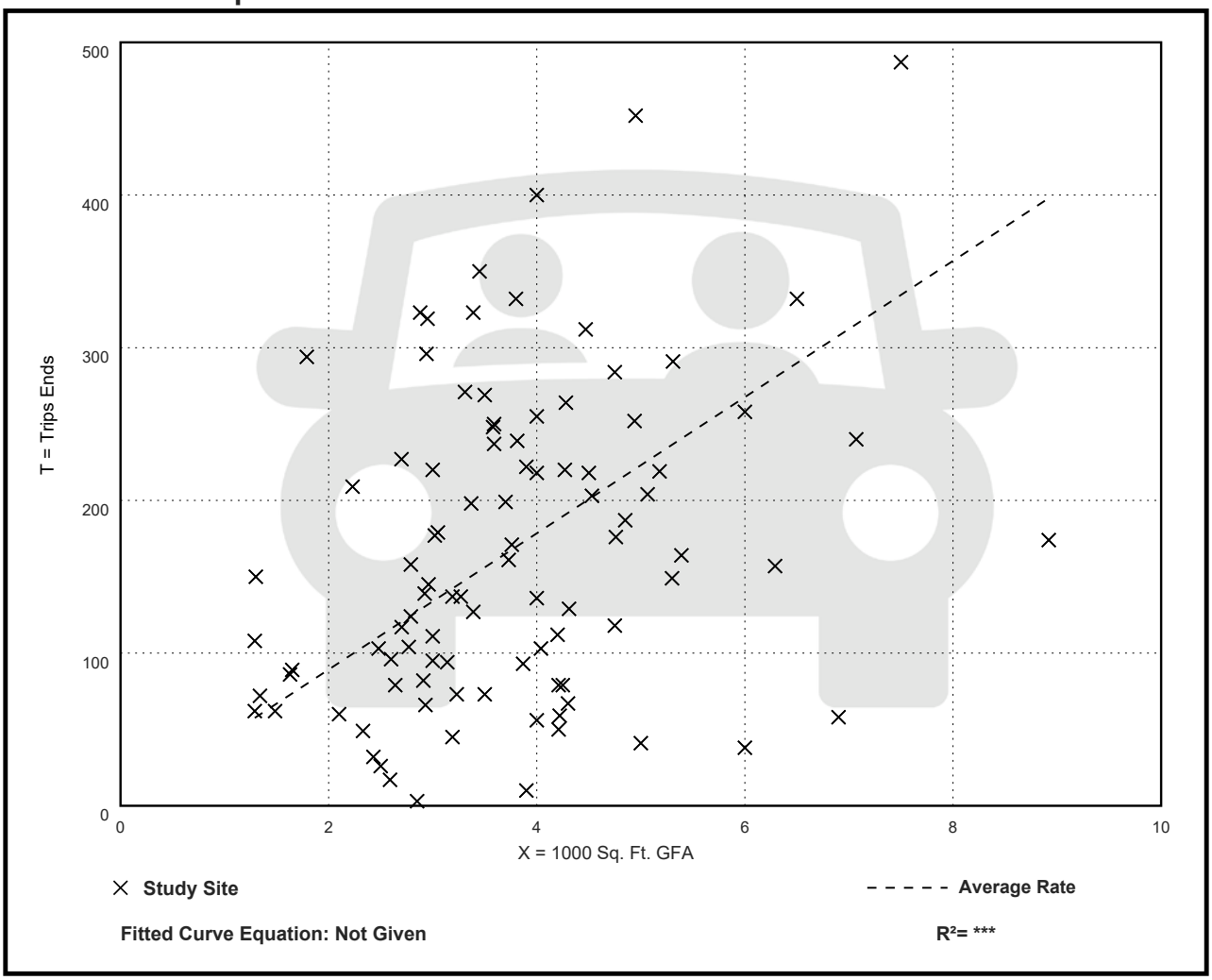
Fast-Food Restaurant with Drive-Through Window (934)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 96
Avg. 1000 Sq. Ft. GFA: 4
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
44.61	1.05 - 164.25	27.14

Data Plot and Equation



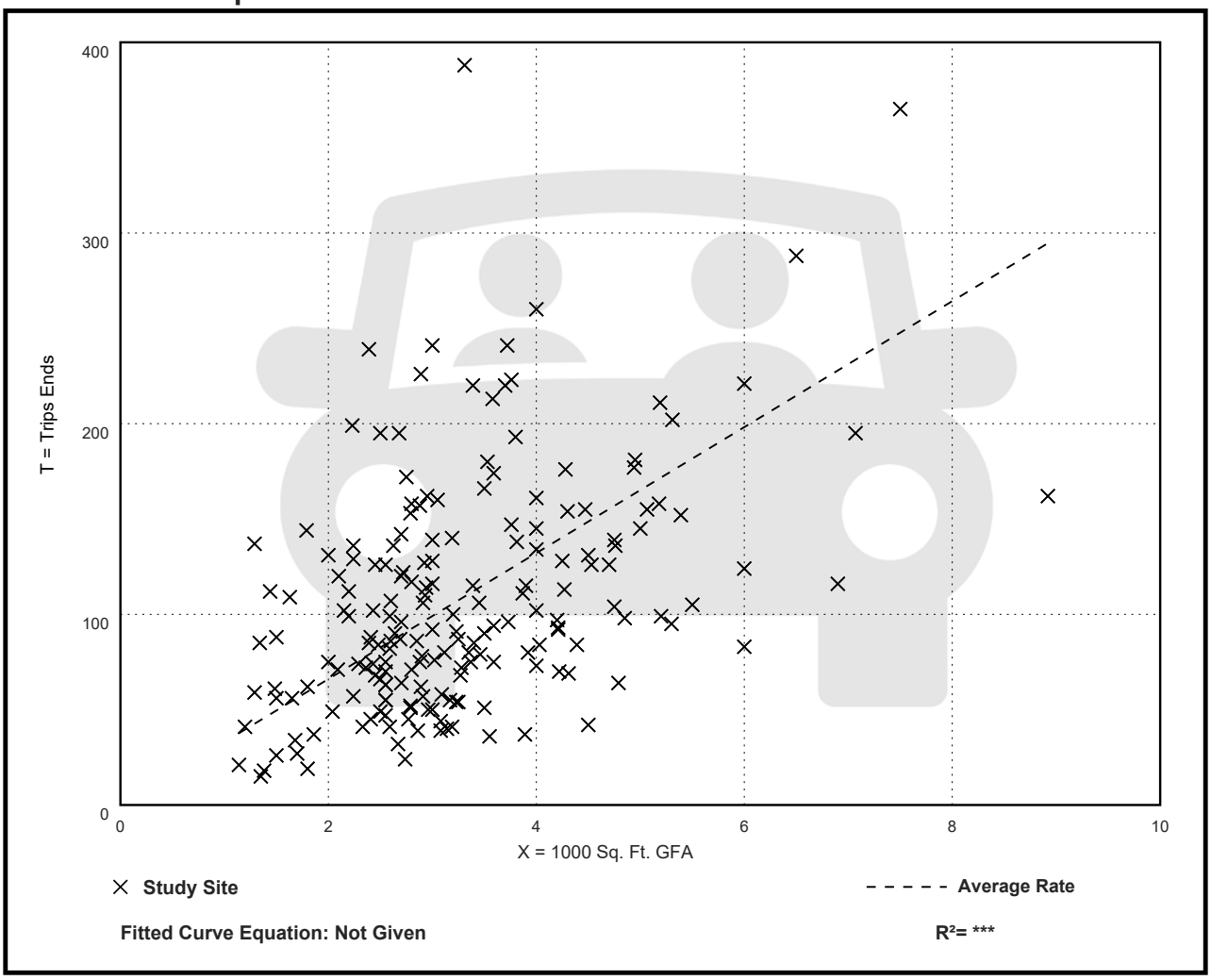
Fast-Food Restaurant with Drive-Through Window (934)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 190
Avg. 1000 Sq. Ft. GFA: 3
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
33.03	8.77 - 117.22	17.59

Data Plot and Equation



Land Use: 945
Convenience Store/Gas Station

Description

A convenience store/gas station is a facility with a co-located convenience store and gas station. The convenience store sells grocery and other everyday items that a person may need or want as a matter of convenience. The gas station sells automotive fuels such as gasoline and diesel.

A convenience store/gas station is typically located along a major thoroughfare to optimize motorist convenience. Extended hours of operation (with many open 24 hours, 7 days a week) are common at these facilities.

The convenience store product mix typically includes pre-packaged grocery items, beverages, dairy products, snack foods, confectionary, tobacco products, over-the-counter drugs, and toiletries. A convenience store may sell alcohol, often limited to beer and wine. Coffee and pre-made sandwiches are also commonly sold at a convenience store. Made-to-order food orders are sometimes offered. Some stores offer limited seating.

The sites in this land use include both self-pump and attendant-pumped fueling positions and both pre-pay and post-pay operations.

Convenience store (Land Use 851), gasoline/service station (Land Use 944), and truck stop (Land Use 950) are related uses.

Land Use Subcategory

Multiple subcategories were added to this land use to allow for multi-variable evaluation of sites with single-variable data plots. All study sites are assigned to one of three subcategories, based on the number of vehicle fueling positions (VFP) at the site: between 2 and 8 VFP, between 9 and 15 VFP, and between 16 and 24 VFP. For each VFP range subcategory, data plots are presented with GFA as the independent variable for all time periods and trip types for which data are available. The use of both GFA and VFP (as the independent variable and land use subcategory, respectively) provides a significant improvement in the reliability of a trip generation estimate when compared to the single-variable data plots in prior editions of *Trip Generation Manual*.

Further, the study sites were also assigned to one of three other subcategories, based on the gross floor area (GFA) of the convenience store at the site: between 2,000 and 4,000 square feet, between 4,000 and 5,500 square feet, and between 5,500 and 10,000 square feet. For each GFA subcategory range, data plots are presented with VFP as the independent variable for all time periods and trip types for which data are available. The use of both VFP and GFA (as the independent variable and land use subcategory, respectively) provides a significant improvement in the reliability of a trip generation estimate when compared to the single-variable data plots in prior editions of *Trip Generation Manual*.

When analyzing the convenience store/gas station land use with each combination of GFA and VFP values as described above, the two sets of data plots will produce two estimates of site-generated trips. Both values can be considered when determining a site trip generation estimate.

Data plots are also provided for three additional independent variables: AM peak hour traffic on adjacent street, PM peak hour traffic on adjacent street, and employees. These independent variables are intended to be analyzed as single independent variables and do not have sub-categories associated with them. Within the data plots and within the ITETripGen web app, these plots are found under the land use subcategory "none."

Additional Data

ITE recognizes there are existing convenience store/gas station sites throughout North America that are larger than the sites presented in the data plots. However, the ITE database does not include any site with more than 24 VFP or any site with gross floor area greater than 10,000 square feet. Submission of trip generation data for larger sites is encouraged.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), Arkansas, California, Connecticut, Delaware, Florida, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Nevada, New Hampshire, New Jersey, Pennsylvania, Rhode Island, South Dakota, Texas, Utah, Vermont, Washington, and Wisconsin.

Source Numbers

221, 245, 274, 288, 300, 340, 350, 351, 352, 355, 359, 385, 440, 617, 718, 810, 813, 844, 850, 853, 864, 865, 867, 869, 882, 883, 888, 904, 926, 927, 936, 938, 954, 960, 962, 977, 1004, 1024, 1025, 1027, 1052

Convenience Store/Gas Station - GFA (2-4k) (945)

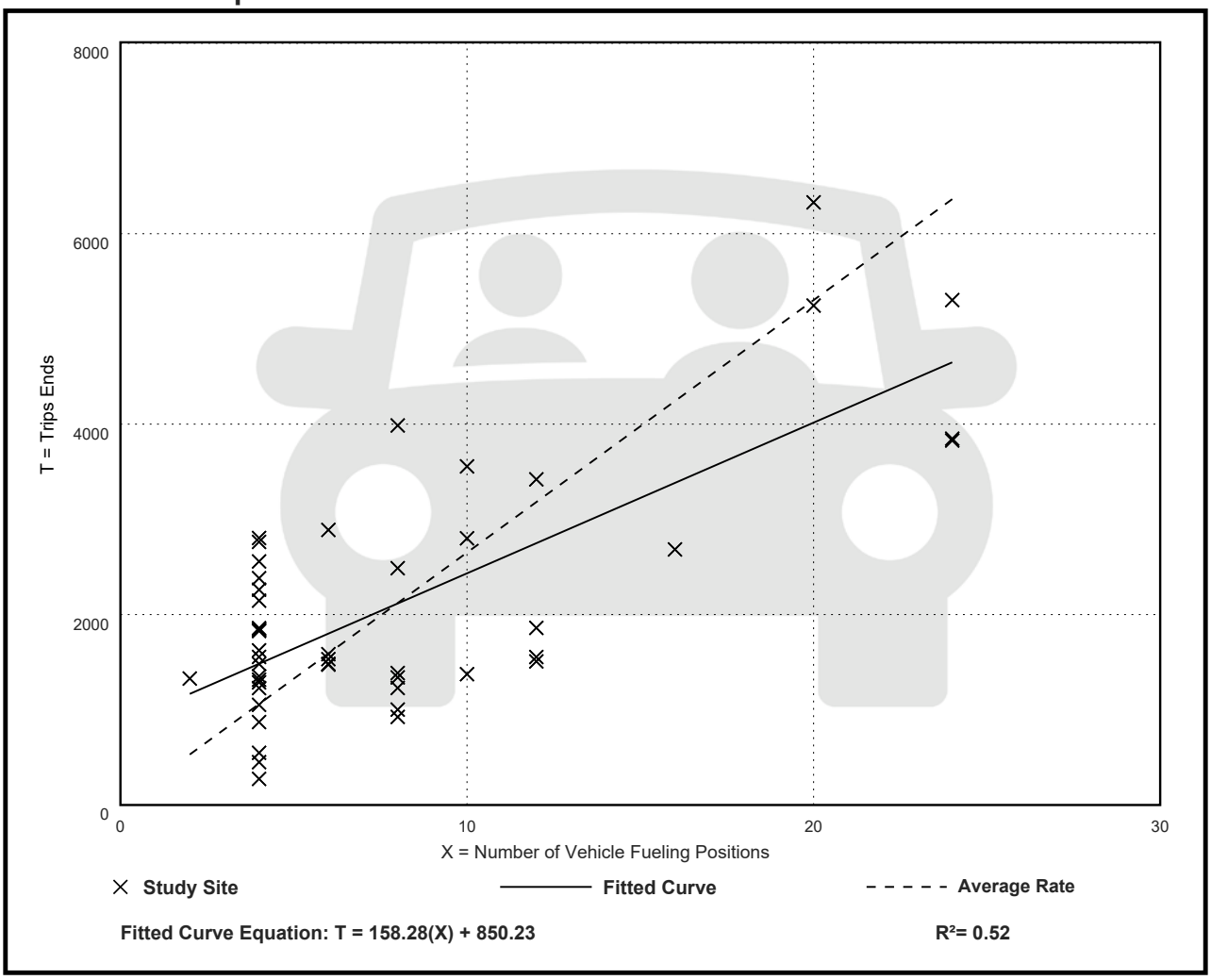
Vehicle Trip Ends vs: Vehicle Fueling Positions
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 48
Avg. Num. of Vehicle Fueling Positions: 8
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
265.12	68.50 - 701.00	142.37

Data Plot and Equation



Fitted Curve Equation: T = 158.28(X) + 850.23

R^2= 0.52

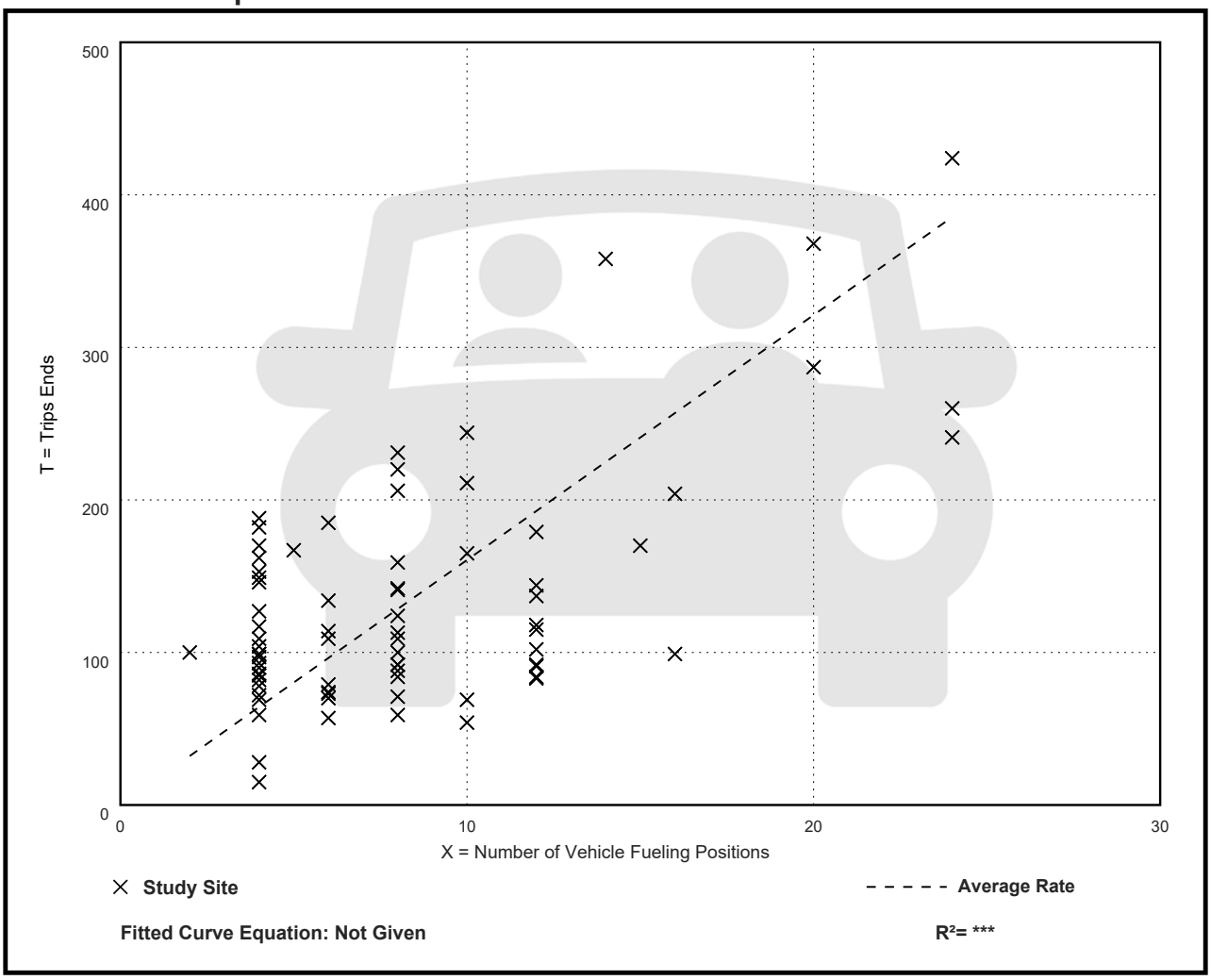
Convenience Store/Gas Station - GFA (2-4k) (945)

Vehicle Trip Ends vs: Vehicle Fueling Positions
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 76
Avg. Num. of Vehicle Fueling Positions: 8
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
16.06	3.75 - 50.00	8.79

Data Plot and Equation



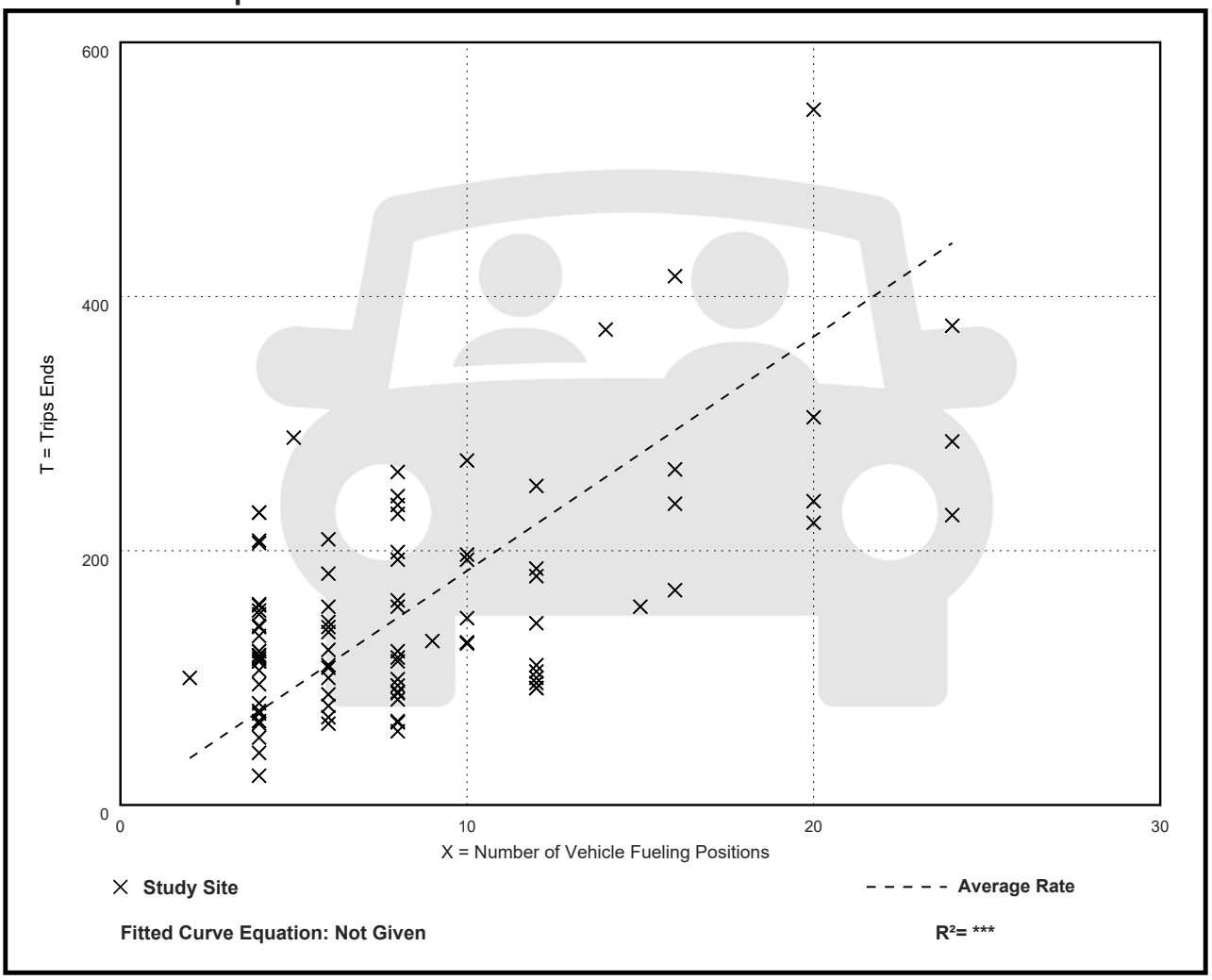
Convenience Store/Gas Station - GFA (2-4k) (945)

Vehicle Trip Ends vs: Vehicle Fueling Positions
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 93
Avg. Num. of Vehicle Fueling Positions: 8
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
18.42	5.75 - 57.80	10.16

Data Plot and Equation



Truck Stop
(950)

Truck Trip Ends vs: Vehicle Fueling Positions
On a: Weekday

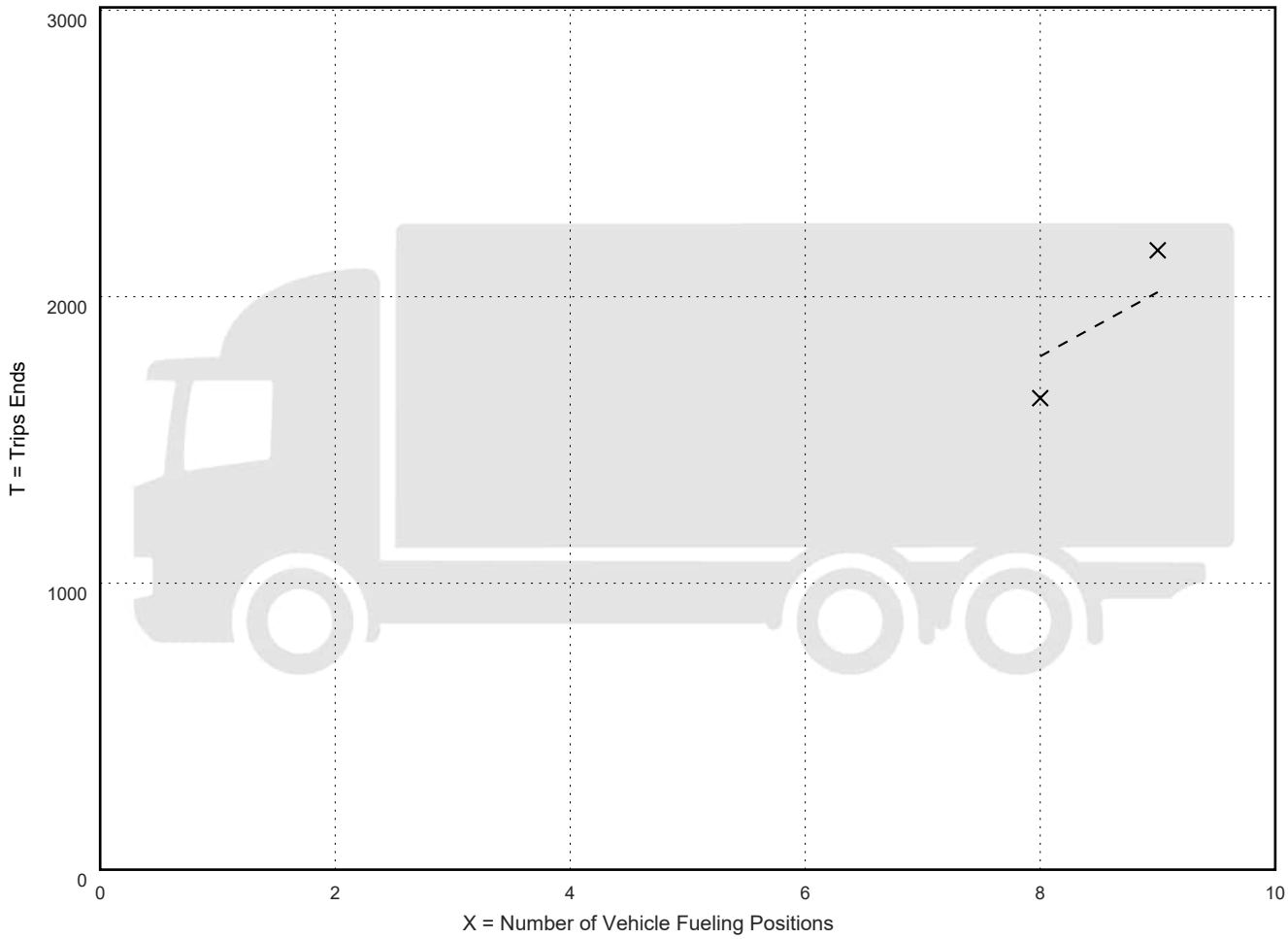
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. Num. of Vehicle Fueling Positions: 9
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
224.00	205.75 - 240.22	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ***

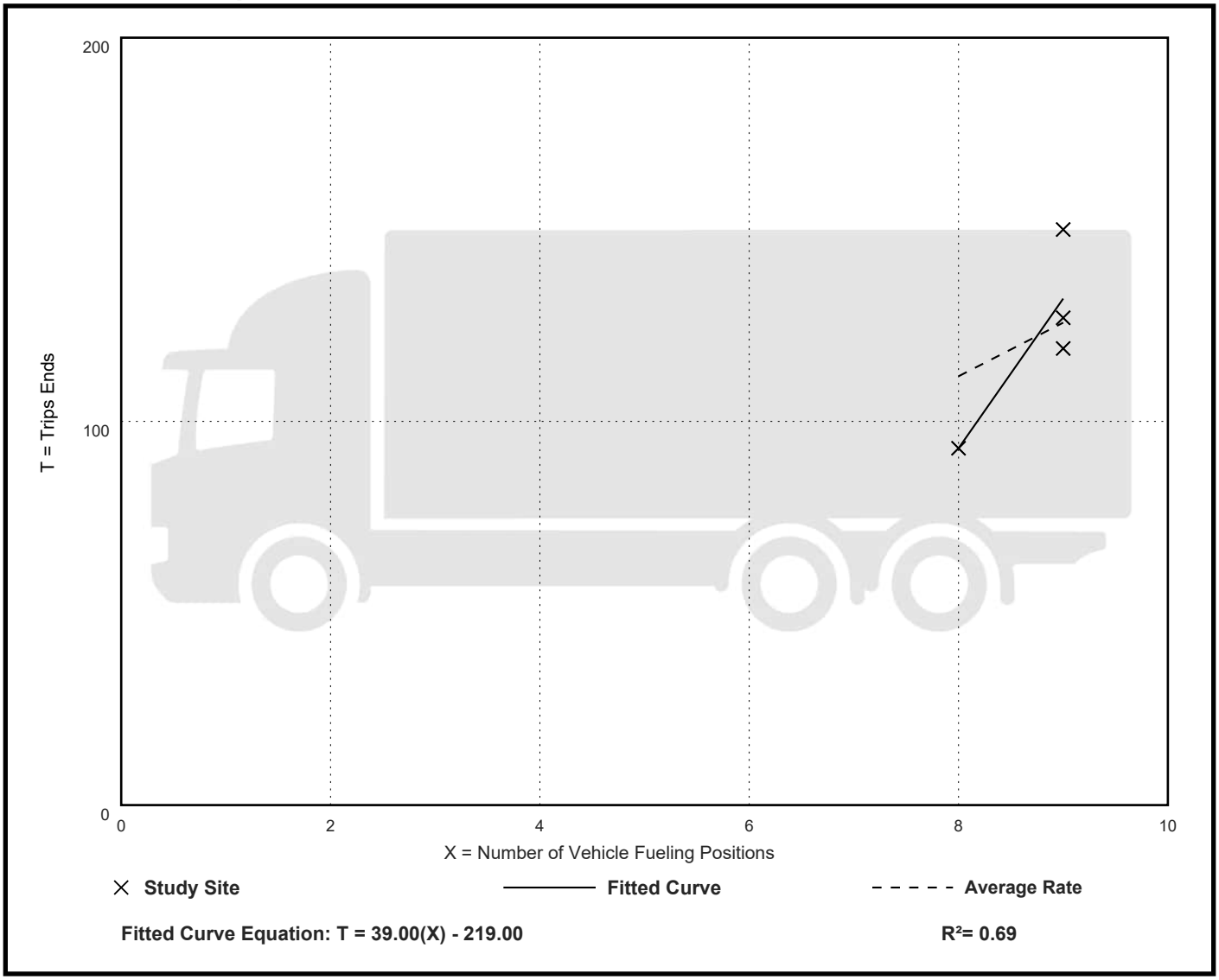
Truck Stop
(950)

