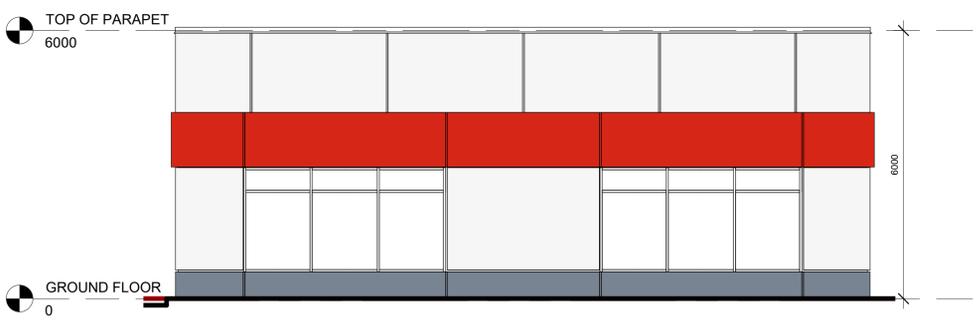
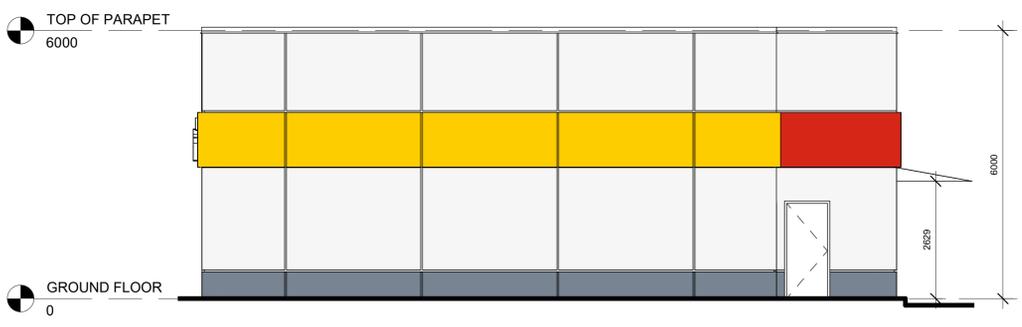


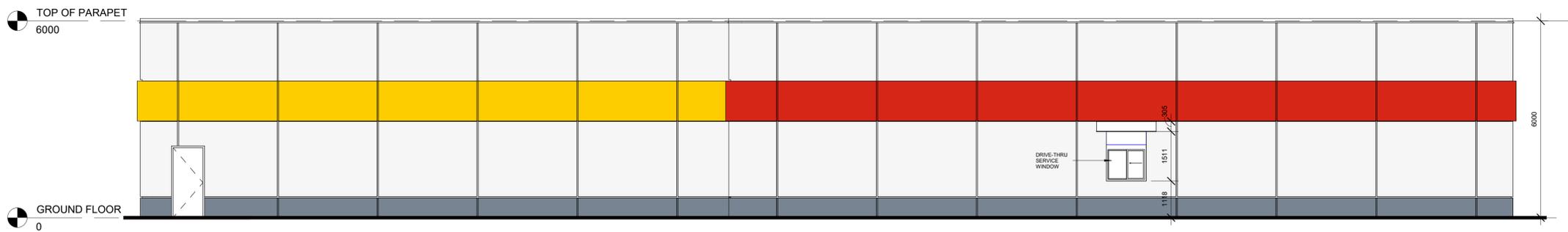
RICHARD ZIEGLER ARCHITECT INC.
 39 POLSON STREET TORONTO, ONTARIO M5A 1A4
 T: 416 461 1494 or 1 800 413 7992 F: 866 895 1488
 www.rzarchitect.com E: mail @ rzarchitect.com



4 SOUTH ELEVATION
 A201 1:75



3 NORTH ELEVATION
 A201 1:75



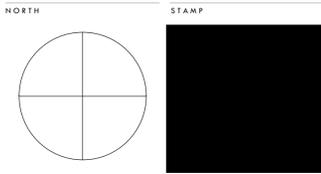
1 WEST ELEVATION
 A201 1:75



2 EAST ELEVATION
 A201 1:75

NO.	ISSUANCE	DATE
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.



PROPOSED COMMERCIAL DEVELOPMENT

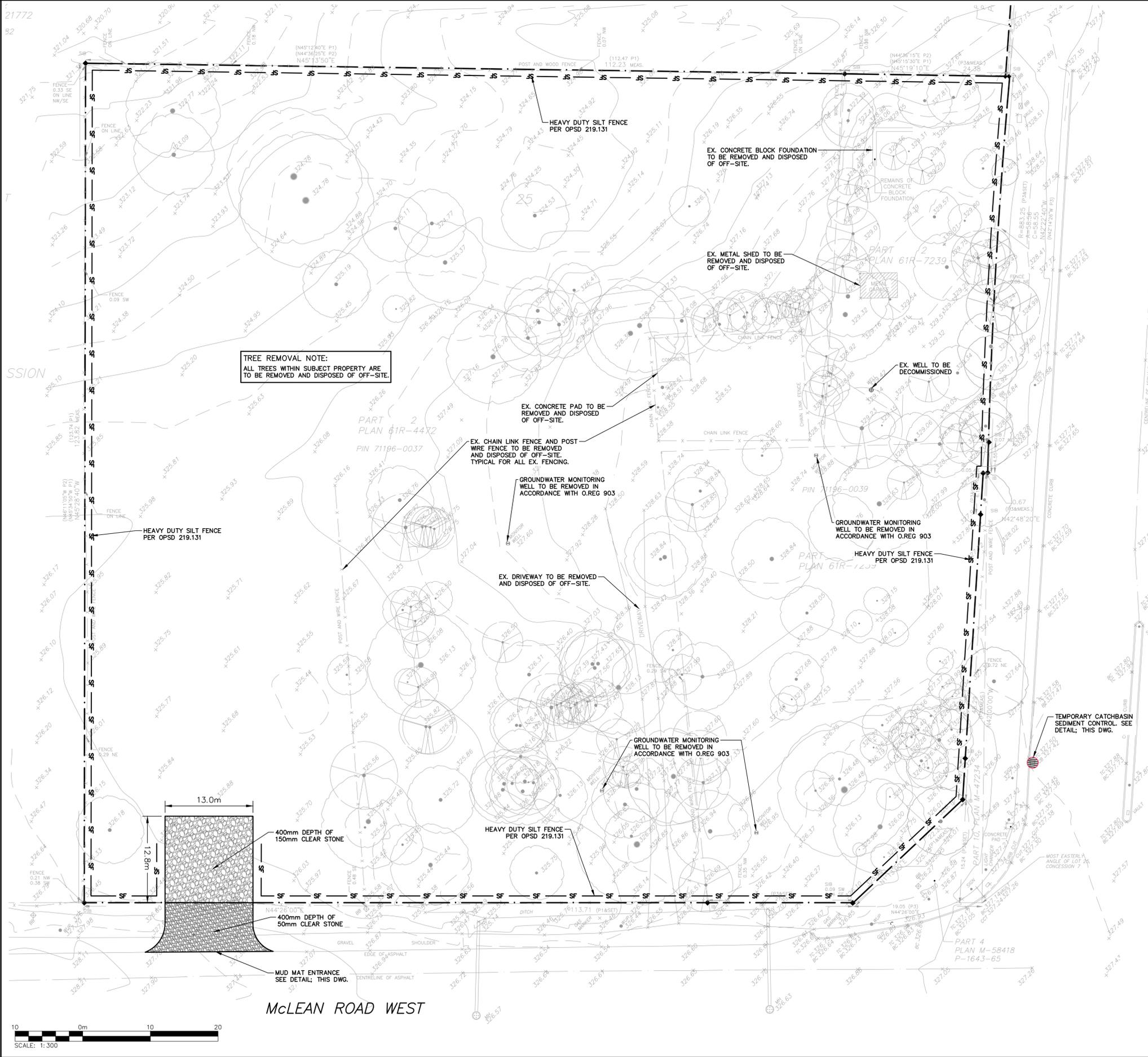
7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
 TOWN OF PUSLINCH

ELEVATIONS

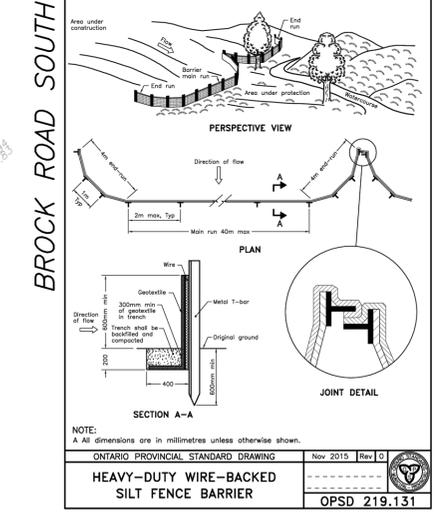
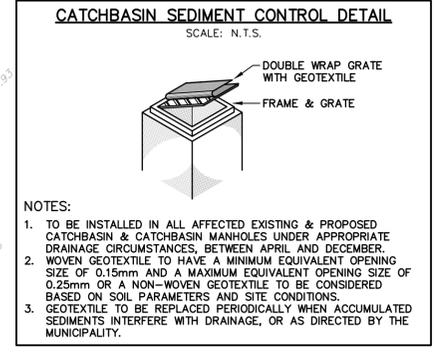
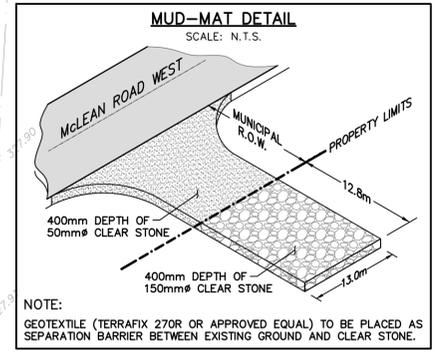
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DATE	2025-08-05 9:52:49 AM	202436
DRAWN	SP	
CHECKED	REZ	
SHEET		REVISION

A201

FILE NAME: Y:\2024\Projects\2024-06-7456 McLean Road_Puslinch\2D Design and Construction Documents\Plan\Plan\7456 McLean Road_20241110.dwg
 PLOT DATE: 2025-08-05 9:52:49 AM



TREE REMOVAL NOTE:
ALL TREES WITHIN SUBJECT PROPERTY ARE TO BE REMOVED AND DISPOSED OF OFF-SITE.



EROSION & SEDIMENT CONTROL NOTES:

- EROSION & SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
- 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.
- EXISTING AND PROPOSED CATCHBASINS ARE TO BE PROTECTED WITH FILTER CLOTH AND 150mm OF 50mm STONE COVER DURING CONSTRUCTION.
- IT IS REQUIRED TO STABILIZE ALL AREAS THAT WILL REMAIN DISTURBED FOR MORE THAN 30 DAYS.
- 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/MM/DD
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 CGVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.592

BEARING NOTE:
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPT COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC. DATED: NOV. 14, 2024 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.
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Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWNSHIP OF PUSLINCH

Drawing
PRELIMINARY EROSION, SEDIMENT CONTROL AND REMOVALS PLAN

NOT FOR CONSTRUCTION

Stamp	Stamp
Drawn	M.I.M.
Design	B.W.
Check	S.C.
Project No.	2792-7289
Scale	1:300
Dwg.	C 101

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

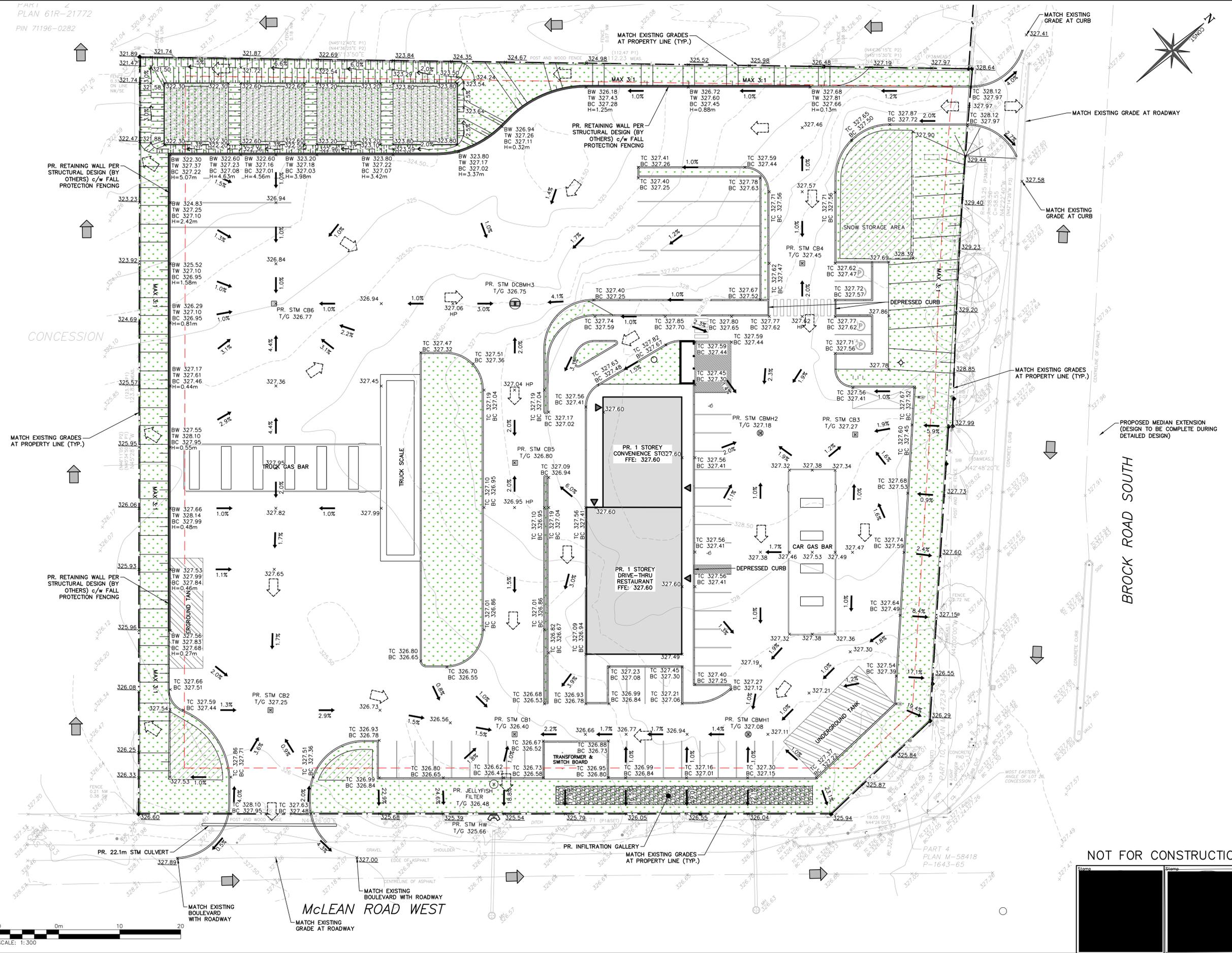


McLEAN ROAD WEST



LEGEND

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



No.	ISSUE / REVISION	YYYY/MM/DD
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:
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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-SRPR1 COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
 DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC. DATED: NOV. 14, 2024. DRAWING No. A101

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

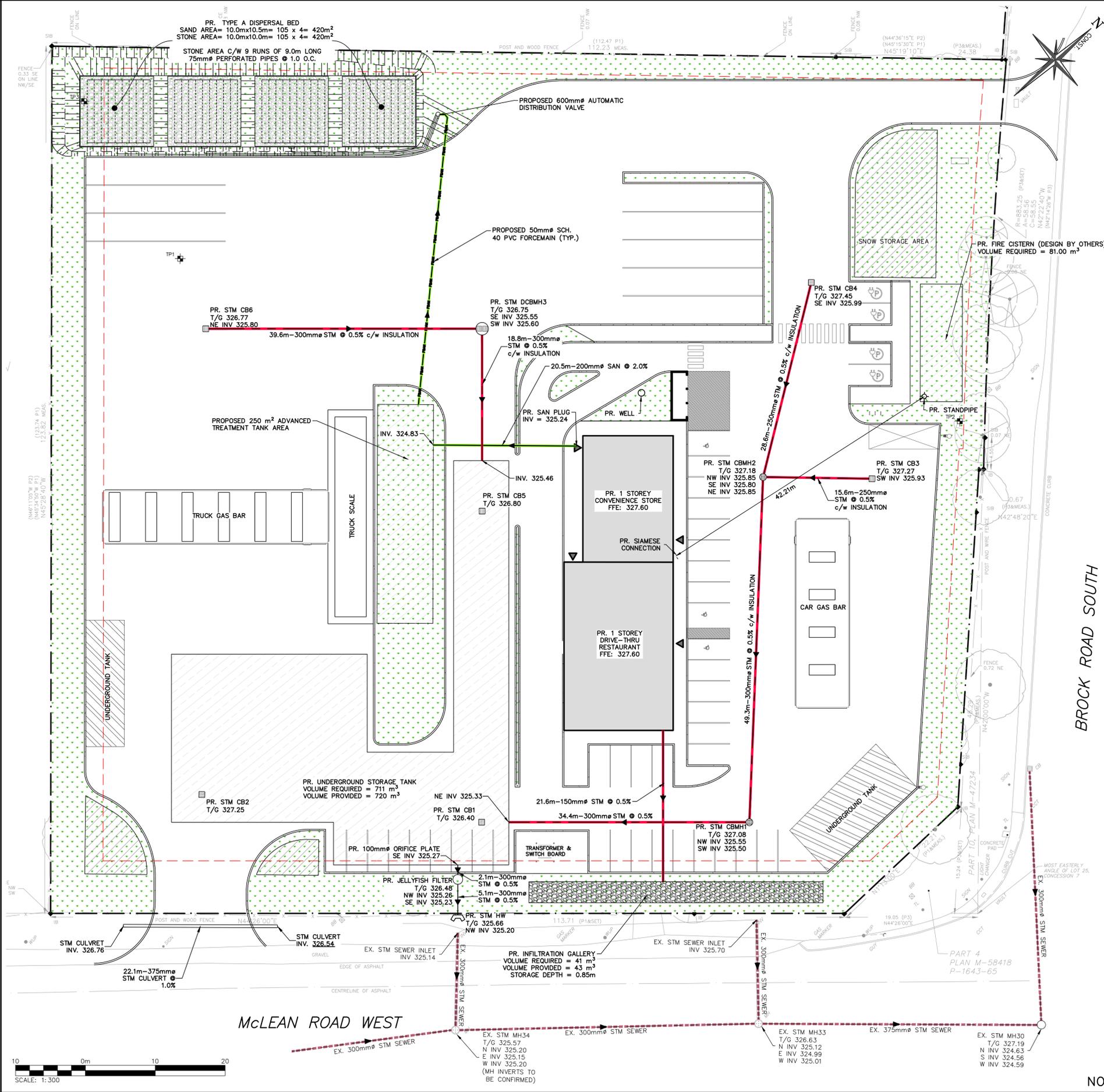
Drawing
PRELIMINARY SITE GRADING PLAN

NOT FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS
 2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

Drawn	M.I.M.	Design	B.W.	Project No.	2792-7289
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 102





SEWAGE SYSTEM NOTES

- PROPOSED SEWAGE SYSTEM CONSTRUCTION TO BE UNDERTAKEN IN ACCORDANCE WITH THE ONTARIO BUILDING CODE, ONTARIO MINISTRY OF ENVIRONMENT, AND THE MANUFACTURER'S RECOMMENDATIONS.
- INSTALLATION OF ALL COMPONENTS OF THE SEWAGE SYSTEM TO BE COMPLETED BY A LICENSED AND REGISTERED ON-SITE SEWAGE SYSTEM INSTALLER IN THE PROVINCE OF ONTARIO.
- THE CONTRACTOR SHALL COORDINATE AND PAY FOR ALL NECESSARY INSPECTIONS WITH THE TOWN AND OTHER AUTHORITIES PERTAINING TO THE INSTALLATION OF THEIR WORK.
- CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES AND EXISTING SEWER WORKS PRIOR TO CONSTRUCTION.
- ALL COMPONENT LOCATIONS SHALL BE FIELD VERIFIED WITH THE ENGINEER PRIOR TO INSTALLATION.
- ALL EARTHWORKS, INCLUDING PLACEMENT OF FILL ARE TO BE UNDERTAKEN WITH TRACK MOUNTED EQUIPMENT TO KEEP COMPACTION TO A MINIMUM. KEEP ALL TRAFFIC IN THE AREA OF THE PROPOSED LEACHING BED TO A MINIMUM.
- ALL TOPSOIL AND ORGANICS TO BE REMOVED FROM LEACHING BED AREA.
- IF HIGH GROUNDWATER CONDITIONS ARE EVIDENT AT THE TIME OF CONSTRUCTION, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY. ALL VERTICAL CLEARANCE DISTANCES AS REQUIRED BY THE ONTARIO BUILDING CODE MUST BE MAINTAINED.
- GRAVITY SEWERS TO HAVE MINIMUM 0.6 M COVER AND SHALL BE INSULATED WHERE LESS THAN 1.2M 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 CPSS.
- UNLESS OTHERWISE NOTED PE FORCEMAIN TO BE HDPE SERIES 100 OR DR 13.5 PE AND PVC FORCEMAIN TO BE SCHEDULE 40. GRAVITY SEWERS TO BE SDR-35. FORCE MAIN TO BE PROVIDED WITH TRACER WIRE, SECURED TO THE TOP OF THE PIPE WITH WATER PROOF TAPE OR ZIP TIES.
- ALL PIPES SUBJECT TO VEHICULAR TRAFFIC SHALL BE ADEQUATELY PROTECTED.
- ALL METAL IN TANKS OR PUMP CHAMBERS TO BE GALVANIZED OR STAINLESS STEEL.
- ALL JOINTS BELOW THE HIGH WATER LEVEL IN PRECAST TANKS TO BE SEALED WITH MASTIC SEALANT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS FOR WATER TIGHT SEAL. ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH CAST IN RUBBER BOOT FOR WATER TIGHT SEAL. UNLESS OTHERWISE NOTED ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH TEES.
- ALL TANKS TO BE PROVIDED WITH PRECAST CONCRETE OR PVC ACCESS RISERS TO GRADE. HATCHES TO BE BOLTED AND CASKETS AND ACCESSIBLE AT GRADE. ALL CIRCULAR HATCHES TO BE 600 MM DIAMETER POLYKOR RISER WITH CAST IN ADAPTOR. ALL SQUARE ACCESS OPENINGS TO BE EQUIPPED WITH CONCRETE RISERS. VENTED HATCHES TO BE PROVIDED ON TANKS CONTAINING PUMPS.
- A TANK SHALL NOT BE COVERED BY SOIL OR LEACHING BED FILL HAVING A DEPTH GREATER THAN THE MAXIMUM DEPTH OF BURIAL THAT THE TANK IS DESIGNED TO WITHSTAND.
- EXISTING SOILS SHALL BE SCARIFIED AT A RIGHT ANGLE TO THE DIRECTION OF LATERAL SEWAGE FLOW IN THE LEACHING BED PRIOR TO IMPORTING FILL OR INSTALLING DISTRIBUTION PIPE STONE LAYER.
- WHEN THE IMPORTATION OF FILL IS REQUIRED, FILL SHOULD BE END-DUMPED AND GRADED PROGRESSIVELY OVER THE PREPARED SITE AREA WITH TRACK MOUNTED EQUIPMENT.
- ALL ELEVATIONS TO BE VERIFIED PRIOR TO BACKFILL.
- ALL FILL MATERIAL PLACED BENEATH TANKS TO BE COMPACTED TO 95%.
- ALL DISTURBED AREAS TO BE TOPSOILED (100MM MINIMUM) AND SEEDING COMPLETE WITH FERTILIZER AND MULCH IN ACCORDANCE WITH CPSS.
- THE INSTALLING CONTRACTOR SHALL INSTALL THE SEWAGE SYSTEM USING A TRANSIT/LEVEL AND SHALL PROVIDE SAME FOR INSPECTION OF ANY COMPONENT.
- UNLESS OTHERWISE NOTED, ALL LEVEL IV TREATMENT UNITS SHALL BE PROVIDED FROM A MANUFACTURER THAT IS CERTIFIED BY CAN/BNO 3680-600 TO PROVIDE A LEVEL OF TREATMENT IN ACCORDANCE WITH OBC TABLE 8.6.2.2 PROVIDING AN EFFLUENT CRITERIA OF 10mg/L SUSPENDED SOLIDS, AND 10mg/L OF COBODS.
- ALL TREATMENT UNITS THAT CONTAIN MECHANICAL COMPONENTS SHALL BE EQUIPPED WITH AN AUDIBLE AND VISUAL WARNING ALARM, LOCATED TO WARN THE OCCUPANTS OF THE BUILDING SERVED OR THE OPERATOR OF THE TREATMENT UNIT OF A MALFUNCTION IN THE OPERATION OF THE TREATMENT UNIT.
- THE CONTRACTOR WILL ENSURE THAT EVERY OPERATOR OF A TREATMENT UNIT SHALL OBTAIN, FROM THE MANUFACTURER OR DISTRIBUTOR OF THE TREATMENT UNIT, LITERATURE THAT DESCRIBES THE UNIT IN DETAIL AND PROVIDES COMPLETE INSTRUCTIONS REGARDING THE OPERATION, SERVICING, AND MAINTENANCE REQUIREMENTS OF THE UNIT AND ITS RELATED COMPONENTS NECESSARY TO ENSURE THE CONTINUED PROPER OPERATION IN ACCORDANCE WITH THE ORIGINAL DESIGN AND SPECIFICATIONS.
- ALL IMPORTED SAND FILL TO HAVE A T-TIME OF 6 TO 10 MIN/CM AND A SILT/CLAY CONTENT OF NO MORE THAN 5% AND SHALL BE VERIFIED IN WRITING BY A SOIL TESTING FIRM AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT.
- SEWAGE SYSTEM HAS BEEN DESIGNED TO RECEIVE DOMESTIC STRENGTH WASTEWATER. ALL SANITARY WASTEWATER FROM THE BUILDINGS MUST MEET THE APPLICABLE SEWER USE BYLAW LIMITS PRIOR TO DISCHARGE TO ADVANCED TREATMENT SYSTEM.



LEGEND

	PROPERTY LINE
	EXISTING STORM SEWER & MANHOLE
	EXISTING SINGLE / DOUBLE CATCHBASIN
	PROPOSED WATERMAIN & GATE VALVE
	PROPOSED STANDPIPE
	PROPOSED SIAMSE CONNECTION
	PROPOSED WELL
	PROPOSED STORM SEWER & MANHOLE
	PROPOSED SINGLE / DOUBLE CATCHBASIN
	PROPOSED SANITARY SEWER
	PROPOSED SANITARY FORCEMAIN
	TEST PIT LOCATION

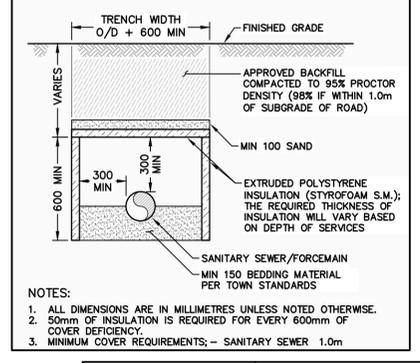
SWM TANK SECTION
SCALE: N.T.S.

GROUND SURFACE=326.40
TOP OF TANK=325.80
BOTTOM OF TANK=325.27
GROUNDWATER=324.19

ON-SITE SEWAGE DESIGN

DAILY DESIGN FLOW REFER TO FSR REPORT FOR DETAILS	TOTAL DESIGN FLOW = 20,000 L/DAY
ADVANCED TREATMENT SYSTEM	TO BE DETERMINED DURING DETAILED DESIGN
SOIL PERCOLATION RATE	T = 15 min/cm (DETERMINED BY C.F. CROZIER)
TYPE A DISPERSAL BED STONE AREA	Q/50 = 20,000/50 REQUIRED = 400 m ² PROVIDED = 420 m ²
TYPE A DISPERSAL BED SAND AREA	QT/850 = 20,000*15/850 REQUIRED = 352 m ² PROVIDED = 420 m ²

INSULATION FOR SHALLOW SANITARY SERVICES
SCALE: N.T.S.



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/MM/DD

ELEVATION NOTE:
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BEARING NOTE:
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SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPR7 COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC. DATED: NOV. 14, 2024 DRAWING No. A101

DRAWING NOTES:
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Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWNSHIP OF PUSLINC

Drawing
PRELIMINARY SITE SERVICING PLAN

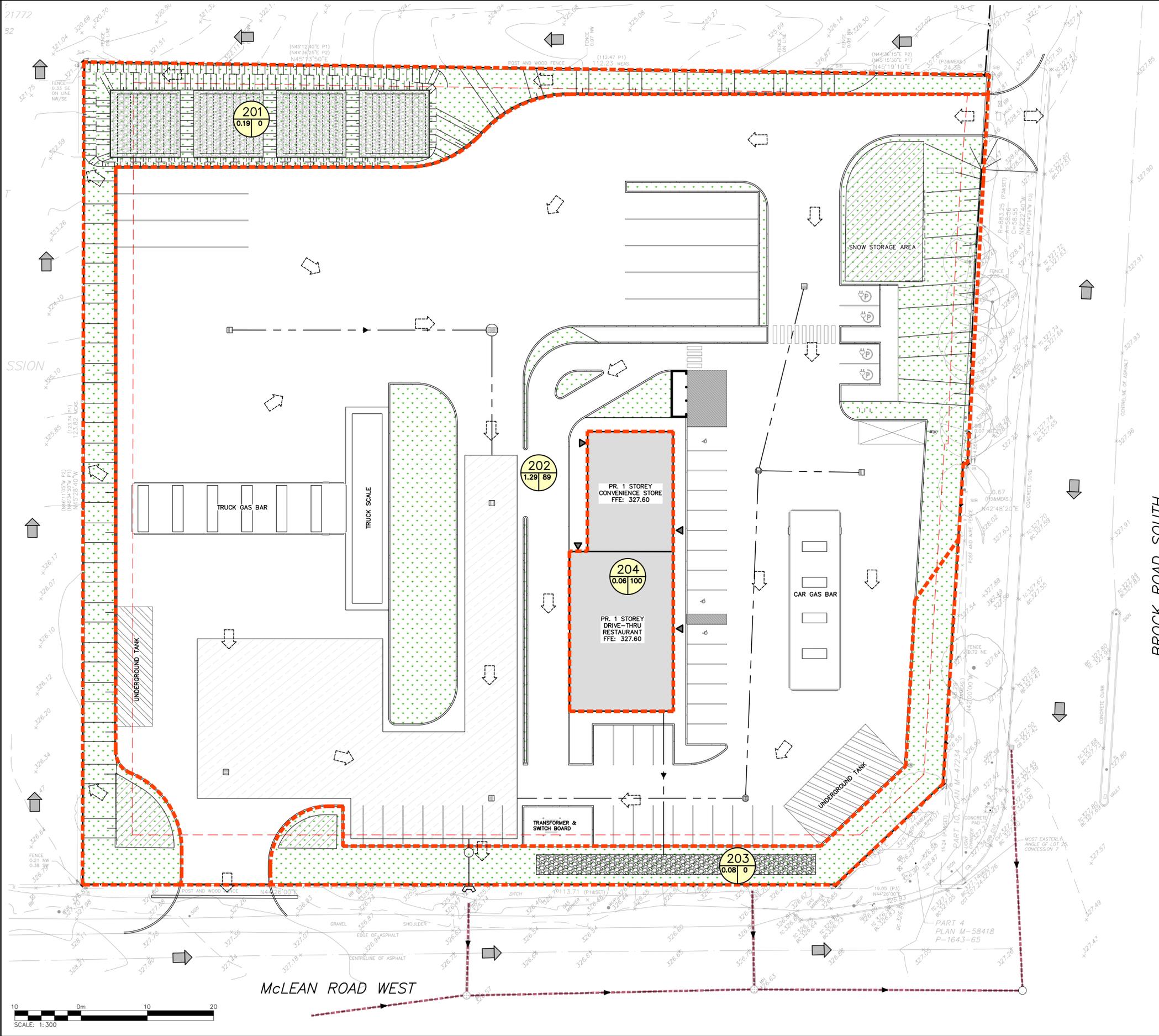
CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

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

NOT FOR CONSTRUCTION



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LEGEND

- PROPERTY LINE
- - - EXISTING CONTOUR (0.5m)
- - - EXISTING CONTOUR (1.0m)
- EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED OVERLAND FLOW DIRECTION
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- POST-DEVELOPMENT CATCHMENT AREA
- ID
- AREA (ha) | % IMPERVIOUSNESS

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/MM/DD

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BEARING NOTE:
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SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED.
PROJECT FILE No. 9625-SRPR
COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC.
DATED: NOV. 14, 2024
DRAWING No. A101

DRAWING NOTES:
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Project
**7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH**

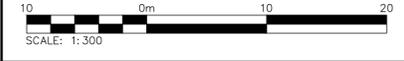
Drawing
**PRELIMINARY POST-DEVELOPMENT
DRAINAGE PLAN**

NOT FOR CONSTRUCTION



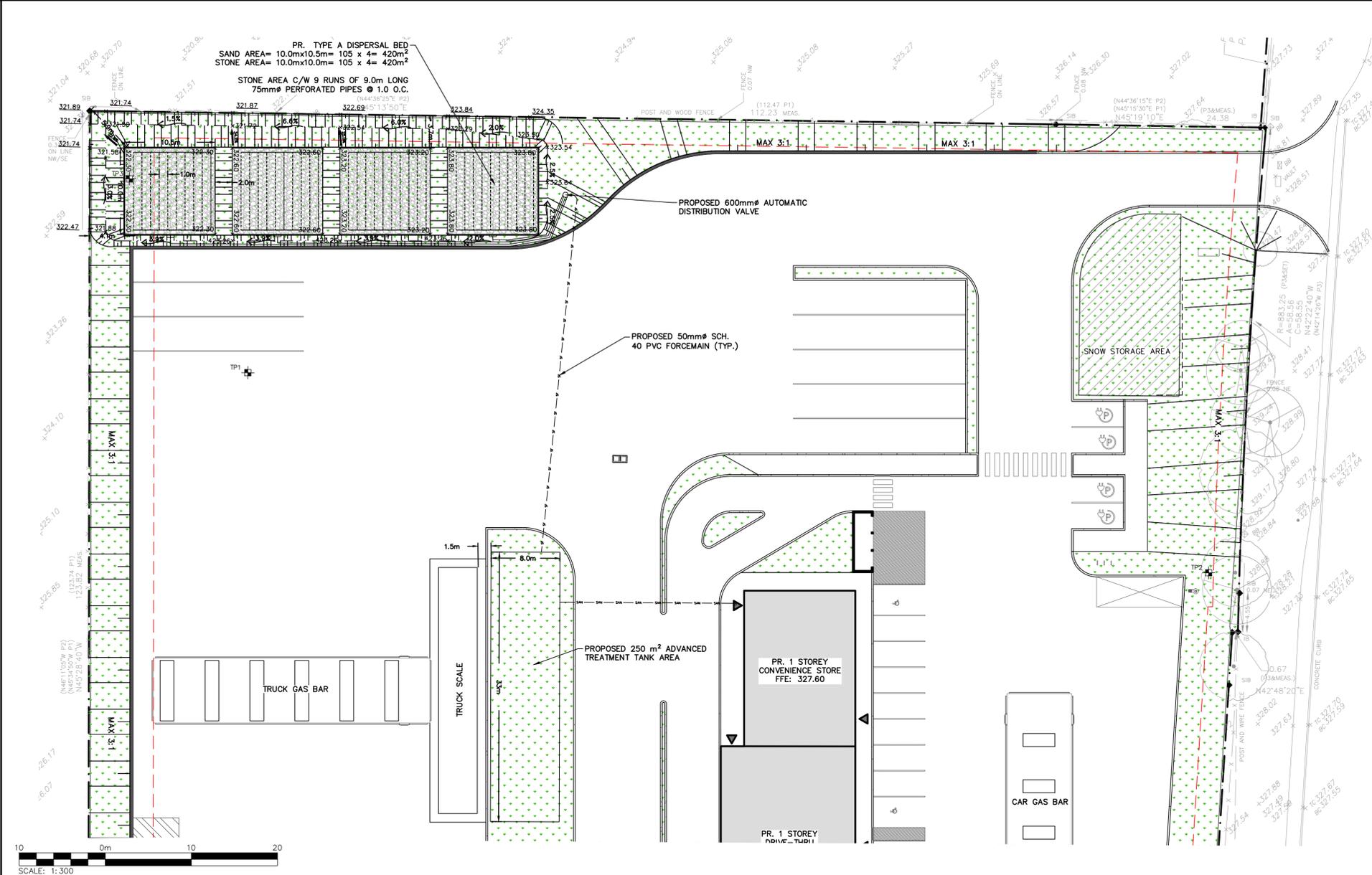
CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

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



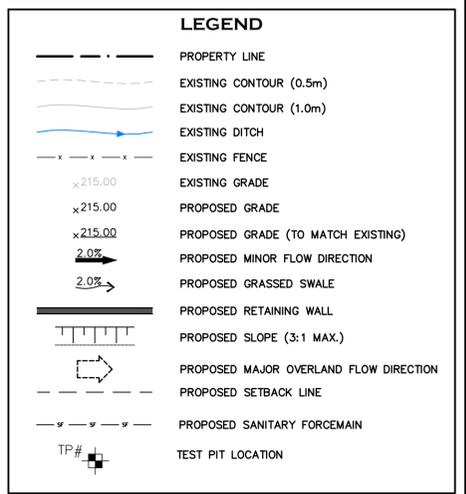
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SEWAGE SYSTEM NOTES

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 1.0M COVER IS PROVIDED. FORCEMAIN SHALL BE INSULATED WHERE LESS THAN 1.5 M COVER IS PROVIDED. BEDDING, COVER AND BACKFILL TO BE IN ACCORDANCE WITH OPSS.
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 GALVANIZED 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% COMPLETE WITH FERTILIZER AND MULCH IN ACCORDANCE WITH OPSS.
20. THE INSTALLING CONTRACTOR SHALL INSTALL THE SEWAGE SYSTEM USING A TRANSIT/LEVEL AND SHALL PROVIDE SAME FOR INSPECTION OF ANY COMPONENT.
21. UNLESS OTHERWISE NOTED, ALL LEVEL IV TREATMENT UNITS SHALL BE PROVIDED FROM A MANUFACTURER THAT IS CERTIFIED BY CAN/BNQ 3680-600 TO PROVIDE A LEVEL OF TREATMENT IN ACCORDANCE WITH OBC TABLE 8.6.2.2 PROVIDING AN EFFLUENT CRITERIA OF 10mg/L SUSPENDED SOLIDS, AND 10mg/L OF CBOD5.
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.



No.	ISSUE / REVISION	DATE
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 CGVD2028.78, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.52.

BEARING NOTE:
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPR1 COMPLETED OCTOBER 20, 2022

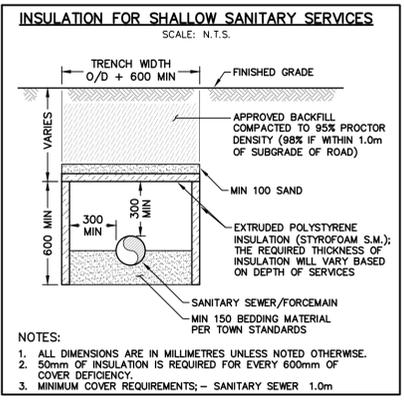
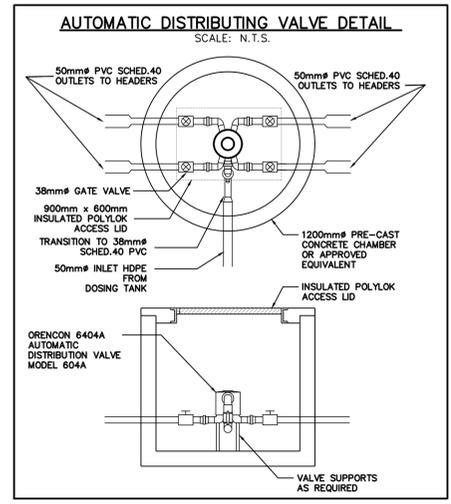
SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC. DATED: NOV. 14, 2024 DRAWING No. A101

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.

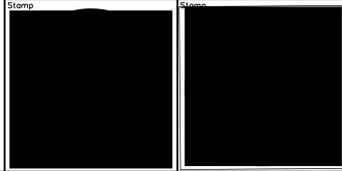
Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWNSHIP OF PUSLINCH

Drawing
ONSITE SEWAGE SYSTEM DESIGN

ON-SITE SEWAGE DESIGN	
DAILY DESIGN FLOW REFER TO FSR REPORT FOR DETAILS	TOTAL DESIGN FLOW = 20,000 L/DAY
ADVANCED TREATMENT SYSTEM	TO BE DETERMINED DURING DETAILED DESIGN
SOIL PERCOLATION RATE	T = 15 min/cm (DETERMINED BY C.F. CROZIER)
TYPE A DISPERSAL BED STONE AREA	Q/50 = 20,000/50 REQUIRED = 400 m ² PROVIDED = 420 m ²
TYPE A DISPERSAL BED SAND AREA	QT/850 = 20,000*15/850 REQUIRED = 352 m ² PROVIDED = 420 m ²



NOT FOR CONSTRUCTION

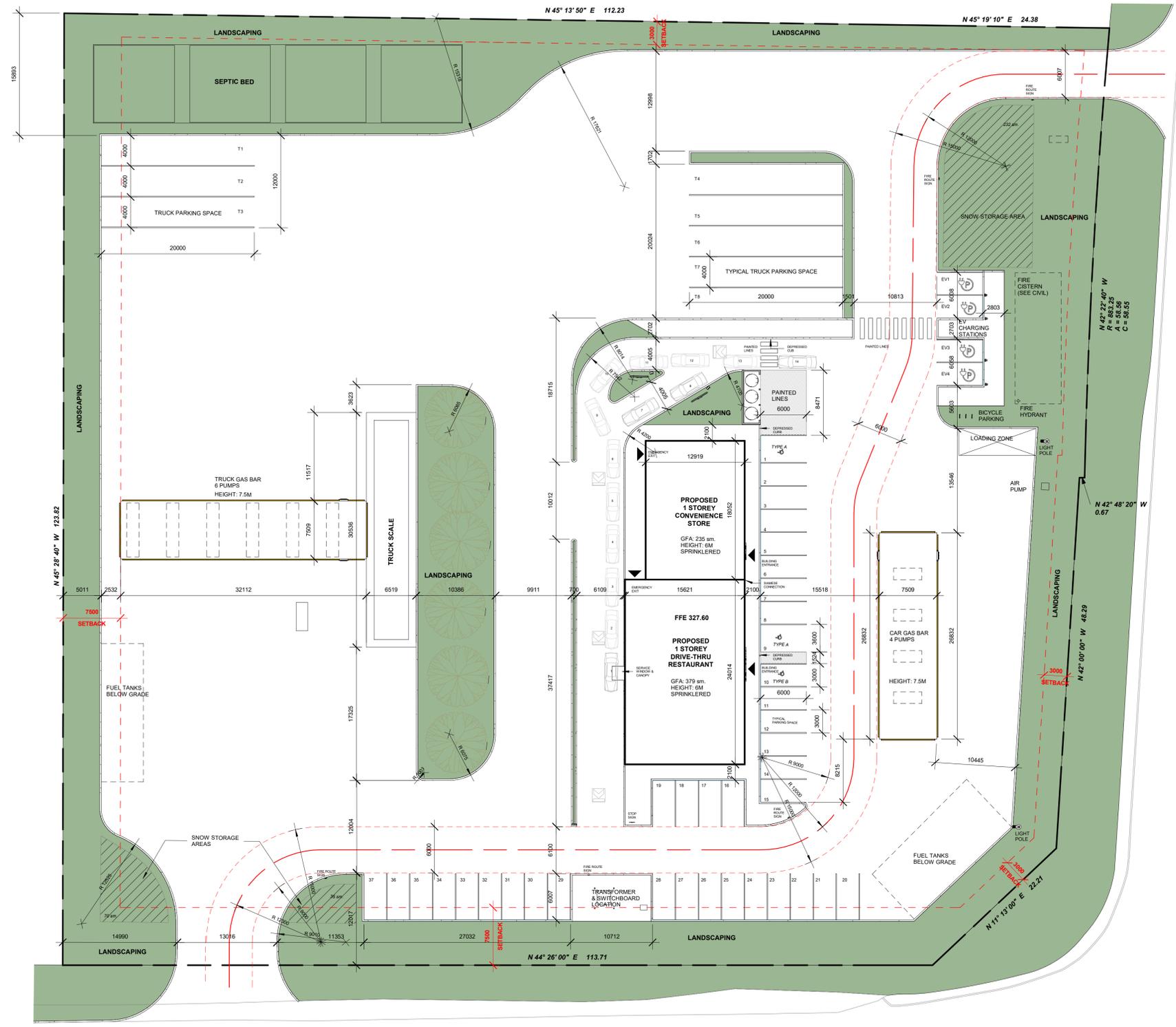


CROZIER CONSULTING ENGINEERS

2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn: A.L. Design: A.L. Project No: **2792-7289**
Check: J.D. Check: J.D. Scale: 1:300 Dwg: **OSS**

FILE NAME: Y:\2024\Projects\202436 - 7456 McLean Road_PlanSet\2D Design and Construction Documents\Plan\Sheet\7456 McLean Road_20241110.dwg
 PLOT DATE: 2025-08-05 9:52:48 AM



McLEAN ROAD WEST

BROCK ROAD

PROJECT STATISTICS

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 AREA		379 sm.
CONVENIENCE STORE		235 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%	24%

PARKING REQUIRED		
GAS BAR - CARS	(1 PER PUMP) = 4	SEE BELOW
GAS BAR - TRUCKS	(1 PER PUMP) = 6	8
CONVENIENCE STORE	(1 PER 20 sm.) = 12	SEE BELOW
RESTAURANT	(1 PER 10 sm.) = 38	SEE BELOW
TOTAL	60	49

VEHICLE PARKING SCHEDULE

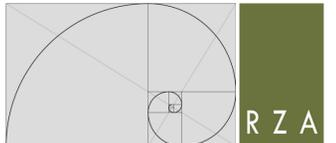
Per Table 5.3 of Zoning Bylaw

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

BICYCLE PARKING SCHEDULE

Per Table 5.6 of Zoning Bylaw

REQUIRED	PROVIDED
2 PER 1,000 sm. = 2	2



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 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

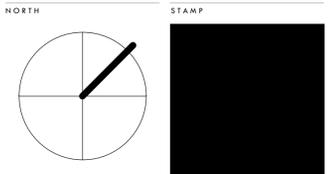


SITE CONTEXT

ISSUED FOR PLANNING APPROVALS 2025.08.05

NO. ISSUANCE DATE

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.



PROPOSED COMMERCIAL DEVELOPMENT

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

SITE PLAN

SCALE	PROJECT NUMBER
1:300	202436
DATE	2025-08-05 9:52:48 AM
DRAWN	REZ
CHECKED	REZ
SHEET	REVISION

A101

ZONING BY-LAW AMENDMENT to By-law 023/18

for

DAAZ Inc.

7456 Mclean Road West & 197 Brock Road South, Puslinch

Township Rezoning Application D14/DAZ

THE CORPORATION OF THE TOWNSHIP OF PUSLINCH

BY-LAW NUMBER _____

**A BY-LAW TO AMEND BY-LAW NUMBER 023/18, AS AMENDED,
BEING THE ZONING BY-LAW OF THE TOWNSHIP OF PUSLINCH**

WHEREAS, the Council of the Corporation of the Township of Puslinch deem it appropriate and in the public interest to amend By-Law Number 023/18 pursuant to Sections 34 of the Planning Act, R.S.O. 1990 as amended;

**NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE
TOWNSHIP OF PUSLINCH ENACTS AS FOLLOWS:**

1. That Schedule "A" of By-law 023/18 is hereby amended by rezoning the lands municipally referred to as 7456 Mclean Road West and 197 Brock Road South, from a Special Provision Industrial (IND(sp54)) ZONE and Holding Industrial (IND(h5)) ZONE to a site specific **Highway Commercial (HC(sp_)) ZONE**, as shown on schedule "A" of this By-law.
2. That Section 14 Site-Specific Special Provisions is amended by adding the following site specific provision:

No.	Zone Designation	Additional Permitted Uses	Prohibited Uses	Site Specific Special Provision
	HC	N/A	N/A	LANDSCAPED OPEN SPACE (MINIMUM): 20.0% PARKING SPACE REQUIREMENT RESTAURANT (MINIMUM): 1 per 20m ² including outdoor patio area.

3. That the subject land as shown on Schedule "A" to this By-Law shall be subject to all applicable regulations of Zoning By-Law 023/18, as amended.
4. This By-law shall become effective from the date of passage by Council and come into force in accordance with the requirements of the Planning Act, R.S.O. 1990, as amended.

READ A FIRST AND SECOND TIME THIS _____ OF _____, 20__.

MAYOR

CLERK

READ A THIRD TIME AND PASSED THIS _____ OF _____, 20__.

MAYOR

CLERK

THE CORPORATION OF THE TOWNSHIP OF PUSLINCH

BY-LAW NUMBER _____

Schedule "A"

INSERT MAP

Highlighted area to be rezoned from **"IND(sp54) & IND(h5)" Zone** to a site specific **"HC(sp_)" Zone**

This is Schedule "A" to By-law No. _____

Passed this ____ day of _____, 20__.

MAYOR

CLERK

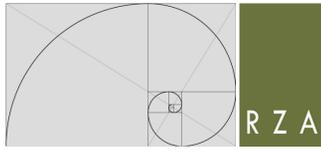
THE CORPORATION OF THE TOWNSHIP OF PUSLINCH

EXPLANATION OF BY-LAW NO. _____

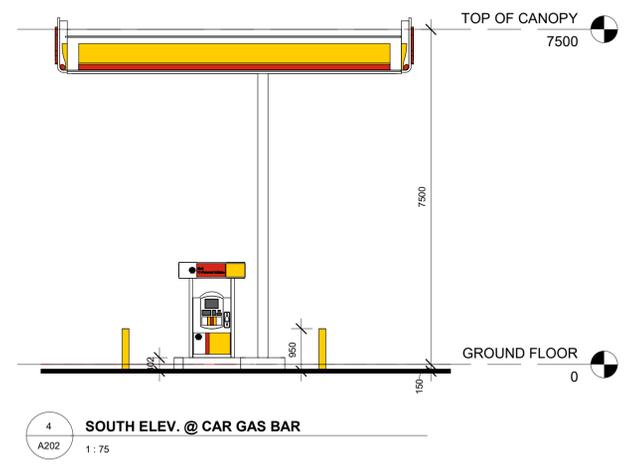
By-law Number _____ amends the Township of Puslinch Zoning By-law 23/18 by rezoning the lands municipally referred to as 7456 Mclean Road West and 197 Brock Road South from a Special Provision Industrial (IND(sp54)) ZONE and a Holding Industrial (IND(h5)) ZONE to a Special Provision Highway Commercial (HC(sp_)) ZONE to permit a gas bar, associated retail/convenience store, and drive through restaurant.

The subject property is approximately 1.62 hectares (4.0 acres) in size and is currently vacant/undeveloped.

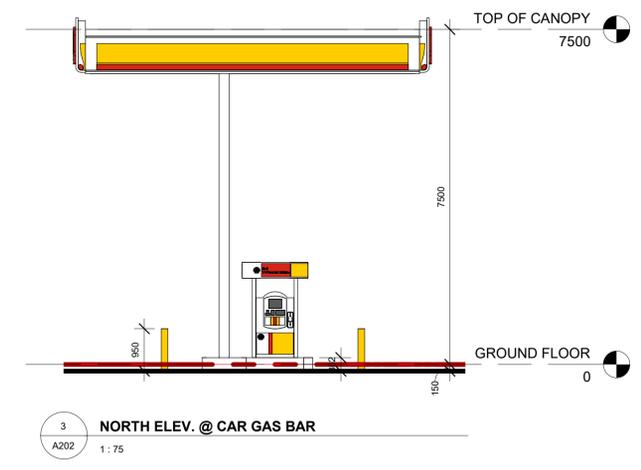
Within the County's Official Plan, the subject lands are designated as "Rural Employment". This designation permits such commercial uses that will be service focused, with limited accessory retails, including both small scale restaurants and automobile services.



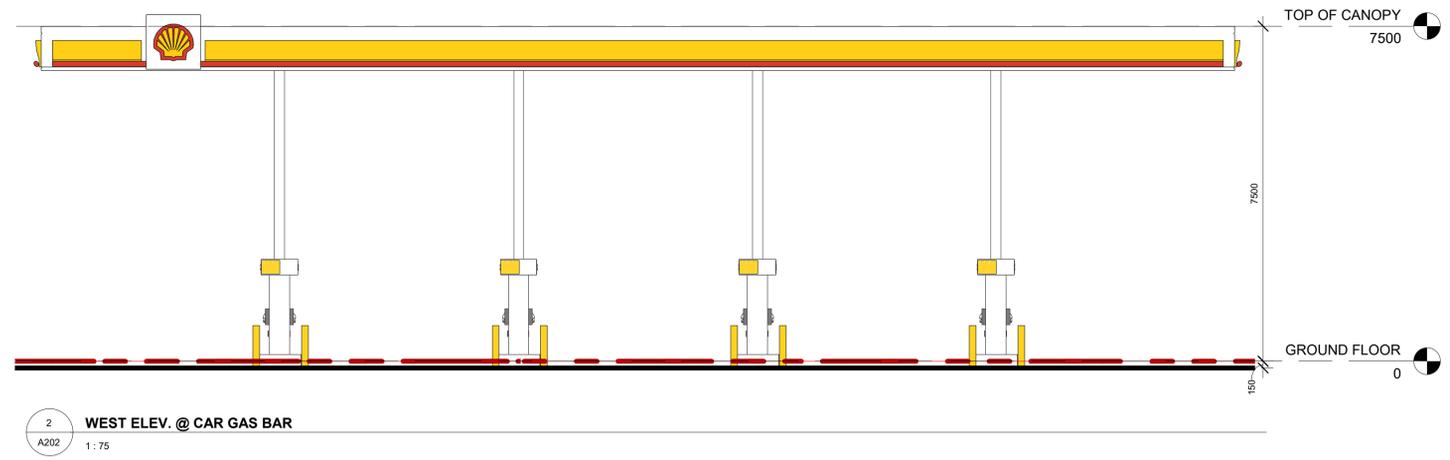
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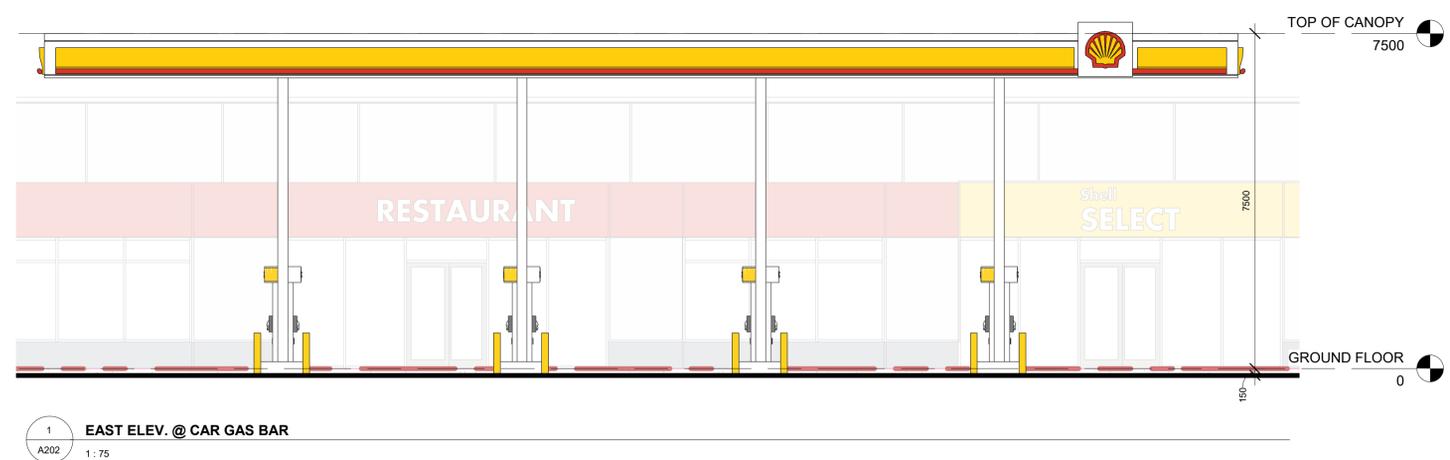
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 A202 1:75



3 NORTH ELEV. @ CAR GAS BAR
 A202 1:75



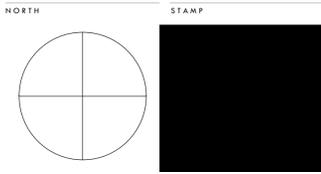
2 WEST ELEV. @ CAR GAS BAR
 A202 1:75



1 EAST ELEV. @ CAR GAS BAR
 A202 1:75

NO.	ISSUANCE	DATE
1	ISSUED FOR PLANNING APPROVALS	2025.08.05

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PROPOSED COMMERCIAL DEVELOPMENT

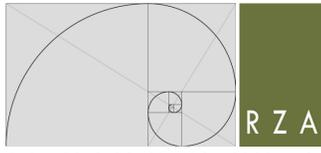
7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
 TOWN OF PUSLINCH

ELEVATIONS - CAR GAS BAR

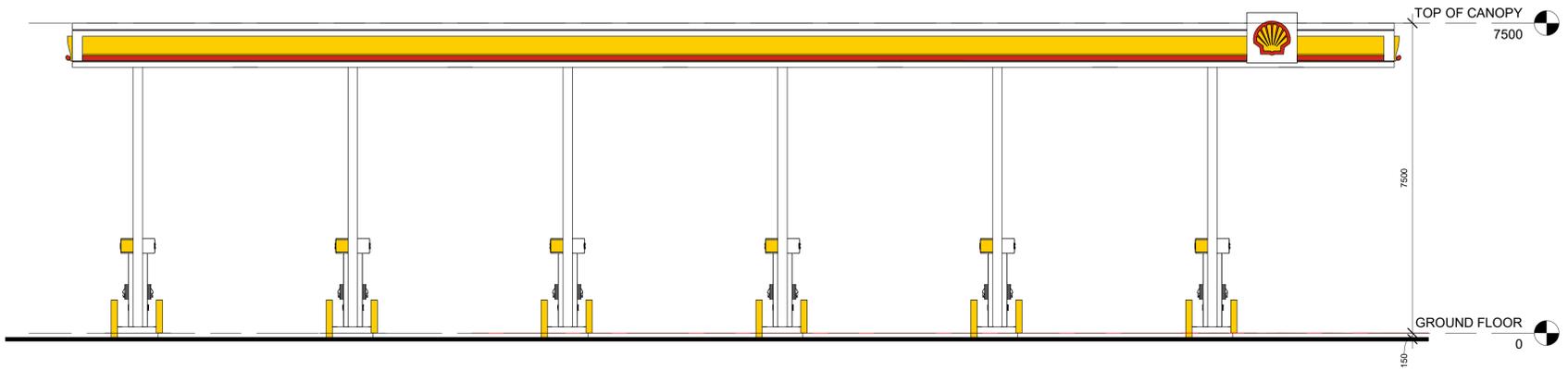
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CHECKED	REZ	
SHEET		REVISION

A202

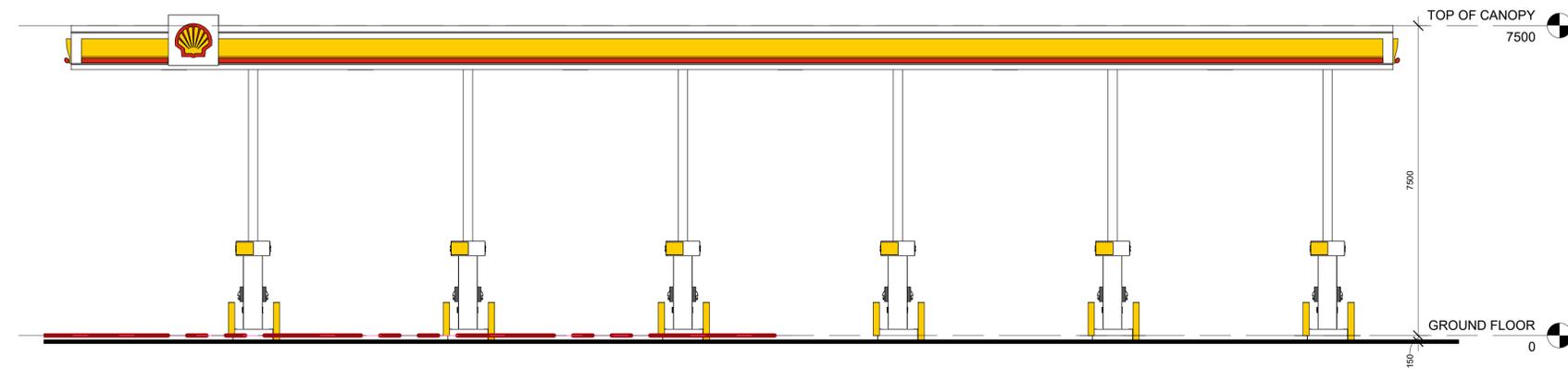
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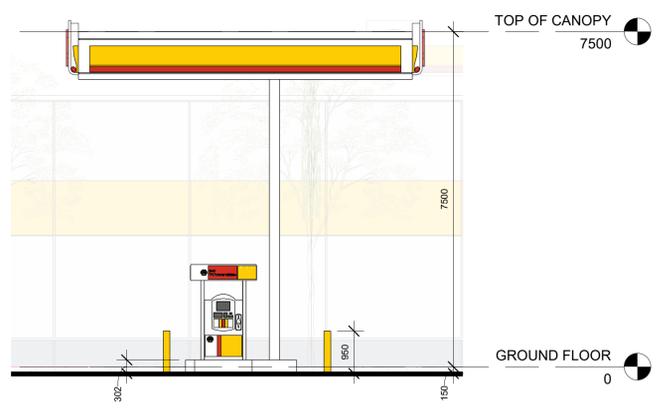
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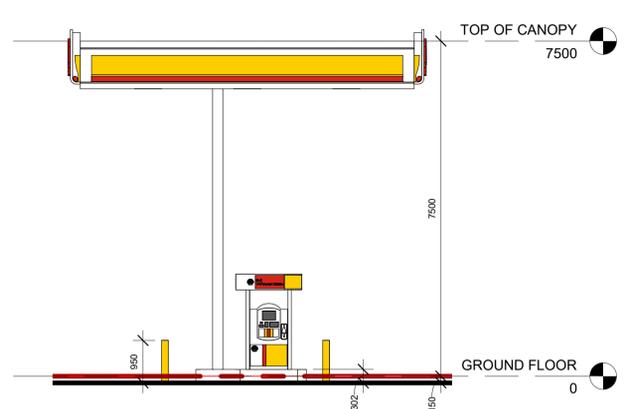
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 A203 1:75



3 NORTH ELEV. @ TRUCK GAS BAR
 A203 1:75



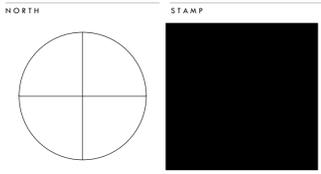
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 A203 1:75



1 EAST ELEV. @ TRUCK GAS BAR
 A203 1:75

NO.	ISSUANCE	DATE
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PROPOSED COMMERCIAL DEVELOPMENT

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

ELEVATIONS - TRUCK GAS BAR

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DATE	2025-08-05 9:52:52 AM
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CHECKED	REZ
SHEET	REVISION

A203

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 PLOT DATE: 2025-08-05 9:52:52 AM

**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.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4**

AUGUST 2025

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.



Revision Number	Date	Comments
Rev. 0	October 2023	Issued for 1 st Submission (ZBA)
Rev. 1	August 2025	Issued for 2 nd 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 (Town) and County of Wellington (County).

This report has been completed in accordance with the appropriate design guidelines and Township of Puslinch Pre-consultation Comment Summary dated November 21, 2022. The relevant background studies and reports used in preparation of this report include:

- Geotechnical Investigation Report (CMT, July 2023)
- 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 Carrol 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 first submission comments received from the reviewing agencies and to support the second 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 consist of two adjacent properties (7456 McLean Road and 197 Brock Road South). The site is comprised of vegetated/landscaped areas and is bounded by Dufferin Aggregates (aggregate pit) to the north, Brock Road South (Wellington Road 46) to the east, McLean Road West to the south, and St. Mary's Cement Inc. (aggregate pit) to the west. Per review of the Conservation Authority Regulation Mapping, the site is not located within a Grand River Conservation Authority regulated area.

According to the Site Plan prepared by Richard Ziegler Architect Inc. dated November 14, 2024, the proposed mixed-use commercial development will consist of the following elements:

- A 1-storey convenience store (235 m²).
- A 1-storey drive-thru restaurant (379 m²).
- A 4-pump car gas bar and a 6-pump truck gas bar.
- 41 standard parking spaces (including 3 accessible parking spaces and 4 electric vehicle charging spaces) and 8 transport truck parking spaces.
- Internal paved areas including access to McLean Road West and Brock Road South.

The existing vegetated and landscaped areas will be removed to accommodate the proposed mixed-use commercial development.

3.0 Soil and Groundwater Evaluation

A Geotechnical Investigation was conducted by CMT Engineering Inc. (CMT) in April 2023, which included the advancement of seven (7) 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). Groundwater levels were measured on April 19, 2023 and ranged from approximately 0.38 to 5.47 mbgs (321.43 to 325.87 masl). A Hydrogeological Assessment Report was prepared by Crozier (July 2025) to support the Zoning By-Law Amendment application for the site. Refer to this report for additional details and analyses regarding on-site groundwater.

In addition, Crozier completed a site investigation on June 7, 2023 to characterize the soil and groundwater conditions in potential areas for a leaching bed. A mini-excavator was used to excavated three (3) test pits to a maximum depth of 2.1 mbgs. The test pit locations are illustrated on the Preliminary Site Servicing Plan (**Drawing C103**). The general soil stratigraphy encountered was consistent with the findings from the Geotechnical Investigation (CMT, September 2023). No free groundwater was encountered in TP-1 or TP-3 to the maximum depth of investigation (2.1 mbgs). Groundwater seepage was identified at approximately 1.2 mbgs at TP-2. Refer to the Hydrogeological Assessment Report (Crozier, July 2025) for additional details.

A representative sample was collected from TP-3 and submitted to Chung & Vander Doelen (CVD) Engineering Ltd. for a particle size distribution analysis. The laboratory test results are presented in **Appendix A**. Referring to Supplementary Standard SB-6 of the 2012 Ontario Building Code (OBC) and the results of the particle size distribution analysis for the soil sample obtained from TP-3, the predominant soil is classified as SM soil as described by the Unified Soil Classification System. An SM soil is a silty sand, or sand silt mix with a percolation rate ranging from 8 min to 20 min/cm. Based on the percentage of sand in the soil sample, a percolation rate of 15 min/cm has been assigned for this sewage system design.

4.0 Water Servicing

4.1 Water Supply

The site is located in the Township of Puslinch, and there is no municipal water supply available to service the proposed development. Based on the review of the MECP Well Records, properties in the vicinity of the site are serviced with private water supply wells with similar anticipated demands. Therefore, the proposed development will be serviced with a water supply well.

The water demand for the proposed development was calculated from the maximum daily sewage flows as noted in Section 5.1 and using the appropriate MECP peaking factors. Table 1 summarizes the anticipated water demand and **Appendix B** contains the detailed water demand calculations.

Table 1: Estimated Daily Water Demand

Average Day Demand (L/min)	Maximum Day Demand (L/min)	Peak Hour Demand (L/min)
6.94	13.89	27.78

One (1) water supply well was identified on-site by Crozier. Refer to the Preliminary Site Servicing Plan (**Drawing C103**) for the well location. This well appears to be associated with the well record for Well ID 6707585. According to the well record, this well was installed in 1981 to a depth of 29 m below ground surface (mbgs) within limestone bedrock. The well is a 6-inch steel cased well in a well pit. Initial testing of the well indicated that the well can produce 8 gallons per minute (GPM) or 30.3 liters per minute (LPM).

As shown on the Preliminary Erosion, Sediment Control, and Removals Plan (Drawing C101), the well conflicts with the proposed development plans. Therefore, this well will be decommissioned, and a new well is proposed to service the development. The existing well will be decommissioned in accordance with Ontario Regulation (O.Reg. 903) by a licensed Well Contractor. The well should be decommissioned prior to any site alteration activities.

A water supply assessment was completed as part of the Hydrogeological Assessment by Crozier (under separate cover) to assess if the proposed development can be serviced with a water supply well. The water supply assessment concluded that it is expected that there is sufficient groundwater supply in the area for a water supply well. Refer to the Hydrogeological Investigation Report (July 2025).

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
 - o 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	614	6.0	3,684	17	1.0	2,700	81,000

¹Minimum 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	238	1,175
		per water closet	1,230	2	2,460
Restaurant, 24-hr	379	per seat	200	40	8,000
Car Gas Bar	n/a	fuel outlet	560	8 ¹	4,480
Truck Gas Bar	n/a	fuel outlet	560	6 ²	3,360
Total Daily Design Sewage Flow:					18,300
Design Sewage Flow:					20,000

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

2. One (1) fuel outlet/nozzle per pump

As shown in Table 3, the total maximum day sanitary sewage flow for the proposed development is 20,000 L/day. Properties with a total daily design sewage flow exceeding 10,000 L/day are subject to Section 53 of the Ontario Water Resources Act and require an Environmental Compliance Approval (ECA) issued by the Ministry of the Environment, Conservation and Parks (MECP). Given that the total daily design sewage flow is 20,000 L/day, an ECA will be required for the sewage works.

5.2 Proposed Sanitary Servicing

An onsite sewage system, consisting of an advanced treatment system with subsurface disposal via leaching bed is proposed for the site. Refer to the Preliminary Site Servicing Plan (**Drawing C103**) for the layout of the onsite sewage system.

5.2.1 Proposed Advanced Treatment System

As noted above, the total daily design sewage flow is 20,000 L/day. Given the relatively constrained space available for subsurface disposal, advanced treatment of the sewage prior to discharge to the leaching bed will be required. A Level IV treatment unit meeting the effluent objectives as noted in Table 8.6.2.2 of the OBC is recommended.

According to the Hydrogeological Investigation Report (Crozier, July 2025), significant denitrification of the effluent will also be required to meet the MECP's "Reasonable Use" guideline as outlined in Chapter 22 of the MECP Design Guidelines for Sewage Works (2008). An effluent objective of 3 mg/L is recommended for the advanced treatment system. Refer to the Hydrogeological Assessment Report for further details.

There are several technologies available on the market that can achieve the anticipated level of treatment required for this site, including Waterloo Biofilter, the MBBR-IQ system as designed and supplied by BNA Inc., and others. Design of the treatment system will be completed during detailed design stages. A preliminary location for the treatment tanks has been indicated on the Preliminary Site Servicing Plan (**Drawing C103**).

5.2.2 Proposed Leaching Bed

Treated effluent from the advanced treatment stage will be dosed to a Type A dispersal bed designed in accordance with the OBC for final polishing and dispersal of effluent. As described in Section 3.0, the soils in the proposed leaching bed are sandy soils with an anticipated T-time of 15 min/cm. The proposed Type A dispersal bed will include a sand and stone layer as sized and described below as per OBC 8.7.7.

A stone layer composed of septic stone meeting the criteria outlined in Table 8.7.3.3.A., Division B of the OBC will be installed to accommodate the effluent distribution piping. The minimum stone area is calculated using the following equation.

$$A = \frac{Q}{50}$$

Where:

A = the contact area between the base of the stone layer and the imported sand layer.

Q = the total design sewage flow in L/d.

Given a total daily design flow of 20,000 L/day, a minimum stone area of 400 m² is required. The proposed stone area is 420 m², which will be equipped with four (4) cells of distribution piping. Each cell will be equipped with nine (9) runs of 9 m length of 75 mm perforated distribution pipes placed at 1.0 m centers. Effluent will be conveyed to the proposed dispersal bed by a 50 mm sanitary force main and distributed to each of the cells in the leaching bed via an automatic distribution valve.

The minimum sand area is calculated using the formula below:

$$A = \frac{QT}{850}$$

Where:

A = the contact area in m² between the base of the sand layer and the native soil.

Q = the total design sewage flow in L/d.

T = the percolation time of the underlying soil in min/cm to a maximum of 15 min/cm.

Given a total daily design flow of 20,000 L/day and a percolation time of 15 min/cm for the underlying soils, the minimum size of the sand area required for the leaching bed is calculated to be 353 m². An area of 420 m² is proposed to ensure a consistent sand layer beneath the stone layer. The sand layer will be constructed of imported sand with a T-time of 6 – 10 min/cm and no more than 5% passing the No.200 sieve. The sand layer will be a minimum of 300 mm thick below the stone layer and in all other areas.

Refer to the Preliminary Site Servicing Plan (**Drawing C103**) for the layout, orientation, and details of the proposed leaching bed.