Truck Trip Ends vs: Vehicle Fueling Positions
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 4
Avg. Num. of Vehicle Fueling Positions: 9
Directional Distribution: 49% entering, 51% exiting

Truck Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
13.97	11.63 - 16.67	2.09

Data Plot and Equation



Fitted Curve Equation: T = 39.00(X) - 219.00

R^2= 0.69

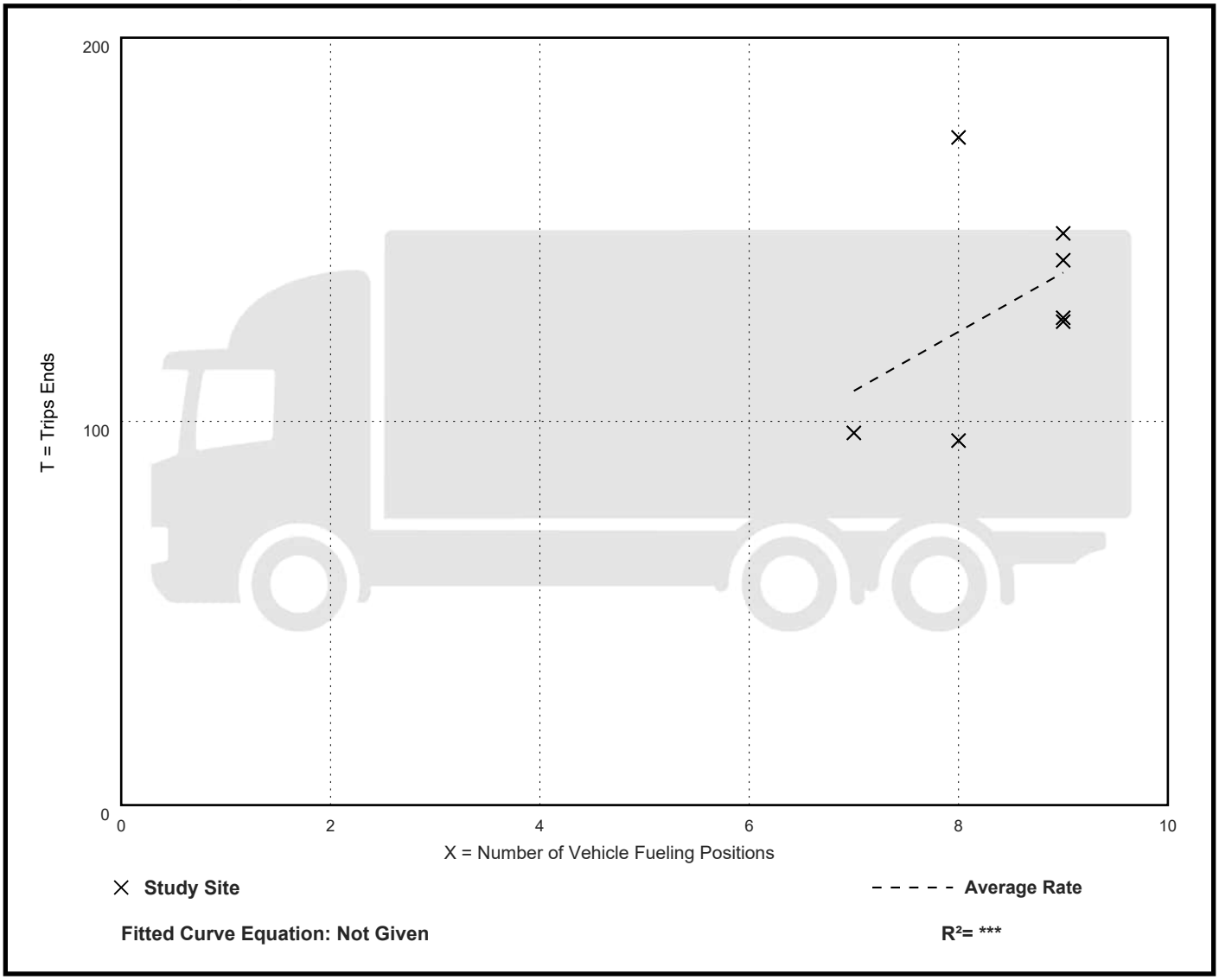
Truck Stop
(950)

Truck Trip Ends vs: Vehicle Fueling Positions
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 7
Avg. Num. of Vehicle Fueling Positions: 8
Directional Distribution: 53% entering, 47% exiting

Truck Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
15.42	11.88 - 21.75	3.10

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ***

Truck Stop
(950)

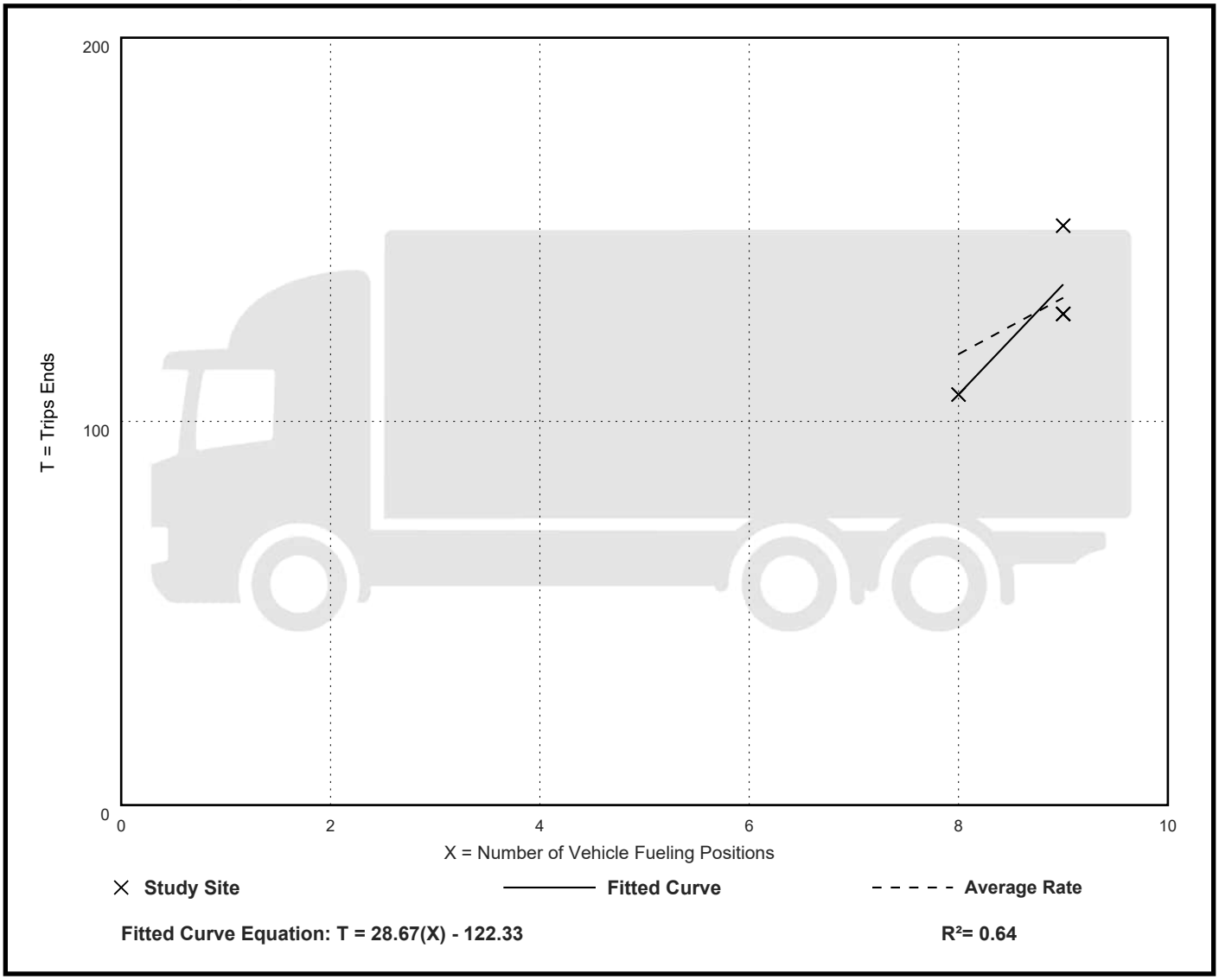
Truck Trip Ends vs: Vehicle Fueling Positions
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 4
Avg. Num. of Vehicle Fueling Positions: 9
Directional Distribution: 51% entering, 49% exiting

Truck Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
14.69	13.38 - 16.78	1.47

Data Plot and Equation



Fitted Curve Equation: T = 28.67(X) - 122.33

R^2= 0.64

Truck Stop
(950)

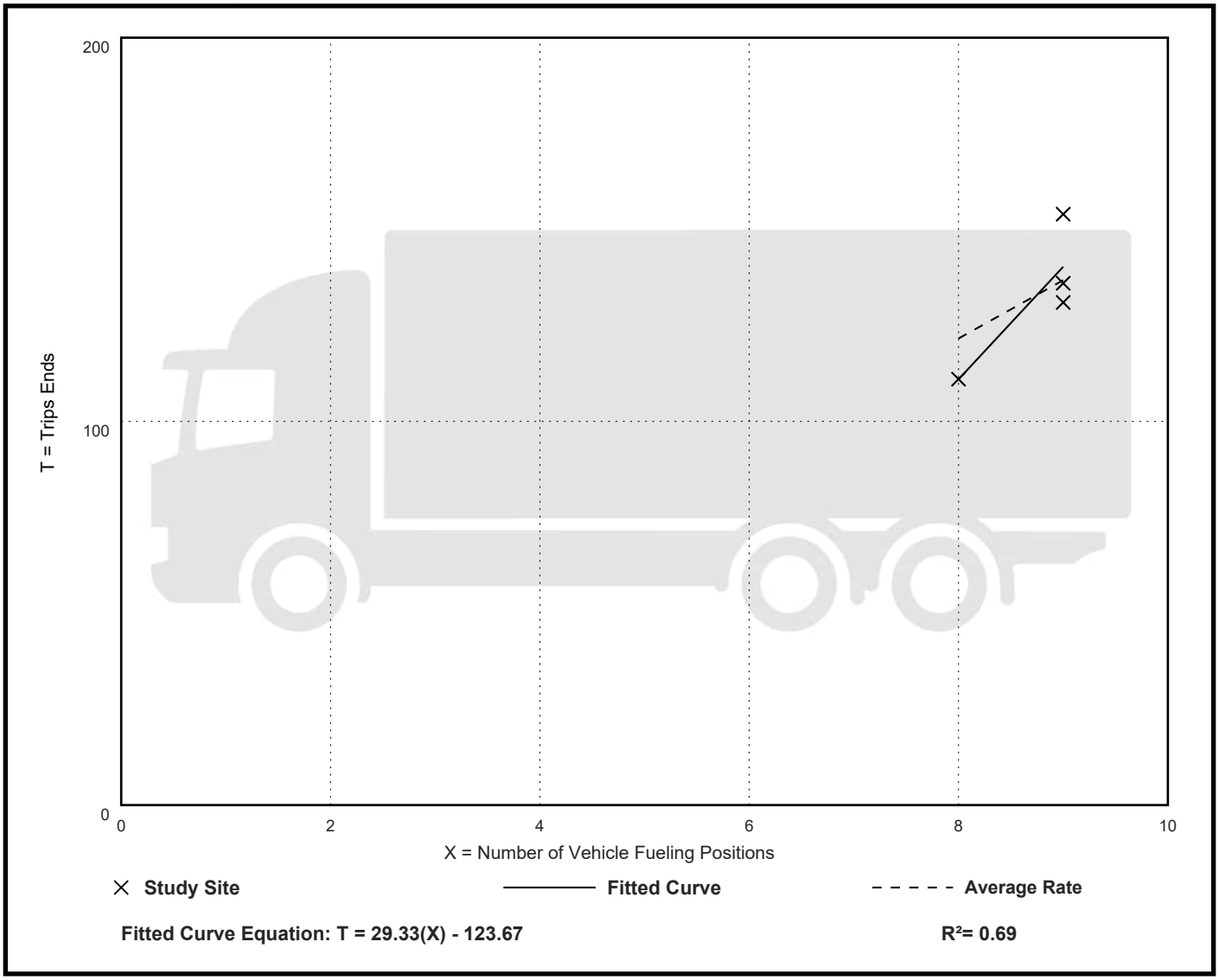
Truck Trip Ends vs: Vehicle Fueling Positions
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 4
Avg. Num. of Vehicle Fueling Positions: 9
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
15.20	13.88 - 17.11	1.39

Data Plot and Equation



Fitted Curve Equation: T = 29.33(X) - 123.67

R^2= 0.69

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 AM Peak Period
# Data Sites	5
Average Pass-By Rate	50%

Pass-By Characteristics for Individual Sites

GFA (000)	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
					Primary (%)	Diverted (%)	Total (%)		
1.4	Kentucky	1993	—	62	22	16	38	1407	2
3	Kentucky	1993	—	43	14	43	57	2903	2
3.3	--	1996	—	68	—	—	32	—	21
3.6	Kentucky	1993	—	32	47	21	68	437	2
4.2	Indiana	1993	—	46	23	31	54	1049	2

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

GFA (000)	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
					Primary (%)	Diverted (%)	Total (%)		
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 AM Peak Period
# Data Sites	12
Average Pass-By Rate	63%

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	21	67	14	19	33	900	25
6	Maryland	1992	21	43	28	29	57	870	25
8	Maryland	1992	46	87	13	0	13	2235	25
8	Maryland	1992	35	78	9	13	22	7080	25
8	Kentucky	1993	61	60	15	25	40	4000	2
8	Kentucky	1993	48	68	13	19	32	1307	2
8	Kentucky	1993	—	56	22	22	44	1211	2
8	Maryland	1992	36	47	14	39	53	3095	25
8	Maryland	1992	46	75	0	25	25	3770	25
10	Kentucky	1993	47	67	11	22	33	1105	2
10	Kentucky	1993	—	46	42	12	54	1211	2
12	Maryland	1992	36	61	8	31	39	3480	25

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

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 (%)		
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									
			Survey		Pass-By	Non-Pass-By Trips			Adj Street Peak	
GFA (000)	VFP	State or Province	Year	# Interviews	Trip (%)	Primary (%)	Diverted (%)	Total (%)	Hour Volume	Source
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									
			Survey		Pass-By	Non-Pass-By Trips			Adj Street Peak	
GFA (000)	VFP	State or Province	Year	# Interviews	Trip (%)	Primary (%)	Diverted (%)	Total (%)	Hour Volume	Source
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 Reports

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	77	63	61	13	202	442	160	125	778	71
Future Volume (vph)	77	63	61	13	202	442	160	125	778	71
Lane Group Flow (vph)	88	241	69	60	230	502	182	142	884	81
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										
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%
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
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
v/c Ratio	0.26	0.86	0.32	0.27	0.97	0.38	0.25	0.29	0.66	0.11
Control Delay (s/veh)	24.7	55.9	26.4	19.5	72.9	22.2	4.2	12.6	27.6	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	24.7	55.9	26.4	19.5	72.9	22.2	4.2	12.6	27.6	2.4
Queue Length 50th (m)	12.4	32.9	9.7	2.7	~24.5	37.9	0.0	13.1	77.5	0.0
Queue Length 95th (m)	23.5	#79.0	19.5	14.6	#75.9	54.3	13.0	24.5	103.4	5.2
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	451	281	372	224	236	1320	718	498	1340	724
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.86	0.19	0.27	0.97	0.38	0.25	0.29	0.66	0.11

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 98.5
Natural Cycle: 90
Control Type: Semi Act-Uncoord

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	63	149	61	13	40	202	442	160	125	778	71
Future Volume (vph)	77	63	149	61	13	40	202	442	160	125	778	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.89		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1289	1228		1106	1077		1180	3167	1468	1626	3282	1615
Flt Permitted	0.71	1.00		0.41	1.00		0.21	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)	957	1228		481	1077		258	3167	1468	759	3282	1615
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	88	72	169	69	15	45	230	502	182	142	884	81
RTOR Reduction (vph)	0	68	0	0	37	0	0	0	107	0	0	48
Lane Group Flow (vph)	88	173	0	69	23	0	230	502	75	142	884	33
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	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
Actuated Green, G (s)	27.3	17.1		26.7	16.8		51.2	41.1	41.1	49.4	40.2	40.2
Effective Green, g (s)	27.3	17.1		26.7	16.8		51.2	41.1	41.1	49.4	40.2	40.2
Actuated g/C Ratio	0.27	0.17		0.27	0.17		0.52	0.41	0.41	0.50	0.40	0.40
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	297	211		191	182		226	1310	607	457	1328	653
v/s Ratio Prot	0.03	c0.14		c0.04	0.02		c0.10	0.16		0.03	0.27	
v/s Ratio Perm	0.05			0.06			c0.42		0.05	0.13		0.02
v/c Ratio	0.30	0.82		0.36	0.12		1.02	0.38	0.12	0.31	0.67	0.05
Uniform Delay, d1	28.0	39.6		28.5	35.0		18.9	20.3	18.0	13.8	24.1	18.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	21.9		2.4	0.3		64.5	0.9	0.4	0.4	2.7	0.1
Delay (s)	29.2	61.5		30.9	35.3		83.4	21.1	18.4	14.2	26.7	18.1
Level of Service	C	E		C	D		F	C	B	B	C	B
Approach Delay (s/veh)		52.8			33.0			36.2			24.5	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	99.3	Sum of lost time (s)	22.0
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	123	130	670	169	806
Future Volume (vph)	123	130	670	169	806
Lane Group Flow (vph)	134	141	830	184	876
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.56	0.42	0.51	0.37	0.41
Control Delay (s/veh)	49.0	10.4	15.2	6.3	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	49.0	10.4	15.2	6.3	6.9
Queue Length 50th (m)	26.2	0.0	50.4	9.3	33.5
Queue Length 95th (m)	46.2	16.9	75.5	17.5	48.5
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	273	365	1635	731	2154
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.49	0.39	0.51	0.25	0.41

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 102.8
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	123	130	670	94	169	806
Future Volume (vph)	123	130	670	94	169	806
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1480	1357	2893		1702	3034
Flt Permitted	0.95	1.00	1.00		0.28	1.00
Satd. Flow (perm)	1480	1357	2893		496	3034
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	141	728	102	184	876
RTOR Reduction (vph)	0	118	7	0	0	0
Lane Group Flow (vph)	134	23	823	0	184	876
Confl. Peds. (#/hr)				3	3	
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	16.8	16.8	57.9		73.0	73.0
Effective Green, g (s)	16.8	16.8	57.9		73.0	73.0
Actuated g/C Ratio	0.16	0.16	0.56		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	241	221	1629		482	2154
v/s Ratio Prot	c0.09		c0.28		0.04	c0.29
v/s Ratio Perm		0.02			0.23	
v/c Ratio	0.56	0.10	0.51		0.38	0.41
Uniform Delay, d1	39.6	36.6	13.7		5.7	6.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	4.7	0.4	1.1		1.1	0.6
Delay (s)	44.2	37.0	14.8		6.8	6.6
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	40.5		14.8			6.7
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	102.8	Sum of lost time (s)	17.0
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	107	557	866
Future Volume (vph)	107	557	866
Lane Group Flow (vph)	116	605	1056
Sign Control		Free	Free

Intersection Summary
Control Type: Unsignalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	107	0	557	866	106
Future Volume (Veh/h)	0	107	0	557	866	106
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	116	0	605	941	115
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	0.90					
vC, conflicting volume	1301	528	1056			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1116	528	1056			
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	77	100			
cM capacity (veh/h)	182	495	655			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	116	303	303	627	429
Volume Left	0	0	0	0	0
Volume Right	116	0	0	0	115
cSH	495	1700	1700	1700	1700
Volume to Capacity	0.23	0.18	0.18	0.37	0.25
Queue Length 95th (m)	7.2	0.0	0.0	0.0	0.0
Control Delay (s/veh)	14.5	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s/veh)	14.5	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	204	200	84
Future Volume (vph)	204	200	84
Lane Group Flow (vph)	232	309	99
Sign Control	Free	Free	Stop

Intersection Summary

Control Type: Unsignalized



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	204	200	85	84	7
Future Volume (Veh/h)	9	204	200	85	84	7
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	222	217	92	91	8
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	0.92				0.92	0.92
vC, conflicting volume	309				505	263
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	199				413	149
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)	1257				541	822

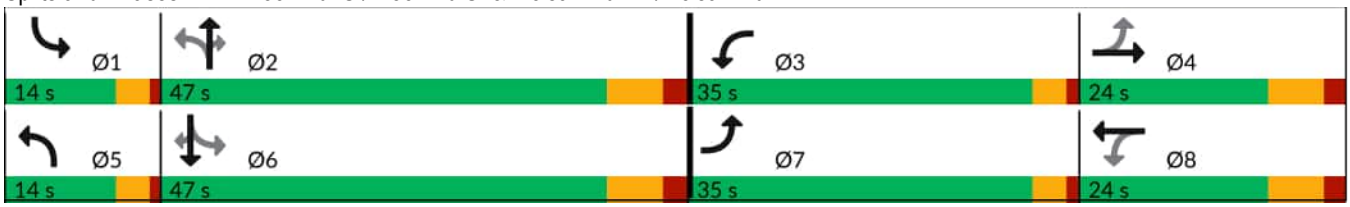
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	232	309	99
Volume Left	10	0	91
Volume Right	0	92	8
cSH	1257	1700	556
Volume to Capacity	0.01	0.18	0.18
Queue Length 95th (m)	0.2	0.0	5.1
Control Delay (s/veh)	0.4	0.0	12.9
Lane LOS	A		B
Approach Delay (s/veh)	0.4	0.0	12.9
Approach LOS			B

Intersection Summary			
Average Delay		2.1	
Intersection Capacity Utilization		29.8%	ICU Level of Service
Analysis Period (min)		15	

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	174	16	153	75	272	688	55	39	527	31
Future Volume (vph)	174	16	153	75	272	688	55	39	527	31
Lane Group Flow (vph)	183	173	161	213	286	724	58	41	555	33
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										
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%
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
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
v/c Ratio	0.46	0.54	0.47	0.74	0.68	0.46	0.09	0.15	0.43	0.06
Control Delay (s/veh)	26.7	15.6	27.7	46.6	24.7	23.1	0.7	13.7	25.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	26.7	15.6	27.7	46.6	24.7	23.1	0.7	13.7	25.4	0.2
Queue Length 50th (m)	26.9	3.2	24.0	31.5	32.0	60.3	0.0	3.9	45.3	0.0
Queue Length 95th (m)	43.8	24.9	40.6	#67.1	#60.5	87.8	1.1	10.3	66.1	0.0
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	571	339	456	299	421	1560	632	295	1299	544
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.51	0.35	0.71	0.68	0.46	0.09	0.14	0.43	0.06

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 104
Natural Cycle: 90
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	174	16	148	153	75	127	272	688	55	39	527	31
Future Volume (vph)	174	16	148	153	75	127	272	688	55	39	527	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1279		1346	1512		1625	3471	1272	1203	3374	1241
Flt Permitted	0.47	1.00		0.51	1.00		0.35	1.00	1.00	0.34	1.00	1.00
Satd. Flow (perm)	835	1279		719	1512		604	3471	1272	433	3374	1241
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	183	17	156	161	79	134	286	724	58	41	555	33
RTOR Reduction (vph)	0	133	0	0	50	0	0	0	32	0	0	20
Lane Group Flow (vph)	183	40	0	161	163	0	286	724	26	41	555	13
Confl. Peds. (#/hr)			1	1			1					1
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
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
Actuated Green, G (s)	31.0	15.6		33.0	16.6		55.8	46.8	46.8	46.8	41.8	41.8
Effective Green, g (s)	31.0	15.6		33.0	16.6		55.8	46.8	46.8	46.8	41.8	41.8
Actuated g/C Ratio	0.29	0.15		0.31	0.16		0.53	0.44	0.44	0.44	0.40	0.40
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	371	188		321	237		415	1535	562	227	1333	490
v/s Ratio Prot	0.07	0.03		c0.08	c0.11		c0.07	0.21		0.01	0.16	
v/s Ratio Perm	0.07			0.08			c0.30		0.02	0.07		0.01
v/c Ratio	0.49	0.21		0.50	0.69		0.69	0.47	0.05	0.18	0.42	0.03
Uniform Delay, d1	29.7	39.7		28.5	42.2		15.5	20.8	16.8	17.1	23.2	19.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.2	0.6		2.6	8.1		4.7	1.0	0.2	0.4	1.0	0.1
Delay (s)	31.9	40.3		31.1	50.2		20.2	21.8	16.9	17.5	24.1	19.7
Level of Service	C	D		C	D		C	C	B	B	C	B
Approach Delay (s/veh)		35.9			42.0			21.1			23.5	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	105.8	Sum of lost time (s)	22.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	140	168	862	52	787
Future Volume (vph)	140	168	862	52	787
Lane Group Flow (vph)	161	193	1021	60	905
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.60	0.47	0.51	0.16	0.39
Control Delay (s/veh)	49.7	9.6	13.8	5.0	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	49.7	9.6	13.8	5.0	6.8
Queue Length 50th (m)	31.7	0.0	65.2	2.9	35.2
Queue Length 95th (m)	51.4	17.2	82.6	6.5	46.5
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	303	436	2010	601	2312
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.53	0.44	0.51	0.10	0.39

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 103.8
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	140	168	862	26	52	787
Future Volume (vph)	140	168	862	26	52	787
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1656	1524	3332		1504	3252
Flt Permitted	0.95	1.00	1.00		0.22	1.00
Satd. Flow (perm)	1656	1524	3332		345	3252
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	161	193	991	30	60	905
RTOR Reduction (vph)	0	162	1	0	0	0
Lane Group Flow (vph)	161	31	1020	0	60	905
Confl. Peds. (#/hr)				1	1	
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.0	17.0	62.6		74.6	74.6
Effective Green, g (s)	17.0	17.0	62.6		74.6	74.6
Actuated g/C Ratio	0.16	0.16	0.60		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	269	247	1994		334	2319
v/s Ratio Prot	c0.10		c0.31		0.01	c0.28
v/s Ratio Perm		0.02			0.11	
v/c Ratio	0.60	0.13	0.51		0.18	0.39
Uniform Delay, d1	40.6	37.5	12.2		5.7	6.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.3	0.5	0.9		0.5	0.5
Delay (s)	46.0	37.9	13.1		6.2	6.5
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	41.6		13.1			6.4
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	104.6	Sum of lost time (s)	17.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBR	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	68	988	527
Future Volume (vph)	68	988	527
Lane Group Flow (vph)	74	1074	645
Sign Control		Free	Free

Intersection Summary

Control Type: Unsignalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	68	0	988	527	66
Future Volume (Veh/h)	0	68	0	988	527	66
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	74	0	1074	573	72
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	0.85					
vC, conflicting volume	1146	323	645			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	831	323	645			
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	89	100			
cM capacity (veh/h)	263	673	936			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	74	537	537	382	263
Volume Left	0	0	0	0	0
Volume Right	74	0	0	0	72
cSH	673	1700	1700	1700	1700
Volume to Capacity	0.11	0.32	0.32	0.22	0.15
Queue Length 95th (m)	2.9	0.0	0.0	0.0	0.0
Control Delay (s/veh)	11.0	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s/veh)	11.0	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	225	255	111
Future Volume (vph)	225	255	111
Lane Group Flow (vph)	253	409	132
Sign Control	Free	Free	Stop

Intersection Summary
Control Type: Unsignalized



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	225	255	121	111	10
Future Volume (Veh/h)	7	225	255	121	111	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)	8	245	277	132	121	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	409				604	343
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	274				493	199
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				74	99
cM capacity (veh/h)	1147				473	749

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	253	409	132
Volume Left	8	0	121
Volume Right	0	132	11
cSH	1147	1700	488
Volume to Capacity	0.01	0.24	0.27
Queue Length 95th (m)	0.2	0.0	8.7
Control Delay (s/veh)	0.3	0.0	15.1
Lane LOS	A		C
Approach Delay (s/veh)	0.3	0.0	15.1
Approach LOS			C

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	77	65	64	13	212	490	165	129	854	74
Future Volume (vph)	77	65	64	13	212	490	165	129	854	74
Lane Group Flow (vph)	88	257	73	62	241	557	188	147	970	84
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										
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%
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
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
v/c Ratio	0.26	0.91	0.34	0.28	1.13	0.42	0.26	0.32	0.73	0.12
Control Delay (s/veh)	24.6	64.1	27.1	19.2	120.1	23.0	4.2	13.1	29.6	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	24.6	64.1	27.1	19.2	120.1	23.0	4.2	13.1	29.6	2.7
Queue Length 50th (m)	12.4	36.1	10.3	2.7	~39.1	43.3	0.0	13.6	88.5	0.0
Queue Length 95th (m)	23.5	#86.4	20.4	14.6	#90.8	61.1	13.2	25.4	117.6	5.7
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	453	282	369	225	214	1316	720	468	1337	722
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.91	0.20	0.28	1.13	0.42	0.26	0.31	0.73	0.12

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 98.7
Natural Cycle: 90
Control Type: Semi Act-Uncoord
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	65	161	64	13	41	212	490	165	129	854	74
Future Volume (vph)	77	65	161	64	13	41	212	490	165	129	854	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.89		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1289	1222		1106	1079		1180	3167	1468	1626	3282	1615
Flt Permitted	0.71	1.00		0.37	1.00		0.17	1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)	967	1222		426	1079		212	3167	1468	691	3282	1615
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	88	74	183	73	15	47	241	557	188	147	970	84
RTOR Reduction (vph)	0	71	0	0	39	0	0	0	111	0	0	50
Lane Group Flow (vph)	88	186	0	73	23	0	241	557	77	147	970	34
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	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
Actuated Green, G (s)	27.3	17.1		27.1	17.0		51.1	41.0	41.0	49.5	40.2	40.2
Effective Green, g (s)	27.3	17.1		27.1	17.0		51.1	41.0	41.0	49.5	40.2	40.2
Actuated g/C Ratio	0.27	0.17		0.27	0.17		0.51	0.41	0.41	0.50	0.40	0.40
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	298	210		185	184		207	1304	604	431	1325	652
v/s Ratio Prot	0.03	c0.15		c0.04	0.02		c0.12	0.18		0.03	0.30	
v/s Ratio Perm	0.05			0.07			c0.48		0.05	0.14		0.02
v/c Ratio	0.30	0.88		0.39	0.13		1.16	0.43	0.13	0.34	0.73	0.05
Uniform Delay, d1	28.1	40.2		28.4	34.9		18.1	20.9	18.2	13.9	25.1	18.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	32.6		2.9	0.3		113.9	1.0	0.4	0.5	3.6	0.2
Delay (s)	29.3	72.9		31.3	35.3		132.0	21.9	18.6	14.4	28.7	18.2
Level of Service	C	E		C	D		F	C	B	B	C	B
Approach Delay (s/veh)		61.7			33.1			48.2			26.2	
Approach LOS		E			C			D			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	99.5	Sum of lost time (s)	22.0
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	136	140	723	185	881
Future Volume (vph)	136	140	723	185	881
Lane Group Flow (vph)	148	152	899	201	958
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.61	0.43	0.56	0.43	0.45
Control Delay (s/veh)	51.2	10.4	16.5	7.1	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	51.2	10.4	16.5	7.1	7.3
Queue Length 50th (m)	29.2	0.0	58.8	10.8	39.8
Queue Length 95th (m)	50.7	17.6	87.3	19.0	54.7
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	272	374	1617	706	2149
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.54	0.41	0.56	0.28	0.45

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 103.1
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	136	140	723	104	185	881
Future Volume (vph)	136	140	723	104	185	881
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1480	1357	2891		1703	3034
Flt Permitted	0.95	1.00	1.00		0.25	1.00
Satd. Flow (perm)	1480	1357	2891		445	3034
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	152	786	113	201	958
RTOR Reduction (vph)	0	127	8	0	0	0
Lane Group Flow (vph)	148	25	891	0	201	958
Confl. Peds. (#/hr)				3	3	
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.0	17.0	57.4		73.0	73.0
Effective Green, g (s)	17.0	17.0	57.4		73.0	73.0
Actuated g/C Ratio	0.17	0.17	0.56		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	244	223	1611		457	2150
v/s Ratio Prot	c0.10		c0.31		0.05	c0.32
v/s Ratio Perm		0.02			0.26	
v/c Ratio	0.61	0.11	0.55		0.44	0.45
Uniform Delay, d1	39.9	36.6	14.6		6.3	6.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.2	0.5	1.4		1.4	0.7
Delay (s)	46.1	37.1	16.0		7.7	7.1
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	41.5		16.0			7.2
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	103.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBR	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	107	607	950
Future Volume (vph)	107	607	950
Lane Group Flow (vph)	116	660	1148
Sign Control		Free	Free

Intersection Summary
Control Type: Unsignalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	107	0	607	950	106
Future Volume (Veh/h)	0	107	0	607	950	106
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	116	0	660	1033	115
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	1421	574	1148			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1218	574	1148			
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	75	100			
cM capacity (veh/h)	153	462	604			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	116	330	330	689	459
Volume Left	0	0	0	0	0
Volume Right	116	0	0	0	115
cSH	462	1700	1700	1700	1700
Volume to Capacity	0.25	0.19	0.19	0.41	0.27
Queue Length 95th (m)	7.9	0.0	0.0	0.0	0.0
Control Delay (s/veh)	15.4	0.0	0.0	0.0	0.0
Lane LOS	C				
Approach Delay (s/veh)	15.4	0.0		0.0	
Approach LOS	C				

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	42.9%	ICU Level of Service		A
Analysis Period (min)	15			



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	219	213	84
Future Volume (vph)	219	213	84
Lane Group Flow (vph)	248	324	99
Sign Control	Free	Free	Stop

Intersection Summary
Control Type: Unsignalized



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	219	213	85	84	7
Future Volume (Veh/h)	9	219	213	85	84	7
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	238	232	92	91	8
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	324				536	278
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	200				435	150
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)	1241				519	812

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	248	324	99
Volume Left	10	0	91
Volume Right	0	92	8
cSH	1241	1700	535
Volume to Capacity	0.01	0.19	0.19
Queue Length 95th (m)	0.2	0.0	5.4
Control Delay (s/veh)	0.4	0.0	13.3
Lane LOS	A		B
Approach Delay (s/veh)	0.4	0.0	13.3
Approach LOS			B

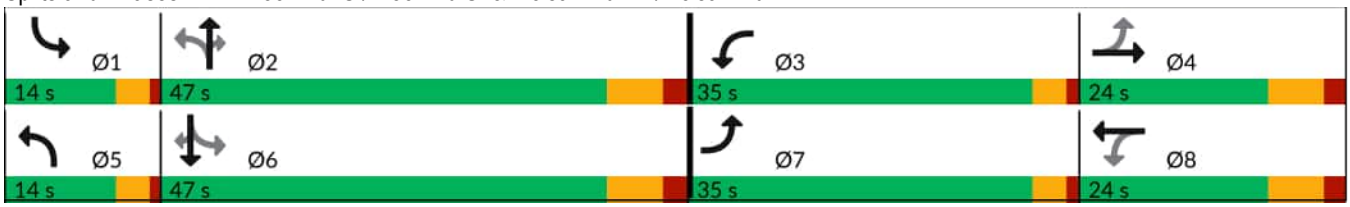
Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	178	16	159	77	287	765	57	40	577	33
Future Volume (vph)	178	16	159	77	287	765	57	40	577	33
Lane Group Flow (vph)	187	183	167	219	302	805	60	42	607	35
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										
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%
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
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
v/c Ratio	0.47	0.55	0.49	0.75	0.76	0.52	0.10	0.17	0.47	0.06
Control Delay (s/veh)	27.0	15.6	28.2	47.7	30.7	24.3	0.9	14.2	26.3	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	27.0	15.6	28.2	47.7	30.7	24.3	0.9	14.2	26.3	0.2
Queue Length 50th (m)	27.6	3.2	25.0	32.8	34.3	69.4	0.0	4.0	50.7	0.0
Queue Length 95th (m)	44.7	25.8	42.1	#68.9	#78.1	101.5	1.6	10.8	74.0	0.0
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	570	347	453	301	396	1553	629	269	1295	543
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.53	0.37	0.73	0.76	0.52	0.10	0.16	0.47	0.06

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 104.4
Natural Cycle: 90
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	178	16	158	159	77	131	287	765	57	40	577	33
Future Volume (vph)	178	16	158	159	77	131	287	765	57	40	577	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1277		1346	1511		1626	3471	1272	1203	3374	1241
Flt Permitted	0.45	1.00		0.48	1.00		0.32	1.00	1.00	0.30	1.00	1.00
Satd. Flow (perm)	809	1277		674	1511		551	3471	1272	374	3374	1241
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	187	17	166	167	81	138	302	805	60	42	607	35
RTOR Reduction (vph)	0	142	0	0	51	0	0	0	34	0	0	21
Lane Group Flow (vph)	187	41	0	167	168	0	302	805	26	42	607	14
Confl. Peds. (#/hr)			1	1			1					1
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
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
Actuated Green, G (s)	31.2	15.6		33.4	16.7		55.7	46.7	46.7	46.7	41.7	41.7
Effective Green, g (s)	31.2	15.6		33.4	16.7		55.7	46.7	46.7	46.7	41.7	41.7
Actuated g/C Ratio	0.29	0.15		0.32	0.16		0.53	0.44	0.44	0.44	0.39	0.39
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	369	187		318	238		390	1529	560	203	1327	488
v/s Ratio Prot	0.07	0.03		c0.08	c0.11		c0.07	0.23		0.01	0.18	
v/s Ratio Perm	0.07			0.08			c0.33		0.02	0.08		0.01
v/c Ratio	0.51	0.22		0.53	0.71		0.77	0.53	0.05	0.21	0.46	0.03
Uniform Delay, d1	29.8	39.8		28.5	42.3		16.9	21.6	16.9	17.4	23.8	19.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	0.6		3.0	9.2		9.3	1.3	0.2	0.5	1.1	0.1
Delay (s)	32.0	40.4		31.5	51.6		26.1	22.9	17.1	17.9	24.9	19.8
Level of Service	C	D		C	D		C	C	B	B	C	B
Approach Delay (s/veh)		36.2			42.9			23.4			24.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	28.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	155	183	942	57	849
Future Volume (vph)	155	183	942	57	849
Lane Group Flow (vph)	178	210	1116	66	976
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.65	0.49	0.56	0.20	0.42
Control Delay (s/veh)	51.9	9.5	14.8	5.4	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	51.9	9.5	14.8	5.4	7.2
Queue Length 50th (m)	35.5	0.0	76.5	3.4	41.0
Queue Length 95th (m)	56.6	18.0	93.6	7.0	51.4
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	303	450	2000	580	2302
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.59	0.47	0.56	0.11	0.42

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 103.7
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	183	942	29	57	849
Future Volume (vph)	155	183	942	29	57	849
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1656	1524	3331		1504	3252
Flt Permitted	0.95	1.00	1.00		0.19	1.00
Satd. Flow (perm)	1656	1524	3331		297	3252
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	178	210	1083	33	66	976
RTOR Reduction (vph)	0	175	1	0	0	0
Lane Group Flow (vph)	178	35	1115	0	66	976
Confl. Peds. (#/hr)				1	1	
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.3	17.3	62.2		74.2	74.2
Effective Green, g (s)	17.3	17.3	62.2		74.2	74.2
Actuated g/C Ratio	0.17	0.17	0.60		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	274	252	1982		303	2309
v/s Ratio Prot	c0.11		c0.33		0.02	c0.30
v/s Ratio Perm		0.02			0.14	
v/c Ratio	0.65	0.14	0.56		0.22	0.42
Uniform Delay, d1	40.8	37.2	12.9		6.3	6.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	7.1	0.5	1.2		0.8	0.6
Delay (s)	47.9	37.8	14.0		7.1	6.8
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	42.4		14.0			6.9
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	104.5	Sum of lost time (s)	17.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	68	1073	580
Future Volume (vph)	68	1073	580
Lane Group Flow (vph)	74	1166	702
Sign Control		Free	Free

Intersection Summary

Control Type: Unsignalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	68	0	1073	580	66
Future Volume (Veh/h)	0	68	0	1073	580	66
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	74	0	1166	630	72
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	0.83					
vC, conflicting volume	1249	351	702			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	896	351	702			
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	89	100			
cM capacity (veh/h)	233	645	891			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	74	583	583	420	282
Volume Left	0	0	0	0	0
Volume Right	74	0	0	0	72
cSH	645	1700	1700	1700	1700
Volume to Capacity	0.11	0.34	0.34	0.25	0.17
Queue Length 95th (m)	3.1	0.0	0.0	0.0	0.0
Control Delay (s/veh)	11.3	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s/veh)	11.3	0.0		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	33.0%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	239	273	111
Future Volume (vph)	239	273	111
Lane Group Flow (vph)	268	429	132
Sign Control	Free	Free	Stop

Intersection Summary

Control Type: Unsignalized



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	239	273	121	111	10
Future Volume (Veh/h)	7	239	273	121	111	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)	8	260	297	132	121	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	0.88				0.88	0.88
vC, conflicting volume	429				639	363
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	284				522	209
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				73	98
cM capacity (veh/h)	1126				450	732

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	268	429	132
Volume Left	8	0	121
Volume Right	0	132	11
cSH	1126	1700	465
Volume to Capacity	0.01	0.25	0.28
Queue Length 95th (m)	0.2	0.0	9.3
Control Delay (s/veh)	0.3	0.0	15.8
Lane LOS	A		C
Approach Delay (s/veh)	0.3	0.0	15.8
Approach LOS			C

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix K

Optimized Existing, Future Background, and Future Total Synchro Reports

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	12	64	64	10	130	532	165	125	817	74
Future Volume (vph)	12	64	64	10	130	532	165	125	817	74
Lane Group Flow (vph)	14	238	73	58	148	605	188	142	928	84
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										
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)	14.0	35.0	16.0	37.0	21.0	57.0	57.0	12.0	48.0	48.0
Total Split (%)	11.7%	29.2%	13.3%	30.8%	17.5%	47.5%	47.5%	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
Recall Mode	None	None	None	None	Max	Max	Max	None	Min	Min
v/c Ratio	0.05	0.79	0.36	0.19	0.55	0.41	0.24	0.34	0.75	0.12
Control Delay (s/veh)	23.8	46.5	30.3	14.5	22.6	22.2	3.9	15.2	35.5	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	23.8	46.5	30.3	14.5	22.6	22.2	3.9	15.2	35.5	0.5
Queue Length 50th (m)	2.1	34.1	11.6	1.7	15.3	48.7	0.0	14.1	97.9	0.0
Queue Length 95th (m)	6.5	62.3	22.3	12.9	35.8	70.7	13.2	27.6	133.3	0.3
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	306	384	210	347	269	1465	780	415	1245	703
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.62	0.35	0.17	0.55	0.41	0.24	0.34	0.75	0.12

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 109.1
Natural Cycle: 90
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	64	145	64	10	41	130	532	165	125	817	74
Future Volume (vph)	12	64	145	64	10	41	130	532	165	125	817	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1289	1232		1106	1091		1180	3167	1468	1626	3282	1615
Flt Permitted	0.72	1.00		0.36	1.00		0.15	1.00	1.00	0.42	1.00	1.00
Satd. Flow (perm)	976	1232		417	1091		188	3167	1468	724	3282	1615
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	14	73	165	73	11	47	148	605	188	142	928	84
RTOR Reduction (vph)	0	71	0	0	35	0	0	0	103	0	0	53
Lane Group Flow (vph)	14	167	0	73	23	0	148	605	85	142	928	31
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	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
Actuated Green, G (s)	25.2	21.8		34.8	27.4		62.6	50.5	50.5	49.5	41.4	41.4
Effective Green, g (s)	25.2	21.8		34.8	27.4		62.6	50.5	50.5	49.5	41.4	41.4
Actuated g/C Ratio	0.23	0.20		0.31	0.25		0.56	0.45	0.45	0.44	0.37	0.37
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	230	241		185	268		258	1435	665	387	1219	600
v/s Ratio Prot	0.00	c0.14		c0.03	0.02		c0.09	0.19		0.03	c0.28	
v/s Ratio Perm	0.01			0.09			0.23		0.06	0.14		0.02
v/c Ratio	0.06	0.69		0.39	0.08		0.57	0.42	0.13	0.37	0.76	0.05
Uniform Delay, d1	33.7	41.7		28.8	32.3		16.1	20.6	17.7	18.8	30.7	22.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	8.4		2.9	0.1		9.0	0.9	0.4	0.6	3.4	0.1
Delay (s)	33.9	50.1		31.7	32.5		25.1	21.5	18.1	19.4	34.0	22.5
Level of Service	C	D		C	C		C	C	B	B	C	C
Approach Delay (s/veh)		49.2			32.0			21.4			31.4	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	29.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	111.4	Sum of lost time (s)	22.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	136	130	694	173	841
Future Volume (vph)	136	130	694	173	841
Lane Group Flow (vph)	148	141	867	188	914
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.61	0.41	0.53	0.39	0.43
Control Delay (s/veh)	51.2	10.4	15.8	6.6	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	51.2	10.4	15.8	6.6	7.1
Queue Length 50th (m)	29.2	0.0	55.2	10.0	37.1
Queue Length 95th (m)	50.7	16.9	80.4	17.8	51.4
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	272	365	1626	717	2149
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.54	0.39	0.53	0.26	0.43

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 103.1
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	136	130	694	104	173	841
Future Volume (vph)	136	130	694	104	173	841
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1480	1357	2889		1703	3034
Flt Permitted	0.95	1.00	1.00		0.26	1.00
Satd. Flow (perm)	1480	1357	2889		469	3034
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	141	754	113	188	914
RTOR Reduction (vph)	0	118	8	0	0	0
Lane Group Flow (vph)	148	23	859	0	188	914
Confl. Peds. (#/hr)				3	3	
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.0	17.0	57.8		73.0	73.0
Effective Green, g (s)	17.0	17.0	57.8		73.0	73.0
Actuated g/C Ratio	0.17	0.17	0.56		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	244	223	1621		466	2150
v/s Ratio Prot	c0.10		c0.30		0.04	c0.30
v/s Ratio Perm		0.02			0.24	
v/c Ratio	0.61	0.10	0.53		0.40	0.43
Uniform Delay, d1	39.9	36.5	14.1		6.0	6.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.2	0.4	1.2		1.2	0.6
Delay (s)	46.1	37.0	15.4		7.2	6.9
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	41.6		15.4			6.9
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	103.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	78	15	159	71	172	829	57	38	552	33
Future Volume (vph)	78	15	159	71	172	829	57	38	552	33
Lane Group Flow (vph)	82	171	167	213	181	873	60	40	581	35
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										
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)	14.0	35.0	16.0	37.0	21.0	57.0	57.0	12.0	48.0	48.0
Total Split (%)	11.7%	29.2%	13.3%	30.8%	17.5%	47.5%	47.5%	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
Recall Mode	None	None	None	None	Max	Max	Max	None	Min	Min
v/c Ratio	0.24	0.52	0.60	0.59	0.36	0.50	0.09	0.16	0.46	0.06
Control Delay (s/veh)	27.5	14.5	38.3	34.1	12.5	20.5	0.7	12.2	27.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	27.5	14.5	38.3	34.1	12.5	20.5	0.7	12.2	27.4	0.2
Queue Length 50th (m)	12.8	3.1	28.4	29.1	16.3	69.5	0.0	3.3	49.3	0.0
Queue Length 95th (m)	24.3	23.4	47.3	55.1	31.8	99.8	1.3	9.1	72.4	0.0
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	351	445	277	472	503	1746	694	254	1277	559
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.38	0.60	0.45	0.36	0.50	0.09	0.16	0.45	0.06

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 108.4
Natural Cycle: 90
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	15	147	159	71	131	172	829	57	38	552	33
Future Volume (vph)	78	15	147	159	71	131	172	829	57	38	552	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1277		1346	1504		1626	3471	1272	1203	3374	1240
Flt Permitted	0.59	1.00		0.44	1.00		0.33	1.00	1.00	0.33	1.00	1.00
Satd. Flow (perm)	1065	1277		630	1504		564	3471	1272	412	3374	1240
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	82	16	155	167	75	138	181	873	60	40	581	35
RTOR Reduction (vph)	0	130	0	0	60	0	0	0	30	0	0	22
Lane Group Flow (vph)	82	41	0	167	153	0	181	873	30	40	581	13
Confl. Peds. (#/hr)			1	1			1					1
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
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
Actuated Green, G (s)	25.4	17.5		33.5	21.6		63.2	54.5	54.5	46.9	42.2	42.2
Effective Green, g (s)	25.4	17.5		33.5	21.6		63.2	54.5	54.5	46.9	42.2	42.2
Actuated g/C Ratio	0.23	0.16		0.30	0.20		0.57	0.49	0.49	0.42	0.38	0.38
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	289	201		268	293		485	1708	626	208	1286	472
v/s Ratio Prot	0.02	0.03		c0.07	0.10		c0.06	c0.25		0.01	0.17	
v/s Ratio Perm	0.04			c0.12			0.16		0.02	0.07		0.01
v/c Ratio	0.28	0.20		0.62	0.52		0.37	0.51	0.05	0.19	0.45	0.03
Uniform Delay, d1	34.5	40.5		31.0	39.9		12.2	19.1	14.6	19.0	25.6	21.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.5		6.3	1.7		2.2	1.1	0.1	0.5	0.5	0.1
Delay (s)	35.7	41.0		37.2	41.6		14.4	20.2	14.7	19.5	26.1	21.5
Level of Service	D	D		D	D		B	C	B	B	C	C
Approach Delay (s/veh)		39.3			39.7			18.9			25.5	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	110.7	Sum of lost time (s)	22.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	155	170	905	53	816
Future Volume (vph)	155	170	905	53	816
Lane Group Flow (vph)	178	195	1073	61	938
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.65	0.47	0.54	0.18	0.41
Control Delay (s/veh)	52.0	9.5	14.4	5.2	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	52.0	9.5	14.4	5.2	7.0
Queue Length 50th (m)	35.5	0.0	72.3	3.1	38.7
Queue Length 95th (m)	56.6	17.4	88.5	6.5	48.7
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	302	438	1999	588	2303
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.59	0.45	0.54	0.10	0.41

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 103.9
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	170	905	29	53	816
Future Volume (vph)	155	170	905	29	53	816
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1656	1524	3329		1504	3252
Flt Permitted	0.95	1.00	1.00		0.20	1.00
Satd. Flow (perm)	1656	1524	3329		318	3252
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	178	195	1040	33	61	938
RTOR Reduction (vph)	0	163	1	0	0	0
Lane Group Flow (vph)	178	32	1072	0	61	938
Confl. Peds. (#/hr)				1	1	
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.3	17.3	62.4		74.4	74.4
Effective Green, g (s)	17.3	17.3	62.4		74.4	74.4
Actuated g/C Ratio	0.17	0.17	0.60		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	273	251	1984		316	2310
v/s Ratio Prot	c0.11		c0.32		0.01	c0.29
v/s Ratio Perm		0.02			0.12	
v/c Ratio	0.65	0.13	0.54		0.19	0.41
Uniform Delay, d1	40.9	37.3	12.6		6.1	6.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	7.3	0.5	1.1		0.6	0.5
Delay (s)	48.2	37.8	13.7		6.7	6.7
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	42.7		13.7			6.7
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	104.7	Sum of lost time (s)	17.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	77	65	64	13	212	490	165	129	854	74
Future Volume (vph)	77	65	64	13	212	490	165	129	854	74
Lane Group Flow (vph)	88	257	73	62	241	557	188	147	970	84
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										
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)	14.0	35.0	16.0	37.0	21.0	57.0	57.0	12.0	48.0	48.0
Total Split (%)	11.7%	29.2%	13.3%	30.8%	17.5%	47.5%	47.5%	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
Recall Mode	None	None	None	None	Max	Max	Max	None	Min	Min
v/c Ratio	0.28	0.82	0.37	0.24	0.93	0.38	0.24	0.35	0.79	0.12
Control Delay (s/veh)	27.7	47.8	30.4	16.8	67.6	22.3	3.9	15.7	37.8	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	27.7	47.8	30.4	16.8	67.6	22.3	3.9	15.7	37.8	0.5
Queue Length 50th (m)	14.1	37.1	11.6	2.8	38.3	45.4	0.0	15.3	107.1	0.0
Queue Length 95th (m)	25.7	67.1	22.3	14.0	#95.1	64.5	13.2	28.5	141.4	0.3
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	311	385	207	331	258	1452	775	425	1234	698
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.67	0.35	0.19	0.93	0.38	0.24	0.35	0.79	0.12

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 110.1
Natural Cycle: 90
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	65	161	64	13	41	212	490	165	129	854	74
Future Volume (vph)	77	65	161	64	13	41	212	490	165	129	854	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.89		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1289	1222		1106	1079		1180	3167	1468	1626	3282	1615
Flt Permitted	0.72	1.00		0.36	1.00		0.14	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)	973	1222		414	1079		169	3167	1468	759	3282	1615
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	88	74	183	73	15	47	241	557	188	147	970	84
RTOR Reduction (vph)	0	78	0	0	37	0	0	0	102	0	0	53
Lane Group Flow (vph)	88	179	0	73	25	0	241	557	86	147	970	31
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	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
Actuated Green, G (s)	29.0	21.3		31.6	22.6		62.6	50.5	50.5	49.5	41.4	41.4
Effective Green, g (s)	29.0	21.3		31.6	22.6		62.6	50.5	50.5	49.5	41.4	41.4
Actuated g/C Ratio	0.26	0.19		0.28	0.20		0.56	0.46	0.46	0.45	0.37	0.37
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	276	234		174	219		252	1442	668	402	1225	602
v/s Ratio Prot	0.02	c0.15		c0.03	0.02		c0.15	0.18		0.03	0.30	
v/s Ratio Perm	0.06			0.09			c0.39		0.06	0.14		0.02
v/c Ratio	0.32	0.76		0.42	0.11		0.96	0.39	0.13	0.37	0.79	0.05
Uniform Delay, d1	32.5	42.4		30.8	36.0		27.2	20.0	17.5	18.7	30.9	22.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	13.7		3.4	0.2		46.5	0.8	0.4	0.6	4.1	0.1
Delay (s)	33.9	56.1		34.2	36.2		73.7	20.7	17.9	19.3	35.0	22.3
Level of Service	C	E		C	D		E	C	B	B	D	C
Approach Delay (s/veh)		50.4			35.1			33.1			32.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	35.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.9	Sum of lost time (s)	22.0
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	136	140	723	185	881
Future Volume (vph)	136	140	723	185	881
Lane Group Flow (vph)	148	152	899	201	958
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.61	0.43	0.56	0.43	0.45
Control Delay (s/veh)	51.2	10.4	16.5	7.1	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	51.2	10.4	16.5	7.1	7.3
Queue Length 50th (m)	29.2	0.0	58.8	10.8	39.8
Queue Length 95th (m)	50.7	17.6	87.3	19.0	54.7
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	272	374	1617	706	2149
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.54	0.41	0.56	0.28	0.45

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 103.1
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	136	140	723	104	185	881
Future Volume (vph)	136	140	723	104	185	881
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1480	1357	2891		1703	3034
Flt Permitted	0.95	1.00	1.00		0.25	1.00
Satd. Flow (perm)	1480	1357	2891		445	3034
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	152	786	113	201	958
RTOR Reduction (vph)	0	127	8	0	0	0
Lane Group Flow (vph)	148	25	891	0	201	958
Confl. Peds. (#/hr)				3	3	
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.0	17.0	57.4		73.0	73.0
Effective Green, g (s)	17.0	17.0	57.4		73.0	73.0
Actuated g/C Ratio	0.17	0.17	0.56		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	244	223	1611		457	2150
v/s Ratio Prot	c0.10		c0.31		0.05	c0.32
v/s Ratio Perm		0.02			0.26	
v/c Ratio	0.61	0.11	0.55		0.44	0.45
Uniform Delay, d1	39.9	36.6	14.6		6.3	6.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.2	0.5	1.4		1.4	0.7
Delay (s)	46.1	37.1	16.0		7.7	7.1
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	41.5		16.0			7.2
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	103.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBR	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	107	607	950
Future Volume (vph)	107	607	950
Lane Group Flow (vph)	116	660	1148
Sign Control		Free	Free

Intersection Summary
Control Type: Unsignalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	107	0	607	950	106
Future Volume (Veh/h)	0	107	0	607	950	106
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	116	0	660	1033	115
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	1421	574	1148			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1234	574	1148			
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	75	100			
cM capacity (veh/h)	151	462	604			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	116	330	330	689	459
Volume Left	0	0	0	0	0
Volume Right	116	0	0	0	115
cSH	462	1700	1700	1700	1700
Volume to Capacity	0.25	0.19	0.19	0.41	0.27
Queue Length 95th (m)	7.9	0.0	0.0	0.0	0.0
Control Delay (s/veh)	15.4	0.0	0.0	0.0	0.0
Lane LOS	C				
Approach Delay (s/veh)	15.4	0.0		0.0	
Approach LOS	C				

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	42.9%	ICU Level of Service		A
Analysis Period (min)	15			



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	219	213	84
Future Volume (vph)	219	213	84
Lane Group Flow (vph)	248	324	99
Sign Control	Free	Free	Stop

Intersection Summary
Control Type: Unsignalized



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	219	213	85	84	7
Future Volume (Veh/h)	9	219	213	85	84	7
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	238	232	92	91	8
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	0.91				0.91	0.91
vC, conflicting volume	324				536	278
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	208				441	157
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)	1241				518	808

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	248	324	99
Volume Left	10	0	91
Volume Right	0	92	8
cSH	1241	1700	534
Volume to Capacity	0.01	0.19	0.19
Queue Length 95th (m)	0.2	0.0	5.4
Control Delay (s/veh)	0.4	0.0	13.3
Lane LOS	A		B
Approach Delay (s/veh)	0.4	0.0	13.3
Approach LOS			B

Intersection Summary			
Average Delay		2.1	
Intersection Capacity Utilization		30.6%	ICU Level of Service
Analysis Period (min)		15	

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	178	16	159	77	287	765	57	40	577	33
Future Volume (vph)	178	16	159	77	287	765	57	40	577	33
Lane Group Flow (vph)	187	183	167	219	302	805	60	42	607	35
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										
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)	14.0	35.0	16.0	37.0	21.0	57.0	57.0	12.0	48.0	48.0
Total Split (%)	11.7%	29.2%	13.3%	30.8%	17.5%	47.5%	47.5%	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
Recall Mode	None	None	None	None	Max	Max	Max	None	Min	Min
v/c Ratio	0.59	0.54	0.60	0.68	0.62	0.46	0.09	0.16	0.48	0.06
Control Delay (s/veh)	36.4	14.4	37.9	40.1	17.4	20.1	0.6	12.4	28.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	36.4	14.4	37.9	40.1	17.4	20.1	0.6	12.4	28.0	0.2
Queue Length 50th (m)	31.3	3.3	28.4	31.9	29.7	62.5	0.0	3.5	51.9	0.0
Queue Length 95th (m)	50.3	24.1	47.3	58.6	55.1	91.8	1.2	9.8	77.0	0.0
Internal Link Dist (m)		106.5		215.4		432.3			100.5	
Turn Bay Length (m)	54.0		55.0		142.0		66.0	62.0		62.0
Base Capacity (vph)	319	452	279	466	491	1741	692	265	1272	558
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.40	0.60	0.47	0.62	0.46	0.09	0.16	0.48	0.06