6.0 Existing Stormwater Servicing

The existing stormwater servicing infrastructure close to the site includes:

- A 300 mm diameter concrete storm sewer transitioning to a 375 mm diameter concrete sanitary sewer on McLean Road West running west to east at a minimum slope of approximately 0.3% (Reconstruction of Wellington Road 46 As-constructed Drawing No. 06).
- Two 300 mm diameter concrete storm sewers which daylight within the McLean Road West roadside ditch directly south of the site. These storm sewers collect runoff from the site and direct it the McLean storm sewer network.
- A 300 mm diameter concrete storm sewer transitioning to a 375 mm diameter concrete 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 Carrol 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 Carrol Pond were designed for the site under pre-development conditions and any development will require on-site controls. Excerpts from the Stormwater Management Report Carrol Pond Municipal Drain (March 2007) have been provided in **Appendix D** along with the as-constructed drawings of the surrounding area.

7.0 Drainage Conditions

The drainage conditions for the site in both pre-development and post-development conditions are outlined in the following sections.

7.1 Existing Drainage Conditions

According to the topographic survey (Tarasick McMillan Kubicki Limited, November 3, 2022), the site currently consists of 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

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., November 14, 2024), the proposed development will consist of a one-storey convenience/restaurant building, 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, and internal paved areas, landscaped areas, and will be collected and conveyed via the storm 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 convenience store building and is to be conveyed towards an infiltration gallery along the southern property line, 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	0.19	Landscaped areas	69 (CN)	Neighbouring Western Lands
202	1.29	Proposed truck gas bar, landscaped areas, and paved areas	89%	McLean Road West ditch
203	0.08	Landscaped areas	69 (CN)	McLean Road West and Brock Road South right-of-ways
204	0.06	Proposed building	100%	Infiltration Gallery

¹SCS Curve Numbers (CN) are used for pervious catchments (NASHYD) and % impervious is for mainly impervious catchments (STANHYD)

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)	0.17	0.17

Table 7: Post-Development Hydrologic Parameters

Catchment Description	201	202	203	204
Drainage Area (ha)	0.19	1.29	0.08	0.06
Total Imperviousness (%)	-	89	-	100
Directly Connected Imperviousness (%)	-	89	-	100
Curve Number (CN)	69	-	59	-
Time to peak (hrs)	0.17	-	0.17	-

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 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	0.276	0.010	274	720
5	0.016	0.368	0.012	374	
10	0.023	0.426	0.015	448	
25	0.034	0.500	0.017	554	
50	0.043	0.553	0.019	631	
100	0.053	0.602	0.021	711	

- Notes: 1. Includes runoff from Catchment 102.
2. Includes runoff from Catchment 203 and 204.
3. 720 m³ 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 711 m³ will be required to provide quantity control for the 100-year storm event. An underground stormwater storage tank has been proposed to provide 720 m³ 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.

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	0.002	-(0.006)
5	0.016	0.005	-(0.011)
10	0.023	0.007	-(0.016)
25	0.034	0.010	-(0.024)
50	0.043	0.012	-(0.031)
100	0.053	0.014	-(0.039)

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 % 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 1935 m³/yr or 62 mm/year due to an increase in impervious surfaces. The detailed water balance calculations can be referenced in Hydrogeological Assessment Report (Crozier, July 2025).

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	614	203	12.7

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 galley is 12.7 m³. The proposed infiltration gallery has been sized to store 43 m³ for stormwater quantity controls, therefore, the infiltration gallery will have sufficient capacity to infiltrate the available 203 m³ of annually available infiltration volume.

Detailed calculations are provided in **Appendix F of the Hydrogeological Investigation Report**.

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 we will assess the following LID opportunities during the detailed design process:

Rainwater Harvesting

With minimal pre-treatment, the captured rainwater within an outdoor cistern can be used for outdoor non-potable water uses such as irrigation, or in the buildings as gray water.

Enhanced Topsoil

Enhanced topsoil provides water quality benefits in addition to water balance storage which will reduce the infrastructure required to store the required water balance volume. Enhanced topsoil's can be placed in all landscape area to help promote infiltration.

9.0 Erosion and Sediment Controls During Construction

The design of the erosion and sediment controls can be referenced on the Preliminary Erosion, Sediment Control, and Removals Plan (**Drawing C101**). The erosion and sediment controls will be required to be installed prior to the beginning of any construction activities. They will be maintained until the site is stabilized or as directed by the Site Engineer and/or Township of Puslinch. Controls will be inspected after each significant rainfall event and maintained in proper working condition.

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 to prevent silt and sediment from entering the storm water system. They will also be installed in the existing catchbasins during construction to prevent sediment from entering the existing storm sewer pipe.

Heavy-Duty Silt Fencing

Heavy-Duty Sediment Control Silt Fence will be installed on the perimeter of the site to intercept sheet flow. Additional Sediment Control Silt Fence may be added based on field decisions with the Site Engineer and Owner prior to, during, and following construction.

Mud Mat

A rock mud mat will be installed at the entrance to the construction zone to prevent mud tracking from the site onto surrounding lands and the perimeter roadway network. All construction traffic will be restricted to this access only.

The Removals, Erosion and Sediment Control Plan will be refined throughout the planning application process with consultation with the Township to ensure potential environmental hazards during construction are minimized.

10.0 Conclusions & Recommendations

This report was prepared in support of the Zoning By-Law Amendment for the property located at 7456 McLean Road and 197 Brock Road South in the Township of Puslinch. The proposed development can be serviced for water, sanitary, and stormwater management in accordance with the Township of Puslinch requirements and standards. Our conclusions and recommendations include:

Proposed Water Services

- The domestic peak hourly water demand for the proposed development is 27.78 L/min. Water servicing will be provided via a private water supply well.
- A minimum storage volume of 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 20,000 L/day. Sanitary servicing will be provided via an onsite sewage system, consisting of an advanced treatment system with discharge of treated effluent to a Type A dispersal bed sized for 20,000 L/day.

Stormwater Management

- The site's 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 building (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.

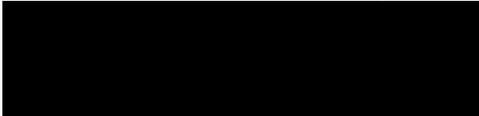
Erosion and Sediment Controls

- 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.



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CM/tc

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APPENDIX A

Grain Size Analysis



CHUNG & VANDER DOELEN
ENGINEERING LTD.

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

July 4, 2023

File No.: M22543 (2377-6556)

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

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

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

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

Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

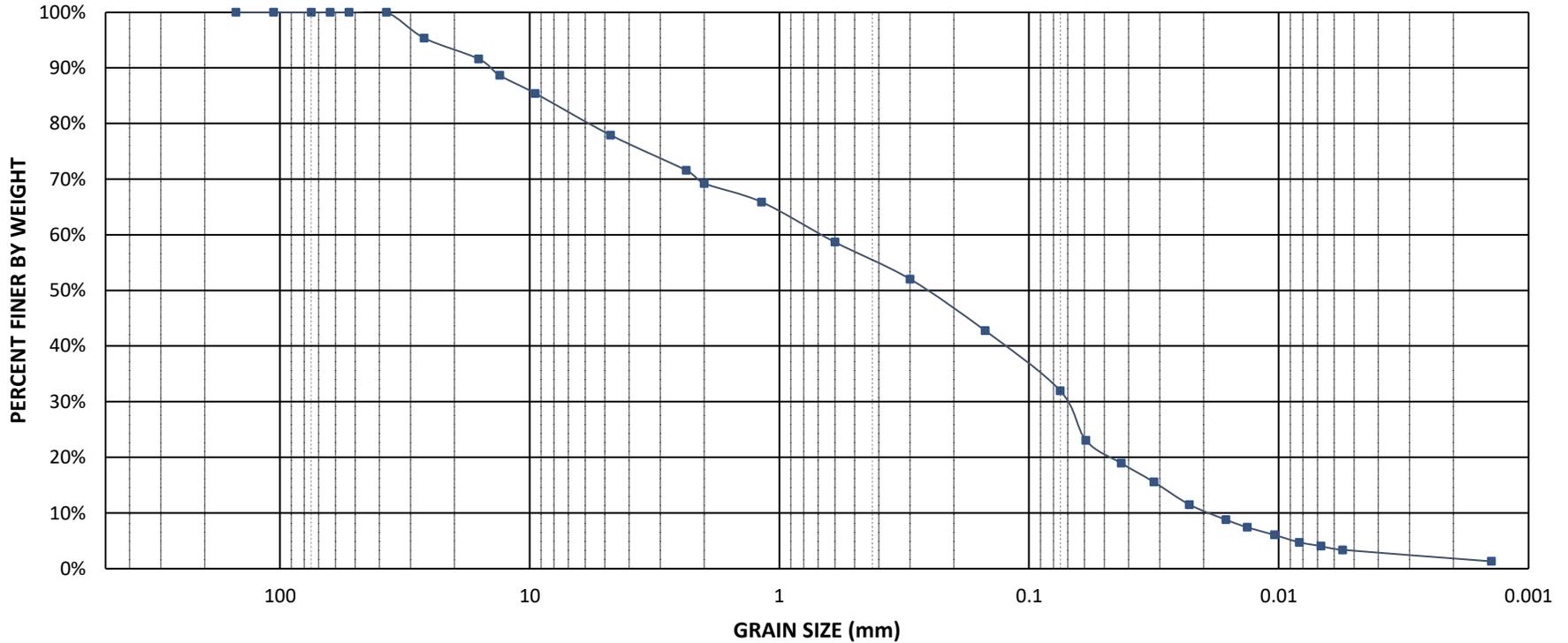


Hugh Arthur
Laboratory Supervisor

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

GRAIN SIZE DISTRIBUTION

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



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

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

APPENDIX B

Water Servicing Calculations



Project: 7456 McLean Road W &
197 Brock Road S

Created By: JD
Checked By: JD

Date: 2023.08.22
Updated: 2025.08.01

Project No.: 2792-7289

Domestic Water Demand - Ontario Building Code

Peak Sewage Flow	20,000	L/day
-------------------------	--------	-------

Notes & References

Ontario Building Code - Table 8.2.1.3.B

Avg. Daily Demand =

10000

L/day

6.94

L/min

24-hr day

Peaking Factors

Max Day = 2.00

Peak Hour = 4.00

Average Day = **6.94** L/min

Max Day = **13.89** L/min

Peak Hour = **27.78** L/min

Based on MECP suggested range between 2 and 4 for industrial uses.

Max Day = (Average Day Demand) * (Max Day Factor)

Peak Hour = (Average Day Demand) * (Peak Hour Factor)

Criteria	Average Daily Water Demand (L/min)	Max Day Demand (L/min)	Peak Hourly Demand (L/min)
OBC and MECP Design Guidelines	6.94	13.89	27.78



Project: 7456 McLean Road W & 197 Brock Road S
Project NO.: 2792-7289
Date: 2025.07.04
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 614 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 = 3684 m³
 S_{TOT} = 1.0

Exposure	Distance (m)	S _{side}
North	N/A	0.0
East	17.5	0.0
South	205.0	0.0
West	36.5	0.0

Q = 62,628 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

Project Name: 7456 McLean Rd &
 197 Brock Rd S
Project Number: 2792-7289

Date: 2025-07-23
Designed By: JD
Checked By: KR

PRELIMINARY FLOW ESTIMATES						##### input required	References/Notes		
Description	Area (m ²)	Unit	Unit Flow	Number of Units	Total Flow (L/day)				
Convenience Store	235	per m ² floor area, or	5	235	1,175	Assume 2 nozzles per pump Assume 1 nozzle per pump			
	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				
Truck Gas Bar	n/a	fuel outlet, and	560	6	3,360				
					18,300				
Design Sewage Flow:					20,000				
Pre-Treatment Options									
Required septic tank size =	60000	L minimum							
Propose Level IV Treatment (Y/N):	Y								
Native Percolation time, T =	15	min/cm							
Imported Percolation time =	10	min/cm							
Type A Dispersal Bed									
Stone area required =	400 m ²								
Sand area required =	352 m ²								

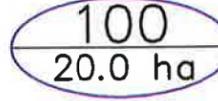
APPENDIX D

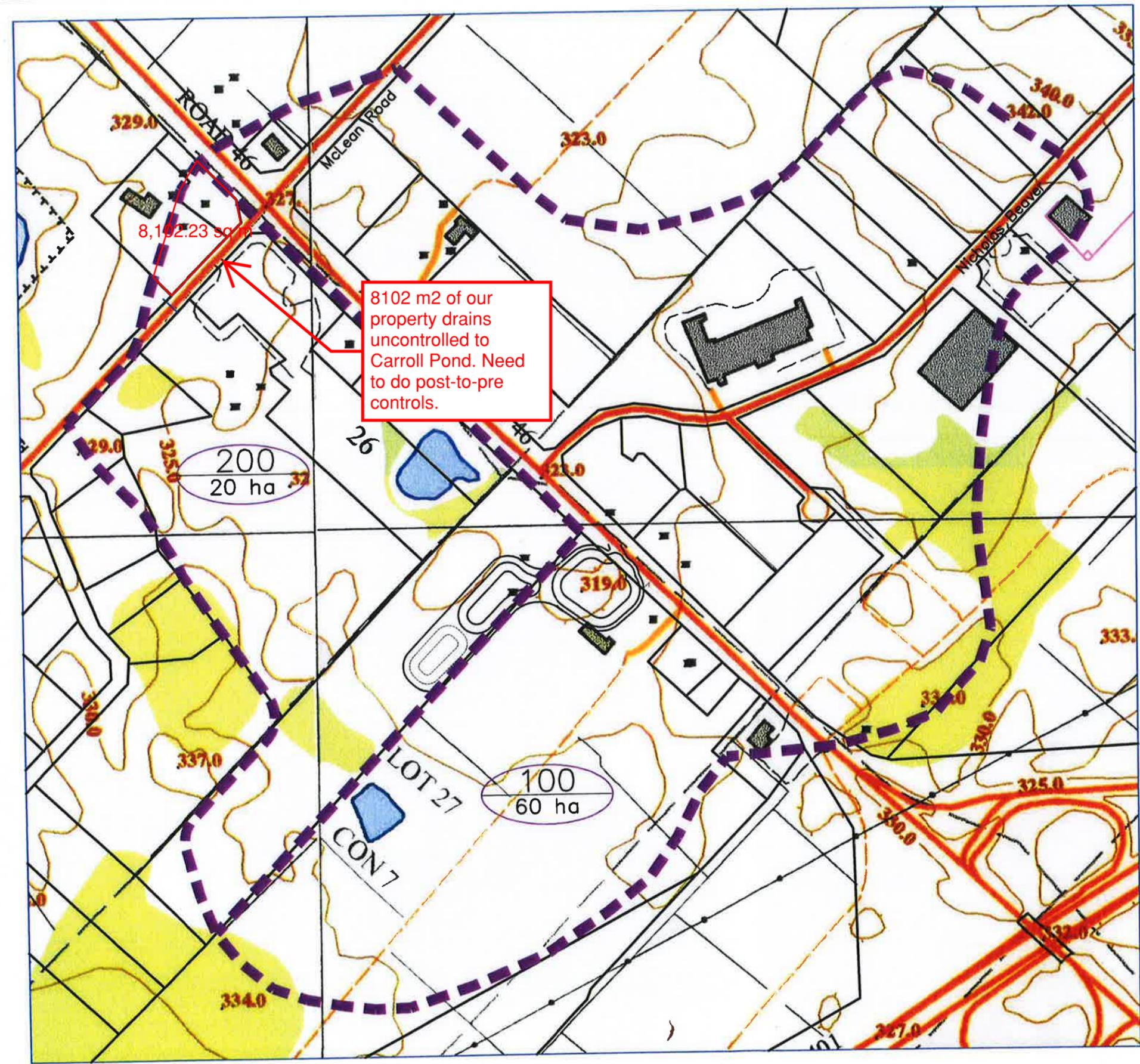
As-Constructed Drawings & Background Material

Carroll Pond Municipal Drain
Stormwater Management Report
Township of Puslinch



LEGEND

-  DRAINAGE CATCHMENT BOUNDARY
-  CATCHMENT
-  APPROXIMATE DRAINAGE AREA

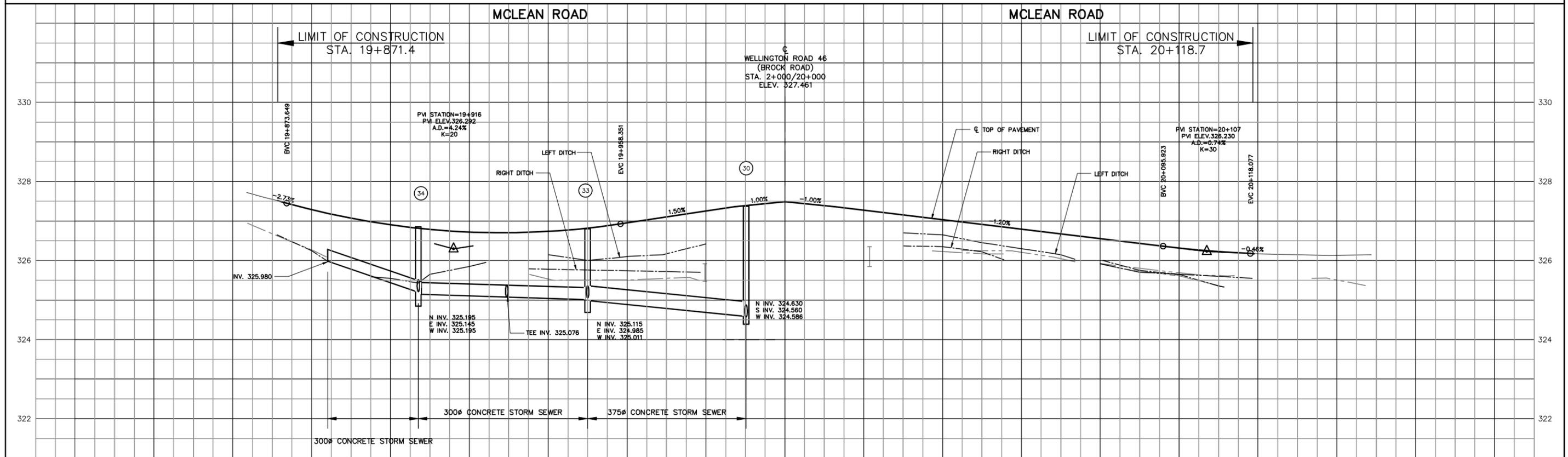
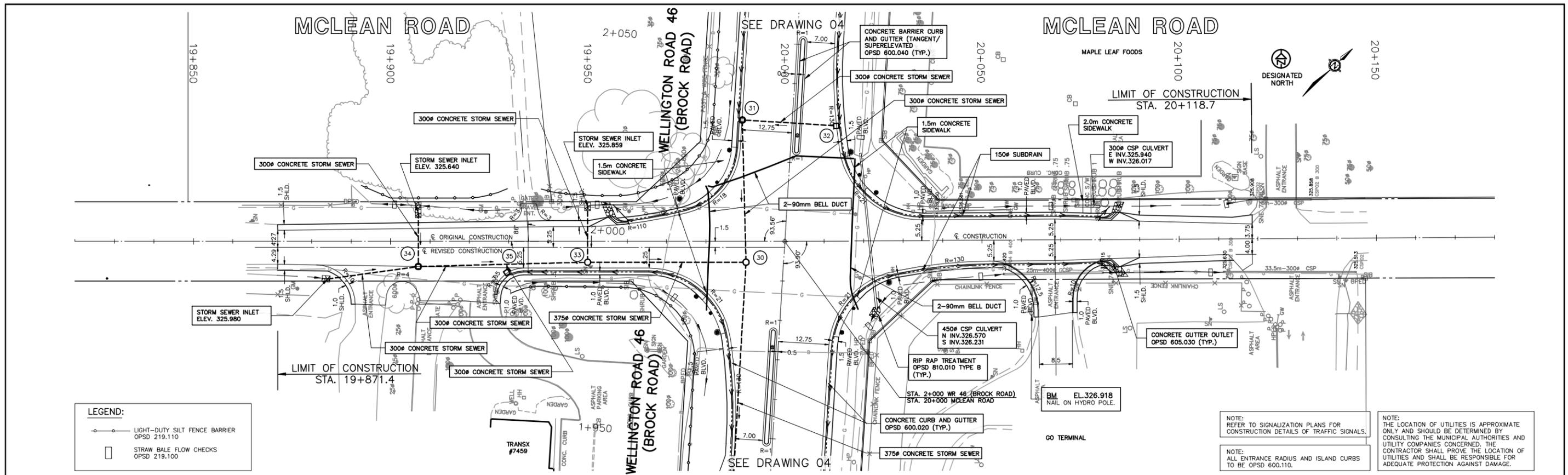


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MARCH 2007

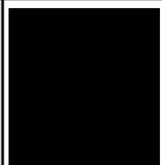
DRAINAGE CATCHMENTS

Figure No. 1





No	DATE	REVISION	INITIAL
04	SEPT 2016	REVISED AS RECORDED	H.W.W.
03	FEB 2016	INTERSECTION REVISION MCLEAN WEST	H.W.W.
02	SEPT 2015	ISSUED FOR CONSTRUCTION	H.W.W.
01	JULY 2015	ISSUED FOR TENDER	H.W.W.



**RECONSTRUCTION OF
WELLINGTON ROAD 46
FROM
HWY 401 TO NORTH OF MCLEAN ROAD**

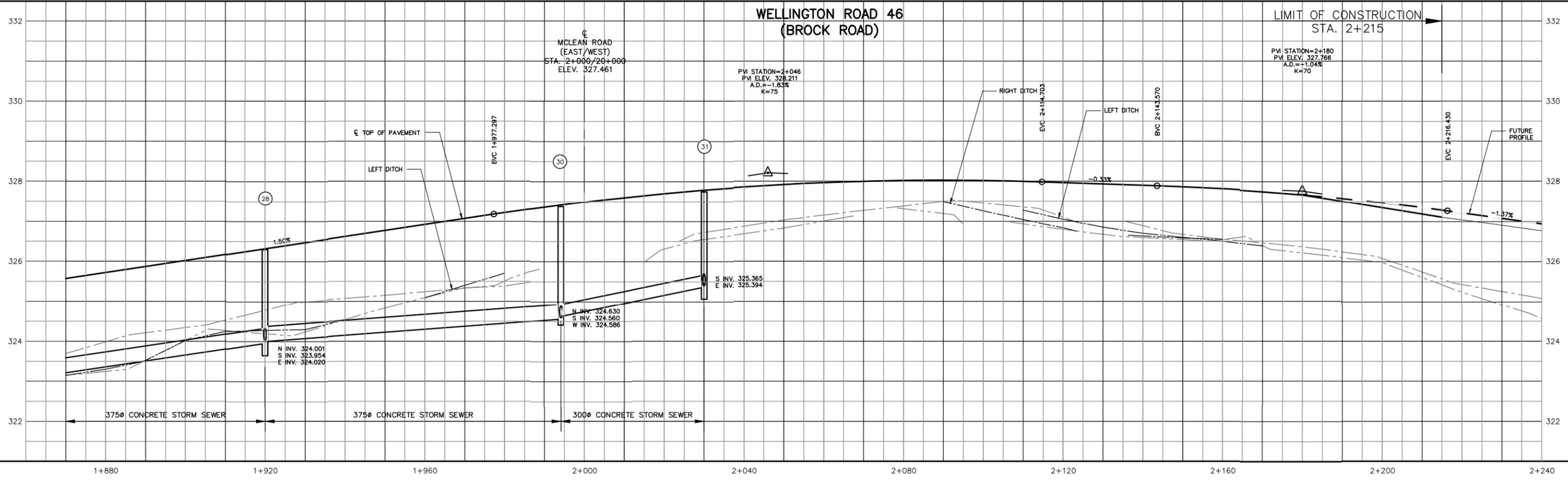
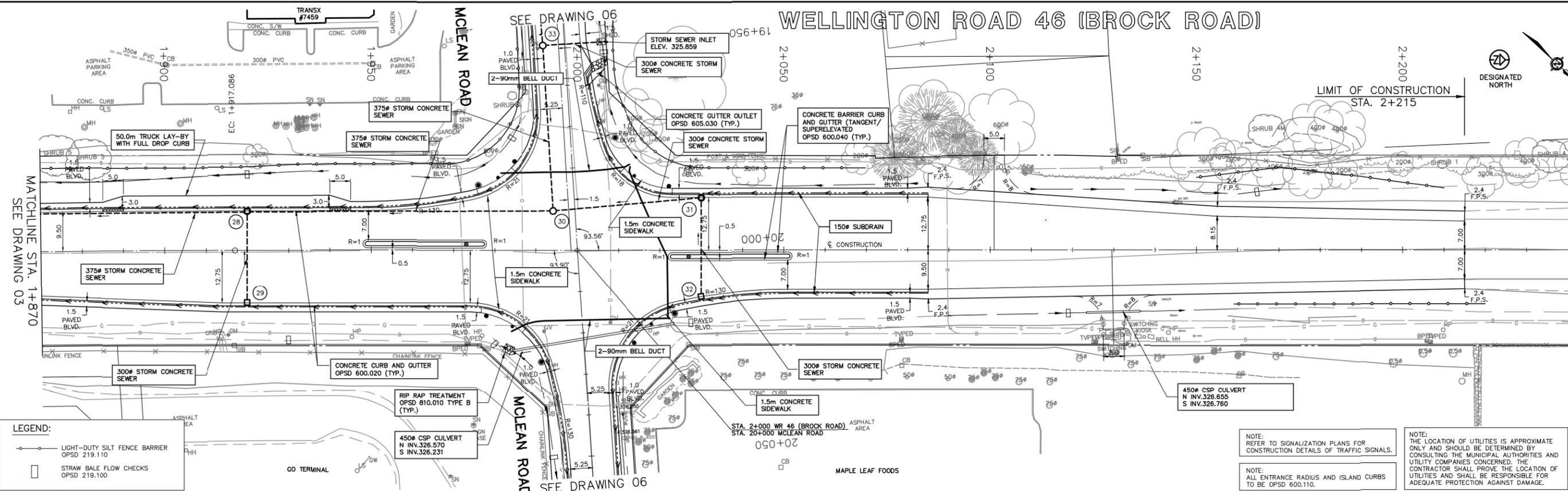
COUNTY OF WELLINGTON
 74 WOOLWICH STREET
 GUELPH, ONTARIO N1H 3T9
CONSTRUCTION PLAN AND PROFILE
 STA. 19+840 TO STA. 20+160

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



SCALES	
1:500	1:50
HORIZONTAL	VERTICAL
DRAWING NUMBER	06

WELLINGTON ROAD 46 (BROCK ROAD)



NOTES

04	SEPT 2016	REVISED AS RECORDED	H.W.W.
03	FEB 2016	INTERSECTION REVISED MCLEAN WEST	H.W.W.
02	SEPT 2015	ISSUED FOR CONSTRUCTION	H.W.W.
01	JULY 2015	ISSUED FOR TENDER	H.W.W.
No	DATE	REVISION	INITIAL

RECONSTRUCTION OF WELLINGTON ROAD 46 FROM HWY 401 TO NORTH OF MCLEAN ROAD			
COUNTY OF WELLINGTON 74 WOOLWICH STREET GUELPH, ONTARIO N1H 3T9			
CONSTRUCTION PLAN AND PROFILE STA. 1+870 TO STA. 2+240			

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

SCALES
1:500 1:50
HORIZONTAL VERTICAL
DRAWING NUMBER 04

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:													
Soils	Roadway		Sidewalk		Driveway		House		SWMF		Subtotals		
	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:													
Soils	Woodland		Meadow		Dirt Area		Lawn		Cultivated		Subtotals		
	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		A*RC
				RC	Area	RC	Area	RC	Area	RC	Area	
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: 0.15 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:													
Soils	Roadway		Sidewalk		Driveway		House		SWMF		Subtotals		
	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:													
Soils	Woodland		Meadow		Dirt Area		Lawn		Cultivated		Subtotals		
	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		A*RC
				RC	Area	RC	Area	RC	Area	RC	Area	
Woodland	10	0.00	0.00									0.00
Meadow	8	0.81	6.48	0.25	1							0
Dirt Area	3	0.00	0									0
Lawn	5	0	0									0
Cultivated	7	0.00	0									0
Impervious	2	0.00	0			0.00						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) 0.19

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	0.19
				0
				0
				0
Total Area				0.19

Impervious Landuses Present:													
Soils	Roadway		Sidewalk		Driveway		House		SWMF		Subtotals		
	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:													
Soils	Woodland		Meadow		Dirt Area		Lawn		Cultivated		Subtotals		
	Area (ha)	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN	
GI							0.19	69			0.19	13.11	
Subtotal Area													
										Composite Area Calculations		Total Pervious Area	0.19
												Total Impervious Area	0.00
												% Impervious	0.00%
												Composite Curve Number	69.0
												Total Area Check	0.19

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
Landuse	IA (mm)	Area (ha)	A * IA	Guelph Loam		0		0		0		A*RC
				RC	Area	RC	Area	RC	Area	RC	Area	
Woodland	10	0.00	0.00	0.00	0	0	0	0	0	0	0.00	
Meadow	8	0.00	0	0.00	0	0	0	0	0	0	0	
Dirt Area	3	0.00	0	0.00	0	0	0	0	0	0	0	
Lawn	5	0.19	0.95	0.20	0.19	0	0	0	0	0	0	
Cultivated	7	0.00	0	0.00	0	0	0	0	0	0	0	
Impervious	2	0.00	0	0.00	0	0	0	0	0	0	0.00	
Composite IA		0.19	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: 0.13 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) 1.29

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

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Guelph Loam	Gl	B	100	1.29
				0
				0
				0
Total Area Check				1.29

Impervious Landuses Present:												
Soils	Roadway		Sidewalk		Driveway		Building		Channel		Subtotals	
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Gl					1.10	98	0.04	98			1.15	112.52
Subtotal Area												
Pervious Landuses Present:												
Soils	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Gl							0.14	69			0.14	9.78
Subtotal Area												
					Pervious Area Calculations		Total Pervious Area				0.14	
							Composite Pervious Curve Number				69	
					Impervious Area Calculations		Total Directly Connected Area				1.15	
							Total Indirectly Connected Area				0.00	
							Total Impervious Area				1.15	
							% X imp				89.01	
							% T imp				89.01	
Total Area Check											1.29	

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	0.14	0.71
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	3.41	46.07	0.25
Impervious	2.0	2.07	98	0.013



Project Name: 7456 McLean Road and
197 Brock Road South

D.A. NAME 203
D.A. AREA (ha) 0.08

Project Number: 2792-7289

Created By: MI
Reviewed By: CM

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:														
Soils	Roadway		Sidewalk		Driveway		House		SWMF		Subtotals			
	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:														
Soils	Woodland		Meadow		Dirt Area		Lawn		Cultivated		Subtotals			
	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			A*RC
				RC	Area	RC	Area	RC	Area	RC	Area		
Woodland	10	0.00	0.00	0.00	0	0	0	0	0	0	0	0.00	
Meadow	8	0.00	0	0.00	0	0	0	0	0	0	0	0	
Dirt Area	3	0.00	0	0.00	0	0	0	0	0	0	0	0	
Lawn	5	0.08	0.41	0.20	0.08	0	0	0	0	0	0	0	
Cultivated	7	0.00	0	0.00	0	0	0	0	0	0	0	0	
Impervious	2	0.00	0	0.00	0	0	0	0	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: 0.05 Appropriate Method: Airport



Project Name: 7456 McLean Road and 197
Brock Road South

D.A. NAME 204

D.A. AREA (ha) 0.06

Project Number: 2792-7289

Created By: MI

Reviewed By: CM

**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	0.06
				0
				0
				0
Total Area Check				0.06

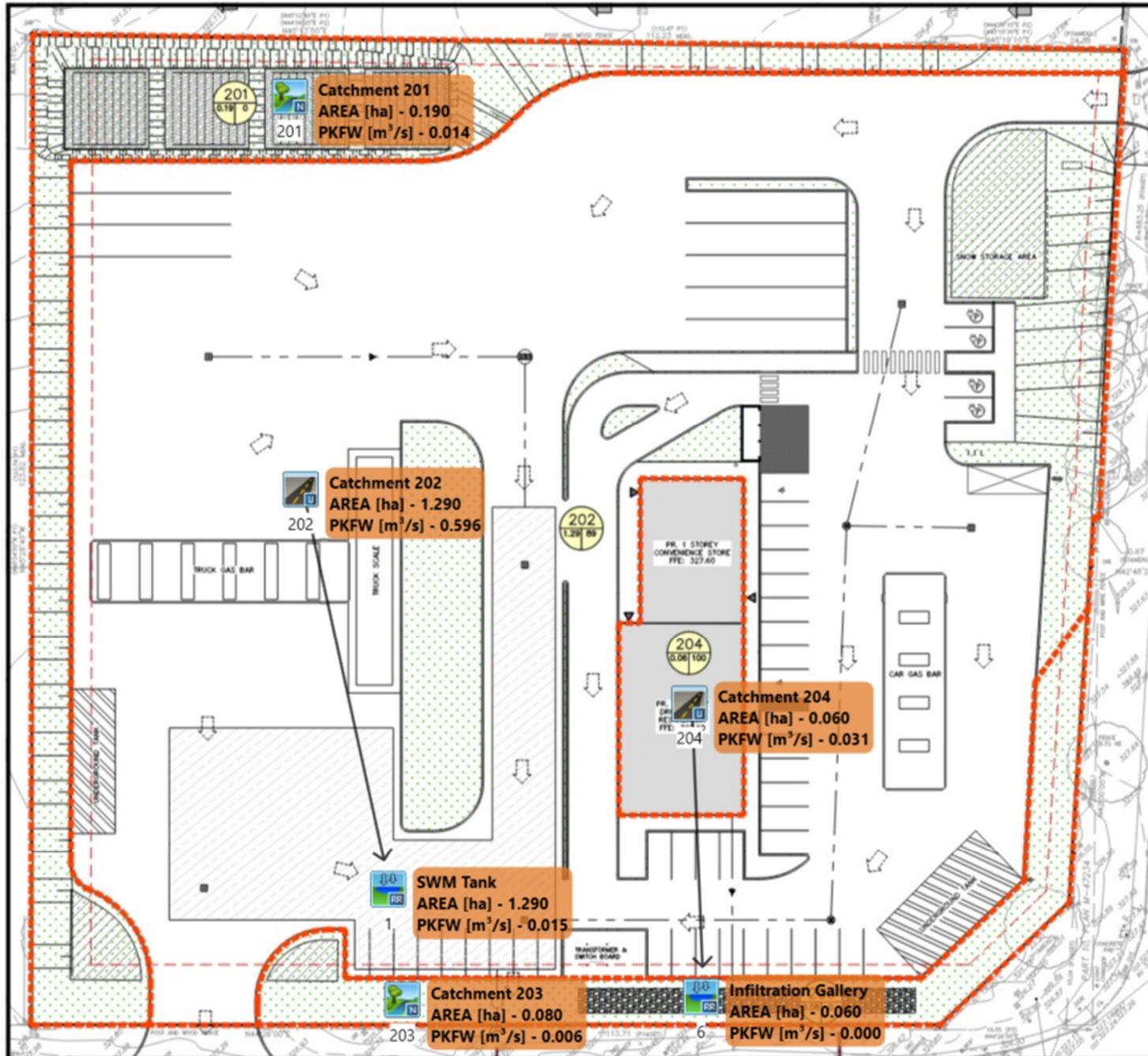
Impervious Landuses Present:													
Soils	Roadway		Sidewalk		Driveway		Building		Channel		Subtotals		
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN	
GI							0.06	98			0.06	5.96	
Subtotal Area													
Pervious Landuses Present:													
Soils	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals		
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN	
GI											0.00	0.00	
Subtotal Area													
						Pervious Area Calculations		Total Pervious Area			0.00		
								Composite Pervious Curve Number			#DIV/0!		
						Impervious Area Calculations		Total Directly Connected Area			0.06		
								Total Indirectly Connected Area			0.00		
								Total Impervious Area			0.06		
								% X imp			100.00		
									% T imp			100.00	
Total Area Check											0.06		

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	0.00	0.00
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	-	-	-	0.25
Impervious	2.0	1.00	45	0.013

Post-Development Visual-Oththymo Schematic



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V V I SSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
W I SSSS UUUU A A LLLLL

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000 TTTT TTTT H H Y Y M M 000 TM
O O T T H H Y Y M M O O
O O T T H H Y Y M M O O
000 T T H H Y M M 000

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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\620175ad-17
 Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\620175ad-17

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

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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN 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 | Area (ha)= 0.81 Curve Number (CN)= 64.0
| NASHYD ( 0101) | Ia (mm)= 8.00 # of Linear Res.(N)= 3.00
| ID= 1 DT= 5.0 min | 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	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 | Area (ha)= 0.81 Curve Number (CN)= 64.0
| NASHYD ( 0102) | Ia (mm)= 8.00 # of Linear Res.(N)= 3.00
| ID= 1 DT= 5.0 min | 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	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.

FINISH

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V V I SSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U A A A A L
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000 TTTT TTTT H H Y Y M M 000 TM
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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\2c18dd30-c8
 Summary filename: C:\Users\cmartin\AppData\Local\Civica\VH5\d2e6ca24-c59f-40b3-9508-3160722ae988\2c18dd30-c8

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

USER:

COMMENTS: _____

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

CHICAGO STORM
Ptotal= 47.37 mm

IDF curve parameters: A= 721.920
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)
ID= 1 DT= 5.0 min

Area (ha)= 0.81 Curve Number (CN)= 64.0
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)
ID= 1 DT= 5.0 min

Area (ha)= 0.81 Curve Number (CN)= 64.0
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.

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

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O O T T H H Y Y M M O O
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***** DETAILED OUTPUT *****

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:

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

CHICAGO STORM
Ptotal= 57.15 mm

IDF curve parameters: A= 822.740
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)
ID= 1 DT= 5.0 min

Area (ha)= 0.81 Curve Number (CN)= 64.0
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 A A A A L
 V V I SS U U A A L
 V V I SSSSS UUUU A A LLLL

000 TTTT TTTT H H Y Y M M 000 TM
 O O T T H H Y Y MM MM O O
 O O T T H H Y Y M M O O
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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\voindat
 Output filename: C:\Users\cmartin\AppData\Local\Civica\vh5\d2e6ca24-c59f-40b3-9508-3160722ae988\4f56e50-9a
 Summary filename: C:\Users\cmartin\AppData\Local\Civica\vh5\d2e6ca24-c59f-40b3-9508-3160722ae988\4f56e50-9a

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

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 (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.

```

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V V I SSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L L L L
W V I SSSS UUUU A A L L L L

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000 TTTT TTTT H H Y Y M M 000 TM
O O T T H H Y Y M M O O
O O T T H H Y Y M M O O
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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\voim.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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN 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.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN 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.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN 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 SSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L L L L
W V I SSSS UUUU A A L L L L

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000 TTTT TTTT H H Y Y M M 000 TM
O O T T H H Y Y M M O O
O O T T H H Y M M O O
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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\voim.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	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 (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	4.11	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	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	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.

```

=====
V V I SSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
W W I SSSS UUUU A A LLLLL

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000 TTTT TTTT H H Y Y M M 000 TM
O O T T H H Y Y M M O O
O O T T H H Y Y M M O O
000 T T H H Y Y M M 000

```

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***** DETAILED OUTPUT *****

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: 06-25-2025 TIME: 02:57:22

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)= 0.19 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)= 0.043
PEAK FLOW (cms)= 0.014 (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 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)= 1.29
ID= 1 DT=10.0 min Total Imp(%)= 89.01 Dir. Conn.(%)= 89.01

```

```

Surface Area (ha)= IMPERVIOUS 1.15 PERVIOUS (i) 0.14
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 2.07 3.41
Length (m)= 98.00 46.07
Mannings n = 0.013 0.250

```

```

Max. Eff. Inten. (mm/hr)= 185.45 50.12
over (min) 10.00 20.00
Storage Coeff. (min)= 1.58 (ii) 10.21 (ii)
Unit Hyd. Tpeak (min)= 10.00 20.00
Unit Hyd. peak (cms)= 0.17 0.08

```

```

PEAK FLOW (cms)= 0.59 0.01 *TOTALS* 0.596 (iii)
TIME TO PEAK (hrs)= 1.00 1.17 1.00
RUNOFF VOLUME (mm)= 69.21 22.25 64.05
TOTAL RAINFALL (mm)= 71.21 71.21 71.21
RUNOFF COEFFICIENT = 0.97 0.31 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--> QUT= 1
DT= 5.0 min
OUTFLOW STORAGE OUTFLOW STORAGE
(cms) (ha.m.) (cms) (ha.m.)
0.0000 0.0000 0.0132 0.0543
0.0050 0.0136 0.0149 0.0679
0.0086 0.0272 0.0154 0.0720
0.0111 0.0407 0.0000 0.0000

```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	1.290	0.596	1.00	64.05
OUTFLOW: ID= 1 (0001)	1.290	0.015	3.08	63.52

```

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.57
TIME SHIFT OF PEAK FLOW (min)=125.00
MAXIMUM STORAGE USED (ha.m.)= 0.0711

```

```

CALIB STANDHYD ( 0204) Area (ha)= 0.06
ID= 1 DT=10.0 min Total Imp(%)= 99.90 Dir. Conn.(%)= 99.90

```

```

Surface Area (ha)= IMPERVIOUS 0.06 PERVIOUS (i) 0.00
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 1.00 2.00
Length (m)= 45.00 45.00
Mannings n = 0.013 0.250

```

```

Max. Eff. Inten. (mm/hr)= 185.45 28.03
over (min) 10.00 20.00
Storage Coeff. (min)= 1.24 (ii) 13.83 (ii)
Unit Hyd. Tpeak (min)= 10.00 20.00
Unit Hyd. peak (cms)= 0.17 0.08

```

```

PEAK FLOW (cms)= 0.03 0.00 *TOTALS* 0.031 (iii)
TIME TO PEAK (hrs)= 1.00 1.17 1.00
RUNOFF VOLUME (mm)= 69.21 19.18 69.16
TOTAL RAINFALL (mm)= 71.21 71.21 71.21

```

RUNOFF COEFFICIENT = 0.97 0.27 0.97

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 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 (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0002
	0.0000	0.0000	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0204)	0.060	0.031	1.00	69.16
OUTFLOW: ID= 1 (0006)	0.060	0.000	0.25	0.30

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.05
 TIME SHIFT OF PEAK FLOW (min)= -45.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0041

```

V V I SSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A A L
VV I SSSS UUUU A A LLLL
  
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000 TTTT TTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T H H Y M M 000
  
```

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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: 06-25-2025 TIME: 02:57:23

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 hrs	RAIN 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)=	0.19	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)= 0.043

PEAK FLOW (cms)= 0.007 (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					
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)=	1.29	Dir. Conn.(%)=	89.01	
ID= 1 DT=10.0 min	Total Imp(%)=	89.01			

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.15	0.14
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	2.07	3.41
Length (m)=	98.00	46.07
Mannings n =	0.013	0.250

Max. Eff. Inten. (mm/hr)= 132.58 15.66
 over (min) 10.00 20.00
 Storage Coeff. (min)= 1.81 (ii) 15.55 (ii)
 Unit Hyd. Tpeak (min)= 10.00 20.00
 Unit Hyd. peak (cms)= 0.17 0.07

TOTALS
 PEAK FLOW (cms)= 0.42 0.00 0.423 (iii)
 TIME TO PEAK (hrs)= 1.00 1.17 1.00
 RUNOFF VOLUME (mm)= 45.37 10.36 41.51
 TOTAL RAINFALL (mm)= 47.37 47.37 47.37
 RUNOFF COEFFICIENT = 0.96 0.22 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 (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0132	0.0543
	0.0050	0.0136	0.0149	0.0679
	0.0086	0.0272	0.0154	0.0720
	0.0111	0.0407	0.0000	0.0000

AREA QPEAK TPEAK R.V.

INFLOW : ID= 2 (0202) (ha) (cms) (hrs) (mm)
 OUTFLOW: ID= 1 (0001) 1.290 0.423 1.00 41.51
 1.290 0.012 3.00 40.98

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.77
 TIME SHIFT OF PEAK FLOW (min)=120.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0448

CALIB
 STANDHYD (0204) | Area (ha)= 0.06
 ID= 1 DT=10.0 min | Total Imp(%)= 99.90 Dir. Conn.(%)= 99.90

IMPERVIOUS PERVIOUS (i)
 Surface Area (ha)= 0.06 0.00
 Dep. Storage (mm)= 2.00 5.00
 Average Slope (%)= 1.00 2.00
 Length (m)= 45.00 45.00
 Mannings n = 0.013 0.250
 Max.Eff.Inten.(mm/hr)= 132.58 13.09
 over (min) 10.00 20.00
 Storage Coeff. (min)= 1.41 (ii) 18.50 (ii)
 Unit Hyd. Tpeak (min)= 10.00 20.00
 Unit Hyd. peak (cms)= 0.17 0.08

TOTALS
 PEAK FLOW (cms)= 0.02 0.00 0.022 (iii)
 TIME TO PEAK (hrs)= 1.00 1.17 1.00
 RUNOFF VOLUME (mm)= 45.37 8.77 45.33
 TOTAL RAINFALL (mm)= 47.37 47.37 47.37
 RUNOFF COEFFICIENT = 0.96 0.19 0.96

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 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 (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0002
0.0000	0.0000	0.0000	0.0000

INFLOW : ID= 2 (0204) AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
 OUTFLOW: ID= 1 (0006) 0.060 0.022 1.00 45.33
 0.060 0.000 0.42 0.28

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.07
 TIME SHIFT OF PEAK FLOW (min)=35.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0027

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 A A A A L
 V V I SS U U A A L
 W I SSSSS UUUU A A LLLLL

000 TTTT TTTT H H Y Y M M 000 TM
 O O T T H H Y Y MM MM O O
 O O T T H H Y M M O O
 000 T T H H Y M M 000

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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\vojn.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: 06-25-2025 TIME: 02:57:22

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 hrs	RAIN 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)= 0.19 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)= 0.043
 PEAK FLOW (cms)= 0.010 (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
 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)= 1.29 Dir. Conn.(%)= 89.01
 ID= 1 DT=10.0 min | Total Imp(%)= 89.01

IMPERVIOUS PERVIOUS (i)
 Surface Area (ha)= 1.15 0.14
 Dep. Storage (mm)= 2.00 5.00
 Average Slope (%)= 2.07 3.41
 Length (m)= 98.00 46.07
 Mannings n = 0.013 0.250
 Max.Eff.Inten.(mm/hr)= 154.98 22.33

over (min) 10.00 20.00
 Storage Coeff. (min)= 1.70 (ii) 13.63 (ii)
 Unit Hyd. Tpeak (min)= 10.00 20.00
 Unit Hyd. peak (cms)= 0.17 0.07

TOTALS
 PEAK FLOW (cms)= 0.49 0.01 0.496 (iii)
 TIME TO PEAK (hrs)= 1.00 1.17 1.00
 RUNOFF VOLUME (mm)= 55.15 14.86 50.72
 TOTAL RAINFALL (mm)= 57.15 57.15 57.15
 RUNOFF COEFFICIENT = 0.97 0.26 0.89

***** 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)
 IN= 2---> OUT= 1
 DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0132	0.0543
0.0050	0.0136	0.0149	0.0679
0.0086	0.0272	0.0154	0.0720
0.0111	0.0407	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	1.290	0.496	1.00	50.72
OUTFLOW: ID= 1 (0001)	1.290	0.013	3.08	50.18

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.69
 TIME SHIFT OF PEAK FLOW (min)=125.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0554

CALIB
 STANDHYD (0204)
 ID= 1 DT=10.0 min

Area (ha)= 0.06
 Total Imp(%)= 99.90
 Dir. Conn.(%)= 99.90

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.06	0.00
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	45.00	45.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	154.98	18.79
over (min)	10.00	20.00
Storage Coeff. (min)=	1.33 (ii)	16.11 (ii)
Unit Hyd. Tpeak (min)=	10.00	20.00
Unit Hyd. peak (cms)=	0.17	0.07

TOTALS
 PEAK FLOW (cms)= 0.03 0.00 0.026 (iii)
 TIME TO PEAK (hrs)= 1.00 1.17 1.00
 RUNOFF VOLUME (mm)= 55.15 12.68 55.11
 TOTAL RAINFALL (mm)= 57.15 57.15 57.15
 RUNOFF COEFFICIENT = 0.97 0.22 0.96

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
 (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 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)
 IN= 2---> OUT= 1
 DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000

AREA	QPEAK	TPEAK	R.V.

(ha) (cms) (hrs) (mm)
 INFLOW : ID= 2 (0204) 0.060 0.026 1.00 55.11
 OUTFLOW: ID= 1 (0006) 0.060 0.000 0.25 0.30

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.06
 TIME SHIFT OF PEAK FLOW (min)= -45.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0033

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
 V V I SSSSS UUUU A A LLLLL

000 TTTT TTTT H H Y Y M M 000 TM
 O O T T H H Y Y MM MM O O
 O O T T H H Y M M O O
 000 T T H H Y M M 000

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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\voim.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: 06-25-2025 TIME: 02:57:22

USER:

COMMENTS:

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

CHICAGO STORM
 Ptotal= 30.88 mm

IDF curve parameters: A= 475.610
 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 hrs	RAIN 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)
 ID= 1 DT=10.0 min

Area (ha)= 0.19
 Ia (mm)= 5.00
 U.H. Tp(hrs)= 0.17
 Curve Number (CN)= 66.0
 # of Linear Res.(N)= 3.00

Unit Hyd Qpeak (cms)= 0.043

PEAK FLOW (cms)= 0.002 (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          |
| NASHYD ( 0203) |
| ID= 1 DT=10.0 min |
|-----|
Area (ha)= 0.08 Curve Number (CN)= 66.0
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) |
| ID= 1 DT=10.0 min |
|-----|
Area (ha)= 1.29 Dir. Conn.(%)= 89.01
Total Imp(%)= 89.01

```

```

IMPERVIOUS PERVIOUS (i)
Surface Area (ha)= 1.15 0.14
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 2.07 3.41
Length (m)= 98.00 46.07
Mannings n = 0.013 0.250
Max.Eff.Inten.(mm/hr)= 86.95 4.76
over (min)= 10.00 30.00
Storage Coeff. (min)= 2.15 (ii) 24.27 (ii)
Unit Hyd. Tpeak (min)= 10.00 30.00
Unit Hyd. peak (cms)= 0.17 0.04

```

```

*TOTALS*
PEAK FLOW (cms)= 0.28 0.00
TIME TO PEAK (hrs)= 1.00 1.33
RUNOFF VOLUME (mm)= 28.88 4.27
TOTAL RAINFALL (mm)= 30.88 30.88
RUNOFF COEFFICIENT = 0.94 0.14 0.85

```

***** 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) |
| IN= 2--> OUT= 1 |
| DT= 5.0 min |
|-----|

```

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0132	0.0543
0.0050	0.0136	0.0149	0.0679
0.0086	0.0272	0.0154	0.0720
0.0111	0.0407	0.0000	0.0000

INFLOW : ID= 2 (0202)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	1.290	0.275	1.00	26.17
OUTFLOW: ID= 1 (0001)	1.290	0.009	3.00	25.64

```

PEAK FLOW REDUCTION [Qout/Qin](%)= 3.14
TIME SHIFT OF PEAK FLOW (min)=120.00
MAXIMUM STORAGE USED (ha.m.)= 0.0274

```

```

-----
| CALIB          |
| STANDHYD ( 0204) |
| ID= 1 DT=10.0 min |
|-----|
Area (ha)= 0.06 Dir. Conn.(%)= 99.90
Total Imp(%)= 99.90

```

```

IMPERVIOUS PERVIOUS (i)
Surface Area (ha)= 0.06 0.00
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 1.00 2.00
Length (m)= 45.00 45.00
Mannings n = 0.013 0.250
Max.Eff.Inten.(mm/hr)= 86.95 3.93

```

```

over (min)= 10.00 30.00
Storage Coeff. (min)= 1.67 (ii) 29.31 (ii)
Unit Hyd. Tpeak (min)= 10.00 30.00
Unit Hyd. peak (cms)= 0.17 0.06

```

```

*TOTALS*
PEAK FLOW (cms)= 0.01 0.00 0.014 (iii)
TIME TO PEAK (hrs)= 1.00 1.33 1.00
RUNOFF VOLUME (mm)= 28.88 3.56 28.86
TOTAL RAINFALL (mm)= 30.88 30.88 30.88
RUNOFF COEFFICIENT = 0.94 0.12 0.93

```

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

```

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 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) |
| IN= 2--> OUT= 1 |
| DT= 5.0 min |
|-----|

```

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0002
0.0000	0.0000	0.0000	0.0000

INFLOW : ID= 2 (0204)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0204)	0.060	0.014	1.00	28.86
OUTFLOW: ID= 1 (0006)	0.060	0.000	0.58	0.26

```

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.11
TIME SHIFT OF PEAK FLOW (min)=-25.00
MAXIMUM STORAGE USED (ha.m.)= 0.0017

```

```

=====
V V I SSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
VV I SSSS UUUU A A LLLL

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000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000

```

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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: 06-25-2025 TIME: 02:57:23

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)= 0.19 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)= 0.043

PEAK FLOW (cms)= 0.012 (i)
 TIME TO PEAK (hrs)= 1.000
 RUNOFF VOLUME (mm)= 17.517
 TOTAL RAINFALL (mm)= 64.054
 RUNOFF COEFFICIENT = 0.273

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

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)= 1.29 Dir. Conn.(%)= 89.01
 ID= 1 DT=10.0 min Total Imp(%)= 89.01

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.15	0.14
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	2.07	3.41
Length (m)=	98.00	46.07
Mannings n =	0.013	0.250

Max. Eff. Inten. (mm/hr)= 170.70 41.81
 over (min) 10.00 20.00
 Storage Coeff. (min)= 1.64 (ii) 10.92 (ii)
 Unit Hyd. Tpeak (min)= 10.00 20.00
 Unit Hyd. peak (cms)= 0.17 0.08

TOTALS
 PEAK FLOW (cms)= 0.54 0.01 0.548 (iii)
 TIME TO PEAK (hrs)= 1.00 1.17 1.00
 RUNOFF VOLUME (mm)= 62.05 18.36 57.25
 TOTAL RAINFALL (mm)= 64.05 64.05 64.05
 RUNOFF COEFFICIENT = 0.97 0.29 0.89

***** 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 (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0132	0.0543
0.0050	0.0136	0.0149	0.0679
0.0086	0.0272	0.0154	0.0720
0.0111	0.0407	0.0000	0.0000

AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
 INFLOW : ID= 2 (0202) 1.290 0.548 1.00 57.25
 OUTFLOW: ID= 1 (0001) 1.290 0.014 3.08 56.72

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.61
 TIME SHIFT OF PEAK FLOW (min)=125.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0631

CALIB STANDHYD (0204) Area (ha)= 0.06 Dir. Conn.(%)= 99.90
 ID= 1 DT=10.0 min Total Imp(%)= 99.90

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.06	0.00
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	45.00	45.00
Mannings n =	0.013	0.250
Max. Eff. Inten. (mm/hr)=	170.70	23.25
over (min)	10.00	20.00
Storage Coeff. (min)=	1.28 (ii)	14.85 (ii)
Unit Hyd. Tpeak (min)=	10.00	20.00
Unit Hyd. peak (cms)=	0.17	0.07

PEAK FLOW (cms)= 0.03 0.00 *TOTALS*
 TIME TO PEAK (hrs)= 1.00 1.17 1.00
 RUNOFF VOLUME (mm)= 62.05 15.75 62.01
 TOTAL RAINFALL (mm)= 64.05 64.05 64.05
 RUNOFF COEFFICIENT = 0.97 0.25 0.97

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 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 (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0002
0.0000	0.0000	0.0000	0.0000

AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
 INFLOW : ID= 2 (0204) 0.060 0.028 1.00 62.01
 OUTFLOW: ID= 1 (0006) 0.060 0.000 0.25 62.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.06
 TIME SHIFT OF PEAK FLOW (min)=-45.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0037

FINISH

V V I SSSS U U A L (v 6.2.2015)
 V V I SS U U A A L
 V V I SS U U A A A A L
 V V I SS U U A A L
 VV I SSSS UUUU A A LLLLL
 000 TTTTT TTTTT H H Y Y M M 000 TM

O O T T H H Y Y MM MM O O
 O O T T H H Y M M O O
 000 T T H H Y M M 000
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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\voindat
 Output filename: C:\Users\cmartin\AppData\Local\Civica\XH5\d2e6ca24-c59f-40b3-9508-3160722ae988\786a5ce5-4f
 Summary filename: C:\Users\cmartin\AppData\Local\Civica\XH5\d2e6ca24-c59f-40b3-9508-3160722ae988\786a5ce5-4f

DATE: 06-25-2025 TIME: 02:57:22

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)^AC
 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)= 0.19 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)= 0.043
 PEAK FLOW (cms)= 0.005 (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 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)= 1.29
 ID= 1 DT=10.0 min Total Imp(%)= 89.01 Dir. Conn.(%)= 89.01

IMPERVIOUS PERVIOUS (i)
 Surface Area (ha)= 1.15 0.14
 Dep. Storage (mm)= 2.00 5.00
 Average Slope (%)= 2.07 3.41
 Length (m)= 98.00 46.07
 Mannings n = 0.013 0.250
 Max.Eff.Inten.(mm/hr)= 114.88 11.32
 over (min) 10.00 20.00
 Storage Coeff. (min)= 1.92 (ii) 17.56 (ii)
 Unit Hyd. Tpeak (min)= 10.00 20.00
 Unit Hyd. peak (cms)= 0.17 0.06

PEAK FLOW (cms)= 0.36 0.00 *TOTALS*
 TIME TO PEAK (hrs)= 1.00 1.17 1.00
 RUNOFF VOLUME (mm)= 38.45 7.56 35.05
 TOTAL RAINFALL (mm)= 40.45 40.45 40.45
 RUNOFF COEFFICIENT = 0.95 0.19 0.87

***** 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 (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0132	0.0543
0.0050	0.0136	0.0149	0.0679
0.0086	0.0272	0.0154	0.0720
0.0111	0.0407	0.0000	0.0000

AREA OPEAK TPEAK R.V.
 (ha) (cms) (hrs) (mm)
 INFLOW : ID= 2 (0202) 1.290 0.366 1.00 35.05
 OUTFLOW: ID= 1 (0001) 1.290 0.010 3.00 34.52

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.87
 TIME SHIFT OF PEAK FLOW (min)=120.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0374

CALIB STANDHYD (0204) Area (ha)= 0.06
 ID= 1 DT=10.0 min Total Imp(%)= 99.90 Dir. Conn.(%)= 99.90

IMPERVIOUS PERVIOUS (i)
 Surface Area (ha)= 0.06 0.00
 Dep. Storage (mm)= 2.00 5.00
 Average Slope (%)= 1.00 2.00
 Length (m)= 45.00 45.00
 Mannings n = 0.013 0.250
 Max.Eff.Inten.(mm/hr)= 114.88 9.41
 over (min) 10.00 30.00
 Storage Coeff. (min)= 1.50 (ii) 20.99 (ii)
 Unit Hyd. Tpeak (min)= 10.00 30.00
 Unit Hyd. peak (cms)= 0.17 0.06

PEAK FLOW (cms)= 0.02 0.00 *TOTALS*
 TIME TO PEAK (hrs)= 1.00 1.33 1.00
 RUNOFF VOLUME (mm)= 38.45 6.35 38.42
 TOTAL RAINFALL (mm)= 40.45 40.45 40.45
 RUNOFF COEFFICIENT = 0.95 0.16 0.95