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 108.8
Natural Cycle: 90
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	178	16	158	159	77	131	287	765	57	40	577	33
Future Volume (vph)	178	16	158	159	77	131	287	765	57	40	577	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1277		1346	1511		1626	3471	1272	1203	3374	1240
Flt Permitted	0.49	1.00		0.46	1.00		0.32	1.00	1.00	0.35	1.00	1.00
Satd. Flow (perm)	876	1277		645	1511		540	3471	1272	440	3374	1240
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	187	17	166	167	81	138	302	805	60	42	607	35
RTOR Reduction (vph)	0	140	0	0	56	0	0	0	30	0	0	22
Lane Group Flow (vph)	187	43	0	167	163	0	302	805	30	42	607	13
Confl. Peds. (#/hr)			1	1			1					1
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
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
Actuated Green, G (s)	27.1	17.1		31.1	19.1		63.3	54.6	54.6	47.0	42.3	42.3
Effective Green, g (s)	27.1	17.1		31.1	19.1		63.3	54.6	54.6	47.0	42.3	42.3
Actuated g/C Ratio	0.25	0.15		0.28	0.17		0.57	0.49	0.49	0.43	0.38	0.38
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	289	197		257	261		476	1716	629	219	1292	475
v/s Ratio Prot	0.06	0.03		c0.07	0.11		c0.10	0.23		0.01	0.18	
v/s Ratio Perm	0.10			c0.11			c0.27		0.02	0.07		0.01
v/c Ratio	0.65	0.22		0.65	0.62		0.63	0.47	0.05	0.19	0.47	0.03
Uniform Delay, d1	35.5	40.8		32.7	42.3		13.4	18.4	14.4	18.9	25.6	21.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.7	0.6		7.5	4.6		6.3	0.9	0.1	0.4	0.6	0.1
Delay (s)	42.1	41.3		40.2	46.9		19.7	19.3	14.6	19.3	26.2	21.3
Level of Service	D	D		D	D		B	B	B	B	C	C
Approach Delay (s/veh)		41.7			44.0			19.2			25.5	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	110.4	Sum of lost time (s)	22.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	155	183	942	57	849
Future Volume (vph)	155	183	942	57	849
Lane Group Flow (vph)	178	210	1116	66	976
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					
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%
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	
Recall Mode	None	None	Max	None	Max
v/c Ratio	0.65	0.49	0.56	0.20	0.42
Control Delay (s/veh)	51.9	9.5	14.8	5.4	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	51.9	9.5	14.8	5.4	7.2
Queue Length 50th (m)	35.5	0.0	76.5	3.4	41.0
Queue Length 95th (m)	56.6	18.0	93.6	7.0	51.4
Internal Link Dist (m)	497.7		346.3		432.3
Turn Bay Length (m)	56.0			21.0	
Base Capacity (vph)	303	450	2000	580	2302
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.59	0.47	0.56	0.11	0.42

Intersection Summary
Cycle Length: 105
Actuated Cycle Length: 103.7
Natural Cycle: 80
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	183	942	29	57	849
Future Volume (vph)	155	183	942	29	57	849
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0		4.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1656	1524	3331		1504	3252
Flt Permitted	0.95	1.00	1.00		0.19	1.00
Satd. Flow (perm)	1656	1524	3331		297	3252
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	178	210	1083	33	66	976
RTOR Reduction (vph)	0	175	1	0	0	0
Lane Group Flow (vph)	178	35	1115	0	66	976
Confl. Peds. (#/hr)				1	1	
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.3	17.3	62.2		74.2	74.2
Effective Green, g (s)	17.3	17.3	62.2		74.2	74.2
Actuated g/C Ratio	0.17	0.17	0.60		0.71	0.71
Clearance Time (s)	6.0	6.0	7.0		4.0	7.0
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Lane Grp Cap (vph)	274	252	1982		303	2309
v/s Ratio Prot	c0.11		c0.33		0.02	c0.30
v/s Ratio Perm		0.02			0.14	
v/c Ratio	0.65	0.14	0.56		0.22	0.42
Uniform Delay, d1	40.8	37.2	12.9		6.3	6.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	7.1	0.5	1.2		0.8	0.6
Delay (s)	47.9	37.8	14.0		7.1	6.8
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	42.4		14.0			6.9
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	104.5	Sum of lost time (s)	17.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	68	1073	580
Future Volume (vph)	68	1073	580
Lane Group Flow (vph)	74	1166	702
Sign Control		Free	Free

Intersection Summary

Control Type: Unsignalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	68	0	1073	580	66
Future Volume (Veh/h)	0	68	0	1073	580	66
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	74	0	1166	630	72
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	0.85					
vC, conflicting volume	1249	351	702			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	936	351	702			
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	89	100			
cM capacity (veh/h)	224	645	891			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	74	583	583	420	282
Volume Left	0	0	0	0	0
Volume Right	74	0	0	0	72
cSH	645	1700	1700	1700	1700
Volume to Capacity	0.11	0.34	0.34	0.25	0.17
Queue Length 95th (m)	3.1	0.0	0.0	0.0	0.0
Control Delay (s/veh)	11.3	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s/veh)	11.3	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	239	273	111
Future Volume (vph)	239	273	111
Lane Group Flow (vph)	268	429	132
Sign Control	Free	Free	Stop

Intersection Summary

Control Type: Unsignalized



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	239	273	121	111	10
Future Volume (Veh/h)	7	239	273	121	111	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)	8	260	297	132	121	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	429				639	363
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	300				535	226
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				73	98
cM capacity (veh/h)	1126				448	726

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	268	429	132
Volume Left	8	0	121
Volume Right	0	132	11
cSH	1126	1700	463
Volume to Capacity	0.01	0.25	0.29
Queue Length 95th (m)	0.2	0.0	9.3
Control Delay (s/veh)	0.3	0.0	15.8
Lane LOS	A		C
Approach Delay (s/veh)	0.3	0.0	15.8
Approach LOS			C

Intersection Summary			
Average Delay		2.6	
Intersection Capacity Utilization		35.2%	ICU Level of Service
Analysis Period (min)		15	

Appendix L

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 m²	0
Between 250 m² and 2,500 m²	1
Greater than 2,500 m² and less than 5,000 m²	2
Greater than 5,000 m²	3 + 1 additional space for each 10,000 m² in excess of 5,000 m²

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 m²
Agricultural service and supply establishments	1 per 40 m²
Agricultural animal clinic	1 per 50 m²
Animal clinic	1 per 20 m²
Art gallery	1 per 30 m²
Artisan studio	1 per 30 m²
Asphalt plant	1 per 30 m² for office component
Assembly hall	1 per 5 persons seating capacity or 1 per 10 m2 GFA where there are no seats
Auction sales establishment	1 per 15 m²
Motor vehicle body shop	3 per service bay
Motor vehicle sales and rental establishment	1 per 30 m² for office component
Motor vehicle service establishment	3 per service bay or 1 per 100 m² or whichever is greater
Motor vehicle washing establishment	1 plus 6 waiting spaces per wash bay
Building supply store	1 per 100 m²
Business or professional office	1 per 40 m²
Caterer's establishment	1 per 40 m²
Commercial mall	1 per 20 m²
Commercial school or studio	1 per 30 m²
Commercial self-storage facility	1 per 100 m²
Community garden	1 per 100 m² of area used for **community garden** purposes
Contractor's yard	1 per 50 m²
Day care centre	1 per 40 m²
Dry cleaning plant	1 per 40 m²
Dry cleaning depot	1 per employee and 2 additional spaces for pickup / loading
Factory outlet	1 per 20 m²
Farm related business	1 per 40 m²
Farm greenhouse	No requirement
Financial institution	1 per 20 m² or 1 per 30 m² 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 m²
Gas bar	1 per **gas bar** pump
Garden centre	1 per 35 m²
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 m² of **floor area** of each refreshment room or dining room
Industrial use	1/100 m² for the first 10,000 m² of **floor area** and 1/200 m² for any **floor area** after the first 10,000 m²
Kennel	1 per 30 m² for office component
Laundromat	1 per 30 m²
Long term care facility	1 per 4 beds and 1 per 2 employees
Marina	0.5 per boat slip and 1/20 m2 of total retail floor area
Medical office	1 per 25 m²
Miniature golf course	1.5 per tee
Museum	1 per 30 m²
Personal service establishment	1 per 20 m²
Place of entertainment	1 per 20 m²
Place of worship	1 per 4 persons seating capacity or 1 per 10 m², whichever is greater
Postal or courier outlet	1 per 30 m²
Private club	1 per 4 persons seating capacity or 1 per 10 m², whichever is greater
Private school	1.5 per classroom for elementary schools 5.0 per classroom for secondary schools
Public **buildings**	1 per 30 m²
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 m² for office component
Equipment rental establishment	1 per 50 m²
Restaurant	1 per 10 m² including **outdoor patio** area
Retail store	1 per 20 m²
Salvage yard	1 per 20 m²
Service or repair establishment	1 per 50 m²
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 m²
Transport terminal	1 per 100 m²
Warehouse	1 per 200 m²
Any **outdoor storage area** involving the	1 per 100 m² 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 m² 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 line**s 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 un-obstructed **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**

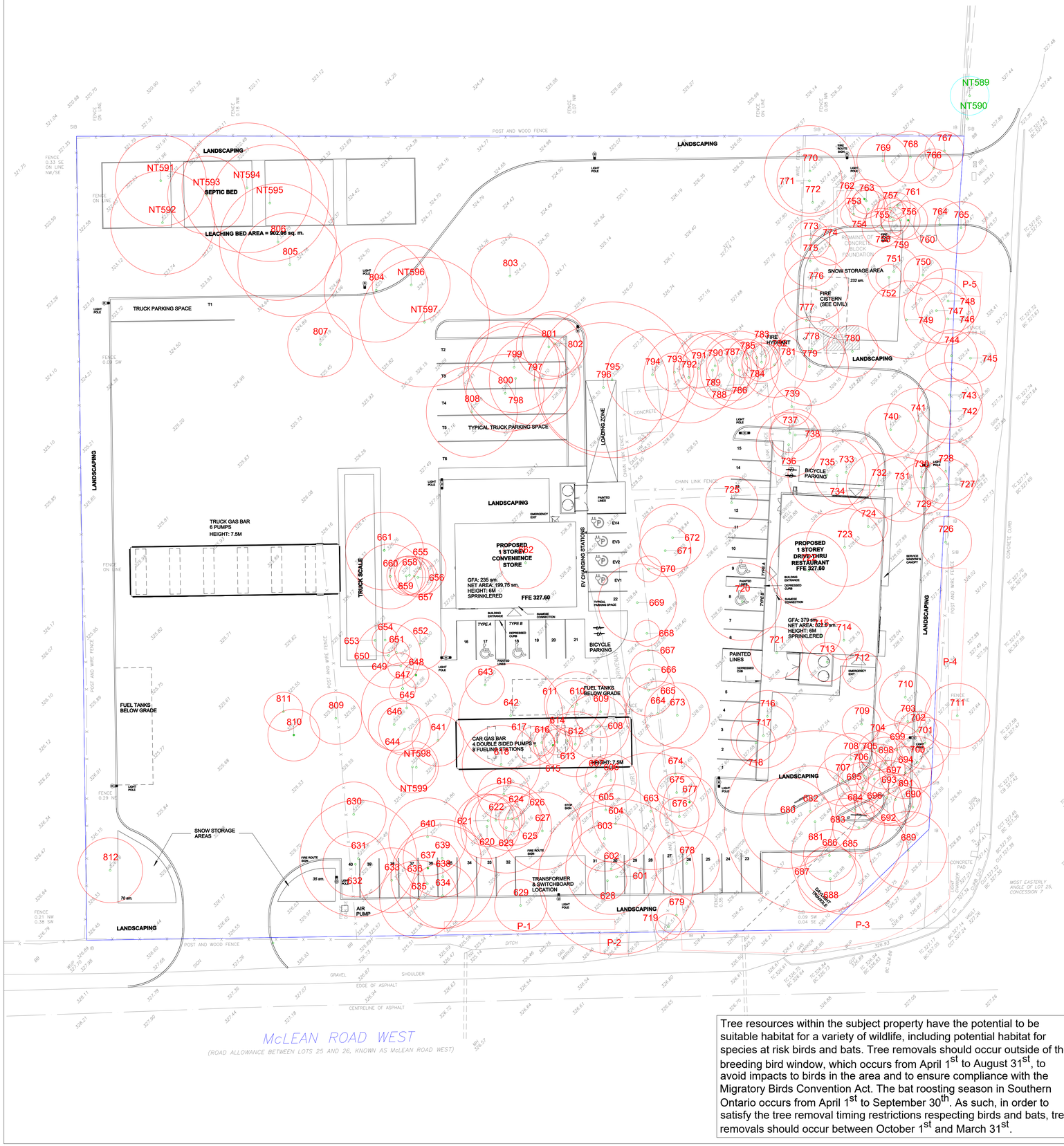
5.2.15 Bicycle Parking

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

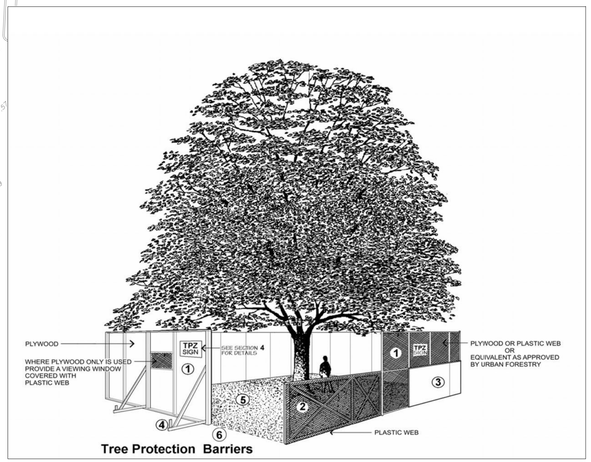
USE	REQUIRED PARKING STANDARDS (PER NET FLOOR AREA)
Retail, personal, institutional	The greater of 2 spaces or 1 space /1000 m²
Industrial	2 /1,000 m²
Long term care facility, retirement home	The lesser of 5 or 0.25 per bed or **dwelling unit**
Public and **private school**	1 /10 students of design capacity & 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



TREE PROTECTION PLAN NOTES

- It is the applicants' responsibility to discuss potential impacts to trees located near or wholly on adjacent properties or on shared boundary lines with their neighbours. Should such trees be injured to the point of instability or death the applicant may be held responsible through civil action. The applicant would also be required to replace such trees to the satisfaction of the Township of Puslinch.
- Tree protection barriers shall be installed to standards as detailed in this document and to the satisfaction of the Township of Puslinch.
- Tree protection barriers must be installed using plywood clad hoarding (minimum 19mm or ¾" thick) or an equivalent approved by the Township of Puslinch.
- Where required, Tree Protection Signage must be attached to all sides of the barrier.
- Prior to the commencement of any site activity such as site alteration, demolition or construction, the tree protection measures specified on this plan must be installed to the satisfaction of the Township of Puslinch.
- Once all tree/site protection measures have been installed, the Township of Puslinch must be contacted to arrange for an inspection of the site and approval of the tree/site protection requirements. Photographs that clearly show the installed tree/site protection shall be provided for review.
- Where changes to the location of the approved TPZ or sediment control or where temporary access to the TPZ is proposed, the Township of Puslinch must be contacted to obtain approval prior to alteration.
- Tree protection barriers must remain in place and in good condition during demolition, construction and/or site disturbance, including landscaping, and must not be altered, moved or removed until authorized by the Township of Puslinch.
- No construction activities including grade changes, surface treatments or excavation of any kind are permitted within the area identified on the Tree Protection Plan or Site Plan as a tree protection zone (TPZ). No root cutting is permitted. No storage of materials or fill is permitted within the TPZ. No movement or storage of vehicles or equipment is permitted within the TPZ. The area(s) identified as a TPZ must be protected and remain undisturbed at all times.
- All additional tree protection or preservation requirements, above and beyond the installation of tree protection barriers, must be undertaken or implemented as detailed in the Township-approved arborist report and/or the approved tree protection plan and to the satisfaction of the Township of Puslinch.
- If the minimum tree protection zone (TPZ) must be reduced to facilitate construction access, the tree protection barriers must be maintained at a lesser distance and the exposed portion of TPZ must be protected using a horizontal root protection method approved by the Township of Puslinch.
- Any roots or branches indicated on this plan which require pruning, as approved by the Township of Puslinch, must be pruned by an arborist. All pruning of tree roots and branches must be in accordance with good arboricultural practice. Roots that have received approval from the Township of Puslinch to be pruned must first be exposed using pneumatic (air) excavation, by hand digging or by a using low pressure hydraulic (water) excavation. The water pressure for hydraulic excavation must be low enough that root bark is not damaged or removed. This will allow a proper pruning cut and minimize tearing of the roots. The arborist retained to carry out crown or root pruning must contact the Township of Puslinch no less than three working days prior to conducting any specified work.
- The applicant/owner shall protect all by-law regulated trees in the area of consideration that have not been approved for removal throughout development works to the satisfaction of the Township of Puslinch.
- Convictions of offences respecting the regulations in the Township of Puslinch's Tree By-laws are subject to fines. The landowner may be ordered by the Township to stop the contravening activity or ordered to undertake work to correct the contravention.
- Prior to site disturbance the owner must confirm that no migratory birds are making use of the site for nesting. The owner must ensure that the works are in conformance with the Migratory Bird Convention Act and that no migratory bird nests will be impacted by the proposed work no less than 48 hours prior to conducting any specified work.

Tree resources within the subject property have the potential to be suitable habitat for a variety of wildlife, including potential habitat for species at risk birds and bats. Tree removals should occur outside of the breeding bird window, which occurs from April 1st to August 31st, to avoid impacts to birds in the area and to ensure compliance with the Migratory Birds Convention Act. The bat roosting season in Southern Ontario occurs from April 1st to September 30th. As such, in order to satisfy the tree removal timing restrictions respecting birds and bats, tree removals should occur between October 1st and March 31st.



Tree Protection Barriers

LEGEND

Tree Inventory

Refer to Table 1 and Table 2 of the report dated 25 July 2025 and last revised 11 February 2026 for the complete tree inventory information. Trees measuring 10cm DBH and greater on and within six metres of the subject property and trees of all sizes within the road right-of-way were included in the inventory.

Tree Removals

The removal of 221 trees and five polygons will be required to accommodate the proposed development, as indicated with RED labels.

Tree Preservation

The preservation of the remaining two trees will be possible, as indicated with GREEN labels.

Tree label (GREEN), to be preserved #

Tree label (RED), to be removed #

Dripline of tree identified for preservation (CYAN circle)

Dripline of tree identified for removal (RED circle)

Tree location estimated by KFCI (GREEN circle with solid hatch)

Tree location derived from survey (GREEN circle)

Approximate extent of polygon, to be removed (thick RED line)

No.	Issue / Revision	Date	By
1	Report Submission	25 Jul. '25	KNH
2	Report Resubmission	26 Sept. '25	KNH
3	Report Resubmission	18 Dec. '25	KNH
4	Report Resubmission	11 Feb. '26	KNH

Base Data: Tarasick McMillan Kubicki Ltd. (survey), Richard Ziegler Architect Inc. (site)

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Property
7456 McLean Road West
Puslinch, Ontario

Tree Inventory and Preservation Plan

Project	P4711	Figure	1
Date	25 July 2025		
Scale	1:300		

Tree Inventory and Preservation Plan
7456 McLean Road West
Puslinch, Ontario

prepared for

DAAZ Inc.
8290 17th Sideroad East
Acton, Ontario L7J 2M1

prepared by

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25 July 2025; revised 26 September 2025, 18 December 2025, and 11 February 2026

KUNTZ FORESTRY CONSULTING INC. Project P4711

Introduction

Kuntz Forestry Consulting Inc. was retained by DAAZ Inc. to complete a Tree Inventory and Preservation Plan as part of a development application for the subject property located at 7456 McLean Road in Puslinch, Ontario. The subject property is located on the west corner of the intersection between McLean Road West and Brock Road South, within an industrial / commercial / rural area.

The work plan for this tree preservation study included the following:

- Prepare an inventory of the tree resources measuring 10cm diameter at breast height (DBH) and greater on and within six metres of the subject property and trees of all sizes within the road right-of-way;
- Evaluate potential tree saving opportunities based on the proposed development plans;
- Determine whether the treed feature within the subject property qualifies as "woodlands" per the definition set forth in the County of Wellington's Forest Conservation By-law (By-law No. 5115-09), and;
- Document the findings in a Tree Inventory and Preservation Plan.

The results of the evaluation are provided below.

Methodology

Tree Inventory

The tree inventory was conducted on 14 July 2025 and 18 July 2025. Trees measuring 10cm DBH and greater on and within six meters of the subject property and trees of all sizes within the road right-of-way were included in the inventory. Trees were located using a topographic survey provided for the subject property, aerial imagery, and estimations made from known points in the field. Trees included in the inventory were identified as Trees 589 – 812. Where appropriate, trees were tagged with their identification number. Trees that were not tagged were denoted with the letters "NT" preceding their identification number on Table 1 and on Figure 1.

The dripline distance was primarily used in the preservation planning analysis to determine the preservation potential of trees. Where development is proposed within a tree's dripline, there is the potential to damage tree roots and tree removal may be required. The dripline distance was estimated for the trees included in the inventory and rounded to the nearest metre.

Tree resources were visually assessed for condition utilizing the following parameters:

Tree # – Number assigned to trees that corresponds to Figure 1.
Species – Common and botanical names provided in the inventory table.
DBH – Diameter (cm) at breast height, measured at 1.4m above the ground.
Condition – Condition of tree considering trunk integrity (TI), crown structure (CS) and crown vigor (CV). Condition ratings include poor (P), fair (F), and good (G).
Crown Dieback – Percentage of dead branches within the crown.
Dripline – Crown radius (m).
Comments – Any other relevant tree condition information.

Where trees occurred in groups, they were inventoried as polygons using a 100% stand tally analysis by species, size class, and quality. Five polygons were included in the inventory and were identified as Polygons P-1 – P-5.

Trees within polygons were assessed utilizing the following parameters:

Species – Common and botanical names provided in the inventory table.
Size Class (DBH) – 0cm – 9.5cm (only for polygons located within the road right-of-way), 10cm – 29.5cm, 30cm – 40.5cm, and 41cm and above.
Quality Class: Acceptable Growing Stock (AGS), Unacceptable Growing Stock (UGS).

Trees classified as AGS are trees with no major defects in the bole and a relatively good crown structure and vigour. Trees classified as UGS are trees with a major defect in the bole and / or those exhibiting a relatively poor crown structure or vigour.

Refer to Table 1 and Table 2 for the detailed tree inventory and Figure 1 for the locations of the trees and polygons.

Woodland Designation Assessment

The definition of “woodlands”, as identified in the County of Wellington’s Forest Conservation By-law (By-law No. 5115-09) is as follows:

> *“Woodlands” means land, one hectare (2.47 acres) or more in area measured to the drip line, and includes any unforested corridors within the area that are equal to or less than 30 metres (98.4 feet) in width, with at least:*
>
> *(i) 1,000 trees, of any size, per hectare (405 trees, of any size, per acre);*
>
> *(ii) 750 trees, measuring over 5 centimetres in diameter, per hectare (304 trees, measuring over 2 inches in diameter, per acre);*
>
> *(iii) 500 trees, measuring over 12 centimetres in diameter, per hectare (202 trees, measuring over 4.7 inches in diameter, per acre), or;*
>
> *(iv) 250 trees, measuring over 20 centimetres in diameter, per hectare (101 trees, measuring over 7.9 inches in diameter, per acre).*
>
> *but does not include a cultivated fruit orchard, nut orchard or a plantation established for the purpose of producing Christmas trees. For the purpose of the definition of woodlands, all measurements of the trees are to be taken at 1.37 metres (4.5 feet) from the ground.*

The field assessments for the woodland designation assessment occurred on 18 July 2025 whereby the dripline limits of the treed feature, identified as Unit 1, were delineated in the field using a backpack GPS unit (Trimble R2® GNSS receiver) accurate to ± one metre.

Unit 1 was subject to a density plot sampling technique involving the placement of five 3.99m-radius plots at random throughout the unit. Within these plots, trees of all sizes were tallied using a 100% plot tally analysis implementing the following parameters:

Species – Common and botanical names provided in the table.
Size Class (DBH) – 0cm – 5cm, 5.5cm – 12cm, 12.5cm – 20cm, and 20.5cm and above.

The tree counts tallied within each size class of the five density plots were averaged and these averages were extrapolated to determine the number of stems per hectare for each size class. These values were compared to the minimum requirements of "woodlands", as defined in the County of Wellington's Forest Conservation By-law.

Refer to Figure 2 for the delineation of Unit 1 and the locations of the density plots. Refer to Table 3 for the 100% plot tally analyses of the density plots.

Existing Site Conditions

The subject property is currently occupied by the remnants of a homestead and vacant land. Tree resources exist in the form of landscape trees and natural regeneration.

Refer to Figure 1 for the existing site conditions.

Individual Tree Resources

The inventory documented a total of 223 trees and five polygons on and within six metres of the subject property and within the road right-of-way. Tree resources are comprised of Apple species (*Malus sp.*), Austrian Pine (*Pinus nigra*), Balsam Fir (*Abies balsamea*), Basswood (*Tilia americana*), Black Cherry (*Prunus serotina*), Black Walnut (*Juglans nigra*), Blue Spruce (*Picea pungens*), Bur Oak (*Quercus macrocarpa*), Eastern White Cedar (*Thuja occidentalis*), Hawthorn species (*Crataegus sp.*), Little-leaf Linden (*Tilia cordata*), Manitoba Maple (*Acer negundo*), Mountain Ash species (*Sorbus sp.*), Norway Maple (*Acer platanoides*), Norway Spruce (*Picea abies*), Poplar species (*Populus sp.*), Scots Pine (*Pinus sylvestris*), Siberian Elm (*Ulmus pumila*), Silver Maple (*Acer saccharinum*), Sugar Maple (*Acer saccharum*), Tamarack (*Larix laricina*), White Birch (*Betula papyrifera*), White Mulberry (*Morus alba*), White Pine (*Pinus strobus*), White Spruce (*Picea glauca*), and Willow species (*Salix sp.*).

Refer to Table 1 and Table 2 for the full tree inventory information and Figure 1 for the locations of trees and polygons reported in the inventory.

Proposed Development

The proposed development involves the demolition of all remaining structures associated with the homestead and the construction of a commercial building, a restaurant building, a transport truck gas bar, a small vehicle gas bar, and surface parking areas. Vehicular access is proposed from McLean Road West and Brock Road South. It is anticipated that grading works will be required throughout the subject property and within the adjacent McLean Road West and Brock Road South right-of-way to support the proposed development.

Refer to Figure 1 for the proposed development plan.

Discussion

The following sections provide a discussion and analysis of tree impacts and tree preservation relative to the proposed development and existing conditions.

Development Impacts / Tree Removal

The removal of 221 trees and five polygons, including Trees 591 – 812 and Polygons P-1 – P-5, will be required to accommodate the proposed development. These trees either conflict directly with the proposed development or the level of encroachment into their driplines resulting from works associated with the proposed development would be at an intolerable level such that the trees would not be expected to overcome the injury.

Trees 689, 711, 726, 742 – 745, and 765, and Polygon P-2 – P-5 are located fully or partially within the Township-owned right-of-way and as such, permission from the Township of Puslinch will be required prior to the removal of these trees and polygons. All other trees identified for removal are located fully within the boundaries of the subject property.

Tree resources within the subject property have the potential to be suitable habitat for a variety of wildlife, including potential habitat for species at risk birds and bats. Tree removals should occur outside of the breeding bird window, which occurs from April 1st to August 31st, to avoid impacts to birds in the area and to ensure compliance with the Migratory Birds Convention Act. The bat roosting season in Southern Ontario occurs from April 1st to September 30th. As such, in order to satisfy the tree removal timing restrictions respecting birds and bats, tree removals should occur between October 1st and March 31st.

Refer to Figure 1 for the locations of the trees and polygons identified for removal.

Tree Preservation

The preservation of the remaining two trees, identified as Trees 589 and 590, will be possible. The dripline of Tree 589 does not intersect the subject property boundary or the right-of-way area immediately adjacent to the subject property and Tree 590 is a dead tree. Tree preservation fencing has not been prescribed for Trees 589 and 590 as it is assumed that these trees will not be subjected to construction-related disturbance associated with the proposed development. Should disturbance within the Brock Road South right-of-way be expected beyond the area immediately adjacent to the subject property, tree preservation fencing may be required to sufficiently protect these trees.

Refer to Figure 1 for the locations of the trees identified for preservation, the general Tree Protection Plan Notes, and the tree preservation fence detail.

Woodland Designation Assessment

The total area of Unit 1, based on the feature's delineated dripline, is approximately 1.12ha. As such, the feature satisfies the minimum size criteria for "woodlands", in accordance with the County of Wellington's Forest Conservation By-law (By-law No. 5115-09).

The tree counts tallied within each size class of the five density plots were averaged and these averages were extrapolated to determine the number of stems per hectare for each size class, as shown in the table below:

Tree Size Class →	0cm - 5cm	5.5cm - 12cm	12.5cm – 20cm	20.5cm +	Total All Sizes
Average Number of Trees	4.4	2.8	0.2	1.4	8.8
Number of Stems Per Hectare	**880**	**560**	**40**	**280**	**1760**

Unit 1 contains over 1000 trees of any size per hectare, more than 750 trees measuring over 5cm DBH per hectare, and over 250 trees measuring over 20cm DBH per hectare. As such, Unit 1 qualifies as “woodlands” per the definition set forth in the County of Wellington’s Forest Conservation By-law.

Refer to Figure 2 for the delineation of Unit 1 and the locations of the density plots. Refer to Table 3 for the 100% plot tally analyses of the density plots.

Summary and Recommendations

Kuntz Forestry Consulting Inc. was retained by DAAZ Inc. to complete a Tree Inventory and Preservation Plan as part of a development application for the subject property located at 7456 McLean Road in Puslinch, Ontario. A tree inventory was conducted and reviewed in the context of the proposed development.

The findings of the study indicate a total of 223 trees and five polygons on and within six metres of the subject property and within the road right-of-way. The removal of 221 trees and five polygons will be required to accommodate the proposed development. The preservation of the remaining two trees will be possible.

The following recommendations are suggested to minimize impacts to trees identified for preservation. Refer to Figure 1 for the general Tree Protection Plan Notes and the tree preservation fence detail.

- Tree protection barriers and fencing should be erected at locations prescribed on Figure 1. All tree protection measures should follow the guidelines as set out in the tree preservation plan notes and the tree preservation fencing detail.

- No construction activity including surface treatments, excavations of any kind, storage of materials or vehicles, unless specifically outlined above, is permitted within the area identified on Figure 1 as a tree protection zone (TPZ) at any time during or after construction.

- Branches and roots that extend beyond prescribed tree protection zones that require pruning must be pruned by a qualified Arborist or other tree professional. All pruning of tree roots and branches must be in accordance with Good Arboricultural Standards.

- Site visits pre, during, and post construction are recommended by either a certified consulting arborist (I.S.A.) or registered professional forester (R.P.F.) to ensure proper utilization of tree protection barriers. Trees should also be inspected for damage incurred during construction to ensure appropriate pruning or other measures are

Respectfully Submitted,

Kuntz Forestry Consulting Inc.

Kaylee Harper

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Resources

The Corporation of the County of Wellington, 2009. Forest Conservation By-law (By-law No. 5115-09). https://www.wellington.ca/media/file/conservation-and-sustainable-use-woodlands-law-5115-09.

Limitations of Assessment

Only the tree(s) identified in this report were included in the inventory. The assessment of the trees presented in this report has been made using accepted arboricultural techniques. These may include a visual examination taken from the ground of all the above-ground parts of the tree for structural defects, scars, external indications of decay such as fungal fruiting bodies, evidence of attack by insects, discoloured foliage, the condition of any visible root structures, the degree of lean (if any), the general condition of the trees and the identification of potentially hazardous trees or recommendations for removal (if applicable). Where trees could not be directly accessed (i.e. due to obstructions, and/or on neighbouring properties), trees were assessed as accurately as possible from nearby vantage points.