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 61.0 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) |
| IN= 2----> OUT= 1 |
| DT= 5.0 min      |
-----

```

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0002
0.0000	0.0000	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0204)	0.060	0.019	1.00	38.42
OUTFLOW: ID= 1 (0006)	0.060	0.000	0.42	0.28

PEAK FLOW REDUCTION	[Qout/Qin](%)=	0.09
TIME SHIFT OF PEAK FLOW	(min)=	-35.00
MAXIMUM STORAGE USED	(ha.m.)=	0.0023

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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: 2025-07-23

**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 (m²) = 1358
 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	136	0.0050	0.0050	0.0136
0.20	0.20	272	0.0086	0.0086	0.0272
0.30	0.30	407	0.0111	0.0111	0.0407
0.40	0.40	543	0.0132	0.0132	0.0543
0.50	0.50	679	0.0149	0.0149	0.0679
0.53	0.53	720	0.0154	0.0154	0.0720

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.



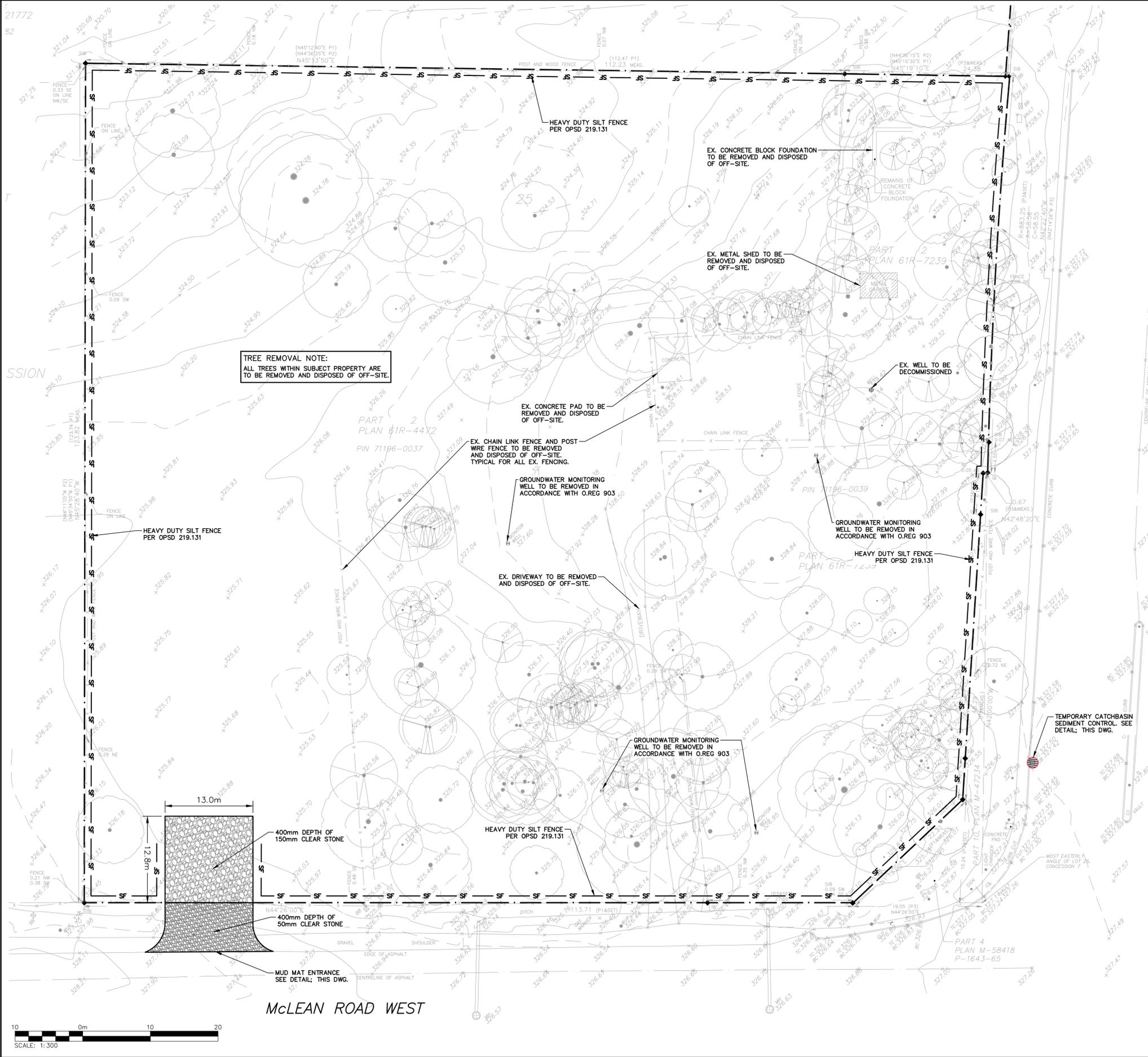
Mitigation Analysis

Project: 7456 McLean Road West
 Project No: 2792-7289
 Date: 22-Jul-25
 Created by: CM
 Checked by: JB

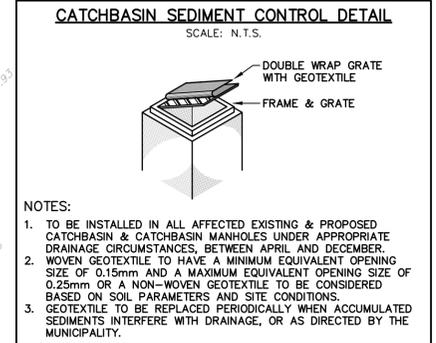
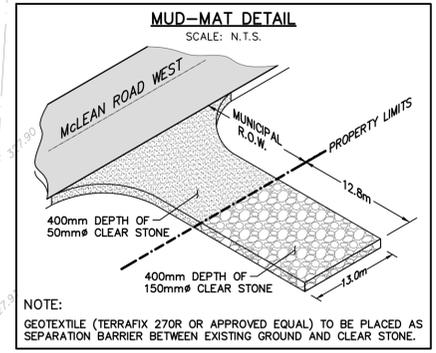
DESIGN PARAMETERS						
LID Identity	Approximate Land Area ¹ (m ²)	Annual Percipitation (mm/yr)	Approximate Evapotranspiration ² (mm/yr)	Design Percipitation (mm/yr)	Runoff (mm/yr)	Total Available Infiltration Volume (m ³ /yr)
Infiltration Gallery	614	916	585	331	331	203
TOTAL WITH MITIGATION	614					203
REQUIRED STORAGE						
Available Infiltration Volume (m ³ /yr)	Annual Events Producing Runoff ³	Capacity	Storage Required (m ³)			
203	40	0.4	12.7			
UNDERGROUND STORAGE VOLUME OF PROPOSED LIDS						
LID Identity	Length (m)	Width (m)	Depth (m)	Total Underground Volume (m ³)	Void Ratio	Underground Storage Volume (m ³)
Infiltration Gallery	42	3	0.85	107.1	0.4	42.84
Storage Required (m³)						12.7
Underground Storage Provided (m³)						42.8

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)

DRAWINGS

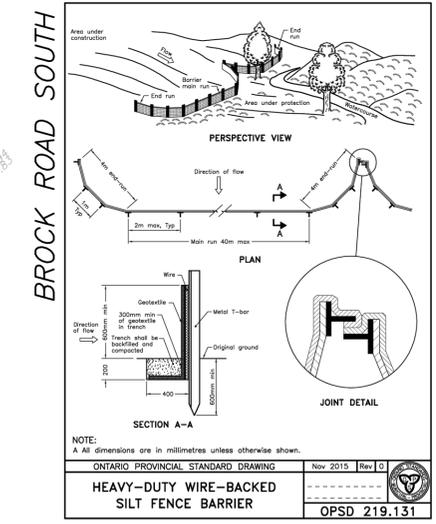


TREE REMOVAL NOTE:
ALL TREES WITHIN SUBJECT PROPERTY ARE TO BE REMOVED AND DISPOSED OF OFF-SITE.



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



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/MM/DD

ELEVATION NOTE:
ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.592

BEARING NOTE:
BEARINGS ARE ASTROMONIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPT COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC. DATED: NOV. 14, 2024 DRAWING No. A101

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- 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.

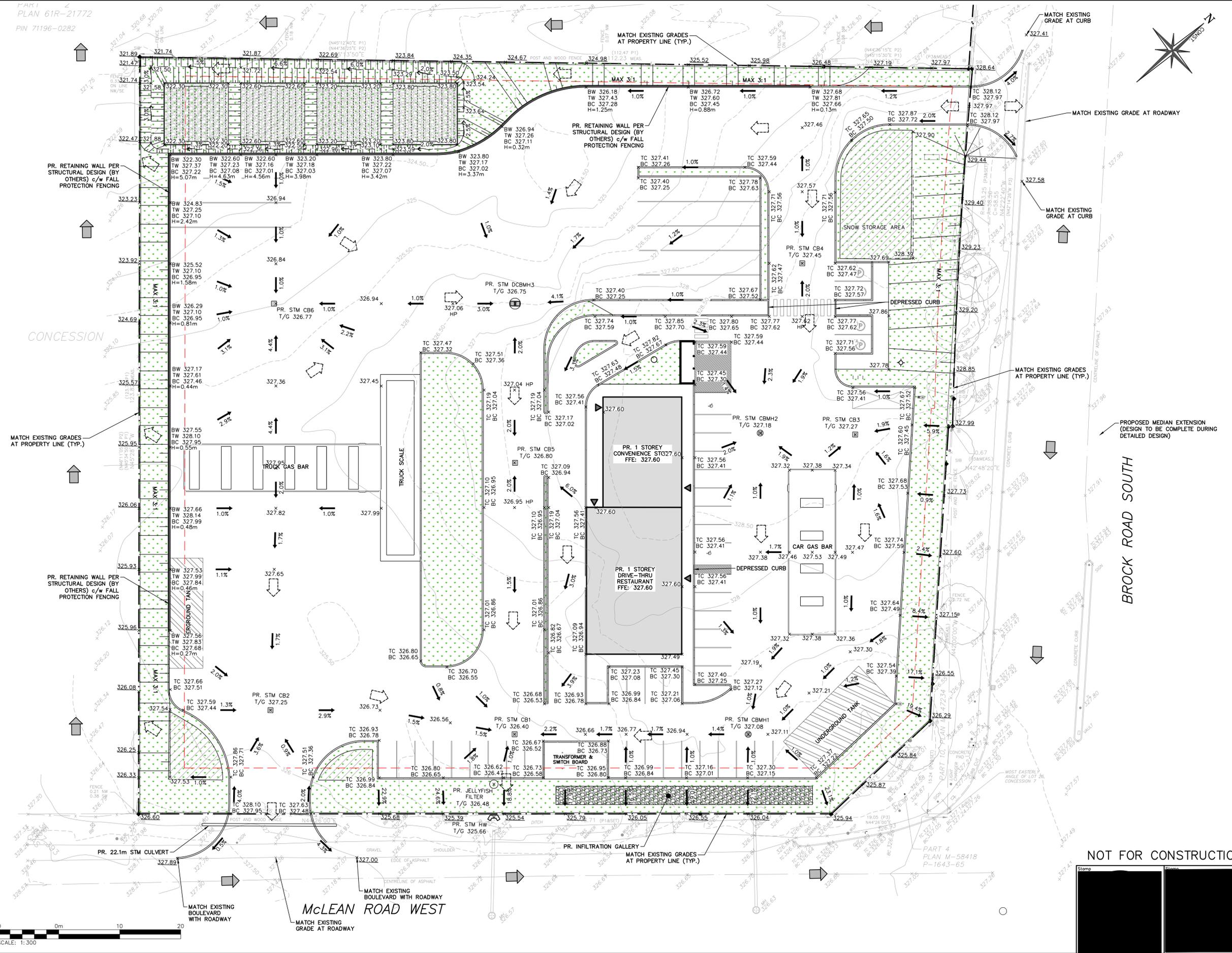
Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWNSHIP OF PUSLINCH

Drawing
PRELIMINARY EROSION, SEDIMENT CONTROL AND REMOVALS PLAN

NOT FOR CONSTRUCTION



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



LEGEND

- PROPERTY LINE
- - - EXISTING CONTOUR (0.5m)
- - - EXISTING CONTOUR (1.0m)
- - - EXISTING DITCH
- - - EXISTING FENCE
- - - EXISTING GRADE
- - - x215.00 PROPOSED GRADE
- - - x215.00 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

No.	ISSUE / REVISION	YYYY/MM/DD
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 CGVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.52

BEARING NOTE:
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SURVEY NOTES:
 SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPR7. COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
 DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC. DATED: NOV. 14, 2024. DRAWING No. A101

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

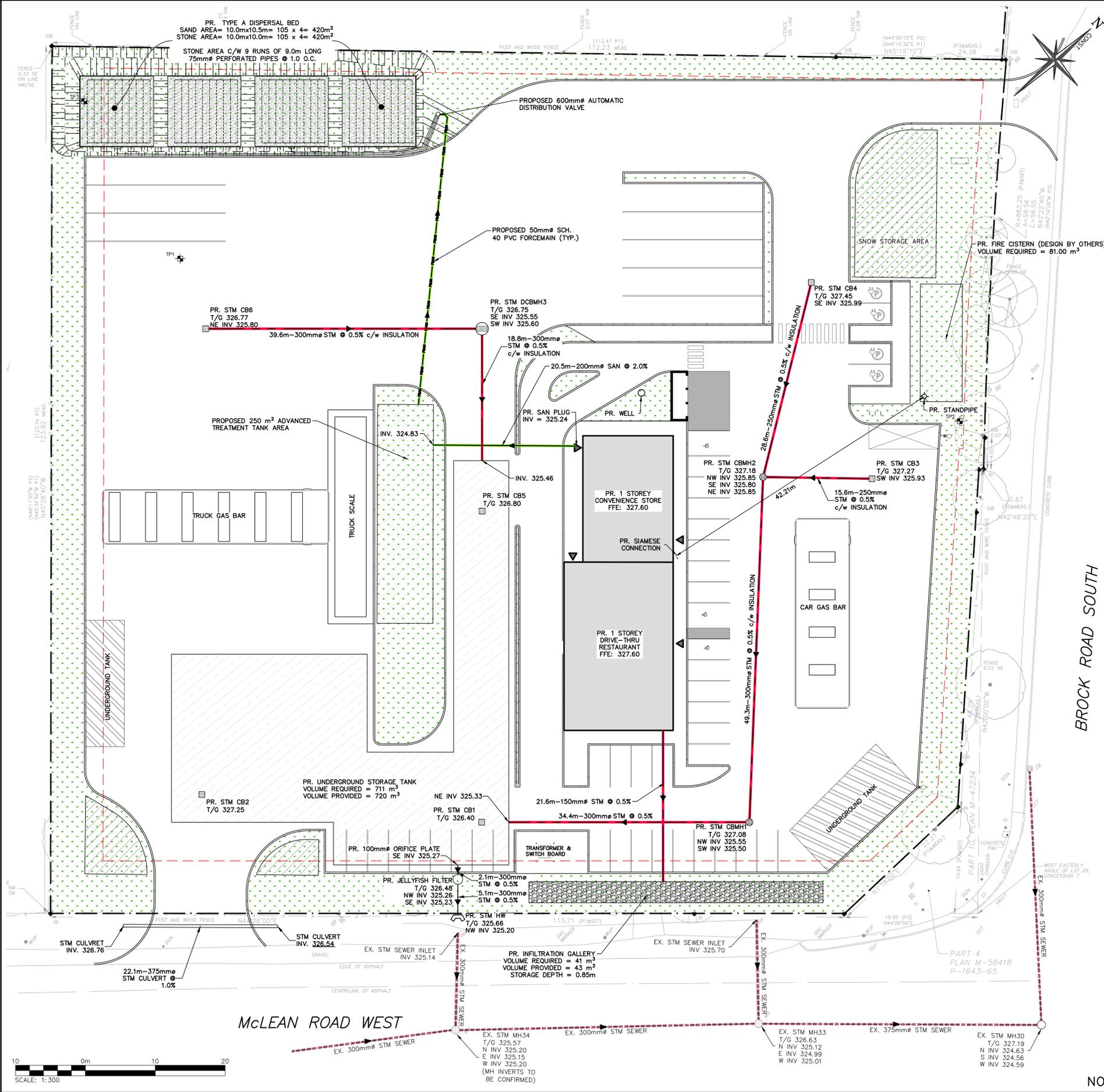
Drawing
PRELIMINARY SITE GRADING PLAN

NOT FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS
 2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

Drawn	M.I.M.	Design	B.W.	Project No.	2792-7289
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 102





SEWAGE SYSTEM NOTES

1. PROPOSED SEWAGE SYSTEM CONSTRUCTION TO BE UNDERTAKEN IN ACCORDANCE WITH THE ONTARIO BUILDING CODE, ONTARIO MINISTRY OF ENVIRONMENT, AND THE MANUFACTURER'S RECOMMENDATIONS.
2. INSTALLATION OF ALL COMPONENTS OF THE SEWAGE SYSTEM TO BE COMPLETED BY A LICENSED AND REGISTERED ON-SITE SEWAGE SYSTEM INSTALLER IN THE PROVINCE OF ONTARIO.
3. THE CONTRACTOR SHALL COORDINATE AND PAY FOR ALL NECESSARY INSPECTIONS WITH THE TOWN AND OTHER AUTHORITIES PERTAINING TO THE INSTALLATION OF THEIR WORK.
4. CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES AND EXISTING SEWER 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 OPSSS.
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 GALVANIZED OR STAINLESS STEEL.
13. ALL JOINTS BELOW THE HIGH WATER LEVEL IN PRECAST TANKS TO BE SEALED WITH MASTIC SEALANT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS FOR WATER TIGHT SEAL. ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH CAST IN RUBBER BOOT FOR WATER TIGHT SEAL. UNLESS OTHERWISE NOTED ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH TEES.
14. ALL TANKS TO BE PROVIDED WITH PRECAST CONCRETE OR PVC ACCESS RISERS TO GRADE. HATCHES TO BE BOLTED AND CASKETS AND ACCESSIBLE AT GRADE. ALL CIRCULAR HATCHES TO BE 600 MM DIAMETER POLYKOR RISER WITH CAST IN ADAPTOR. ALL SQUARE ACCESS OPENINGS TO BE EQUIPPED WITH CONCRETE RISERS. VENTED HATCHES TO BE PROVIDED ON TANKS CONTAINING PUMPS.
15. A TANK SHALL NOT BE COVERED BY SOIL OR LEACHING BED FILL HAVING A DEPTH GREATER THAN THE MAXIMUM DEPTH OF BURIAL THAT THE TANK IS DESIGNED TO WITHSTAND.
16. EXISTING SOILS SHALL BE SCARIFIED AT A RIGHT ANGLE TO THE DIRECTION OF LATERAL SEWAGE FLOW IN THE LEACHING BED PRIOR TO IMPORTING FILL OR INSTALLING DISTRIBUTION PIPE STONE LAYER.
17. WHEN THE IMPORTATION OF FILL IS REQUIRED, FILL SHOULD BE END-DUMPED AND GRADED PROGRESSIVELY OVER THE PREPARED SITE AREA WITH TRACK MOUNTED EQUIPMENT.
18. ALL ELEVATIONS TO BE VERIFIED PRIOR TO BACKFILL.
19. ALL FILL MATERIAL PLACED BENEATH TANKS TO BE COMPACTED TO 95%.
20. ALL DISTURBED AREAS TO BE TOPSOILED (100MM MINIMUM) AND SEEDING COMPLETE WITH FERTILIZER AND MULCH IN ACCORDANCE WITH OPSSS.
21. THE INSTALLING CONTRACTOR SHALL INSTALL THE SEWAGE SYSTEM USING A TRANSIT/LEVEL AND SHALL PROVIDE SAME FOR INSPECTION OF ANY COMPONENT.
22. UNLESS OTHERWISE NOTED, ALL LEVEL IV TREATMENT UNITS SHALL BE PROVIDED FROM A MANUFACTURER THAT IS CERTIFIED BY CAN/BNO 3680-600 TO PROVIDE A LEVEL OF TREATMENT IN ACCORDANCE WITH OBC TABLE 8.6.2.2 PROVIDING AN EFFLUENT CRITERIA OF 10mg/L SUSPENDED SOLIDS, AND 10mg/L OF COBODS.
23. ALL TREATMENT UNITS THAT CONTAIN MECHANICAL COMPONENTS SHALL BE EQUIPPED WITH AN AUDIBLE AND VISUAL WARNING ALARM, LOCATED TO WARN THE OCCUPANTS OF THE BUILDING SERVED OR THE OPERATOR OF THE TREATMENT UNIT OF A MALFUNCTION IN THE OPERATION OF THE TREATMENT UNIT.
24. THE CONTRACTOR WILL ENSURE THAT EVERY OPERATOR OF A TREATMENT UNIT SHALL OBTAIN, FROM THE MANUFACTURER OR DISTRIBUTOR OF THE TREATMENT UNIT, LITERATURE THAT DESCRIBES THE UNIT IN DETAIL AND PROVIDES COMPLETE INSTRUCTIONS REGARDING THE OPERATION, SERVICING, AND MAINTENANCE REQUIREMENTS OF THE UNIT AND ITS RELATED COMPONENTS NECESSARY TO ENSURE THE CONTINUED PROPER OPERATION IN ACCORDANCE WITH THE ORIGINAL DESIGN AND SPECIFICATIONS.
25. ALL IMPORTED SAND FILL TO HAVE A T-TIME OF 6 TO 10 MIN/CM AND A SILT/CLAY CONTENT OF NO MORE THAN 5% AND SHALL BE VERIFIED IN WRITING BY A SOIL TESTING FIRM AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT.
26. SEWAGE SYSTEM HAS BEEN DESIGNED TO RECEIVE DOMESTIC STRENGTH WASTEWATER. ALL SANITARY WASTEWATER FROM THE BUILDINGS MUST MEET THE APPLICABLE SEWER USE BYLAW LIMITS PRIOR TO DISCHARGE TO ADVANCED TREATMENT SYSTEM.



LEGEND

- PROPERTY LINE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- PROPOSED WATERMAIN & GATE VALVE
- PROPOSED STANDPIPE
- PROPOSED SIAMASE CONNECTION
- PROPOSED WELL
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY FORCEMAIN
- TP# TEST PIT LOCATION

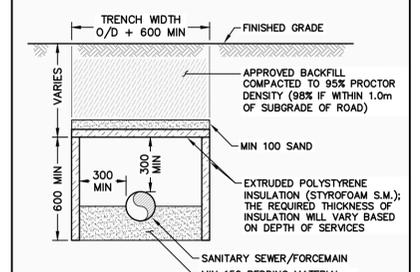
SWM TANK SECTION
SCALE: N.T.S.

GROUND SURFACE=326.40
TOP OF TANK=325.80
BOTTOM OF TANK=325.27
GROUNDWATER=324.19

ON-SITE SEWAGE DESIGN

DAILY DESIGN FLOW REFER TO FSR REPORT FOR DETAILS	TOTAL DESIGN FLOW = 20,000 L/DAY
ADVANCED TREATMENT SYSTEM	TO BE DETERMINED DURING DETAILED DESIGN
SOIL PERCOLATION RATE	T = 15 min/cm (DETERMINED BY C.F. CROZIER)
TYPE A DISPERSAL BED STONE AREA	Q/50 = 20,000/50 REQUIRED = 400 m ² PROVIDED = 420 m ²
TYPE A DISPERSAL BED SAND AREA	QT/850 = 20,000*15/850 REQUIRED = 352 m ² PROVIDED = 420 m ²

INSULATION FOR SHALLOW SANITARY SERVICES
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.
 3. MINIMUM COVER REQUIREMENTS: - SANITARY SEWER 1.0m

2	ISSUED FOR SECOND SUBMISSION (ZBA)	2025/AUG/01
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0	ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20
No.	ISSUE / REVISION	YYYY/MM/DD

ELEVATION NOTE:
ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD28-78, AND WERE DERIVED FROM TOWNSHIP OF PUSLINC BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.52.

BEARING NOTE:
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SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPRP COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC. DATED: NOV. 14, 2024 DRAWING No. A101

DRAWING NOTES:
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Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWNSHIP OF PUSLINC

Drawing
PRELIMINARY SITE SERVICING PLAN

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

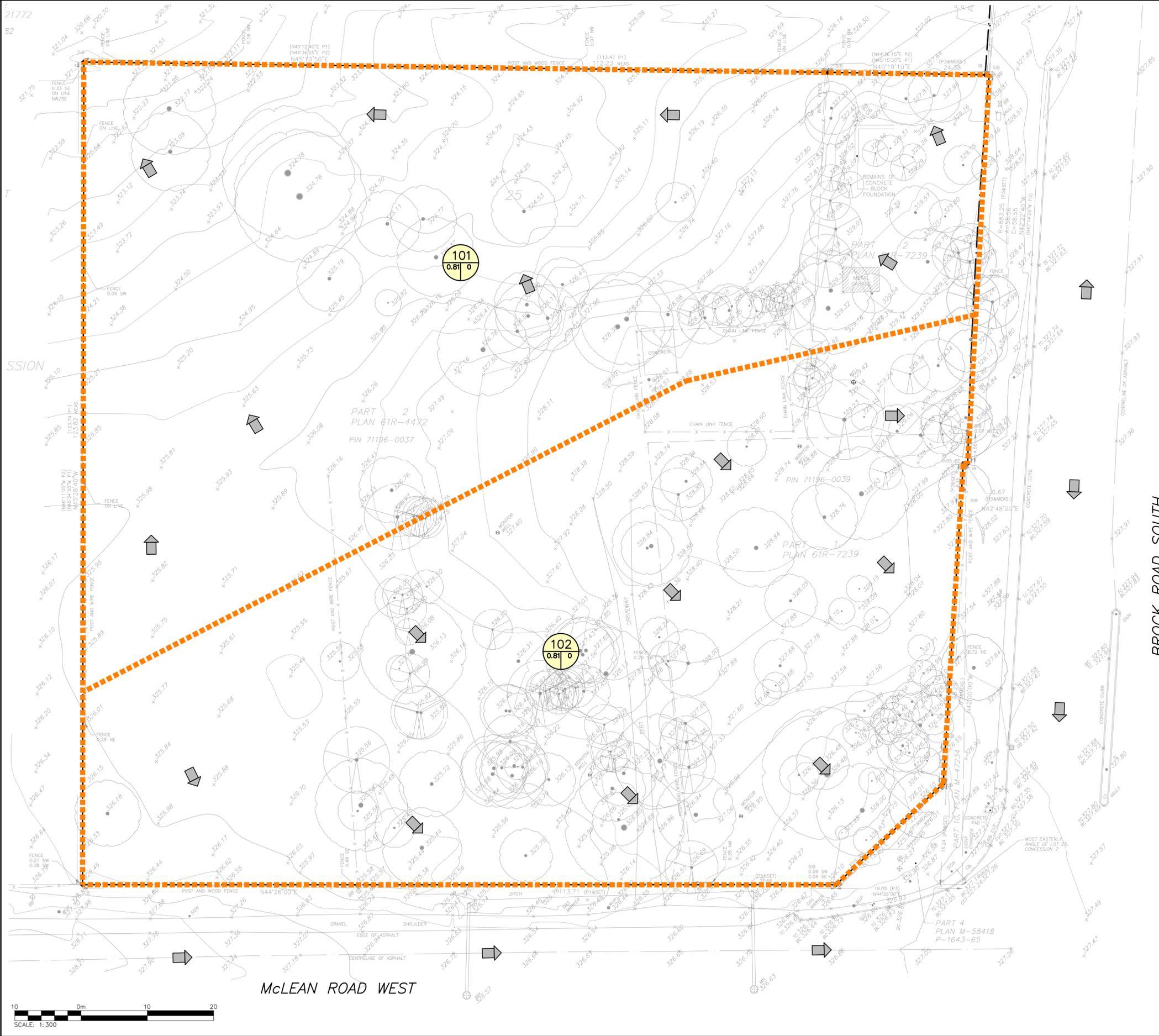
Drawn	M.I.M.	Design	B.W.	Project No.	2792-7289
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 103

NOT FOR CONSTRUCTION



c:\Users\egan.iev\OneDrive\Documents\crozier consulting engineers\2792-7289 - 7456 mclean rd w & 197 brock rd s\project files\Civil_Sheets\7289_C103.dwg, 8/1/2025 9:48:05 AM, AutoCAD PDF (General Documentation).pc3

FIGURES



LEGEND

- PROPERTY LINE
- - - EXISTING CONTOUR (0.5m)
- - - EXISTING CONTOUR (1.0m)
- × 215.00 EXISTING GRADE
- ➔ EXISTING OVERLAND FLOW DIRECTION
- PRE-DEVELOPMENT STORM DRAINAGE CATCHMENT AREA
- ⊙ ID
- AREA (ha) | % IMPERVIOUSNESS

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

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/MM/DD

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SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPR1 COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY RICHARD ZIEGLER ARCHITECT INC. DATED: NOV. 14, 2024 DRAWING No. A101

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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 PRE-DEVELOPMENT DRAINAGE PLAN

NOT FOR CONSTRUCTION

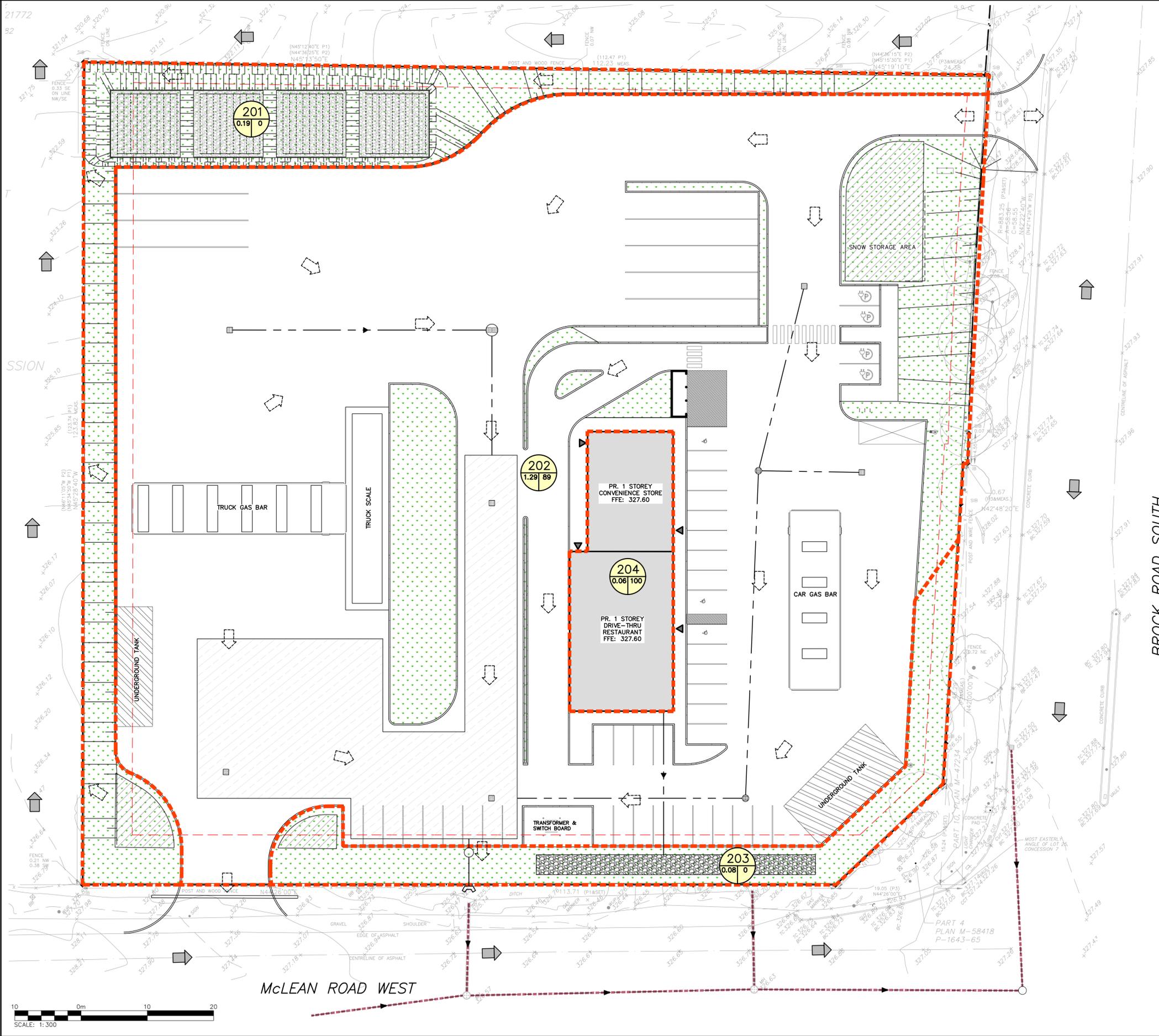
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CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

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

- PROPERTY LINE
- - - EXISTING CONTOUR (0.5m)
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- EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED OVERLAND FLOW DIRECTION
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- POST-DEVELOPMENT CATCHMENT AREA
- ID
A/IMP CATCHMENT I.D.
- AREA (ha) | % IMPERVIOUSNESS

2	ISSUED FOR SECOND SUBMISSION (ZBA)	2025/AUG/01
1	ISSUED FOR COORDINATION	2025/JUL/18
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SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED.
PROJECT FILE No. 9625-SRPR1
COMPLETED OCTOBER 20, 2022

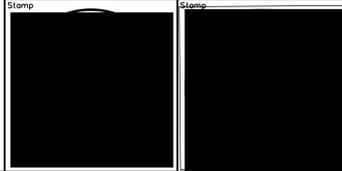
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Project
**7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH**

Drawing
**PRELIMINARY POST-DEVELOPMENT
DRAINAGE PLAN**

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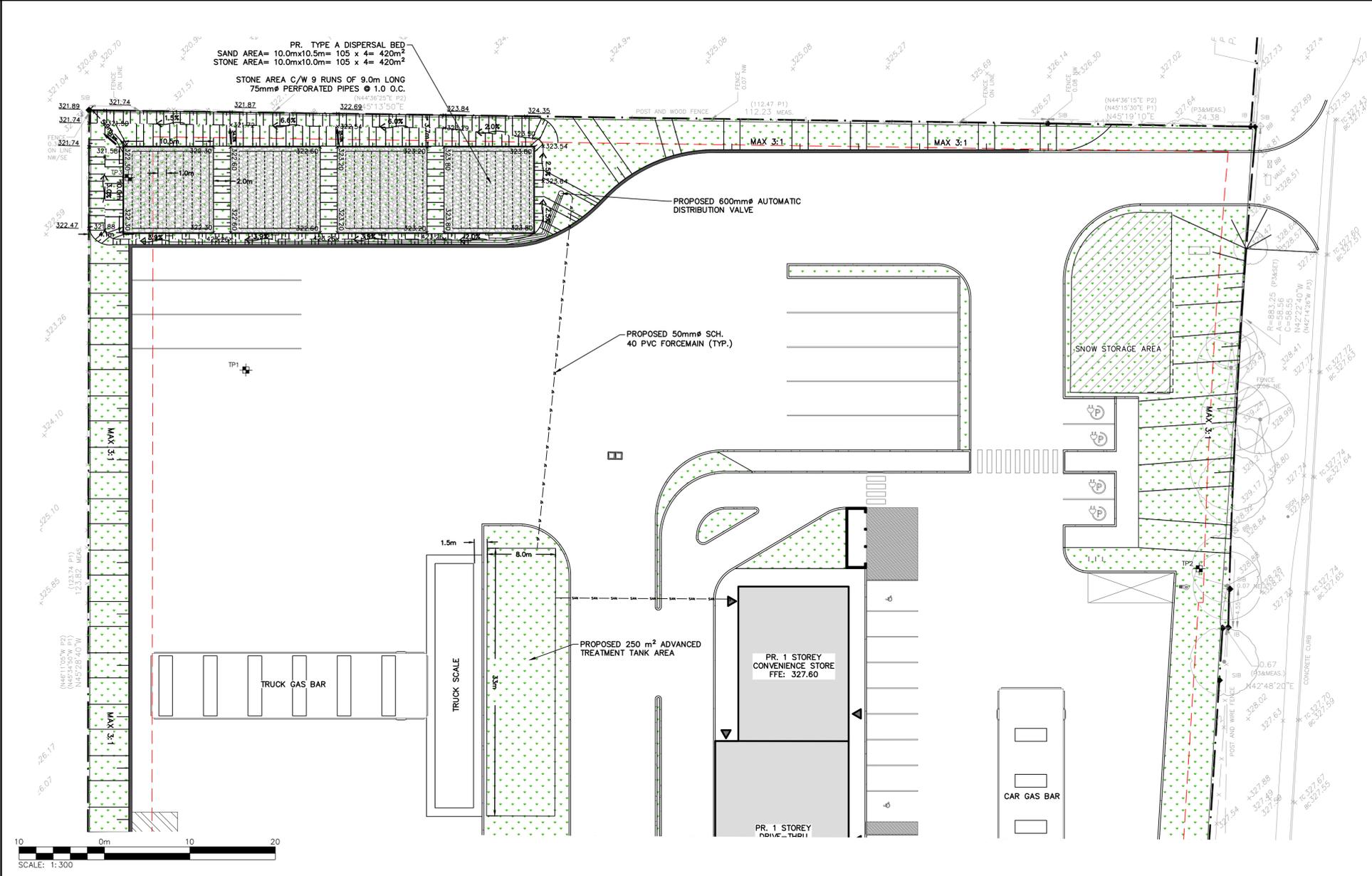
CROZIER CONSULTING ENGINEERS
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				Dwg.	FIG 2



c:\Users\egan.iev\OneDrive\Documents\crozier\crozier\consulting\engineers\2792-7289 - 7456 mclean rd w & 197 brock rd s\project files\Civil_Sheets\7289_FIG 2.dwg, 8/1/2025 9:48:25 AM, AutoCAD PDF (General Documentation).pc3

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SEWAGE SYSTEM NOTES

- PROPOSED SEWAGE SYSTEM CONSTRUCTION TO BE UNDERTAKEN IN ACCORDANCE WITH THE ONTARIO BUILDING CODE, ONTARIO MINISTRY OF ENVIRONMENT, AND THE MANUFACTURER'S RECOMMENDATIONS.
- INSTALLATION OF ALL COMPONENTS OF THE SEWAGE SYSTEM TO BE COMPLETED BY A LICENSED AND REGISTERED ONSITE SEWAGE SYSTEM INSTALLER IN THE PROVINCE OF ONTARIO.
- THE CONTRACTOR SHALL COORDINATE AND PAY FOR ALL NECESSARY INSPECTIONS WITH THE TOWN AND OTHER AUTHORITIES PERTAINING TO THE INSTALLATION OF THEIR WORK.
- CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES AND EXISTING SEWAGE WORKS PRIOR TO CONSTRUCTION.
- ALL COMPONENT LOCATIONS SHALL BE FIELD VERIFIED WITH THE ENGINEER PRIOR TO INSTALLATION.
- ALL EARTHWORKS, INCLUDING PLACEMENT OF FILL ARE TO BE UNDERTAKEN WITH TRACK MOUNTED EQUIPMENT TO KEEP COMPACTION TO A MINIMUM. KEEP ALL TRAFFIC IN THE AREA OF THE PROPOSED LEACHING BED TO A MINIMUM.
- ALL TOPSOIL AND ORGANICS TO BE REMOVED FROM LEACHING BED AREA.
- IF HIGH GROUNDWATER CONDITIONS ARE EVIDENT AT THE TIME OF CONSTRUCTION, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY. ALL VERTICAL CLEARANCE DISTANCES AS REQUIRED BY THE ONTARIO BUILDING CODE MUST BE MAINTAINED.
- GRAVITY SEWERS TO HAVE MINIMUM 0.6 M COVER AND SHALL BE INSULATED WHERE LESS THAN 1.0M COVER IS PROVIDED. FORCEMAIN SHALL BE INSULATED WHERE LESS THAN 1.5 M COVER IS PROVIDED. BEDDING, COVER AND BACKFILL TO BE IN ACCORDANCE WITH OPSS.
- UNLESS OTHERWISE NOTED PE FORCEMAIN TO BE HDPE SERIES 100 OR DR 13.5 PE AND PVC FORCEMAIN TO BE SCHEDULE 40. GRAVITY SEWERS TO BE SDR-35. FORCE MAIN TO BE PROVIDED WITH TRACER WIRE, SECURED TO THE TOP OF THE PIPE WITH WATER PROOF TAPE OR ZIP TIES.
- ALL PIPES SUBJECT TO VEHICULAR TRAFFIC SHALL BE ADEQUATELY PROTECTED.
- ALL METAL IN TANKS OR PUMP CHAMBERS TO BE GALVANIZED OR STAINLESS STEEL
- ALL JOINTS BELOW THE HIGH WATER LEVEL IN PRECAST TANKS TO BE SEALED WITH MASTIC SEALANT IN ACCORDANCE WITH 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.
- A TANK SHALL NOT BE COVERED BY SOIL OR LEACHING BED FILL HAVING A DEPTH GREATER THAN THE MAXIMUM DEPTH OF BURIAL THAT THE TANK IS DESIGNED TO WITHSTAND.
- EXISTING SOILS SHALL BE SCARIFIED AT A RIGHT ANGLE TO THE DIRECTION OF LATERAL SEWAGE FLOW IN THE LEACHING BED PRIOR TO IMPORTING FILL OR INSTALLING DISTRIBUTION PIPE STONE LAYER.
- WHEN THE IMPORTATION OF FILL IS REQUIRED, FILL SHOULD BE END-DUMPED AND GRADED PROGRESSIVELY OVER THE PREPARED SITE AREA WITH TRACK MOUNTED EQUIPMENT.
- ALL ELEVATIONS TO BE VERIFIED PRIOR TO BACKFILL
- ALL FILL MATERIAL PLACED BENEATH TANKS TO BE COMPACTED TO 95% COMPLETE WITH FERTILIZER AND MULCH IN ACCORDANCE WITH OPSS
- THE INSTALLING CONTRACTOR SHALL INSTALL THE SEWAGE SYSTEM USING A TRANSIT/LEVEL AND SHALL PROVIDE SAME FOR INSPECTION OF ANY COMPONENT.
- UNLESS OTHERWISE NOTED, ALL LEVEL IV TREATMENT UNITS SHALL BE PROVIDED FROM A MANUFACTURER THAT IS CERTIFIED BY CAN/BNQ 3680-600 TO PROVIDE A LEVEL OF TREATMENT IN ACCORDANCE WITH OBC TABLE 8.6.2.2 PROVIDING AN EFFLUENT CRITERIA OF 10mg/L SUSPENDED SOLIDS, AND 10mg/L OF CBOD5.
- ALL TREATMENT UNITS THAT CONTAIN MECHANICAL COMPONENTS SHALL BE EQUIPPED WITH AN AUDIBLE AND VISUAL WARNING ALARM, LOCATED TO WARN THE OCCUPANTS OF THE BUILDING SERVED OR THE OPERATOR OF THE TREATMENT UNIT OF A MALFUNCTION IN THE OPERATION OF THE TREATMENT UNIT.
- THE CONTRACTOR WILL ENSURE THAT EVERY OPERATOR OF A TREATMENT UNIT SHALL OBTAIN, FROM THE MANUFACTURER OR DISTRIBUTOR OF THE TREATMENT UNIT, LITERATURE THAT DESCRIBES THE UNIT IN DETAIL AND PROVIDES COMPLETE INSTRUCTIONS REGARDING THE OPERATION, SERVICING, AND MAINTENANCE REQUIREMENTS OF THE UNIT AND ITS RELATED COMPONENTS NECESSARY TO ENSURE THE CONTINUED PROPER OPERATION IN ACCORDANCE WITH THE ORIGINAL DESIGN AND SPECIFICATIONS.
- ALL IMPORTED SAND FILL TO HAVE A T-TIME OF 6 TO 10 MIN/CM AND A SILT/CLAY CONTENT OF NO MORE THAN 5% AND SHALL BE VERIFIED IN WRITING BY A SOIL TESTING FIRM AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT.
- SEWAGE SYSTEM HAS BEEN DESIGNED TO 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 CONTOUR (0.5m)
	EXISTING CONTOUR (1.0m)
	EXISTING DITCH
	EXISTING FENCE
	EXISTING GRADE
	PROPOSED GRADE
	PROPOSED GRADE (TO MATCH EXISTING)
	PROPOSED MINOR FLOW DIRECTION
	PROPOSED RETAINING WALL
	PROPOSED SLOPE (3:1 MAX.)
	PROPOSED MAJOR OVERLAND FLOW DIRECTION
	PROPOSED SETBACK LINE
	PROPOSED SANITARY FORCEMAIN
	TEST PIT LOCATION

No.	ISSUE / REVISION	DATE
2	ISSUED FOR SECOND SUBMISSION (ZBA)	2025/AUG/01
1	ISSUED FOR COORDINATION	2025/JUL/18
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SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPR1 COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
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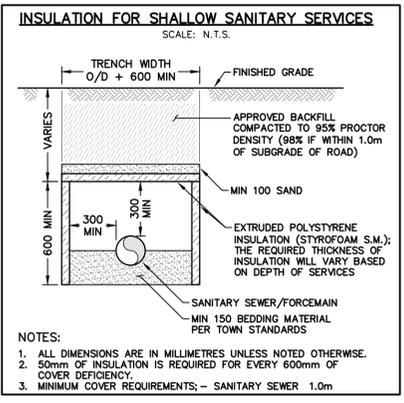
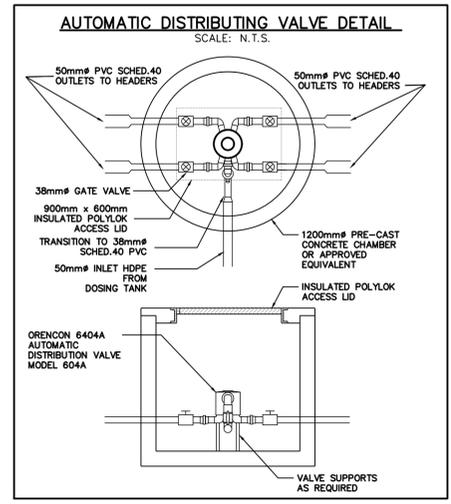
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Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWNSHIP OF PUSLINCH

Drawing
ONSITE SEWAGE SYSTEM DESIGN

ON-SITE SEWAGE DESIGN

DAILY DESIGN FLOW REFER TO FSR REPORT FOR DETAILS	TOTAL DESIGN FLOW = 20,000 L/DAY
ADVANCED TREATMENT SYSTEM	TO BE DETERMINED DURING DETAILED DESIGN
SOIL PERCOLATION RATE	T = 15 min/cm (DETERMINED BY C.F. CROZIER)
TYPE A DISPERSAL BED STONE AREA	Q/50 = 20,000/50 REQUIRED = 400 m ² PROVIDED = 420 m ²
TYPE A DISPERSAL BED SAND AREA	QT/850 = 20,000*15/850 REQUIRED = 352 m ² PROVIDED = 420 m ²



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**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**

JULY 2025

CFCA FILE NO. 2792-7289

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Revision Number	Date	Comments
Rev.0	July 23, 2025	Issued for first 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 Assessment 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 Site, 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 includes 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 November 14, 2024, the proposed mixed-use commercial development will consist of the following elements:

- A 1-storey convenience store (235 m²).
- A 1-storey drive-thru restaurant (379 m²).
- A 4-pump car gas bar and a 6-pump truck gas bar.
- 41 standard parking spaces (including 3 accessible parking spaces and 4 electric vehicle charging spaces) and 8 transport truck parking spaces.
- Internal paved areas including access to McLean Road West and Brock Road South.

The existing vegetated and landscaped areas will be removed to accommodate the proposed mixed-use commercial development.

3.0 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 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 significant groundwater recharge area 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 significant groundwater recharge area, the following best management practices are recommended 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.	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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
<p>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.</p> <p>An activity that reduces the recharge of an aquifer.</p>	<ul style="list-style-type: none"> - 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.

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 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.

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 m below grade. The test pit locations were approximately located in the field by Crozier referencing property lines and other Site features and are illustrated on Figure 7. Test pit logs are enclosed in Appendix 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 m below the ground surface. Extending to the maximum depth of 2.10 m, the silty sand and sandy silt deposits were thicker consisting of more silt and trace clay material. Fill material consisting of old bricks and presumed non-native soils was encountered in TP-1 at 0.9 m to 1.3 m. Fill material consisting of white stones was also encountered in TP-2 at 0.40-0.45 m.

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

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

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 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 C. Well records for the 2021 monitoring wells are also included in Appendix C.

5.3 Groundwater Monitoring

Manual groundwater measurements were collected in Spring and Summer 2023 by Crozier staff. An additional manual measurement was collected in July 2025 to confirm the findings of the 2023 investigation. Automatic water level loggers were also deployed in MW4-23 and MW5-23. Hydrographs have been appended to this report in Appendix D.

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	
Well Location	Ground Elevation (masl)	Static Level (mbgs)	Groundwater Elevation (masl)	Static Level (mbgs)	Groundwater Elevation (masl)	Static Level (mbgs)	Groundwater Elevation (masl)	Static Level (mbgs)	Groundwater Elevation (masl)
MW1-21	327.60	3.41	324.19	3.87	323.73	5.27	322.33	4.27	323.33
MW2-21	326.88	3.01	325.87	- ¹	- ¹	4.03	324.85	3.93	324.95
MW3-21	326.95	5.47	321.48	5.75	321.20	5.88	321.07	5.99	320.96
MW4-23	321.81	0.38	321.43	1.14	320.67	1.04	320.77	1.44	320.37
MW5-23	325.82	0.42	325.40	1.27	324.55	1.77	324.05	1.91	323.91
MW6-23	328.84	5.08	323.76	6.56	322.28	6.04	322.80	5.70	323.14

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 D, 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 meters at MW4-23 and 3.5 meters 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 320.77 at MW4-23 in Summer 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.

Groundwater elevations across the property are shown on Figure 7. Based on the water levels collected to date, there appears to be a groundwater flow divide between the western and eastern portions of the Site, consistent with topography. Groundwater flow on the eastern portion of the Site is interpreted to flow primarily to the east/southeast, while groundwater flow on the western portion of the Site is interpreted to flow primarily to the west. The interpreted groundwater flow direction is shown on Figure 8.

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 outlines the pre- and post- development site infiltration and discusses the overall infiltration deficit due to increased imperviousness on the Site. Please refer to Appendix E 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	3732	230	884	55	9165	566
Difference	0	-5266	-325	-1985	-123	7251	448
% Difference	0%	-59%	-59%	-69%	-69%	379%	379%

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.

Canadian climate normals from the Kitchener/Waterloo Composite Station 2010 were used to complete the water balance calculations for the Site. The long-term monthly average for precipitation and climate is shown in Table 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)	65.2	54.9	61	74.5	82.3	82.4	98.6	83.9	87.8	67.4	87.1	71.2	916.3¹
Temperature (°C)	-6.5	-5.5	-1	6.2	12.5	17.6	20	18.9	14.5	8.2	2.5	-3.3	7.2²

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 **916.3 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 E) using the following equations:

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

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

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

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

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

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

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

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

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

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

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

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

Where: S_{mc} = soil moisture capacity

APWL = accumulated potential water loss

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

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

As discussed in Section 5 above, the soils on the property were determined to be silty sand to sandy silt. Using the Ministry Environment, Conservation and Parks (MECP) Stormwater Management and Design Manual Table 3.1. (2003), the soil moisture capacity was estimated to be 150 mm for silty sand soils for within pasture/shrubs. Therefore, based on local climate conditions the Actual Evapotranspiration (AET) is calculated to be 585 mm/year.

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 E.

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 E.

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	0.19	1014	534	422	222	181	95
202	1.29	2215	172	311	24	8449	655
203	0.08	427	534	152	190	101	127
204	0.06	77	128	0	0	434	723
Total	1.62	3732	230	884	55	9165	566

An infiltration deficit of 1935 m³/yr or 62 mm/yr annually is anticipated due to the development. LID strategies have not been proposed in 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. The infiltration gallery has been sized to capture 203 m³/yr. It is noted that 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, July 2025).

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, 2025), the calculated water demands for the proposed development is 6.94 L/min (average day), 13.89 L/min (maximum day), and 27.78 L/min (peak hour).

Based on the review of the well records in the vicinity of the Site (refer to Section 4.4), the majority of the bedrock wells report well yields far greater than the peak hour demand. According to the MECP Well Record, the existing onsite well (Well ID 6707585) has sufficient yield (30.3 L/min) to meet the peak hour demand for the proposed development. However, the well location conflicts with development plans and therefore a new water supply well is proposed. Refer to the Functional Servicing and Stormwater Management Report (Crozier, 2025) 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 must be constructed by a licensed well contractor and constructed in accordance with Ontario Regulation 903. The well shall be constructed upgradient of the proposed onsite sewage system and gas storage. Further recommendations are provided in Section 9.

8.0 Groundwater Impact Assessment

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

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

8.1 Attenuation Zone

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

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

8.2 Groundwater Impacts

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

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

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

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

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

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

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

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

Table 8: Groundwater Impact Assessment Parameters

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

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

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

8.3 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 320.77 meters above sea level (masl) (0.38 mbgs) to 325.87 masl in April 2023.
- Based on the water levels collected to date, there appears to be a groundwater flow divide between the western and eastern portions of the Site, consistent with topography. Groundwater flow on the eastern portion of the Site is interpreted to flow primarily to the east/southeast, while groundwater flow on the western portion of the Site is interpreted to flow primarily to the west.
- A pre- to post-development water balance assessment was conducted for the property based on the Site Plan dated November 2024. An infiltration deficit of 1935 m³/yr or 62 mm/yr is expected from pre-post development. Only clean runoff is proposed to be infiltrated in Catchment 204 to provide best efforts possible in mitigating the deficit.
- 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.
- The 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.
- 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.



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Caitlyn MacPhee, EIT, GIT
Hydrogeology

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APPENDIX A

MECP Well Records

MECP WATER WELL RECORDS

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

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

Well ID	Inside Diameter (cm)	Depth (m)	Static Level (m)	Quantity (Lpm)	Quality	Materials	Aquifer ¹	Use	Location	Notes	Date Completed
7414795	5.1	4.6	3.05	N/A	Untested	Black loam / brown fill / grey clay	OB	Monitoring	Lot 25, Concession 7		2021-12-29
7412600	5.1	16.8	15.24	N/A	Untested	Brown sand / brown clay / brown sand	OB	Monitoring	Lot 26, Concession 8		2022-02-10
7406730	5.1	3.9	N/A	N/A	Untested	Brown rock / brown sand / grey silt	OB	Monitoring	Lot 26, Concession 8		2021-11-24
7406699	5.1	3.9	N/A	N/A	Untested	Brown rock / brown sand / grey silt	OB	Monitoring	Lot 26, Concession 8		2021-11-24
7406698	5.1	3.9	N/A	N/A	Untested	Brown rock / brown sand / grey silt	OB	Monitoring	Lot 26, Concession 8		2021-11-25
7406693	5.1	3.9	N/A	N/A	Untested	Brown rock / brown sand / grey silt	OB	Monitoring	Lot 26, Concession 8		2021-11-25
7399817	5.1	9.1	6.10	N/A	Untested	Black loam / brown clay / grey silt	OB	Monitoring	Lot 25, Concession 7		2021-09-08
7399816	5.1	7.6	4.57	N/A	Untested	Black loam / brown clay / grey silt / grey sand	OB	Monitoring	Lot 25, Concession 7		2021-09-08
7399815	5.1	7.6	4.57	N/A	Untested	Black loam / brown clay / grey silt	OB	Monitoring	Lot 25, Concession 7		2021-09-08
7399813	5.1	7.6	N/A	N/A	Untested	Black loam / brown clay / grey silt	OB	Monitoring	Lot 25, Concession 7		2021-09-09
7394717	5.1	10.7	N/A	N/A	Untested	Brown sand / grey sand	OB	Monitoring	Lot 25, Concession 7		2021-06-29
7394716	5.1	15.2	N/A	N/A	Untested	Brown sand / grey silt	OB	Monitoring	Lot 25, Concession 7		2021-06-29
7394715	5.1	15.2	N/A	N/A	N/A	Brown silt / grey silt	OB	Monitoring	Lot 25, Concession 7		2021-06-28
7357994	15.9	N/A	12.19	N/A	Clear	N/A	N/A	N/A	Lot 26, Concession 8	Well head upgrade	2020-04-09
7353361	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Concession 7		2020-01-13
7331341	5.1	6.1	N/A	N/A	Untested	Brown sand	OB	Test hole	Lot 25, Concession 7		2019-03-05
7331340	5.1	7.6	N/A	N/A	N/A	Sand	OB	Test hole	Lot 25, Concession 7		2019-03-05
7317763	15.2	N/A	N/A	N/A	Disinfected	N/A	N/A	N/A	N/A	Well head upgrade	2018-08-17
7296634	5.1	6.7	N/A	N/A	N/A	Sand	OB	Test hole / monitoring	Lot 25, Concession 8		2017-09-08
7296633	5.1	6.9	N/A	N/A	N/A	Sand	OB	Test hole / monitoring	Lot 25, Concession 8		2017-09-05
7291411	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		2017-06-14
7291402	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		2017-06-14
7230460	5.2	9.2	N/A	N/A	N/A	Topsoil / fine sand	OB	Monitoring	N/A		2014-07-25
7230459	5.2	10.7	N/A	N/A	N/A	Topsoil / fine sand	OB	Monitoring	N/A		2014-07-25
7230458	5.2	6.1	N/A	N/A	N/A	Topsoil / fine sand	OB	Monitoring	N/A		2014-07-25
7230457	5.2	9.2	N/A	N/A	N/A	Topsoil / fine sand	OB	Monitoring	N/A		2014-07-25
7230456	5.2	6.1	N/A	N/A	N/A	Topsoil / fine sand	OB	Monitoring	N/A		2014-07-25
7220822	5.1	6.1	N/A	N/A	N/A	Sand / till	OB	Monitoring	Lot 25, Concession 8		2013-05-03
7214833	15.9	61.3	14.20	113.6	N/A	Clay / gravel / limestone	BR	Domestic	Lot 25, Concession 8		2013-07-30
7214832	15.9	61.0	13.60	113.6	N/A	Clay / boulders / gravel / limestone	BR	Domestic	Lot 25, Concession 8		2013-08-08
7202412	5.1	10.9	N/A	N/A	N/A	Sand / silt	OB	Test hole	N/A		2013-03-03
7201847	12.0	21.8	15.30	N/A	N/A	Native / bentonite / pea stone	OB	Not used	Lot 25, Concession 8	Abandonment record	2013-04-19
7199708	N/A	24.4	N/A	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2012-04-17
7189280	15.6	54.9	15.80	60.6	N/A	Clay / gravel / rock	BR	Industrial	Lot 25, Concession 8		2012-09-12
7189279	15.6	54.9	15.80	60.6	N/A	Clay / gravel / rock	BR	Industrial	Lot 25, Concession 8		2012-09-13
7159585	5.1	8.8	N/A	N/A	N/A	Sand / silt	OB	Test hole	N/A		2011-01-28
7122497	5.0	7.6	N/A	N/A	N/A	Sand	OB	Monitoring	Lot 25, Concession 8		2008-07-15
7122497	N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-15
7122497	N/A	N/A	4.00	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-15
7122497	N/A	N/A	4.00	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-16
7122497	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-16
7122497	N/A	N/A	2.20	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-16
7122497	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-16
7121698	15.9	44.2	13.10	170.3	N/A	Sand gravel / sand / coarse sand / limestone	BR	Commercial	Lot 26, Concession 8		2009-03-17
7112542	5.1	6.0	N/A	N/A	N/A	Sand / silt	OB	Monitoring	N/A	Cluster of wells	2008-08-14
7041704	15.9	65.2	12.80	56.8	N/A	Clay gravel / gravel / clay & stones / limestone	BR	Commercial, industrial	Lot 25, Concession 7		2007-01-06
7041703	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lot 5, Concession 7		2007-01-09
7039424	1.9	4.6	N/A	N/A	N/A	Brown sand	OB	Observation	Lot 25, Concession 7		2006-12-15
6716001	15.9	43.3	14.60	113.6	N/A	Clay & stones / gravel & sand / clay & gravel / limestone	BR	Domestic	Lot 26, Concession 7		2006-10-27
6715873	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 7		2006-08-05
6715825	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lot 26, Concession 7		2006-06-21
6715718	5.1	4.5	N/A	N/A	N/A	Sand / silt / clay	OB	Testing	Lot 26, Concession 7		2006-04-07
6715714	15.2	57.6	17.37	12.0	Clear, fresh, disinfected	Brown clay / brown gravel / brown rock / grey rock	BR	Commercial	Lot 26, Concession 7		2006-04-26
6713044	15.2	56.4	21.34	75.7	Clear, fresh	Brown clay / brown gravel / brown limestone	BR	Domestic	Lot 14, Concession 7		1999-07-01
6712209	15.2	36.6	11.90	75.7	N/A	loam / clay/ limestone	BR	Domestic	Lot 26, Concession 7		1997-04-02
6711872	15.2	73.2	13.10	151.4	N/A	Clay / sand / rock	BR	Industrial	Lot 26, Concession 8		1995-10-17
6711723	15.2	49.1	16.46	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 7		1995-04-11
6711455	15.2	49.7	17.07	45.4	Clear, fresh	Sand / brown limestone / grey limestone	BR	Domestic	Lot 26, Concession 7		1994-07-06
6707585	15.2	29.0	4.60	30.3	N/A	Sandy clay / gravel / limestone	BR	Domestic	Lot 25, Concession 7		1981-03-26
6707241	30.5	25.0	3.96	26.5	Clear, fresh	Loam / brown clay / brown hardpan / brown rock	BR	Commercial	Lot 24, Concession 7		1980-02-21
6704401	15.2	19.2	3.05	94.6	Clear, fresh	Pit gravel / grey gravel / grey clay / grey limestone	BR	Domestic	Lot 24, Concession 7		1972-10-16
6703496	15.2	25.9	16.50	75.7	N/A	Clay / stones / limestones	BR	Domestic	Lot 25, Concession 8		1969-11-26
6702529	15.9	24.4	12.20	37.9	N/A	Clay / stones / gravel / limestone	BR	Domestic	Lot 26, Concession 7		1959-01-13
6702528	12.7	30.5	12.80	189.3	N/A	Clay / stones / gravel / rock	BR	Domestic	Lot 26, Concession 7		1966-08-16
6702527	15.9	20.7	12.20	75.7	N/A	Clay / sad / gravel	OB	Domestic	Lot 26, Concession 7		1966-10-19
MAX	30.5	73.2	21.34	189.3							
MIN	1.9	3.9	1.40	12.0							
AVERAGE	9.9	23.2	10.60	87.8							

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

1. OB = Overburden Aquifer, BR = Bedrock Aquifer

APPENDIX B

Testpit Logs



ONSITE SEWAGE SYSTEM TEST PIT LOG

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

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

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



CHUNG & VANDER DOELEN
ENGINEERING LTD.

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

July 4, 2023

File No.: M22543 (2377-6556)

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

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

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

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

Yours truly,

CHUNG & VANDER DOELEN ENGINEERING LTD.

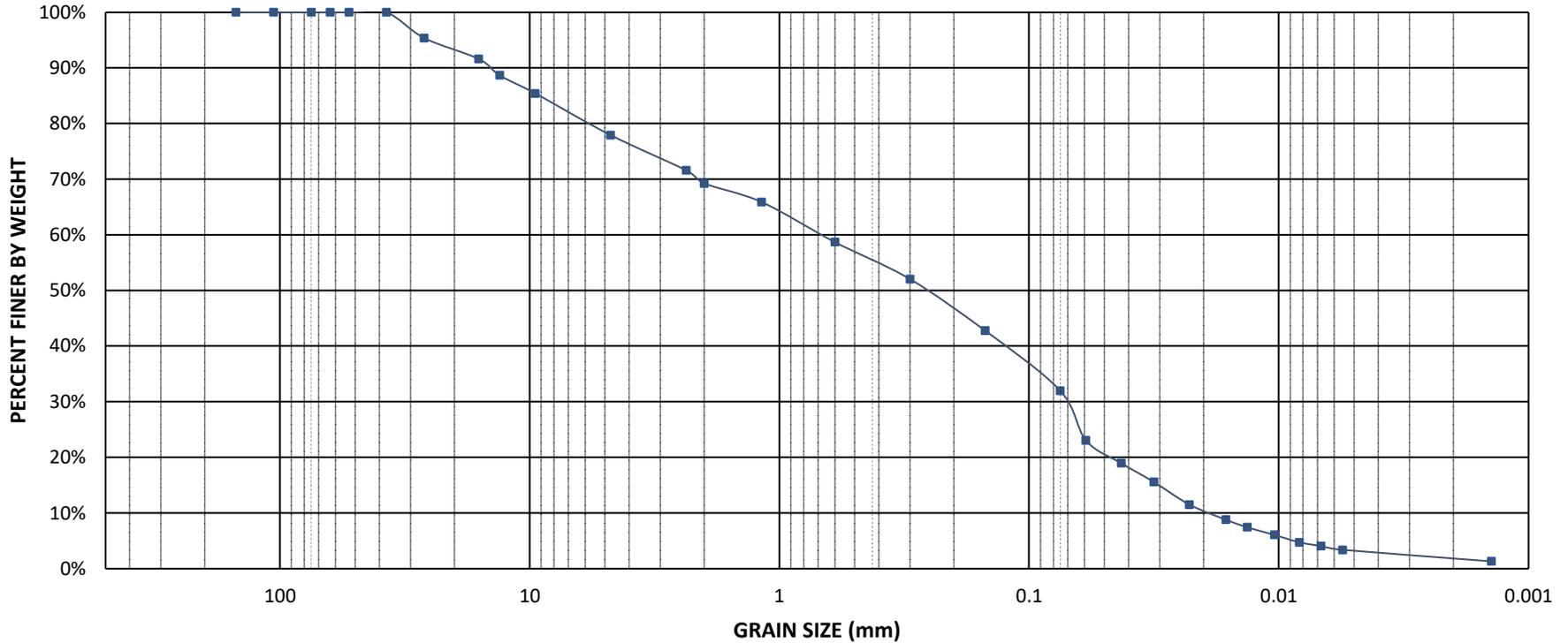


Hugh Arthur
Laboratory Supervisor

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

GRAIN SIZE DISTRIBUTION

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



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

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

APPENDIX C

Borehole Logs



Notice of Collection of Personal Information

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Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 323495

Type *

Construction Abandonment

Measurement recorded in: *

Metric Imperial

1. Well Owner's Information

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

Last Name	First Name
Organization 2701267 Ontario Inc.	Email Address

Current Address

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

2. Well Location

Address of Well Location

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

Other

3. Overburden and Bedrock Material *

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

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

4. Annular Space *

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

5. Method of Construction *

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

6. Well Use *

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

7. Status of Well *

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

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

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

9. Construction Record - Screen

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

10. Water Details

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

11. Hole Diameter

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

12. Results of Well Yield Testing

Pumping Discontinued

Explain _____

If flowing give rate

Flowing _____ (GPM)

Draw down

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

Recovery

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

After test of well yield, water was

Clear and sand free Other (specify)

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

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

13. Map of Well Location *

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



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

15. Well Contractor and Well Technician Information			
Business Name of Well Contractor *		Well Contractor's License Number *	
Aardvark Drilling Inc.		7675	
Business Address			
Unit Number	Street Number	Street Name *	
C	25	Lewis Road	
City/Town/Village *		Province	Postal Code *
Guelph		ON	N1H 1E9
Business Telephone Number		Business Email Address	
519-826-9340		info@aardvarkdrillinginc.com	
Last Name of Well Technician *		First Name of Well Technician *	Well Technician's License Number *
England		Matt	3059

16. Declaration *		
<input checked="" type="checkbox"/> I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.		
Last Name	First Name	Email Address
England	Matthew	mengland@aardvarkdrillinginc.com
Signature		Date Submitted (yyyy/mm/dd)
Matt England Digitally signed by Matt England Date: 2021.08.09 14:31:18 -04'00'		2021/08/09

17. Ministry Use Only
Audit Number
9KUI ET4F



Notice of Collection of Personal Information

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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 2701267 Ontario Inc.	Email Address

Current Address

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

2. Well Location

Address of Well Location

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

Other

3. Overburden and Bedrock Material *

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

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

4. Annular Space *

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

5. Method of Construction *

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

6. Well Use *

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

7. Status of Well *

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

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

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

9. Construction Record - Screen

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

10. Water Details

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

11. Hole Diameter

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

12. Results of Well Yield Testing

Pumping Discontinued

Explain _____

If flowing give rate

Flowing _____ (GPM)

Draw down

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

Recovery

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

After test of well yield, water was

Clear and sand free Other (specify)

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

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

13. Map of Well Location *

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



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

15. Well Contractor and Well Technician Information			
Business Name of Well Contractor *		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 *		
<input checked="" type="checkbox"/> 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



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Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A323497

Type *

Construction Abandonment

Measurement recorded in: *

Metric Imperial

1. Well Owner's Information

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

Last Name	First Name
Organization 2701267 Ontario Inc.	Email Address

Current Address

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

2. Well Location

Address of Well Location

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

Other

3. Overburden and Bedrock Material *

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

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

4. Annular Space *

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

5. Method of Construction *

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

6. Well Use *

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

7. Status of Well *

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

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

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

9. Construction Record - Screen

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

10. Water Details

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

11. Hole Diameter

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

12. Results of Well Yield Testing

Pumping Discontinued

Explain _____

If flowing give rate

Flowing _____ (GPM)

Draw down

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

Recovery

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

After test of well yield, water was

Clear and sand free Other (specify)

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

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

13. Map of Well Location *

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



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

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

16. Declaration *		
<input checked="" type="checkbox"/> 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 <i>Digitally signed by Matt England Date: 2021.08.09 14:33:28 -04'00'</i>	2021/08/09	

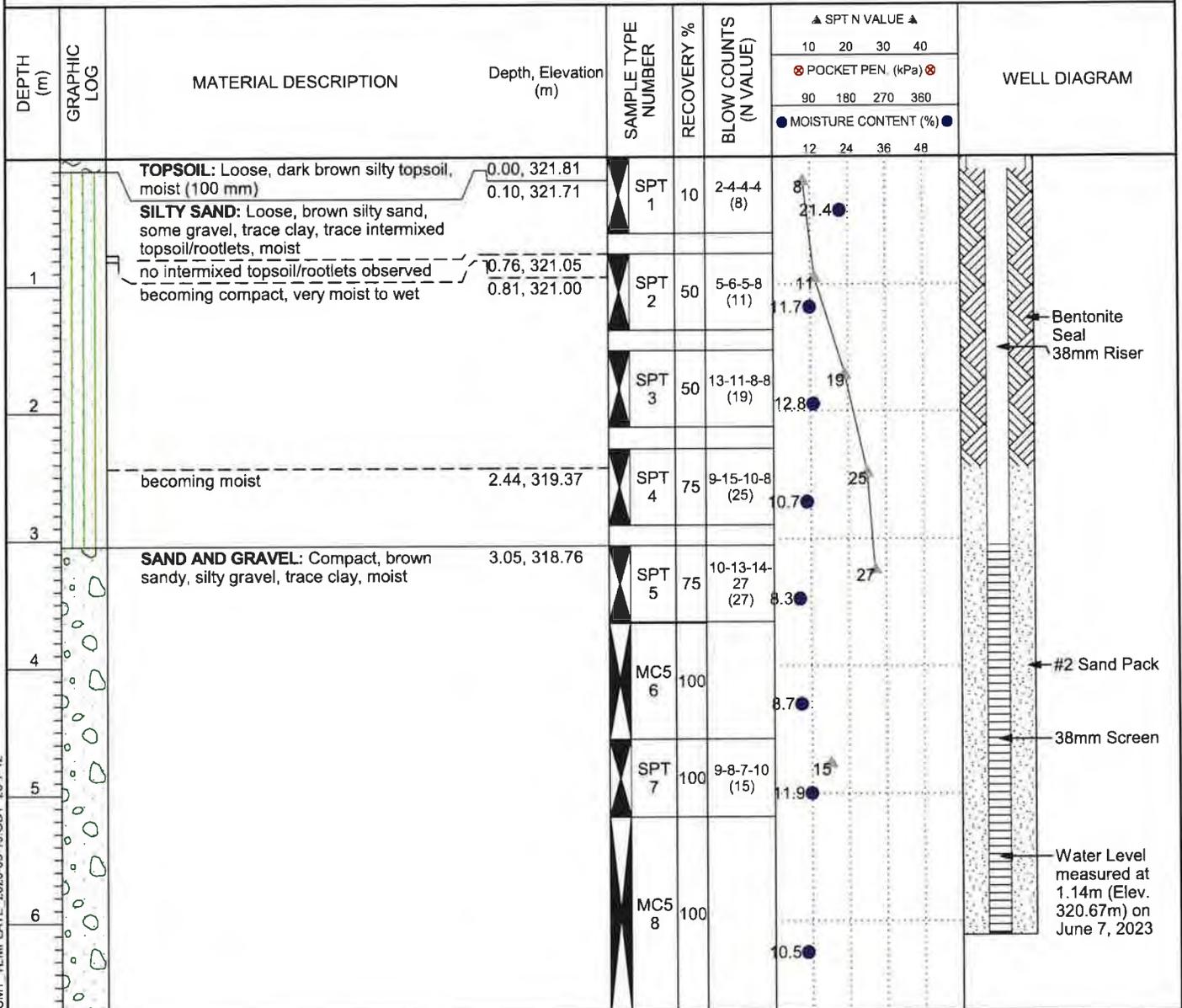
17. Ministry Use Only
Audit Number
MIIO HQ93



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

BOREHOLE NUMBER 4

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



Bottom of borehole at 6.71 m, Elevation 315.10 m.

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

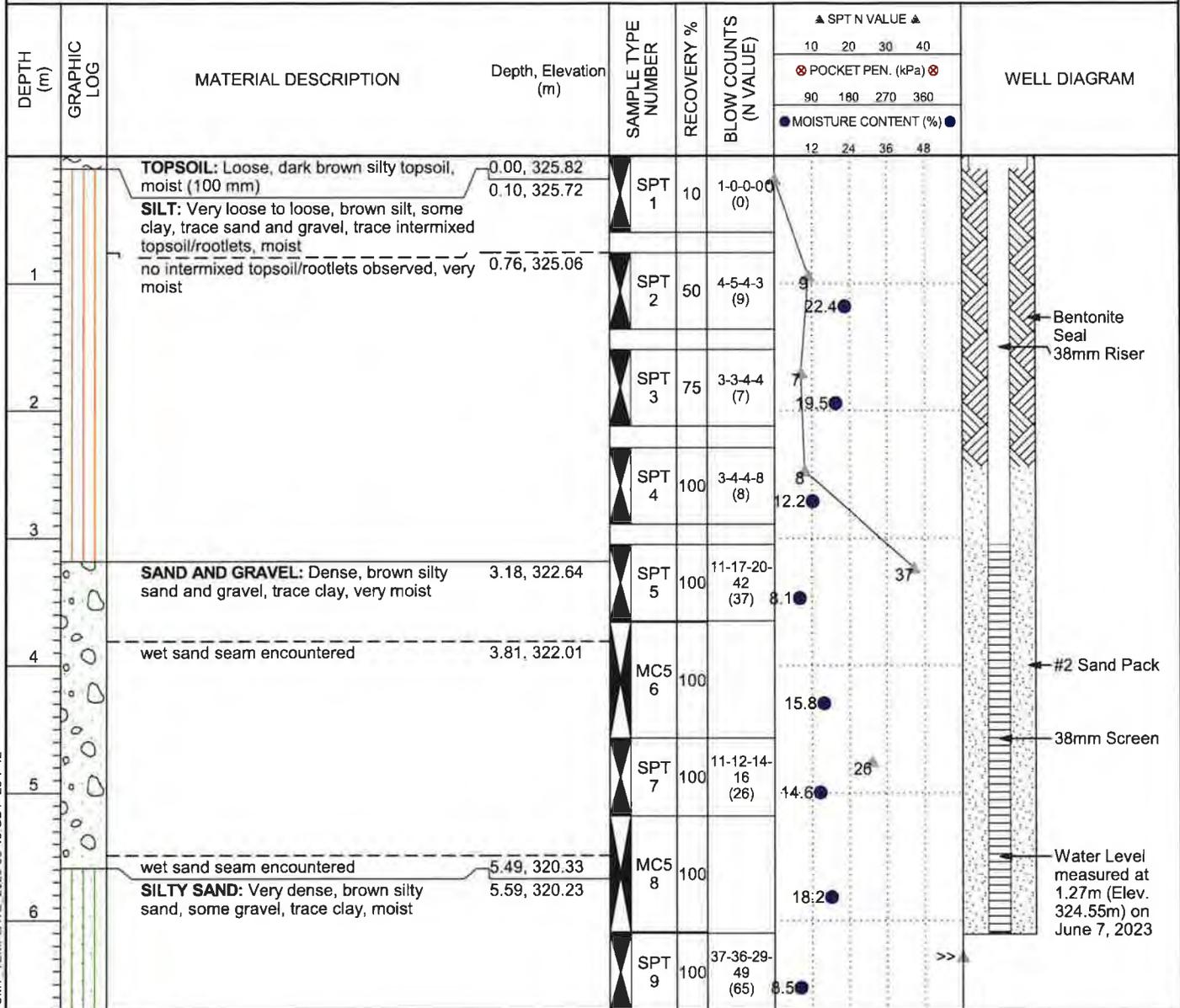
Groundwater measured at approximately 1.14m below the ground surface (Elev. 320.67m) on June 7, 2023.

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



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

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



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

Bottom of borehole at 6.71 m, Elevation 319.11 m.

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

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



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

BOREHOLE NUMBER 6

PROJECT NUMBER: 23-133

PROJECT: Proposed Development

DRILLING DATE: 23-4-12

PROJECT ADDRESS: 7456 McLean Road

DRILLING CONTRACTOR: CMT DRILLING INC.

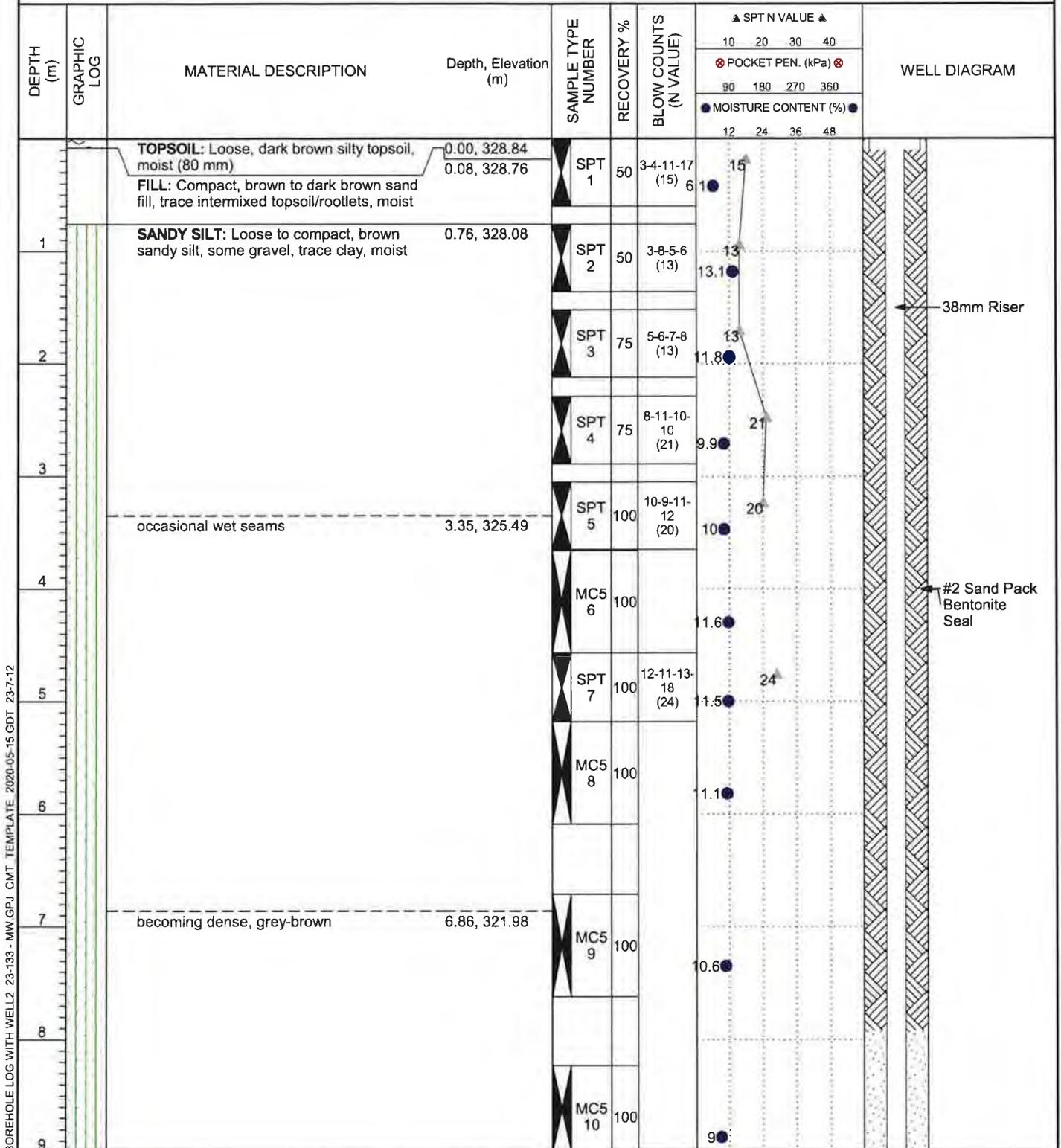
PROJECT LOCATION: Puslinch, Ontario

DRILLING EQUIPMENT: Geoprobe 7822DT

GROUND ELEVATION: 328.84 m

LOGGED BY: BL

SAMPLING METHOD: SPT/MC5



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

(Continued Next Page)



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

BOREHOLE NUMBER 6

PROJECT: 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 ▲				WELL DIAGRAM
							10	20	30	40	
		becoming dense, grey-brown (continued)	6.86, 321.98 (continued)								<p>Water Level measured at 6.56m (Elev. 322.28m) on June 7, 2023 38mm Screen</p>
10				MC5 11	100						
11											
12				MC5 12	100						

Bottom of borehole at 12.19 m, Elevation 316.65 m.

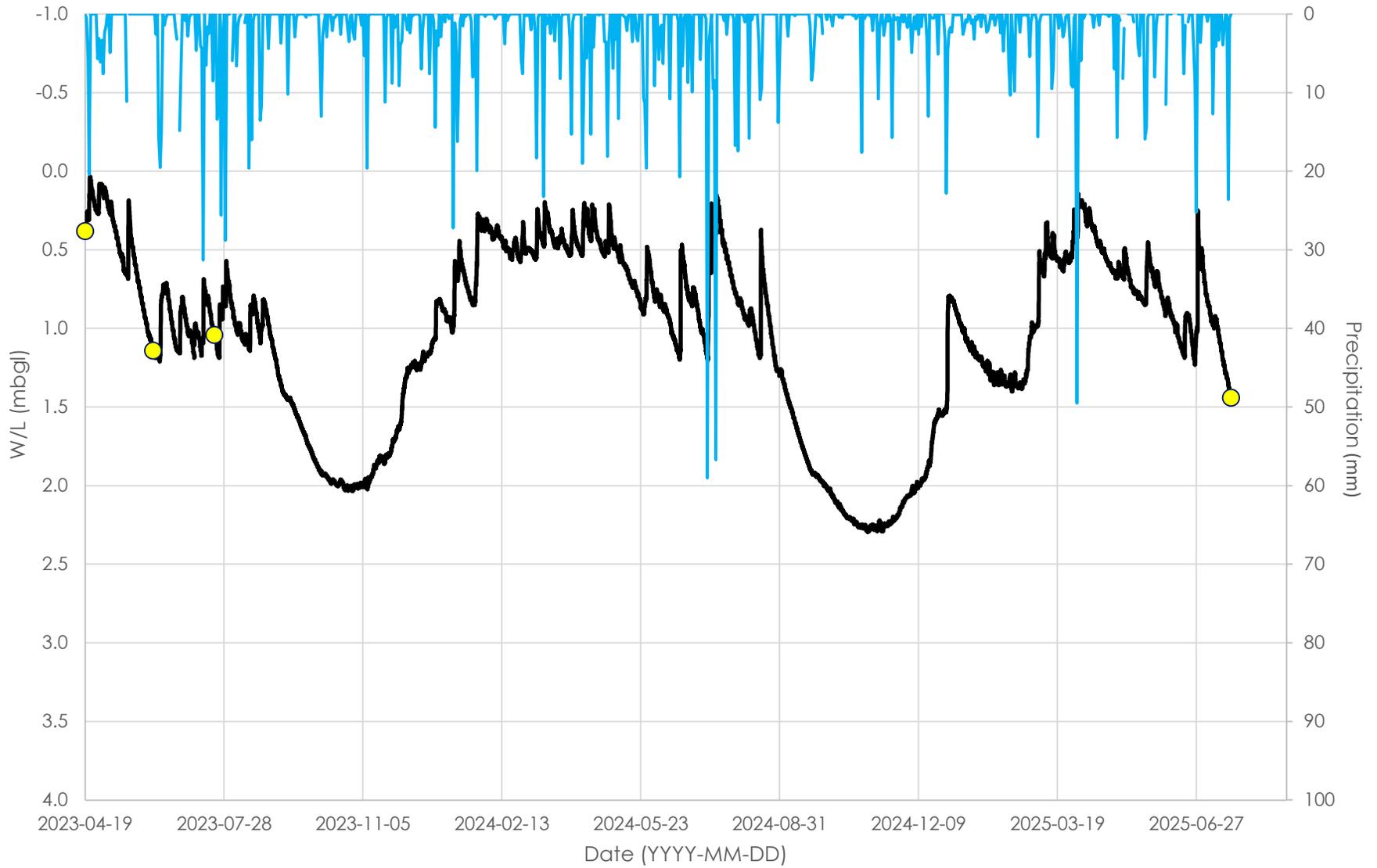
Monitoring well installed at an elevation of approximately 316.65m on April 12, 2023.

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

APPENDIX D

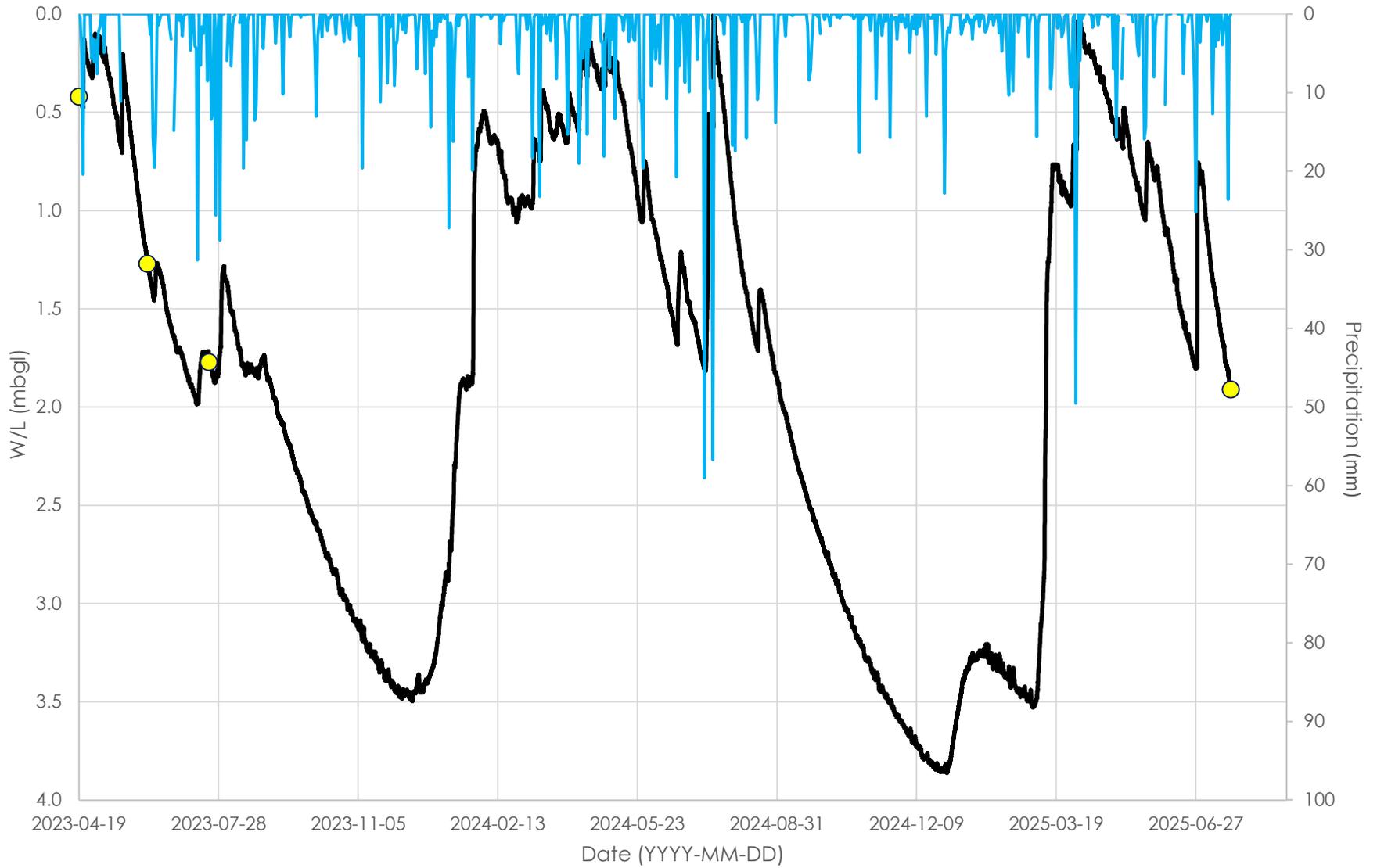
Hydrographs

MW4-23
7456 McLean Road



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

MW5-23
7456 McLean Road



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

APPENDIX E

Water Balance Assessment



Climate Parameters
Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: CM
Checked By: CM
Date: 2025-07-23

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 the Kitchener/Waterloo Composite Climate Station.
 2. Latitude adjustment/correction factors determined based on site location assuming 12 hours of sunlight per day for 30 days



Pre-Development Water Balance
Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: CM
Checked By: CM
Date: 2025-07-23

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
<i>Pervious Area Water Balance</i>													
Evapotranspiration (mm)	0	0	0	30	77	110	121	93	76	39	9	0	555
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
<i>Impervious Area Water Balance</i>													
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
<i>Combined Water Balance</i>													
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 101				
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:
- 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.



Pre-Development Water Balance
Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: CM
Checked By: CM
Date: 2025-07-23

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
<i>Pervious Area Water Balance</i>													
Evapotranspiration (mm)	0	0	0	30	77	110	121	93	76	39	9	0	555
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
<i>Impervious Area Water Balance</i>													
Evaporation (mm)	10	7	9	12	12	12	14	10	11	11	11	8	128
Surface Water Runoff (mm)	56	39	48	69	68	82	57	64	60	64	64	47	723
<i>Combined Water Balance</i>													
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.



Post-Development Water Balance
Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: CM
Checked By: CM
Date: 2025-07-23

Project Name: **7456 MCLEAN ROAD**
Location: **PUSLINCH ONTARIO**

Catchment ID	201												
Catchment Parameters	Pervious Area			0.19 ha	Impervious Area			0.00 ha	Total Area			0.19 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
<i>Pervious Area Water Balance</i>													
Evapotranspiration (mm)	0	0	0	30	77	107	114	82	76	39	9	0	534
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
<i>Impervious Area Water Balance</i>													
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
<i>Combined Water Balance</i>													
Pervious ET (m ³)	0	0	0	58	146	203	217	155	144	75	17	0	1014
Impervious ET (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Infiltration (m ³)	88	61	76	68	5	0	0	0	0	0	51	73	422
Impervious Infiltration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Runoff (m ³)	38	26	32	29	2	0	0	0	0	0	22	31	181
Impervious Runoff (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0

Post-Development Water Balance Summary: Catchment 201				
Post-Development Evapotranspiration	1014	m ³ /yr	534	mm/yr
Post-Development Infiltration	422	m ³ /yr	222	mm/yr
Post-Development Runoff	181	m ³ /yr	95	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.



Post-Development Water Balance
Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: CM
Checked By: CM
Date: 2025-07-23

Project Name: **7456 MCLEAN ROAD**
Location: **PUSLINCH ONTARIO**

Catchment ID	202												
Catchment Parameters	Pervious Area			0.14 ha	Impervious Area			1.15 ha	Total Area			1.29 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
<i>Pervious Area Water Balance</i>													
Evapotranspiration (mm)	0	0	0	30	77	107	114	82	76	39	9	0	534
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
<i>Impervious Area Water Balance</i>													
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
<i>Combined Water Balance</i>													
Pervious ET (m ³)	0	0	0	42	108	150	160	114	106	55	13	0	747
Impervious ET (m ³)	114	80	98	140	138	139	166	116	130	122	129	95	1467
Pervious Infiltration (m ³)	65	45	56	50	3	0	0	0	0	0	38	54	311
Impervious Infiltration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Runoff (m ³)	28	19	24	21	1	0	0	0	0	0	16	23	133
Impervious Runoff (m ³)	648	451	557	794	784	787	940	657	735	694	732	537	8316

Post-Development Water Balance Summary: Catchment 202				
Post-Development Evapotranspiration	2215	m ³ /yr	172	mm/yr
Post-Development Infiltration	311	m ³ /yr	24	mm/yr
Post-Development Runoff	8449	m ³ /yr	655	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.



Post-Development Water Balance
Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: CM
Checked By: CM
Date: 2025-07-23

Project Name: **7456 MCLEAN ROAD**
Location: **PUSLINCH ONTARIO**

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
<i>Pervious Area Water Balance</i>													
Evapotranspiration (mm)	0	0	0	30	77	107	114	82	76	39	9	0	534
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
<i>Impervious Area Water Balance</i>													
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
<i>Combined Water Balance</i>													
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	m ³ /yr	534	mm/yr
Post-Development Infiltration	152	m ³ /yr	190	mm/yr
Post-Development Runoff	101	m ³ /yr	127	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.



Post-Development Water Balance
Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: CM
Checked By: CM
Date: 2025-07-23

Project Name: **7456 MCLEAN ROAD**
Location: **PUSLINCH ONTARIO**

Catchment ID	204												
Catchment Parameters	Pervious Area			0.00 ha	Impervious Area			0.06 ha	Total Area			0.06 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
<i>Pervious Area Water Balance</i>													
Evapotranspiration (mm)	0	0	0	30	77	107	114	82	76	39	9	0	534
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
<i>Impervious Area Water Balance</i>													
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
<i>Combined Water Balance</i>													
Pervious ET (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Impervious ET (m ³)	6	4	5	7	7	7	9	6	7	6	7	5	77
Pervious Infiltration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Impervious Infiltration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Runoff (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Impervious Runoff (m ³)	34	24	29	41	41	41	49	34	38	36	38	28	434

Post-Development Water Balance Summary: Catchment 204				
Post-Development evapotranspiration	77	m ³ /yr	128	mm/yr
Post-Development Infiltration	0	m ³ /yr	0	mm/yr
Post-Development Runoff	434	m ³ /yr	723	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.



Site Water Balance Summary
 Thornthwaite & Mather Method

Project: 7456 McLean Road
Project No.: 2792-7289
Created By: CM
Checked By: CM
Date: 2025-07-23

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	0.19	1014	534	422	222	181	95
202	1.29	2215	172	311	24	8449	655
203	0.08	427	534	152	190	101	127
204	0.06	77	128	0	0	434	723
Total	1.62	3732	230	884	55	9165	566

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	3732	230	884	55	9165	566
Difference	0	-5266	-325	-1985	-123	7251	448
% Difference	0%	-59%	-59%	-69%	-69%	379%	379%

Annual Infiltration Deficit 1985 m³

Soil Moisture Capacity		50 mm											
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	66	46	57	81	80	81	96	67	75	71	75	55	851
Adjusted Potential Evapotranspiration (APET)	0	0	0	30	77	113	130	114	78	39	9	0	591
P-APET	66	46	57	51	3	-32	-34	-47	-2	32	66	55	260
Cummulative moisture deficit	0	0	0	0	0	-32	-67	-114	-116	0	0	0	0
Storage (S) (mm)	50	50	50	50	50	26	13	5	5	37	50	50	0
Change in Storage (mm)	0	0	0	0	0	-24	-13	-8	0	32	13	0	0
Evapotranspiration (mm)	0	0	0	30	77	104	109	75	75	39	9	0	520
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	52	55	331

Soil Moisture Capacity		75 mm											
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	66	46	57	81	80	81	96	67	75	71	75	55	851
Adjusted Potential Evapotranspiration (APET)	0	0	0	30	77	113	130	114	78	39	9	0	591
P-APET	66	46	57	51	3	-32	-34	-47	-2	32	66	55	260
Cummulative moisture deficit	0	0	0	0	0	-32	-67	-114	-116	0	0	0	0
Storage (S) (mm)	75	75	75	75	75	49	31	16	16	48	75	75	0
Change in Storage (mm)	0	0	0	0	0	-26	-18	-14	0	32	27	0	0
Evapotranspiration (mm)	0	0	0	30	77	107	114	82	76	39	9	0	534
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	38	55	317

Soil Moisture Capacity		100 mm											
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	66	46	57	81	80	81	96	67	75	71	75	55	851
Adjusted Potential Evapotranspiration (APET)	0	0	0	30	77	113	130	114	78	39	9	0	591
P-APET	66	46	57	51	3	-32	-34	-47	-2	32	66	55	260
Cummulative moisture deficit	0	0	0	0	0	-32	-67	-114	-116	0	0	0	0
Storage (S) (mm)	100	100	100	100	100	72	51	32	31	63	100	100	0
Change in Storage (mm)	0	0	0	0	0	-28	-21	-19	-1	32	37	0	0
Evapotranspiration (mm)	0	0	0	30	77	108	117	86	76	39	9	0	543
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	29	55	307

Soil Moisture Capacity		125 mm											
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	66	46	57	81	80	81	96	67	75	71	75	55	851
Adjusted Potential Evapotranspiration (APET)	0	0	0	30	77	113	130	114	78	39	9	0	591
P-APET	66	46	57	51	3	-32	-34	-47	-2	32	66	55	260
Cummulative moisture deficit	0	0	0	0	0	-32	-67	-114	-116	0	0	0	0
Storage (S) (mm)	125	125	125	125	125	96	73	50	49	81	125	125	0
Change in Storage (mm)	0	0	0	0	0	-29	-23	-23	-1	32	44	0	0
Evapotranspiration (mm)	0	0	0	30	77	109	119	90	76	39	9	0	550
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	22	55	300

Soil Moisture Capacity		150 mm											
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	66	46	57	81	80	81	96	67	75	71	75	55	851
Adjusted Potential Evapotranspiration (APET)	0	0	0	30	77	113	130	114	78	39	9	0	591
P-APET	66	46	57	51	3	-32	-34	-47	-2	32	66	55	260
Cummulative moisture deficit	0	0	0	0	0	-32	-67	-114	-116	0	0	0	0
Storage (S) (mm)	150	150	150	150	150	121	96	70	69	101	150	150	0
Change in Storage (mm)	0	0	0	0	0	-29	-25	-26	-1	32	49	0	0
Evapotranspiration (mm)	0	0	0	30	77	110	121	93	76	39	9	0	555
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	17	55	295

Soil Moisture Capacity		200 mm											
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	66	46	57	81	80	81	96	67	75	71	75	55	851
Adjusted Potential Evapotranspiration (APET)	0	0	0	30	77	113	130	114	78	39	9	0	591
P-APET	66	46	57	51	3	-32	-34	-47	-2	32	66	55	260
Cummulative moisture deficit	0	0	0	0	0	-32	-67	-114	-116	0	0	0	0
Storage (S) (mm)	200	200	200	200	200	170	143	113	112	144	200	200	0
Change in Storage (mm)	0	0	0	0	0	-30	-27	-30	-1	32	56	0	0
Evapotranspiration (mm)	0	0	0	30	77	110	123	97	76	39	9	0	563
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	9	55	288

Soil Moisture Capacity		250 mm												
Evapotranspiration Analysis														
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Precipitation (P)	66	46	57	81	80	81	96	67	75	71	75	55	851	
Adjusted Potential Evapotranspiration (APET)	0	0	0	30	77	113	130	114	78	39	9	0	591	
P-APET	66	46	57	51	3	-32	-34	-47	-2	32	66	55	260	
Cummulative moisture deficit	0	0	0	0	0	-32	-67	-114	-116	0	0	0		
Storage (S) (mm)	250	250	250	250	250	220	191	159	157	189	250	250		
Change in Storage (mm)	0	0	0	0	0	-30	-28	-33	-1	32	61	0		
Evapotranspiration (mm)	0	0	0	30	77	111	124	100	77	39	9	0	567	
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	5	55	283	

Soil Moisture Capacity		300 mm											
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	66	46	57	81	80	81	96	67	75	71	75	55	851
Adjusted Potential Evapotranspiration (APET)	0	0	0	30	77	113	130	114	78	39	9	0	591
P-APET	66	46	57	51	3	-32	-34	-47	-2	32	66	55	260
Cummulative moisture deficit	0	0	0	0	0	-32	-67	-114	-116	0	0	0	
Storage (S) (mm)	300	300	300	300	300	269	240	205	204	235	300	300	
Change in Storage (mm)	0	0	0	0	0	-31	-29	-35	-2	32	65	0	
Evapotranspiration (mm)	0	0	0	30	77	111	125	102	77	39	9	0	571
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	1	55	280

Soil Moisture Capacity		350 mm											
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	66	46	57	81	80	81	96	67	75	71	75	55	851
Adjusted Potential Evapotranspiration (APET)	0	0	0	30	77	113	130	114	78	39	9	0	591
P-APET	66	46	57	51	3	-32	-34	-47	-2	32	66	55	260
Cummulative moisture deficit	0	0	0	0	0	-32	-67	-114	-116	0	0	0	
Storage (S) (mm)	350	350	350	350	350	319	289	253	251	283	349	350	
Change in Storage (mm)	0	0	0	0	0	-31	-30	-36	-2	32	66	1	
Evapotranspiration (mm)	0	0	0	30	77	112	126	104	77	39	9	0	573
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	0	54	277

Soil Moisture Capacity		400 mm											
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	66	46	57	81	80	81	96	67	75	71	75	55	851
Adjusted Potential Evapotranspiration (APET)	0	0	0	30	77	113	130	114	78	39	9	0	591
P-APET	66	46	57	51	3	-32	-34	-47	-2	32	66	55	260
Cummulative moisture deficit	0	0	0	0	0	-32	-67	-114	-116	0	0	0	
Storage (S) (mm)	400	400	400	400	400	369	339	301	299	331	397	400	
Change in Storage (mm)	0	0	0	0	0	-31	-30	-38	-2	32	66	3	
Evapotranspiration (mm)	0	0	0	30	77	112	126	105	77	39	9	0	575
Water Surplus (mm)	66	46	57	51	3	0	0	0	0	0	0	52	275

Adjustment Factors Based on Site Latitude Based on 12 hours of Sunlight per day for 30 days

Latitude °	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
50	0.74	0.78	1.02	1.15	1.33	1.36	1.37	1.25	1.06	0.92	0.76	0.70
49	0.75	0.79	1.02	1.14	1.32	1.34	1.35	1.24	1.05	0.93	0.76	0.71
48	0.76	0.80	1.02	1.14	1.31	1.33	1.34	1.23	1.05	0.93	0.77	0.72
47	0.77	0.80	1.02	1.14	1.30	1.32	1.33	1.22	1.04	0.93	0.78	0.73
46	0.79	0.81	1.02	1.13	1.29	1.31	1.32	1.22	1.04	0.94	0.79	0.74
45	0.80	0.81	1.02	1.13	1.28	1.29	1.31	1.21	1.04	0.94	0.79	0.75
44	0.81	0.82	1.02	1.13	1.27	1.29	1.30	1.20	1.04	0.95	0.80	0.76
43	0.81	0.82	1.02	1.12	1.26	1.28	1.29	1.20	1.04	0.95	0.81	0.77
42	0.82	0.83	1.03	1.12	1.26	1.27	1.28	1.19	1.04	0.95	0.82	0.79
41	0.83	0.83	1.03	1.11	1.25	1.26	1.27	1.19	1.04	0.96	0.82	0.80
40	0.84	0.83	1.03	1.11	1.24	1.25	1.27	1.18	1.04	0.96	0.83	0.81
39	0.85	0.84	1.03	1.11	1.23	1.24	1.26	1.18	1.04	0.96	0.84	0.82
38	0.85	0.84	1.03	1.10	1.23	1.24	1.25	1.17	1.04	0.96	0.84	0.83
37	0.86	0.84	1.03	1.10	1.22	1.23	1.25	1.17	1.03	0.97	0.85	0.83
36	0.87	0.85	1.03	1.10	1.21	1.22	1.24	1.16	1.03	0.97	0.86	0.84
35	0.87	0.85	1.03	1.09	1.21	1.21	1.23	1.16	1.03	0.97	0.86	0.85
34	0.88	0.85	1.03	1.09	1.20	1.20	1.22	1.16	1.03	0.97	0.87	0.86
33	0.88	0.86	1.03	1.09	1.19	1.20	1.22	1.15	1.03	0.97	0.88	0.86
32	0.89	0.86	1.03	1.08	1.19	1.19	1.21	1.15	1.03	0.98	0.88	0.87
31	0.90	0.87	1.03	1.08	1.18	1.18	1.20	1.14	1.03	0.98	0.89	0.88
30	0.90	0.87	1.03	1.08	1.18	1.17	1.20	1.14	1.03	0.98	0.89	0.88
29	0.91	0.87	1.03	1.07	1.17	1.16	1.19	1.13	1.03	0.98	0.90	0.89
28	0.91	0.88	1.03	1.07	1.16	1.16	1.18	1.13	1.02	0.98	0.90	0.90
27	0.92	0.88	1.03	1.07	1.16	1.15	1.18	1.13	1.02	0.99	0.90	0.90
26	0.92	0.88	1.03	1.06	1.15	1.15	1.17	1.12	1.02	0.99	0.91	0.91
25	0.93	0.89	1.03	1.06	1.15	1.14	1.17	1.12	1.02	0.99	0.91	0.91
20	0.95	0.90	1.03	1.05	1.13	1.11	1.14	1.11	1.02	1.00	0.93	0.94
15	0.97	0.91	1.03	1.04	1.11	1.08	1.12	1.08	1.02	1.01	0.95	0.97
10	1.00	0.91	1.03	1.03	1.08	1.06	1.08	1.07	1.02	1.02	0.98	0.99
5	1.02	0.93	1.03	1.02	1.06	1.03	1.06	1.05	1.01	1.03	0.99	1.02
0	1.04	0.94	1.04	1.01	1.04	1.01	1.04	1.04	1.01	1.04	1.01	1.04
-5	1.06	0.91	1.04	1.00	1.02	0.99	1.02	1.03	1.00	1.05	1.03	1.06
-10	1.08	0.97	1.05	0.99	1.01	0.96	1.00	1.01	1.00	1.06	1.05	1.10
-15	1.12	0.98	1.05	0.98	0.98	0.94	0.97	1.00	1.00	1.07	1.07	1.12
-20	1.14	1.00	1.05	0.97	0.96	0.91	0.95	0.99	1.00	1.08	1.09	1.15
-25	1.17	1.01	1.05	0.96	0.94	0.88	0.93	0.98	1.00	1.10	1.11	1.18
-30	1.20	1.03	1.06	0.95	0.92	0.85	0.90	0.96	1.00	1.12	1.14	1.21
-35	1.23	1.04	1.06	0.94	0.89	0.82	0.87	0.94	1.00	1.13	1.17	1.25
-45	1.27	1.06	1.07	0.93	0.86	0.78	0.84	0.92	1.00	1.15	1.20	1.29
-42	1.28	1.07	1.07	0.92	0.85	0.76	0.82	0.92	1.00	1.16	1.22	1.31
-44	1.30	1.08	1.07	0.92	0.83	0.74	0.81	0.91	0.99	1.17	1.23	1.33
-46	1.32	1.10	1.07	0.91	0.82	0.72	0.79	0.90	0.99	1.17	1.25	1.35
-48	1.34	1.11	1.08	0.90	0.80	0.70	0.76	0.89	0.99	1.18	1.27	1.37
-50	1.37	1.12	1.08	0.89	0.77	0.67	0.74	0.88	0.99	1.19	1.29	1.41

Source: Dunne, T. and Leopold, L.B., 1978. Water in environmental planning, Freeman Publishers.



Mitigation Analysis

Project: 7456 McLean Road West
 Project No: 2792-7289
 Date: 23-Jul-25
 Created by: CM
 Checked by: JB

DESIGN PARAMETERS						
LID Identify	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	614	916	585	331	331	203
TOTAL WITH MITIGATION	614					203
REQUIRED STORAGE						
Available Infiltration Volume (m ³ /yr)	Annual Events Producing Runoff ³	Capacity	Storage Required (m ³)			
203	40	0.4	12.7			
UNDERGROUND STORAGE VOLUME OF PROPOSED LIDS						
LID Identify	Length (m)	Width (m)	Depth (m)	Total Underground Volume (m ³)	Void Ratio	Underground Storage Volume (m ³)
Infiltration Gallery	42	3	0.85	107.1	0.4	42.84
Storage Required (m³)						12.7
Underground Storage Provided (m³)						42.8

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)

APPENDIX F

Groundwater Impact Assessment



NITRATE ATTENUATION CALCULATION

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

Project Name: 7456 McLean
Project Number: 2377-6556

IMPACT ASSESSMENT

MOE, 2008

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

= Manual Data Entry

Infiltration Volume

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

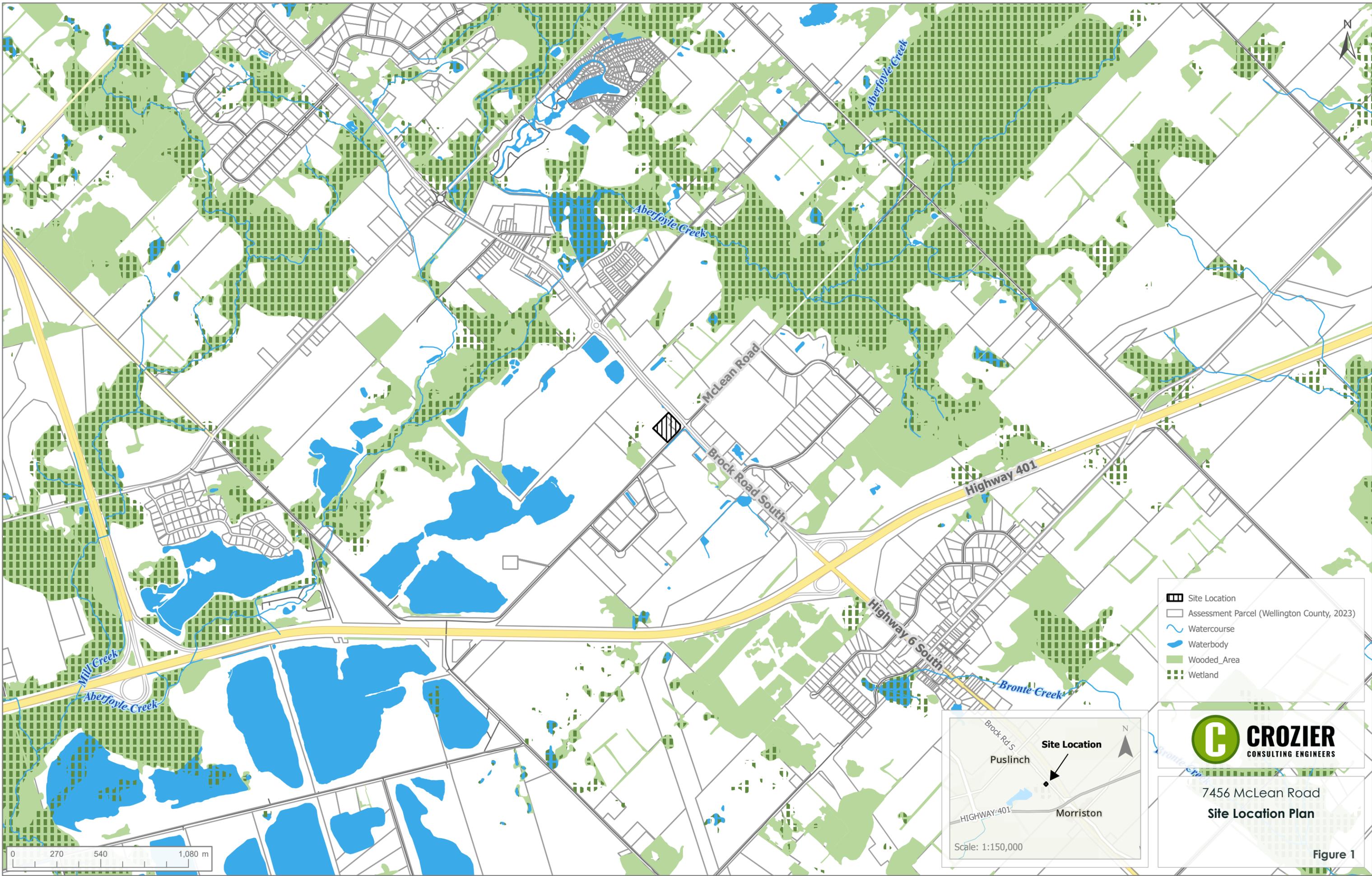
Sewage Effluent Volume

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

Totals

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

FIGURES



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



7456 McLean Road
Site Location Plan

Figure 1



Site Location



7456 McLean Road
Site Overview

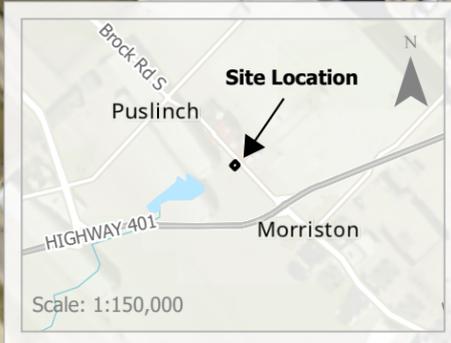


Figure 2



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



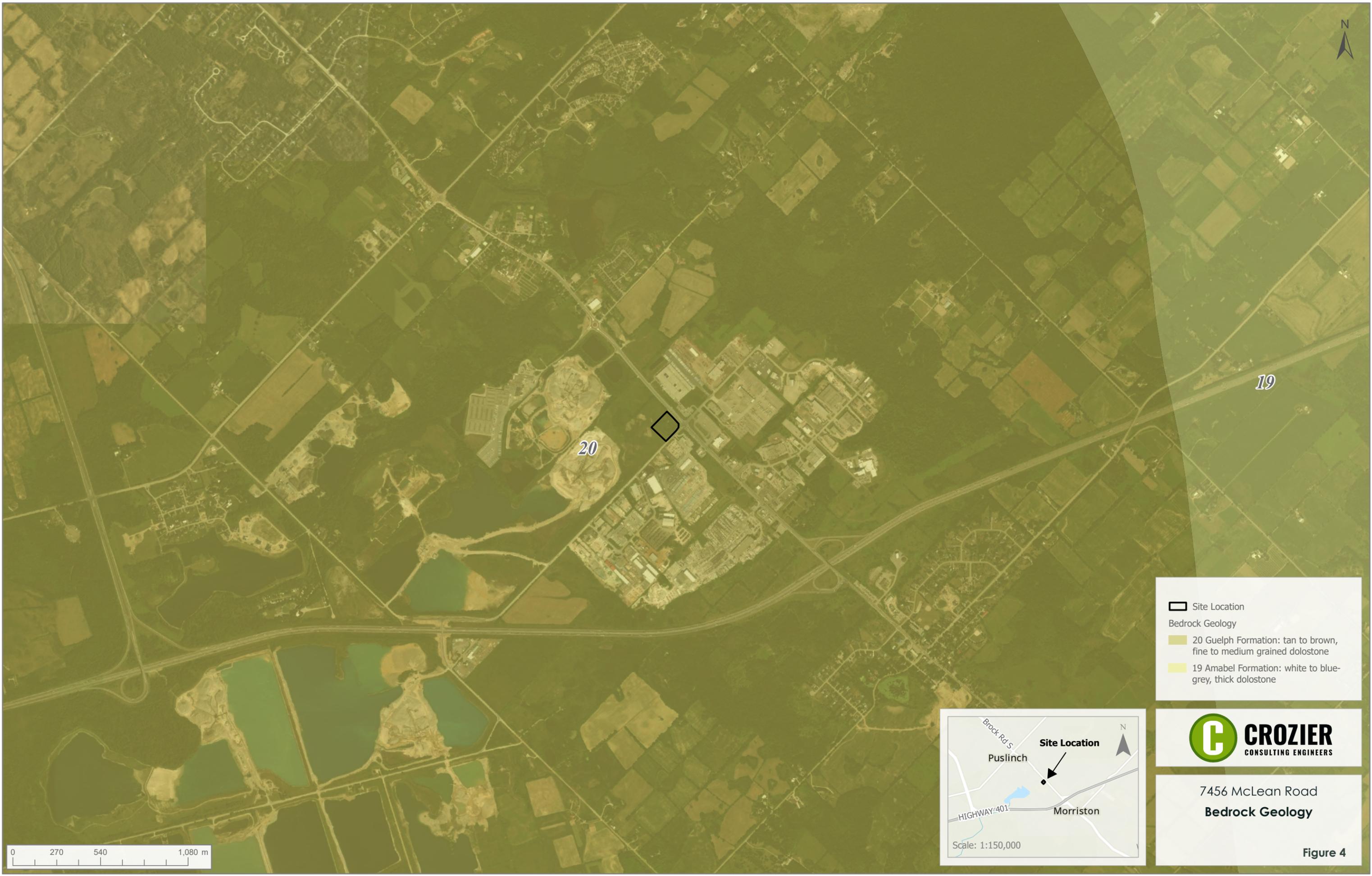
CROZIER
CONSULTING ENGINEERS

7456 McLean Road
Physiography

Figure 3

Brock Rd S
Puslinch
Site Location
Morrison
HIGHWAY 401
Scale: 1:150,000

0 270 540 1,080 m



20

19

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



7456 McLean Road
Bedrock Geology

Figure 4

0 270 540 1,080 m



Site Location

Surficial Geology

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

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7456 McLean Road
Surficial Geology
 Figure 5



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



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

Figure 7



MW2=21
325.87

MW6=23
323.76

MW4=23
321.43

MW1=21
324.19

MW3=21
321.48

MW5=23
325.40

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

321.48 Seasonally High Groundwater Elevation (April 2023, Crozier)



7456 McLean Road
Interpreted Groundwater Flow Direction

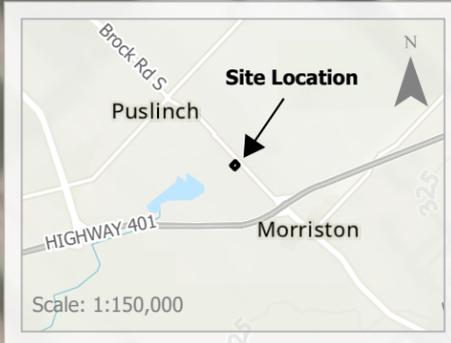


Figure 8

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



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



7456 McLean Road
Attenuation Zone

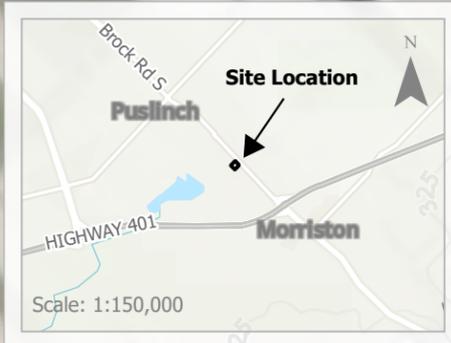
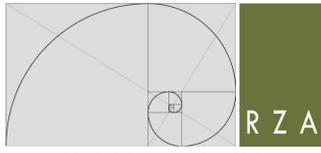
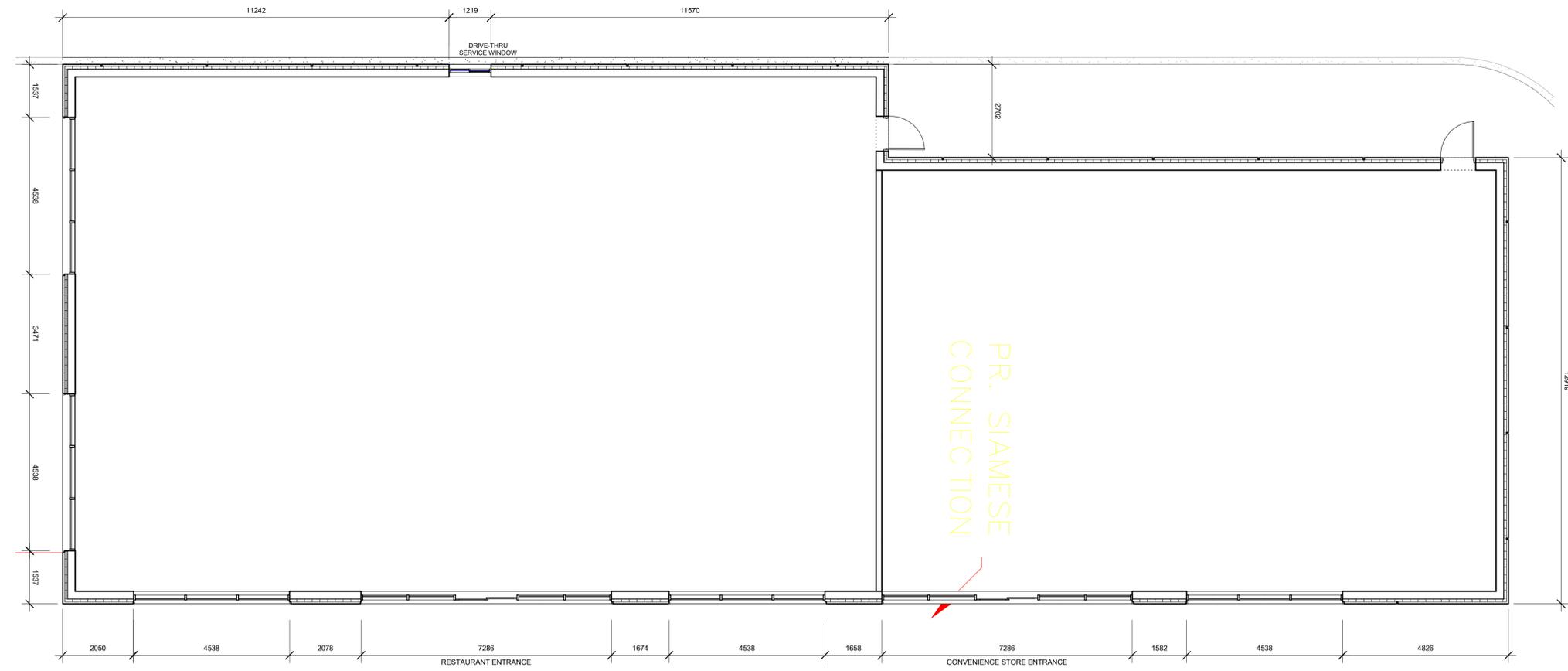


Figure 9

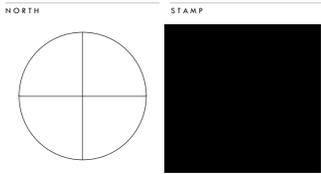


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NO.	ISSUANCE	DATE
1	ISSUED FOR PLANNING APPROVALS	2025.08.05

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.



PROPOSED COMMERCIAL DEVELOPMENT
 7456 McLEAN ROAD WEST & 197 BROCK ROAD SOUTH
 TOWN OF PUSLINCH

FLOOR PLAN - MAIN BUILDING

SCALE	PROJECT NUMBER
1:75	202436
DATE	2025-08-05 9:52:48 AM
DRAWN	SP
CHECKED	REZ
SHEET	REVISION

A102

FILE NAME: Y:\2024\Projects\202436 - 7456 McLean Road Puslinch\2D Design and Construction Documents\Plan\Plan\7456 McLean Road 20241110.dwg
 PLOT DATE: 2025-08-05 9:52:48 AM



7456 MCLEAN ROAD W AND 197 BROCK ROAD S

PLANNING JUSTIFICATION **REPORT**

Zoning By-law Amendment Application

[siv-ik] PLANNING
/ DESIGN



VERSION 1.0

ISSUED

09.20.2023

PREPARED BY

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PREPARED FOR

Black-Hart Construction Inc. (on behalf of DAAZ Inc.)

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1.0 INTRODUCTION

This report has been prepared by Siv-ik Planning & Design Inc. for Black-Hart Construction (representing the registered owner DAAZ Inc.) in support of a Zoning By-law Amendment application for the properties municipally known as 7456 McLean Road West and 197 Brock Road South in the Township of Puslinch. This report provides an independent professional analysis and opinion regarding the merits of the proposed Zoning By-law Amendment and has been prepared, in part, to satisfy the Municipality's complete application requirements. The report explains how the proposed Zoning By-law Amendment aligns with the objectives of the Provincial Policy Statement (2020), the County Official Plan, represents sound planning and is in the public interest.

The purpose of the proposed Zoning By-law Amendment is to facilitate the development of a multi-tenant commercial development (approximately 6,000 sf of gross floor area) on the project site. From a technical perspective, the proposed Zoning By-law Amendment seeks to rezone the lands from the Industrial IND(sp54) and IND(h5) Zones to the Highway Commercial (HC) Zone to allow for an appropriate range of commercial uses to support the travelling public and the overall function of the broader Aberfoyle Industrial Park. The proposed by-law also includes special provisions relating to minor reductions in parking counts and landscaped open space.

Figure 1: Site Overview



The subject site is municipally identified as 7456 McLean Road West and 197 Brock Road South in the Township of Puslinch. It is located in the *Aberfoyle Industrial Park*, at the intersection of Brock Road South (County Road) and McLean Road (Local Road), approximately 700m southeast of the Secondary Urban Centre of Aberfoyle, and 1.25km north of Highway 401. The site is approximately 1.62 hectares (4.0 acres) in size, irregular in shape, consisting of two existing parcels, and is currently vacant and undeveloped.

Additional details about the site and the context are summarized in *Table 1* below.

Table 1: Site Statistics

Project Site Attributes		
Site Area	1.62 hectares (4.0 acres)	
Frontage	101.0 metres (Brock Road South) 113.7 metres (McLean Road West)	
Depth	135.2 metres	
Existing Use(s)	Vacant/Undeveloped	
Servicing	<ul style="list-style-type: none"> • Private On-Site Water and Sanitary Services. • Existing Storm Sewers on McLean Road West 	
Existing Zoning	7456 McLean Road West	197 Brock Road South
	IND(sp54)	IND(h5)
Official Plan (County of Wellington)	Rural Employment Area	

Note: A “Site Plan” has been prepared by ATA Architects Inc and is attached as Appendix ‘A’ to this report for further reference. The existing conditions information has been prepared based on publicly available data from the County of Wellington, on-site observation and a legal/topographic survey prepared Tarasick McMillan Kubicki Limited, dated November 2022.

2.0 SITE CONTEXT

2.1 Surrounding Land Use

As noted in Section 1.0 of this report, the site is located within the *Aberfoyle Industrial Park* in Puslinch Township, a specialized area of rural commercial/industrial land south of the Secondary Urban Centre of Aberfoyle and north of Highway 401. The Industrial Park was established to create a central logistics hub that is intended to serve the Greater Toronto Area (GTA) and Southwestern Ontario, taking advantage of the proximity to major urban centres and Highway 401. The area is primarily developed with large-scale industrial and employment uses however there are a collection of commercial developments along Brock Road that serve and cater to the function of the employment area. Within 800 metres of the project site there are numerous large scale logistics terminals and distribution centres on lots of considerable size, a collection of auto-oriented services and shops such as gas bars and drive-thru restaurants focused along Brock Rd, and active aggregate extraction operations. A GO Transit Park and Ride Station is located on the southeast corner of the intersection of Brock Rd S and McLean Rd W, which generates significant commuter traffic along Brock Rd. The project site is located 1.25km north of Highway 401, connecting the industries within the *Aberfoyle Industrial Park* north towards the GTA, and south to Waterloo Region. It is expected that *Aberfoyle Industrial Park* will continue to grow, as several large scale industrial and logistics facilities have been proposed recently in the area, including a new freight operations headquarters located north of the site at 128 Brock Rd.

Figure 2: Surrounding Land Use Map (800m)



Employment	Aggregate Extraction	Vacant	Site Boundary
Commercial	Transit	Open Space	

2.2 Site Analysis

The site analysis graphic below represents the existing physical characteristics of the site and the lands immediately surrounding the site. The site consists of two legally titled parcels, with frontage on Brock Road South (Wellington Road 46) and McLean Road West. The site is generally flat, though it is divided by a drainage split into east and west catchment areas, largely comprised of landscaped and vegetated areas. No buildings currently exist on the site, however remnants of a former farmstead are visible including an overgrown vehicular access along McLean Road West.

Brock Road South, identified in the County of Wellington Official Plan as a Major Arterial/County Road, consists of a 4-lane cross section with a paved shoulder with no sidewalks or active transportation facilities. McLean Road, a Local Road currently operates as a rural 2-lane cross section, with paved shoulders on both sides, with no sidewalks or active transportation facilities.

From a servicing perspective, there is no municipal water or sanitary servicing available to service the site, although it has been identified that private water and sanitary systems are being utilized by surrounding properties with similar anticipated demands. Existing stormwater servicing infrastructure is located within the Brock Road S and McLean Road right-of-ways.

Figure 3: Site Analysis



LEGEND

- | | | |
|--------------------|---------------------------|-----------------|
| ◄► Existing Access | ○ Signalized Intersection | ■ Local Road |
| ● Vegetation | ■ County Road | — Site Boundary |

3.0 POLICY AND REGULATORY FRAMEWORK

The following section of this report provides an overview of the applicable planning policy & regulatory framework that currently guides land use and development on the subject site. In this case, the key applicable statutory documents include the Provincial Policy Statement (2020), the County of Wellington Official Plan, and Township of Puslinch Zoning By-law 23-2018. The following policies and regulations inform and guide the professional analysis of the proposal provided in Section 5.0 below.

3.1 Provincial Policy Statement, 2020:

The Provincial Policy Statement (PPS) provides policy direction on matters of Provincial interest regarding land use planning and development. The PPS is issued under Section 3 of the Planning Act. Section 3 of the Planning Act requires that land use planning decisions be consistent with the PPS, ensuring that matters of provincial interest, as identified in Section 2 of the Planning Act, are addressed. The PPS is a broad provincial policy document that is generally implemented through local municipal planning documents.

Although it is to be interpreted broadly, the following policy guidance is important to consider in the context of the Zoning By-law Amendment application for 7456 McLean Road West and 197 Brock Road South. Commercial and industrial development within the Municipality is generally provided for in the Municipality's Urban Settlement Areas. The site represents a special exception to this pattern in that it is within a specialized specifically planned and designated for industrial/employment uses outside of Wellington County's existing urban settlement areas.

The PPS provides that rural areas are important to the economic success of the Province and our quality of life. Rural areas are a system of lands that may include rural settlement areas, rural lands, prime agricultural areas, natural heritage features and areas, and other resource areas. Rural areas and urban areas are interdependent in terms of markets, resources and amenities. It is important to leverage rural assets and amenities and protect the environment as a foundation for a sustainable economy.

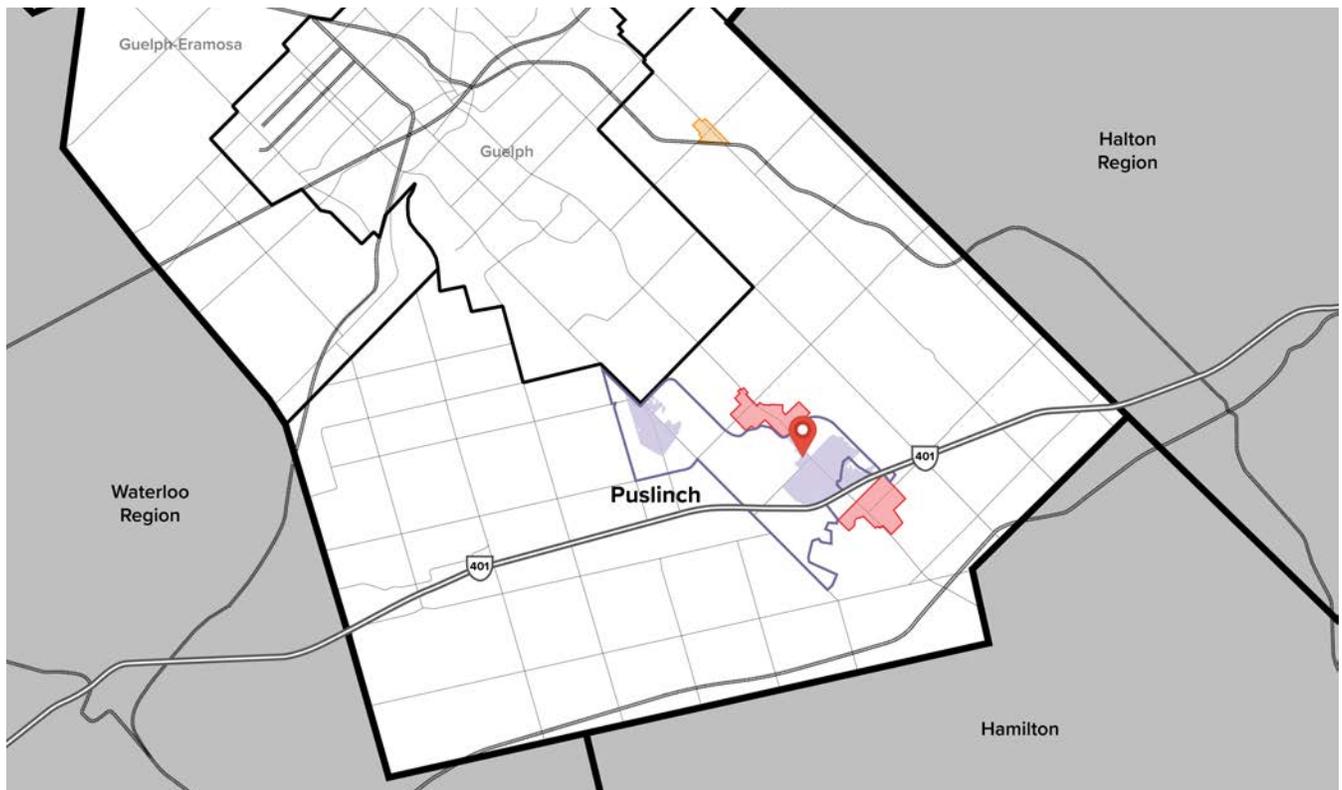
- Section 11.4.1 of the PPS, *Managing and Directing Land Use to Achieve Efficient and Resilient Development and Land Use Patterns* directs that Healthy, integrated and viable rural areas should be supported by building upon rural character, and leveraging rural amenities and assets promoting diversification of the economic base and employment opportunities through goods and services, including value-added products and the sustainable management or use of resources.
- Section 11.5.4 of the PPS, *Rural Lands in Municipalities* promotes development that is compatible with the rural landscape and that can be sustained by rural service levels.
- Section 1.3 provides that planning authorities shall promote economic development and competitiveness by: a) providing for an appropriate mix and range of employment, institutional, and broader mixed uses to meet long-term needs; b) providing opportunities for a diversified economic base, including maintaining a range and choice of suitable sites for employment uses which support a wide range of economic activities and ancillary uses, and take into account the needs of existing and future businesses.

In view of the PPS policies noted above, the proposed Zoning By-law Amendment will serve to enhance the viability and utility of an existing rural commercial site. The rezoning of the site to Highway Commercial (HC) Zone will support the viability of the local economic base and the function of the Aberfoyle Industrial Area and can be supported by the available "rural" servicing options as detailed in the August 2023 Functional Servicing Report prepared by Crozier & Associates Inc. The use of the subject land for a small-scale service oriented commercial development is consistent with the policies of the PPS.

3.2 County of Wellington Official Plan:

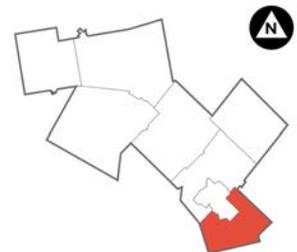
Figure 4 represents the site's positioning relative to Wellington County's overall land use structure. The purpose of the Wellington County Official Plan is to provide direction and a policy framework for managing growth and land use decisions in the County over a 20-year period. The Plan establishes a broad, upper-tier policy framework that provides guidance to local municipalities in the preparation of their own local Official Plans, Official Plan Amendments and Zoning By-laws. Sections 2.6 & 2.7 of the Plan sets out the hierarchy of Settlement Patterns and land use categories that apply in the County and the conditions under which development may be permitted within those various areas.

Figure 4: County of Wellington Official Plan Settlement Areas



LEGEND

- Rural Employment Area
- Secondary Urban Centre
- Regionally Significant Economic Development Study Area
- Hamlet



Land Use Structure:

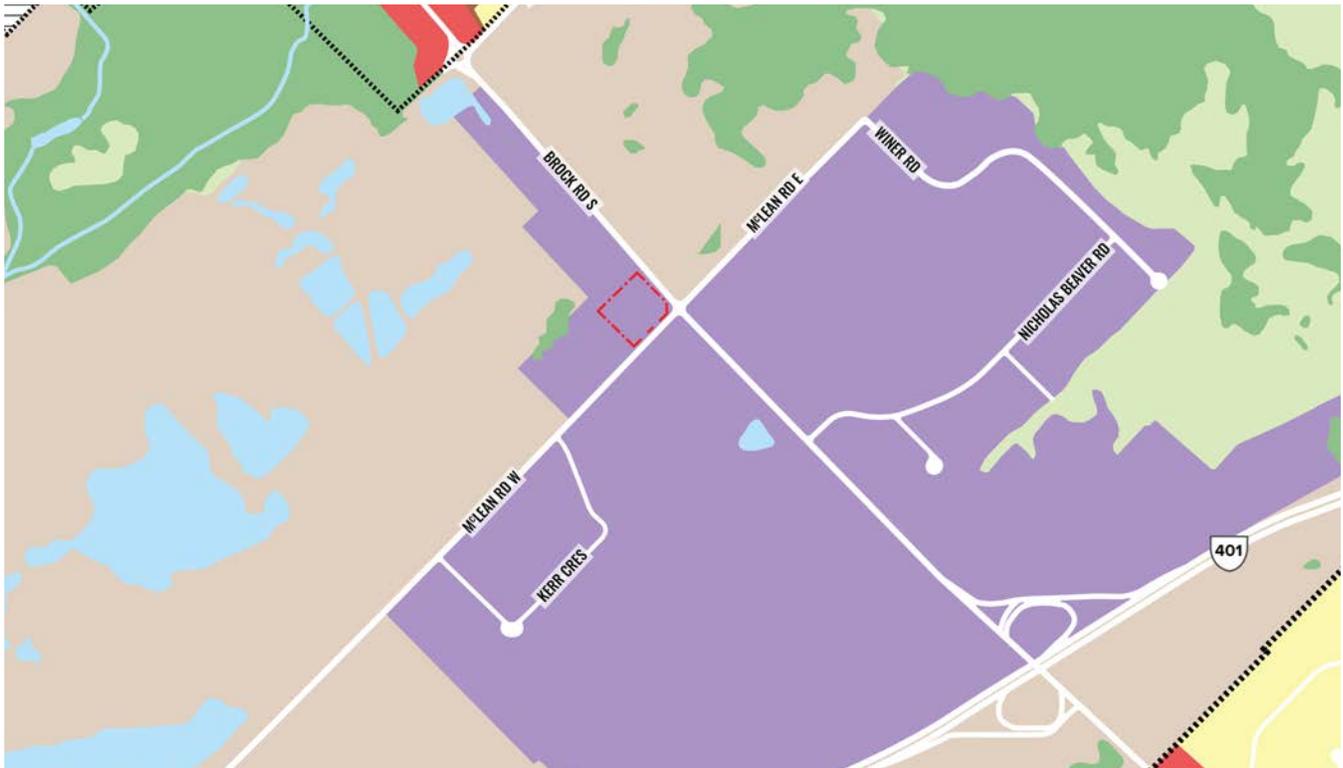
The project site and the surrounding lands are not identified as a settlement area on the County Official Plan Mapping. In fact, these lands are identified as being within a Rural Employment Area as per Schedule A7 - Community Growth Structure - Puslinch in the Official Plan. Notwithstanding the overall Secondary Agricultural designation of the broader area, the site and adjacent lands located along the Brock Road South Corridor between Aberfoyle and Morriston are identified as location for non-farm commercial and industrial uses in the Official Plan (see below) as part of the Rural Employment Area designation and Regionally Significant Economic Development Study Area.

Policies detailing the Regionally Significant Economic Development Study Area are found within Section 9.8.4 of the County of Wellington Official Plan. This area applies to a significant portion of Puslinch Township, extending from Guelph’s southern boundary to Aberfoyle, Highway 401, and Morriston. This area is predominantly made up of Secondary Agricultural Lands that are anticipated for future employment uses, in addition to the lands designated as Rural Employment Areas. Future study initiated by the Township will further develop strategies on how these lands will be built out.

Land Use Designations:

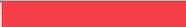
The applicable land use designation mapping is shown in Figure 5 below. The subject site is designated Rural Employment Area on Schedule B7 - Land Use - Puslinch of the County of Wellington Official Plan. The Official Plan land use designation provides the most direct/specific policy guidance for consideration of redevelopment of the project site and other lands along the Brock Road South corridor and adjacent lands.

Figure 4: County of Wellington Official Plan Land Use Designations



LEGEND

● Rural Employment	● Central Business District	● Greenlands
● Secondary Agricultural	● Residential Transition	/// Future Development
● Residential	● Core Greenlands	— Site Boundary



Rural Employment Designation:

Section 6.8 of the Official Plan pertains to Rural Employment Areas. These areas represent a significant collection of lands set aside for dry industrial and commercial uses, often requiring large lots, which benefit from a rural location due to proximity to rural resources and/or major transportation routes, among others. In any case, developments within Rural Employment Areas are to be “dry,” therefore not requiring significant amounts of water in their operations, nor producing significant amounts of effluent, such that private water and sewage systems can be utilized. In this regard, a Functional Servicing Report has been prepared by Crozier & Associates which details the servicing strategy for the proposed development and supports conformity with the policies of Section 6.8.

Section 6.8.2 – Permitted Uses – permits such commercial uses that will be service focused, with limited accessory retail, including both small scale restaurants and automobile services. More intense retail commercial uses that are more commonplace in an urban setting is not permitted in Rural Employment Areas. A significant number of commercial and industrial operations exist in this Rural Employment Area, taking advantage of access to major roads (Brock Road South and Highway 401), aggregate resources, and large lots. Additionally, Section 9.8.3 – Puslinch Industrial Policy – identifies the additional permitted uses within areas designated Rural Employment including complementary commercial uses such as automotive uses, restaurants and limited retail.

Section 6.8.2 and 9.8.3 collectively establish a policy framework to support the development of a mixed commercial development on the project site. The applicable policies (6.8) do require that development occurring in Rural Employment Areas be “dry” given the lack of availability of municipal water and sanitary services. In light of this policy requirement, a detailed function servicing report has been prepared by Crozier & Associates in support of the application. The FSR outlines the specific servicing demands for the proposal and the applicable requirements for private on-site water and sanitary services along with stormwater quality and quantity controls. Based on the Crozier report, the proposed development can be effectively serviced by rural servicing options.

Lastly, Section 13.10 of the Official Plan establishes that all lands within the County of Wellington are hereby established as a site plan control area. Future development of the site will be required to obtain Site Plan Control approval which will provide a planning process to address technical/detailed aspects of the site development such as site layout, site servicing design, landscape design, etc.

3.4 Township of Puslinch Comprehensive Zoning By-law 023-2018:

The subject site is currently divided into two legally titled parcels, each with different existing zoning provisions. 7456 McLean Road W is currently zoned Industrial (IND(sp54)) Zone with special provisions in the Township of Puslinch Zoning By-law 023-2018. The special regulations applied to the site relate to additional parking requirements for uses within a multi-tenanted building, at 1 space per 50m² of net floor area. 197 Brock Road South is zoned Holding Industrial (INC(h5)). Removal of the holding provision requires the submission and approval of a Site Plan Approval application for development of the site.

The IND Zone provides for a wide range of industrial land uses. The IND zone provides regulations regarding setbacks, heights, and other lot requirements, mainly intended for large scale industrial development on large lots. The existing applicable zoning regulations are listed in Table 2. The IND Zone is generally intended to implement the industrial policies across the Township of Puslinch, as well as the Rural Employment Area designation outlined in Section 6.8 of the County of Wellington Official Plan. While a restaurant use is permitted, the IND Zone is limited in its permissions for commercial land uses, namely gas bars.

The surrounding lands, as depicted in Figure 6 below, are zoned via a combination of IND and the Highway Commercial (HC) Zone variations which provide for a similar and compatible range of rural commercial and industrial uses. Other developments along Brock Road South containing drive-through restaurants and/or gas bars with associated retail stores are zoned HC and are on similarly sized smaller lots.

Figure 5: Township of Puslinch Zoning Mapping (023-2018)

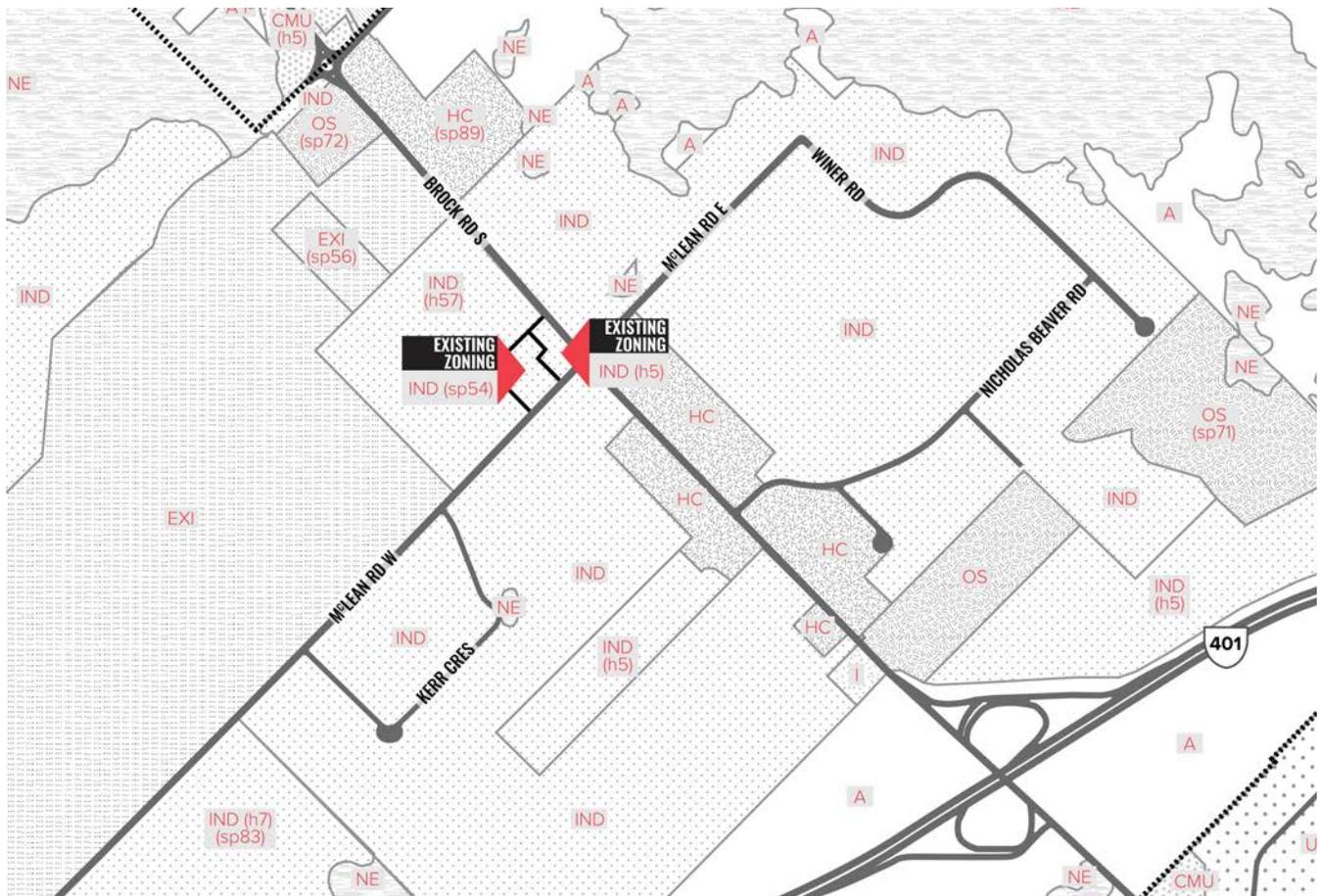


Table 2: Existing IND Zone Regulations

Regulation	IND Zone
Permitted Uses	See Section 9.2 Special Provisions for Restaurant Use: Permitted only as an accessory use. All accessory uses shall occupy a combined maximum of 30 percent of the floor area of the principal use.
Lot Area (min.)	0.4ha
Lot Frontage (min.)	30.0m
Front Yard Depth (min.)	6.0m
Interior Side Yard (min.)	5.0m
Rear Yard Depth (min.)	7.5m
Lot Coverage (max.)	75%
Landscaped Open Space (min.)	15%
Height (max.)	25.0m
Gross Floor Area (max.)	N/A

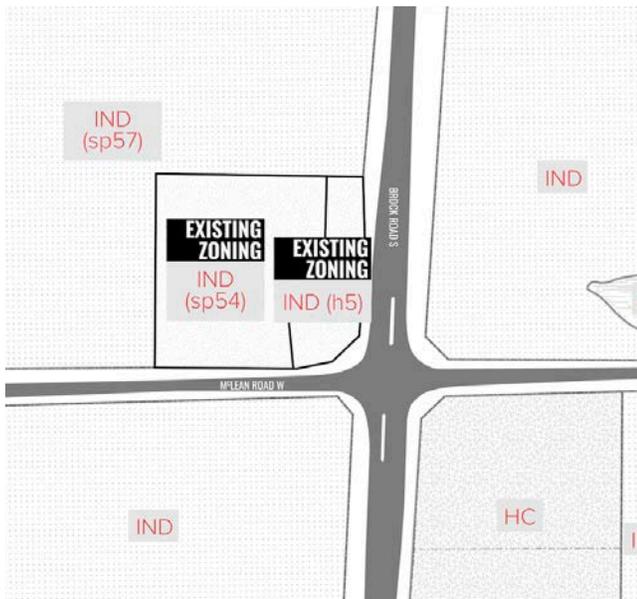
4.0 THE PROPOSAL

4.1 Zoning By-law Amendment:

The proposed Zoning By-law Amendment will provide a framework for auto-oriented, mixed-use commercial development in the form of a multi-tenant commercial development with uses that are intended to support the function of the broader Aberfoyle Industrial Park. The western portion of the site includes a 6-pump gas bar and truck scale intended for commercial motor vehicles and a tractor-trailer parking/staging area with 10 dedicated stalls. The conceptual design accommodates truck stacking and turnarounds on-site which minimizes traffic impacts on McLean Road W. The proposed Highway Commercial (HC) Zone includes some minor special regulations to account for the unique context of the project site and the specific development concept being proposed. These include site-specific special regulations for vehicular parking and landscaped open space.

The proposed zone and special regulations are structured to facilitate the development of the concept plan prepared by ATA Architects Inc., attached as Appendix A to this report. In this regard, the proposed Zoning By-law Amendment will “lock-in” key development and built form standards but will also allow for a degree of flexibility to address site and building design details through the future Site Plan Control application process.

EXISTING ZONING



PROPOSED ZONING



Table 3: Proposed Zoning By-law Regulations

By-law Regulation	HC	Proposed HC(sp_)
Permitted Uses	See Section 8.2	-
Lot Frontage (min.)	20.0m	-
Front Yard Depth (min.)	3.0m	-
Interior Side (min.)	3.0m	-
Exterior Side Yard (min.)	7.5m	-
Rear Yard Depth (min.)	3.0m	-
Lot Coverage (min.)	45%	-
Landscaped Open Space (min.)	45%	21%
Height (max.)	N/A	-
Vehicle Parking (min.)	Gas Bar: 1 per gas bar pump Restaurant: 1 per 10m ² including outdoor patio area Retail Store: 1 per 20m ² Total Required: 50	Restaurant: 1 per 20m ²

-: indicates no change proposed to existing HC regulations

The primary purpose of the proposed Zoning By-law Amendment is to allow for the gas bar use, which is not a permitted use in the existing IND Zone. As detailed in Table 3 above, site-specific special regulations for landscaped open space and parking are proposed in order to enable the development concept. Further details on the proposed development statistics are found in Table 4 in the following section of this report and on the Zoning Data Table included in Appendix 'A'. The Zoning By-law Amendment application is a precursor to a future Site Plan Control application that will address the detailed/technical aspects of the development including building and site layout, site servicing and lot grading, tree protection/landscape design, etc.

4.2 Development Concept

The proposed concept plan envisions a multi-tenant commercial development with uses that are intended to support the function of the broader Aberfoyle Industrial Park. The western portion of the site includes a 6-pump gas bar and truck scale intended for commercial motor vehicles and a tractor-trailer parking/staging area with 10 dedicated stalls. The conceptual design accommodates truck stacking and turnarounds on-site which minimizes traffic impacts on McLean Road W. Access and internal circulation has been planned comprehensively across the proposed development.

The eastern portion of the site is proposed to be developed with a 4-pump car gas bar (for regular motor vehicles), an associated retail/convenience store (approx. 238m² GFA), and a drive through restaurant (approx. 334m² GFA). A total of 41 parking stalls (including 4 electric vehicle charging stations) have been provided to serve this portion of the planned development. A significant landscape strip/buffer area (6 metres) has been incorporated along all portions of the site abutting both Brock Road S and McLean Road W.

Access to the site is provided via a full turns access from McLean Road W and a right-in-right-out only restricted access from Brock Road S. Access and internal circulation has been planned comprehensively across the proposed development. The shared internal circulation network allows for both truck and car traffic to utilize both access points while also minimizing potential conflicts between motor vehicles and tractor-trailers within the site.

The key statistics regarding the proposed development concept are summarized in Table 4 below. For detailed evaluation of the development concept, the Preliminary Site Plan prepared by ATA Architects Inc. and attached as Appendix 'A' to this report should be referred to.

Figure 6: Simplified Conceptual Site/Landscape Plan



Table 4: Proposed Development Statistics

Concept Plan Data Table		
Use	Gas Bar, Drive-Through Restaurant & Convenience Store	
Buildings/Structures	3	
Height	Gas Pumps - 7.5m (1-Storey) Restaurant/Convenience Store - 6.0 m (1-Storey)	
Parking	37 standard (including 3 accessible parking stalls) 4 electric vehicle charging stalls 10 transport trailer parking stalls	
Coverage	8%	
Landscaped Open Space	21%	
Setbacks	North (Interior)	52.3m
	East (Front)	15.8m (to car gas bar canopy) 41.0m (to building)
	West (Rear)	3.0m (to truck gas bar canopy) 74.3m (to building)
	South (Exterior)	17.1m

5.0 PLANNING ANALYSIS

The following analysis examines the impacts/implications of the proposed Zoning By-law Amendment with respect to use, intensity, form and function. As explained in Section 4.0 - Proposal - of this report, the proposed Zoning By-law Amendment is intended to rezone the project site to the Highway Commercial (HC) Zone to allow for a small-scale multi-tenant commercial development (commercial Gas Bar, Convenience Store and Drive-Through Restaurant) along Brock Road S that will serve an ancillary function to support the viability of the broader Aberfoyle Industrial Area. The proposed amendment also included special provisions to alter other regulations and/or development standards in the HC Zone, including required parking rates and landscaped open space. The scope of the analysis will be focused on the technical issues and impacts arising from the change in land use and associated special provisions.

It is important to note that any future development as envisioned by the landowner would be subject to the Municipality's Site Plan Control By-law. The Site Plan Control process would provide an opportunity to review the detailed design and servicing plans for the site and also address any other technical considerations deemed relevant by Municipal Planning Authorities.

5.1 Land Use:

Section 6.8 of the County of Wellington Official Plan describes the intended function and purpose of the "Rural Employment Lands" designation.