Locations of trees provided in the report are determined as accurately as possible based on the best information available. If official survey information is not provided, tree locations in the report may not be exact. Where KFCI's in-house GPS unit is used (if applicable), tree locations are accurate only to the extent that the technology allows, which can be variable based on satellite available, RTK network / cell coverage, canopy coverage, and/or projection transformation limitations. In this case, if trees occur on or near property boundaries, an official site survey may be required to determine ownership utilizing specialized survey protocol to gain precise location.

Furthermore, recommendations made in this report are based on the development plans that have been provided at the time of reporting. These recommendations may no longer be applicable should changes be made to the development plan and/or grading, servicing, or landscaping plans following report submission.

Notwithstanding the recommendations and conclusions made in this report, it must be recognized that trees are living organisms, and their health and vigor constantly change over time. They are not immune to changes in site conditions or seasonal variations in the weather conditions. Any tree will fail if the forces applied to the tree exceed the strength of the tree or its parts.

Although every effort has been made to ensure that this assessment is reasonably accurate, the trees should be re-assessed periodically. The assessment presented in this report is valid at the time of inspection.

Table 1. Tree Inventory

Location: 7456 McLean Road West, Puslinch Date: 14 July 2025 and 18 July 2025 Surveyors: KNH

Tree #	Common Name	Scientific Name	DBH	TI	CS	CV	CDB	DL	Comments	Owner	Action
NT589	Hawthorn species	*Crataegus sp.*	~12, ~12	FG	F	F	30	3	Union at base, epicormic branching (M), lean (L)	Township (Right-of-Way)	Preserve
NT590	White Elm	*Ulmus americana*	~26	D	D	D	100	-	Dead	Township (Right-of-Way)	Preserve
NT591	Manitoba Maple	*Acer negundo*	~80, ~58	P	P	P	90	7	V-union at 1m with included bark, lean (M), moribund	Subject	Remove
NT592	Manitoba Maple	*Acer negundo*	~59	F	PF	PF	20	8	Lean (M), poor branch unions, epicormic branching (H), poor form (M)	Subject	Remove
NT593	Manitoba Maple	*Acer negundo*	~30	PF	PF	PF	20	6	Bow (H), epicormic branching (H)	Subject	Remove
NT594	Manitoba Maple	*Acer negundo*	~90	PF	P	PF	60	10	V-union at 1.5m with included bark, poor form (H), poor branch unions, broken branches (H), epicormic branching (H)	Subject	Remove
NT595	Manitoba Maple	*Acer negundo*	~66	P	P	P	80	9	Broken branches (H), stem wounds (H) from torn out branch, lean (L), epicormic branching (H), poor form (H)	Subject	Remove
NT596	Manitoba Maple	*Acer negundo*	~44, ~30	P	P	P	80	6	Failed at base, broken branches (H), epicormic branching (H), poor form (H)	Subject	Remove
NT597	Manitoba Maple	*Acer negundo*	~60	P	P	P	80	10	Failed at base, broken branches (H), epicormic branching (H), poor form (H)	Subject	Remove
NT598	White Spruce	*Picea glauca*	~28	G	F	F	30	3		Subject	Remove
NT599	White Spruce	*Picea glauca*	~40	FG	F	F	30	4	Lean (L)	Subject	Remove
601	Willow species	*Salix sp.*	104.5	F	F	PF	20	12	V-union at 1.5m and 2m with included bark, pruning wounds (L), coppice growth, epicormic branching (L)	Subject	Remove
602	Norway Maple	*Acer platanoides*	33	FG	FG	FG		7	Lean (L), crowded by Tree 601	Subject	Remove
603	Sugar Maple	*Acer saccharum*	37.5	F	F	F		5	V-union at 3m with included bark, epicormic branching (L)	Subject	Remove
604	Black Walnut	*Juglans nigra*	38.5	F	F	F		6	Burls (M), asymmetrical crown (L)	Subject	Remove
605	Scots Pine	*Pinus sylvestris*	16	D	D	D	100	-	Dead	Subject	Remove
606	Norway Maple	*Acer platanoides*	11	F	G	FG		4	Lean (L), seam (L)	Subject	Remove
607	Scots Pine	*Pinus sylvestris*	20	G	F	F		3	Vine competition (H), asymmetrical crown (M)	Subject	Remove
608	Willow species	*Salix sp.*	59, 41	P	P	P	90	5	Cavities (H), v-union at 1m and 2m with included bark, broken branches (M)	Subject	Remove
609	Norway Maple	*Acer platanoides*	17, 10	F	F	FG		4	Union at base, lean (L), crowded by Tree 608, multiple branch attachments	Subject	Remove
610	Norway Maple	*Acer platanoides*	21.5	FG	F	F		5	Lean (L), asymmetrical crown (M)	Subject	Remove
611	Norway Maple	*Acer platanoides*	18, 14.5	FG	G	G		4	Lean (L), union at base	Subject	Remove
612	Willow species	*Salix sp.*	27	FG	PF	F	30	5	Broken branches (M), bow (L)	Subject	Remove
613	Eastern White Cedar	*Thuja occidentalis*	13.5	F	PF	PF	40	2	Crook (M), decay (L) in trunk	Subject	Remove
614	Eastern White Cedar	*Thuja occidentalis*	18.5	PF	PF	PF	40	2	Lean (L), decay (M) in trunk, cavities (M)	Subject	Remove
615	Eastern White Cedar	*Thuja occidentalis*	20.5, 20.5, 14	P	PF	P	40	3	V-union at base with included bark, cavities (H), decay (H) in trunk, lean (L)	Subject	Remove
616	Eastern White Cedar	*Thuja occidentalis*	19.5	P	PF	P	40	2	Lean (M), cavities (H), decay (H) in trunk	Subject	Remove
617	Eastern White Cedar	*Thuja occidentalis*	41, 25	P	PF	P	40	3	Union at base, v-union at 2m with included bark, crook (M), vine competition (M), multiple branch attachments, cavities (H), decay (M) in trunk	Subject	Remove
618	Black Walnut	*Juglans nigra*	28	F	F	FG		6	Canker (L)	Subject	Remove
619	Manitoba Maple	*Acer negundo*	27, 21.5	P	P	P	80	4	Epicormic branching (M), vine competition (H), v-union at 1m with included bark, decay (H) in trunk, broken branches (H)	Subject	Remove
620	Sugar Maple	*Acer saccharum*	32	G	F	F		5	Asymmetrical crown (M), epicormic branching (L)	Subject	Remove
621	Sugar Maple	*Acer saccharum*	24	G	PF	PF	10	4	Asymmetrical crown (M), epicormic branching (H)	Subject	Remove
622	Sugar Maple	*Acer saccharum*	26	G	F	F	10	4	Epicormic branching (M)	Subject	Remove
623	Black Walnut	*Juglans nigra*	44	PF	F	PF	10	7	Canker (M), cavities (M)	Subject	Remove
624	Sugar Maple	*Acer saccharum*	34	PF	F	PF	20	5	V-union at 2m with included bark, decay (M) in trunk, epicormic branching (L)	Subject	Remove
625	Sugar Maple	*Acer saccharum*	11	G	PF	PF	40	2	Crowded by Trees 624 and 626, epicormic branching (M), asymmetrical crown (M)	Subject	Remove
626	Sugar Maple	*Acer saccharum*	25	G	F	F	20	4	Asymmetrical crown (M)	Subject	Remove
627	Black Walnut	*Juglans nigra*	30	F	FG	F	10	6	Lean (L), crook (M)	Subject	Remove
628	Eastern White Cedar	*Thuja occidentalis*	11.5	FG	F	F	20	3	Asymmetrical crown (M), lean (L)	Subject	Remove
629	Apple species	*Malus sp.*	39.5	F	F	F	30	4	Lean (M), union at 1.5m, epicormic branching (M)	Subject	Remove
630	White Pine	*Pinus strobus*	35	G	F	F	20	5	Vine competition (M)	Subject	Remove

631	Willow species	*Salix sp.*	72	PF	F	PF	10	9	Decay (M) in trunk, burls (L), lean (L), epicormic branching (M), broken branches (L)	Subject	Remove
632	Willow species	*Salix sp.*	15.5	PF	F	F		5	Crook (H), asymmetrical crown (M), crowded by Tree 631	Subject	Remove
633	Manitoba Maple	*Acer negundo*	20	PF	PF	PF	40	5	Lean (M), crook (M), cavities (L), epicormic branching (M)	Subject	Remove
634	Silver Maple	*Acer saccharinum*	13, 12.5, 12	F	F	F	10	5	Union at base, v-union at 1m with included bark, lean (L), bow (L), epicormic branching (L), asymmetrical crown (L)	Subject	Remove
635	Silver Maple	*Acer saccharinum*	30, 30, 19	PF	PF	F		6	V-union at 0.5m with included bark, epicormic branching (H), crook (M), poor form (M)	Subject	Remove
636	Willow species	*Salix sp.*	94	D	D	D	100	-	Dead	Subject	Remove
637	Poplar species	*Populus sp.*	41	F	F	F	20	5	Crook (M)	Subject	Remove
638	Silver Maple	*Acer saccharinum*	30, 21	PF	F	F	20	8	V-union at 0.5m with included bark, epicormic branching (M), crook (M), lean (L)	Subject	Remove
639	Silver Maple	*Acer saccharinum*	28, 21, 11	F	F	F	20	6	V-union at 0.5m with included bark, epicormic branching (L)	Subject	Remove
640	Willow species	*Salix sp.*	45	F	F	F		6	Lean (M), crook (M), seam (L), epicormic branching (M), broken branches (L)	Subject	Remove
641	Black Walnut	*Juglans nigra*	15.5	F	G	F		4	Lean (L), canker (L)	Subject	Remove
642	Black Walnut	*Juglans nigra*	44	FG	F	F	10	8	Lean (L), broken branches (L)	Subject	Remove
643	Eastern White Cedar	*Thuja occidentalis*	~28, ~12	P	F	PF	20	3	Union at 0.5m, cavities (H)	Subject	Remove
644	White Spruce	*Picea glauca*	29	G	F	F	20	4		Subject	Remove
645	Silver Maple	*Acer saccharinum*	59, 13, 12.5, 12	F	F	F	30	7	V-union at base and 3m with included bark, epicormic branching (L)	Subject	Remove
646	Manitoba Maple	*Acer negundo*	20	PF	F	PF	30	4	Lean (M), decay (L) in trunk, epicormic branching (M)	Subject	Remove
647	White Spruce	*Picea glauca*	12	FG	G	G		2	Lean (L)	Subject	Remove
648	Manitoba Maple	*Acer negundo*	20	PF	F	PF	30	2	Lean (M), epicormic branching (M), cavities (L)	Subject	Remove
649	White Spruce	*Picea glauca*	20	FG	FG	F	10	2	Lean (L)	Subject	Remove
650	Manitoba Maple	*Acer negundo*	22	FG	F	F	30	5	Lean (L), epicormic branching (M)	Subject	Remove
651	White Spruce	*Picea glauca*	19	G	FG	F	10	2		Subject	Remove
652	Manitoba Maple	*Acer negundo*	30	F	PF	PF	30	4	V-union at 3m with included bark, poor form (L), epicormic branching (M)	Subject	Remove
653	Poplar species	*Populus sp.*	54	D	D	D	100	-	Dead	Subject	Remove
654	White Spruce	*Picea glauca*	15	FG	P	F		2	Top lost at 2m, lean (L)	Subject	Remove
655	Manitoba Maple	*Acer negundo*	27	FG	F	F	20	4	Lean (L), epicormic branching (M)	Subject	Remove
656	Eastern White Cedar	*Thuja occidentalis*	14, 10, 10, 9	F	F	FG		3	V-union at base and 1m with included bark, asymmetrical crown (M)	Subject	Remove
657	White Spruce	*Picea glauca*	19.5	G	FG	F	10	3		Subject	Remove
658	White Spruce	*Picea glauca*	20	G	FG	F	10	3		Subject	Remove
659	White Spruce	*Picea glauca*	20	FG	FG	F	10	3	Crook (L)	Subject	Remove
660	White Spruce	*Picea glauca*	50.5	G	F	F	20	5	Broken branches (L)	Subject	Remove
661	Manitoba Maple	*Acer negundo*	40, 21, 20, 17	PF	F	F	20	6	V-union at base and 1m with included bark, cavities (L), lean (L-M), epicormic branching (M)	Subject	Remove
662	Sugar Maple	*Acer saccharum*	49	P	P	P	80	4	Vertical crack in trunk, broken branches (H), cavities (H), decay (H) in trunk, asymmetrical crown (H), epicormic branching (H)	Subject	Remove
663	Norway Maple	*Acer platanoides*	57	G	FG	F	10	9		Subject	Remove
664	Black Walnut	*Juglans nigra*	22	FG	FG	F	10	5	Included fence (L)	Subject	Remove
665	Bur Oak	*Quercus macrocarpa*	21	G	PF	PF	20	4	Epicormic branching (H)	Subject	Remove
666	Willow species	*Salix sp.*	12, 11	P	P	P	70	3	V-union at base with included bark and cavities (H), decay (H) in trunk, lean (M), epicormic branching (M), poor branch unions	Subject	Remove
667	White Elm	*Ulmus americana*	39	D	D	D	100	-	Dead	Subject	Remove
668	Apple species	*Malus sp.*	15, 10	PF	P	PF	40	2	Epicormic branching (H), union at 1m, asymmetrical crown (M), decay (M) in trunk, cavities (M), broken branches (M)	Subject	Remove
669	Little-leaf Linden	*Tilia cordata*	50, 19	F	F	F		6	Union at base, poor branch unions, burls (L), bow (L)	Subject	Remove
670	Eastern White Cedar	*Thuja occidentalis*	10	F	F	FG		2	Asymmetrical crown (M), crook (M)	Subject	Remove
671	Norway Spruce	*Picea abies*	47.5	G	F	F	10	4	Epicormic branching (L)	Subject	Remove
672	Manitoba Maple	*Acer negundo*	24, 13, 11.5	PF	F	PF	30	5	V-union at base and 0.5m with included bark, cavities (L), epicormic branching (M), lean (L-M), poor branch unions	Subject	Remove
673	Silver Maple	*Acer saccharinum*	50	F	PF	PF	40	5	Multiple branch attachments, v-union at 3m with included bark, canker (L), epicormic branching (L)	Subject	Remove
674	Norway Spruce	*Picea abies*	36	G	F	F	20	4	Epicormic branching (M)	Subject	Remove
675	Blue Spruce	*Picea pungens*	26	G	F	F	20	3	Epicormic branching (M)	Subject	Remove
676	Blue Spruce	*Picea pungens*	26.5	G	F	F	20	3	Epicormic branching (M)	Subject	Remove

677	Black Walnut	*Juglans nigra*	13	G	F	G		4	Asymmetrical crown (M)	Subject	Remove
678	Willow species	*Salix sp.*	39	G	PF	PF	40	5	Asymmetrical crown (L), epicormic branching (M)	Subject	Remove
679	Black Walnut	*Juglans nigra*	22.5	F	F	F	20	3	Crook (M)	Subject	Remove
680	Black Walnut	*Juglans nigra*	35	G	F	F	20	7	Epicormic branching (L)	Subject	Remove
681	Willow species	*Salix sp.*	~160	P	P	PF	30	14	Failed at base, epicormic branching (M), union at base with cavities (H)	Subject	Remove
682	Black Walnut	*Juglans nigra*	29.5	G	G	FG		7		Subject	Remove
683	Poplar species	*Populus sp.*	19	F	FG	F	10	4	Crook (M)	Subject	Remove
684	Poplar species	*Populus sp.*	11.5	FG	FG	F	10	3	Crook (L)	Subject	Remove
685	Silver Maple	*Acer saccharinum*	76	PF	PF	F	20	9	V-union at 1.5m with included bark, multiple branch attachments, poor branch unions, epicormic branching (M)	Subject	Remove
686	Poplar species	*Populus sp.*	13	FG	F	F	30	4	Lean (L), asymmetrical crown (L)	Subject	Remove
687	Poplar species	*Populus sp.*	16	F	PF	PF	30	4	Lean (L), crook (L), asymmetrical crown (H), epicormic branching (M)	Subject	Remove
688	Silver Maple	*Acer saccharinum*	~12, ~12, ~12	PF	PF	PF		5	Epicormic branching from stump, decay (H) in stump, asymmetrical crown (M), bow (M)	Subject	Remove
689	Silver Maple	*Acer saccharinum*	49.5	F	F	F	10	6	V-union at 2m with included bark, asymmetrical crown (L), epicormic branching (M)	Subject / Township (Right-of-Way)	Remove
690	Poplar species	*Populus sp.*	22.5	PF	P	P	90	3	Moribund, crook (L), decay (M) in trunk, top dead	Subject	Remove
691	Poplar species	*Populus sp.*	19, 15	F	F	F	20	4	Union at base, crook (L), decay (L) in trunk	Subject	Remove
692	Poplar species	*Populus sp.*	21	FG	F	F	20	4	Crook (L)	Subject	Remove
693	Black Walnut	*Juglans nigra*	33	G	FG	F	10	5		Subject	Remove
694	Poplar species	*Populus sp.*	30	PF	P	P	90	4	Decay (M) in trunk, moribund	Subject	Remove
695	Poplar species	*Populus sp.*	16	G	FG	FG	10	4		Subject	Remove
696	Poplar species	*Populus sp.*	18	G	FG	FG	10	4		Subject	Remove
697	Poplar species	*Populus sp.*	22.5	G	F	F	20	4		Subject	Remove
698	Poplar species	*Populus sp.*	22.5	G	FG	FG	10	4		Subject	Remove
699	Poplar species	*Populus sp.*	27.5	G	F	F	20	4		Subject	Remove
700	Poplar species	*Populus sp.*	20	F	PF	PF	40	4	Crook (M), asymmetrical crown (M)	Subject	Remove
701	Poplar species	*Populus sp.*	21	G	F	F	20	4		Subject	Remove
702	Poplar species	*Populus sp.*	13	F	F	F	20	3	Crook (M)	Subject	Remove
703	Mountain Ash species	*Sorbus sp.*	16	P	P	P	80	2	Top lost at 3m, epicormic branching (M), decay (M) in trunk, lean (L)	Subject	Remove
704	Poplar species	*Populus sp.*	11	F	P	P	70	3	Lean (L), crook (L)	Subject	Remove
705	Poplar species	*Populus sp.*	13	D	D	D	100	-	Dead	Subject	Remove
706	Poplar species	*Populus sp.*	11.5	D	D	D	100	-	Dead	Subject	Remove
707	Poplar species	*Populus sp.*	20	FG	FG	F	10	4	Crook (L)	Subject	Remove
708	Poplar species	*Populus sp.*	28	PF	PF	P	60	4	Top dead, epicormic branching (M), decay (M) in trunk	Subject	Remove
709	Poplar species	*Populus sp.*	10	G	FG	FG	10	3		Subject	Remove
710	Poplar species	*Populus sp.*	17	G	FG	FG	10	4		Subject	Remove
711	White Elm	*Ulmus americana*	41	G	F	F	30	5	Pruning wounds (L), epicormic branching (M)	Township (Right-of-Way)	Remove
712	Siberian Elm	*Ulmus pumila*	15	G	F	F	30	3	Epicormic branching (M)	Subject	Remove
713	Poplar species	*Populus sp.*	14	FG	F	F	10	3	Crook (L), epicormic branching (L)	Subject	Remove
714	Siberian Elm	*Ulmus pumila*	13	G	F	F	20	3	Epicormic branching (L)	Subject	Remove
715	Siberian Elm	*Ulmus pumila*	11	G	PF	PF	40	3		Subject	Remove
716	Poplar species	*Populus sp.*	24.5	PF	F	PF	30	4	Vine competition (M), decay (M) in trunk, crook (L), epicormic branching (M)	Subject	Remove
717	Poplar species	*Populus sp.*	23	F	F	F	10	5	Lean (L), crook (M), epicormic branching (L)	Subject	Remove
718	Poplar species	*Populus sp.*	14	G	F	FG	10	3	Asymmetrical crown (L)	Subject	Remove
719	Eastern White Cedar	*Thuja occidentalis*	~10	FG	F	FG		2	Lean (L), asymmetrical crown (M)	Subject	Remove
720	Silver Maple	*Acer saccharinum*	~56, 34.5, 23	PF	PF	PF	30	6	Union at 1m, cavities (M), broken branches (M), decay (M) in trunk, epicormic branching (M)	Subject	Remove
721	Poplar species	*Populus sp.*	25.5	F	F	F	10	4	Lean (L), multiple branch attachments, poor branch unions, vine competition (L)	Subject	Remove
722	Silver Maple	*Acer saccharinum*	35	FG	PF	PF	30	6	Poor branch unions, poor form (L), asymmetrical crown (L), epicormic branching (M)	Subject	Remove
723	Silver Maple	*Acer saccharinum*	~78	F	PF	PF	30	6	V-union at 2m with included bark, poor branch unions, poor form (L), asymmetrical crown (L), epicormic branching (M)	Subject	Remove

724	Balsam Fir	*Abies balsamea*	20	F	F	F	20	3	Stem wounds (M), rope girdling trunk (L)	Subject	Remove
725	Manitoba Maple	*Acer negundo*	24, 18, 13	PF	PF	PF	30	4	V-union at 1m with included bark, broken branches (M), epicormic branching (M), decay (L) in trunk, cavities (L)	Subject	Remove
726	White Birch	*Betula papyrifera*	~24, ~14, 11	F	F	F		4	V-union at base with included bark, lean (L), epicormic branching (M)	Township (Right-of-Way)	Remove
727	Austrian Pine	*Pinus nigra*	37	FG	PF	PF	40	4	Lean (L)	Subject	Remove
728	Black Walnut	*Juglans nigra*	33	FG	FG	FG		5	Lean (L), asymmetrical crown (L)	Subject	Remove
729	Sugar Maple	*Acer saccharum*	21	PF	F	PF		4	Cavities (M), epicormic branching (M), asymmetrical crown (M), lean (L)	Subject	Remove
730	Austrian Pine	*Pinus nigra*	24.5	D	D	D	100	-	Dead	Subject	Remove
731	Norway Maple	*Acer platanoides*	27.5	G	F	F	20	5		Subject	Remove
732	Sugar Maple	*Acer saccharum*	37	G	F	F	20	5		Subject	Remove
733	Black Walnut	*Juglans nigra*	18	G	FG	FG	10	5		Subject	Remove
734	Apple species	*Malus sp.*	15.5	D	D	D	100	-	Dead	Subject	Remove
735	Austrian Pine	*Pinus nigra*	47	F	F	F	20	6	V-union at 5m with included bark	Subject	Remove
736	Tamarack	*Larix laricina*	34.5	FG	F	F	20	5	Lean (L), epicormic branching (L)	Subject	Remove
737	Norway Spruce	*Picea abies*	20	FG	F	F	10	3	Lean (L), asymmetrical crown (L)	Subject	Remove
738	Sugar Maple	*Acer saccharum*	16	G	F	FG		4	Asymmetrical crown (M)	Subject	Remove
739	White Spruce	*Picea glauca*	20, 19	F	FG	FG		3	V-union at 0.5m with included bark	Subject	Remove
740	Scots Pine	*Pinus sylvestris*	32.5	FG	F	F	10	4	Lean (L), asymmetrical crown (L)	Subject	Remove
741	White Birch	*Betula papyrifera*	30, 25	F	F	F	10	5	V-union at 0.5m with included bark, lean (L)	Subject	Remove
742	Sugar Maple	*Acer saccharum*	~86	P	P	P	80	5	Cavities (H), decay (H) in trunk, asymmetrical crown (H), broken branches (H)	Subject / Township (Right-of-Way)	Remove
743	Sugar Maple	*Acer saccharum*	~54	F	F	F	30	5	Asymmetrical crown (L), broken branches (M), decay (L) in trunk	Subject / Township (Right-of-Way)	Remove
744	Austrian Pine	*Pinus nigra*	32	F	F	F	30	4	Included chain (H)	Subject / Township (Right-of-Way)	Remove
745	Austrian Pine	*Pinus nigra*	40.5	F	F	F	30	4	Lean (L)	Township (Right-of-Way)	Remove
746	Blue Spruce	*Picea pungens*	37	F	PF	PF	30	4	Asymmetrical crown (L), top dead	Subject	Remove
747	Austrian Pine	*Pinus nigra*	38	G	PF	F	30	5	Asymmetrical crown (M)	Subject	Remove
748	Austrian Pine	*Pinus nigra*	35	G	PF	F	30	5	Asymmetrical crown (M)	Subject	Remove
749	Norway Maple	*Acer platanoides*	52	F	F	F	10	6	Multiple branch attachments, poor branch unions, epicormic branching (L)	Subject	Remove
750	Hawthorn species	*Crataegus sp.*	16, 16	PF	PF	PF	40	3	V-union at 1m with included bark and cavities (M)	Subject	Remove
751	Norway Maple	*Acer platanoides*	24	FG	G	FG		4	Lean (L)	Subject	Remove
752	Eastern White Cedar	*Thuja occidentalis*	10, 10	G	F	F		2	Union at 1m, asymmetrical crown (M)	Subject	Remove
753	Scots Pine	*Pinus sylvestris*	14	FG	F	F	20	2	Lean (L)	Subject	Remove
754	Poplar species	*Populus sp.*	15.5	F	F	F	30	3	Top dead	Subject	Remove
755	Scots Pine	*Pinus sylvestris*	18.5	FG	FG	FG	10	3	Lean (L)	Subject	Remove
756	Poplar species	*Populus sp.*	15	G	G	G		3		Subject	Remove
757	Poplar species	*Populus sp.*	11	G	G	G		2		Subject	Remove
758	Poplar species	*Populus sp.*	11	G	G	G		2		Subject	Remove
759	Scots Pine	*Pinus sylvestris*	17	F	F	F	20	3	Lean (L), crook (L)	Subject	Remove
760	Poplar species	*Populus sp.*	13	F	F	F	10	3	Sweep (L), seam (L), crook (L)	Subject	Remove
761	Scots Pine	*Pinus sylvestris*	14.5	FG	F	F	20	2	Lean (L), asymmetrical crown (L)	Subject	Remove
762	Scots Pine	*Pinus sylvestris*	19.5	G	FG	FG	10	3		Subject	Remove
763	Scots Pine	*Pinus sylvestris*	11	G	G	G		2		Subject	Remove
764	Apple species	*Malus sp.*	17.5, 17	F	F	F	20	4	Union at base, bow (L), epicormic branching (M), lean (L)	Subject	Remove
765	Norway Maple	*Acer platanoides*	20	FG	FG	G		4	Sweep (L), asymmetrical crown (L)	Township (Right-of-Way)	Remove
766	Apple species	*Malus sp.*	10.5, 10	F	F	F	30	3	Bow (M), v-union at 1m with included bark, epicormic branching (M)	Subject	Remove
767	Sugar Maple	*Acer saccharum*	14.5	PF	F	F	20	3	Bow (M), crook (M), poor form (M)	Subject	Remove
768	Apple species	*Malus sp.*	23, 17, 15	P	F	PF	30	4	V-union at 0.5m with included bark, union at 1m, cavities (H), epicormic branching (M), crook (L)	Subject	Remove

769	Apple species	*Malus sp.*	35, 24	P	P	P	60	4	Union at 1m, cavities (H), decay (M) in trunk, epicormic branching (M)	Subject	Remove
770	Black Walnut	*Juglans nigra*	37	G	FG	F	10	7		Subject	Remove
771	Black Cherry	*Prunus serotina*	42	P	P	P	90	5	Cavities (H), decay (H) in trunk, asymmetrical crown (H), broken branches (H), moribund	Subject	Remove
772	Austrian Pine	*Pinus nigra*	19	D	D	D	100	-	Dead	Subject	Remove
773	Austrian Pine	*Pinus nigra*	14.5	G	PF	PF	40	3		Subject	Remove
774	Scots Pine	*Pinus sylvestris*	16.5	FG	FG	FG	10	3	Lean (L)	Subject	Remove
775	Scots Pine	*Pinus sylvestris*	27	FG	FG	FG	10	4	Lean (L)	Subject	Remove
776	Norway Spruce	*Picea abies*	35	G	FG	F	10	5		Subject	Remove
777	Austrian Pine	*Pinus nigra*	41	F	F	F	10	5	V-union at 4m with included bark	Subject	Remove
778	Sugar Maple	*Acer saccharum*	42	PF	PF	PF	40	5	V-union at 2m with included bark, multiple branch attachments, poor branch unions, root flare below ground, broken branches (H)	Subject	Remove
779	Basswood	*Tilia americana*	56.5	F	F	F	10	6	V-union at 2m and 3m with included bark, asymmetrical crown (M), bow (L)	Subject	Remove
780	Willow species	*Salix sp.*	15.5, 14, 13	PF	F	F	30	4	V-union at base with included bark, bow (M), epicormic branching (M)	Subject	Remove
781	White Pine	*Pinus strobus*	28	G	FG	FG	10	5		Subject	Remove
782	White Spruce	*Picea glauca*	11	G	FG	G		2	Asymmetrical crown (L)	Subject	Remove
783	White Spruce	*Picea glauca*	14	G	G	G		3		Subject	Remove
784	White Spruce	*Picea glauca*	11	G	F	F	20	2	Asymmetrical crown (M)	Subject	Remove
785	White Spruce	*Picea glauca*	14	G	F	F	20	3	Asymmetrical crown (L)	Subject	Remove
786	Silver Maple	*Acer saccharinum*	21, 15, 14, 10	PF	F	F	20	6	V-union at base and 1m with included bark, canker (L), lean (L), epicormic branching (L)	Subject	Remove
787	Silver Maple	*Acer saccharinum*	14	FG	F	F		4	Bow (L), epicormic branching (M)	Subject	Remove
788	Silver Maple	*Acer saccharinum*	12	F	PF	F	20	4	Asymmetrical crown (H), canker (L)	Subject	Remove
789	Silver Maple	*Acer saccharinum*	22, 17	PF	F	F	20	6	V-union at 1m with included bark, bow (L), canker (L), asymmetrical crown (L)	Subject	Remove
790	Silver Maple	*Acer saccharinum*	18	FG	F	F	10	5	Epicormic branching (M), crook (L)	Subject	Remove
791	White Spruce	*Picea glauca*	15	G	G	G		3		Subject	Remove
792	Silver Maple	*Acer saccharinum*	29	FG	F	F	10	7	Lean (L), asymmetrical crown (L)	Subject	Remove
793	White Spruce	*Picea glauca*	~14	G	G	G		3		Subject	Remove
794	Silver Maple	*Acer saccharinum*	40, 37	PF	F	PF	20	7	Cavities (H), union at 1m with cavities (H), multiple branch attachments, bow (M), epicormic branching (M)	Subject	Remove
795	White Elm	*Ulmus americana*	~72, ~48	P	PF	PF	30	12	V-union at 1m with included bark and wetwood and stems fused to 2m and seam (H) below, broken branches (M), epicormic branching (M)	Subject	Remove
796	White Elm	*Ulmus americana*	~82	G	PF	F	30	10	Epicormic branching (M), broken branches (M)	Subject	Remove
797	Manitoba Maple	*Acer negundo*	36	F	F	F	30	7	Growth deficit (L), asymmetrical crown (L), lean (L), epicormic branching (M)	Subject	Remove
798	Manitoba Maple	*Acer negundo*	34.5, 18	PF	F	F	30	8	V-union at 1m with included bark, epicormic branching (M), bow (M), asymmetrical crown (L)	Subject	Remove
799	Manitoba Maple	*Acer negundo*	38	F	PF	F	30	7	Asymmetrical crown (M), lean (L), crook (L), epicormic branching (M)	Subject	Remove
800	Manitoba Maple	*Acer negundo*	28	PF	PF	PF	30	6	Sweep (M), bow (M), broken branches (H), asymmetrical crown (H), epicormic branching (M)	Subject	Remove
801	Manitoba Maple	*Acer negundo*	18, 17, 16, 14, 14, 11	PF	F	F	20	5	V-union at base and 0.5m with included bark, lean (L-M), epicormic branching (M)	Subject	Remove
802	Manitoba Maple	*Acer negundo*	17, 17	F	PF	F	30	5	Union at base, lean (M), broken branches (H), epicormic branching (M), asymmetrical crown (M)	Subject	Remove
803	Manitoba Maple	*Acer negundo*	~34	PF	PF	PF	30	6	Lean (H), epicormic branching (H), asymmetrical crown (M)	Subject	Remove
804	Manitoba Maple	*Acer negundo*	~40	P	P	P	80	8	Failed at base, broken branches (H), epicormic branching (H), poor form (H)	Subject	Remove
805	Manitoba Maple	*Acer negundo*	35, 27.5, 24	PF	PF	PF	30	8	V-union at 1m with included bark, lean (H), asymmetrical crown (M), epicormic branching (H)	Subject	Remove
806	Manitoba Maple	*Acer negundo*	55.5	PF	PF	PF	30	9	Multiple branch attachments, poor branch unions, epicormic branching (H), broken branches (M), fruiting bodies	Subject	Remove
807	Black Walnut	*Juglans nigra*	20, 18.5	F	F	F	10	5	V-union at 1m with included bark	Subject	Remove
808	Manitoba Maple	*Acer negundo*	~42, ~36	F	F	F	20	7	V-union at base with included bark, bow (L), asymmetrical crown (L), epicormic branching (H)	Subject	Remove
809	Poplar species	*Populus sp.*	22.5, 10.5	PF	FG	F		4	V-union at 0.5m with included bark, decay (H) in trunk, epicormic branching (L)	Subject	Remove
810	Poplar species	*Populus sp.*	18	F	G	G		4	Sweep (M), lean (L), vine competition (L)	Subject	Remove
811	Poplar species	*Populus sp.*	15	G	G	G		3	Vine competition (L)	Subject	Remove
812	Black Walnut	*Juglans nigra*	25, 22	F	F	F		5	Previously tagged: #724, v-union at 0.5m with included bark, epicormic branching (L)	Subject	Remove

P-1	See Table 2	Subject	Remove
P-2	See Table 2	Township (Right-of-Way)	Remove
P-3	See Table 2	Township (Right-of-Way)	Remove
P-4	See Table 2	Township (Right-of-Way)	Remove
P-5	See Table 2	Township (Right-of-Way)	Remove

Codes		
DBH	Diameter at Breast Height	*(cm)*
TI	Trunk Integrity	*(G, F, P, D)*
CS	Crown Structure	*(G, F, P, D)*
CV	Crown Vigor	*(G, F, P, D)*
CDB	Crown Dieback	*(%)*
DL	Dripline (Radius)	*(m)*
Owner	Subject, Neighbour, Township	
~ = estimate (L) = light; (M) = moderate; (H) = heavy G = good; F = fair; P = poor; D = dead		

Table 2. 100% Stand Tally Analyses of Polygons

Polygon P-1

Tree Size Class →	10cm - 29.5cm		30cm - 40.5cm		41cm +		Total All Sizes	
Species	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**
Eastern White Cedar (*Thuja occidentalis*)	1	9	0	0	0	0	1	9
Total Number of Trees	**1**	**9**	**0**	**0**	**0**	**0**	**1**	**9**

Polygon P-2

Tree Size Class →	0cm - 9.5cm		10cm - 29.5cm		30cm - 40.5cm		41cm +		Total All Sizes	
Species	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**
Norway Maple (*Acer platanoides*)	4	0	0	0	0	0	0	0	4	0
White Mulberry (*Morus alba*)	1	0	0	0	0	0	0	0	1	0
Total Number of Trees	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**0**

Polygon P-3

Tree Size Class →	0cm - 9.5cm		10cm - 29.5cm		30cm - 40.5cm		41cm +		Total All Sizes	
Species	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**
Willow species (*Salix sp.*)	3	0	0	0	0	0	0	0	3	0
Manitoba Maple (*Acer negundo*)	7	0	0	0	0	0	0	0	7	0
Poplar species (*Populus sp.*)	1	0	0	0	0	0	0	0	1	0
Total Number of Trees	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**

Polygon P-4

Tree Size Class →	0cm - 9.5cm		10cm - 29.5cm		30cm - 40.5cm		41cm +		Total All Sizes	
Species	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**
Poplar species (*Populus sp.*)	7	0	0	0	0	0	0	0	7	0
Total Number of Trees	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**0**

Polygon P-5

Tree Size Class →	0cm - 9.5cm		10cm - 29.5cm		30cm - 40.5cm		41cm +		Total All Sizes	
Species	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**	**AGS**	**UGS**
Austrian Pine (*Pinus nigra*)	2	0	0	0	0	0	0	0	2	0
Poplar species (*Populus sp.*)	1	0	0	0	0	0	0	0	1	0
Total Number of Trees	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**

Table 3. 100% Plot Tally Analyses of Density Plots

Plot 1

Tree Size Class →	0cm - 5cm	5.5cm - 12cm	12.5cm - 20cm	20.5cm +	Total All Sizes
Species					
Manitoba Maple (*Acer negundo*)	0	0	0	3	3
Total Number of Trees	**0**	**0**	**0**	**3**	**3**

Plot 2

Tree Size Class →	0cm - 5cm	5.5cm - 12cm	12.5cm - 20cm	20.5cm +	Total All Sizes
Species					
Sugar Maple (*Acer saccharum*)	0	1	0	2	3
Black Walnut (*Juglans nigra*)	2	0	0	2	4
Total Number of Trees	**2**	**1**	**0**	**4**	**7**

Plot 3

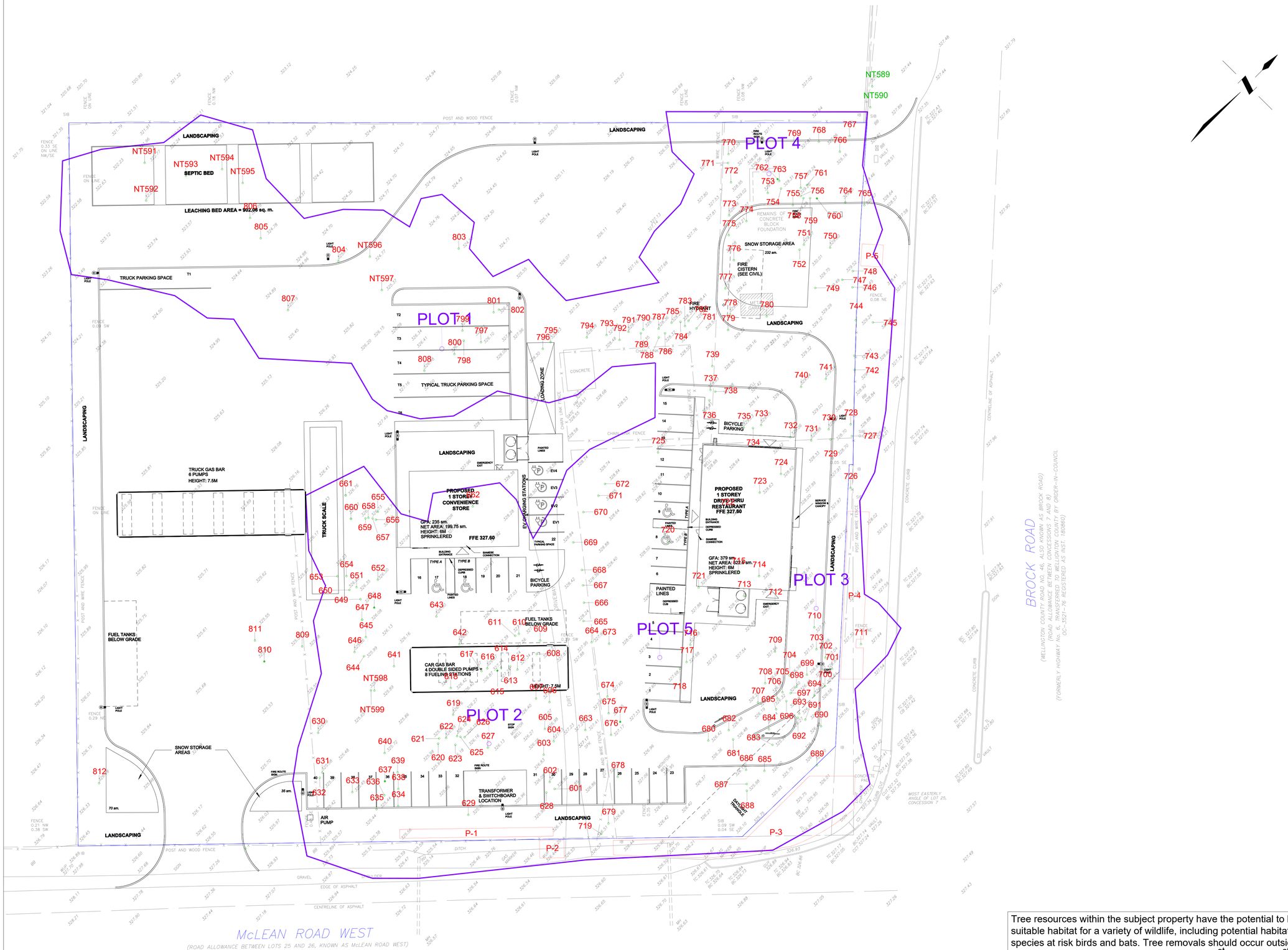
Tree Size Class →	0cm - 5cm	5.5cm - 12cm	12.5cm - 20cm	20.5cm +	Total All Sizes
Species					
Poplar species (*Populus sp.*)	11	6	1	0	18
Total Number of Trees	**11**	**6**	**1**	**0**	**18**

Plot 4

Tree Size Class →	0cm - 5cm	5.5cm - 12cm	12.5cm - 20cm	20.5cm +	Total All Sizes
Species					
Scots Pine (*Pinus sylvestris*)	1	3	3	0	7
Poplar species (*Populus sp.*)	2	2	2	0	6
Willow species (*Salix sp.*)	0	1	0	0	1
Total Number of Trees	**3**	**6**	**0**	**0**	**9**

Plot 5

Tree Size Class →	0cm - 5cm	5.5cm - 12cm	12.5cm - 20cm	20.5cm +	Total All Sizes
Species					
Poplar species (*Populus sp.*)	6	0	0	0	6
Scots Pine (*Pinus sylvestris*)	0	1	0	0	1
Total Number of Trees	**6**	**1**	**0**	**0**	**7**



LEGEND

Woodland Designation Assessment

Refer to Table 3 of the report dated 25 July 2025 and last revised 11 February 2026 for the 100% plot tally analyses for Unit 1.

- Approximate extent of Unit 1 dripline (thick PURPLE line)
- Location of 3.99m-radius plot centre (PURPLE circle with PURPLE label) — PLOT #
- Tree label (GREEN), to be preserved — #
- Tree label (RED), to be removed — #
- Tree location estimated by KFCI (GREEN circle with solid hatch)
- Tree location derived from survey (GREEN circle)
- Approximate extent of polygon, to be removed (thick RED line)

No.	Issue / Revision	Date	By
1	Report Submission	25 Jul. '25	KNH
2	Report Resubmission	26 Sept. '25	KNH
3	Report Resubmission	18 Dec. '25	KNH
4	Report Resubmission	11 Feb. '26	KNH

Base Data: Tarasick McMillan Kubicki Ltd. (survey), Richard Ziegler Architect Inc. (site)

Tree resources within the subject property have the potential to be suitable habitat for a variety of wildlife, including potential habitat for species at risk birds and bats. Tree removals should occur outside of the breeding bird window, which occurs from April 1st to August 31st, to avoid impacts to birds in the area and to ensure compliance with the Migratory Birds Convention Act. The bat roosting season in Southern Ontario occurs from April 1st to September 30th. As such, in order to satisfy the tree removal timing restrictions respecting birds and bats, tree removals should occur between October 1st and March 31st.

KUNTZ FORESTRY CONSULTING Inc.
146 Lakeshore Road West
PO Box 1267 Lakeshore W PO
Oakville ON L6K 0B3
t: 289.837.1871
e: consult@kuntzforestry.ca
web: www.kuntzforestry.ca

Client
DAAZ Inc.
8290 17th Sideroad East
Acton, Ontario L7J 2M1

Property
7456 McLean Road West
Puslinch, Ontario

Woodland Designation Assessment

Project	P4711	Figure	2
Date	25 July 2025		
Scale	1:300		

W. E. OUGHTRED and Associates Inc.
Real Estate Analysts / Development Consultants

February 13, 2026

Township of Puslinch
4704 Wellington Road 34
Puslinch, ON
N0B 2J0

Attention: Ms. Monika Farncombe
Planning and Corporate Services Coordinator

Dear Monika:

Re: Addendum to Planning Justification Report
Application for Zoning By-law Amendment D14-DAA
7456 McLean Road West and 197 Brock Road South

Siv-ik Planning and Design Inc. prepared a Planning Justification Report in September 2023 in support of the above-noted application to rezone the subject lands from IND (Industrial) to HC (Highway Commercial) to permit 2 gas bars, a retail (convenience) store and a drive-through restaurant. The Siv-ik report evaluated the proposed development against policies of the Provincial Policy Statement 2020 and found the proposal to be in conformity with the Provincial policies in effect at that time.

In October 2024, the Province of Ontario issued a new Provincial Planning Statement that replaced both the Provincial Policy Statement, 2020 and the Growth Plan for the Greater Golden Horseshoe, 2020. The purpose of this Addendum is to review the proposed development against the policies of the Provincial Planning Statement 2024 and confirm consistency with current Provincial policy.

The Provincial Planning Statement, 2024, (PPS) sets the policy foundation for decisions related to development and use of land within Ontario. Section 3 of the Planning Act requires that all decisions on land use matters made by municipalities, planning boards, the Province or a commission or agency of the government be consistent with the Provincial Planning Statement.

Policies for rural areas in municipalities are provided in Section 2.5 of the PPS. Policies relevant to the proposed development are:

1. Healthy, integrated and viable rural areas should be supported by:
   a) Building upon rural character, and leveraging rural amenities and assets;
   d) Using rural infrastructure and public service facilities efficiently;
   e) 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.
2. In rural areas, rural settlement areas shall be the focus of growth and development and their vitality and regeneration shall be promoted.

The subject properties are not located in a rural settlement area. However, the lands are located within a Rural Employment Area, as designated in Schedule B7 to the County of Wellington Official Plan. As such, the lands are specifically planned to accommodate dry industrial and commercial uses which do not require significant amounts of water in their operation or produce significant amounts of effluent and can be accommodated by private services. The proposed development of convenience retail, drive-through restaurant and motor vehicle fuel sales will support the vitality of broader Rural Employment Area and provide for the needs of the travelling public. The development can be accommodated by private services.

Section 2.5 states "Growth and development may be directed to rural lands in accordance with policy 2.6, including where a municipality does not have a settlement area. Section 2.6 provides policies for rural lands in municipalities. Specifically:

2. Development that can be sustained by rural service levels shall be promoted.
3. Development shall be appropriate to the infrastructure which is planned or available, and avoid the need for the uneconomical expansion of this infrastructure.

The proposed development can be adequately accommodated with private water, wastewater and sanitary services. Expansion of public water and sewer services is not required.

Section 2.8 of the PPS set out policies for employment. The following policies are relevant to the proposed development:

1. 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.

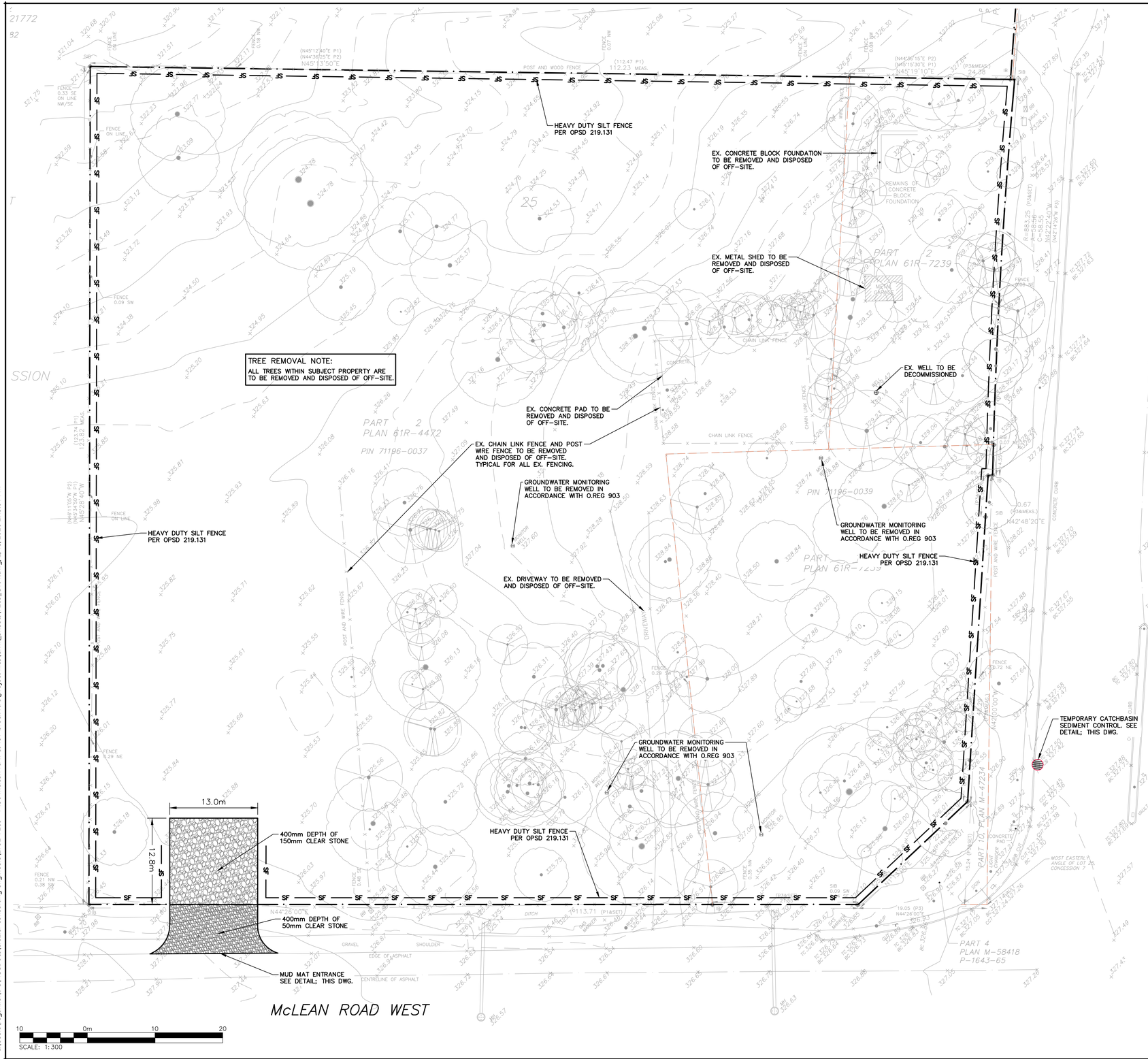
The proposed restaurant, convenience retail and gas bar uses should be considered ancillary uses that will be supportive of the Rural Employment Area and will help to meet the needs of the employees of existing and future businesses.

The subject site is located within a Rural Employment Area that is planned to accommodate dry industrial, commercial uses. The proposed development of service commercial uses can be accommodated with private services and will and help to meet the needs of current and future businesses in the Rural Employment Area. As such, the proposal to rezone the site to HC (Highway Commercial) is consistent with the Provincial Planning Statement 2024.

Yours truly,

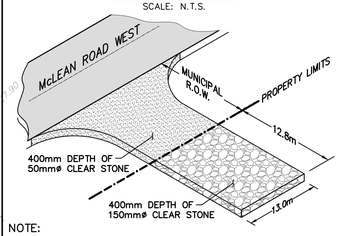


W. E. Oughtred



MUD-MAT DETAIL

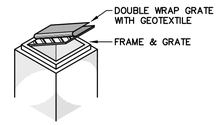
SCALE: N.T.S.



NOTE:
GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.

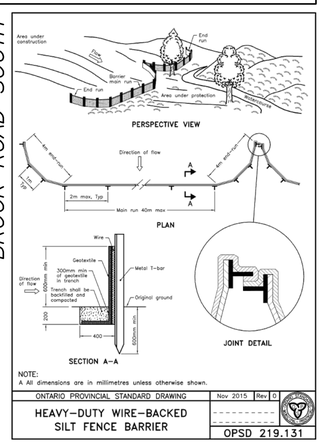
CATCHBASIN SEDIMENT CONTROL DETAIL

SCALE: N.T.S.



NOTES:
1. TO BE INSTALLED IN ALL AFFECTED EXISTING & PROPOSED CATCHBASIN & CATCHBASIN MANHOLES UNDER APPROPRIATE DRAINAGE CIRCUMSTANCES, BETWEEN APRIL AND DECEMBER.
2. WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm OR A NON-WOVEN GEOTEXTILE TO BE CONSIDERED BASED ON SOIL PARAMETERS AND SITE CONDITIONS.
3. GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERE WITH DRAINAGE, OR AS DIRECTED BY THE MUNICIPALITY.

BROCK ROAD SOUTH



NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 0
HEAVY-DUTY WIRE-BACKED SILT FENCE BARRIER		OPSD 219.131

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 — HEAVY DUTY SILT FENCE; SEE DETAIL
- PROPOSED SEDIMENT CONTROL DEVICE IN EX. CATCHBASIN PER

No.	ISSUE / REVISION	YYYY/MMM/DD
3	ISSUED FOR THIRD SUBMISSION (ZBA)	2026/FEB/13
2	ISSUED FOR SECOND SUBMISSION (ZBA)	2025/AUG/01
1	ISSUED FOR COORDINATION	2025/JUL/18
0	ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20

ELEVATION NOTE:

ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD28:78, 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-SRPRT
COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC.
DATED: FEB. 09, 2026
DRAWING No. A101

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 TOWNSHIP OF PUSLINCH

Drawing
PRELIMINARY EROSION, SEDIMENT CONTROL AND REMOVALS PLAN

Stamp: LICENSED PROFESSIONAL ENGINEER — J. KOEHLER 100198747 — FEB/13/2026 — PROVINCE OF ONTARIO

Stamp: LICENSED PROFESSIONAL ENGINEER — N. CONSTANTIN 100073636 — 2026.02.13 — PR.2792-7289 — PROVINCE OF ONTARIO

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.	2792-7289
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 101

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PART 2
PLAN 61R-21772
PIN 71196-0282

LOT 25

CONCESSION 7

PART 1
PLAN 61R-4472
PIN 71196-0037

PART 1
PLAN 61R-7239
PIN 71196-0039

PART 4
PLAN M-58418
P-1643-65

PART 1
PLAN 61R-4234

MATCH EXISTING GRADE AT CURB

MATCH EXISTING GRADE AT ROADWAY

MATCH EXISTING GRADE AT CURB

MATCH EXISTING GRADES AT PROPERTY LINE (TYP.)

MATCH EXISTING GRADES AT PROPERTY LINE (TYP.)

PR. RETAINING WALL PER STRUCTURAL DESIGN (BY OTHERS) c/w FALL PROTECTION FENCING

PR. RETAINING WALL PER STRUCTURAL DESIGN (BY OTHERS) c/w FALL PROTECTION FENCING

MATCH EXISTING GRADES AT PROPERTY LINE (TYP.)

BW 323.85
TW 327.79
BC 327.64
H=3.94m

BW 324.60
TW 327.62
BC 327.47
H=3.02m

BW 325.80
TW 327.41
BC 327.26
H=1.61m

BW 325.23
TW 327.75
BC 327.60
H=2.52m

BW 326.13
TW 327.65
BC 327.50
H=1.52m

BW 327.16
TW 327.65
BC 327.50
H=0.49m

BW 327.50
TW 327.65
BC 327.50
H=0.15m

BW 326.18
TW 327.30
BC 327.15
H=1.12m

BW 327.15
TW 327.30
BC 327.15
H=0.15m

BW 326.77
TW 327.35
BC 327.20
H=0.58m

BW 327.20
TW 327.35
BC 327.20
H=0.15m

BW 326.80
TW 327.30
BC 327.15
H=0.50m

3.00m SETBACK

7.50m SETBACK

3.00m SETBACK

MAX 3:1

TRUCK GAS BAR
327.50

PR. 1 STOREY CONVENIENCE STORE
FFE: 327.60

PR. 1 STOREY DRIVE-THRU RESTAURANT
FFE: 327.60

CAR GAS BAR

UNDERGROUND FUEL TANK

UNDERGROUND FUEL TANK

SNOW STORAGE AREA

SNOW STORAGE AREA

SNOW STORAGE AREA

TRANSFORMER & SWITCH BOARD

DEPRESSED CURB

PR. WELL

PR. INFILTRATION GALLERY

PR. STM DCB5
T/G 326.81

PR. STM CB2
T/G 327.00

PR. STM DCB1
T/G 326.68

PR. STM CB3
T/G 326.97

PR. STM CBMH4
T/G 326.85

PR. JELLYFISH FILTER
T/G 326.85

PR. STM HW
T/G 325.66

PR. 22.1m STM CULVERT

PR. 200mmø RIP RAP C/W FILTER CLOTH TERRAFIX 270R

8.72m DRIVEWAY TRIANGLE

7.50m SETBACK

3.00m SETBACK

MATCH EXISTING BOULEVARD WITH ROADWAY

MATCH EXISTING BOULEVARD WITH ROADWAY

MATCH EXISTING GRADE AT ROADWAY

MATCH EXISTING GRADES AT PROPERTY LINE (TYP.)

McLEAN ROAD WEST

BROCK ROAD SOUTH

SCALE: 1:300



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING FENCE
- 215.00 EXISTING GRADE
- 215.00 PROPOSED GRADE
- 215.00 PROPOSED GRADE (TO MATCH EXISTING)
- 2.0% PROPOSED MINOR FLOW DIRECTION
- 2.0% PROPOSED GRASSED SWALE
- PROPOSED RETAINING WALL
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED DEPRESSED CURB
- SETBACK LIMIT
- PROPOSED LANDSCAPE AREA

HEAVY DUTY PAVEMENT

SCALE: N.T.S.

40mm	HL3 SURFACE
70mm	HL8 BINDER
150mm	GRANULAR 'A'
450mm	GRANULAR 'B'
710mm	TOTAL
	COMPACTED SUB-BASE (ALL TOPSOIL REMOVED)

NOTE:
ALL MATERIAL TO CONFORM TO OPSS. REFER TO CONSTRUCTION NOTES FOR DETAILS ON COMPACTION.