As described in 6.8.2, it is the intention that the uses allowed in areas designated "Rural Employment Lands" are to be industrial or commercial uses, that may benefit from larger lot sizes, major road access, and proximity to rural resources. Furthermore, commercial uses in this land use designation shall be service focused, which may include uses like small-scale restaurants and automobile services. The Highway Commercial (HC) Zone implements the commercial components outlined in the Rural Employment Lands designation in the Official Plan, by providing a framework for auto-oriented, service based commercial land uses. This section also directs new development to be dry due to lack of availability of municipal services. Dry uses are to require significant amounts of water in their operation, while not producing similar levels of effluent. The proposed development is considered a dry use, not requiring substantial water usage, and is proposed to be utilize private water and sanitary services, similar to other developments in the area.

The project site is 1.62 ha (4.0 acres) in total size, a relatively small site in comparison to the larger lots that make up the majority of the Aberfoyle Industrial Park. Given the contextual size and scale of adjacent industrial operations in the area, it is unlikely that the project site is of sufficient size to accommodate industrial development as described in Section 6.8.2 of the Official Plan and is better suited for smaller scale commercial development. Significantly larger parcels than the subject site and more suitable for industrial land uses.

The project site is located at the intersection of Brock Road South (a County Road) and McLean Road. Given the site's proximity to Highway 401 and major industrial and logistics facilities in the Aberfoyle Industrial Park, there is opportunity to provide freight and automobile supportive commercial uses that take advantage of the site's strategic access to major transportation routes.

Section 6.8.3 states that any new development in Rural Employment Areas is to be compatible with existing uses. The proposed uses of a gas bar and accessory retail store, and drive-thru restaurant are compatible with existing land uses along Brock Road South and the Aberfoyle Industrial Park. The existing automobile sales establishments, logistics and freight operations, aggregate resource extraction facilities, and other industrial uses would generally benefit from the services proposed on the subject site, specifically the proposed transport truck-only gas bar and dedicated transport trailer parking areas. There are several existing gas bars and drive-thru restaurants currently operating along Brock Road South on small lots, indicating that there is a strong demand for such uses in the area.

Section 9.8.3 – Puslinch Industrial Policy – within the Official Plan permits lands designated Rural Employment to have additional uses, namely automotive uses, and restaurants. There are additional policies contained within Section 9.8.6.PA7-1 – Puslinch Economic Development Area stating that the area is intended to service the Township by providing locations for economic activity and employment opportunities. There is clear policy direction within the Official Plan that small-scale commercial land use that is supportive of existing industrial facilities in the Rural Employment land use designation.

5.2 Parking & Access:

The proposed multi-tenant commercial development is proposed to be accessed through a full moves site access from McLean Road West, and a restricted right-in-right-out access from Brock Road South. A Transportation Impact Assessment (TIA) was prepared by C.F. Crozier & Associates Inc, dated August 2023. The TIA reviewed the impact of the proposed development as well as the viability of the proposed access locations. Based on the proposed use and the site's location along Brock Road South, access via the County Road is critical to the development. Through the TIA, the Brock Road access was deemed supportable due to its distance away from the signalized intersection of Brock Road and McLean Road (105m) and that it is a restricted right-in-right-out access. The subject site is expected to generate 148 two-way (75 inbound and 73 outbound) trips during the weekday a.m. peak hour, and 139 (72 inbound and 67 outbound) primary trips during the weekday p.m. peak hour. Additionally, no challenges to capacity or storage issues are expected. Therefore, the accesses are expected to operate efficiently with minimal delays and reserve capacity to accommodate future increases in traffic volumes.

The proposed commercial development includes 41 parking spaces, broken up into four (4) electric vehicle charging stalls, and thirty-seven (37) standard parking spaces. Ten (10) truck parking spaces are provided on the west side of the property. Based on Section 5.5.2 of the Township of Puslinch Zoning By-law, the required amount of parking for this development is fifty (50) car parking stalls, based on the number of car gas pumps (4) and the gross floor areas of the restaurant and retail components. Given the context of the site, and the auto-oriented and drive-thru nature of the uses proposed on-site, a significant portion of expected users of the development are not anticipated to park for extended periods of time. The restaurant use is smaller, forming part of the convenience store building, and is expected to operate differently than a traditional restaurant, thus a reduced parking demand can be justified. A rate of 1 parking space per 20m² of restaurant gross floor area is proposed, resulting in 17 parking spaces required for the restaurant use.

Ten (10) transport truck parking spaces are provided, representing a surplus of four (4) stalls in truck parking based on the 1 stall per gas pump as per the Zoning By-law. Many of the existing gas bars along this section of Brock Road South do not have truck parking capabilities due to site size, limiting maneuverability.

5.3 Landscaped Open Space:

The Highway Commercial (HC) Zone in the Township of Puslinch Zoning By-law requires a minimum of 25% landscaped open space on new developments. The proposed development on the subject site in its current configuration contains approximately 21% landscaped open space, largely through 3.0-6.0 metre landscape buffers along the perimeter of the site. This area of land includes snow storage areas for the site, as well as providing visual amenity for the property. The proposed development is deficient 4% landscaped open space as per the HC Zone. This is driven by the amount of asphalt required for the manoeuvring of transport trucks throughout the site so that they are able to utilize the truck-only gas bar, and park in the proposed truck parking spaces.

5.4 Puslinch Design Guidelines:

The project site is subject to the Puslinch Design Guidelines, which are intended to guide development to respect and be sensitive towards the local area, both planned and existing. The Guidelines are organized into three main categories; Enhancing the Streetscape, Promoting Quality Development, and Respecting Established Character.

The project site located in Area A3: Aberfoyle to Highway 401. Regarding the streetscape, the Guidelines have been implemented on the proposed concept plan through the provision of a 6.0m landscaped strip along Brock Road for tree planting. Landscaped islands have been incorporated at appropriate intervals through internal parking areas. A detailed landscape plan will be completed and provided for the Municipality's review through the site plan process. Driveway accesses have been designed to the minimum necessary width to maintain a consistent streetscape as per A3.3 of the Guidelines.

As the project site is a corner site and commercial land uses are proposed, Sections B1 and B2 of the Guidelines apply. These sections call for the provision of architectural detailing such as variations in colour and materials, enhanced landscaping, as well as ensuring primary building entrances are visible from the highest order street. A detailed building design package meeting the design objectives will be provided as part of the Site Plan Control process.

Section C5 - Site Landscaping of the Guidelines apply to the site, and will be taken into account during the completion of detailed landscaped plans in subsequent phases of the planning process.

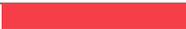
5.5 Site Servicing:

Section 6.8 of the Official Plan states that land development that occurs within the Rural Employment Lands designation is to be a dry-use, requiring minimal water use while not producing significant effluent, consistent of with rural servicing levels that exist in the Aberfoyle Industrial Park. A Functional Servicing & Stormwater Management Report dated August 2023 was prepared by C.F. Crozier & Associates Inc. in support of the Zoning By-law Amendment.

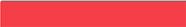
There is no existing municipal water systems that are available to service the site. The project site is expected to be serviced through a private water supply well. The existing well, identified as ID 67070585, is proposed to be decommissioned prior to site alteration occurring. A new well is proposed along the south property line, adjacent to McLean Road, within the landscaped strip. An underground storage tank (minimum 58,344L) is required for fire prevention on the site, of which the design and location will be confirmed through consultation with the local fire department.

No sanitary services exist in the area. Sanitary servicing for the development is proposed to occur through an on-site sewage system with treatment occurring on-site before effluent flows towards a leaching bed, located in the northwest corner of the site.

Lastly, stormwater management for the proposed development is designed to flow towards the existing stormwater sewers in the Brock Road S and McLean Road W right-of-ways. An oil/grit separator and underground storage tank are proposed to provide quality and quantity controls prior to outletting into the existing storm sewers. For undeveloped and landscaped areas, the flow will be uncontrolled towards their respective outlets.



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6.0 CONCLUSIONS

The proposed HC zoning that is being sought for the site effectively implements the policies of the Rural Employment designation outlined in Section 6.8 of the County of Wellington Official Plan. The proposed Zoning By-law Amendment will provide for an appropriate zoning framework to guide land use and development at 7456 McLean Road West and 197 Brock Road South that preserves the overall intended function of the lands, seeking to add a desirable and compatible commercial permitted use that aligns with the applicable land use policies in the Official Plan. The proposed site-specific parking rate will recognize the specific nature of the intended land use and the context of the area and work to ensure there is appropriate provisions for on-site parking without regulating an oversupply. The site and the intended form of development are subject to Site Plan Control under Section 41 of the Planning Act which will provide an outlet to ensure any/all site development issues such as layout, servicing, landscaping, etc. are addressed and meet municipal standards. Overall, the proposal will enhance the rural industrial economic base in this unique portion of the Township of Puslinch and will ultimately be serviceable by rural service levels.

In light of the foregoing, the proposed Zoning By-law Amendment represents sound land use planning, is in the public interest and implements the applicable municipal planning framework.

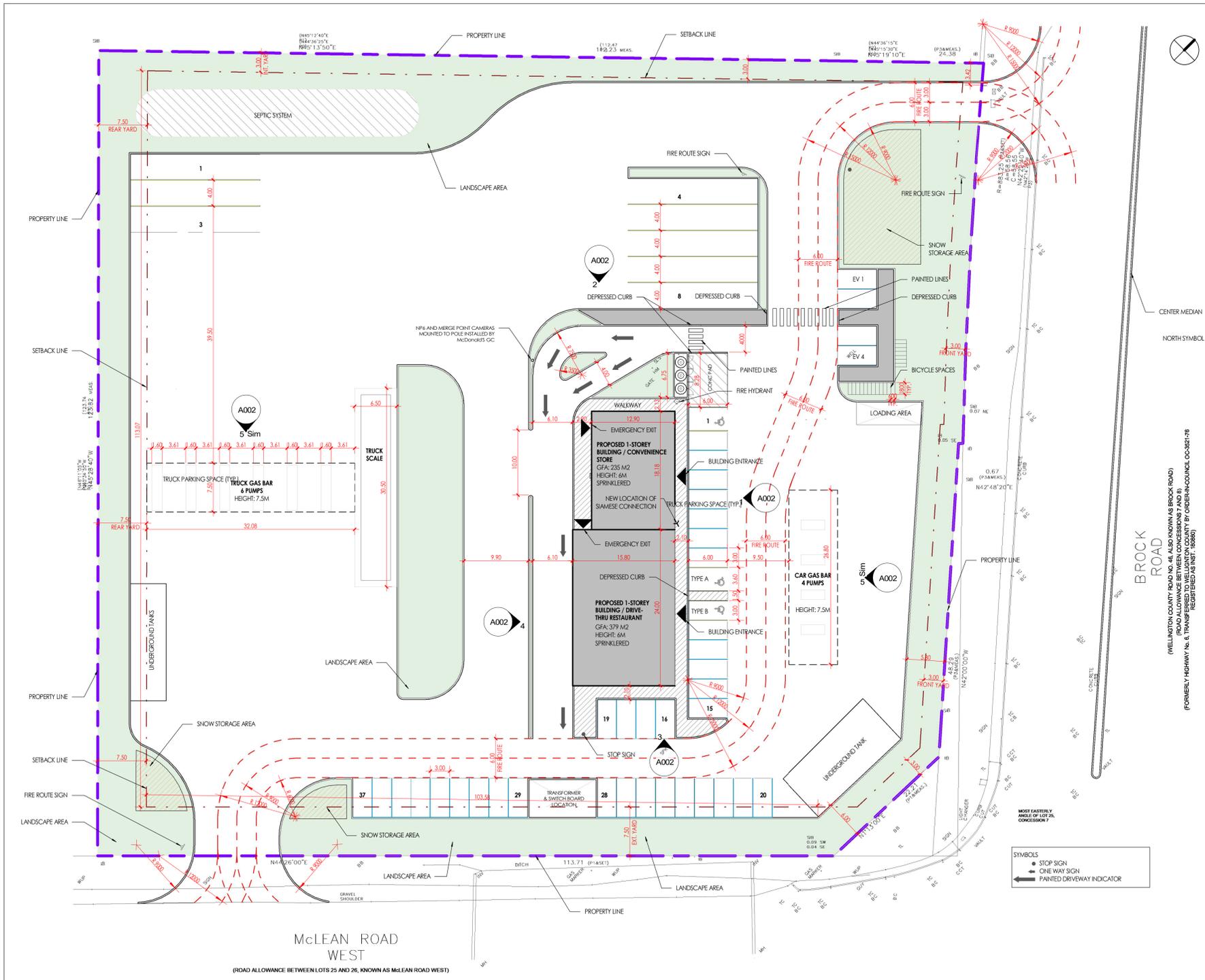
Dan Murphy, MA, BAA

APPENDICES

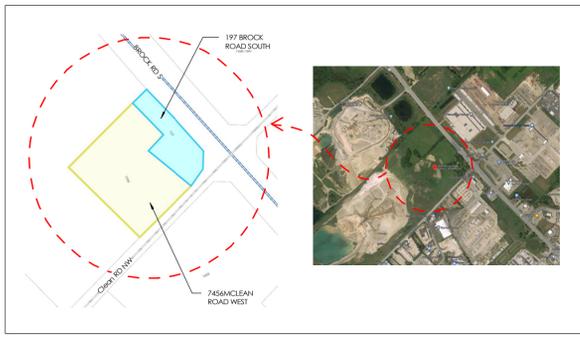
Site Concept Plan	A
<hr/>	
Draft Zoning By-law	B
<hr/>	



APPENDIX A: SITE CONCEPT PLAN



1 00 - SITE PLAN
1:350



KEY PLAN
1:100

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

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

5.2.15 BICYCLE PARKING

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

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

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

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

2 SITE STATISTICS & TABLES
1:120

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

REVISION

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

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

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

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SEALS

PROJECT

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

DRAWING

SITE PLAN & KEYPLAN

DRAWN

AA

SCALE

As indicated

DATE

2023 10 04

CHECKED

AT

PROJECT

#TBD

DRAWING

A001



APPENDIX B: DRAFT ZONING BYLAW

The Corporation of the Township of Puslinch

BY-LAW NUMBER _____

WHEREAS, the Council of the Corporation of the Township of Puslinch deem it appropriate and in the public interest to amend By-Law Number 023/2018 pursuant to Section 34 of the Planning Act, R.S.O. 1990 as amended;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWNSHIP OF PUSLINCH ENACTS AS FOLLOWS:

1. THAT Schedule 'A' (Map A-4) of Zoning By-law 023/2018 is hereby amended by rezoning Parts 1 & 2, Concession 7, from INDUSTRIAL (IND(h5)) and INDUSTRIAL (IND(sp54)) to a site specific **HIGHWAY COMMERCIAL (HC(spXX)) ZONE**, as shown on Schedule "A" of this By-law.
2. That section 14.0 SPECIAL PROVISIONS is amended by adding the following new exception:

HC(spXX) Parts 1 & 2, Concession 7

Notwithstanding any provisions of this By-law to the contrary, for lands zoned HC(spXX) on Schedule 'A' hereto, the following special provisions shall apply:

LANDSCAPED OPEN SPACE (MINIMUM): 20.0%

PARKING SPACE REQUIREMENT

RESTAURANT (MINIMUM): 1 per 20m² including outdoor patio area

3. This By-law shall become effective from the date of passage by Council and come into force in accordance with the requirements of the Planning Act, R.S.O. 1990, as amended.



**197 Brock Road South & 7456 McLean Road W
Zoning By-law Amendment Application
Comment Response Matrix**

Consultant	Comments	Applicant Team Response
County of Wellington Planning	<p>1. <i>The County's Roads department will provide further information regarding submitted traffic impact study. Staff note that previous comments indicated access from Brock Road S would not be permitted and the applicant is indicating that a right in-right out access is required to facilitate the development of the site.</i></p>	<p>Agreed and noted. Comments issued by Dillon Consulting (County TIA Peer Reviewer) indicate support for the proposed RIRO access subject to extension of the median on Brock Road S. Further details can be found in the December 6, 2023 comments from Dillon and further updates to the TIA from Crozier.</p>
	<p>2. <i>197 Brock Rd S is zoned IND (h5). 7456 McLean Rd W is zoned IND (sp54). Both properties are included in the Township's Industrial Overlay.</i></p>	<p>Agreed and noted. No action required.</p>
	<p>3. <i>The applicant is proposing to rezone the property to Highway Commercial (HC) to facilitate the construction of a multi-tenant commercial development including a gas bar, restaurant with a drive-thru and a convenience store.</i></p>	<p>Agreed and noted. No action required.</p>
	<p>4. <i>The draft By-law also includes a site-specific parking provision for 1 space per 20 m²; whereas 1 space per 10 m² is required in the zoning by-law.</i></p>	<p>Agreed and noted. No action required.</p>
	<p>5. <i>The applicant's TIS indicates a required parking number of 60 spaces and 49 spaces provided. Table 14 uses the required parking for 'other uses,' this is incorrect. The Township's zoning by-law does not indicate additional parking for</i></p>	<p>Please refer to the submitted Planning Justification Report for correct details and information regarding the requested Zoning By-law Amendment.</p>

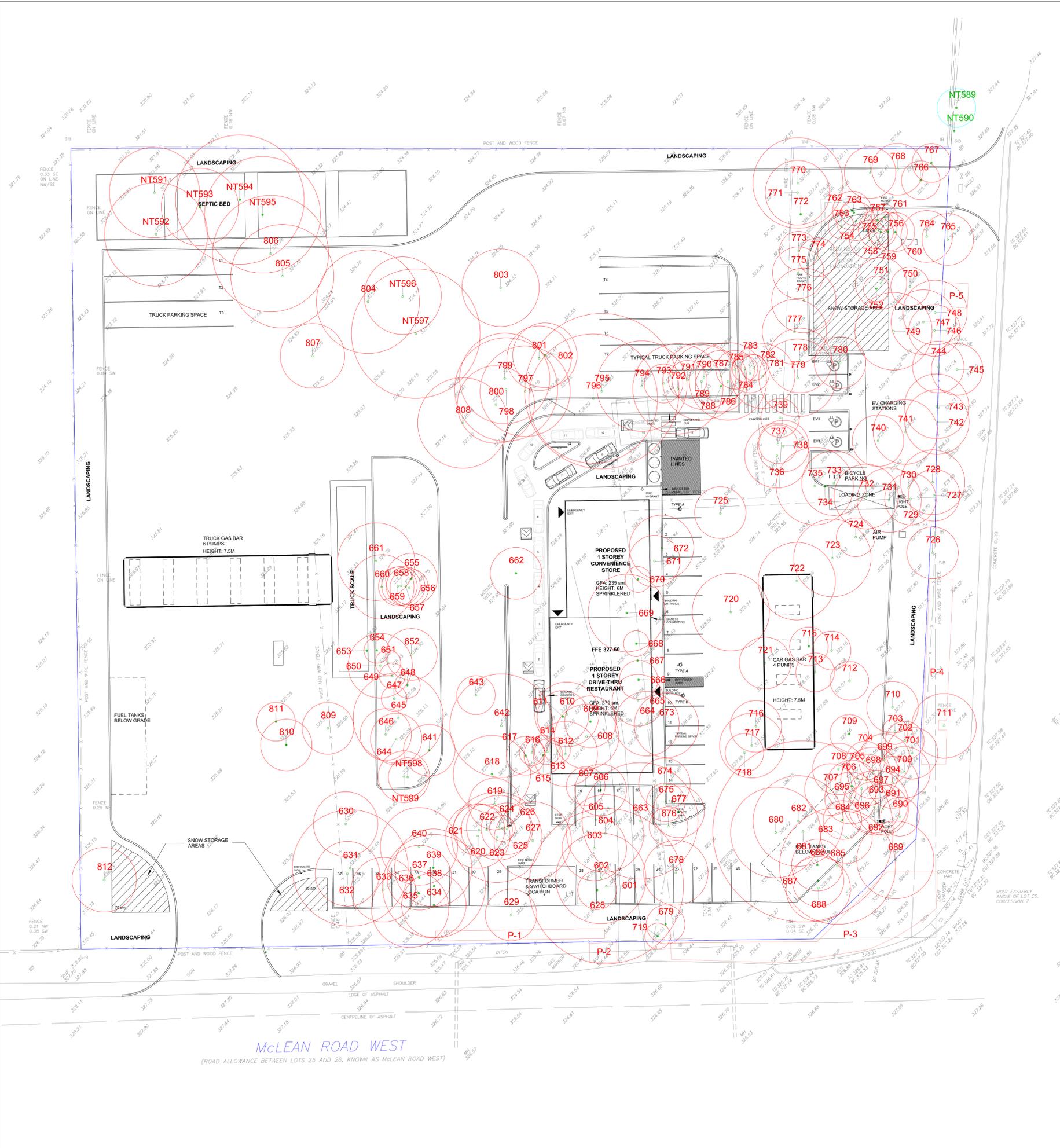
	<p><i>restaurants with drive-through facilities nor does it indicate reduced requirements. The applicant should clarify if the restaurant is serviced by the drive-through only or if there is seating/service in addition to the drive-through. Further, the applicant should compare parking requirements for this type of use with neighbouring municipalities and provide justification for the reduced parking requirement for the restaurant and drive-through use.</i></p>	<p>The TIS has been updated to remove reference to parking requirements for “other uses” in reference to the drive-through restaurant.</p> <p>The revised Planning Justification Report (Section 5.2) includes further review of the shared use parking regulations in Table 5.4 and further justification for the proposed reduced rate.</p>
	<p>6. <i>Table 5.4 of the Township’s zoning by-law provides an opportunity to calculate shared use parking. This Section should be referred to when determining the required parking for the site.</i></p>	<p>See above.</p>
	<p>7. <i>The TIS and/or site plan should include the estimated number of spaces included in the drive-through before impeding the fire route and/or access to the site. The Township zoning by-law does not have specific requirements but there are other municipalities with drive-through queuing requirements.</i></p>	<p>The Conceptual Site Plan allows for 12 “stacking spaces” within the proposed drive-through. The conceptual site plan has been updated to indicate the stacking space capacity of the drive-through lane.</p>
MTO	<p><i>The subject properties are beyond MTO’s Permit Control Area. Therefore, MTO review, approval and permits are not required.</i></p>	<p>Agreed and noted. No action required for deeming ZBA Application Complete.</p>
TIA – Township Peer Reviewer (Salvini)	<ul style="list-style-type: none"> <i>The base traffic data along McLean Road West and at the Brock Road intersection is comparable to other traffic data collected in the area.</i> 	<p>(Crozier) Agreed and noted.</p>
	<ul style="list-style-type: none"> <i>The background growth rate of 2 percent per year is appropriate and consistent with other studies in the area.</i> 	<p>(Crozier) Agreed and noted. The growth rates were applied and forecasted to base year 2025.</p>
	<ul style="list-style-type: none"> <i>There is substantial planned development in the area including the adjacent two sites to</i> 	<p>(Crozier)</p>

	<p><i>the west, other sites on Brock Road, and two sites on McLean Road East not far from the subject site. There is a need to look at the cumulative impact of all of this development in particular on McLean Road approaching Brock Road both from the east and from the west in order to understand the impact to existing and planned driveway connections. The consultant should reach out to the Township to confirm which proposals to include and to confirm traffic for each.</i></p>	<p>Agreed and noted. The background developments were implemented into the analysis.</p>
	<ul style="list-style-type: none"> <i>The trip generation and distribution data is appropriate for the proposal. However, the pass-by traffic was double counted in the assignment and should be updated.</i> 	<p>(Crozier) Acknowledged. See section 4.1 for updated pass-by trips.</p>
	<ul style="list-style-type: none"> <i>The adjacent parcel to the west of this site includes for a new future public road immediately adjacent to the common property line and therefore adjacent to the driveway for this site as proposed. It would be helpful to have a discussion with both applicants about how these two new connections to McLean Road West can be consolidated and achieved in the timeline of each development. If this site accesses McLean Road through the new public road, there will be impacts on the site design and circulation patterns that may be favorable for addressing the truck circulation issues identified in the TIS.</i> 	<p>(Crozier) Agreed and noted.</p>
	<ul style="list-style-type: none"> <i>The TIS included for a review of the circulation paths of a number of key design vehicles. There are some places on the site where tweaks to the design will be needed to accommodate both the WB-20 and the gas tanker truck, but generally it appears that the design vehicles can be accommodated on the site.</i> 	<p>(Crozier) Noted.</p>

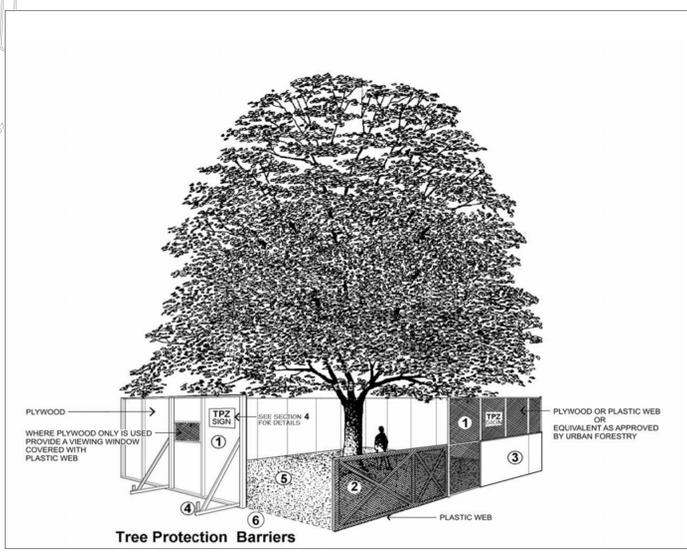
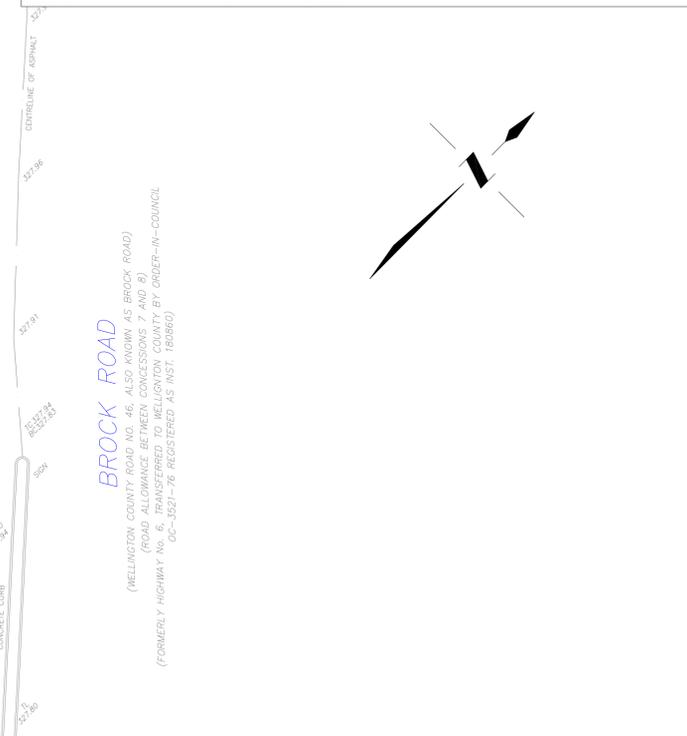
	<ul style="list-style-type: none"> • <i>Information about how much queueing space is provided in the drive-thru and how/if that will accommodate demand should be provided in the TIS.</i> 	<p>(Crozier) Agreed and noted. See section 8.5 Stacking Lanes Requirement</p>
	<ul style="list-style-type: none"> • <i>It may be desirable to provide sidewalks on the north side of McLean Drive across the site frontage and potentially along Brock Road as well.</i> 	<p>(Crozier) Due to the low/non-existent pedestrians around the area a sidewalk will not be added</p>
	<ul style="list-style-type: none"> • <i>A review of the parking requirements and provisions on the site suggests that the provisions meet the requirements in the Zoning By-law. This analysis does not agree with the site statistics provided on the concept site plan. I believe it could be because the site plan includes for a parking requirement of one (1) space for every 10 s.m. for the restaurant use. The TIS suggests that the requirement for the restaurant should be one (1) space for every 20 s.m. in accordance with the “any other use” clause in the Zoning By-law given that the restaurant use does not contemplate a drive-through. It would be appropriate to have a zoning opinion provided by the Township in order to understand the requirement and whether or not the provision meets that requirement.</i> 	<p>Agreed and noted.</p>
<p>TIA – Wellington County Peer Reviewer (Dillon)</p>	<ul style="list-style-type: none"> • <i>While it was originally identified that no driveway access to Wellington Road 46 (Brock Street) would be permitted, it has been determined that a right-in, right-out access at the north edge of the parcel could be supported provided the existing raised median to the south is extended north across and beyond this proposed driveway access to physically restrict any driveway to right-in, right-out. The concept plans within the TIS should note the limits of the existing median and the limits of the proposed</i> 	<p>(Crozier) Agreed and noted. The median has been extended up to the brock road south site access</p>

	<p><i>(extended) median. Depending on the design of the raised median extension, it may be necessary to slightly shift both the northbound and southbound travel lanes around this raised median extension.</i></p>	
	<ul style="list-style-type: none"> • <i>Within Section 2.1 of the report, the first paragraph notes certain streets are considered to be north-south while others were to be considered east-west. However, within the subsequent paragraphs of the report, these cardinal directions are reversed. It also appears the incorrect directions are applied to the trip distribution and assignment numbers (as seen in Table 9 and Table 10), especially when compared to the cardinal directions shown in Figure 7 and Figure 8 (on the following two pages).</i> 	<p>(Crozier) Agreed and noted.</p>
	<ul style="list-style-type: none"> • <i>Tables 4, 6, 7, 11 and 12 (intersection operations tables) all should report on all movements at the study area intersections and site accesses, showing the level of service, delay, v/c ratios, and 95th percentile queues for each type of movement, in addition to how the overall intersection is operating.</i> 	<p>(Crozier) Agreed and noted.</p>
	<ul style="list-style-type: none"> • <i>No background developments were noted or included in the TIS findings (as noted in Section 3.2 of the submitted TIS). However, when this study was scoped out with this firm previously, it was advised that the firm needed connect with staff at the Township of Puslinch to determine what background developments needed to be included here. Dillon and the County of Wellington are aware of several other developments that have been proposed around this intersection</i> 	<p>(Crozier) Agreed and noted.</p>

	<p><i>and should have been included in this TIS's analysis and findings.</i></p>	
	<ul style="list-style-type: none"> • <i>Table 8 notes that there will be six pumps within the truck stop and four pumps within the gas station. When looking at the concept plan, it is noted that six islands are shown at the truck stop and four islands at the gas station. However, as gas pumps are often double-sided, there may be additional pumps provided. If so, the trip generation calculations should be revised accordingly.</i> 	<p>(Crozier) There are 4 vehicle, and 6 truck spaces provided.</p>
	<ul style="list-style-type: none"> • <i>Given it is understood that a McDonald's restaurant and drive-through is proposed, stacking analysis and consideration should be completed. This is to ensure that the proposed drive-through has sufficient stacking spaces. This study should also confirm that under no circumstances would the queue ever extend back onto Wellington Road 46 (Brock Street). The drawing should be updated to note the locations and numbers of vehicles stacking in the drive-through to confirm sufficiency.</i> 	<p>(Crozier) Agreed and noted. See site plan and section 8.5</p>
	<ul style="list-style-type: none"> • <i>Within Figure 11 (sightline reviews), it does not appear the geometry of the proposed accesses and site layout align with the details shown on the aerial map. For example, the location and alignment of the proposed raised median extension on Wellington Road 46 into the east shoulder of the corridor.</i> 	<p>(Crozier) Agreed and noted. See updated figure 11.</p>



- ### 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 3/4" 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.



LEGEND

- ### Tree Inventory
- Refer to Table 1 and Table 2 of the report dated 25 July 2025 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

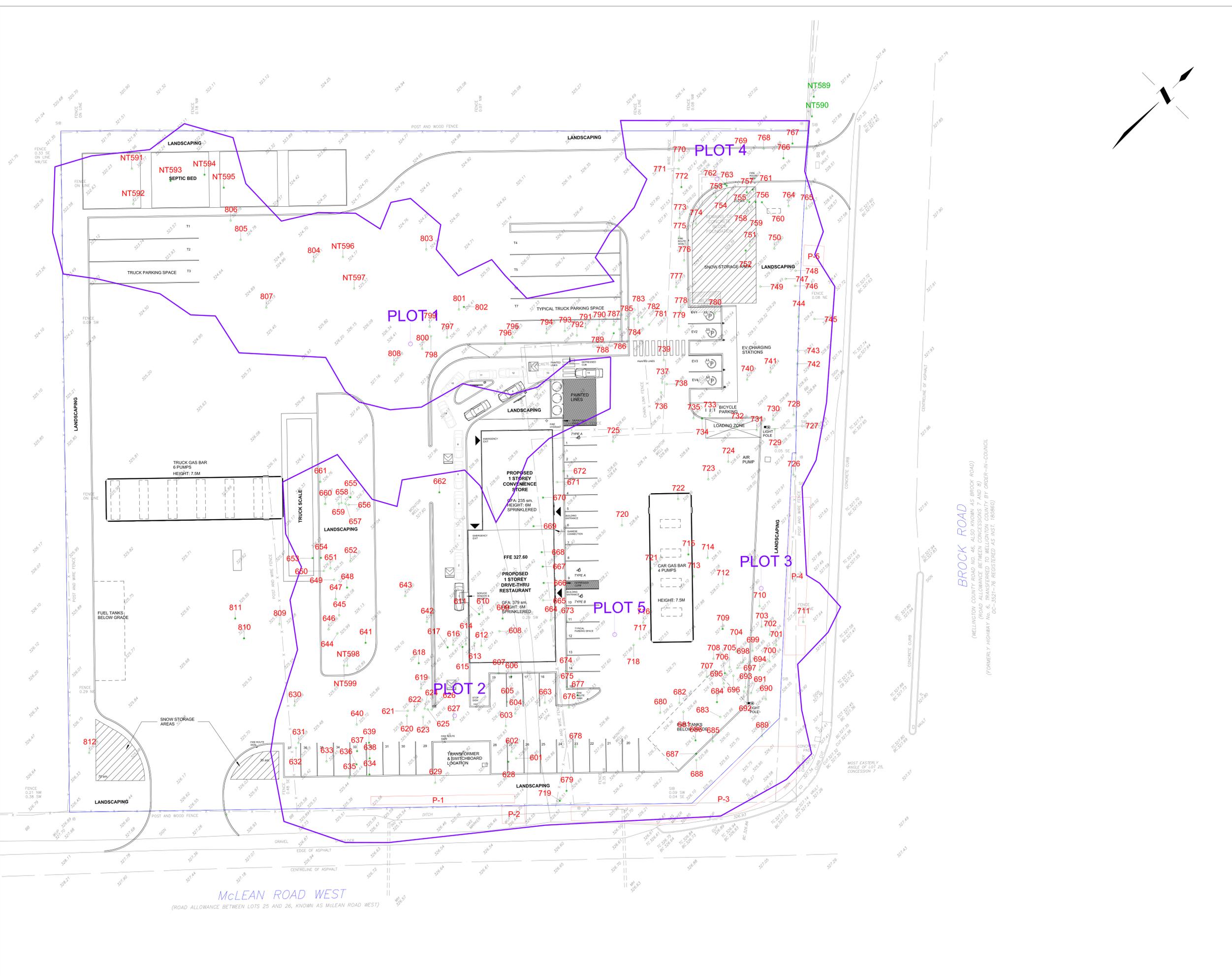
Base Data: Tarasick McMillan Kubicki Ltd. (survey), Richard Ziegler Architect Inc. (site)

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Property
7456 McLean Road West
 Puslinch, Ontario

Tree Inventory and Preservation Plan		Figure
Project	P4711	1
Date	25 July 2025	
Scale	1:300	



LEGEND

Woodland Designation Assessment
 Refer to Table 3 of the report dated 25 July 2025
 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) ○
- 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

Base Data: Tarasick McMillan Kubicki Ltd. (survey), Richard Ziegler Architect Inc. (site)

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Property:
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 Puslinch, Ontario

Woodland Designation Assessment

Project	P4711	2
Date	25 July 2025	
Scale	1:300	

PLAN OF SURVEY WITH TOPOGRAPHY OF
PART OF LOT 25
CONCESSION 7
TOWNSHIP OF PUSLINCH
COUNTY OF WELLINGTON

SCALE 1 : 300

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-CGD2878, 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 VEILING 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
TO	DENOTES	STANDARD IRON BAR
TC	DENOTES	TOP OF CURB
BC	DENOTES	BOTTOM OF CURB
CCT	DENOTES	CURB CUT
CB	DENOTES	BELL BOX
MB	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

○ 0.200D DENOTES DECIDUOUS TREE WITH TRUNK DIAMETER
 ○ 0.200C 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.

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 _____
 BORYS KLUBICKI
 ONTARIO LAND SURVEYOR

TARASICK McMILLAN KUBICKI LIMITED
 ONTARIO LAND SURVEYORS

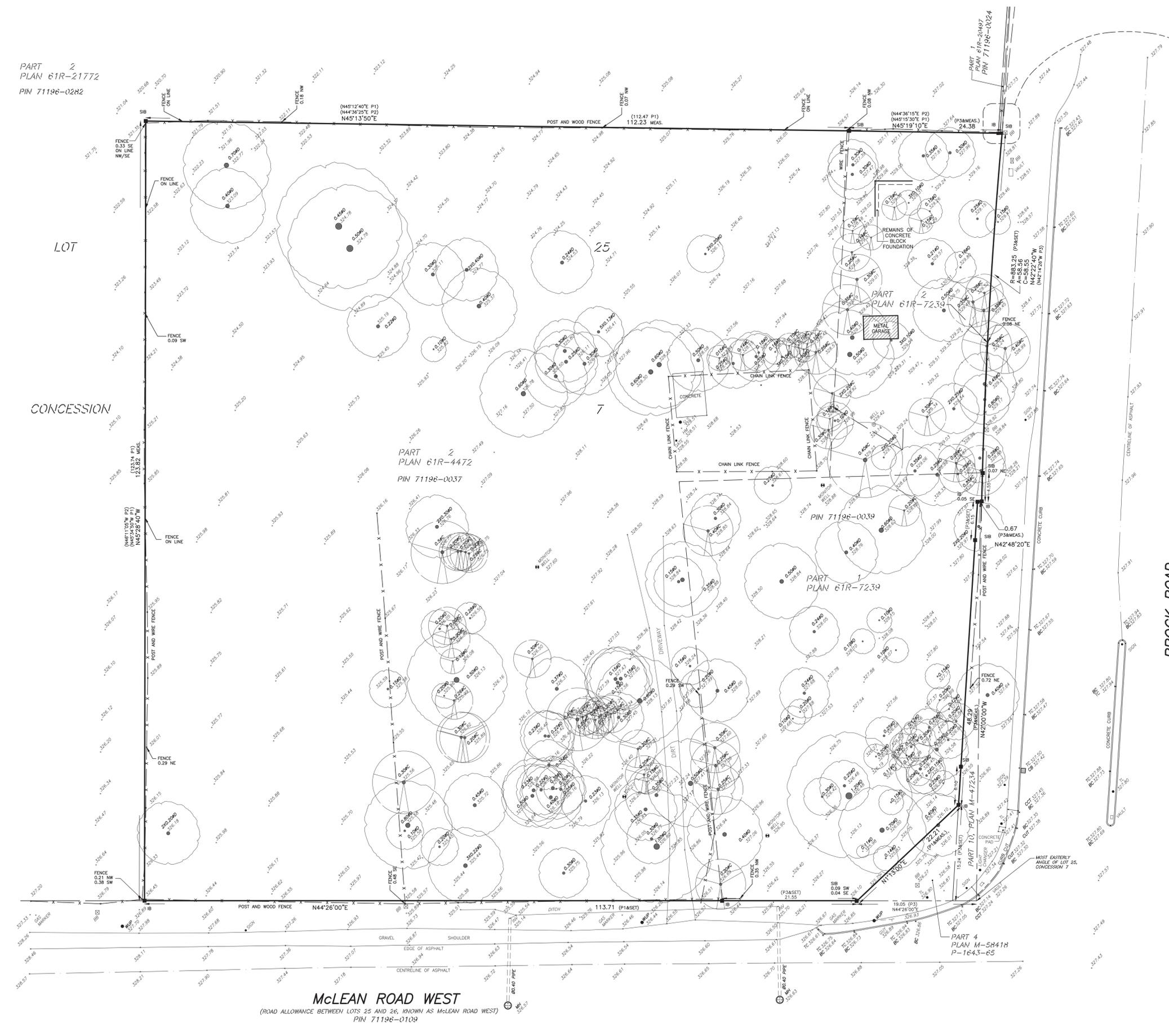
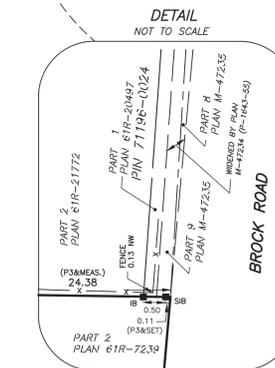
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DRAWN BY: A.P. FILE NO. 9625-SRPRP



THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR in accordance with Regulation 1028, Section 24(3)

BROCK ROAD
 (WELLINGTON COUNTY ROAD NO. 46, ALSO KNOWN AS BROCK ROAD)
 (FORMERLY HIGHWAY 10C & TRANSFERRED TO WELLINGTON COUNTY BY ORDER-IN-COUNCIL CC-5521-76 REGISTERED AS INST. 1A0085)
 PIN 71195-0001



McLEAN ROAD WEST
 (ROAD ALLOWANCE BETWEEN LOTS 25 AND 26, KNOWN AS McLEAN ROAD WEST)
 PIN 71196-0109

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.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4**

AUGUST 2025

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.



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

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:

- A four-pump gas station with a 1-storey accessory retail/convenience store (235 m²)
- A six-pump truck gas station
- A 1-storey fast food restaurant (379 m²) with drive-thru
- 41 vehicle parking spaces including 3 accessible spaces and 4 electric vehicle charging spaces
- 8 truck parking spaces
- 1 loading space
- 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.

The 95th percentile queue lengths exceed the auxiliary lane storage length at Brock Road South and Nicholas Beaver Road for southbound left-turn movement during both the a.m. and p.m. peak periods. The rest of the auxiliary lane 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 0.74 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 0.61 and 0.65 is expected during the weekday a.m. and weekday p.m. peak hours, respectively.

The 2031 future background queuing assessment results in instances where the 95th percentile queues exceed the auxiliary turn lane storage length for the westbound left-turn and northbound left-turn movements at Brock Road South and McLean Road. Furthermore, the queue exceedances continue from the existing conditions for the southbound left-turn movement at Brock Road South and Nicholas Beaver Road.

Future Background Recommendations

It is noted that most of the operational results are expected to remain within acceptable limits, however, to mitigate the 95th percentile queue exceedances observed at Brock Road South and McLean Road in the northbound left-turn lane and westbound left-turn lane during the 2031 future background a.m. scenario, the impacts of signal optimization and adjustments were assessed.

Traffic operations with the adjusted signal timings are expected to remain adequate, with maximum volume-to-capacity ratios of 0.76 in the weekday morning and 0.62 in the afternoon peak hours. While some queuing issues persist, specifically northbound and westbound left-turn queues at Brock Road South and McLean Road as well as ongoing exceedances at Brock Road South and Nicholas Beaver Road, these exceedances are minor. Typically, they are within two vehicle lengths of the storage area and can generally be accommodated without significant disruption to through traffic. Monitoring these locations for potential future storage lane expansion is recommended, but overall, the intersections are projected to function well with acceptable delays and sufficient capacity for future traffic growth.

Site Generated Traffic

During the weekday a.m. peak hour, the site is expected to generate 148 primary and 182 pass-by trips. In the p.m. peak hour, projections are 131 primary and 170 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 1.09 (0.35 increase from 2031 Future Background) and 0.71 (0.14 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 0.61 (0.00 increase from 2031 Future Background) and 0.65 (0.00 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 "B" or better during the weekday a.m. and p.m., peak hours.

The queuing assessment results in instances where the 95th percentile queues exceed the auxiliary turn lane storage length for the northbound left-turn movement at Brock Road South and McLean Road during the a.m. peak period, starting from the 2026 horizon year.

Similar to future background conditions, the queuing assessment results in a few instances where 95th percentile queues exceed the auxiliary turn lane storage length for the southbound left-turn movement at Brock Road South and Nicholas Beaver Road starting from the 2026 horizon year. Compared to the future background conditions, this is only a minimal increase in queue lengths. As adverse exceedances in queue lengths existed in the future background conditions, the site-generated traffic is not expected to impact the queue lengths.

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 0.89 and 0.64 during the a.m. and p.m. peak hours, respectively.

The queuing reassessment at Brock Road South and McLean Road indicates that the signal timing changes reduced the northbound left queue length exceedance. 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 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.

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 8 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.

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 Town Puslinch on November 23, 2022, and comments from the County were received on December 7, 2022. Correspondence from the County is included in **Appendix A**.

1.1 Development Lands

The subject lands cover an area of approximately 1.62 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	4 Pumps
Truck Gas Pumps	6 Pumps
Convenience Store	235 m ²
Fast Food Restaurant with Drive Thru	379 m ²
Total Building GFA	572 m²
Vehicle Parking Spaces	41 spaces (Including 3 accessible parking spaces and 4 electric vehicle parking spaces)
Truck Parking Spaces	8 spaces

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

The most recent Site Plan prepared by Richard Ziegler Architects Inc. (dated November 14, 2024) is included as **Figure 2**.



Legend

 Site Boundary

7456 McLean Road & 197 Brock Road
South
Site Location



Figure 1
Project No. 2377-6556
Date. 2023.08.15
Analyst. TDS

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.

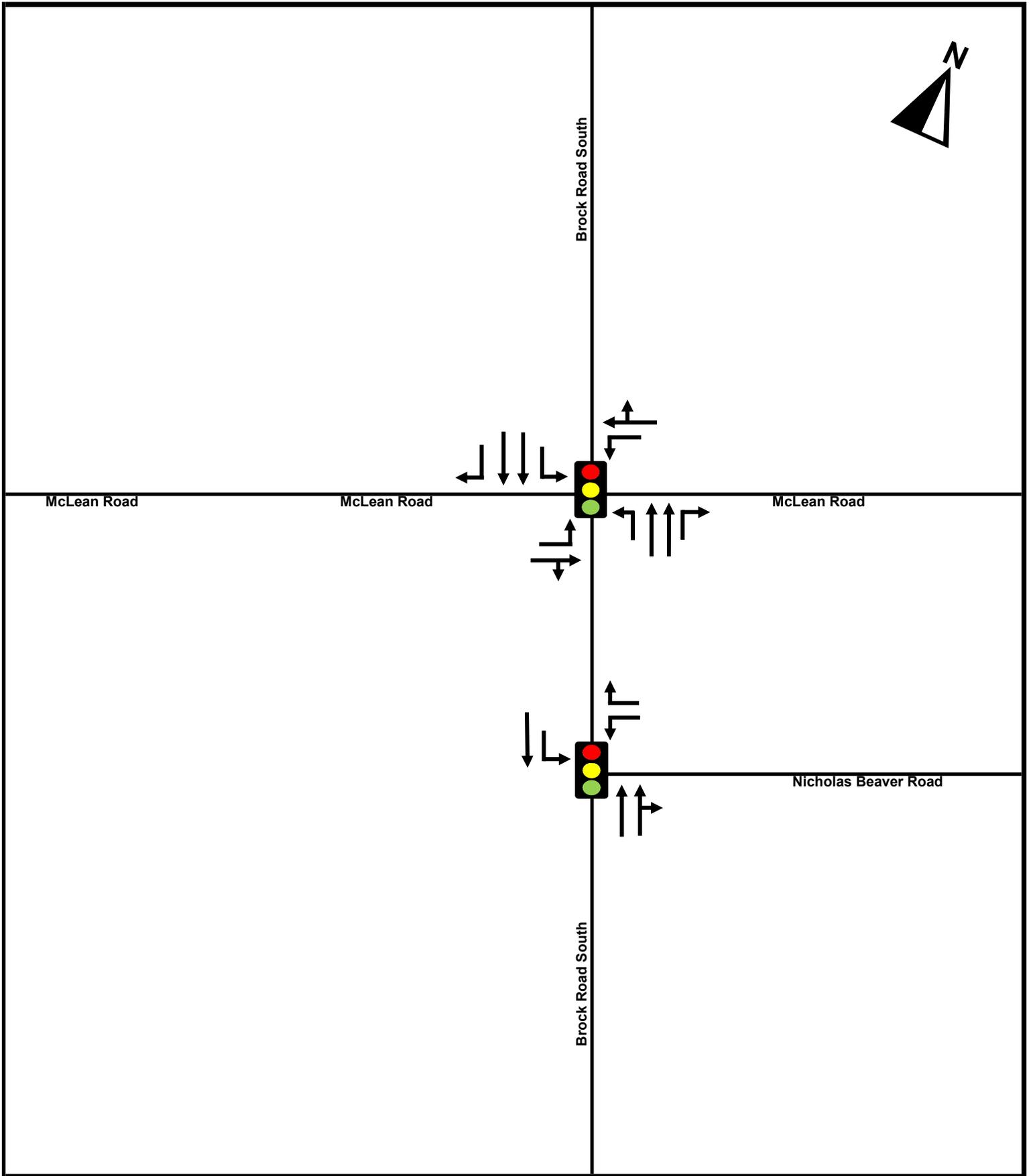
Excerpts of the County of Wellington Road Master Action Plan are included in **Appendix B**.

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

• Stop Bar

7456 McLean Road & 197 Brock Road South

2025 Existing Study Road Network



Figure 3

Project No. 2792-7289
Date. 2025.07.04
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 SimTraffic 12 software. The 95th percentile queue length metric, which represents the 95th percentile queue length of the peak hour traffic simulated in SimTraffic 12, 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**.

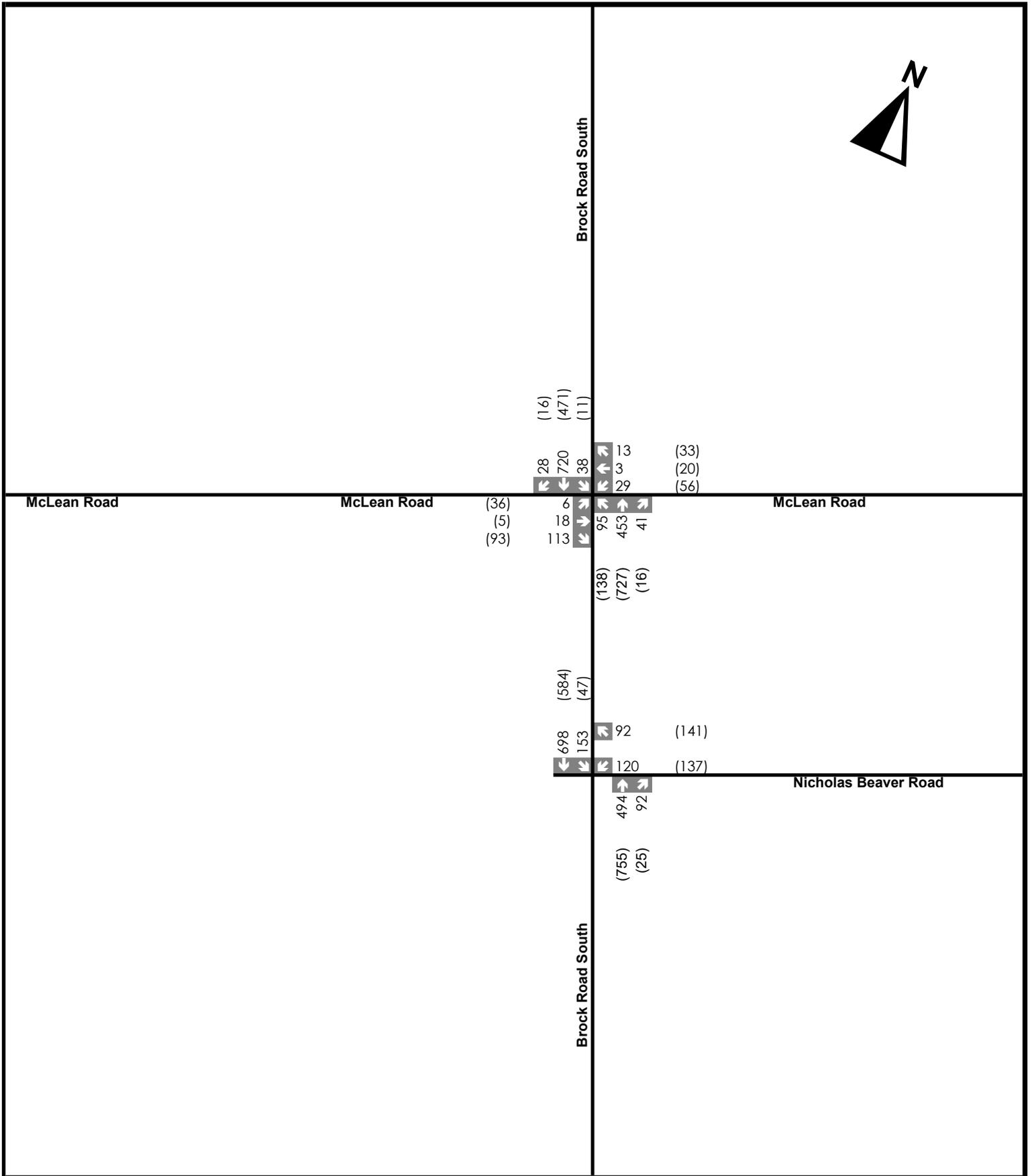


Table 5: 2025 Existing Operations

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	B	B	19.9	17.2	0.56	0.40
	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	0.54	0.59
	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 0.56 and 0.40 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 0.54 and 0.59 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	5.2	15.4	54.0
	WBL	23.3	27.0	55.0
	NBL	53.6	41.8	142.0
	NBR	10.5	7.6	66.0
	SBL	20.2	14.3	62.0
	SBR	8.9	8.5	62.0
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	52.2	49.0	56.0
	SBL	33.2	21.5	21.0

Note 1: 95th percentile queue lengths derived from SimTraffic reports using 15-minute seeding, 60-minute simulation and an average of five runs.

In the 2025 existing conditions, the 95th percentile queue lengths are exceeding the auxiliary lane storage lengths at Brock Road South and Nicholas Beaver Road at the southbound left-turn movement. The rest of 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

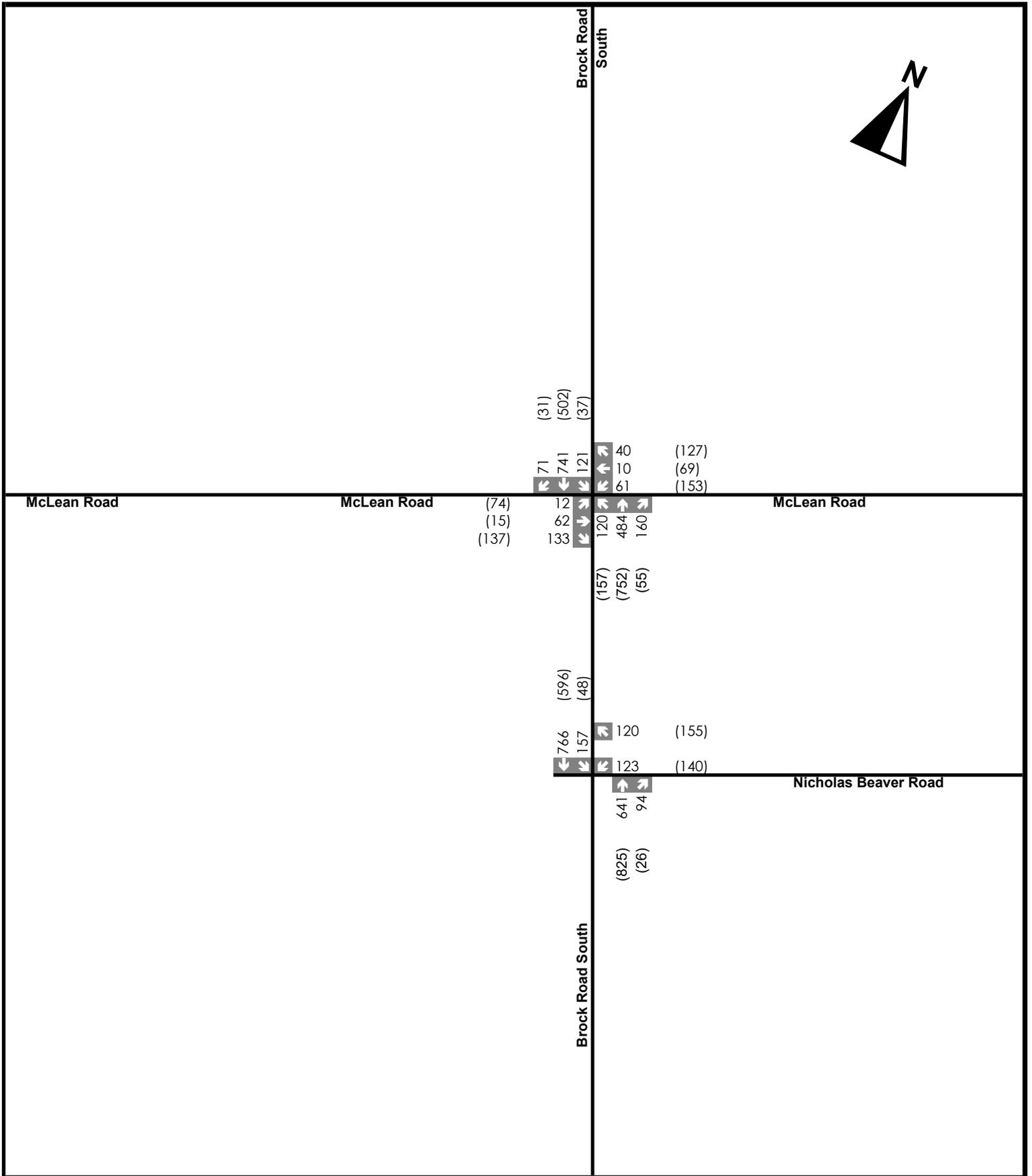
Developments	Land Use	Referenced TIS
7434 McLean Road (Adjacent Wheelking Site)	Industrial	Paradigm
Truckline Site (West of Wheelking)	Truck Distribution Terminal	Paradigm
128 Brock Road South	Manufacturing	Paradigm
7475 McLean Road East	Industrial	GHD
7504 McLean Road East	Industrial	Paradigm

Site generated trip figures for each background development site, as supplied by the Township and their peer reviewer, are available in **Appendix A**.

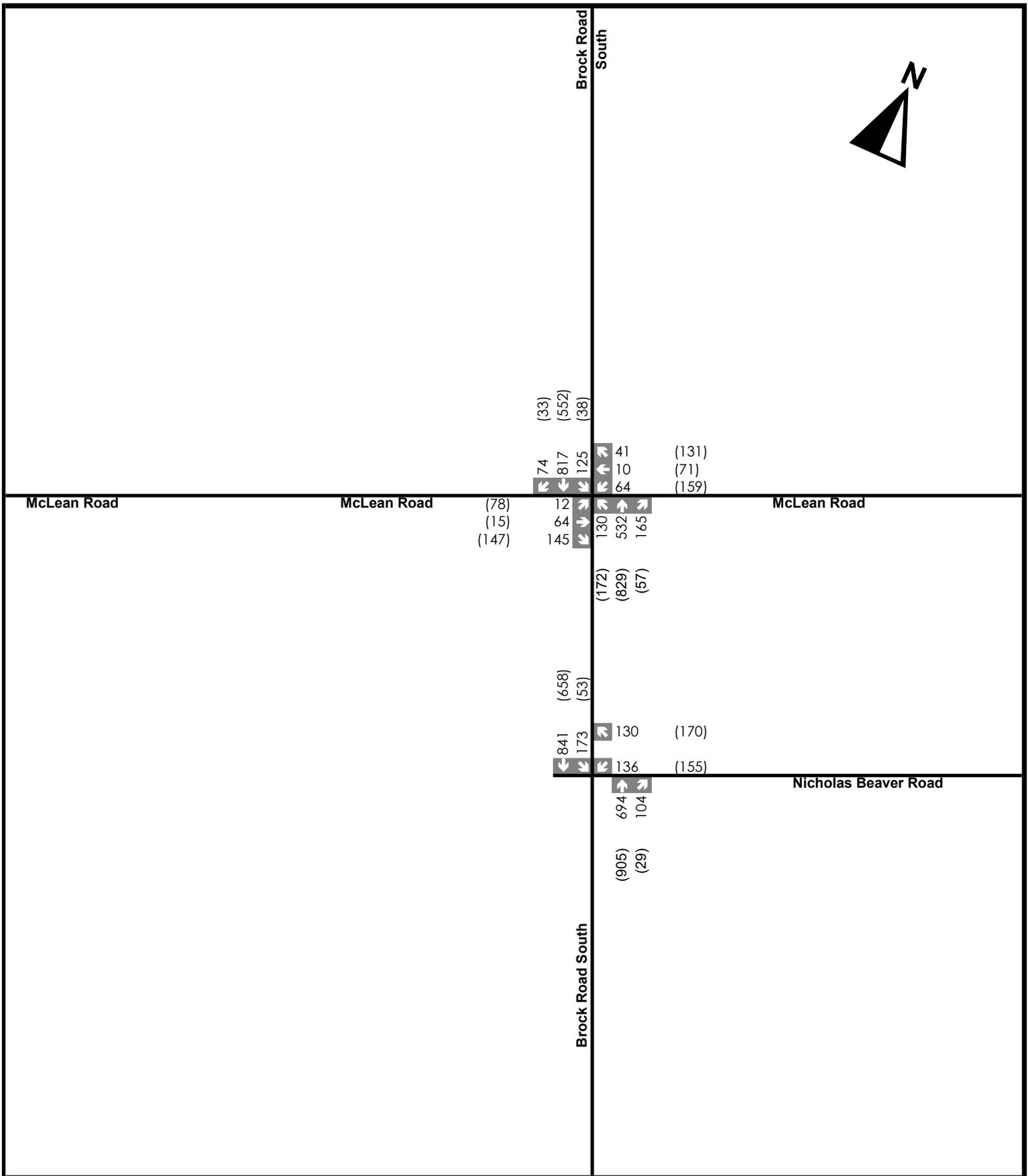
3.4 Future Roadway Improvements

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 xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes	7456 McLean Road & 197 Brock Road South		Figure 5
	2026 Future Background Volumes		Project No. 2792-7289 Date. 2025.07.04 Analyst. Ramy Kamal



Legend

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

7456 McLean Road & 197 Brock Road South

2031 Future Background Volumes



Figure 6

Project No. 2792-7289
 Date. 2025.07.04
 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	0.69	0.52
	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	15.1	0.56	0.60
	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	5.8	0.39	0.30	

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)	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	28.0	26.1	0.74	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	15.7	0.61	0.65
	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	6.1	0.43	0.33

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 0.74 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 0.61 and 0.65 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	11.1	23.8	54.0
	WBL	35.1	52.0	55.0
	NBL	87.0	56.1	142.0
	NBR	23.1	16.6	66.0
	SBL	39.4	28.8	62.0
	SBR	12.3	16.4	62.0
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	52.2	46.5	56.0
	SBL	35.1	23.1	21.0

Note 1: 95th percentile queue lengths derived from SimTraffic reports using 15-minute seeding, 60-minute simulation and an average of five runs.

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	13.4	23.1	54.0
	WBL	33.0	55.7	55.0
	NBL	167.8	68.3	142.0
	NBR	21.3	17.8	66.0
	SBL	46.4	31.2	62.0
	SBR	21.2	13.2	62.0
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	54.1	49.5	56.0
	SBL	39.8	25.1	21.0

Note 1: 95th percentile queue lengths derived from SimTraffic reports using 15-minute seeding, 60-minute simulation and an average of five runs.

The 2031 future background queuing assessment results in instances where the 95th percentile queues exceed the auxiliary turn lane storage length for the westbound left-turn and northbound left-turn movements at Brock Road South and McLean Road. Furthermore, the queue exceedances continue from the existing conditions for the southbound left-turn movement at Brock Road South and Nicholas Beaver Road.

3.6 Future Background Recommendations

While operationally there are no concerns at the intersections, in an attempt to mitigate the 95th percentile queue exceedances observed at Brock Road South and McLean Road in the northbound left-turn lane and westbound left-turn lane during the 2031 future background a.m. scenario, the impacts of signal optimization and adjustments were assessed.

A summary of the proposed signal timing plan changes is provided in **Table 13**.

Detailed adjusted signal timing future background capacity analyses are included in **Appendix K**.

Table 13: 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 14** and **Table 15**

Table 14: 2031 Future Background Operations – Signal Timings Adjusted

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	29.4	26.1	0.76	0.62
	EBL	C	D	33.9	35.7	0.06	0.28
	EBTR	D	D	50.1	41.0	0.69	0.20
	WBL	C	D	31.7	37.2	0.39	0.62
	WBTR	C	D	32.5	41.6	0.08	0.52
	NBL	C	B	25.1	14.4	0.57	0.37
	NBT	C	C	21.5	20.2	0.42	0.51
	NBR	B	B	18.1	14.7	0.13	0.05
	SBL	B	B	19.4	19.5	0.37	0.19
	SBT	C	C	34.0	26.1	0.76	0.45
SBR	C	C	22.5	21.5	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 15: 2031 Future Background Queuing Assessment – Signal Timings Adjusted

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	12.6	28.7	54.0
	WBL	40.6	68.7	55.0
	NBL	58.0	43.7	142.0
	NBR	20.7	15.1	66.0
	SBL	56.1	26.5	62.0
	SBR	14.8	16.8	62.0
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	57.2	53.7	56.0
	SBL	41.3	27.0	21.0

Note 1: 95th percentile queue lengths derived from SimTraffic reports using 15-minute seeding, 60-minute simulation and an average of five runs.

The traffic operations with the adjusted signal timings in **Table 14** continue to operate adequately. An adjusted maximum volume-to-capacity ratio of 0.76 and 0.62 is expected during the weekday a.m. and weekday p.m. peak hours, respectively.

The queuing assessment using the adjusted signal timings shown in **Table 15**, at Brock Road South and McLean Road indicates that the signal timing changes reduced northbound left queue length exceedance, which was the intended outcome of the optimizations, while westbound left queue length continues to exceed. 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 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.

4.0 Site Generated Traffic

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

4.1 ITE Trip Generation

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

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

Table 16 summarizes the number of trips forecasted to be generated by the proposed development.

Table 16: ITE Trip Generation

ITE Land Use Category	Units	Trip Type	A.M Peak Hour Trips Generated			P.M Peak Hour Trips Generated		
			IN	OUT	TOTAL	IN	OUT	TOTAL
Truck Gas Station - LUC 950 - Truck Stop	6 Pumps	Primary	15	16	31	21	18	39
		Pass-by	26	27	53	28	25	53
Vehicle Gas Station Pumps + Convenience Store - LUC 945 - Convenience Store/Gas Station	4 Pumps	Primary	13	13	26	16	16	33
		Pass-by	19	19	38	21	21	41
Fast Food Restaurant with Drive Thru - LUC 934 - Fast-Food Restaurant with Drive- Through Window	4,080 ft ²	Primary	47	44	91	35	33	68
		Pass-by	46	45	91	35	32	67
Combined Site		Total Primary	75	73	148	68	63	131
		Total Pass-by	91	91	182	88	82	170
		Total Trips	166	164	330	156	145	301

As shown in **Table 16**, during the weekday a.m. peak hour, the subject site is projected to generate 148 primary trips (75 inbound, 73 outbound) and 182 pass-by trips (91 inbound, 91 outbound). For the weekday p.m. peak hour, trip generation is anticipated to be 131 primary trips (68 inbound, 63 outbound) and 170 pass-by trips (88 inbound, 82 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 17 summarizes the primary site trip distribution.

Table 17: 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 18 summarizes the pass-by rates for each land use in the development.

Table 18: 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

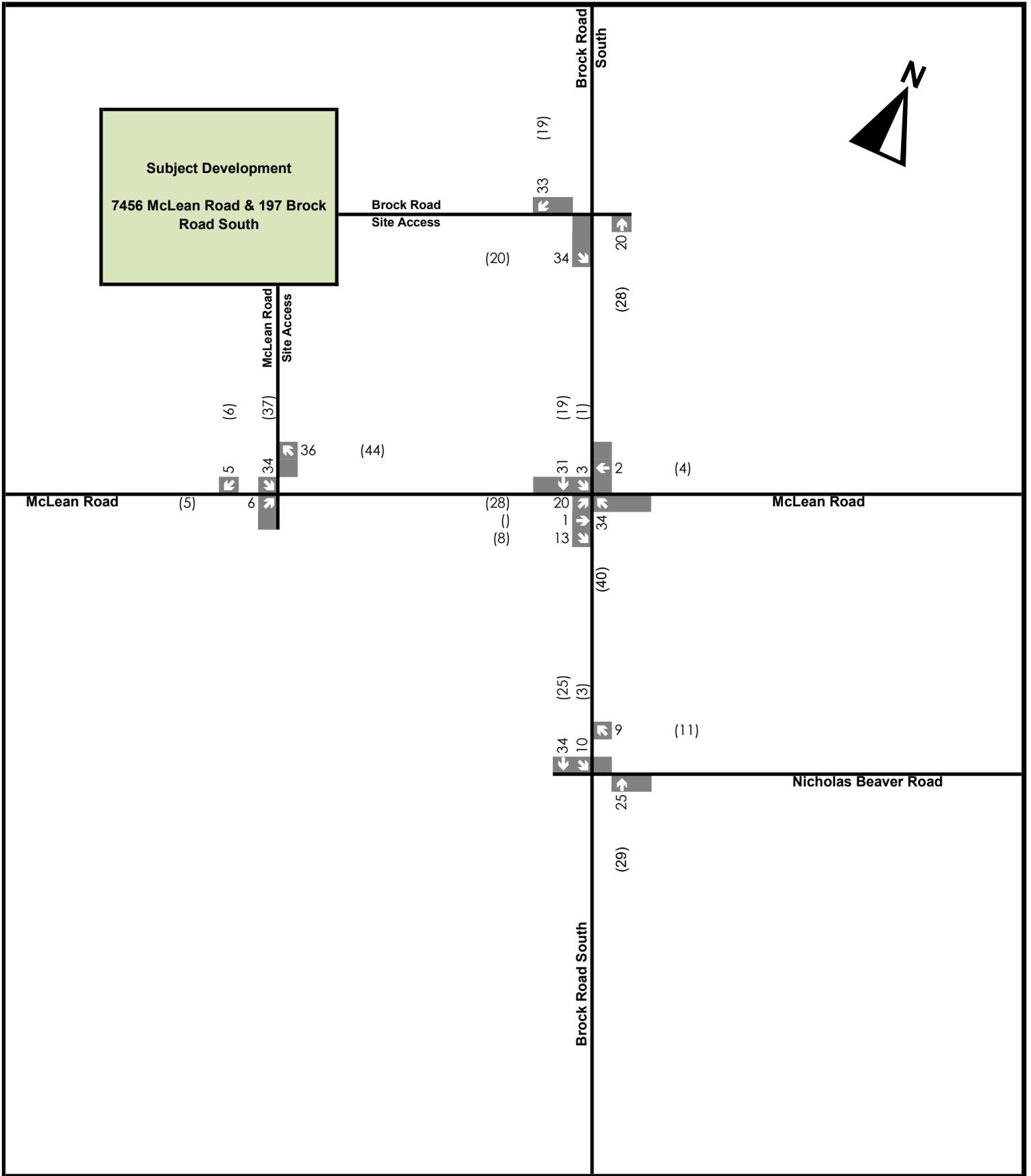
The pass-by trips were distributed to the boundary road network proportionally based on the recorded 2023 Turning Movement Counts at the intersection of Brock Road South at McLean Road using the through movements in each direction. **Table 19** summarizes the pass-by distribution for the proposed development.

Table 19: 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		Figure 7
	Primary Trip Assignment		Project No. 2792-7289 Date. 2025.07.04 Analyst. Ramy Kamal

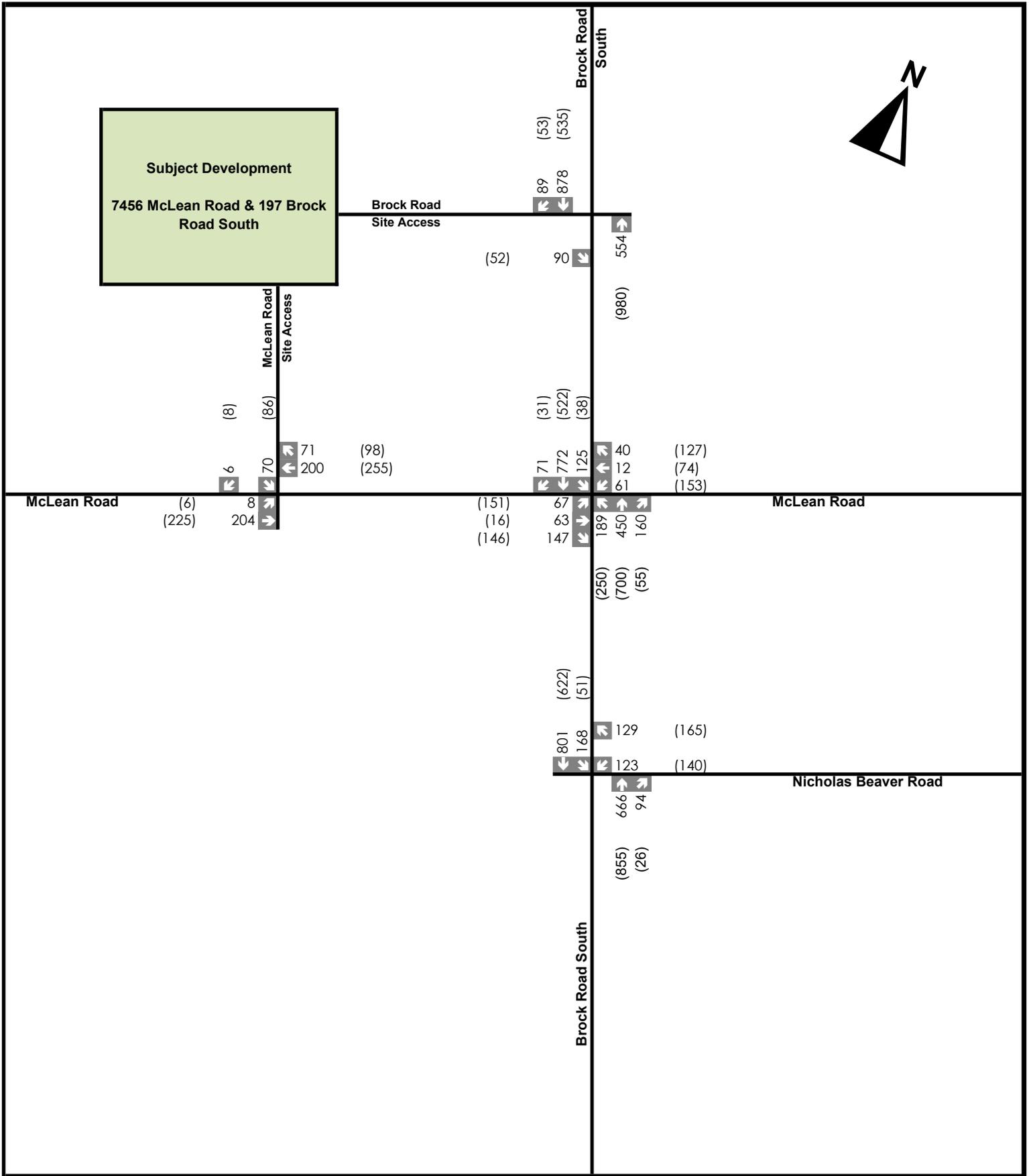
5.0 Future Total Traffic Conditions

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 20 and **Table 21** summarizes the 2026 and future total traffic operations for the study intersections, respectively.

Detailed capacity analyses are included in **Appendix J**.



Legend xx A.M. Peak Hour Traffic Percent (xx) P.M. Peak Hour Traffic Percent	7456 McLean Road & 197 Brock Road South		Figure 9 Project No. 2792-7289 Date. 2025.07.04 Analyst. Ramy Kamal
	2026 Future Total Volumes		

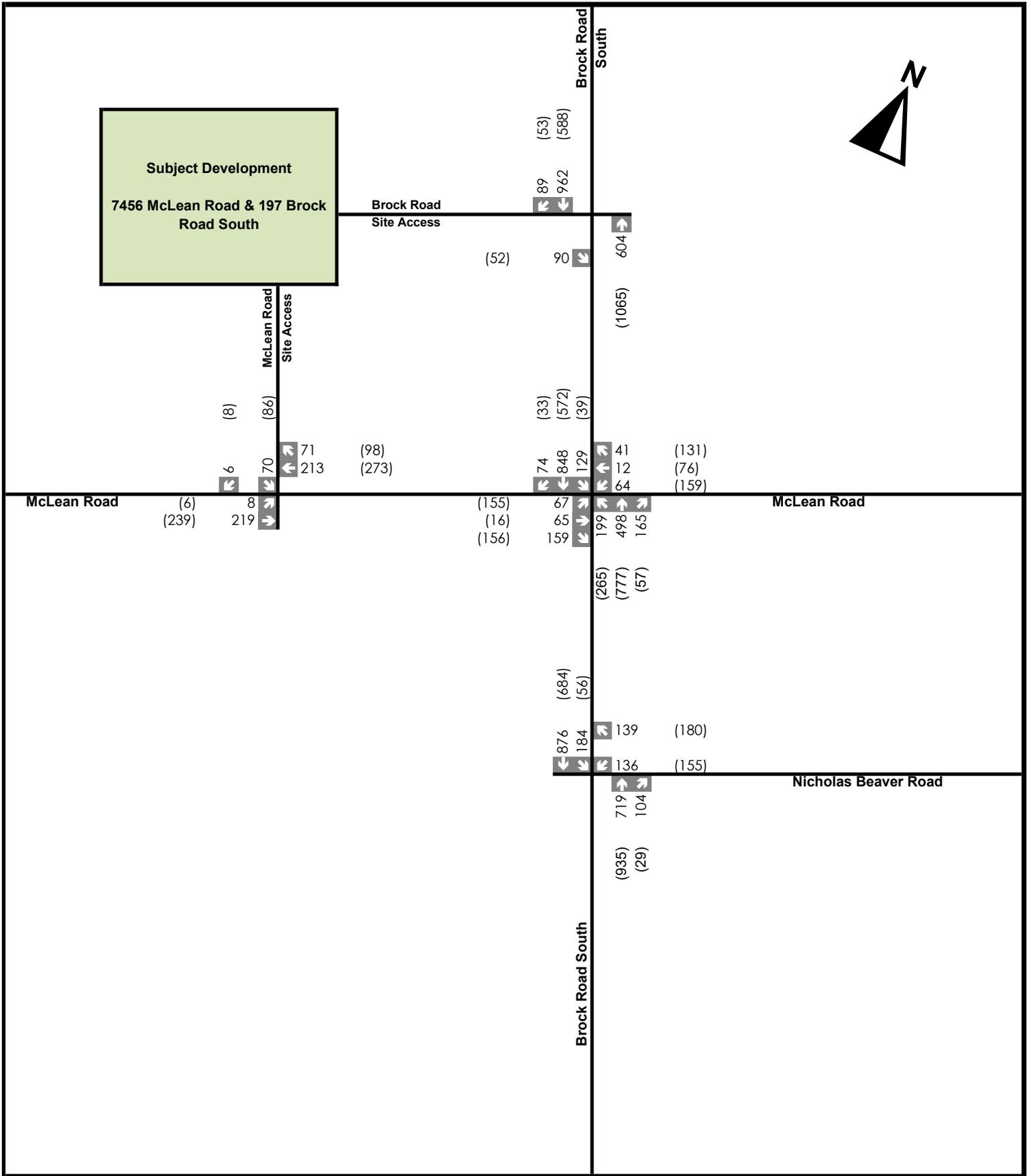


Table 20: 2026 Future Total Operations

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	30.6	26.4	0.94	0.65
	EBL	C	C	29.2	32.0	0.26	0.44
	EBTR	E	D	60.5	40.4	0.81	0.21
	WBL	C	C	30.4	30.3	0.36	0.50
	WBTR	C	D	34.7	47.1	0.12	0.65
	NBL	E	B	61.0	17.4	0.94	0.63
	NBT	C	C	21.2	21.7	0.39	0.48
	NBR	B	B	18.4	16.8	0.12	0.05
	SBL	B	B	14.2	17.3	0.31	0.18
	SBT	C	C	26.6	23.9	0.66	0.41
	SBR	B	B	18.1	19.5	0.05	0.03
Brock Road South at Nicholas Beaver Road (Signalized)	Overall	B	B	14.1	15.1	0.56	0.60
	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	13.0	0.50	0.51
	SBL	A	A	6.8	6.2	0.38	0.18
	SBT	A	A	6.6	5.9	0.40	0.31
Brock Road South at Proposed Right-in/Right Out Site Access (Stop)	Overall	B	B	14.0	10.8	0.37	0.31
	EBR	B	B	14.0	10.8	0.20	0.08
	NBT	A	A	0.0	0.0	0.18	0.31
	SBT	A	A	0.0	0.0	0.37	0.23
	SBTR	A	A	0.0	0.0	0.24	0.15
McLean Road at Proposed Site Access (Stop)	Overall	B	B	12.5	14.1	0.17	0.23
	EBLT	A	A	0.4	0.3	0.01	0.01
	WBTR	A	A	0.0	0.0	0.17	0.23
	SBLR	B	B	12.5	14.1	0.15	0.21

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 21: 2031 Future Total 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	D	C	36.3	27.3	1.09	0.71
	EBL	C	C	29.3	32.2	0.26	0.45
	EBTR	E	D	71.5	40.6	0.88	0.22
	WBL	C	C	30.9	30.7	0.39	0.53
	WBTR	C	D	34.7	48.0	0.12	0.67
	NBL	F	C	105.5	21.2	1.09	0.71
	NBT	C	C	22.0	22.9	0.43	0.53
	NBR	B	B	18.6	17.0	0.13	0.05
	SBL	B	B	14.4	17.8	0.34	0.20
	SBT	C	C	28.6	24.7	0.73	0.45
	SBR	B	B	18.2	19.7	0.05	0.03
Brock Road South at Nicholas Beaver Road (Signalized)	Overall	B	B	14.9	15.8	0.61	0.65
	WBL	D	D	46.1	47.9	0.61	0.65
	WBR	D	D	37.0	37.7	0.11	0.14
	NBTR	B	B	15.9	14.0	0.55	0.56
	SBL	A	A	7.6	7.0	0.44	0.21
	SBT	A	A	7.0	6.2	0.44	0.34
Brock Road South at Proposed Right-in/Right Out Site Access (Stop)	Overall	B	B	14.8	11.1	0.41	0.34
	EBR	B	B	14.8	11.1	0.21	0.09
	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	0.26	0.16
McLean Road at Proposed Site Access (Stop)	Overall	B	B	12.9	14.7	0.18	0.24
	EBLT	A	A	0.4	0.3	0.01	0.01
	WBTR	A	A	0.0	0.0	0.18	0.24
	SBLR	B	B	12.9	14.7	0.15	0.22

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 21**, 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 1.09 (0.35 increase from 2031 Future Background) and 0.71 (0.14 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 0.61 (0.00 increase from 2031 Future Background) and 0.65 (0.00 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 “B” or better during the weekday a.m. and p.m., peak hours.

Table 22 and **Table 23** outline the results of the 2026 and 2031 future total queuing assessment.

Table 22: 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	30.5	41.2	54.0
	WBL	37.6	49.9	55.0
	NBL	155.6	149.5	142.0
	NBR	22.0	18.0	66.0
	SBL	38.7	31.4	62.0
	SBR	12.9	15.3	62.0
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	65.7	49.4	56.0
	SBL	40.1	24.5	21.0

Note 1: 95th percentile queue lengths derived from SimTraffic reports using 15-minute seeding, 60-minute simulation and an average of five runs.

Table 23: 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	31.6	42.3	54.0
	WBL	36.7	50.5	55.0
	NBL	150.4	180.3	142.0
	NBR	24.2	18.7	66.0
	SBL	47.6	33.0	62.0
	SBR	13.4	16.0	62.0
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	83.2	51.8	56.0
	SBL	42.9	25.6	21.0

Note 1: 95th percentile queue lengths derived from SimTraffic reports using 15-minute seeding, 60-minute simulation and an average of five runs.

The queuing assessment results in instances where the 95th percentile queues exceed the auxiliary turn lane storage length for the northbound left-turn movement at Brock Road South and McLean Road during the a.m. peak period, starting from the 2026 horizon year.

Similar to future background conditions, the queuing assessment results in a few instances where 95th percentile queues exceed the auxiliary turn lane storage length for the southbound left-turn movement at Brock Road South and Nicholas Beaver Road starting from the 2026 horizon year. Compared to the future background conditions, this is only a minimal increase in queue lengths. As adverse exceedances in queue lengths existed in the future background conditions, the site-generated traffic is not expected to impact the queue lengths.

5.2 Future Total Recommendations

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, signal timing adjustments were examined. The timings detailed in **Section 3.6, Table 13** for the future background scenario were subsequently applied to the 2031 future total scenario.

Detailed adjusted signal timing future total capacity analyses are included in **Appendix K**.

Table 24: 2031 Future Total Operations – Signal Timings Adjusted

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	33.4	27.2	0.89	0.64
	EBL	C	D	33.3	38.9	0.28	0.56
	EBTR	E	D	55.5	41.3	0.76	0.22
	WBL	C	D	34.2	40.0	0.42	0.64
	WBTR	D	D	36.2	46.5	0.11	0.62
	NBL	E	B	59.6	18.2	0.89	0.58
	NBT	C	B	20.8	19.4	0.39	0.48
	NBR	B	B	17.8	14.6	0.13	0.05
	SBL	B	B	19.2	19.3	0.37	0.19
	SBT	C	C	34.7	26.1	0.79	0.47
SBR	C	C	22.2	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 25: 2031 Future Total Queuing Assessment – Signal Timings Adjusted

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	38.5	50.5	54.0
	WBL	37.3	58.8	55.0
	NBL	89.8	72.2	142.0
	NBR	21.1	14.9	66.0
	SBL	50.8	29.0	62.0
	SBR	23.7	17.3	62.0
Brock Road South at Nicholas Beaver Road (Signalized)	WBL	53.2	50.6	56.0
	SBL	40.0	23.6	21.0

Note 1: 95th percentile queue lengths derived from SimTraffic reports using 15-minute seeding, 60-minute simulation and an average of five runs.

The results of the signal adjustments in **Table 24** 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 0.89 and 0.64 during the a.m. and p.m. peak hours, respectively.

The queuing assessment using the adjusted signal timings shown in **Table 25**, at Brock Road South and McLean Road indicates that the signal timing changes reduced the northbound left queue length exceedance. 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 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 26 outlines the sight distance requirements for the proposed site access. **Figure 11** illustrates the sight lines at the site.

Table 26: Sight Distance Analysis

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

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

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

As outlined in **Table 26**, Brock Road and McLean Road are straight, relatively flat, with no visible obstructions noted. Minimum sight distance requirements are expected to be satisfied at both accesses. The permanent site accesses can be supported from a traffic safety perspective. **Figure 11** illustrates the sight lines at the site.



Legend



Passenger car



Minimum Sight Distance



Measured Sight Distance

No.	ISSUE	DATE: MM/DD/YYYY
0	ISSUED FOR 1st SUBMISSION	10/20/2023
1	ISSUED FOR 2nd SUBMISSION	07/31/2025

Engineer _____ Engineer _____

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project
 DAAZ INC
 7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
 TOWNSHIP OF PUSLINCH, COUNTY OF WELLINGTON

Drawing
 SIGHT DISTANCE ANALYSIS



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

Drawn By	B.L.	Design By		Project	2792-7289
Check By	R.K.	Check By	B.B.	Scale	N.T.S. Drawing
					FIG 11

6.2 Access Spacing

Brock Road Site Access

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

Per Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR) Section 8.2, direct property access at a major arterial roadway should be restricted, as such, a restricted 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** illustrate the WB-20 Truck entering the site and accessing the Truck gas pumps before exiting the site. **Figure 15** shows the 8 Axle Fuel Tanker navigating the proposed tanker route within the site.

As shown in **Figure 14** and **Figure 15**, some vehicle maneuvering issues were identified in the northeast corner of the site due to the turning radii provided at the Brock Road South Site Access and preceding internal turn not being sufficient for the WB-20 Truck and 8 Axle Fuel Tanker movements, respectively, as well as the west most truck gas pump not providing sufficient spacing for the WB-20 trucks to 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.

Waste Vehicles

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

7.2 Emergency Vehicles

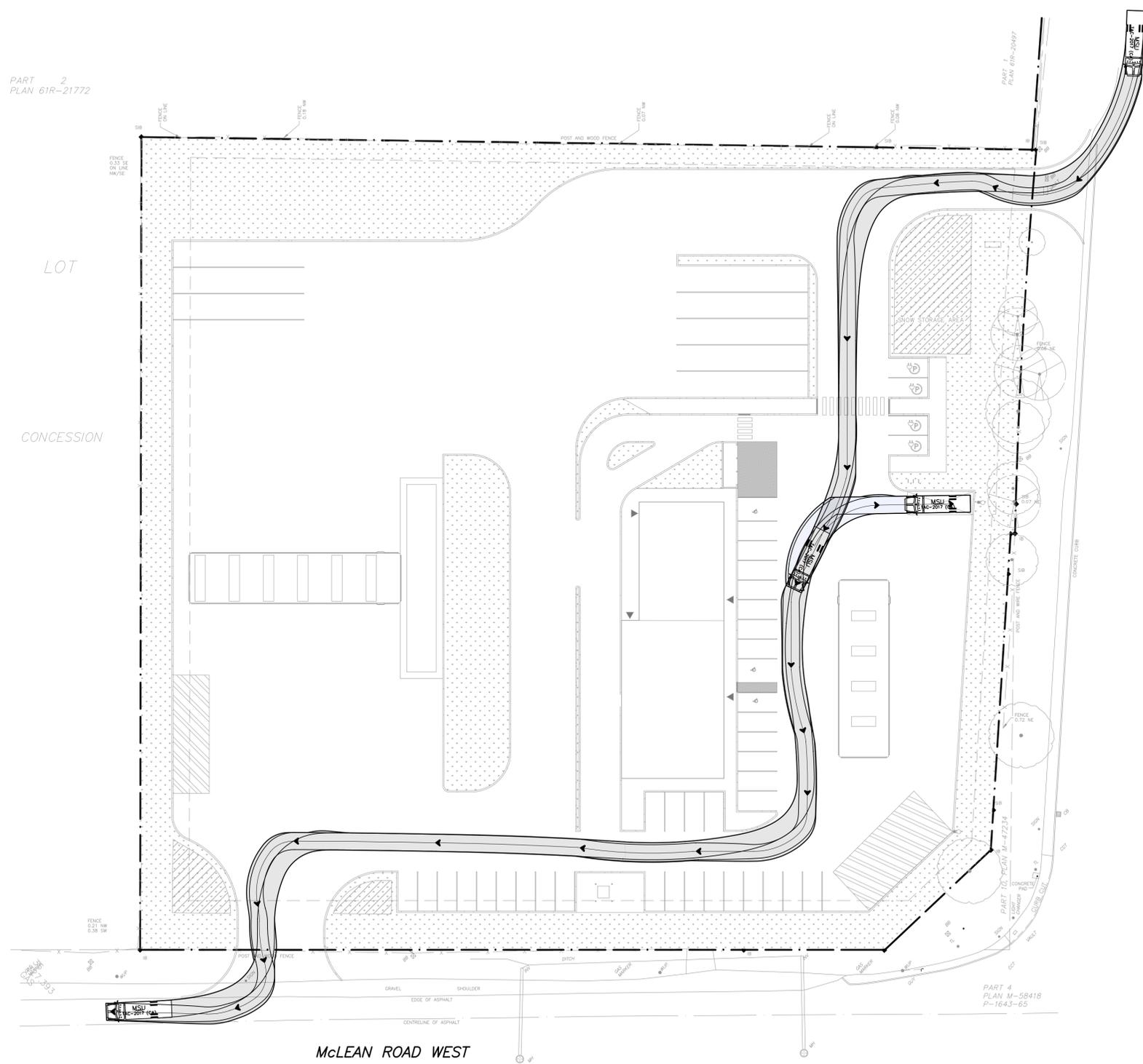
A maneuvering assessment was conducted for emergency vehicles using a Pumper Fire Truck 13.4 metres in length. As shown in **Figure 18** and **Figure 19**, the fire truck is able to enter the site using both site accesses and can safely maneuver the proposed fire route in either direction safely entering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

7.3 Passenger Vehicles

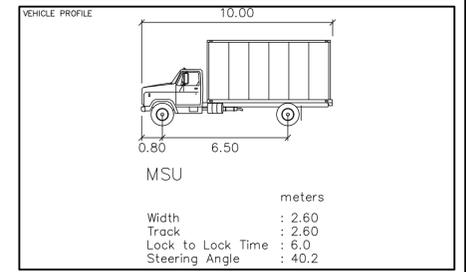
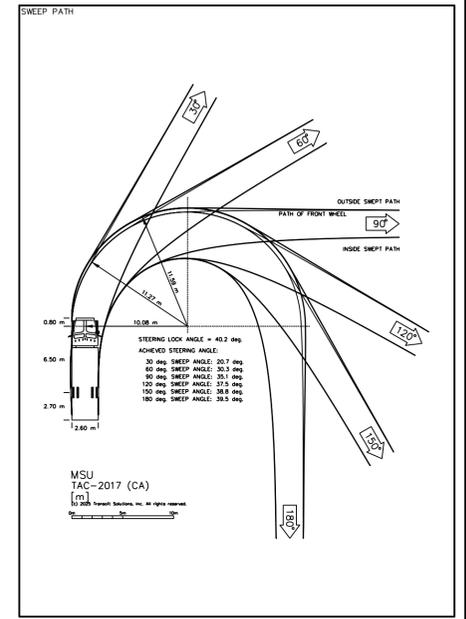
A maneuvering assessment was conducted using a Passenger TAC (P-TAC) vehicle as shown in **Figure 20**, which demonstrates that passenger vehicles can enter and exit critical parking spots within a three-point turning movement, as well as restaurant drive through. No issues were identified with any of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

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

PART 2
PLAN 61R-21772



FOR REVIEW
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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

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

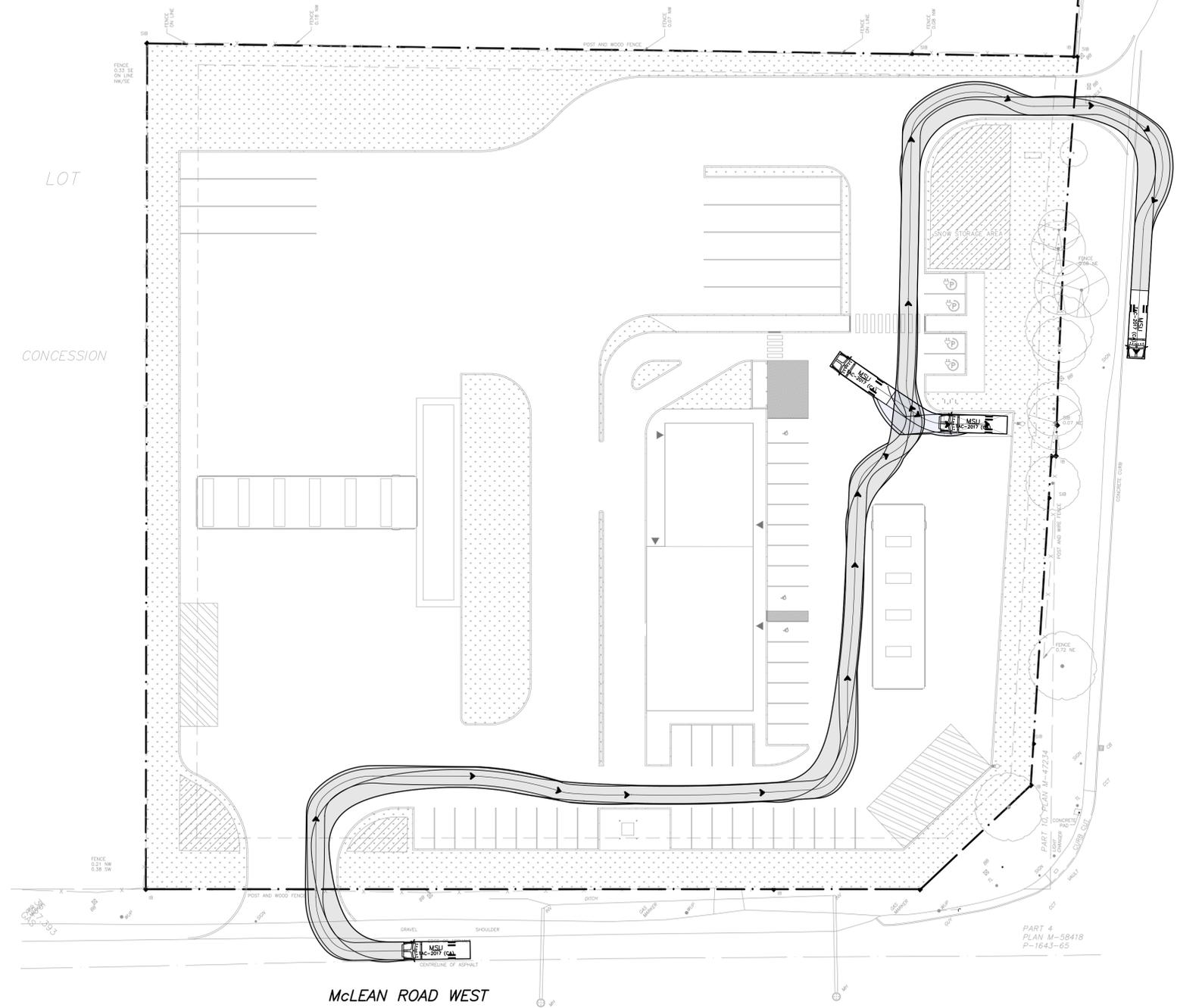
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**VEHICLE MANEUVERING ANALYSIS
MEDIUM SINGLE UNIT (MSU) TRUCK**

2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	M.P.	Design	M.P.	Project No.	2792-7289
Check	R.K./LL	Check	R.K./LL	Scale	1:400
				Dwg.	FIG12



PART 2
PLAN 61R-21772

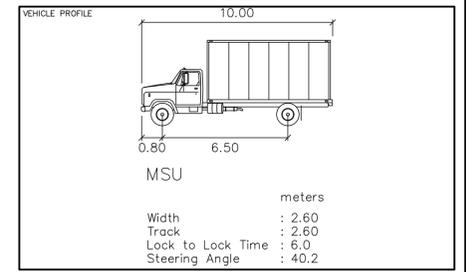
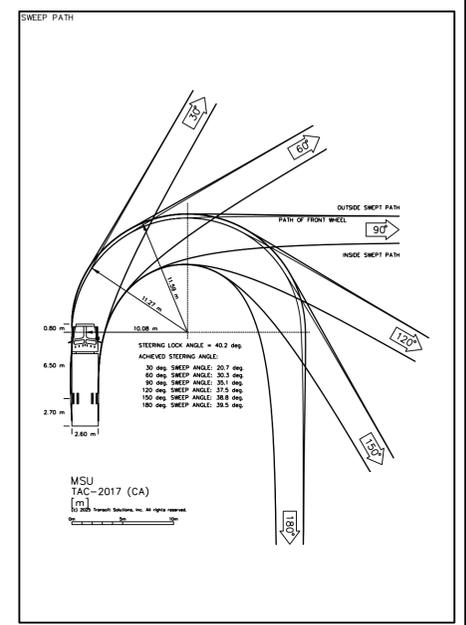


McLEAN ROAD WEST

BROCK ROAD SOUTH



FOR REVIEW
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No.	ISSUE	DATE: MM/DD/YYYY
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2	ISSUED FOR SUBMISSION	10/19/2023
3	ISSUED FOR SUBMISSION	08/01/2025

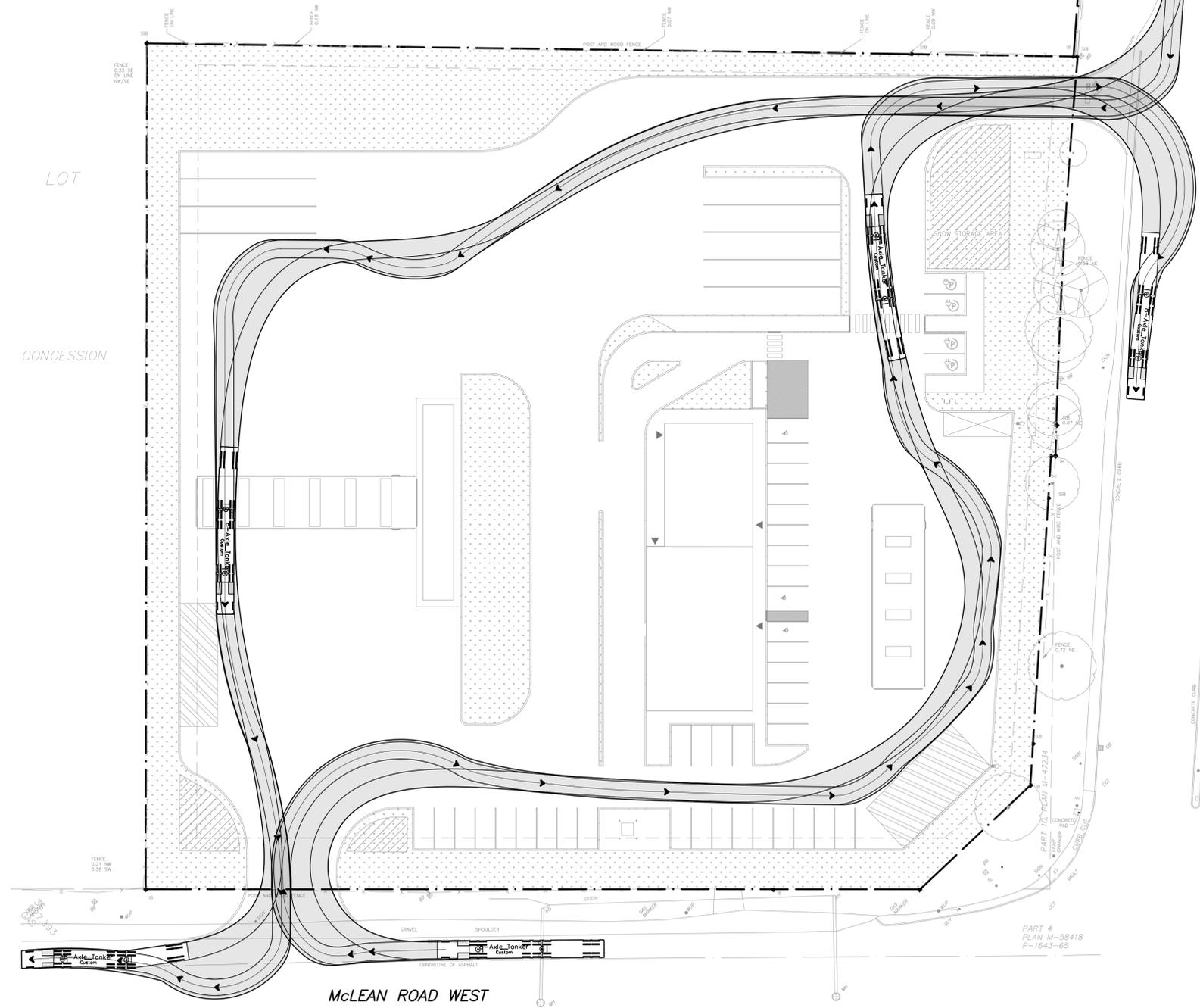
Project
**7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH**

Drawing
**VEHICLE MANEUVERING ANALYSIS
MEDIUM SINGLE UNIT (MSU) TRUCK**

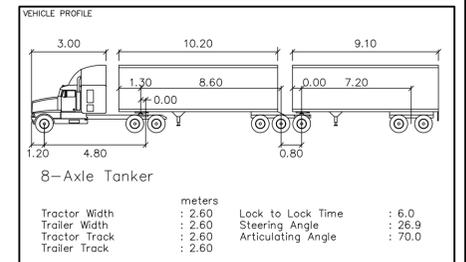
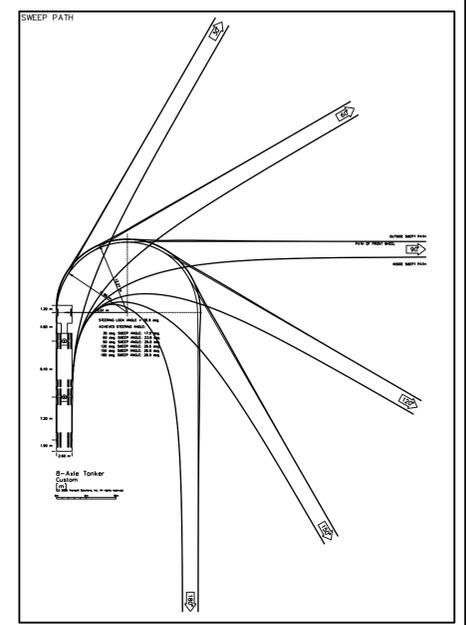
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				Dwg.	FIG13



PART 2
PLAN 61R-21772



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1	ISSUED FOR REVIEW	08/31/2023
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3	ISSUED FOR SUBMISSION	08/01/2025

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

Drawing
**VEHICLE MANEUVERING ANALYSIS
8-AXLE FUEL TANKER**

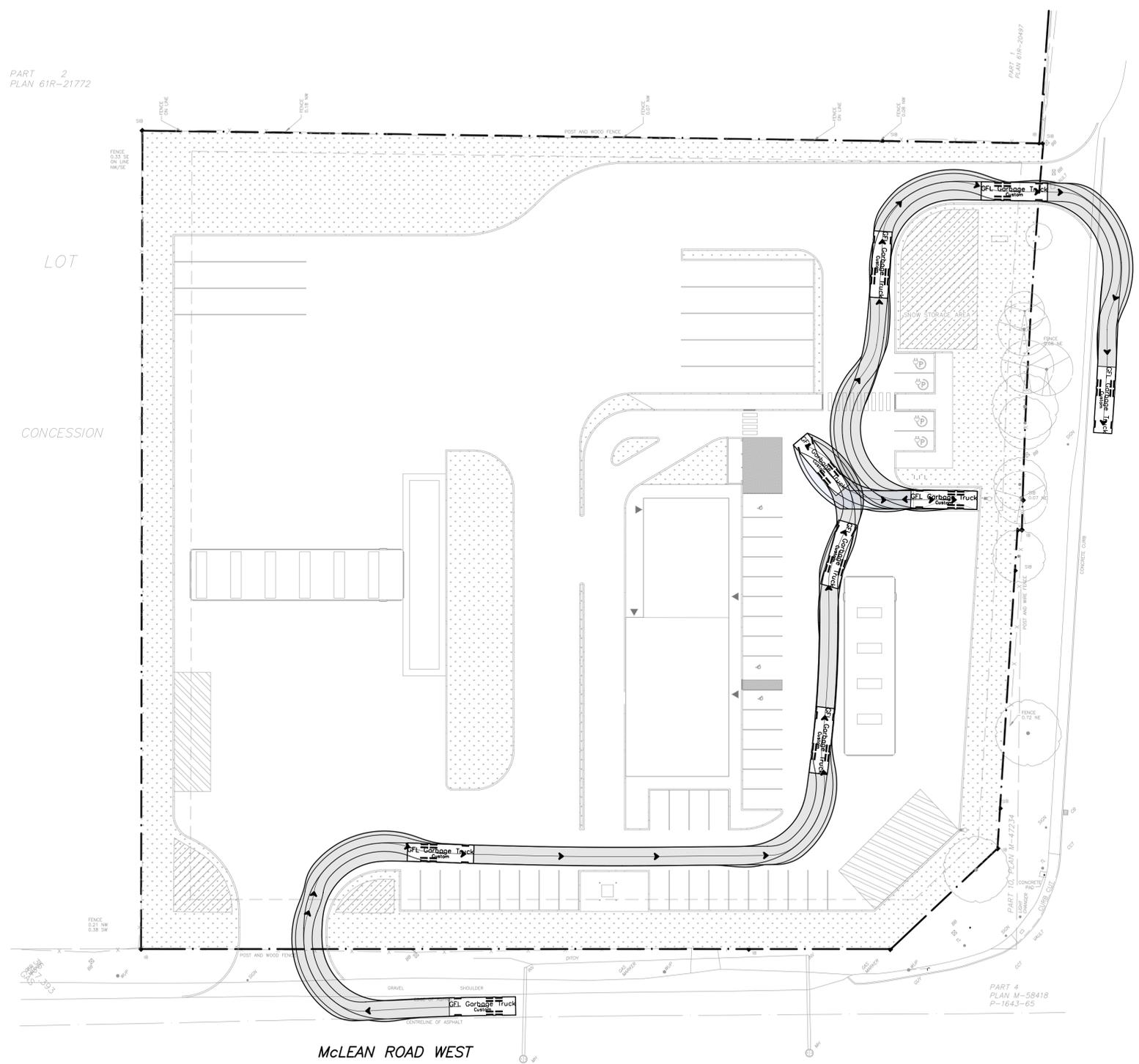
CROZIER
CONSULTING ENGINEERS

2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

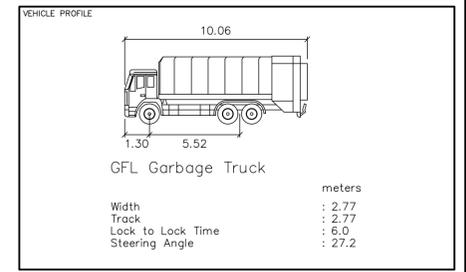
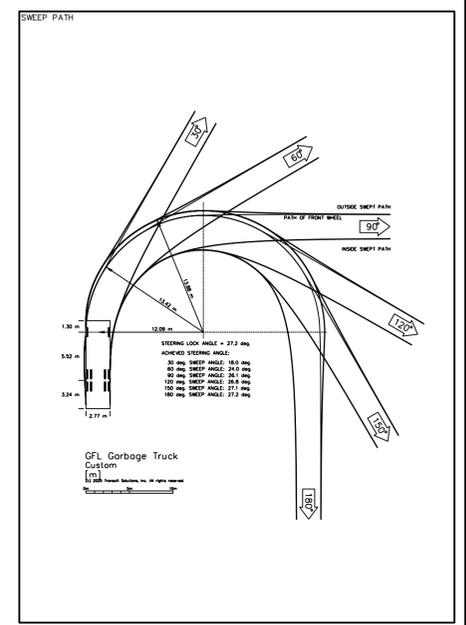
Drawn	M.P.	Design	M.P.	Project No.	2792-7289
Check	R.K./LL	Check	R.K./LL	Scale	1:400
				Dwg.	FIG15



PART 2
PLAN 61R-21772



FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023
3	ISSUED FOR SUBMISSION	08/01/2025

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

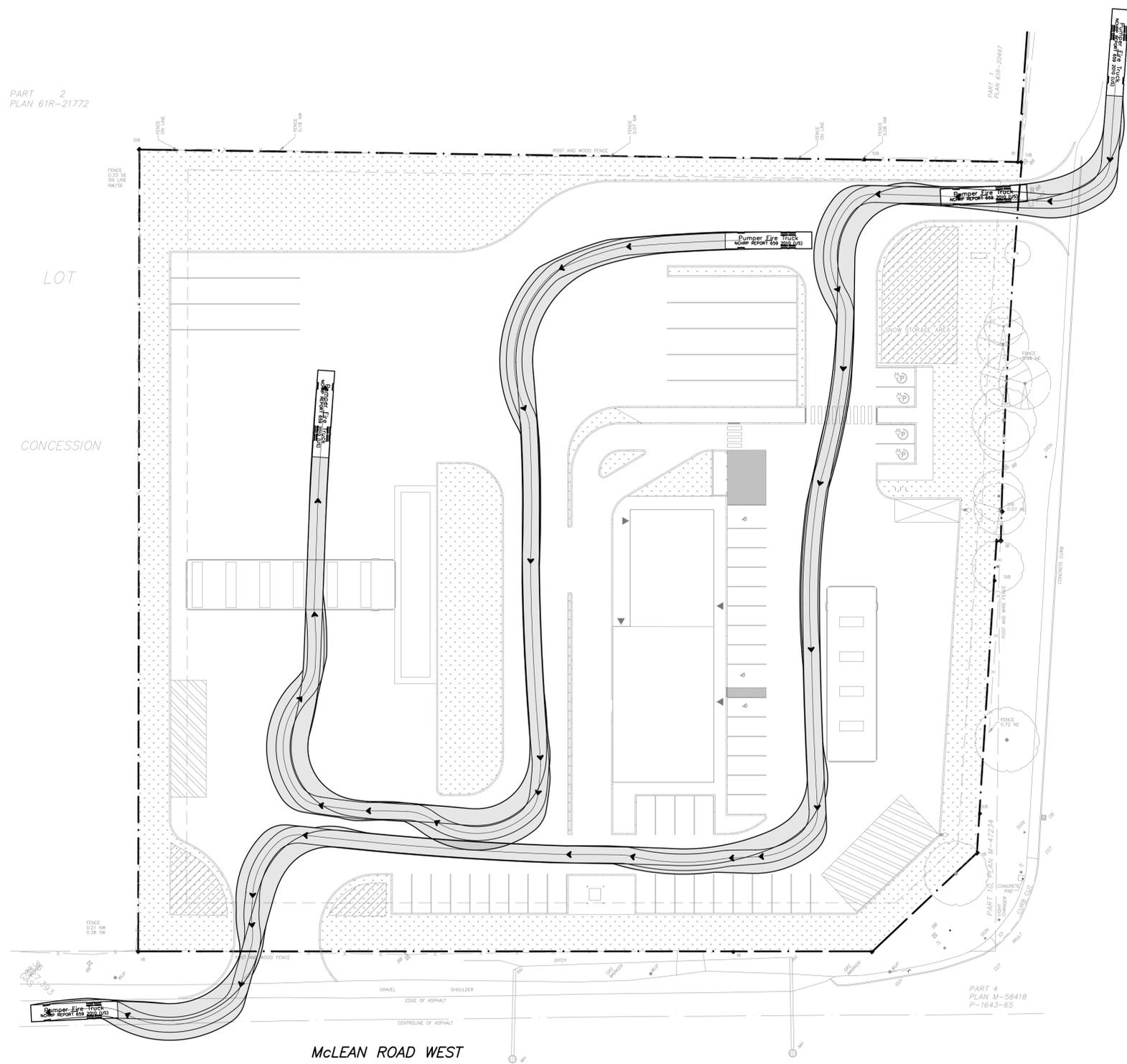
Drawing
**VEHICLE MANEUVERING ANALYSIS
WASTE COLLECTION**

2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

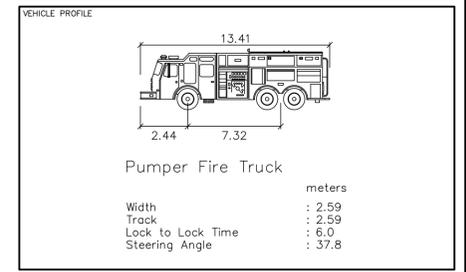
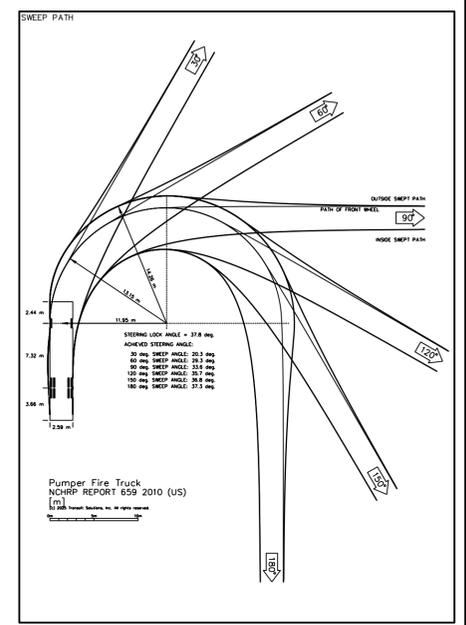
Drawn	M.P.	Design	M.P.	Project No.	2792-7289
Check	R.K./LL	Check	R.K./LL	Scale	1:400
				Dwg.	FIG17



PART 2
PLAN 61R-21772



FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023
3	ISSUED FOR SUBMISSION	08/01/2025

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

Drawing
**VEHICLE MANEUVERING ANALYSIS
FIRE TRUCK**

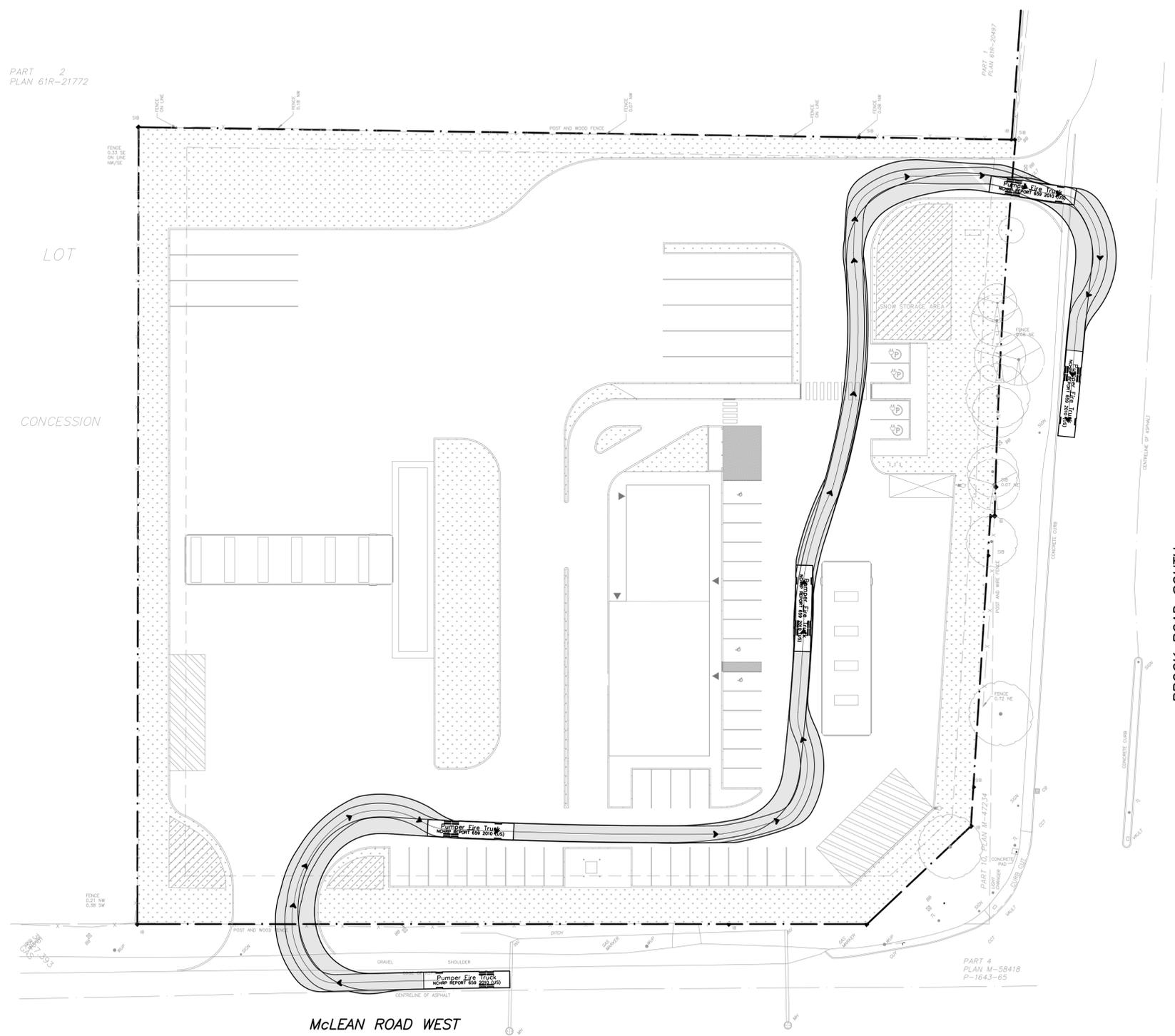
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	M.P.	Design	M.P.	Project No.	2792-7289
Check	R.K./LL	Check	R.K./LL	Scale	1:400

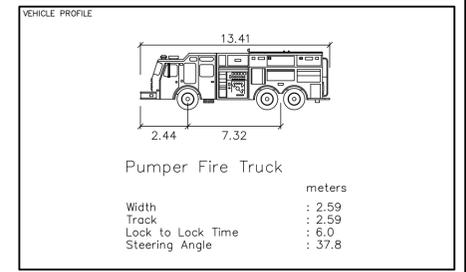
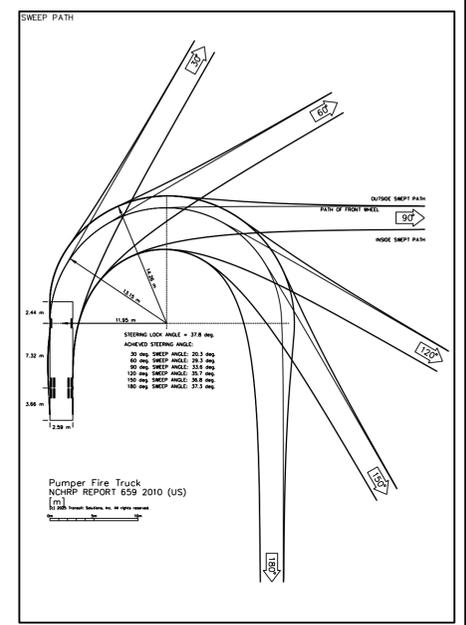


Dwg. **FIG18**

PART 2
PLAN 61R-21772



FOR REVIEW
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No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
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Project
**7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH**

Drawing
**VEHICLE MANEUVERING ANALYSIS
FIRE TRUCK**

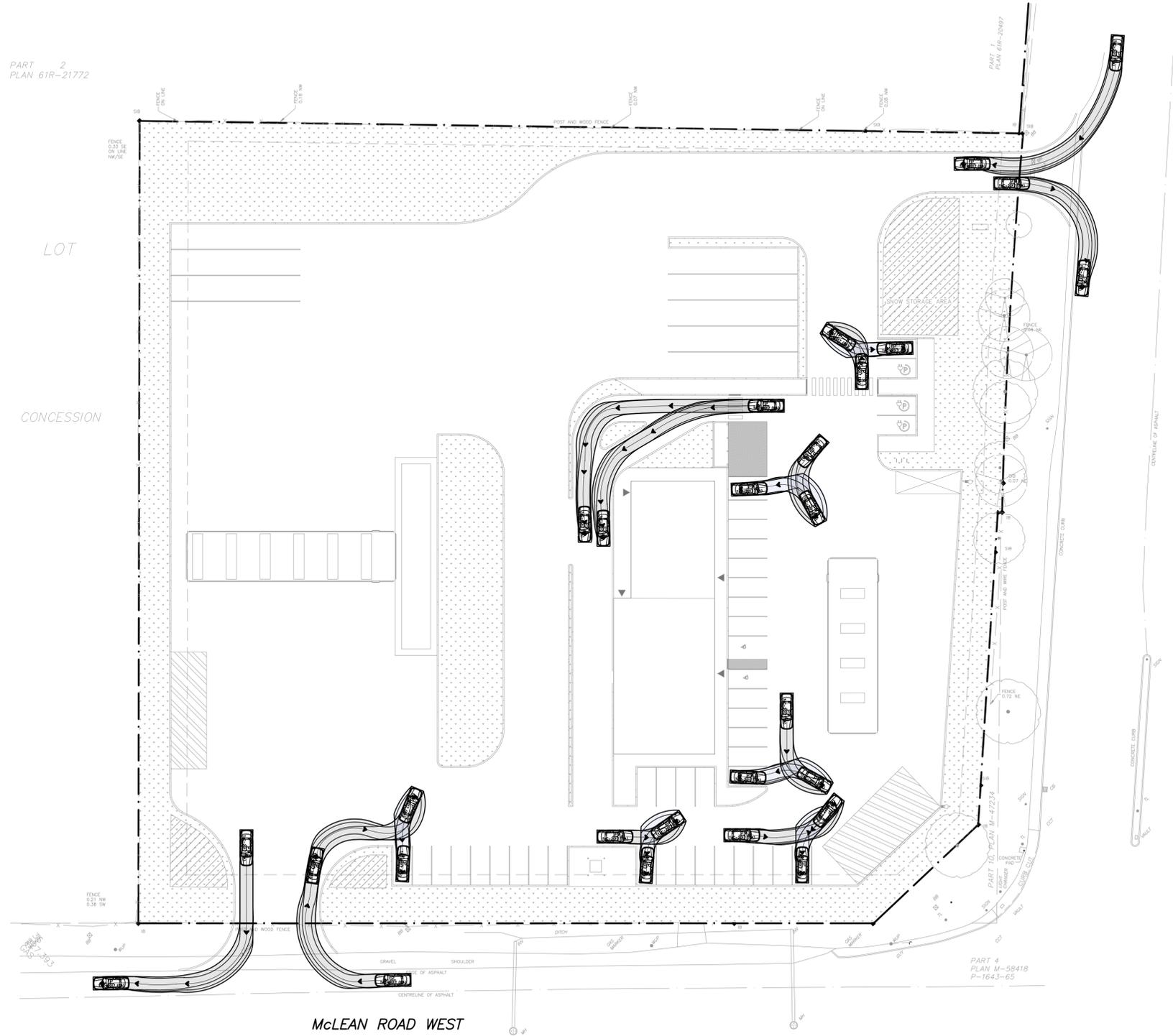
CROZIER
CONSULTING ENGINEERS

2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
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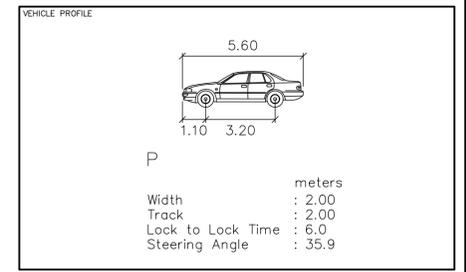
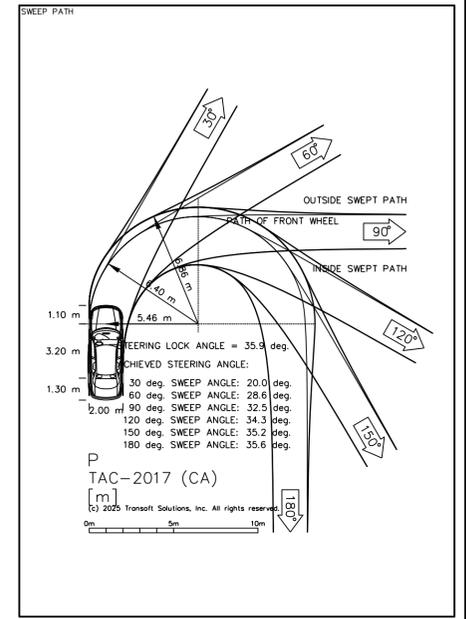
Drawn	M.P.	Design	M.P.	Project No.	2792-7289
Check	R.K./LL	Check	R.K./LL	Scale	1:400
				Dwg.	FIG19



PART 2
PLAN 61R-21772



FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



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3	ISSUED FOR SUBMISSION	08/01/2025

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

Drawing
**VEHICLE MANEUVERING ANALYSIS
PASSENGER CAR**

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.P.	Design	M.P.	Project No.	2792-7289
Check	R.K./LL	Check	R.K./LL	Scale	1:400
				Dwg.	FIG20



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 27**.

Table 27: 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	235 m ²	12
Drive-Thru Restaurant ¹	Restaurant ¹	1 space per /10 m ² GFA	379 m ²	38
Total Vehicle Parking Spaces Required				50
Total Vehicle Parking Spaces Proposed (Surplus/Deficit)				41 (-9)²
Gas Bar Parking Space Requirement				
Vehicle Gas Bar	Gas Bar	1 space per gas bar pump	4 pumps	4
Total Vehicle Gas Bar Parking Spaces Required				4
Total Vehicle Gas Bar Parking Spaces Proposed (Surplus/Deficit)				4 (+0)
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)				8 (+2)

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 m².

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 28**.

Table 28: Percentage of Required Parking Permitted to be Shared

Period	Weekday			Saturday		
	Restaurant	Retail Store	Parking Required	Restaurant	Retail Store	Parking Required
Morning	20%	75%	17	30	80	21
Noon	90%	80%	44	90	100	47
Afternoon	30%	90%	23	50	100	31
Evening	100%	90%	49	100	50	44
Updated Total Vehicle Parking Space Required (Shared)						49
Total Vehicle Parking Spaces Proposed (Surplus/Deficit)						41 (-8)

As shown in **Table 28**, 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 8 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 in surplus by 2 parking spaces, when compared to the Township's Zoning By-law requirements.

Relevant excerpts from the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 can be found in **Appendix 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 29**.

Table 29: 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 29**, 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 30**.

Table 30: 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	235 m ²	-
Drive-Thru Restaurant		379 m ²	-
Total Bicycle Spaces Required		614 m²	2
Total Bicycle Parking Spaces Proposed (Surplus/Deficit)			2 (0)

As shown in **Table 30**, 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 31**.

Table 31: Zoning By-Law Loading Review

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

As shown in **Table 31**, 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 32**.

Table 32: 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 32**, the proposed development includes 14 stacking spaces, which represents a surplus of 4 spaces relative to the 10-space requirement observed across the referenced townships.

9.0 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.

The 95th percentile queue lengths exceed the auxiliary lane storage length at Brock Road South and Nicholas Beaver Road for the southbound left-turn movement during the a.m. and p.m. peak periods. The rest of 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 0.74 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 0.61 and 0.65 is expected during the weekday a.m. and weekday p.m. peak hours, respectively.

The 2031 future background queuing assessment results in instances where the 95th percentile queues exceed the auxiliary turn lane storage length for the westbound left-turn and northbound left-turn movements at Brock Road South and McLean Road. Furthermore, the queue exceedances continue from the existing conditions for the southbound left-turn movement at Brock Road South and Nicholas Beaver Road.

Future Background Improvements

Based on the future background queue length exceedances, the signal timings for the 2031 horizon year were optimized and adjusted.

Traffic operations with the adjusted signal timings are expected to remain adequate, with maximum volume-to-capacity ratios of 0.76 in the weekday morning and 0.62 in the afternoon peak hours. While some queuing issues persist, specifically northbound and westbound left-turn queues at Brock Road South and McLean Road as well as ongoing exceedances at Brock Road South and Nicholas Beaver Road, these exceedances are minor. Typically, they are within two vehicle lengths of the storage area and can generally be accommodated without significant disruption to through traffic. Monitoring these locations for potential future storage lane expansion is recommended, but overall, the intersections are projected to function well with acceptable delays and sufficient capacity for future traffic growth.

Site Generated Traffic

During the weekday a.m. peak hour, the site is expected to generate 148 primary and 182 pass-by trips. In the p.m. peak hour, projections are 131 primary and 170 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 1.09 (0.35 increase from 2031 Future Background) and 0.71 (0.14 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 0.61 (0.00 increase from 2031 Future Background) and 0.65 (0.00 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 "B" or better during the weekday a.m. and p.m., peak hours.

The queuing assessment results in instances where the 95th percentile queues exceed the auxiliary turn lane storage length for the northbound left-turn movement at Brock Road South and McLean Road during the a.m. peak period, starting from the 2026 horizon year.

Similar to future background conditions, the queuing assessment results in a few instances where 95th percentile queues exceed the auxiliary turn lane storage length for the southbound left-turn movement at Brock Road South and Nicholas Beaver Road starting from the 2026 horizon year. Compared to the future background conditions, this is only a minimal increase in queue lengths. As adverse exceedances in queue lengths existed in the future background conditions, the site-generated traffic is not expected to impact the queue lengths.

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 0.89 and 0.64 during the a.m. and p.m. peak hours, respectively.

The queuing reassessment at Brock Road South and McLean Road indicates that the signal timing changes reduced the northbound left queue length exceedance. 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 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.

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 parking supply deficiency of 8 cars 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.

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,

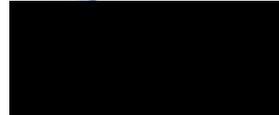
C.F. CROZIER & ASSOCIATES INC.



Ian Lindley, M.A.Sc., P.Eng.
Project Engineer, Transportation

RK:IL/tc

C.F. CROZIER & ASSOCIATES INC



Ramy Kamal
Engineering Intern, Transportation

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**197 Brock Road South & 7456 McLean Road W
Zoning By-law Amendment Application
Comment Response Matrix**

Consultant	Comments	Applicant Team Response
County of Wellington Planning	<p>1. <i>The County's Roads department will provide further information regarding submitted traffic impact study. Staff note that previous comments indicated access from Brock Road S would not be permitted and the applicant is indicating that a right in-right out access is required to facilitate the development of the site.</i></p>	<p>Agreed and noted. Comments issued by Dillon Consulting (County TIA Peer Reviewer) indicate support for the proposed RIRO access subject to extension of the median on Brock Road S. Further details can be found in the December 6, 2023 comments from Dillon and further updates to the TIA from Crozier.</p>
	<p>2. <i>197 Brock Rd S is zoned IND (h5). 7456 McLean Rd W is zoned IND (sp54). Both properties are included in the Township's Industrial Overlay.</i></p>	<p>Agreed and noted. No action required.</p>
	<p>3. <i>The applicant is proposing to rezone the property to Highway Commercial (HC) to facilitate the construction of a multi-tenant commercial development including a gas bar, restaurant with a drive-thru and a convenience store.</i></p>	<p>Agreed and noted. No action required.</p>
	<p>4. <i>The draft By-law also includes a site-specific parking provision for 1 space per 20 m²; whereas 1 space per 10 m² is required in the zoning by-law.</i></p>	<p>Agreed and noted. No action required.</p>
	<p>5. <i>The applicant's TIS indicates a required parking number of 60 spaces and 49 spaces provided. Table 14 uses the required parking for 'other uses,' this is incorrect. The Township's zoning by-law does not indicate additional parking for</i></p>	<p>Please refer to the submitted Planning Justification Report for correct details and information regarding the requested Zoning By-law Amendment.</p>

	<p><i>restaurants with drive-through facilities nor does it indicate reduced requirements. The applicant should clarify if the restaurant is serviced by the drive-through only or if there is seating/service in addition to the drive-through. Further, the applicant should compare parking requirements for this type of use with neighbouring municipalities and provide justification for the reduced parking requirement for the restaurant and drive-through use.</i></p>	<p>The TIS has been updated to remove reference to parking requirements for “other uses” in reference to the drive-through restaurant.</p> <p>The revised Planning Justification Report (Section 5.2) includes further review of the shared use parking regulations in Table 5.4 and further justification for the proposed reduced rate.</p>
	<p>6. <i>Table 5.4 of the Township’s zoning by-law provides an opportunity to calculate shared use parking. This Section should be referred to when determining the required parking for the site.</i></p>	<p>See above.</p>
	<p>7. <i>The TIS and/or site plan should include the estimated number of spaces included in the drive-through before impeding the fire route and/or access to the site. The Township zoning by-law does not have specific requirements but there are other municipalities with drive-through queuing requirements.</i></p>	<p>The Conceptual Site Plan allows for 12 “stacking spaces” within the proposed drive-through. The conceptual site plan has been updated to indicate the stacking space capacity of the drive-through lane.</p>
<p>MTO</p>	<p><i>The subject properties are beyond MTO’s Permit Control Area. Therefore, MTO review, approval and permits are not required.</i></p>	<p>Agreed and noted. No action required for deeming ZBA Application Complete.</p>
<p>TIA – Township Peer Reviewer (Salvini)</p>	<ul style="list-style-type: none"> • <i>The base traffic data along McLean Road West and at the Brock Road intersection is comparable to other traffic data collected in the area.</i> • <i>The background growth rate of 2 percent per year is appropriate and consistent with other studies in the area.</i> • <i>There is substantial planned development in the area including the adjacent two sites to</i> 	<p>(Crozier) Agreed and noted.</p> <p>(Crozier) Agreed and noted. The growth rates were applied and forecasted to base year 2025.</p> <p>(Crozier)</p>

	<p><i>the west, other sites on Brock Road, and two sites on McLean Road East not far from the subject site. There is a need to look at the cumulative impact of all of this development in particular on McLean Road approaching Brock Road both from the east and from the west in order to understand the impact to existing and planned driveway connections. The consultant should reach out to the Township to confirm which proposals to include and to confirm traffic for each.</i></p>	<p>Agreed and noted. The background developments were implemented into the analysis.</p>
	<ul style="list-style-type: none"> <i>The trip generation and distribution data is appropriate for the proposal. However, the pass-by traffic was double counted in the assignment and should be updated.</i> 	<p>(Crozier) Acknowledged. See section 4.1 for updated pass-by trips.</p>
	<ul style="list-style-type: none"> <i>The adjacent parcel to the west of this site includes for a new future public road immediately adjacent to the common property line and therefore adjacent to the driveway for this site as proposed. It would be helpful to have a discussion with both applicants about how these two new connections to McLean Road West can be consolidated and achieved in the timeline of each development. If this site accesses McLean Road through the new public road, there will be impacts on the site design and circulation patterns that may be favorable for addressing the truck circulation issues identified in the TIS.</i> 	<p>(Crozier) Agreed and noted.</p>
	<ul style="list-style-type: none"> <i>The TIS included for a review of the circulation paths of a number of key design vehicles. There are some places on the site where tweaks to the design will be needed to accommodate both the WB-20 and the gas tanker truck, but generally it appears that the design vehicles can be accommodated on the site.</i> 	<p>(Crozier) Noted.</p>

	<ul style="list-style-type: none"> • <i>Information about how much queueing space is provided in the drive-thru and how/if that will accommodate demand should be provided in the TIS.</i> 	<p>(Crozier) Agreed and noted. See section 8.5 Stacking Lanes Requirement</p>
	<ul style="list-style-type: none"> • <i>It may be desirable to provide sidewalks on the north side of McLean Drive across the site frontage and potentially along Brock Road as well.</i> 	<p>(Crozier) Due to the low/non-existent pedestrians around the area a sidewalk will not be added</p>
	<ul style="list-style-type: none"> • <i>A review of the parking requirements and provisions on the site suggests that the provisions meet the requirements in the Zoning By-law. This analysis does not agree with the site statistics provided on the concept site plan. I believe it could be because the site plan includes for a parking requirement of one (1) space for every 10 s.m. for the restaurant use. The TIS suggests that the requirement for the restaurant should be one (1) space for every 20 s.m. in accordance with the “any other use” clause in the Zoning By-law given that the restaurant use does not contemplate a drive-through. It would be appropriate to have a zoning opinion provided by the Township in order to understand the requirement and whether or not the provision meets that requirement.</i> 	<p>Agreed and noted.</p>
<p>TIA – Wellington County Peer Reviewer (Dillon)</p>	<ul style="list-style-type: none"> • <i>While it was originally identified that no driveway access to Wellington Road 46 (Brock Street) would be permitted, it has been determined that a right-in, right-out access at the north edge of the parcel could be supported provided the existing raised median to the south is extended north across and beyond this proposed driveway access to physically restrict any driveway to right-in, right-out. The concept plans within the TIS should note the limits of the existing median and the limits of the proposed</i> 	<p>(Crozier) Agreed and noted. The median has been extended up to the brock road south site access</p>

	<p><i>(extended) median. Depending on the design of the raised median extension, it may be necessary to slightly shift both the northbound and southbound travel lanes around this raised median extension.</i></p>	
	<ul style="list-style-type: none"> • <i>Within Section 2.1 of the report, the first paragraph notes certain streets are considered to be north-south while others were to be considered east-west. However, within the subsequent paragraphs of the report, these cardinal directions are reversed. It also appears the incorrect directions are applied to the trip distribution and assignment numbers (as seen in Table 9 and Table 10), especially when compared to the cardinal directions shown in Figure 7 and Figure 8 (on the following two pages).</i> 	<p>(Crozier) Agreed and noted.</p>
	<ul style="list-style-type: none"> • <i>Tables 4, 6, 7, 11 and 12 (intersection operations tables) all should report on all movements at the study area intersections and site accesses, showing the level of service, delay, v/c ratios, and 95th percentile queues for each type of movement, in addition to how the overall intersection is operating.</i> 	<p>(Crozier) Agreed and noted.</p>
	<ul style="list-style-type: none"> • <i>No background developments were noted or included in the TIS findings (as noted in Section 3.2 of the submitted TIS). However, when this study was scoped out with this firm previously, it was advised that the firm needed connect with staff at the Township of Puslinch to determine what background developments needed to be included here. Dillon and the County of Wellington are aware of several other developments that have been proposed around this intersection</i> 	<p>(Crozier) Agreed and noted.</p>

	<p><i>and should have been included in this TIS's analysis and findings.</i></p>	
	<ul style="list-style-type: none"> • <i>Table 8 notes that there will be six pumps within the truck stop and four pumps within the gas station. When looking at the concept plan, it is noted that six islands are shown at the truck stop and four islands at the gas station. However, as gas pumps are often double-sided, there may be additional pumps provided. If so, the trip generation calculations should be revised accordingly.</i> 	<p>(Crozier) There are 4 vehicle, and 6 truck spaces provided.</p>
	<ul style="list-style-type: none"> • <i>Given it is understood that a McDonald's restaurant and drive-through is proposed, stacking analysis and consideration should be completed. This is to ensure that the proposed drive-through has sufficient stacking spaces. This study should also confirm that under no circumstances would the queue ever extend back onto Wellington Road 46 (Brock Street). The drawing should be updated to note the locations and numbers of vehicles stacking in the drive-through to confirm sufficiency.</i> 	<p>(Crozier) Agreed and noted. See site plan and section 8.5</p>
	<ul style="list-style-type: none"> • <i>Within Figure 11 (sightline reviews), it does not appear the geometry of the proposed accesses and site layout align with the details shown on the aerial map. For example, the location and alignment of the proposed raised median extension on Wellington Road 46 into the east shoulder of the corridor.</i> 	<p>(Crozier) Agreed and noted. See updated figure 11.</p>

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

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

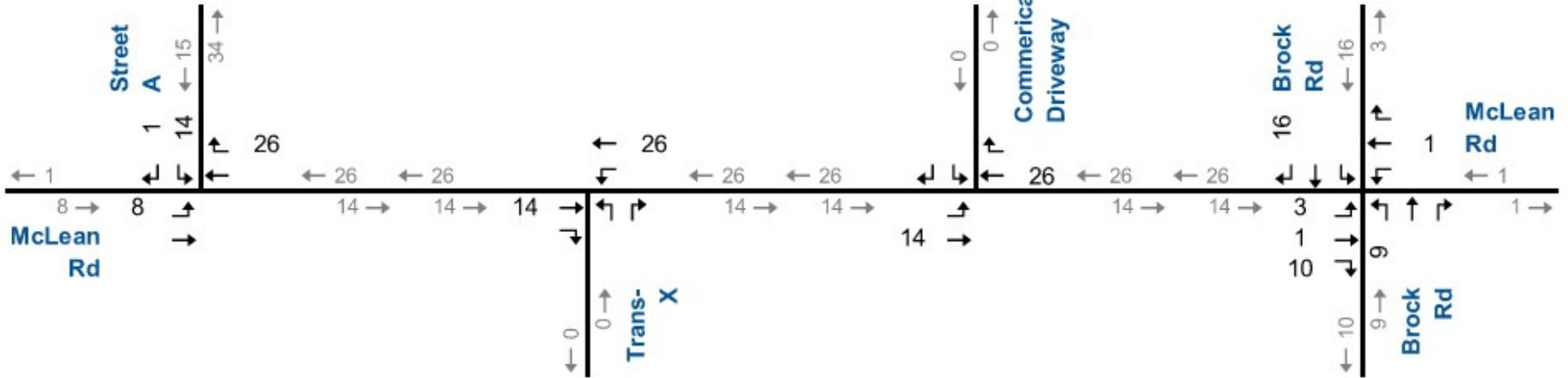
Background traffic should include the following sites

- 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

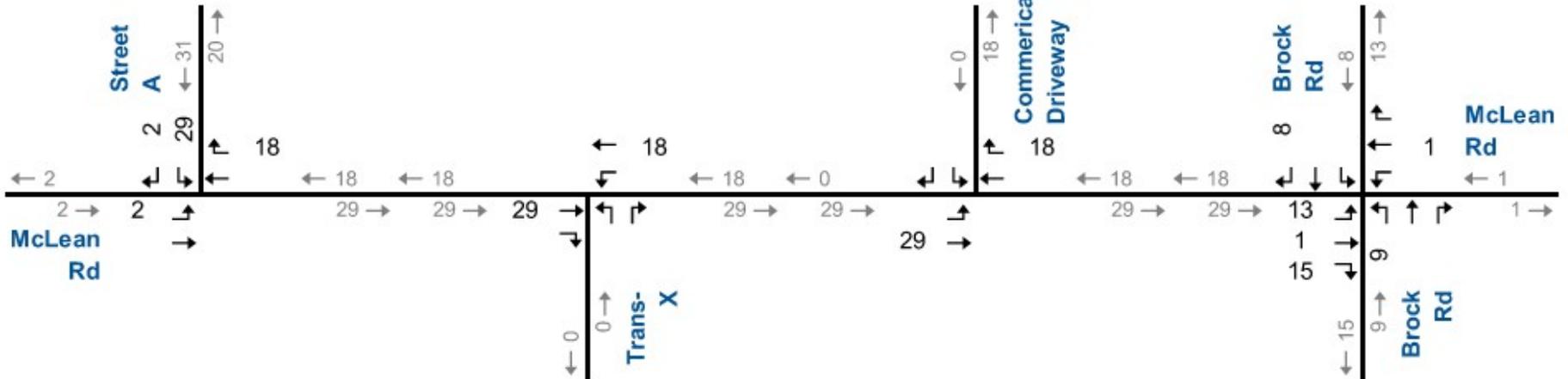
I'm including several attached files illustrating the site traffic for the various developments. Below I've included an excerpt for the Wheelking site at 7434 McLean W.



AM Peak Hour



PM Peak Hour

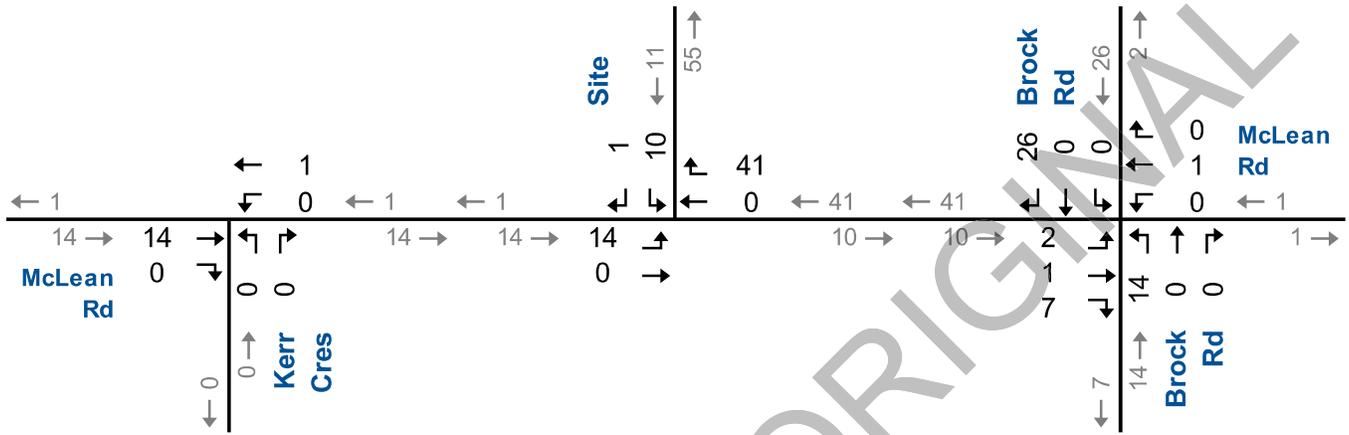


Site Generated Traffic Volumes

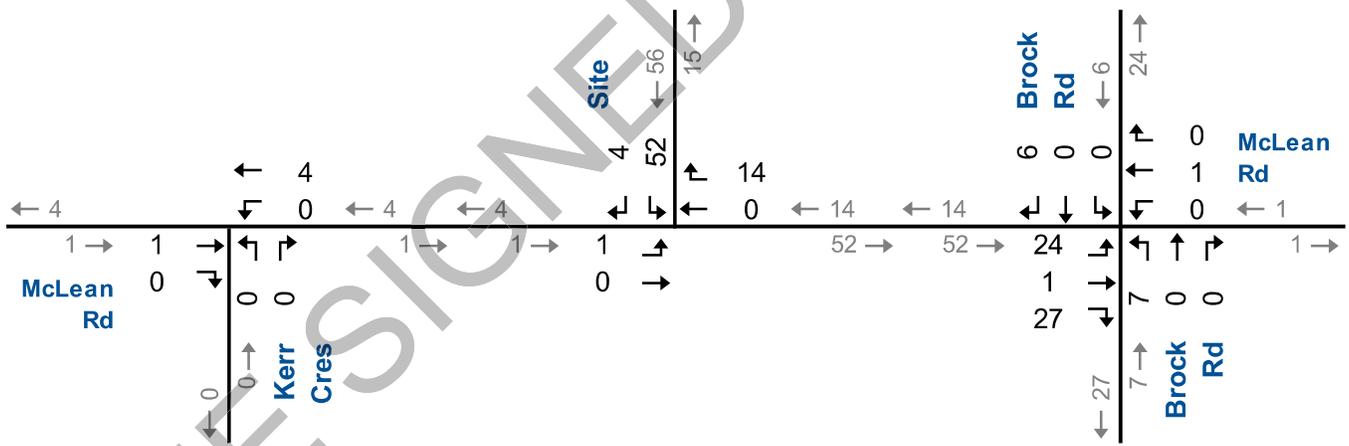
Figure 2



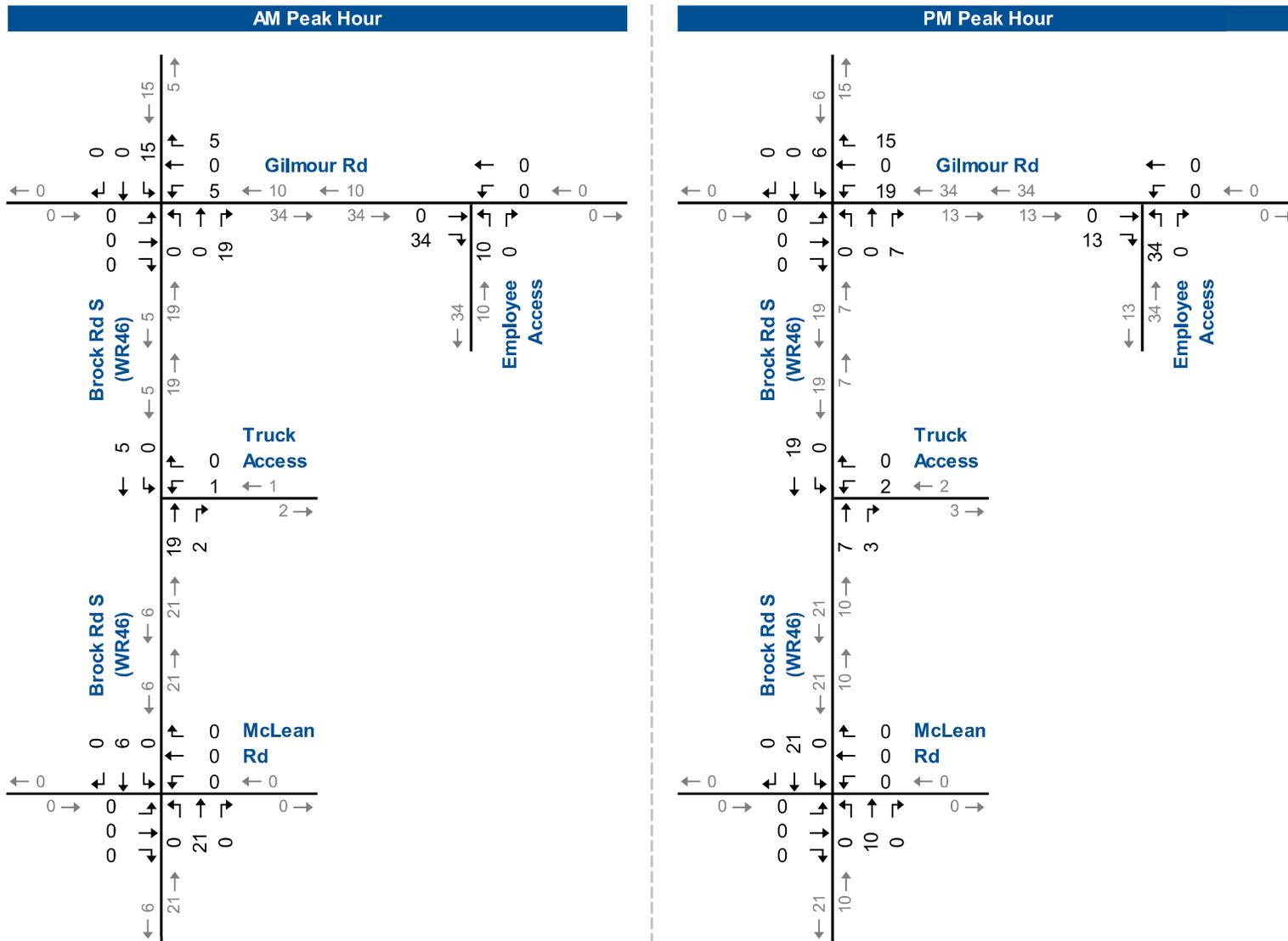
AM Peak Hour



PM Peak Hour



Site Generated Traffic Volumes



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.

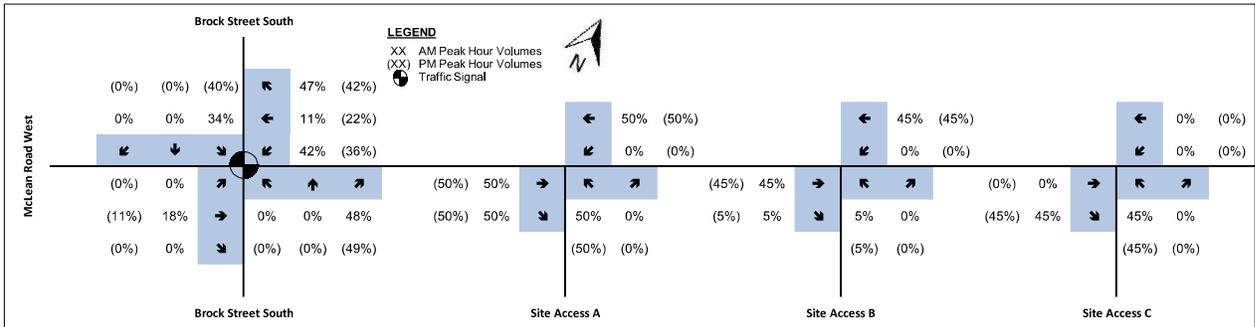


Figure 6 Trip Distribution Percentages (Passenger Vehicles)

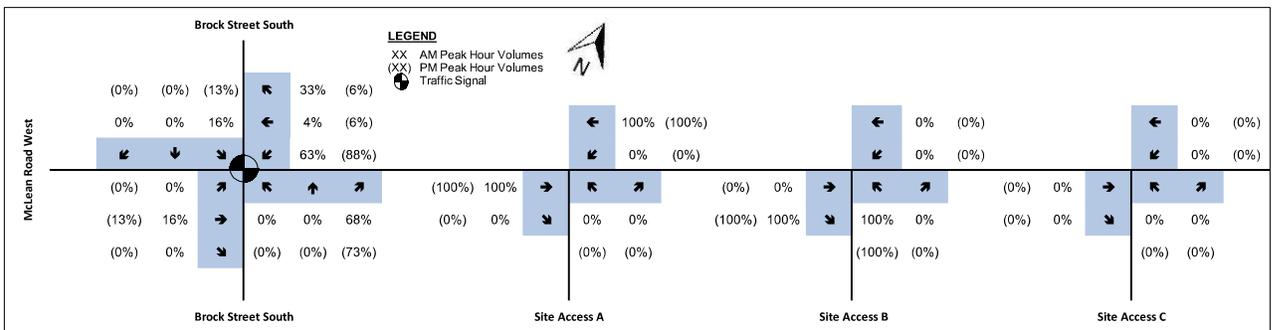


Figure 7 Trip Distribution Percentages (Heavy Trucks)

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**.

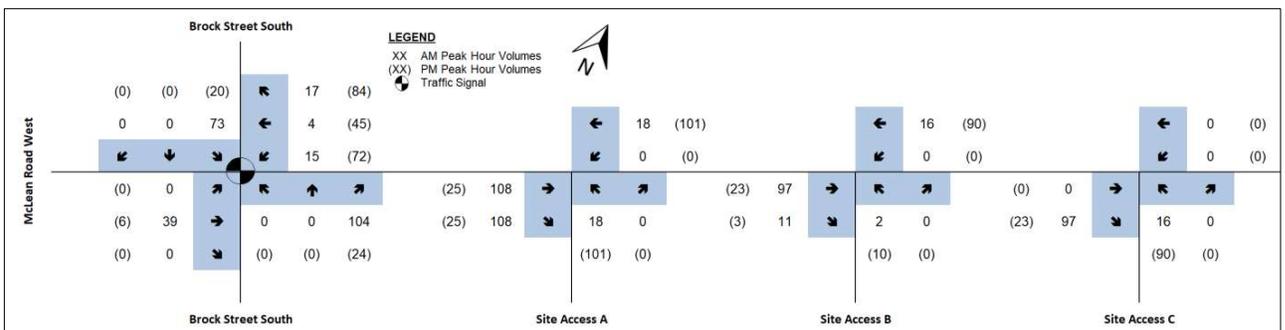


Figure 8 Estimated Site Trips (Passenger Vehicles)

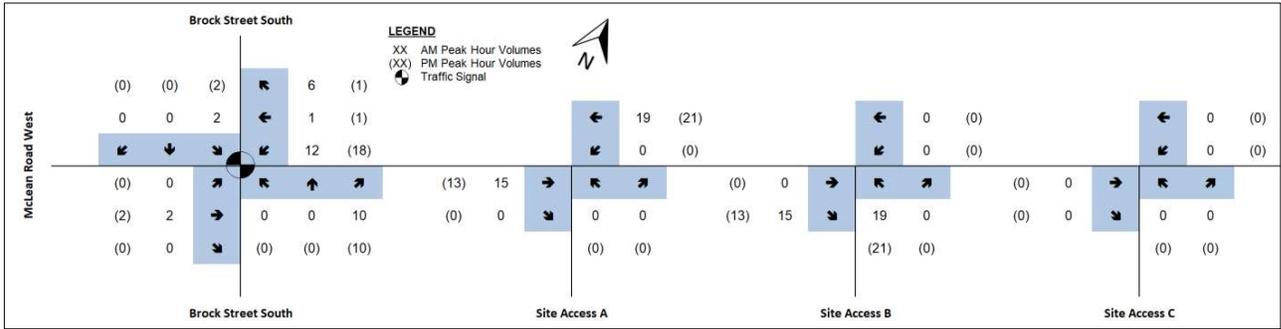


Figure 9 Estimated Site Trips (Heavy Trucks)

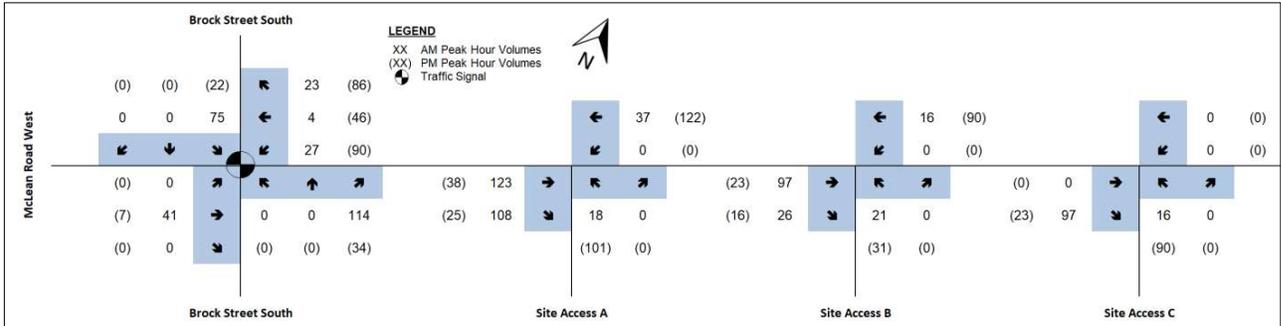


Figure 10 Estimated Site Trips (Combined)

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.

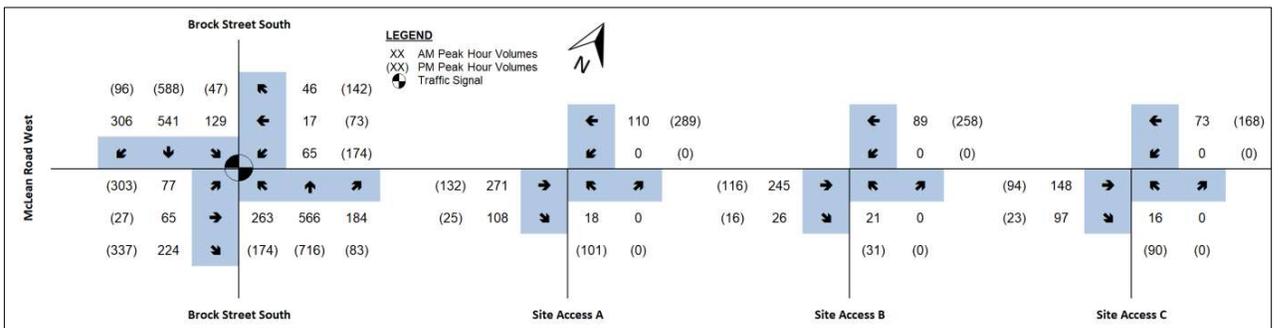
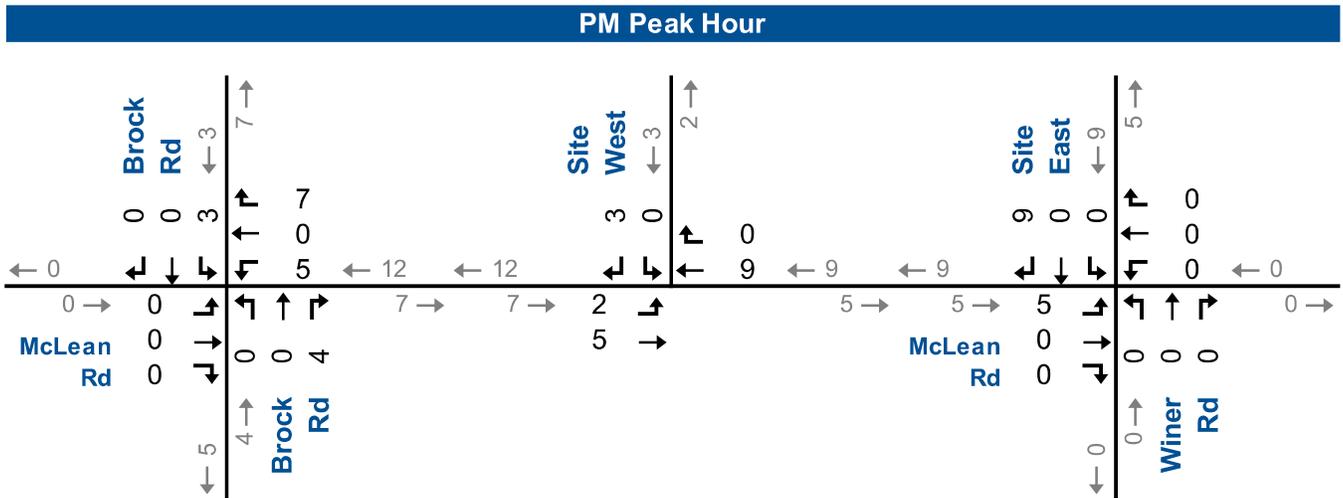
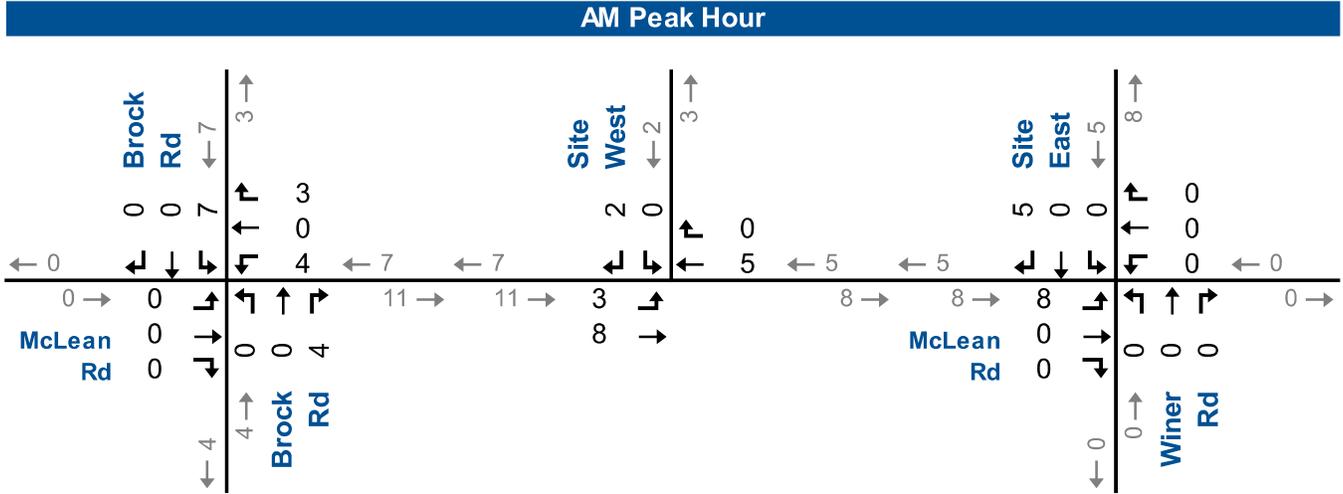


Figure 11 2027 Future Total Traffic

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



Site Generated Traffic Volumes

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.

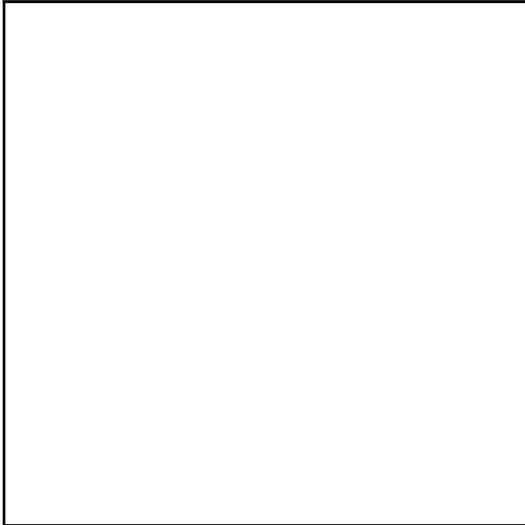
The scope you have identified is generally acceptable, noting that the following needs to be considered in the study and also within the development plan.

- 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

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**.

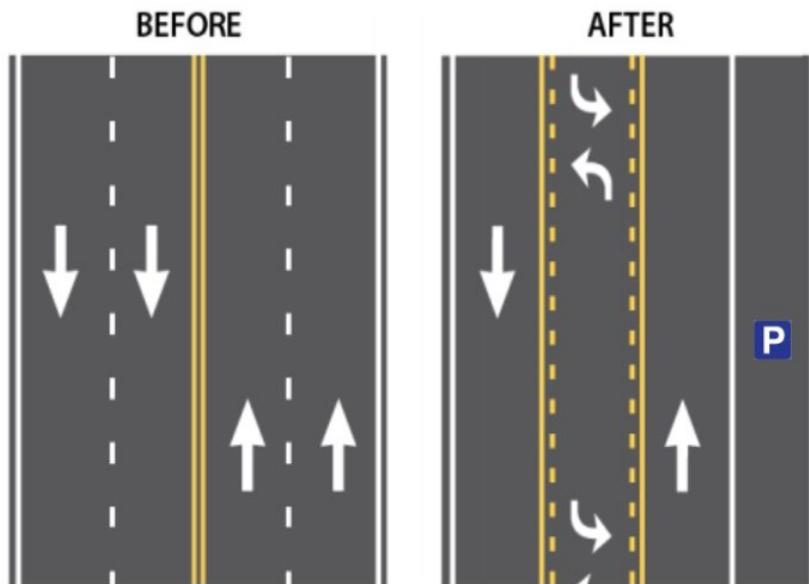


Figure 29: Aberfoyle Road Diet

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).

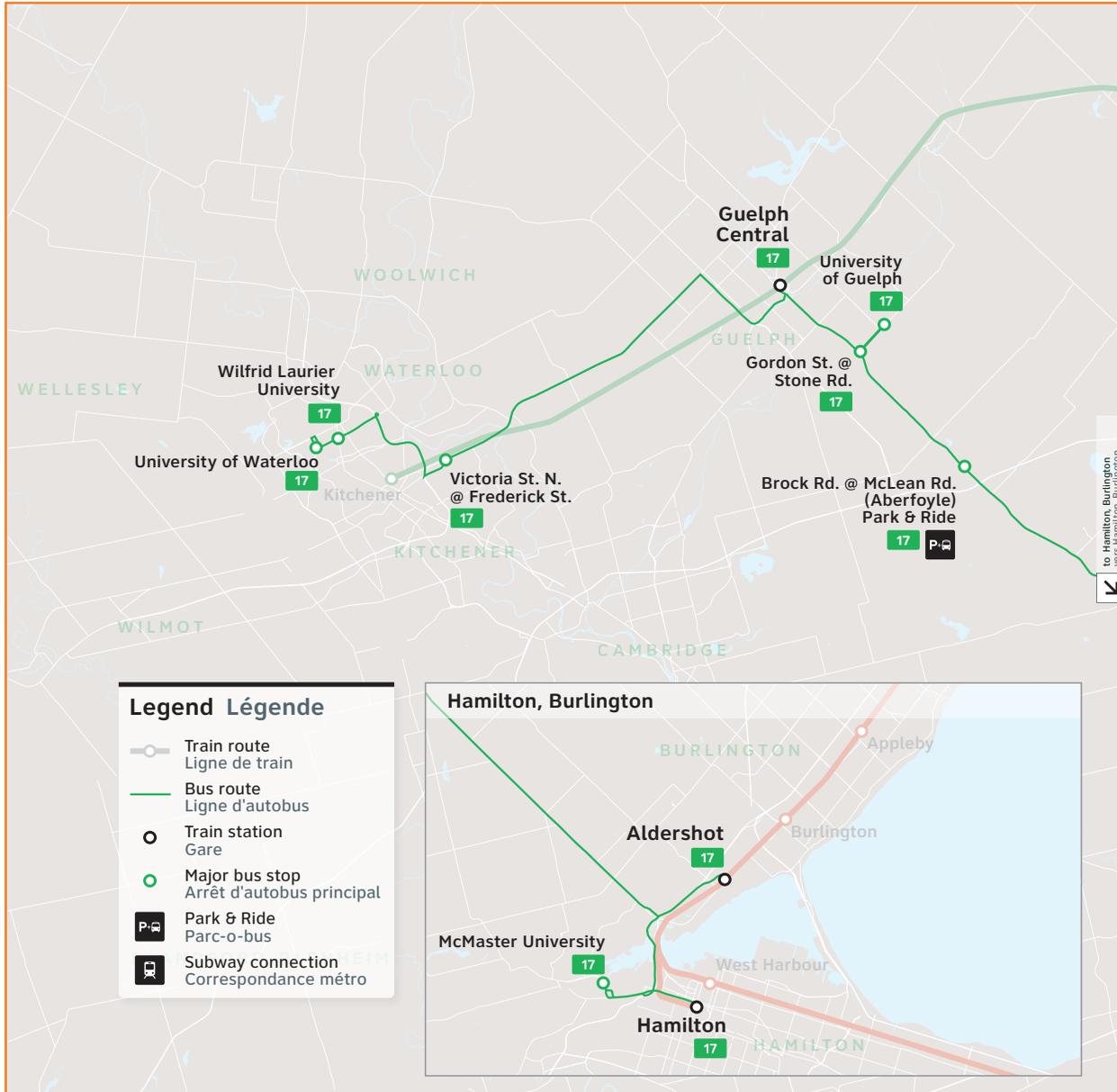
Appendix C

Transit Maps and Schedules

17

Route number
Nombre d'itinéraire

Waterloo/Hamilton



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Waterloo/ Hamilton



GO Bus Schedule/
Horaire des autobus GO



17

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

Daily / Quotidiennement

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

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AVRIL **2023**



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Step 2

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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.

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

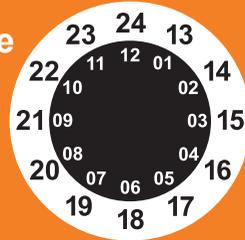
Regardez dans les rangées pour obtenir les heures de départ offertes.

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

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 Stationnement disponible.

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2. Foldable bicycles are allowed on-board trains at all times.

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											NORTHBOUND / EN DIRECTION NORD																								
Route Number Numéro du trajet	Zone→	Waterloo 27	Dp	Waterloo 27	Kitchener 27	Victoria St. @ Frederick St.	Guelph 39	Guelph 39	Puslinch 39	Brock Rd. @ McLean Rd.	Burlington 17	Hamilton 18	Hamilton 18	McMaster University	Hamilton 18	Hamilton GO Centre	Route Number Numéro du trajet	Zone→	Hamilton 18	Dp	Hamilton 18	McMaster University	Burlington 17	Puslinch 39	Brock Rd. @ McLean Rd.	University of Guelph	Guelph 39	Guelph 39	Guelph Central GO	Kitchener 27	Victoria St. @ Frederick St.	Waterloo 27	Wilfrid Laurier University	Waterloo 27	University of Waterloo
17	17030	05 00	05 03	05 14	05 47	05 57	06 12	06 43	07 00	07 20	17	17071	05 55	06 09	06 22	06 53	07 09	07 19	07 55	08 08	08 20														
17	17060	05 55	05 58	06 09	06 44	06 54	07 11	07 43	08 00	08 20	17	17131	06 55	07 12	07 27	07 58	08 14	08 24	09 00	09 13	09 25														
17	17120	06 50	06 53	07 05	07 41	07 51	08 11	08 43	09 00	09 20	17	17191	08 00	08 17	08 32	09 03	09 19	09 29	10 05	10 18	10 30														
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29

Route number
Numéro du trajet

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Guelph/ Mississauga



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29



Kipling Bus Terminal



Renforth Transitway



Dixie Transitway



Square One GO



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Transitway Station



Winston Churchill
Transitway Station



Regional Rd.25 @
Hwy.401 Park & Ride



Aberfoyle Park & Ride



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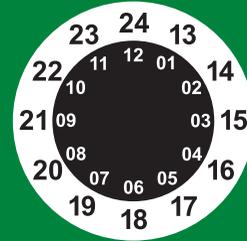
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Schedule times shown in 24-hour clock

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



Legend

 Bus trips



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Notes

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Comment lire nos horaires

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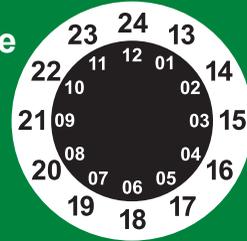
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Indications selon un système horaire de 24 heures

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De midi à minuit:
12 01 - 24 00



Légende

 Horaire des autobus



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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												WESTBOUND / EN DIRECTION OUEST												
Route Number Numéro du trajet	Zone→	Guelph 39		University of Guelph		Brook Rd. @ McLean Rd. (Aberfoyle)		Regional Rd. 25 @ Hwy. 401		Winston Churchill Transitway Station		Erin Mills Transitway Station		Square One		Dixie Transitway Station		Renforth Transitway Station		Kipling Bus Terminal				
Trip Number Numéro du parcours		Dp	39	Dp	39	Dp	39	Dp	39	Dp	39	Dp	39	Dp	39	Dp	39	Dp	39	Dp	39	Ar		
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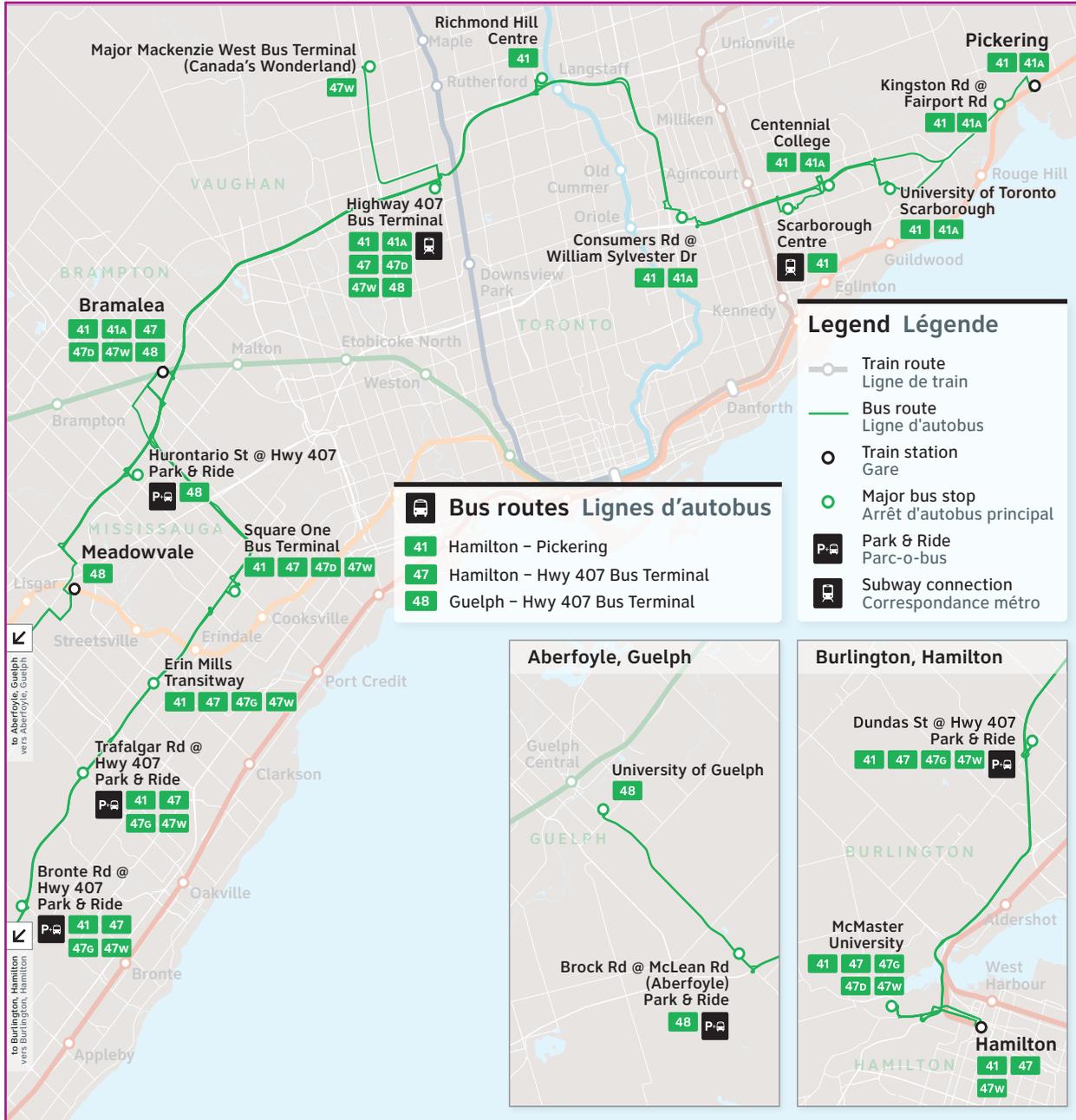
Saturday and Sunday
Samedi et dimanche

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

41-47-48

Route number
Numéro du trajet

Hamilton/Pickering



CONTACT US

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

gotransit.com/schedules

@GOtransitBus

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

prestocard.ca

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

Hamilton/ Pickering



GO Bus Schedule/
Horaire des autobus GO



41 47 48

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

Daily / Quotidiennement

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

Effective / À partir de:

6 MAY
MAI 2023



How to read our schedules

Step 1

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

Step 2

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

Step 3

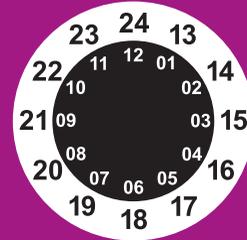
Look across the rows for available departure times.

Step 4

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

Schedule times shown in 24-hour clock

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



Legend

 Bus trips

→ Trip does not serve this location.



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



Parking available.

Bicycles

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

2

Notes

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

Comment lire nos horaires

Étape 1

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

Étape 2

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

Étape 3

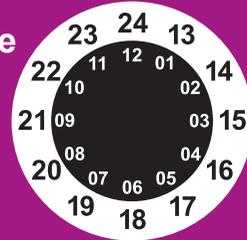
Regardez dans les rangées pour obtenir les heures de départ offertes.

Étape 4

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

Indications selon un système horaire de 24 heures

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



Légende

 Horaire des autobus

→ Trajet ne sert pas cette station.



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



Stationnement disponible.

Vélos

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

3

Notes

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

		Monday to Friday (except holidays) Du lundi au vendredi (sauf les jours fériés)																							
		EASTBOUND / EN DIRECTION EST																							
Route Number Numéro du trajet	Zone →	Guelph 39 University of Guelph	Dp Puslinch 39 Brock Rd. @ McLean Rd. (Aberfoyle)	Hamilton 18	Hamilton 18	Burlington 16	Oakville 14	Oakville 13	Mississauga 22	Mississauga 22	Mississauga 21	Mississauga 20	Brampton 32	Vaughan 19	A	Dp	Richmond Hill 60	North York 5	Scarborough 7	Scarborough 89	Scarborough 89	Pickering 91	Pickering 91	A	
		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	Meadowdale GO	Huronario St. @ Hwy. 407	Erim Mills Transitway Station	Square One	Bramalea GO	Hwy. 407 Bus Terminal	Hwy. 407 Bus Terminal	Richmond Hill Centre	North York Consumers Rd. Business Park	Scarborough Centre Bus Terminal	Centennial College	University of Toronto Scarborough	Kingston Rd. @ Fairport Rd.	Pickering GO	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	41044								05 50	06 04	→	→	06 15	06 35	06 55	07 05	07 25	07 40	07 47	08 02	08 13	08 20			
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 50	08 10	08 30	08 35	08 45	09 05	09 20	09 27	09 42	09 53	10 00			
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	08 10	08 30	08 50	09 05	09 25	09 40	09 50	09 57	10 12	10 23	10 30			
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 25	08 45	09 05	09 15	09 35	09 50	09 57	10 12	10 23	10 30				
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 40	09 00	09 20	09 35	09 50	09 57	10 12	10 23	10 30					
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	09 15	09 35	09 50	09 57	10 12	10 23	10 30							
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 45	09 65	10 05	10 15	10 35	10 50	10 57	11 07	11 18	11 25				
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	10 10	10 30	10 50	11 10	11 30	11 50	12 10	12 30	12 50	13 10	13 30			
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 35	10 55	11 15	11 35	11 55	12 15	12 35	12 55	13 15	13 35	13 55			
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 60	10 80	11 00	11 15	11 30	11 45	11 55	12 05	12 15	12 25	12 35	12 45	12 55	
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 35	11 55	12 15	12 35	12 55	13 15	13 35	13 55	14 15	14 35	14 55			
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 65	11 85	12 05	12 25	12 45	12 65	12 85	13 05	13 25	13 45	13 65			
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 35	12 55	13 15	13 35	13 55	14 15	14 35	14 55	15 15	15 35	15 55			
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	13 10	13 30	13 50	14 10	14 30	14 50	15 10	15 30	15 50	16 10	16 30			
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	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→

		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 University of Guelph	Dp Puslinch 39 Brock Rd. @ McLean Rd. (Aberfoyle)	Hamilton 18	Hamilton 18	Burlington 16	Oakville 14	Oakville 13	Mississauga 22	Mississauga 22	Mississauga 21	Mississauga 20	Brampton 32	Vaughan 19	A	Dp	Richmond Hill 60	North York 5	Scarborough 7	Scarborough 89	Scarborough 89	Pickering 91	Pickering 91	A	
		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	Meadowdale GO	Huronario St. @ Hwy. 407	Erim Mills Transitway Station	Square One	Bramalea GO	Hwy. 407 Bus Terminal	Hwy. 407 Bus Terminal	Richmond Hill Centre	North York Consumers Rd. Business Park	Scarborough Centre Bus Terminal	Centennial College	University of Toronto Scarborough	Kingston Rd. @ Fairport Rd.	Pickering GO	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													

**Saturday and Sunday
Samedi et dimanche**

EASTBOUND / EN DIRECTION EST

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

**Saturday and Sunday
Samedi et dimanche**

WESTBOUND / EN DIRECTION OUEST

Route Number Numéro du trajet	Zone→ Trips Number Numéro du parcours	19		32		20		21		13		14		16		18		18		Ar
		Vaughan Major Mackenzie W. Terminal	Dp	Vaughan 19	Hwy. 407 Bus Terminal	Bramalea GO	Mississauga 20	Mississauga 21	Erin Mills Transitway Station	Oakville 13	Trafalgar Rd. @ Hwy. 407	Oakville 14	Bronte Rd. @ Hwy. 407	Burlington 16	Dundas St. @ Hwy. 407	Hamilton 18	McMaster University	Hamilton 18	Hamilton GO Centre	
47	47111			06 40	06 55	07 20	07 28	07 35	07 43	07 51	08 10	08 25								
47	47141			07 10	07 25	07 50	07 58	08 05	08 13	08 21	08 40	08 55								
47	47201			08 10	08 25	08 50	08 58	09 05	09 13	09 21	09 40	09 55								
47W	47231	08 25		08 40	08 55	09 20	09 28	09 35	09 43	09 51	10 10	10 25								
47	47251			09 10	09 25	09 50	09 58	10 05	10 13	10 21	10 40	10 55								
47W	47271	09 25		09 40	09 55	10 20	10 28	10 35	10 43	10 51	11 10	11 25								
47	47291			10 10	10 25	10 50	10 58	11 05	11 13	11 21	11 40	11 55								
47W	47311	10 25		10 40	10 55	11 20	11 28	11 35	11 43	11 53	12 15	12 30								
47	47331			11 10	11 25	11 50	11 58	12 05	12 13	12 23	12 45	13 00								
47W	47351	11 25		11 40	11 55	12 20	12 28	12 35	12 43	12 53	13 15	13 30								
47	47371			12 10	12 25	12 50	13 03	13 10	13 18	13 28	13 50	14 05								
47W	47391	12 25		12 40	12 55	13 20	13 33	13 40	13 48	13 58	14 20	14 35								
47	47411			13 10	13 25	13 50	14 03	14 10	14 18	14 28	14 50	15 05								
47W	47431	13 25		13 40	13 55	14 20	14 33	14 40	14 48	14 58	15 20	15 35								
47	47451			14 10	14 25	14 50	15 03	15 10	15 18	15 28	15 50	16 05								
47W	47471	14 25		14 40	14 55	15 20	15 33	15 40	15 48	15 58	16 20	16 35								
47	47491			15 10	15 25	15 50	16 03	16 10	16 18	16 28	16 50	17 05								
47W	47521	15 25		15 40	15 55	16 20	16 33	16 40	16 48	16 58	17 20	17 35								
47	47551			16 10	16 25	16 50	17 03	17 12	17 20	17 30	17 55	18 10								
47W	47581	16 25		16 40	16 55	17 20	17 33	17 42	17 50	18 00	18 25	18 40								
47	47611			17 10	17 25	17 50	18 03	18 12	18 20	18 30	18 55	19 10								
47W	47641	17 25		17 40	17 55	18 20	18 33	18 42	18 50	19 00	19 25	19 40								
47	47671			18 10	18 25	18 50	19 03	19 12	19 20	19 30	19 55	20 10								
47W	47691	18 25		18 40	18 55	19 20	19 33	19 42	19 50	20 00	20 25	20 40								
47	47711			19 10	19 25	19 50	20 03	20 12	20 20	20 30	20 55	21 10								
47W	47731	19 25		19 40	19 55	20 20	20 33	20 42	20 50	21 00	21 25	21 40								
47	47751			20 10	20 25	20 50	20 63	21 02	21 10	21 20	21 45	22 00								
47W	47781	20 25		20 40	20 55	21 20	21 33	21 42	21 50	22 00	22 25	22 40								
47	47791			21 10	21 25	21 50	21 63	22 02	22 10	22 20	22 45	23 00								
47W	47811	21 25		21 40	21 55	22 20	22 33	22 42	22 50	23 00	23 25	23 40								
47	47831			22 10	22 25	22 50	23 03	23 12	23 20	23 30	23 55	24 10								
47W	47841	22 25		22 40	22 55	23 20	23 33	23 42	23 50	24 00	24 25	24 40								
47	47851			23 10	23 25	23 50	24 03	24 12	24 20	24 30	24 55	25 10								
47	47881			00 10	00 25	00 50	01 03	01 12	01 20	01 30	01 55	02 10								
47	47911			01 10	01 25	01 50	02 03	02 12	02 20	02 30	02 55	03 10								

Appendix D

Traffic Data

Turning Movement Counts



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

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



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

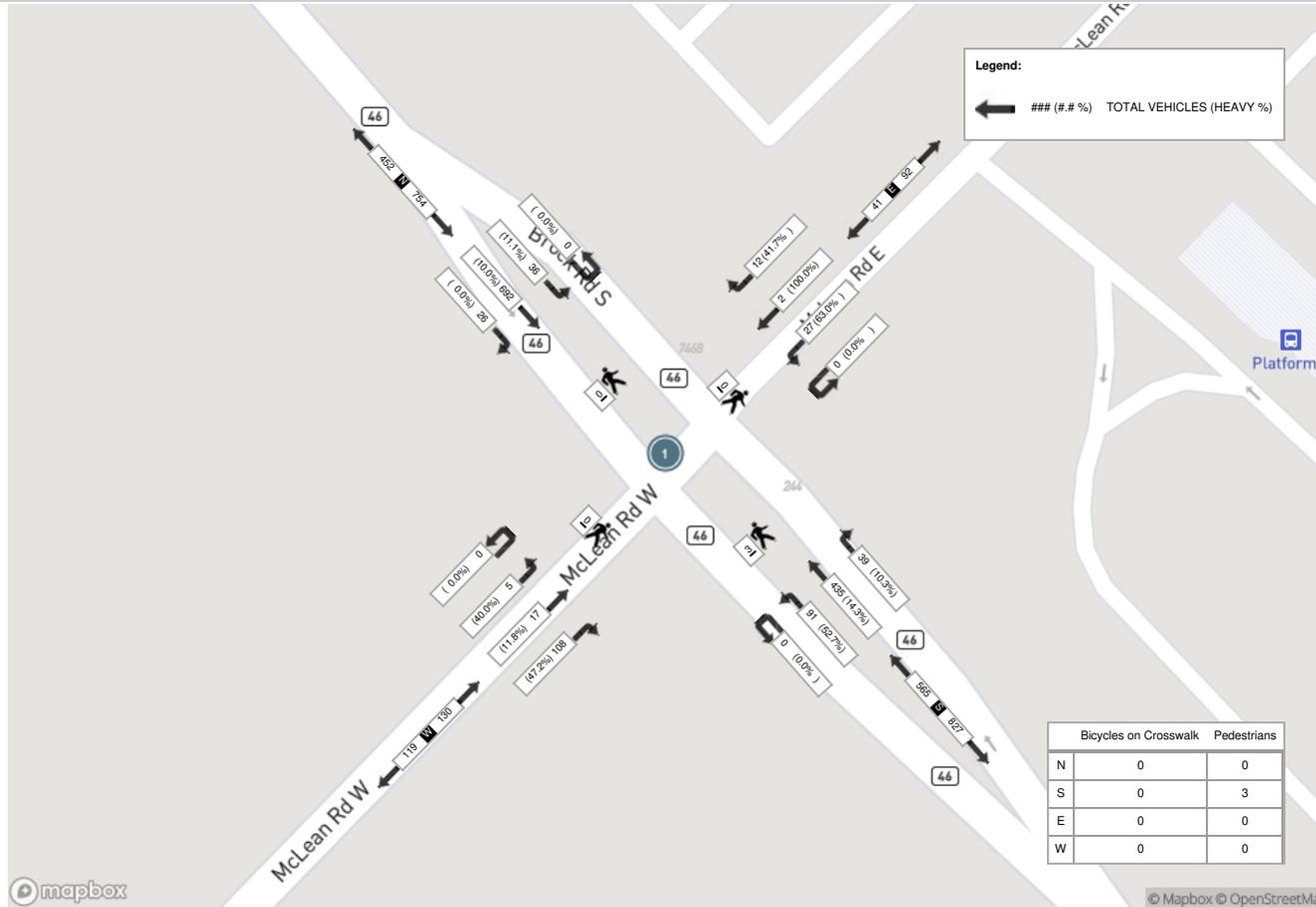
Start Time	N Approach BROCK RD S (WELLINGTON RD 46)						E Approach MCLEAN RD W						S Approach BROCK RD S (WELLINGTON RD 46)						W Approach MCLEAN RD W						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total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



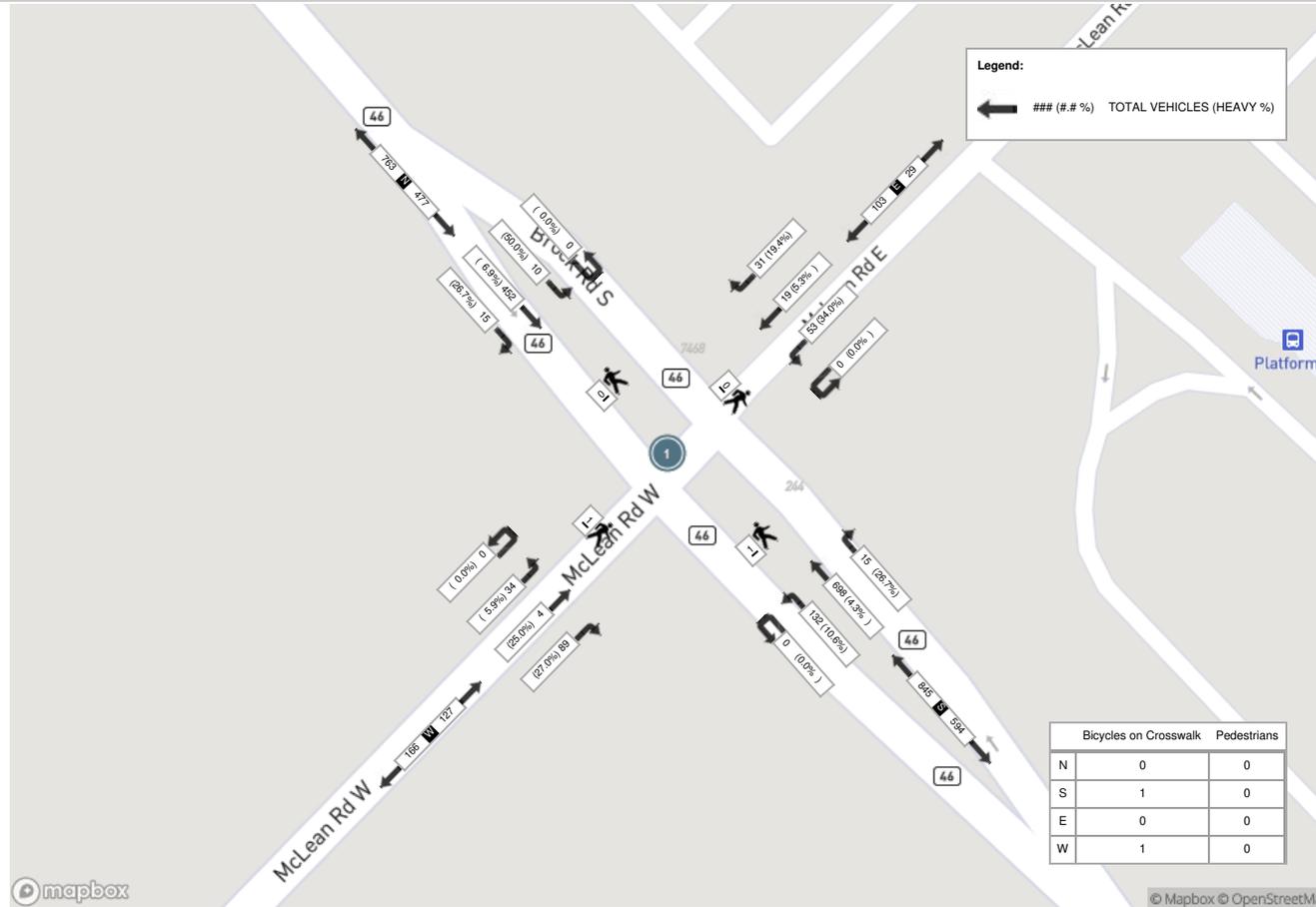
Peak Hour: 04:15 PM - 05:15 PM Weather: Light Rain (4.44 °C)

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

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



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





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

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



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

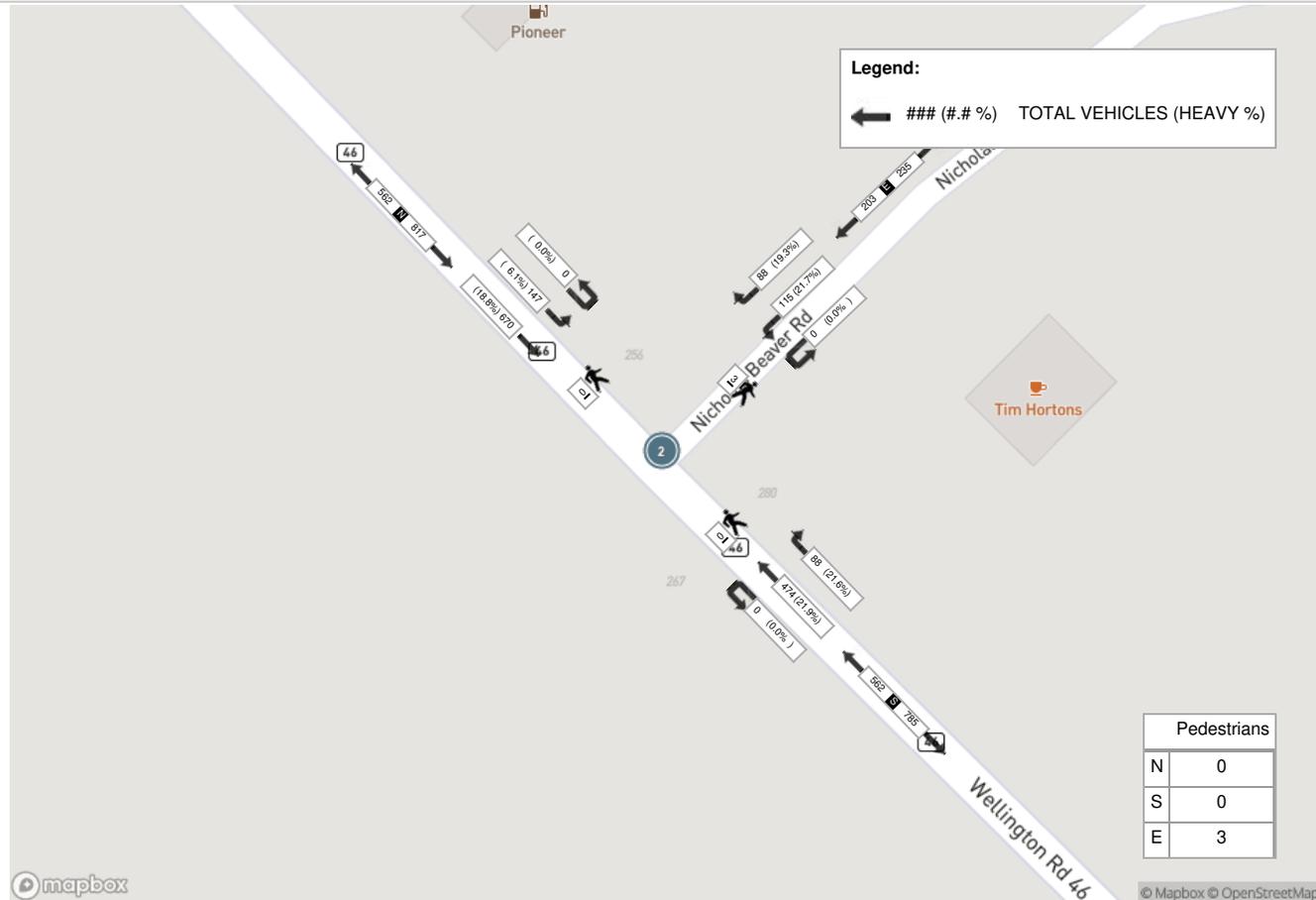
Start Time	N Approach BROCK RD S (WELLINGTON RD 46)					E Approach NICHOLAS BEAVER RD					S Approach BROCK RD S (WELLINGTON RD 46)				Int. Total (15 min)	
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds		Approach Total
07:30:00	162	37	0	0	199	26	20	0	1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



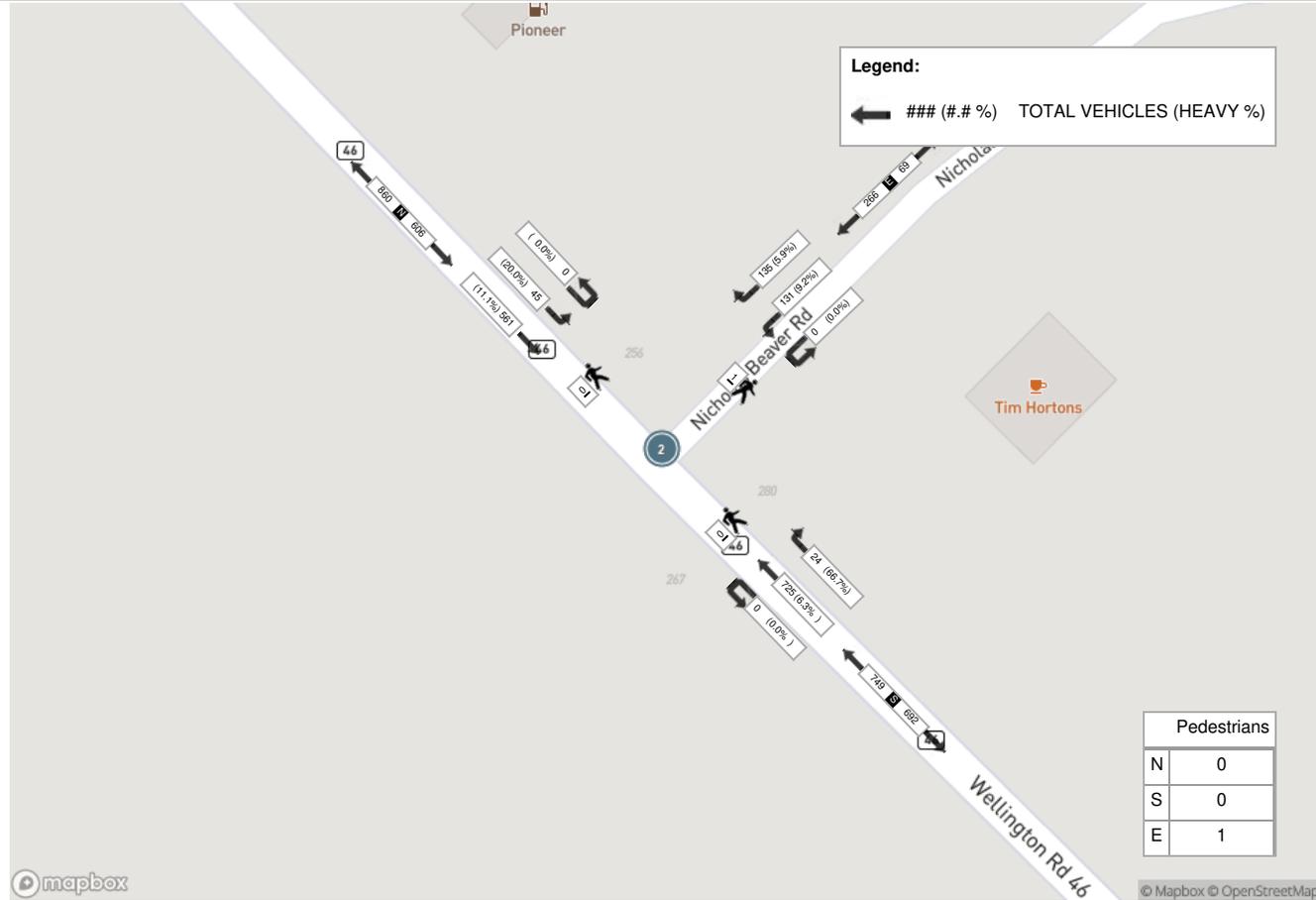
Peak Hour: 04:15 PM - 05:15 PM Weather: Light Rain (4.44 °C)

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

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



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



Signal Timing Plans

Configuration