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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 RICHARD ZIEGLER ARCHITECT INC.
DATED: FEB. 09, 2026
DRAWING No. A101

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Project
7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH

Drawing
PRELIMINARY SITE GRADING PLAN

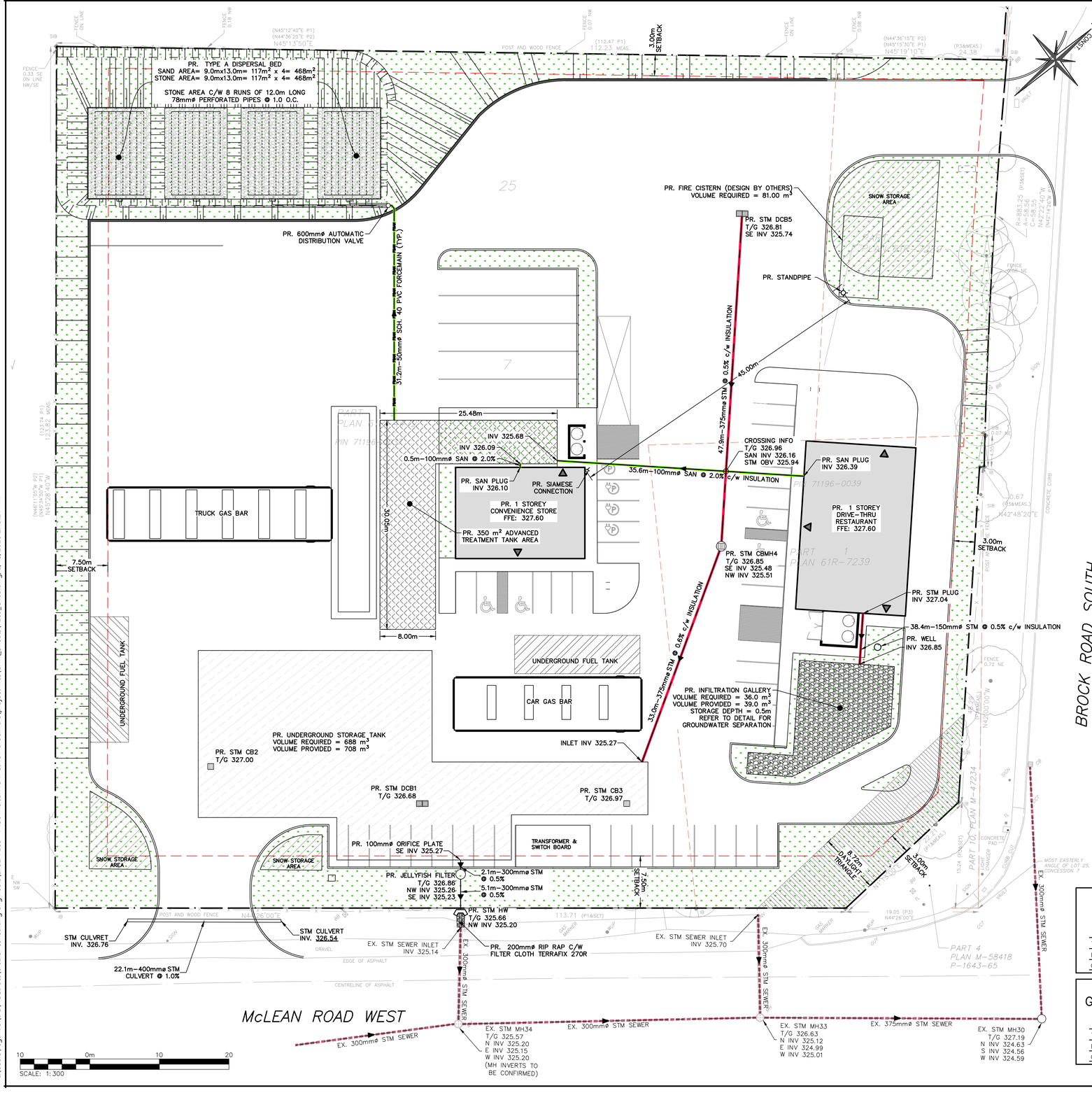
Stamp
LICENSED PROFESSIONAL ENGINEER
J. KOEHLER
100198747
FEB/13/2026
PROVINCE OF ONTARIO

Stamp
LICENSED PROFESSIONAL ENGINEER
N. CONSTANTIN
100073536
2026.02.13
PR.2792-7289
PROVINCE OF ONTARIO

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.	2792-7289
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 102

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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 ONSITE 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 1.2M 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.
10. 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.
11. ALL PIPES SUBJECT TO VEHICULAR TRAFFIC SHALL BE ADEQUATELY PROTECTED.
12. ALL METAL IN TANKS OR PUMP CHAMBERS TO BE GLAVANIZED OR STAINLESS STEEL.
13. ALL JOINTS BELOW THE HIGH WATER LEVEL IN PRECAST TANKS TO BE SEALED WITH MASTIC SEALANT IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS FOR WATERTIGHT 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 SEEDED COMPLETE WITH FERTILIZER AND MULCH IN ACCORDANCE WITH OPSS
21. THE INSTALLING CONTRACTOR SHALL INSTALL THE SEWAGE SYSTEM USING A TRANSIT/LEVEL AND SHALL PROVIDE SAME FOR INSPECTION OF ANY COMPONENT.
22. 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.
23. 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.
24. 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.
25. SEWAGE SYSTEM HAS BEEN DESIGNED TO RECEIVED 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
- TP# TEST PIT LOCATION
- SETBACK LIMIT
- PROPOSED LANDSCAPE AREA

ON-SITE SEWAGE DESIGN

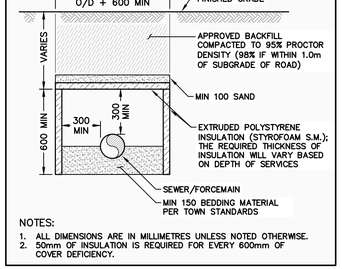
DAILY DESIGN FLOW REFER TO FSR REPORT FOR DETAILS	TOTAL DESIGN FLOW = 22,000 L/DAY
ADVANCED TREATMENT SYSTEM	TO BE DETERMINED DURING DETAILED DESIGN
SOIL PERCOLATION RATE	T = 15 min/cm (DETERMINED BY C.F. CROZIER)
TYPE A DISPESAL BED STONE AREA	Q/50 =22,000/50 REQUIRED = 440 m² PROVIDED = 468 m²
TYPE A DISPERSAL BED SAND AREA	QT/850= 22,000*15/850 REQUIRED = 389 m² PROVIDED = 468 m²

AUTOMATIC DISTRIBUTING VALVE DETAIL

SCALE: N.T.S.

INSULATION FOR SHALLOW SERVICES

SCALE: N.T.S.



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. 50mm OF INSULATION IS REQUIRED FOR EVERY 600mm OF COVER DEFICIENCY.

SWM TANK SECTION

SCALE: N.T.S.

GROUND SURFACE=326.68
TOP OF TANK=325.87
BOTTOM OF TANK=325.27
GROUNDWATER=324.19

INFILTRATION GALLERY SECTION

SCALE: N.T.S.

GROUND SURFACE=327.30
TOP OF GALLERY=327.15
BOTTOM OF GALLERY=326.65
GROUNDWATER=321.48

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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:

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DATED: FEB. 09, 2026
DRAWING No. A101

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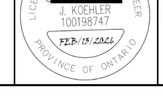
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7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWNSHIP OF PUSLINCH

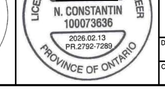
Drawing

PRELIMINARY SITE SERVICING PLAN

Stamp



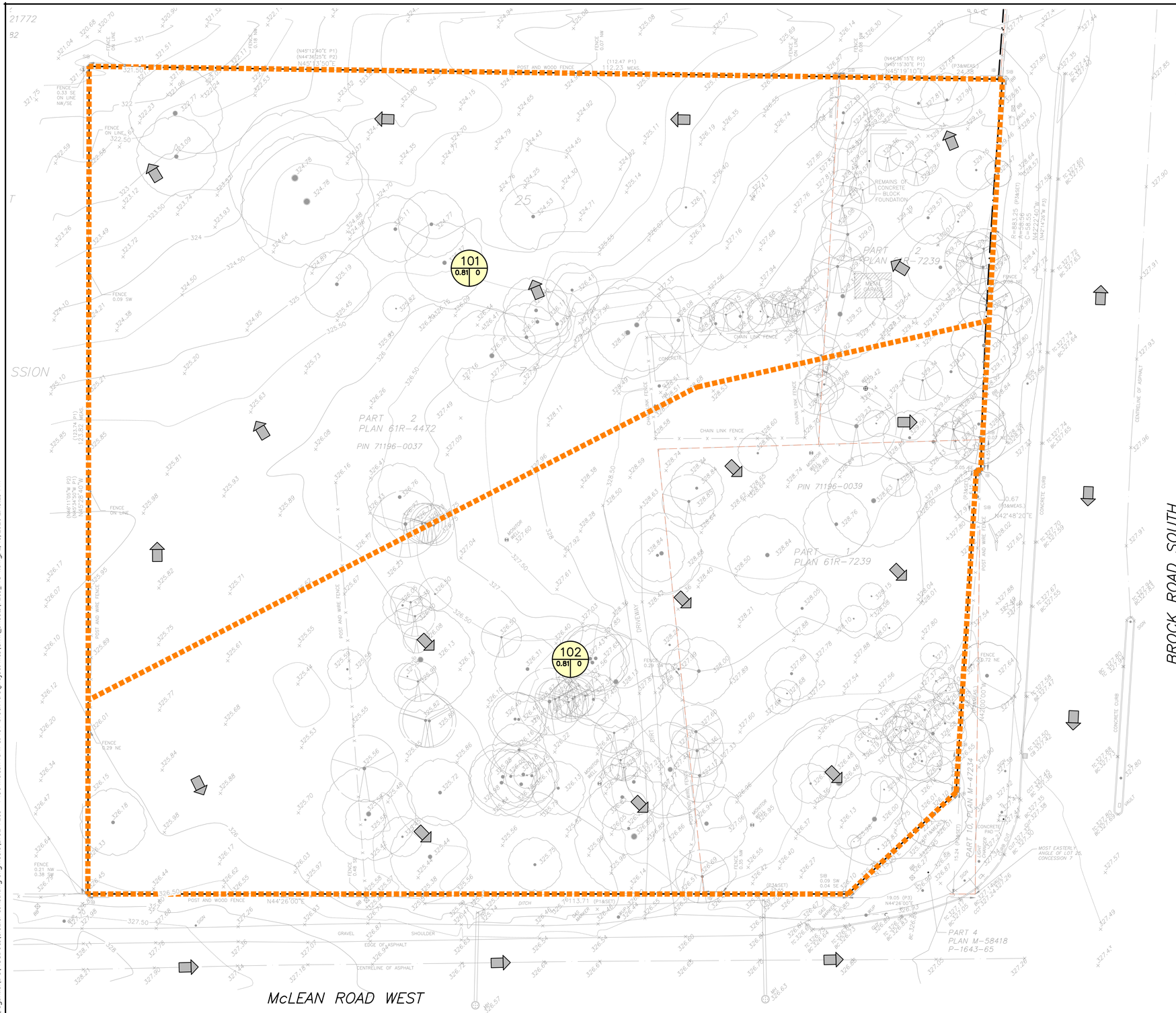
Stamp



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.	2792-7289
Check	S.C.	Check	B.W./K.R.	Scale	1: 300
				Dwg.	C 103

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LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- x 215.00 EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- PRE-DEVELOPMENT STORM DRAINAGE CATCHMENT AREA
- ID — CATCHMENT I.D.
- A (ha) | 70IMP % IMPERVIOUSNESS

PRE-DEVELOPMENT CATCHMENT AREAS PER THE STORMWATER MANAGEMENT REPORT - CARROLL POND MUNICIPAL DRAIN (TOWNSHIP OF PUSLINCH, MARCH 2007)

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PROJECT FILE No. 9625-SRPRT
COMPLETED OCTOBER 20, 2022

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Project
7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH

Drawing
PRELIMINARY PRE-DEVELOPMENT DRAINAGE PLAN

Stamp
LICENSED PROFESSIONAL ENGINEER
[redacted]
J. KOEHLER
100198747
FEB/13/2026
PROVINCE OF ONTARIO

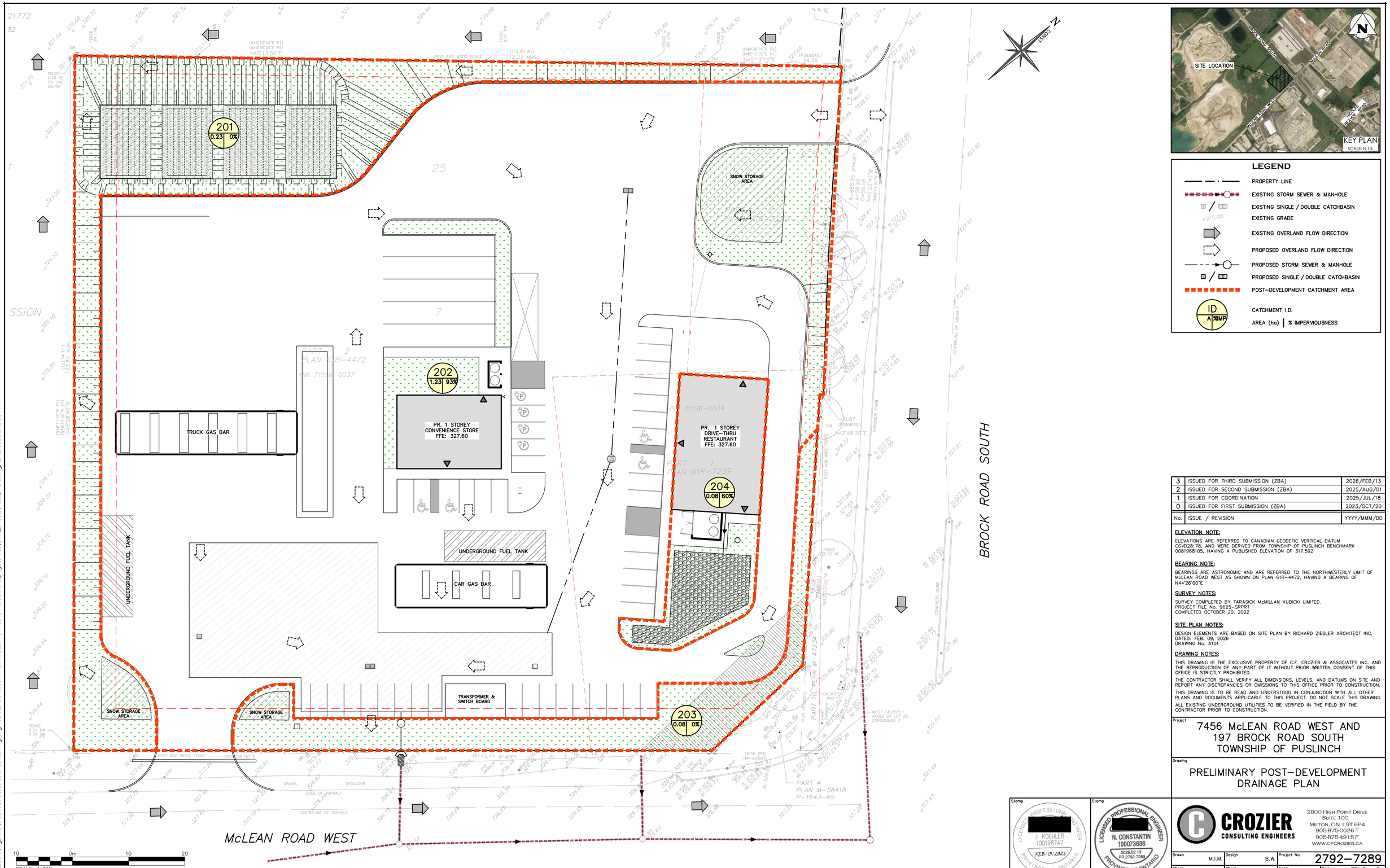
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LICENSED PROFESSIONAL ENGINEER
[redacted]
N. CONSTANTIN
100073636
2026.02.13
PR.2792-7289
PROVINCE OF ONTARIO

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	Design	Project No.
M.I.M.	B.W.	2792-7289
Check	Check	Scale
S.C.	B.W./K.R.	1: 300

Dwg. FIG 1

C:\Users\regan.le\DC\ACCDocs\crozier consulting engineers\2792-7289 - 7456 mclean rd w & 197 brock rd s\project files\Civil_Sheets\7289_FIG 1.dwg, 2/13/2026 2:43:29 PM



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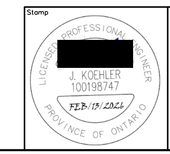
Project

7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWNSHIP OF PUSLINCH

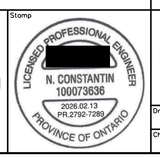
Drawing

PRELIMINARY POST-DEVELOPMENT DRAINAGE PLAN

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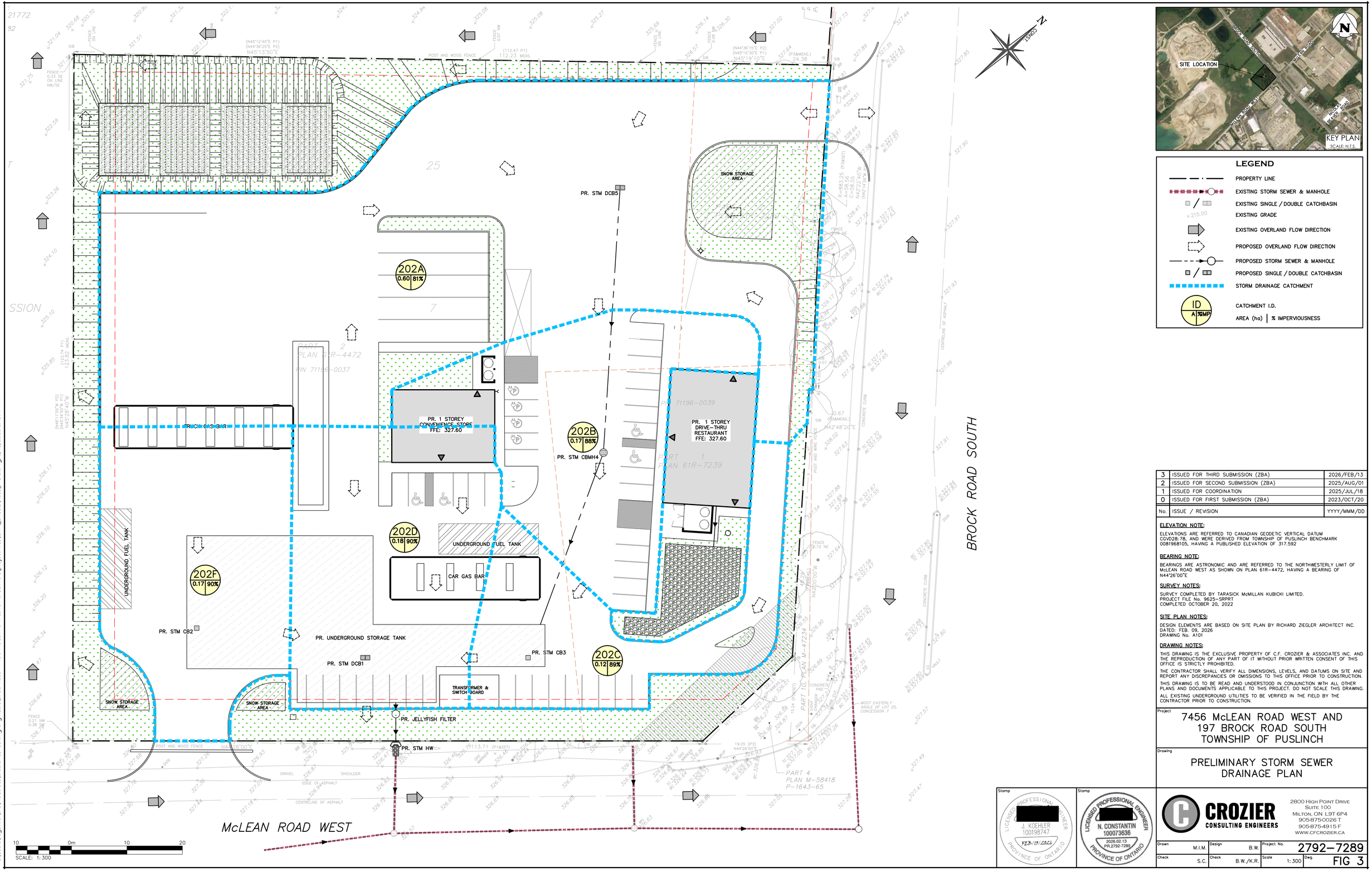
Stamp



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.	2792-7289
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	FIG 2

c:\Users\regan.len\DC\ACCDocs\crozier consulting engineers\2792-7289 - 7456 mclean rd w & 197 brock rd s\project files\Civil_Sheets\7289_FIG 2.dwg, 2/13/2026 2:43:38 PM



3	ISSUED FOR THIRD SUBMISSION (ZBA)	2026/FEB/13
2	ISSUED FOR SECOND SUBMISSION (ZBA)	2025/AUG/01
1	ISSUED FOR COORDINATION	2025/JUL/18
0	ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20
No.	ISSUE / REVISION	YYYY/MMM/DD

ELEVATION NOTE:

ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD28:78, 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-SRPRT
COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC.
DATED: FEB. 09, 2026
DRAWING No. A101

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 TOWNSHIP OF PUSLINCH

Drawing

PRELIMINARY STORM SEWER DRAINAGE PLAN

Stamp

LICENSED PROFESSIONAL ENGINEER
[redacted]
J. KOEHLER
100198747
FEB/13/2026
PROVINCE OF ONTARIO

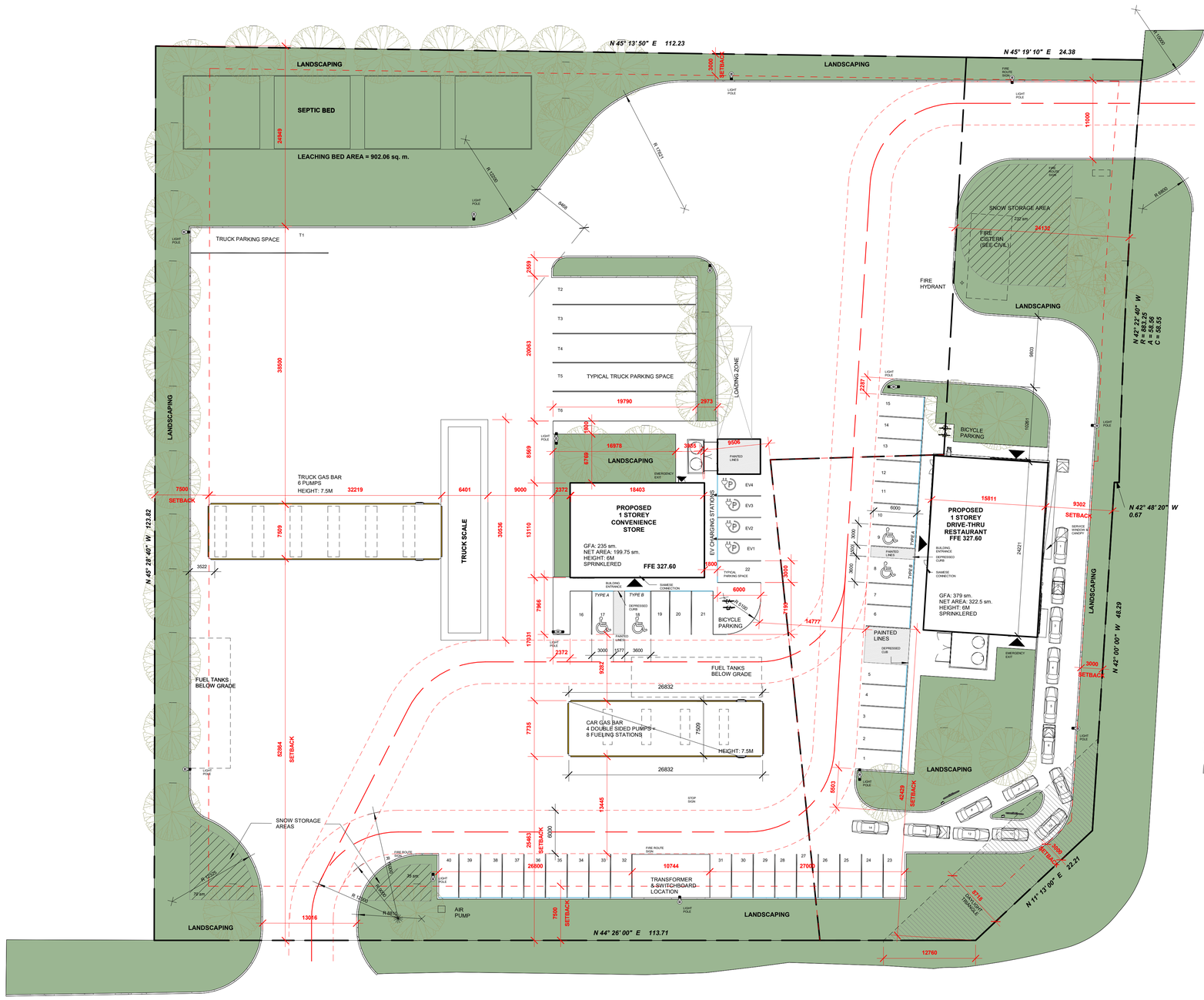
Stamp

LICENSED PROFESSIONAL ENGINEER
[redacted]
N. CONSTANTIN
100073636
2026.02.13
PR.2792-7289
PROVINCE OF ONTARIO

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
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Drawn	M.I.M.	Design	B.W.	Project No.	2792-7289
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	FIG 3

C:\Users\regan.lei\DCACDocs\crozier consulting engineers\2792-7289 - 7456 mclean rd w & 197 brock rd s\project files\Civil_Sheets\7289_FIG 3.dwg, 2/13/2026 2:43:47 PM



HC ZONE REGULATIONS	REQUIRED	PROPOSED
PERMITTED USES	TABLE 8.1 ZONING BYLAW	GAS BAR(S), CONVENIENCE STORE AND RESTAURANT
LOT AREA (MIN)	0.4 HA	1.62 H
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.)	3 M	3 M
RESTAURANT GFA		379 sm
RESTAURANT NET AREA		322.5 sm
CONVENIENCE STORE GFA		235 sm.
CONVENIENCE STORE NET AREA		199.75 sm.
GAS BAR CANOPY (CARS)		201 sm.
GAS BAR CANOPY (TRUCKS)		241 sm.
TOTAL BUILDING/STRUCTURE AREA		1,056 sm.
LOT COVERAGE (MAX.)	45%	6.50%
LANDSCAPED OPEN SPACE (MIN.)	25%	27%

PARKING REQUIRED		
GAS BAR - CARS	(1 PER PUMP) = 8	SEE BELOW
GAS BAR - TRUCKS	(1 PER PUMP) = 6	6
CONVENIENCE STORE	(1 PER 20 sm.) = 10	SEE BELOW
RESTAURANT	(1 PER 10 sm.) = 33	SEE BELOW
TOTAL	57	50

VEHICLE PARKING SCHEDULE

Per Table 5.3 of Zoning Bylaw

TYPE OF PARKING SPACE	PROVIDED PARKING SPACE
ACCESSIBLE PARKING - TYPE A	2
ACCESSIBLE PARKING - TYPE B	2
TRUCK PARKING	6
TYPICAL PARKING SPACE	36
EV PARKING / CHARGING SPACE	4
TOTAL	50

BICYCLE PARKING SCHEDULE

Per Table 5.6 of Zoning Bylaw

REQUIRED	PROVIDED
2 PER 1,000 sm. = 2	2

RICHARD ZIEGLER ARCHITECT INC.
39 POLSON STREET TORONTO, ONTARIO M5A 1A4
T: 416 461 1494 or 1 800 413 7992 F: 866 895 1488
www.rzarchitect.com E: mail @ rzarchitect.com



SITE CONTEXT

NO.	ISSUANCE	DATE
4	REV. & ISSUED FOR PLANNING APPROVALS	2026.02.11
3	REV. & ISSUED FOR PLANNING APPROVALS	2025.11.12
2	REV. & ISSUED FOR PLANNING APPROVALS	2025.08.08
1	ISSUED FOR PLANNING APPROVALS	2025.08.05

THE GENERAL CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECT. DO NOT SCALE THE DRAWINGS. DO NOT USE THIS DRAWING FOR CONSTRUCTION UNLESS SIGNED AND SEALED BY THE ARCHITECT.

NORTH

STAMP

ONTARIO ASSOCIATION OF ARCHITECTS
RICHARD E. ZIEGLER
LICENCE
4462

PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

SITE PLAN

SCALE	1 : 300	PROJECT NUMBER
DATE	2026-02-11 8:38:49 AM	202436
DRAWN	REZ	
CHECKED	REZ	
SHEET		REVISION

A101

FILE NAME: Y:\2024 Projects\202436 - 7456 McLean Road, Puslinch\20 Design and Construction Documents (Revit)\7456 McLean Road 2026.02.09.rvt
PLOT DATE: 2026-02-11 8:38:49 AM

W. E. OUGHTRED and Associates Inc.
Real Estate Analysts / Development Consultants

February 13, 2026

Township of Puslinch
4704 Wellington Road 34
Puslinch, ON
N0B 2J0

Attention: Ms. Monika Farncombe
Planning and Corporate Services Coordinator

Dear Monika:

Re: Zoning By-law Amendment – 3rd Submission
7456 McLean Road West and 197 Brock Road South
Puslinch, ON

We are pleased submit revised plans and studies to address comments on the above-noted application that were issued on October 20, 2025.

The following materials are being uploaded to Cloudpermit today:

1. Revised Draft Zoning By-law;
2. Addendum to the Planning Justification Report prepared by W.E. Oughtred and Associates Inc. and dated February 13, 2026;
3. Tree Inventory and Protection Plan prepared by Kuntz Forestry and dated February 11, 2026;
4. TIPP Figure 1 prepared by Kuntz Forestry and dated February 11, 2026;
5. TIPP Figure 2 prepared by Kuntz Forestry and dated February 11, 2026;
6. Conceptual Site Plan prepared by Richard Ziegler Architect and dated February 11, 2026 (Drawing A101);
7. Main Floor Plans for the Restaurant and Convenience Store prepared by Richard Ziegler Architect and dated February 11, 2026 (Drawing A102);
8. Roof Plans for the Restaurant and Convenience Store prepared by Richard Ziegler Architect and dated February 11, 2026 (Drawing A103);
9. Elevations for Convenience Store prepared by Richard Ziegler Architect and dated February 11, 2026 (Drawing A201);
10. Elevations for the Restaurant prepared by Richard Ziegler Architect and dated February 11, 2026 (Drawing A202);
11. Elevations for the Truck Gas Bar prepared by Richard Ziegler Architect and dated February 11, 2026 (Drawing A203);
12. Elevations for the Car Gas Bar prepared by Richard Ziegler Architect and dated February 11, 2026 (Drawing A204);

13. Rendered Views of the Restaurant and Convenience Store prepared by Richard Ziegler Architect and dated February 11, 2026 (Drawing A205);
14. Gas Pump Plans prepared by Richard Ziegler Architect and dated February 11, 2026 (Drawing A206);
15. Transportation Impact Study prepared by C.F. Crozier and Associates Inc. and dated February 2026;
16. Hydrogeological Report prepared by C.F. Crozier and Associates Inc. and dated February 2026;
17. Functional Servicing and Stormwater Management Report prepared by C.F. Crozier and Associates Inc. and dated February 2026;
18. Geotechnical Investigation prepared by CMT Engineering Inc. and dated July 13, 2023;
19. Civil Engineering Plans including a Preliminary Erosion and Sediment Control Plan, Preliminary Site Grading Plan, Preliminary Site Servicing Plan, Preliminary Pre-Development Drainage Plan, Preliminary Post-Development Drainage Plan and Preliminary Storm Sewer Drainage Plan, prepared by C.F. Crozier and Associates Inc. and dated February 13, 2026;
20. Comment response letter prepared by C.F. Crozier and Associates Inc. and dated February 13, 2026. This letter provides responses to all comments on the Transportation Impact Study, Hydrogeological Investigation, Functional Servicing and Stormwater Management Report and civil engineering plans.
21. Topographic Survey prepared by TMK Surveyors and dated November 3, 2022, and revised November 3, 2025;
22. Photometric Plan, Lighting Plan and Lighting Details prepared by Spline and dated January 27, 2026.
23. Lighting

Comments have been addressed as follows:

A. Comments from NPG Planning Solutions dated October 1, 2025

1. We understand that the application is now deemed to be complete.
2. We are unable to revise the Panning Justification Report as the report did not originate in our office. We have, however, provided an Addendum that reviews the proposal against the policies in the Provincial Policy Statement, 2024.
3. Noted.
4. We acknowledge that the holding provision (h-5) that requires the submission and approval of a Site Plan Application prior to new uses, buildings and structures being permitted on the lands, will be applied to the new zoning on the 197 Brock Road South property.
5. TMK Surveyors has determined that land dedication for widening of McLean Road West is not required as the current road allowance width is 20.12 metres. We provide a revised Topographic Survey which shows the width of the McLean Road West road allowance.
6. The Site Plan has been revised to show a 28 metre sight triangle at the corner of McLean Road West and Brock Road South. We provide a revised Topographic Survey which shows the area of the sight triangle.
7. The Draft Zoning By-law has been revised to address comments, as follows:
   a) List of permitted uses incudes: gas bar(s), restaurant, retail store and drive-through service facility.

b) The parking requirement has been revised. The requirement is now based on Net Floor Arean of the proposed restaurant and associated patio and the retail store. As such, the required number of spaces is now 57 including 8 spaces for the car gas bar, 6 spaces for the truck gas bar, 10 spaces for the retail (convenience) store and 33 spaces for the drive-through restaurant.
c) The landscaped open space provided has now increased to 27% of the lot area and meets the Zoning By-law requirements for the HC zone. Site specific requirements for landscape open space have been removed from the draft Zoning By-law.
d) A site-specific regulation has been added to the Draft Zoning By-law to permit provision of a loading space that does not abut the building for which the loading space is provided.
e) Land dedication for road widening is not required.