```

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

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

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

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

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

Configuration Continued

Event Enabling

Alarm Enabling

```

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

```

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

MMU Compatibility Program (Info Only)

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

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

Ped Carryover

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

Power Start, Remote Flash

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

Initialization Interval:

Power Start Yellow
 External Start Yellow

Power Start All Red Time 0
 Power Start Flash Time 0

Remote Flash Options:

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

Option Data

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

Enable Programmable Options

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

Five Section Left Turn Control

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

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

Detector Type/Timers

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

Detector Names

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

Detector Type/Timers

```

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

```

Detector Names

```

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

```


Ped/SD Local Assign,Log Interval

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

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

Detector Log Interval . . 0

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

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

Diagnostic Plans/Fail Action

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

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

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

Diagnostic Plans/Fail Action

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

Plan		Detector															
		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 Time from By-Phase Timing Data

Detector Diagnostic Intervals

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

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

Speed Detectors

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

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

Units. Inches

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

Coordinator Manual Command and Options

```

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

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

```

```

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

```

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

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

Free Alternate Sequence . .	A	B	C	D	E	F
	

Coordination Patterns

NIC/TOD Clock/Calendar

Manual NIC Program Step 0

Manual TOD Program Step 0

NIC Resync Time 0000

Sync Reference is Reference Time

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

Disable Daylight Savings Time NO

Daylight Savings
Begins Last Sunday in March NO If NO, then Second Sunday as per 2007 DST Law

TOD Weekly/Yearly

	Weekly Program Numbers										
	1	2	3	4	5	6	7	8	9	10	
Sunday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Monday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Tuesday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Wednesday . .	1	1	1	1	1	1	1	1	1	1	Program No.
Thursday . .	1	1	1	1	1	1	1	1	1	1	Program No.
Friday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Saturday . .	1	1	1	1	1	1	1	1	1	1	Program No.

	Week of Year																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Prog	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Prog	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Prog	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	

Holiday Programs

Holiday	Type	Month	Day of Week/ Day of Month	Week of Year/ Year	Program
1	Fixed	0	0	0	0
2	Fixed	0	0	0	0
3	Fixed	0	0	0	0
4	Fixed	0	0	0	0
5	Fixed	0	0	0	0
6	Fixed	0	0	0	0
7	Fixed	0	0	0	0
8	Fixed	0	0	0	0
9	Fixed	0	0	0	0
10	Fixed	0	0	0	0
11	Fixed	0	0	0	0
12	Fixed	0	0	0	0
13	Fixed	0	0	0	0
14	Fixed	0	0	0	0
15	Fixed	0	0	0	0
16	Fixed	0	0	0	0
17	Fixed	0	0	0	0
18	Fixed	0	0	0	0
19	Fixed	0	0	0	0
20	Fixed	0	0	0	0
21	Fixed	0	0	0	0
22	Fixed	0	0	0	0
23	Fixed	0	0	0	0
24	Fixed	0	0	0	0
25	Fixed	0	0	0	0
26	Fixed	0	0	0	0
27	Fixed	0	0	0	0
28	Fixed	0	0	0	0
29	Fixed	0	0	0	0
30	Fixed	0	0	0	0
31	Fixed	0	0	0	0
32	Fixed	0	0	0	0
33	Fixed	0	0	0	0
34	Fixed	0	0	0	0
35	Fixed	0	0	0	0
36	Fixed	0	0	0	0

NIC Program Steps

Step	Program	Step Begins	Pattern	Override
------	---------	-------------	---------	----------

TOD Program Steps

Configuration

```

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

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

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

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

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

Configuration Continued

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

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

MMU Compatibility Program (Info Only)

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

Version Info:

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

Ped Carryover

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

Power Start, Remote Flash

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

Initialization Interval:

Power Start Yellow
 External Start Yellow

Power Start All Red Time 0
 Power Start Flash Time 0

Remote Flash Options:

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

Option Data

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

Enable Programmable Options

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

Five Section Left Turn Control

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

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

Detector Type/Timers

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

Detector Names

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

Detector Type/Timers

```

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

```

Detector Names

```

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

```


Ped/SD Local Assign,Log Interval

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

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

Detector Log Interval . . 0

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

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

Diagnostic Plans/Fail Action

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

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

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

Diagnostic Plans/Fail Action

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

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

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

Detector Diagnostic Intervals

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

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

Speed Detectors

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

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

Units. Inches

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

Coordinator Manual Command and Options