8. The Traffic Consultant, C.F. Crozier, has provided responses items 8 a)-d) in their comment response letter dated February 13, 2026.
9. A Photometric Plan, Lighting Plan and Lighting Details are included with the submission.
10. The site plan has now been revised so that the gas bars and all related infrastructure are located on the 7456 McLean Road West property. The lands at 197 Brock Road South will be reserved for the restaurant use only.

B. Comments from Dougan Ecology dated October 6, 2025

1. We understand that the application is now deemed to be complete.
2. As per Section 3.1.(d) of the Wellington Woodland Conservation By-law 5115-09, the by-law does not apply to injuring or destruction of trees imposed after December 31, 2002 as a condition of the approval of a site plan, a plan of subdivision or a consent under Section 41, 51 or 53, respectively, of the Planning Act or as a requirement of a site plan agreement entered into under these sections. The development proposal will require Site Plan Approval and, as such, a Clearing Permit should not be required.
6. Technical Items – Tree Inventory and Preservation Plan
   (1) The timing window has been added as a specification on Figures 1 and 2. The timing window has been revised on page 4 of the report to note that tree removals should occur between October 1 and March 31.
   (2) As noted above, a clearing permit is not required when a development proposal is subject to Site Plan approval.
7. Technical Comments – Landscape Plan
   The Landscape Plan is currently being revised to show native vegetation species instead of non-native species. The revised Landscape Plan will be submitted by February 20th.

C. Comments from GEI Consultants dated October 1, 2025

1. A Photometric Plan, Lighting Plan and Lighting Details have been included with this submission;
2. A Spills Management Plan will be provided with the site plan application;
3. An Itemized Cost Estimate for Site Servicing will be provided with the site plan application;
4. All technical comments are addressed in the comment response letter prepared by C.F. Crozier.

D. Comments from the Office of the County Engineer, County of Dufferin dated September 22, 2025

We note the requirement for the centre median extension and will provide those details through the site plan application.

E. Comments from Salvini Consulting dated September 9, 2025

Comments are addressed in the comment response letter prepared by C.F. Crozier.

F. Comments from EXP dated September 3, 2025

Comments are addressed in the comment response letter prepared by C.F. Crozier.

G. Comments from Wellington Source Water Protection dated August 26, 2025

1. The Winter Maintenance plan will be provided through the site plan application.
2. A liquid fuel handling, storage and spill response procedure will be provided through the site plan application.
3. Further discussion with the Township Hydrogeologist will take place through the site plan application.
4. Documentation with respect to the flow meter will be provide through the site plan application.
5. Documentation that the monitoring wells and unused well will be decommissioned will be provided through the site plan application.
6. Documentation on the ECA approval for sewage works will be provided once available.
7. Comments on the Hydrogeological Investigation have been addressed in the response letter prepared by C.F. Crozier.

We look forward to having the rezoning application scheduled for a Council decision in March. In the meantime, please do not hesitate to contact me if you have any questions.

Yours truly,

[redacted]

Arlene Beaumont, M.Pl.

FEBRUARY 13, 2026

PROJECT NO: 2792-7289

SENT VIA: EMAIL
ARLENE@WEOUGHTRED.CA

W.E. Oughtred & Associated Inc.
2140 Winston Park Drive, Suite 26 & 27
Oakville, ON L6H 5V5

Attention: **Arlene Beaumont**
Planner

RE: **COMMENT RESPONSE LETTER**
7456 MCLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH, COUNTY OF WELLINGTON

Dear Arlene,

We have received comments from NPG Planning Solutions (dated October 01, 2025), Harden Environmental Services Ltd (dated August 21, 2025), GEI Consultants (dated August 26, 2025) and Wellington Source Water Protection (dated August 26, 2025) in response to Crozier's 2nd submission package for a Zoning By-law Amendment Application for a site located at 7456 McLean Road West & 197 Brock Road South in the Township of Puslinch. The following letter has been prepared to provide responses to the Planner's comments. Responses are in bold for clarity.

Transportation Engineering Comments – NPG Planning Solutions, Jeremy Tran (October 01, 2025):

1. We note that the Township Zoning By-law requires a minimum of 1 parking space per 20 m^2 net floor area for restaurant use while not having a stacking requirement for drive-through service facilities. The TIS notes that the Township of Guelph/Eramosa requires one parking space per 15 m^2 for restaurant uses. Please consider providing more examples of parking and stacking requirements for restaurant use in comparable municipalities.

   Comment Acknowledged. Please see updated parking section in 2nd submission of the TIS.

2. The TIS indicated that the ITE's Parking Generation Manual would require 31 parking spaces for the proposed restaurant with drive-through facility. Please elaborate more on this and confirm whether the 31 parking spaces include stacking spaces. Would 31 parking spaces be equivalent to a parking rate of 1 space per 12-13 m^2 of net floor area for the restaurant use?

   Comment Acknowledged. Please see updated parking section in 2nd submission of the TIS. Parking spaces do not include stacking spaces.

3. In general, the TIS should provide further justification as to why 1 parking space per 20 m^2 of floor area for the restaurant use is appropriate. The example of the Township of Guelph/Eramosa and the ITE's Parking Generation Manual both seem to justify a parking

requirement less than the required 1 space per 10 m^2 but more than the requested 1 space per 20 m^2.

Comment Acknowledged. Please see updated parking section in 2nd submission of the TIS.

4. We will discuss with staff and the Township's Traffic Consultant further on the requested reduction in parking requirement. More comments may come forward following our discussion.

Comment Acknowledged.

Transportation Engineering Comments – Salvini Consulting, Julia Salvini (September 9, 2025):

1. The base traffic data along McLean Road West and at the Brock Road intersection is comparable to other traffic data collected in the area and is acceptable.

Comment Acknowledged.

2. The background growth rate of 2 percent per year is appropriate and consistent with other studies in the area.

Comment Acknowledged.

3. The study accounts for background development using the information we provided on several planned developments in the area as requested.

Comment Acknowledged.

4. The site traffic generation includes for four vehicle fuelling positions at the gas bar where it appears there will be at least five fuelling positions available. The consultant should verify the design and how many vehicles can be fuelling at the same time and then prepare an updated trip generation forecast if needed.

Comment Acknowledged. Please see updated site plan and the updated trip generation forecast.

5. The pass-by traffic has been updated. It is generally correct, but there appear to be some small discrepancies in the PM peak hour trips; these discrepancies do not impact the conclusions of the study but should be reviewed and updated in any future analysis.

Comment Acknowledged. Please see updated pass-by trip distribution figure.

6. The future total analysis suggests that the traffic can be accommodated at the Brock/McLean intersection with changes to the signal timing. I defer to the County to comment on whether or not the signal timing changes can be accommodated.

Comment Acknowledged.

7. Could the consultant please confirm the 95th percentile queues at the Brock/McLean intersection in the future total 2031 scenario using the Synchro methodology? The northbound left turn queue at the intersection has access to a centre left turn lane that is continuous, but the auxiliary left turn lanes on McLean Road have a limited amount of storage. I prefer to see the Synchro queues.

   Comment Acknowledged. Please see updated queue tables that now represent synchro queues

8. The study includes several diagrams that illustrate the paths of various vehicles throughout the site. It appears that the design vehicles are able to access and circulate the site appropriately. There is a truck scale on the site – I would like to have more information about how the scale operates and see a diagram showing how a truck would use the scale and also fuel to confirm there is appropriate room on-site for that circulation pattern if it is needed.

   Comment Acknowledged. Please see updated truck turning diagrams.

9. The drive-thru for the restaurant has been designed with space for 10 vehicles to queue before the pick-up window. The study references requirements for 10 stacking spaces in other comparable Zoning By-laws. The County has asked for additional data and it would also be helpful to show on the site plan how many more vehicles could be accommodated in the drive-thru queue without impacting site circulation as there appears to be additional space on site for queuing.

   Comment Acknowledged. Please see updated site plan and section 9.0 in the report.

10. The study provides some high level rationale for a reduced parking provision for the restaurant use from 1 space/10 s.m. to 1 space/20 s.m. of GFA. More information is needed to support the requested variance. The consultant should undertake surveys of at least two proxy sites during peak periods to understand the demand for parking at the restaurant. The chosen sites could overlap with the sites chosen for the drive-thru queuing surveys, if appropriate. For purposes of measuring parking demand, the sites should incorporate current drive-thru operations including the designation of spaces for mobile pick-up and for when orders are taking longer than expected. It would be helpful to have a meeting to discuss and agree to the proxy sites and survey times with the consultant and representatives of both the Township and the County.

    Comment Acknowledged. Please see section 9.0 in the report.

<u>Transportation Engineering Comments – EXP, Tim Kooistra (September 3, 2025):</u>

1. **Trip Generation.** Table 16 estimates the trip generation for the Gas Station and convenience store using ITE Manual Land Use Code 945 – Convenience Store/Gas Station, using the Vehicle Fueling Positions (VFP) Independent Variable. The Report uses a VFP value of 4. ITE identifies the VFP as "The number of vehicles that can be fueled simultaneously at a service station". Could the Consultant clarify if some or all of the gas pumps structures will be single or double sided? if so, a VFP between 5 and 8 would be present. In June 2020, Crozier conducted a study titled "Traffic Impact Study – 12476 Highway 50 Commercial Development" in the Town of Caledon, the Trip Generation for

the Gas station was calculated using the VFP of 8, although the site plan had 4 structures (islands) only. That separate study did mention that it is an 8-pump gas station.

Comment Acknowledged. Number of pumps identified in trip generation section of the TIS and Table 16 updated accordingly.

2. **McDonald's Drive-Through Stacking Analysis.** Section 8.5 of the report did compare the number of stacking spaces for the proposed McDonald's in comparison to the zoning by laws of Township of Guelph/Ermosa, Township of Centre Wellington and Town of Milton. The study does fall short of providing a stacking analysis to ensure that the proposed drive-through has sufficient stacking spaces. This study should also confirm that under nocircumstances would the drive-through queue ever extend back onto Wellington Road 46 (Brock Street). Proxy site data collection at two comparable McDonald's drive-throughs should be completed during the same time periods as the traffic data collection (6:30-9:30 AM; 4:00-7:00 PM). Two potential sites where the proxy drive-through stacking data could be collected are 1) 2410 Homer Watson Boulevard in Kitchener, Ontario and 2) 4 Sinclair Boulevard in Brantford, Ontario.

   Comment Acknowledged. See updated parking section with surrogate site and stacking survey results.

3. **Data Discrepancy in Synchro Table**: The overall volume-to-capacity ratios presented in the Synchro tables doesn't match the Appendices for all intersections. The consultant is required to review the presented tables and update accordingly.

   Comment Acknowledged. TIS Report updated and corrected.

4. **Appendix I Trip Generation**: Trip Generation sheets are not provided in Appendix I, please revise Appendix I to include them.

   Comment Acknowledged. Appendix I has been updated.

5. **Background Development**: The Consultant is required to clarify if the background development trips were included in the projected southbound and northbound volumes at the Brock Road South & Nicholas Beaver Road intersection.

   Comment Acknowledged. Volumes included in the projected volumes at the Brock Road South & Nicholas Beaver Road intersection.

6. **Sightline Analysis:** When looking at Streetview on McLean Road near the site access, there is a vertical curve that that may impact sightlines. Table 26presented the sightline analysis that was prepared for the site accesses. It showed that 145 metres is required for a right-turn from the site access to McLean Road. Figure 11 illustrates the sightlines for the two site accesses. However, the driver should be looking 145 meters to the east direction (looking left, towards Wellington Road 46) in order to determine if they are able to have clear visibility to conduct the right-turn. A left-turn movement would require 170 metres (and a driver would need to look to the east and west to ensure they have conducted the left-turn. It is recommended that field sightline analysis is undertaken to confirm that the vertical geometry does not create sightline issues is conducted.

Comment Acknowledged. Field visit was undertaken to check the sightlines along McLean Road and is noted in the updated sightline analysis section of the report.

Hydrogeological Comments – Harden Environmental Services Ltd, Stan Denhoed (August 2025) & Wellington Source Water Protection, Danielle Fisher (August 2025)

1. 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).

   Comment acknowledged.

2. Crozier (2025b) 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.

   Comment acknowledged.

3. The proposed treatment level of 3.0 mg/L of nitrate or less is not easy to achieve and given the location of the septic system at the downgradient boundary of the site, there may well be impacts off-site. The overall development of this site may be too ambitious given the hydrogeological setting (high water table) and limited dilution for the effluent.

   The Site Plan has been adjusted to allow for a slightly larger dilution area for the leaching bed. Refer to Figure 9 in the Hydrogeological Investigation Report. The design of the Type A dispersal bed meets the minimum separation distance to the seasonally high groundwater per the Ontario Building Code (600mm from the bottom of the distribution piping).

   We agree that treating to 3.0 mg/L of nitrate or less is challenging, but there are wastewater treatment technologies that can meet these low levels, including Waterloo Biofilter treatment systems. As noted in Comment 2, an ECA for this sewage system will be required and the MECP will review the proposed effluent criteria, treatment system technology, and required monitoring plan. The monitoring plan could include installation of monitoring wells downgradient of the leaching bed and regular groundwater monitoring to ensure there are no offsite impacts. As noted in Section 8.3 of the Hydrogeological Investigation Report, there are no water supply wells downgradient of the leaching bed.

4. Shallow groundwater was identified at the western portion of the site, with static groundwater levels less than 0.5 m below existing grade recorded in the spring of the year (MW4-23 and MW5-23). 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.

Comment acknowledged. The design of the Type A dispersal bed meets the minimum separation distance to the seasonally high groundwater per the Ontario Building Code (600mm from the bottom of the distribution piping).

5. Given the significant fluctuation observed in the groundwater hydrographs and groundwater levels in all three hydrographs observed with 0.5 m of existing grade in springtime, the potential for high groundwater levels across the site should be considered in the design of subsurface infrastructure for the property.

   Comment acknowledged, seasonally high groundwater conditions are identified and should be considered for design purposes.

6. Section 7.0 of the hydrogeological report (Crozier, 2025a) 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.

   Comment acknowledged.

7. 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, 2025a) indicates that 6 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.

   Comment acknowledged.

8. Section 3.0 of the hydrogeological report (Crozier, 2025a) 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.

   Crozier acknowledges that the Site is located in a draft WHPA-Q. Specific source protection policy will be addressed during the SPA process.

9. The water balance precipitation rates in the text do not match with the precipitation in the appendix (Crozier 2025a).

   Comment addressed, appendix updated.

10. The proposed LID measures will only be able to infiltrate approximately 10% of the estimated deficit of groundwater recharge. There will need to be further discussions with Source Water Protection to determine if this can be accommodated within the Source Water Protection plan for this area.

    Comment acknowledged, LID measures will be further discussed in the SPA process.

11. 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.

    Comment acknowledged.

12. It should be noted that the 'Activities of Concern for Source Water Protection' are briefly discussed in the report mentioned. Please provide more detailed plans/procedures as requested in Conditions 1. and 2. above. Please ensure the spill response procedure discusses the procedure for both small and large fuel spills.

    Crozier acknowledges that the Site is located in a draft WHPA-Q and SGRA. Specific source protection policies (ex. Winter Maintenance Plan, Spill Response Procedure Plan) will be addressed during the SPA process.

13. Reprotection policy ability, the mentioned report indicates that there are no specific policies that apply as it relates to Source Water Protection. As noted, the site is located within a Significant Groundwater Recharge Area, and it is also located within a draft Wellhead Protection Area for Quantity. Although the WHPA-Q is still in draft form, once approved, there will be legally binding policies that will apply. As noted by the Township Hydrogeologist, we also strongly recommended that the WHPA-Q policies listed in the Grand River Source Protection Plan be adhered to as part of this development. Please discuss these policies and how they will be implemented, during the Site Plan process.

    Crozier acknowledges that the Site is located in a draft WHPA-Q and SGRA. Specific source protection policies (ex. Winter Maintenance Plan, Spill Response Procedure Plan) will be addressed during the SPA process.

Civil Engineering Comments – GEI Consultants, Andrea Reed (October 2025)

1. Please provide a storm sewer design sheet for all on-site storm sewer. Please demonstrate that the storm sewer is able to convey the 100-year design storm, as the underground storage tank is sized for the 100-year event.

   A storm sewer design sheet has been prepared and storm sewers have been sized to convey the 5-year design storm as per Township of Puslinch standards. Flows exceeding the capacity of the pipe will be conveyed overland towards the CBs on top of the tank which have adequate inlet capacity to drain the flows from the 100-year design storm into the tank. Refer to detailed calculations provided in Appendix E.

2. Please ensure that the Regional event (Hurricane Hazel) can be conveyed safely to the proposed major storm outlets.

The Regional event will be conveyed off our site and will follow the proposed emergency overland flow route outlined on the proposed grading plan (drawings C102). Refer to section 8.3.2 of the report for more information about the conveyance of the regional event.

3. The report indicates that design of the wastewater treatment system will be completed during detailed design systems. Please provide this design for future site plan submissions.

   Comment acknowledged.

4. Prior to site plan approval, written permission should be obtained from the Owner of the Wheel King Trans Haul Inc. Site (7434 McLean Road West) for discharge of post-development stormwater to the property from catchment 201.

   Letter to neighbouring property has been provided to Owner. Property Owner to provide letter of approval prior to site plan approval.

5. Please provide the Geotechnical Report prepared by CMT and dated July 2023.

   Comment acknowledged.

6. The times to peak in Tables 6 and 7, and used in the Visual OTTHYMO model, do not match those calculated using the Airport Method in Appendix E.

   Inconsistencies have been addressed in the report and Appendix E. Note a minimum time to peak of 10 minutes (0.17 hrs) was used in the model.

7. There are some discrepancies between the Curve Numbers outlined in the report and those used in the Visual OTTHYMO model.

   Comment Acknowledged. Curve Numbers have been updated for consistency. Please note that CN values are converted to CN* values as per typical practice within southern Ontario. This results in slightly different CN values in the model than what is represented in the report.

8. The curve number for catchment 203 in Table 7 should be 69 not 59.

   Comment Acknowledged.

9. The number of units in row 1 of Table 3 should be 235 not 238.

   Comment Acknowledged.

10. The total flows in Table 3 sum to 19,475 L/day and not 18,300 L/day.

    Please note the or in row 1. The total flow includes the largest of the two flows per the Ontario Building Code.

11. Section 3.0 could be updated to reference additional groundwater measurements taken since April 2023.

    Updates provided to Section 3.0. Refer to the Hydrogeological Investigation Report for additional details and analyses regarding onsite hydrogeological conditions.

12. The first paragraph of Section 8.3 references an infiltration deficit of 1935 m^3/year and 62 mm/year. These values should be 1985 m^3/year and 123 mm/year. The text in the Hydrogeological Report should also be updated. All tables appear to be up to date.

    Comment Acknowledged.

13. Sizing and details of the Jellyfish unit should be provided for future site plan submissions.

    Comment Acknowledged. Jellyfish unit to be sized at detailed design.

14. The County should confirm what additional protections are needed for the roadside ditches during construction.

    Comment Acknowledged.

15. Please provide details for the infiltration gallery on the Site Servicing Plan, including elevations and depth to seasonal high groundwater level.

    Comment Acknowledged. Please refer to the servicing and grading plans (Drawings C102 and C103) for details on the proposed infiltration gallery including elevations and groundwater separation.

16. The vehicle maneuvering analysis for waste collection does not appear to show the correct garbage pickup location. Please update.

    Comment Acknowledged. See updated maneuvering diagrams.

17. Please show details for the barrier free spaces, including tactile plates, signage and appropriate grades from parking spaces to building entrance.

    Comment Acknowledged. Tactile plates, signage and detailed grading will be provided at detailed design stage.

18. Please increase the size of the driveway culvert to at least 400 mm diameter, per Township standards.

    Comment Acknowledged.

19. Please add a section to the report to discuss required ongoing maintenance of stormwater management infrastructure, including required frequency of inspection and maintenance tasks.

    Comment Acknowledged. Operation and maintenance section of SWM tank and Jellyfish unit will be provided at detailed design.

Should you have any questions or require any further information, please do not hesitate to contact the undersigned.

Sincerely,

C.F. CROZIER & ASSOCIATES INC.

[redacted]

Cole Martin
Engineering Intern, Land Development

C.F. CROZIER & ASSOCIATES INC.

[redacted]

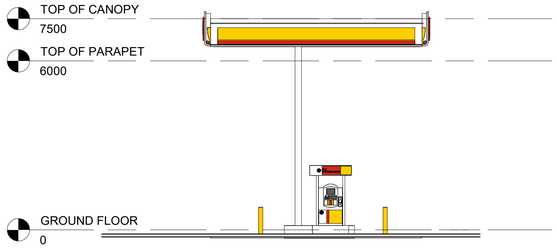
Ian Lindley, P.Eng.
Project Engineer, Transportation

C.F. CROZIER & ASSOCIATES INC.

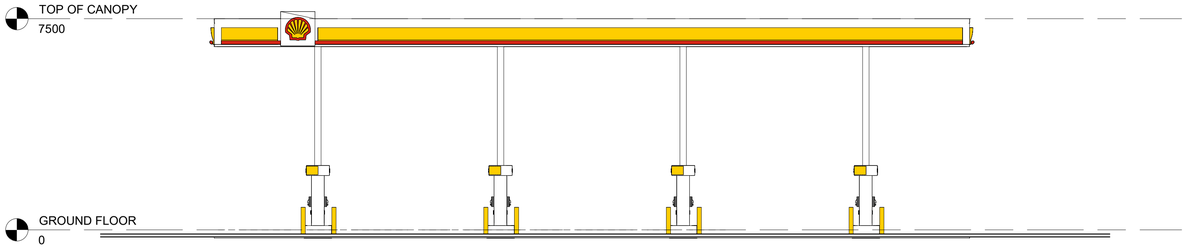
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Jessica Doherty, P.Eng.
Project Manager, Land Development

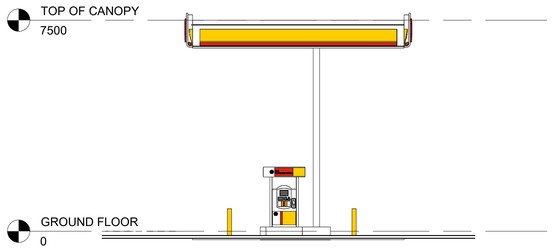
RICHARD ZIEGLER ARCHITECT INC.
39 POLSON STREET TORONTO, ONTARIO M5A 1A4
T: 416 461 1494 or 1 800 413 7992 F: 866 895 1488
www.rzarchitect.com E: mail @ rzarchitect.com



4 / A204 **GAS BAR - EAST ELEVATION**
1 : 100



3 / A204 **GAS BAR - NORTH ELEVATION**
1 : 100



2 / A204 **GAS BAR -WEST ELEVATION**
1 : 100



1 / A204 **GAS BAR - SOUTH ELEVATION**
1 : 100

NO.	ISSUANCE	DATE
2	REV. & ISSUED FOR PLANNING APPROVALS	2026.02.11
1	ISSUED FOR PLANNING APPROVALS	2025.08.05

THE GENERAL CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECT. DO NOT SCALE THE DRAWINGS. DO NOT USE THIS DRAWING FOR CONSTRUCTION UNLESS SIGNED AND SEALED BY THE ARCHITECT.

NORTH

STAMP

ONTARIO ASSOCIATION OF ARCHITECTS
[redacted]
RICHARD E. ZIEGLER
LICENCE
4462

PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

ELEVATIONS - CAR GAS PUMPS

SCALE	1 : 100	PROJECT NUMBER
DATE	2026-02-11 8:38:59 AM	202436
DRAWN	SP	
CHECKED	REZ	

SHEET A204 REVISION

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PLOT DATE: 2026-02-11 8:38:59 AM



3 / A202 **NORTH ELEV. @ RESTAURANT**

1 : 75



4 / A202 **SOUTH ELEV. @ RESTAURANT**

1 : 75



2 / A202 **WEST ELEV. @ RESTAURANT**

1 : 75



1 / A202 **EAST ELEV. @ RESTAURANT**

1 : 75

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MATERIAL LEGEND

1	GREY CORRUGATED METAL
2	GREY STONE
3	WOOD-LOOK HARDIE BOARD
4	CLEAR ANODIZED STOREFRONT FRAMING
5	GLASS
6	SILVER CLEAR ANODIZED ACM
7	RED ACM

NO.	ISSUANCE	DATE
2	REV. & ISSUED FOR PLANNING APPROVALS	2026.02.11
1	ISSUED FOR PLANNING APPROVALS	2025.08.05

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ONTARIO ASSOCIATION OF ARCHITECTS [redacted] LICENCE 4462

PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

ELEVATIONS - RESTAURANT

SCALE	As indicated	PROJECT NUMBER
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CHECKED	REZ	

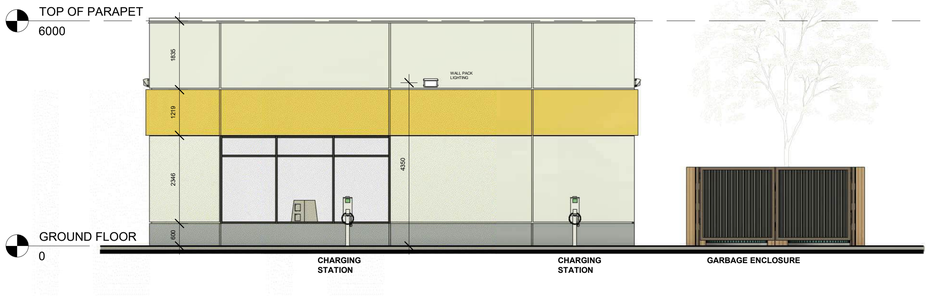
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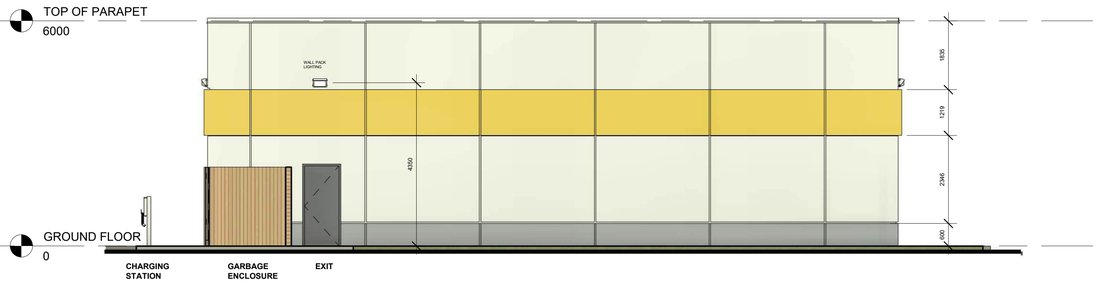
RICHARD ZIEGLER ARCHITECT INC.
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MATERIAL LEGEND

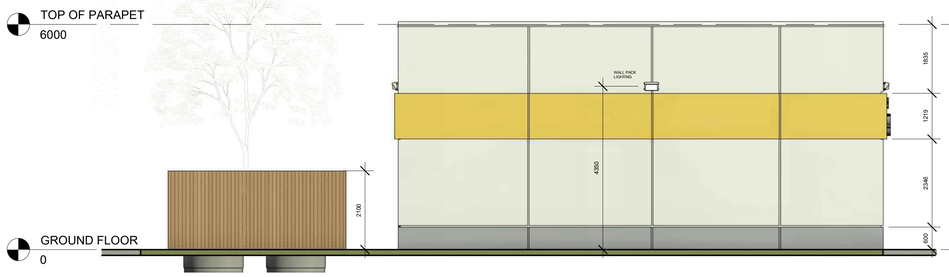
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3		GREY ACM
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5		GLASS



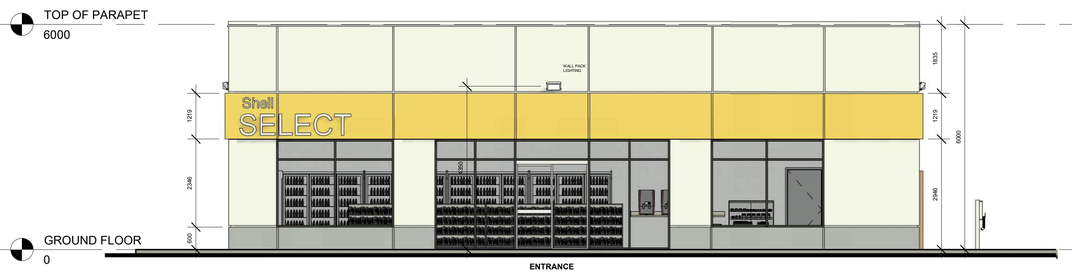
4 A201 **CONVENIENCE STORE - EAST ELEVATION**
1 : 75



2 A201 **CONVENIENCE STORE - NORTH ELEVATION**
1 : 75



3 A201 **CONVENIENCE STORE - WEST ELEVATION**
1 : 75



1 A201 **CONVENIENCE STORE - SOUTH ELEVATION**
1 : 75

NO.	ISSUANCE	DATE
1	REV. & ISSUED FOR PLANNING APPROVALS	2026.02.11

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ONTARIO ASSOCIATION OF ARCHITECTS
[redacted]
RICHARD E. ZIEGLER
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4462

PROPOSED COMMERCIAL DEVELOPMENT

7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
TOWN OF PUSLINCH

ELEVATIONS - CONVENIENCE STORE

SCALE	As indicated	PROJECT NUMBER
DATE	2026-02-11 8:38:53 AM	202436
DRAWN	SP	
CHECKED	REZ	
SHEET		REVISION

A201

FILE NAME: Y:\2024 Projects\202436 - 7456 McLeane Road, Puslinch\2.0 Design and Construction Documents Phase\Revit\7456 McLeane Road 2026.02.09.rvt
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