```

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

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

```

```

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

```

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

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

Free Alternate Sequence . .	A	B	C	D	E	F
	

Coordination Patterns

NIC/TOD Clock/Calendar

Manual NIC Program Step 0

Manual TOD Program Step 0

NIC Resync Time 0000

Sync Reference is Reference Time

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

Disable Daylight Savings Time NO

Daylight Savings
Begins Last Sunday in March NO If NO, then Second Sunday as per 2007 DST Law

TOD Weekly/Yearly

	Weekly Program Numbers										
	1	2	3	4	5	6	7	8	9	10	
Sunday . . .	2	1	1	1	1	1	1	1	1	1	Program No.
Monday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Tuesday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Wednesday . .	1	1	1	1	1	1	1	1	1	1	Program No.
Thursday . .	1	1	1	1	1	1	1	1	1	1	Program No.
Friday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Saturday . .	2	1	1	1	1	1	1	1	1	1	Program No.

	Week of Year																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Prog	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Prog	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Prog	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	

Holiday Programs

Holiday	Type	Month	Day of Week/ Day of Month	Week of Year/ Year	Program
1	Fixed	0	0	0	0
2	Fixed	0	0	0	0
3	Fixed	0	0	0	0
4	Fixed	0	0	0	0
5	Fixed	0	0	0	0
6	Fixed	0	0	0	0
7	Fixed	0	0	0	0
8	Fixed	0	0	0	0
9	Fixed	0	0	0	0
10	Fixed	0	0	0	0
11	Fixed	0	0	0	0
12	Fixed	0	0	0	0
13	Fixed	0	0	0	0
14	Fixed	0	0	0	0
15	Fixed	0	0	0	0
16	Fixed	0	0	0	0
17	Fixed	0	0	0	0
18	Fixed	0	0	0	0
19	Fixed	0	0	0	0
20	Fixed	0	0	0	0
21	Fixed	0	0	0	0
22	Fixed	0	0	0	0
23	Fixed	0	0	0	0
24	Fixed	0	0	0	0
25	Fixed	0	0	0	0
26	Fixed	0	0	0	0
27	Fixed	0	0	0	0
28	Fixed	0	0	0	0
29	Fixed	0	0	0	0
30	Fixed	0	0	0	0
31	Fixed	0	0	0	0
32	Fixed	0	0	0	0
33	Fixed	0	0	0	0
34	Fixed	0	0	0	0
35	Fixed	0	0	0	0
36	Fixed	0	0	0	0

NIC Program Steps

Step	Program	Step Begins	Pattern	Override
------	---------	-------------	---------	----------

Appendix E

Level of Service Definitions

Level of Service Definitions

Signalized Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Extremely favourable progression with most vehicles arriving during the green phase. Most vehicles do not stop and short cycle lengths may contribute to low delay.
B	> 10 and ≤ 20	VERY GOOD. Very good progression and/or short cycle lengths with slightly more vehicles stopping than LOS "A" causing slightly higher levels of average delay.
C	> 20 and ≤ 35	GOOD. Fair progression and longer cycle lengths lead to a greater number of vehicles stopping than LOS "B".
D	> 35 and ≤ 55	FAIR. Congestion becomes noticeable with higher average delays resulting from a combination of long cycle lengths, high volume-to-capacity ratios and unfavourable progression.
E	> 55 and ≤ 80	POOR. Lengthy delays values are indicative of poor progression, long cycle lengths and high volume-to-capacity ratios. Individual cycle failures are common with individual movement failures also common.
F	> 80	UNSATISFACTORY. Indicative of oversaturated conditions with vehicular demand greater than the capacity of the intersection.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Level of Service Definitions

Two-Way Stop Controlled Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Large and frequent gaps in traffic on the main roadway. Queuing on the minor street is rare.
B	> 10 and ≤ 15	VERY GOOD. Many gaps exist in traffic on the main roadway. Queuing on the minor street is minimal.
C	> 15 and ≤ 25	GOOD. Fewer gaps exist in traffic on the main roadway. Delay on minor approach becomes more noticeable.
D	> 25 and ≤ 35	FAIR. Infrequent and shorter gaps in traffic on the main roadway. Queue lengths develop on the minor street.
E	> 35 and ≤ 50	POOR. Very infrequent gaps in traffic on the main roadway. Queue lengths become noticeable.
F	> 50	UNSATISFACTORY. Very few gaps in traffic on the main roadway. Excessive delay with significant queue lengths on the minor street.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Appendix F

Peak Hour Factor Calculations

Peak Hour Factor Calculation from TMC Reports

Intersection	AM			PM		
	Peak 15 Min	Peak 60 Min	PHF	Peak 15 Min	Peak 60 Min	PHF
Brock Road South at McLean Road	421	1490	0.88	410	1552	0.95
Brock Road South at Nicholas Beaver Road	431	1582	0.92	465	1621	0.87

Appendix G

2023 Existing Synchro and SimTraffic Reports

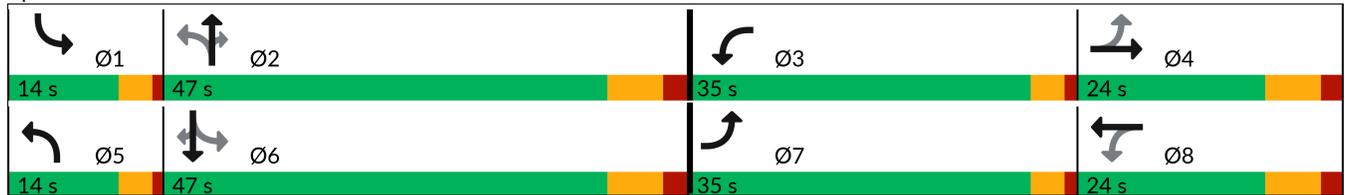


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	6	18	29	3	95	453	41	38	720	28
Future Volume (vph)	6	18	29	3	95	453	41	38	720	28
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2		1	6	
Permitted Phases	4		8		2		2	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

Intersection Summary

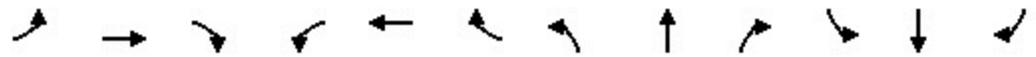
Cycle Length: 120
 Actuated Cycle Length: 92.3
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

2025 Existing AM
 07/24/2025



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 (vphp)	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
Frbp, 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
HCM 2000 Volume to Capacity ratio	0.44	B
Actuated Cycle Length (s)	97.2	Sum of lost time (s)
Intersection Capacity Utilization	75.0%	22.0
Analysis Period (min)	15	ICU Level of Service
		D

c Critical Lane Group

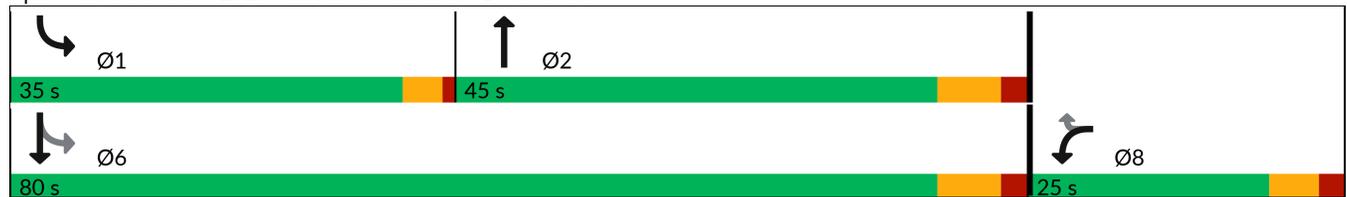


Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations	↶	↷	↕	↷	↕
Traffic Volume (vph)	120	92	494	153	698
Future Volume (vph)	120	92	494	153	698
Turn Type	Prot	Perm	NA	pm+pt	NA
Protected Phases	8		2	1	6
Permitted Phases		8		6	
Detector Phase	8	8	2	1	6
Switch Phase					
Minimum Initial (s)	15.0	15.0	35.0	10.0	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

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.



HCM Signalized Intersection Capacity Analysis
 2: Brock Rd. S. & Nicholas Beaver Rd.

2025 Existing AM
 07/24/2025



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
Frbp, 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

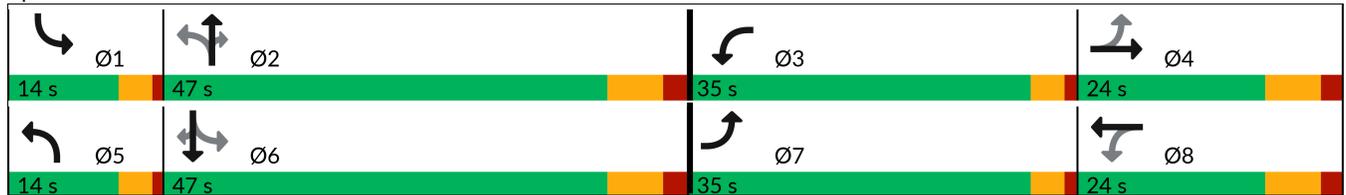


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	36	5	56	20	138	727	16	11	471	16
Future Volume (vph)	36	5	56	20	138	727	16	11	471	16
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2		1	6	
Permitted Phases	4		8		2		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

Intersection Summary

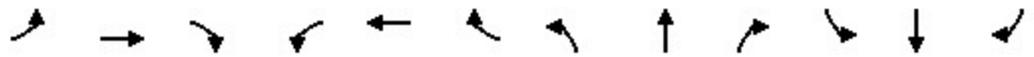
Cycle Length: 120
 Actuated Cycle Length: 92.7
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

2025 Existing PM
 07/24/2025



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 (vphp)	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
Frbp, 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									B
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			99.3							22.0		
Intersection Capacity Utilization			68.5%									C
Analysis Period (min)			15									

c Critical Lane Group

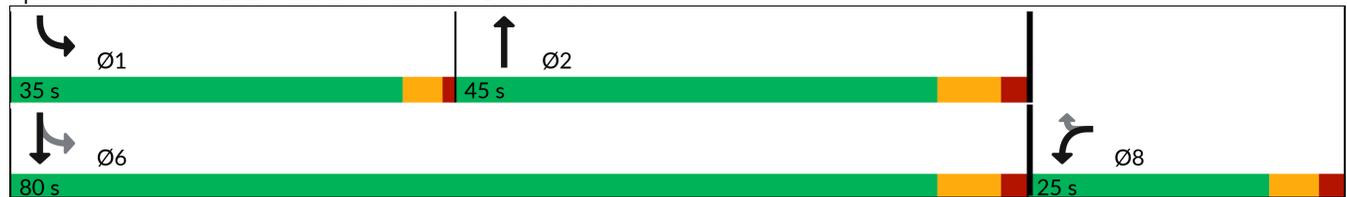


Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations	↵	↶	↕↔	↷	↕↕
Traffic Volume (vph)	137	141	755	47	584
Future Volume (vph)	137	141	755	47	584
Turn Type	Prot	Perm	NA	pm+pt	NA
Protected Phases	8		2	1	6
Permitted Phases		8		6	
Detector Phase	8	8	2	1	6
Switch Phase					
Minimum Initial (s)	15.0	15.0	35.0	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

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.



HCM Signalized Intersection Capacity Analysis
 2: Brock Rd. S. & Nicholas Beaver Rd.

2025 Existing PM
 07/24/2025



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

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	9.6	44.4	31.8	19.0	58.6	40.7	44.9	14.7	30.2	72.7	49.1	10.7
Average Queue (m)	0.8	18.2	9.6	3.0	26.3	16.9	18.6	3.3	7.5	33.2	18.8	2.8
95th Queue (m)	5.2	33.9	23.3	12.0	53.6	33.9	35.9	10.5	20.2	57.0	39.3	8.9
Link Distance (m)		103.4		220.8		433.8	433.8			105.8	105.8	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)		0								0	0	
Queuing Penalty (veh)		0								0	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	62.0	57.0	47.0	39.3	34.8	64.0	62.2
Average Queue (m)	28.3	14.2	22.6	13.3	18.2	22.9	27.1
95th Queue (m)	52.2	35.9	41.8	28.8	33.2	51.7	52.4
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1	0			7	4	
Queuing Penalty (veh)	1	0			26	6	

Network Summary

Network wide Queuing Penalty: 32

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	20.5	39.5	33.1	24.6	48.0	57.2	55.1	13.7	21.6	51.2	36.2	14.9
Average Queue (m)	6.3	11.7	11.6	7.7	21.6	24.3	26.1	1.6	3.3	24.7	11.5	1.8
95th Queue (m)	15.4	25.9	27.0	18.3	41.8	47.3	47.0	7.6	14.3	43.5	28.3	8.5
Link Distance (m)		103.4		220.8		433.8	433.8			105.8	105.8	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)		0					0			0		
Queuing Penalty (veh)		0					0			0		

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	54.8	43.8	52.1	43.5	30.8	46.1	44.1
Average Queue (m)	28.5	14.8	28.1	15.5	9.4	14.5	19.5
95th Queue (m)	49.0	30.6	47.2	34.2	21.5	33.5	38.1
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	0	0			1	2	
Queuing Penalty (veh)	1	0			4	1	

Network Summary

Network wide Queuing Penalty: 6

Appendix H

2026 Future Background Synchro and SimTraffic Reports

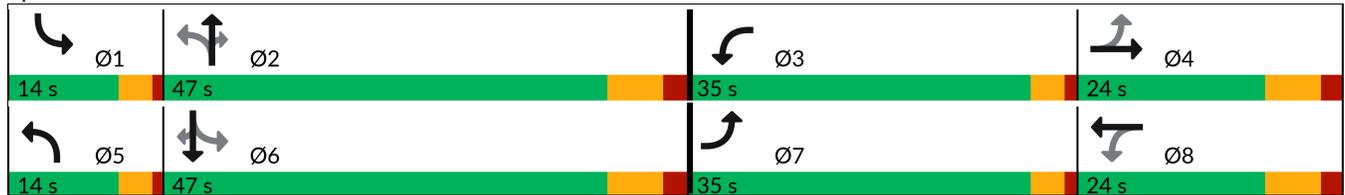


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	12	62	61	10	120	484	160	121	741	71
Future Volume (vph)	12	62	61	10	120	484	160	121	741	71
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2		1	6	
Permitted Phases	4		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

Intersection Summary

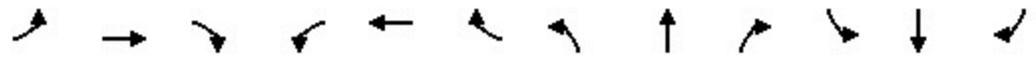
Cycle Length: 120
 Actuated Cycle Length: 97.7
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FB 2026 AM
 07/25/2025



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 (vphp)	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
Frbp, 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									C
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			100.8							22.0		
Intersection Capacity Utilization			75.0%									D
ICU Level of Service												
Analysis Period (min)			15									

c Critical Lane Group

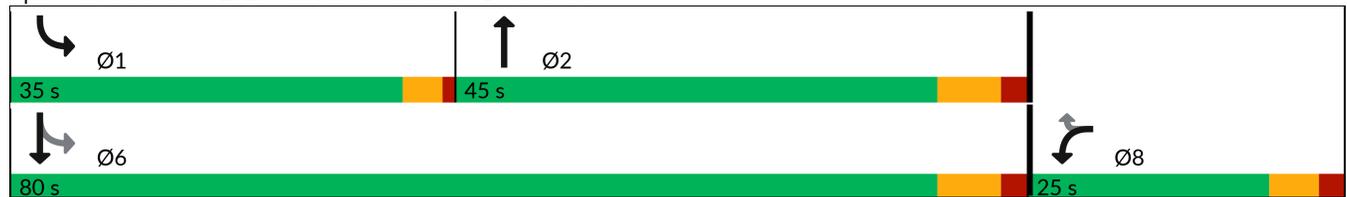


Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations	↩	↪	↕	↩	↕
Traffic Volume (vph)	123	120	641	157	766
Future Volume (vph)	123	120	641	157	766
Turn Type	Prot	Perm	NA	pm+pt	NA
Protected Phases	8		2	1	6
Permitted Phases		8		6	
Detector Phase	8	8	2	1	6
Switch Phase					
Minimum Initial (s)	15.0	15.0	35.0	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

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.



HCM Signalized Intersection Capacity Analysis
 2: Brock Rd. S. & Nicholas Beaver Rd.

FB 2026 AM
 07/25/2025



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 (vphp)	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
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

Intersection Summary

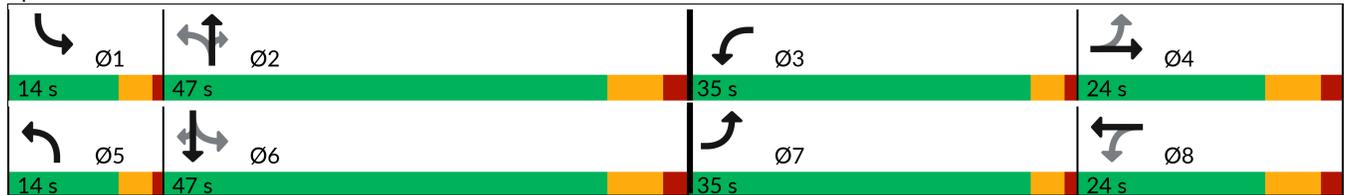
Cycle Length: 120

Actuated Cycle Length: 103.1

Natural Cycle: 90

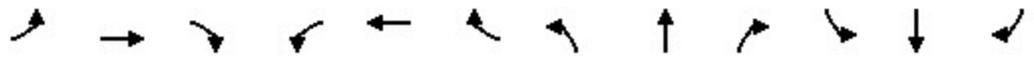
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FB 2026 PM
 07/25/2025



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 (vphp)	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
Frbp, 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

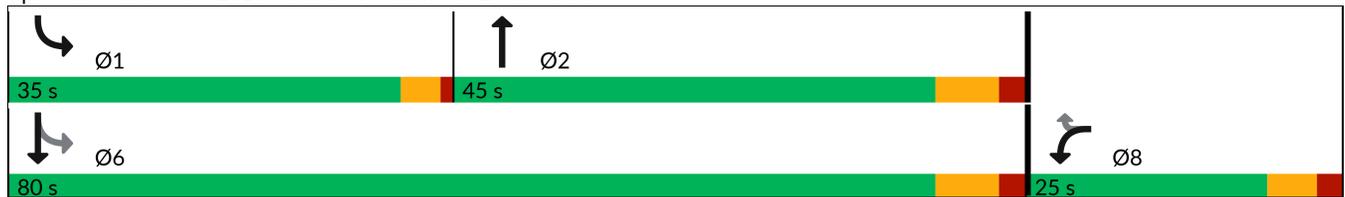


Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	140	155	825	48	596
Future Volume (vph)	140	155	825	48	596
Turn Type	Prot	Perm	NA	pm+pt	NA
Protected Phases	8		2	1	6
Permitted Phases		8		6	
Detector Phase	8	8	2	1	6
Switch Phase					
Minimum Initial (s)	15.0	15.0	35.0	10.0	35.0
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

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.



HCM Signalized Intersection Capacity Analysis
 2: Brock Rd. S. & Nicholas Beaver Rd.

FB 2026 PM
 07/25/2025



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	140	155	825	26	48	596
Future Volume (vph)	140	155	825	26	48	596
Ideal Flow (vphp)	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	685
RTOR Reduction (vph)	0	149	1	0	0	0
Lane Group Flow (vph)	161	29	977	0	55	685
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	c0.21
v/s Ratio Perm		0.02			0.10	
v/c Ratio	0.60	0.12	0.49		0.16	0.30
Uniform Delay, d1	40.7	37.5	11.9		5.5	5.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.5	0.4	0.9		0.4	0.3
Delay (s)	46.2	37.9	12.8		5.9	5.8
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	41.9		12.8			5.8
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
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

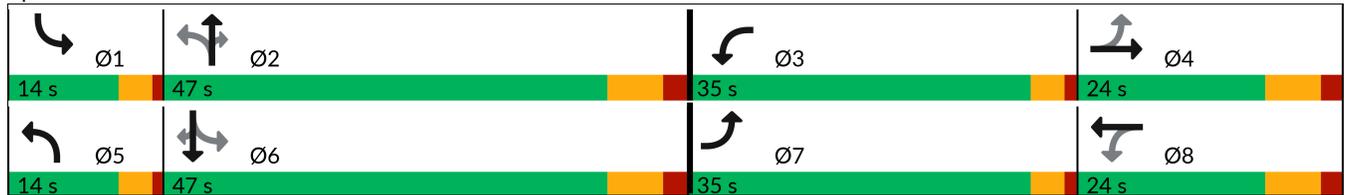


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	12	64	64	10	130	532	165	125	817	74
Future Volume (vph)	12	64	64	10	130	532	165	125	817	74
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2		1	6	
Permitted Phases	4		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

Intersection Summary

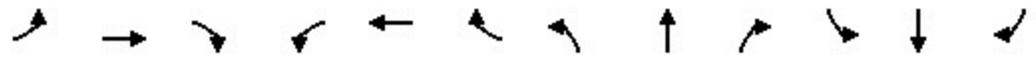
Cycle Length: 120
 Actuated Cycle Length: 98.7
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FB 2031 AM
 07/25/2025



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 (vphp)	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
Frbp, 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									C
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			101.9							22.0		
Intersection Capacity Utilization			75.5%									D
ICU Level of Service												
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
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

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.



HCM Signalized Intersection Capacity Analysis
 2: Brock Rd. S. & Nicholas Beaver Rd.

FB 2031 AM
 07/25/2025



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 (vphp)	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
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

Intersection Summary

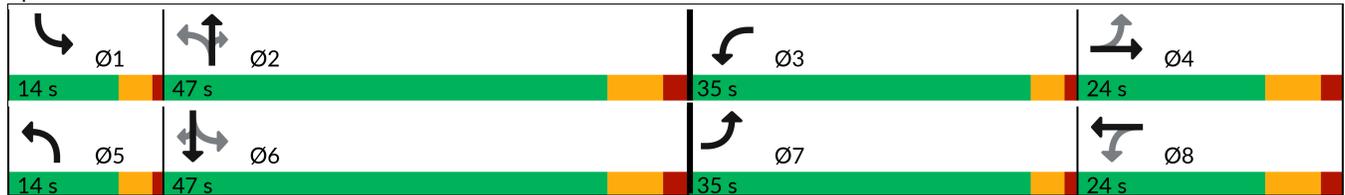
Cycle Length: 120

Actuated Cycle Length: 103.7

Natural Cycle: 90

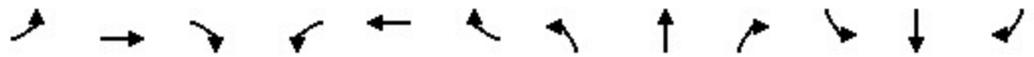
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FB 2031 PM
 07/25/2025



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 (vphp)	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
Frbp, 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	658
Future Volume (vph)	155	170	905	53	658
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

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.



HCM Signalized Intersection Capacity Analysis
 2: Brock Rd. S. & Nicholas Beaver Rd.

FB 2031 PM
 07/25/2025



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	170	905	29	53	658
Future Volume (vph)	155	170	905	29	53	658
Ideal Flow (vphp)	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	756
RTOR Reduction (vph)	0	163	1	0	0	0
Lane Group Flow (vph)	178	32	1072	0	61	756
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	c0.23
v/s Ratio Perm		0.02			0.12	
v/c Ratio	0.65	0.13	0.54		0.19	0.33
Uniform Delay, d1	40.9	37.3	12.6		6.1	5.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	7.3	0.5	1.1		0.6	0.4
Delay (s)	48.2	37.8	13.7		6.7	6.1
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	42.7		13.7			6.1
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
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

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	16.8	69.0	43.1	30.6	101.7	53.9	55.1	32.2	46.2	73.6	64.9	16.5
Average Queue (m)	2.9	30.9	16.1	9.2	43.8	23.4	25.0	11.1	21.3	40.7	28.7	5.2
95th Queue (m)	11.1	58.4	35.1	23.0	87.0	44.2	47.6	23.1	39.4	64.4	54.5	12.3
Link Distance (m)		103.4		220.8		433.8	433.8			105.8	105.8	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)		2			0				0	1	0	
Queuing Penalty (veh)		0			1				0	1	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	63.5	33.5	65.0	53.9	34.8	71.9	66.6
Average Queue (m)	28.3	15.5	27.4	20.7	19.5	25.0	29.7
95th Queue (m)	52.2	27.7	51.6	42.3	35.1	55.9	58.3
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1				10	5	
Queuing Penalty (veh)	1				37	8	

Network Summary

Network wide Queuing Penalty: 48

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	30.9	61.9	67.2	65.7	70.5	68.9	78.1	21.4	36.6	59.4	47.7	21.7
Average Queue (m)	11.7	21.2	27.6	27.7	29.6	32.8	35.7	6.5	12.4	30.7	19.6	5.4
95th Queue (m)	23.8	44.8	52.0	52.4	56.1	57.3	61.6	16.6	28.8	50.6	39.8	16.4
Link Distance (m)		103.4		220.8		433.8	433.8			105.8	105.8	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)		1	1	1			1			0	0	
Queuing Penalty (veh)		1	2	2			0			0	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	52.3	46.3	45.2	45.3	29.6	45.8	53.8
Average Queue (m)	27.4	16.0	24.5	16.5	9.7	15.5	20.6
95th Queue (m)	46.5	30.2	41.2	35.4	23.1	35.2	43.6
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	0	0			3	3	
Queuing Penalty (veh)	0	0			7	1	

Network Summary

Network wide Queuing Penalty: 13

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	20.4	84.0	41.1	45.3	143.3	233.7	228.0	24.6	62.9	83.1	70.5	32.8
Average Queue (m)	3.6	33.7	14.8	10.6	89.4	84.9	79.4	11.3	23.8	47.5	32.8	6.4
95th Queue (m)	13.4	65.6	33.0	28.1	167.8	262.9	246.7	21.3	46.4	74.0	59.1	21.2
Link Distance (m)		103.4		220.8		433.8	433.8			105.8	105.8	
Upstream Blk Time (%)										0	0	0
Queuing Penalty (veh)										0	0	0
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)		3		0	23	5	0		1	2	0	
Queuing Penalty (veh)		0		0	61	6	0		5	2	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	66.2	54.3	58.3	57.6	34.9	81.0	72.7
Average Queue (m)	29.8	18.3	27.6	23.2	24.1	34.1	34.0
95th Queue (m)	54.1	37.4	50.2	46.7	39.8	70.7	64.2
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1				20	6	
Queuing Penalty (veh)	1				85	11	

Network Summary

Network wide Queuing Penalty: 172

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	29.0	62.4	67.3	72.6	78.3	75.0	78.6	25.3	40.8	68.3	53.7	18.3
Average Queue (m)	12.1	20.4	29.1	27.4	37.7	36.3	39.5	6.6	13.5	35.5	23.8	4.0
95th Queue (m)	23.1	44.0	55.7	56.6	68.3	62.7	66.2	17.8	31.2	59.1	45.8	13.2
Link Distance (m)		103.4		220.8		433.8	433.8			105.8	105.8	
Upstream Blk Time (%)		0										
Queuing Penalty (veh)		0										
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)		1	1	1			1			0	0	
Queuing Penalty (veh)		1	2	2			1			0	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	59.1	56.1	60.8	57.2	33.2	50.5	54.4
Average Queue (m)	28.2	20.0	30.8	20.8	11.5	16.1	21.8
95th Queue (m)	49.5	39.6	51.3	43.6	25.1	38.8	45.7
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1	0			3	3	
Queuing Penalty (veh)	1	0			11	2	

Network Summary

Network wide Queuing Penalty: 19

Appendix I

ITE Trip Generation Manual Excerpts

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	934								
Land Use	Fast-Food Restaurant with Drive-Through Window								
Setting	General Urban/Suburban								
Time Period	Weekday PM Peak Period								
# Data Sites	11								
Average Pass-By Rate	55%								
	Pass-By Characteristics for Individual Sites								
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 PM Peak Period								
# Data Sites	17								
Average Pass-By Rate	57%								
Pass-By Characteristics for Individual Sites									
Vehicle Fueling Positions	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
					Primary (%)	Diverted (%)	Total (%)		
6	Maryland	1992	18	61	6	33	39	2510	25
6	Maryland	1992	26	58	11	31	42	1020	25
8	Maryland	1992	47	62	23	15	38	2635	25
8	Kentucky	1993	83	52	8	40	48	4965	2
8	Kentucky	1993	60	53	20	27	47	1491	2
8	Kentucky	1993	—	72	7	21	28	2657	2
8	Maryland	1992	36	67	14	19	33	3095	25
8	Maryland	1992	46	46	11	43	54	3770	25
8	Maryland	1992	35	54	3	43	46	7080	25
10	Kentucky	1993	—	57	19	24	43	1812	2
10	Kentucky	1993	—	55	16	29	45	2657	2
12	Maryland	1992	52	38	10	52	62	3835	25
12	Pennsylvania	2009	—	66	—	—	34	—	19
12	Pennsylvania	2009	—	51	—	—	49	—	19
12	Pennsylvania	2009	—	40	—	—	60	—	19
12	Pennsylvania	2009	—	61	—	—	39	—	19
12	New Jersey	2009	—	73	—	—	27	—	19

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	944								
Land Use	Gasoline/Service Station								
Setting	General Urban/Suburban								
Time Period	Saturday Midday								
# Data Sites	5								
Average Pass-By Rate	49%								
	Pass-By Characteristics for Individual Sites								
		Survey		Pass-By	Non-Pass-By Trips			Adj Street Peak	
Vehicle Fueling Positions	State or Province	Year	# Interviews	Trip (%)	Primary (%)	Diverted (%)	Total (%)	Hour Volume	Source
12	Pennsylvania	2009	—	60	—	—	40	—	19
12	Pennsylvania	2009	—	30	—	—	70	—	19
12	Pennsylvania	2009	—	55	—	—	45	—	19
12	Pennsylvania	2009	—	37	—	—	63	—	19
12	New Jersey	2009	—	65	—	—	35	—	19

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	945									
Land Use	Convenience Store/Gas Station									
Setting	General Urban/Suburban									
Time Period	Weekday AM Peak Period									
# Data Sites	16 Sites with between 2 and 8 VFP					28 Sites with between 9 and 20 VFP				
Average Pass-By Rate	60% for Sites with between 2 and 8 VFP					76% for Sites with between 9 and 20 VFP				
Pass-By Characteristics for Individual Sites										
GFA (000)	VFP	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
						Primary (%)	Diverted (%)	Total (%)		
2	8	Maryland	1992	46	87	13	0	13	2235	25
2.1	6	Maryland	1992	26	58	23	19	42	2080	25
2.1	6	Maryland	1992	26	58	23	19	42	2080	25
2.2	8	Maryland	1992	31	47	34	19	53	1785	25
2.2	< 8	Indiana	1993	79	56	6	38	44	635	2
2.2	8	Maryland	1992	35	78	9	13	22	7080	25
2.3	6	Maryland	1992	37	32	41	27	68	2080	25
2.3	< 8	Kentucky	1993	58	64	5	31	36	1255	2
2.3	6	Maryland	1992	37	32	41	27	68	2080	25
2.4	< 8	Kentucky	1993	—	48	17	35	52	1210	2
2.6	< 8	Kentucky	1993	—	72	15	13	28	940	2
2.8	< 8	Kentucky	1993	—	54	11	35	46	1240	2
3	< 8	Indiana	1993	62	74	10	16	26	790	2
3.6	< 8	Kentucky	1993	49	67	4	29	33	1985	2
3.7	< 8	Kentucky	1993	49	66	16	18	34	990	2
4.694	12	Maryland	2000	—	72	—	—	28	2440	30
4.694	12	Maryland	2000	—	78	—	—	22	1561	30
4.694	12	Maryland	2000	—	79	—	—	21	2764	30
4.848	12	Virginia	2000	—	55	—	—	45	1398	30
5.06	12	Pennsylvania	2000	—	84	—	—	16	3219	30
5.242	12	Virginia	2000	—	74	—	—	26	1160	30
5.242	12	Virginia	2000	—	71	—	—	29	548	30
5.488	12	Delaware	2000	—	80	—	—	20	—	30
5.5	12	Pennsylvania	2000	—	85	—	—	15	2975	30
4.2	< 8	Kentucky	1993	47	62	19	19	38	1705	2
4.694	16	Maryland	2000	—	90	—	—	10	2278	30
4.694	16	Delaware	2000	—	74	—	—	26	2185	30
4.694	16	Delaware	2000	—	58	—	—	42	962	30
4.694	16	Delaware	2000	—	84	—	—	16	2956	30
4.694	16	New Jersey	2000	—	79	—	—	21	1859	30
4.694	20	Delaware	2000	—	84	—	—	16	3864	30
4.848	16	Virginia	2000	—	68	—	—	32	2106	30
4.848	16	Virginia	2000	—	85	—	—	15	2676	30
4.848	16	Virginia	2000	—	75	—	—	25	3244	30
4.848	16	Virginia	2000	—	71	—	—	29	1663	30
4.993	16	Pennsylvania	2000	—	75	—	—	25	1991	30
5.094	16	New Jersey	2000	—	86	—	—	14	1260	30
5.5	16	Pennsylvania	2000	—	82	—	—	18	1570	30
5.543	16	Pennsylvania	2000	—	84	—	—	16	1933	30
5.565	16	Pennsylvania	2000	—	77	—	—	23	2262	30
5.565	16	Pennsylvania	2000	—	68	—	—	32	2854	30
5.565	16	New Jersey	2000	—	58	—	—	42	1253	30
5.565	16	New Jersey	2000	—	79	—	—	21	1928	30
5.565	16	New Jersey	2000	---	84	---	---	16	1953	30

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	945									
Land Use	Convenience Store/Gas Station									
Setting	General Urban/Suburban									
Time Period	Weekday PM Peak Period									
# Data Sites	12 Sites with between 2 and 8 VFP					28 Sites with between 9 and 20 VFP				
Average Pass-By Rate	56% for Sites with between 2 and 8 VFP					75% for Sites with between 9 and 20 VFP				
Pass-By Characteristics for Individual Sites										
GFA (000)	VFP	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
						Primary (%)	Diverted (%)	Total (%)		
2.1	8	Maryland	1992	31	52	13	35	48	1785	25
2.1	6	Maryland	1992	30	53	20	27	47	1060	25
2.2	< 8	Indiana	1993	115	48	16	36	52	820	2
2.3	< 8	Kentucky	1993	67	57	16	27	43	1954	2
2.3	6	Maryland	1992	55	40	11	49	60	2760	25
2.4	< 8	Kentucky	1993	—	58	13	29	42	2655	2
2.6	< 8	Kentucky	1993	68	67	15	18	33	950	2
2.8	< 8	Kentucky	1993	—	62	11	27	38	2875	2
3	< 8	Indiana	1993	80	65	15	20	35	1165	2
3.6	< 8	Kentucky	1993	60	56	17	27	44	2505	2
3.7	< 8	Kentucky	1993	70	61	16	23	39	2175	2
4.2	< 8	Kentucky	1993	61	58	26	16	42	2300	2
4.694	12	Maryland	2000	—	78	—	—	22	3549	30
4.694	12	Maryland	2000	—	67	—	—	33	2272	30
4.694	12	Maryland	2000	—	66	—	—	34	3514	30
4.848	12	Virginia	2000	—	71	—	—	29	2350	30
5.06	12	Pennsylvania	2000	—	91	—	—	9	4181	30
5.242	12	Virginia	2000	—	70	—	—	30	2445	30
5.242	12	Virginia	2000	—	56	—	—	44	950	30
5.488	12	Delaware	2000	—	73	—	—	27	—	30
5.5	12	Pennsylvania	2000	—	84	—	—	16	4025	30
4.694	16	Maryland	2000	—	89	—	—	11	2755	30
4.694	16	Delaware	2000	—	73	—	—	27	1858	30
4.694	16	Delaware	2000	—	59	—	—	41	1344	30
4.694	16	Delaware	2000	—	72	—	—	28	3434	30
4.694	16	New Jersey	2000	—	81	—	—	19	1734	30
4.694	20	Delaware	2000	—	76	—	—	24	1616	30
4.848	16	Virginia	2000	—	67	—	—	33	2.954	30
4.848	16	Virginia	2000	—	78	—	—	22	3086	30
4.848	16	Virginia	2000	—	83	—	—	17	4143	30
4.848	16	Virginia	2000	—	73	—	—	27	2534	30
4.993	16	Pennsylvania	2000	—	72	—	—	28	2917	30
5.094	16	New Jersey	2000	—	86	—	—	14	1730	30
5.5	16	Pennsylvania	2000	—	90	—	—	10	2616	30
5.543	16	Pennsylvania	2000	—	87	—	—	13	2363	30
5.565	16	Pennsylvania	2000	—	81	—	—	19	2770	30
5.565	16	Pennsylvania	2000	—	76	—	—	24	3362	30
5.565	16	New Jersey	2000	—	61	—	—	39	1713	30
5.565	16	New Jersey	2000	—	86	—	—	14	1721	30
5.565	16	New Jersey	2000	---	81	---	---	19	2227	30

Appendix J

Future Total Synchro and SimTraffic Reports

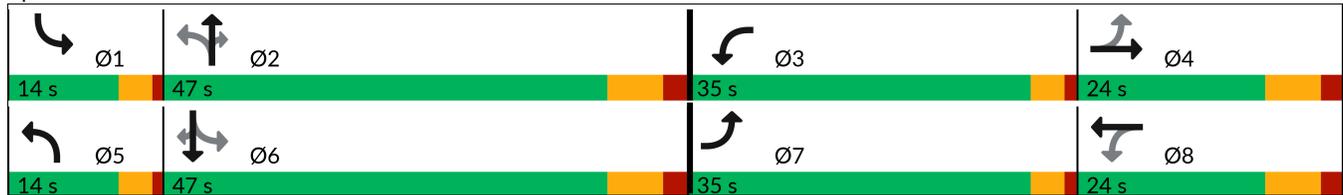


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	67	63	61	12	189	450	160	125	772	71
Future Volume (vph)	67	63	61	12	189	450	160	125	772	71
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2		1	6	
Permitted Phases	4		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

Intersection Summary

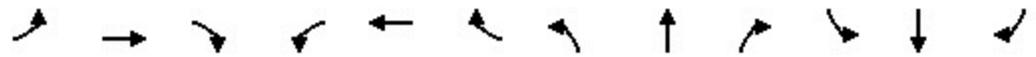
Cycle Length: 120
 Actuated Cycle Length: 98.5
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FT 2026 AM
 07/25/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	63	147	61	12	40	189	450	160	125	772	71
Future Volume (vph)	67	63	147	61	12	40	189	450	160	125	772	71
Ideal Flow (vphp)	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
Frbp, 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	0.89		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	1230		1106	1080		1180	3167	1468	1626	3282	1615
Flt Permitted	0.72	1.00		0.40	1.00		0.21	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)	975	1230		470	1080		262	3167	1468	748	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)	76	72	167	69	14	45	215	511	182	142	877	81
RTOR Reduction (vph)	0	67	0	0	37	0	0	0	107	0	0	48
Lane Group Flow (vph)	76	172	0	69	22	0	215	511	75	142	877	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)	26.7	17.1		27.3	17.4		51.2	41.1	41.1	49.4	40.2	40.2
Effective Green, g (s)	26.7	17.1		27.3	17.4		51.2	41.1	41.1	49.4	40.2	40.2
Actuated g/C Ratio	0.27	0.17		0.27	0.18		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)	292	211		192	189		228	1310	607	453	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	0.04			0.06			c0.39		0.05	0.13		0.02
v/c Ratio	0.26	0.81		0.36	0.12		0.94	0.39	0.12	0.31	0.66	0.05
Uniform Delay, d1	28.2	39.6		28.0	34.5		17.3	20.3	18.0	13.8	24.0	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	1.0	20.9		2.4	0.3		43.7	0.9	0.4	0.4	2.6	0.1
Delay (s)	29.2	60.5		30.4	34.7		61.0	21.2	18.4	14.2	26.6	18.1
Level of Service	C	E		C	C		E	C	B	B	C	B
Approach Delay (s/veh)		52.9			32.4			30.1			24.4	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			30.6									C
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			99.3								22.0	
Intersection Capacity Utilization			78.9%									D
ICU Level of Service												
Analysis Period (min)			15									

c Critical Lane Group

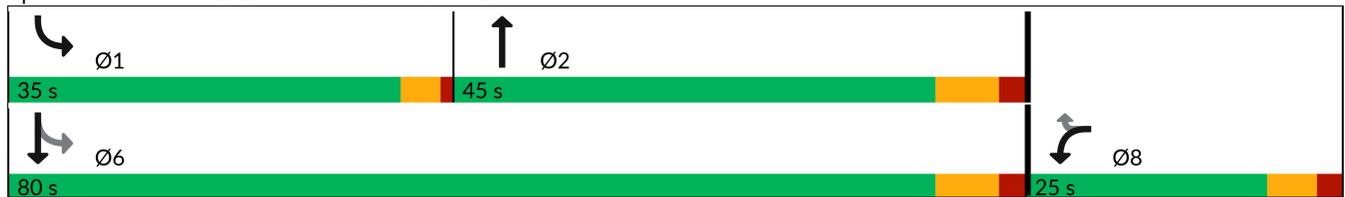


Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations	↵	↶	↕↔	↷	↕↕
Traffic Volume (vph)	123	129	666	168	801
Future Volume (vph)	123	129	666	168	801
Turn Type	Prot	Perm	NA	pm+pt	NA
Protected Phases	8		2	1	6
Permitted Phases		8		6	
Detector Phase	8	8	2	1	6
Switch Phase					
Minimum Initial (s)	15.0	15.0	35.0	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

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.



HCM Signalized Intersection Capacity Analysis
 2: Brock Rd. S. & Nicholas Beaver Rd.

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Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	123	129	666	94	168	801
Future Volume (vph)	123	129	666	94	168	801
Ideal Flow (vphp)	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		499	3034
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	140	724	102	183	871
RTOR Reduction (vph)	0	117	7	0	0	0
Lane Group Flow (vph)	134	23	819	0	183	871
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		484	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	0.50		0.38	0.40
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		1.0	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			6.6
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		65.1%	ICU Level of Service	C
Analysis Period (min)		15		

c Critical Lane Group



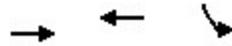
Lane Group	EBR	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	90	554	878
Future Volume (vph)	90	554	878
Sign Control		Free	Free
Intersection Summary			
Control Type: Unsignalized			

HCM Unsignalized Intersection Capacity Analysis
 3: Brock Rd.S. & Site Access

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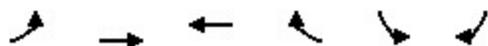
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↓	
Traffic Volume (veh/h)	0	90	0	554	878	89
Future Volume (Veh/h)	0	90	0	554	878	89
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	98	0	602	954	97
Pedestrians						
Lane 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	1304	526	1051			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1114	526	1051			
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	80	100			
cM capacity (veh/h)	182	497	658			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	98	301	301	636	415	
Volume Left	0	0	0	0	0	
Volume Right	98	0	0	0	97	
cSH	497	1700	1700	1700	1700	
Volume to Capacity	0.20	0.18	0.18	0.37	0.24	
Queue Length 95th (m)	5.8	0.0	0.0	0.0	0.0	
Control Delay (s/veh)	14.0	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s/veh)	14.0	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay	0.8					
Intersection Capacity Utilization	39.3%			ICU Level of Service	A	
Analysis Period (min)	15					



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	204	200	70
Future Volume (vph)	204	200	70
Sign Control	Free	Free	Stop
Intersection Summary			
Control Type: Unsignalized			

HCM Unsignalized Intersection Capacity Analysis
 4: Mclean Rd. W. & Site Access

FT 2026 AM
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Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (veh/h)	8	204	200	71	70	6
Future Volume (Veh/h)	8	204	200	71	70	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	222	217	77	76	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)	130					
pX, platoon unblocked	0.93				0.93	0.93
vC, conflicting volume	294				496	256
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	199				416	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				86	99
cM capacity (veh/h)	1273				546	823
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	231	294	83			
Volume Left	9	0	76			
Volume Right	0	77	7			
cSH	1273	1700	562			
Volume to Capacity	0.01	0.17	0.15			
Queue Length 95th (m)	0.2	0.0	4.1			
Control Delay (s/veh)	0.4	0.0	12.5			
Lane LOS	A		B			
Approach Delay (s/veh)	0.4	0.0	12.5			
Approach LOS			B			
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			28.1%	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)	151	16	153	74	250	700	55	38	522	31
Future Volume (vph)	151	16	153	74	250	700	55	38	522	31
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

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 103.6

Natural Cycle: 90

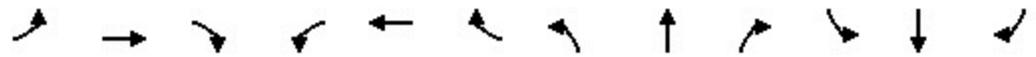
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FT 2026 PM
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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	151	16	146	153	74	127	250	700	55	38	522	31
Future Volume (vph)	151	16	146	153	74	127	250	700	55	38	522	31
Ideal Flow (vphp)	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
Frbp, 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	1511		1625	3471	1272	1203	3374	1241
Flt Permitted	0.52	1.00		0.47	1.00		0.36	1.00	1.00	0.34	1.00	1.00
Satd. Flow (perm)	933	1279		673	1511		612	3471	1272	425	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)	159	17	154	161	78	134	263	737	58	40	549	33
RTOR Reduction (vph)	0	132	0	0	50	0	0	0	32	0	0	20
Lane Group Flow (vph)	159	39	0	161	162	0	263	737	26	40	549	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)	29.4	15.2		33.8	17.4		55.8	46.8	46.8	46.8	41.8	41.8
Effective Green, g (s)	29.4	15.2		33.8	17.4		55.8	46.8	46.8	46.8	41.8	41.8
Actuated g/C Ratio	0.28	0.14		0.32	0.17		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)	363	184		320	249		420	1541	564	225	1338	492
v/s Ratio Prot	0.06	0.03		c0.08	c0.11		c0.06	0.21		0.01	0.16	
v/s Ratio Perm	0.06			0.08			c0.27		0.02	0.07		0.01
v/c Ratio	0.44	0.21		0.50	0.65		0.63	0.48	0.05	0.18	0.41	0.03
Uniform Delay, d1	30.3	39.8		27.7	41.2		14.5	20.7	16.6	16.9	22.9	19.4
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	1.8	0.6		2.6	6.0		2.9	1.1	0.2	0.4	0.9	0.1
Delay (s)	32.0	40.4		30.3	47.1		17.4	21.7	16.8	17.3	23.9	19.5
Level of Service	C	D		C	D		B	C	B	B	C	B
Approach Delay (s/veh)		36.4			39.9			20.4			23.2	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			26.4			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			105.4			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			86.5%			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)	140	165	855	51	622
Future Volume (vph)	140	165	855	51	622
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

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.



HCM Signalized Intersection Capacity Analysis
 2: Brock Rd. S. & Nicholas Beaver Rd.

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Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	140	165	855	26	51	622
Future Volume (vph)	140	165	855	26	51	622
Ideal Flow (vphp)	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		0.22	1.00
Satd. Flow (perm)	1656	1524	3331		349	3252
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	161	190	983	30	59	715
RTOR Reduction (vph)	0	159	1	0	0	0
Lane Group Flow (vph)	161	31	1012	0	59	715
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	1993		337	2319
v/s Ratio Prot	c0.10		c0.30		0.01	c0.22
v/s Ratio Perm		0.02			0.11	
v/c Ratio	0.60	0.13	0.51		0.18	0.31
Uniform Delay, d1	40.6	37.4	12.1		5.7	5.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.3	0.5	0.9		0.5	0.3
Delay (s)	46.0	37.9	13.0		6.2	5.9
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	41.6		13.0			5.9
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
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



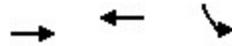
Lane Group	EBR	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	52	980	535
Future Volume (vph)	52	980	535
Sign Control		Free	Free
Intersection Summary			
Control Type: Unsignalized			

HCM Unsignalized Intersection Capacity Analysis
 3: Brock Rd.S. & Site Access

FT 2026 PM
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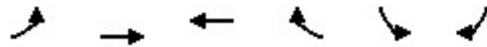
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↓	
Traffic Volume (veh/h)	0	52	0	980	535	53
Future Volume (Veh/h)	0	52	0	980	535	53
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	57	0	1065	582	58
Pedestrians						
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	1144	320	640			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	821	320	640			
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	92	100			
cM capacity (veh/h)	266	676	940			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	57	533	533	388	252	
Volume Left	0	0	0	0	0	
Volume Right	57	0	0	0	58	
cSH	676	1700	1700	1700	1700	
Volume to Capacity	0.08	0.31	0.31	0.23	0.15	
Queue Length 95th (m)	2.2	0.0	0.0	0.0	0.0	
Control Delay (s/veh)	10.8	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s/veh)	10.8	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay	0.3					
Intersection Capacity Utilization	30.4%			ICU Level of Service	A	
Analysis Period (min)	15					



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	225	255	86
Future Volume (vph)	225	255	86
Sign Control	Free	Free	Stop
Intersection Summary			
Control Type: Unsignalized			

HCM Unsignalized Intersection Capacity Analysis
 4: Mclean Rd. W. & Site Access

FT 2026 PM
 07/25/2025



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↘	
Traffic Volume (veh/h)	6	225	255	98	86	8
Future Volume (Veh/h)	6	225	255	98	86	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	245	277	107	93	9
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	384				590	331
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	263				490	203
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				81	99
cM capacity (veh/h)	1174				482	755
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	252	384	102			
Volume Left	7	0	93			
Volume Right	0	107	9			
cSH	1174	1700	497			
Volume to Capacity	0.01	0.23	0.21			
Queue Length 95th (m)	0.1	0.0	6.1			
Control Delay (s/veh)	0.3	0.0	14.1			
Lane LOS	A		B			
Approach Delay (s/veh)	0.3	0.0	14.1			
Approach LOS			B			
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			31.3%	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)	67	65	64	12	199	498	165	129	848	74
Future Volume (vph)	67	65	64	12	199	498	165	129	848	74
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

Intersection Summary

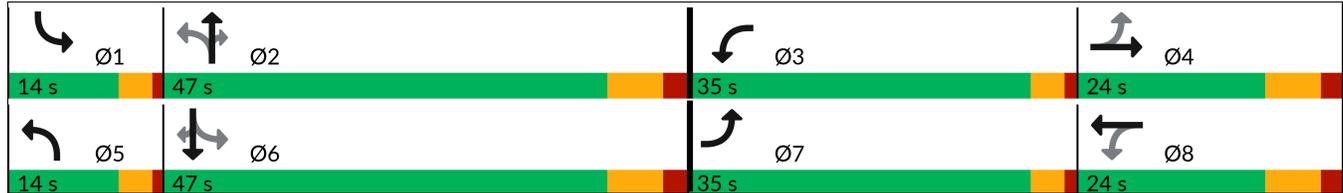
Cycle Length: 120

Actuated Cycle Length: 98.7

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FT 2031 AM
 07/25/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	65	159	64	12	41	199	498	165	129	848	74
Future Volume (vph)	67	65	159	64	12	41	199	498	165	129	848	74
Ideal Flow (vphp)	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
Frbp, 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	0.88		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	1224		1106	1082		1180	3167	1468	1626	3282	1615
Flt Permitted	0.72	1.00		0.36	1.00		0.17	1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)	973	1224		418	1082		215	3167	1468	681	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)	76	74	181	73	14	47	226	566	188	147	964	84
RTOR Reduction (vph)	0	70	0	0	39	0	0	0	111	0	0	50
Lane Group Flow (vph)	76	185	0	73	22	0	226	566	77	147	964	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)	26.7	17.1		27.7	17.6		51.1	41.0	41.0	49.5	40.2	40.2
Effective Green, g (s)	26.7	17.1		27.7	17.6		51.1	41.0	41.0	49.5	40.2	40.2
Actuated g/C Ratio	0.27	0.17		0.28	0.18		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)	291	210		186	191		208	1304	604	427	1325	652
v/s Ratio Prot	0.03	c0.15		c0.04	0.02		c0.11	0.18		0.03	0.29	
v/s Ratio Perm	0.04			0.07			c0.45		0.05	0.14		0.02
v/c Ratio	0.26	0.88		0.39	0.12		1.09	0.43	0.13	0.34	0.73	0.05
Uniform Delay, d1	28.3	40.2		28.0	34.4		18.1	20.9	18.2	13.9	25.0	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	1.0	31.3		2.8	0.3		87.4	1.1	0.4	0.5	3.5	0.2
Delay (s)	29.3	71.5		30.9	34.7		105.5	22.0	18.6	14.4	28.6	18.2
Level of Service	C	E		C	C		F	C	B	B	C	B
Approach Delay (s/veh)		61.8			32.6			40.6			26.1	
Approach LOS		E			C			D			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			36.3				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			99.5			Sum of lost time (s)				22.0		
Intersection Capacity Utilization			80.3%			ICU Level of Service				D		
Analysis Period (min)			15									

c Critical Lane Group

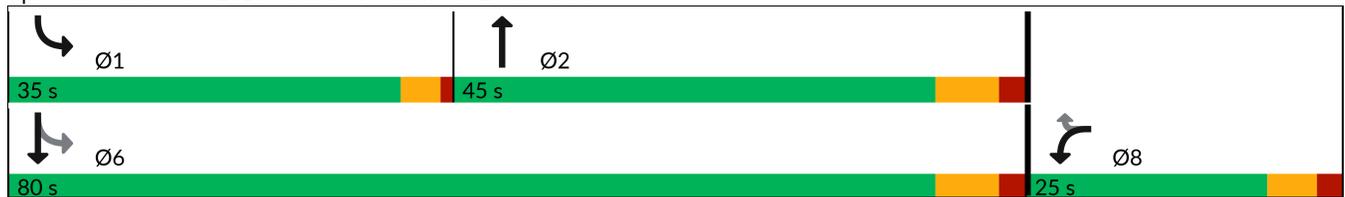


Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations	↵	↵	↕↕	↵	↕↕
Traffic Volume (vph)	136	139	719	184	876
Future Volume (vph)	136	139	719	184	876
Turn Type	Prot	Perm	NA	pm+pt	NA
Protected Phases	8		2	1	6
Permitted Phases		8		6	
Detector Phase	8	8	2	1	6
Switch Phase					
Minimum Initial (s)	15.0	15.0	35.0	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

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.



HCM Signalized Intersection Capacity Analysis
 2: Brock Rd. S. & Nicholas Beaver Rd.

FT 2031 AM
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Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	136	139	719	104	184	876
Future Volume (vph)	136	139	719	104	184	876
Ideal Flow (vphp)	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		448	3034
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	151	782	113	200	952
RTOR Reduction (vph)	0	126	8	0	0	0
Lane Group Flow (vph)	148	25	887	0	200	952
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		458	2150
v/s Ratio Prot	c0.10		c0.31		0.05	c0.31
v/s Ratio Perm		0.02			0.26	
v/c Ratio	0.61	0.11	0.55		0.44	0.44
Uniform Delay, d1	39.9	36.6	14.6		6.2	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	37.0	15.9		7.6	7.0
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	41.5		15.9			7.1
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		0.55		
Actuated Cycle Length (s)		103.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization		66.0%	ICU Level of Service	C
Analysis Period (min)		15		

c Critical Lane Group



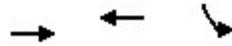
Lane Group	EBR	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	90	604	962
Future Volume (vph)	90	604	962
Sign Control		Free	Free
Intersection Summary			
Control Type: Unsignalized			

HCM Unsignalized Intersection Capacity Analysis
 3: Brock Rd.S. & Site Access

FT 2031 AM
 07/25/2025



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↓	
Traffic Volume (veh/h)	0	90	0	604	962	89
Future Volume (Veh/h)	0	90	0	604	962	89
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	98	0	657	1046	97
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	0.88					
vC, conflicting volume	1423	572	1143			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1216	572	1143			
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	79	100			
cM capacity (veh/h)	153	464	607			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	98	329	329	697	446	
Volume Left	0	0	0	0	0	
Volume Right	98	0	0	0	97	
cSH	464	1700	1700	1700	1700	
Volume to Capacity	0.21	0.19	0.19	0.41	0.26	
Queue Length 95th (m)	6.3	0.0	0.0	0.0	0.0	
Control Delay (s/veh)	14.8	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s/veh)	14.8	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay	0.8					
Intersection Capacity Utilization	41.7%			ICU Level of Service	A	
Analysis Period (min)	15					



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	219	213	70
Future Volume (vph)	219	213	70
Sign Control	Free	Free	Stop
Intersection Summary			
Control Type: Unsignalized			

HCM Unsignalized Intersection Capacity Analysis
 4: Mclean Rd. W. & Site Access

FT 2031 AM
 07/25/2025



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↔		↘	
Traffic Volume (veh/h)	8	219	213	71	70	6
Future Volume (Veh/h)	8	219	213	71	70	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	238	232	77	76	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)	130					
pX, platoon unblocked	0.92				0.92	0.92
vC, conflicting volume	309				527	271
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	200				438	158
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				86	99
cM capacity (veh/h)	1257				524	813
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	247	309	83			
Volume Left	9	0	76			
Volume Right	0	77	7			
cSH	1257	1700	540			
Volume to Capacity	0.01	0.18	0.15			
Queue Length 95th (m)	0.2	0.0	4.3			
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			1.8			
Intersection Capacity Utilization			28.9%	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)	155	16	159	76	265	777	57	39	572	33
Future Volume (vph)	155	16	159	76	265	777	57	39	572	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

Intersection Summary

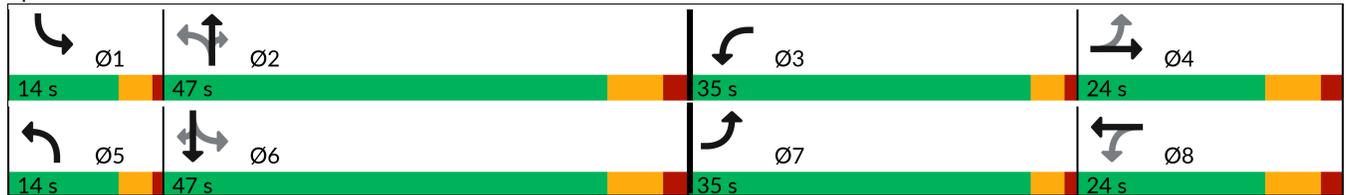
Cycle Length: 120

Actuated Cycle Length: 104.1

Natural Cycle: 90

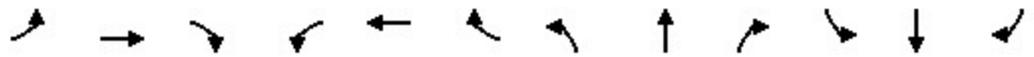
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FT 2031 PM
 07/25/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	16	156	159	76	131	265	777	57	39	572	33
Future Volume (vph)	155	16	156	159	76	131	265	777	57	39	572	33
Ideal Flow (vphp)	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
Frbp, 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	1278		1346	1510		1626	3471	1272	1203	3374	1241
Flt Permitted	0.51	1.00		0.45	1.00		0.33	1.00	1.00	0.29	1.00	1.00
Satd. Flow (perm)	907	1278		631	1510		557	3471	1272	367	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)	163	17	164	167	80	138	279	818	60	41	602	35
RTOR Reduction (vph)	0	140	0	0	50	0	0	0	33	0	0	21
Lane Group Flow (vph)	163	41	0	167	168	0	279	818	27	41	602	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)	29.7	15.3		34.3	17.6		55.8	46.8	46.8	46.8	41.8	41.8
Effective Green, g (s)	29.7	15.3		34.3	17.6		55.8	46.8	46.8	46.8	41.8	41.8
Actuated g/C Ratio	0.28	0.14		0.32	0.17		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)	362	184		317	251		394	1535	562	201	1333	490
v/s Ratio Prot	0.06	0.03		c0.08	c0.11		c0.07	0.24		0.01	0.18	
v/s Ratio Perm	0.06			0.09			c0.31		0.02	0.08		0.01
v/c Ratio	0.45	0.22		0.53	0.67		0.71	0.53	0.05	0.20	0.45	0.03
Uniform Delay, d1	30.3	40.0		27.8	41.4		15.4	21.5	16.8	17.3	23.6	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	1.9	0.6		3.0	6.6		5.7	1.3	0.2	0.5	1.1	0.1
Delay (s)	32.2	40.6		30.7	48.0		21.2	22.9	17.0	17.8	24.7	19.7
Level of Service	C	D		C	D		C	C	B	B	C	B
Approach Delay (s/veh)		36.6			40.5			22.1			24.0	
Approach LOS		D			D			C			C	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	27.3	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.71	C
Actuated Cycle Length (s)	105.8	Sum of lost time (s)
Intersection Capacity Utilization	87.7%	22.0
Analysis Period (min)	15	ICU Level of Service
		E

c Critical Lane Group

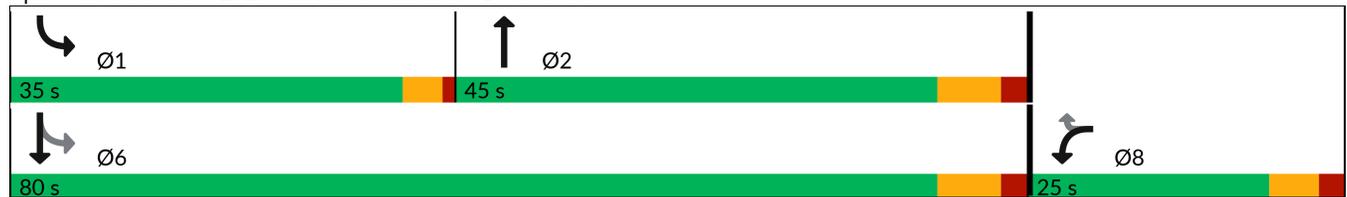


Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations	↶	↷	↕	↶	↕
Traffic Volume (vph)	155	180	935	56	684
Future Volume (vph)	155	180	935	56	684
Turn Type	Prot	Perm	NA	pm+pt	NA
Protected Phases	8		2	1	6
Permitted Phases		8		6	
Detector Phase	8	8	2	1	6
Switch Phase					
Minimum Initial (s)	15.0	15.0	35.0	10.0	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

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.



HCM Signalized Intersection Capacity Analysis
 2: Brock Rd. S. & Nicholas Beaver Rd.

FT 2031 PM
 07/25/2025



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	180	935	29	56	684
Future Volume (vph)	155	180	935	29	56	684
Ideal Flow (vphp)	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		301	3252
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	178	207	1075	33	64	786
RTOR Reduction (vph)	0	173	1	0	0	0
Lane Group Flow (vph)	178	34	1107	0	64	786
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		305	2309
v/s Ratio Prot	c0.11		c0.33		0.02	c0.24
v/s Ratio Perm		0.02			0.13	
v/c Ratio	0.65	0.14	0.56		0.21	0.34
Uniform Delay, d1	40.8	37.2	12.8		6.3	5.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	7.1	0.5	1.1		0.7	0.4
Delay (s)	47.9	37.7	14.0		7.0	6.2
Level of Service	D	D	B		A	A
Approach Delay (s/veh)	42.4		14.0			6.3
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
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)	52	1065	588
Future Volume (vph)	52	1065	588
Sign Control		Free	Free
Intersection Summary			
Control Type: Unsignalized			

HCM Unsignalized Intersection Capacity Analysis
 3: Brock Rd.S. & Site Access

FT 2031 PM
 07/25/2025



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↘
Traffic Volume (veh/h)	0	52	0	1065	588	53
Future Volume (Veh/h)	0	52	0	1065	588	53
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	57	0	1158	639	58
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	1247	349	697			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	886	349	697			
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	91	100			
cM capacity (veh/h)	236	648	895			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	57	579	579	426	271	
Volume Left	0	0	0	0	0	
Volume Right	57	0	0	0	58	
cSH	648	1700	1700	1700	1700	
Volume to Capacity	0.09	0.34	0.34	0.25	0.16	
Queue Length 95th (m)	2.3	0.0	0.0	0.0	0.0	
Control Delay (s/veh)	11.1	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s/veh)	11.1	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay	0.3					
Intersection Capacity Utilization	32.8%			ICU Level of Service	A	
Analysis Period (min)	15					



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	239	273	86
Future Volume (vph)	239	273	86
Sign Control	Free	Free	Stop

Intersection Summary
 Control Type: Unsignalized

HCM Unsignalized Intersection Capacity Analysis
 4: Mclean Rd. W. & Site Access

FT 2031 PM
 07/25/2025



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↘	
Traffic Volume (veh/h)	6	239	273	98	86	8
Future Volume (Veh/h)	6	239	273	98	86	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	260	297	107	93	9
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	404			625	351	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	273			520	213	
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			80	99	
cM capacity (veh/h)	1152			459	739	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	267	404	102			
Volume Left	7	0	93			
Volume Right	0	107	9			
cSH	1152	1700	474			
Volume to Capacity	0.01	0.24	0.22			
Queue Length 95th (m)	0.1	0.0	6.5			
Control Delay (s/veh)	0.3	0.0	14.7			
Lane LOS	A		B			
Approach Delay (s/veh)	0.3	0.0	14.7			
Approach LOS			B			
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			32.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	40.7	71.4	50.1	37.9	149.5	445.3	450.2	27.7	46.6	86.5	78.1	15.4
Average Queue (m)	14.1	37.2	17.6	12.1	148.7	374.8	311.9	10.9	21.1	48.6	35.0	6.3
95th Queue (m)	30.5	66.5	37.6	28.5	155.6	542.3	570.6	22.0	38.7	75.7	63.2	12.9
Link Distance (m)		101.6		220.8		433.8	433.8			105.5	105.5	
Upstream Blk Time (%)						30	11					0
Queuing Penalty (veh)						117	42					0
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)	0	3	0		92	20				2	1	
Queuing Penalty (veh)	0	2	0		206	38				3	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	72.5	115.7	274.8	265.7	34.9	85.2	82.6
Average Queue (m)	31.6	35.5	121.4	110.5	24.7	34.1	34.4
95th Queue (m)	65.7	94.8	314.4	302.2	40.1	75.2	68.7
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)			9	8			
Queuing Penalty (veh)			0	0			
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	3	9			27	6	
Queuing Penalty (veh)	4	11			109	10	

Intersection: 3: Brock Rd.S. & Site Access

Movement	EB
Directions Served	R
Maximum Queue (m)	26.6
Average Queue (m)	11.6
95th Queue (m)	19.9
Link Distance (m)	50.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Mclean Rd. W. & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	10.0	22.1
Average Queue (m)	0.7	10.0
95th Queue (m)	4.9	17.4
Link Distance (m)	128.6	63.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 544

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	52.7	54.2	62.7	71.3	135.7	151.2	145.3	23.0	36.4	63.4	52.1	21.6
Average Queue (m)	22.0	22.0	26.7	31.0	83.5	50.1	50.3	6.5	13.3	37.1	24.1	5.1
95th Queue (m)	41.2	41.9	49.9	58.7	149.5	137.2	128.2	18.0	31.4	60.7	47.3	15.3
Link Distance (m)		101.6		220.8		433.8	433.8			105.5	105.5	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)	0	0	1	2	10	1	0			0	0	
Queuing Penalty (veh)	0	0	2	3	34	1	0			0	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	55.4	38.2	58.8	51.8	30.8	39.9	49.0
Average Queue (m)	27.2	16.0	29.5	18.8	11.0	15.7	21.4
95th Queue (m)	49.4	28.4	49.9	41.4	24.5	34.8	42.0
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	0				3	3	
Queuing Penalty (veh)	1				9	2	

Intersection: 3: Brock Rd.S. & Site Access

Movement	EB
Directions Served	R
Maximum Queue (m)	18.2
Average Queue (m)	8.3
95th Queue (m)	15.5
Link Distance (m)	50.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Mclean Rd. W. & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	10.2	23.6
Average Queue (m)	0.7	10.8
95th Queue (m)	5.0	18.2
Link Distance (m)	128.6	63.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 52

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	37.5	69.6	46.1	44.8	149.5	444.4	453.7	30.2	65.1	88.7	78.1	15.1
Average Queue (m)	14.7	35.8	16.7	11.5	149.2	395.4	321.9	10.7	23.7	50.8	37.2	6.1
95th Queue (m)	31.6	62.7	36.7	28.7	150.4	521.2	584.7	24.2	47.6	80.2	67.1	13.4
Link Distance (m)		101.6		220.8		433.8	433.8			105.5	105.5	
Upstream Blk Time (%)						37	17			0	0	
Queuing Penalty (veh)						160	74			0	0	
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)	0	3	0	0	91	24	0		1	3	1	
Queuing Penalty (veh)	0	2	0	0	228	48	1		4	4	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	81.9	280.6	379.2	376.6	34.9	114.2	114.6
Average Queue (m)	41.2	74.3	204.2	197.8	25.4	43.7	44.4
95th Queue (m)	83.2	229.1	445.1	443.9	42.9	105.8	99.0
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)			34	27			
Queuing Penalty (veh)			0	0			
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	5	25			35	7	
Queuing Penalty (veh)	8	34			152	13	

Intersection: 3: Brock Rd.S. & Site Access

Movement	EB
Directions Served	R
Maximum Queue (m)	28.0
Average Queue (m)	12.0
95th Queue (m)	22.3
Link Distance (m)	50.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Mclean Rd. W. & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	8.5	21.5
Average Queue (m)	0.7	9.9
95th Queue (m)	4.6	17.4
Link Distance (m)	128.6	63.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 727

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	51.2	57.7	57.6	63.2	149.5	410.8	416.2	26.7	36.2	69.8	60.9	23.6
Average Queue (m)	23.6	20.7	27.9	32.9	139.2	257.5	243.2	6.7	15.1	38.9	28.2	5.2
95th Queue (m)	42.3	41.4	50.5	56.5	180.3	481.5	470.0	18.7	33.0	61.5	50.8	16.0
Link Distance (m)		101.6		220.8		433.8	433.8			105.5	105.5	
Upstream Blk Time (%)						2	1					
Queuing Penalty (veh)						10	6					
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)	0	0	1	1	75	7	0			1	0	
Queuing Penalty (veh)	0	0	1	2	292	19	0			0	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	59.5	45.8	88.1	79.6	31.6	51.7	57.1
Average Queue (m)	30.4	19.0	36.3	23.7	12.5	18.1	23.5
95th Queue (m)	51.8	34.8	69.6	58.9	25.6	42.2	47.5
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1	0			3	4	
Queuing Penalty (veh)	1	0			9	3	

Intersection: 3: Brock Rd.S. & Site Access

Movement	EB
Directions Served	R
Maximum Queue (m)	16.7
Average Queue (m)	8.8
95th Queue (m)	15.1
Link Distance (m)	50.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Mclean Rd. W. & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	10.6	25.5
Average Queue (m)	0.8	11.5
95th Queue (m)	5.8	20.5
Link Distance (m)	128.6	63.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 344

Appendix K

Optimized Existing, Future Background, and Future Total Synchro & SimTraffic 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
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

Intersection Summary

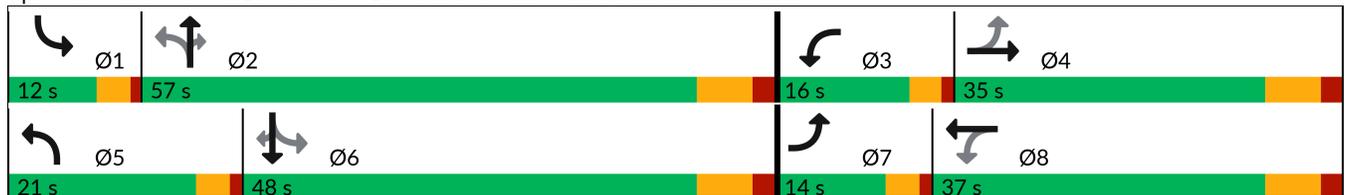
Cycle Length: 120

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.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FB 2031 AM
 07/29/2025



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 (vphp)	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
Frbp, 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									C
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			111.4							22.0		
Intersection Capacity Utilization			75.5%									D
Analysis Period (min)			15									

c Critical Lane Group

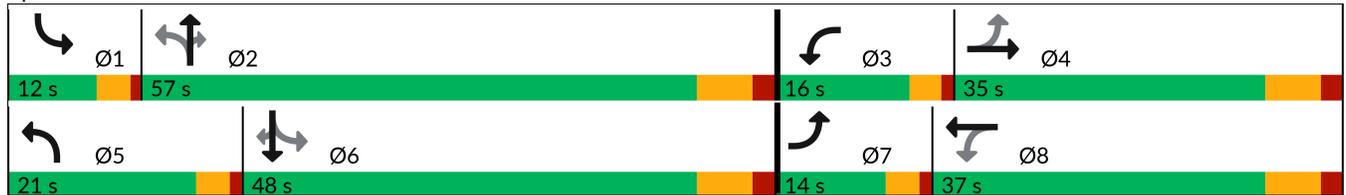


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	78	15	159	71	172	829	57	38	552	33
Future Volume (vph)	78	15	159	71	172	829	57	38	552	33
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	3	8	5	2		1	6	
Permitted Phases	4		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

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.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FB 2031 PM
 07/29/2025



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 (vphp)	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
Frbp, 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

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	B4	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	T	L	TR	L	T	T	R	L	T	T
Maximum Queue (m)	19.9	98.2	3.3	50.9	38.7	67.1	51.6	54.6	24.8	91.0	120.6	100.6
Average Queue (m)	3.2	42.1	0.1	19.1	11.0	31.1	23.0	24.5	10.3	26.5	72.0	56.9
95th Queue (m)	12.6	80.5	2.3	40.6	27.1	58.0	45.0	47.6	20.7	56.1	107.8	90.7
Link Distance (m)		103.4	126.7		220.8		433.8	433.8			105.8	105.8
Upstream Blk Time (%)		1								0	1	0
Queuing Penalty (veh)		0								0	0	0
Storage Bay Dist (m)	54.0			55.0		142.0			66.0	62.0		
Storage Blk Time (%)		6		0	0			0		0	13	4
Queuing Penalty (veh)		1		0	0			0		0	16	3

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	SB	B3
Directions Served	R	T
Maximum Queue (m)	16.4	9.0
Average Queue (m)	7.2	0.4
95th Queue (m)	14.8	4.9
Link Distance (m)		187.9
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	62.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	65.2	66.1	62.8	54.8	34.9	86.1	87.0
Average Queue (m)	31.5	16.6	28.3	22.9	25.6	38.9	38.9
95th Queue (m)	57.2	39.4	52.8	43.1	41.3	81.1	77.8
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	2	0			26	8	
Queuing Penalty (veh)	2	0			108	13	

Network Summary

Network wide Queuing Penalty: 143

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	34.6	52.8	84.8	91.7	51.7	83.5	90.8	22.2	32.4	87.9	68.7	21.7
Average Queue (m)	15.0	21.6	38.1	36.7	23.8	35.5	39.4	5.1	11.5	48.0	33.6	6.1
95th Queue (m)	28.7	42.5	68.7	71.3	43.7	66.9	72.1	15.1	26.5	75.6	60.0	16.8
Link Distance (m)		103.4		220.8		433.8	433.8			105.8	105.8	
Upstream Blk Time (%)										0		
Queuing Penalty (veh)										0		
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)		0	3	2			1			2	0	
Queuing Penalty (veh)		0	7	4			1			1	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	62.5	50.4	54.1	51.5	33.6	43.2	55.1
Average Queue (m)	31.9	18.2	30.6	21.2	12.2	14.5	19.1
95th Queue (m)	53.7	35.2	48.6	43.4	27.0	35.9	43.1
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1	0			4	3	
Queuing Penalty (veh)	1	0			13	2	

Network Summary

Network wide Queuing Penalty: 28



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	67	65	64	12	199	498	165	129	848	74
Future Volume (vph)	67	65	64	12	199	498	165	129	848	74
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

Intersection Summary

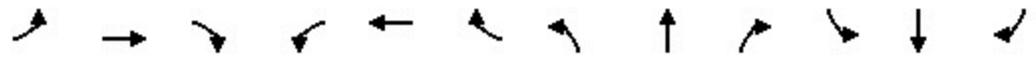
Cycle Length: 120
 Actuated Cycle Length: 110
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FT 2031 AM
 07/29/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	65	159	64	12	41	199	498	165	129	848	74
Future Volume (vph)	67	65	159	64	12	41	199	498	165	129	848	74
Ideal Flow (vphp)	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
Frbp, 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	0.88		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	1223		1106	1082		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	1223		417	1082		172	3167	1468	752	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)	76	74	181	73	14	47	226	566	188	147	964	84
RTOR Reduction (vph)	0	78	0	0	37	0	0	0	102	0	0	53
Lane Group Flow (vph)	76	177	0	73	24	0	226	566	86	147	964	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)	28.9	21.2		31.5	22.5		62.6	50.5	50.5	49.5	41.4	41.4
Effective Green, g (s)	28.9	21.2		31.5	22.5		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)	275	234		174	219		253	1443	669	399	1226	603
v/s Ratio Prot	0.02	c0.15		c0.03	0.02		c0.14	0.18		0.03	0.29	
v/s Ratio Perm	0.05			0.08			c0.37		0.06	0.14		0.02
v/c Ratio	0.28	0.76		0.42	0.11		0.89	0.39	0.13	0.37	0.79	0.05
Uniform Delay, d1	32.2	42.4		30.8	36.0		24.9	20.0	17.4	18.6	30.8	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	1.1	13.1		3.4	0.2		34.6	0.8	0.4	0.6	3.9	0.1
Delay (s)	33.3	55.5		34.2	36.2		59.6	20.8	17.8	19.2	34.7	22.2
Level of Service	C	E		C	D		E	C	B	B	C	C
Approach Delay (s/veh)		50.4			35.1			29.2			31.9	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			33.4				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			110.8				Sum of lost time (s)				22.0	
Intersection Capacity Utilization			80.3%				ICU Level of Service				D	
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)	155	16	159	76	265	777	57	39	572	33
Future Volume (vph)	155	16	159	76	265	777	57	39	572	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)	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

Intersection Summary

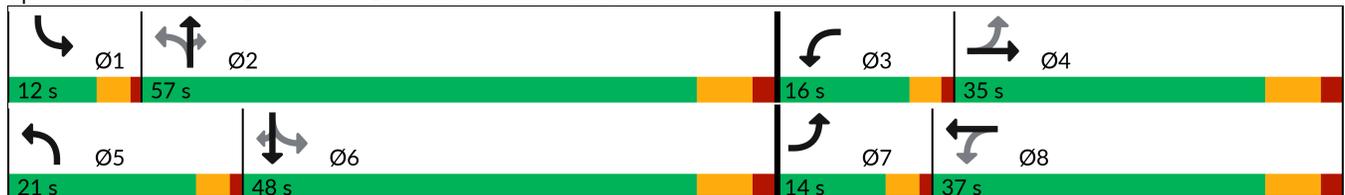
Cycle Length: 120

Actuated Cycle Length: 108.7

Natural Cycle: 90

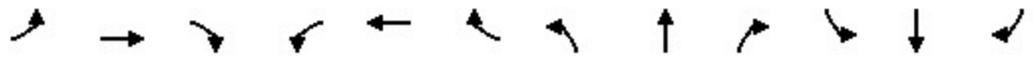
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



HCM Signalized Intersection Capacity Analysis
 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

FT 2031 PM
 07/29/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	16	156	159	76	131	265	777	57	39	572	33
Future Volume (vph)	155	16	156	159	76	131	265	777	57	39	572	33
Ideal Flow (vphp)	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
Frbp, 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	1510		1626	3471	1272	1203	3374	1240
Flt Permitted	0.49	1.00		0.46	1.00		0.32	1.00	1.00	0.34	1.00	1.00
Satd. Flow (perm)	881	1277		652	1510		545	3471	1272	435	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)	163	17	164	167	80	138	279	818	60	41	602	35
RTOR Reduction (vph)	0	139	0	0	57	0	0	0	30	0	0	22
Lane Group Flow (vph)	163	42	0	167	161	0	279	818	30	41	602	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)	290	197		259	261		478	1716	629	217	1292	475
v/s Ratio Prot	0.05	0.03		c0.07	0.11		c0.09	0.24		0.01	0.18	
v/s Ratio Perm	0.09			c0.11			c0.24		0.02	0.07		0.01
v/c Ratio	0.56	0.22		0.64	0.62		0.58	0.48	0.05	0.19	0.47	0.03
Uniform Delay, d1	34.8	40.8		32.7	42.3		13.1	18.5	14.4	18.8	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	4.1	0.6		7.3	4.3		5.1	1.0	0.1	0.4	0.6	0.1
Delay (s)	38.9	41.3		40.0	46.5		18.2	19.4	14.6	19.3	26.1	21.3
Level of Service	D	D		D	D		B	B	B	B	C	C
Approach Delay (s/veh)		40.2			43.7			18.9			25.5	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			27.2									C
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			110.4							22.0		
Intersection Capacity Utilization			87.7%									E
Analysis Period (min)			15									

c Critical Lane Group

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	44.3	77.6	40.6	46.7	117.8	64.5	65.7	27.0	64.8	107.4	100.1	34.7
Average Queue (m)	18.5	39.9	19.0	13.6	49.9	22.1	25.5	10.6	26.1	72.6	61.0	8.6
95th Queue (m)	38.5	68.8	37.3	31.9	89.8	47.0	49.3	21.1	50.8	102.9	93.9	23.7
Link Distance (m)		101.6		220.8		433.8	433.8			105.5	105.5	
Upstream Blk Time (%)		0								1	0	0
Queuing Penalty (veh)		0								3	1	0
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)	0	4	0	0	0		0		0	15	6	
Queuing Penalty (veh)	0	3	0	0	0		0		0	20	5	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	62.9	57.7	58.4	51.2	34.9	83.9	88.7
Average Queue (m)	28.8	18.6	29.9	21.5	25.6	33.9	35.8
95th Queue (m)	53.2	37.7	52.6	40.7	40.0	74.1	73.7
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1	0			23	6	
Queuing Penalty (veh)	1	0			102	11	

Intersection: 3: Brock Rd.S. & Site Access

Movement	EB	SB	SB
Directions Served	R	T	TR
Maximum Queue (m)	22.6	29.8	12.6
Average Queue (m)	11.1	1.3	0.4
95th Queue (m)	19.4	11.7	6.3
Link Distance (m)	50.7	188.2	188.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Mclean Rd. W. & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	5.2	21.3
Average Queue (m)	0.3	9.8
95th Queue (m)	3.1	16.7
Link Distance (m)	128.6	63.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 147

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	60.0	74.8	71.8	85.2	79.5	71.1	73.9	20.7	39.2	77.5	68.8	22.3
Average Queue (m)	28.0	27.0	32.0	38.3	41.5	34.7	37.5	5.5	12.4	51.5	40.6	6.1
95th Queue (m)	50.5	57.4	58.8	69.9	72.2	60.7	64.1	14.9	29.0	72.2	64.2	17.3
Link Distance (m)		101.6		220.8		433.8	433.8			105.5	105.5	
Upstream Blk Time (%)		0										
Queuing Penalty (veh)		0										
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)	1	2	2	3			1			3	0	
Queuing Penalty (veh)	2	3	4	5			0			1	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	61.3	52.8	60.2	48.8	27.7	54.0	56.2
Average Queue (m)	29.4	19.2	33.3	20.6	11.3	17.5	22.6
95th Queue (m)	50.6	36.3	54.2	41.9	23.6	42.0	46.7
Link Distance (m)		505.0	361.3	361.3		433.8	433.8
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1	0			3	4	
Queuing Penalty (veh)	2	0			9	2	

Intersection: 3: Brock Rd.S. & Site Access

Movement	EB
Directions Served	R
Maximum Queue (m)	16.8
Average Queue (m)	8.4
95th Queue (m)	15.8
Link Distance (m)	50.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Mclean Rd. W. & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	3.4	25.6
Average Queue (m)	0.2	12.5
95th Queue (m)	2.1	21.5
Link Distance (m)	128.6	63.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 28

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 m ²	0
Between 250 m ² and 2,500 m ²	1
Greater than 2,500 m ² and less than 5,000 m ²	2
Greater than 5,000 m ²	3 + 1 additional space for each 10,000 m ² in excess of 5,000 m ²

5.1.3 Dimensions of Loading Spaces

- a. The minimum dimensions of a **loading space** shall be 3.5 metres in width and 10 metres in length, with a minimum vertical clearance of four (4) metres.

5.1.4 Location of Loading Spaces

- a. Required **loading spaces** shall:
 - i. be provided on the same **lot** occupied by the **building or structure** for which the said **loading spaces** are required;
 - ii. abut the **building** for which the **loading space** is provided; and

- iii. shall not form a part of any **street** or **lane**.

5.1.5 Yards Where Permitted

- a. **Loading spaces** shall not be permitted:
 - i. closer than three (3) metres to any **lot line**;
 - ii. in any **front yard**;
 - iii. in any minimum **required yard**;
 - iv. between the exterior closest to the **exterior lot line** and the **exterior lot line**; and
 - v. closer than 7.5 metres to any Residential **Zone** boundary, except if it is located entirely within a **building** or **structure** or located in a Residential **Zone**.

5.1.6 Access to Loading Spaces

- a. Access to **loading spaces** shall be by means of a **driveway** at least six (6) metres wide contained within the **lot** on which the **loading spaces** are located.

5.1.7 Addition to Existing Use

- a. When a **building** or **structure** has insufficient **loading spaces** on the date of passing of this By-Law to comply with the requirements herein, this By-Law shall not be interpreted to require that the deficiency be made up prior to the construction of any addition, provided that any additional **loading spaces** required by this By-Law for such addition are provided in accordance with all provisions hereof respecting **loading spaces**.

5.1.8 Exemption for C1 and CMU Zone

- a. Notwithstanding any other provision hereof to the contrary, no **loading spaces** shall be required for any **building, structure**, or use located within a C1 or CMU **Zone**.

5.2 PARKING REGULATIONS

5.2.1 General Parking Provisions

- a. No person shall use any **premises** in any **zone** for any purpose permitted by this By-law, unless the minimum number of **parking spaces** required are provided as specified by this By-law.
- b. Where the minimum number of **parking spaces** is calculated on the basis of a rate or ratio,

the required number of **parking spaces** shall be rounded up to the next whole number.

- c. The parking requirements for more than one use on a **lot** or for a **building** containing more than one use, shall be the sum total of the parking requirements for each of the component uses, unless otherwise specified in this By-law.
- d. All required **parking spaces** shall be unobstructed and available for general parking purposes and used for that purpose at all times, unless otherwise specified in this By-law.

5.2.2 Parking Spaces Required

- a. Except as otherwise provided herein, the **owner** of any **lot, building, or structure** used or **erected** for any of the purposes set forth in Tables 5.2 and 5.3 of this Subsection, shall provide and maintain for the sole use of the **owner** or other persons entering upon or making use of the said **lot, building or structure** from time to time, one or more **parking spaces** in accordance with the provisions of this Subsection.

Table 5.2 Residential **Parking Space** Requirements

USE	MINIMUM PARKING SPACE REQUIREMENT
Accessory apartment	1 per dwelling unit , in addition to the requirement for the principal dwelling unit
Bed and breakfast	1 per guest room, in addition to the requirement for the principal dwelling unit
Boarding, lodging, or rooming house	1 per guest room, in addition to the requirement for the principal dwelling unit
Dwelling, duplex	2 per dwelling unit
Dwelling, multiple	1.5 per dwelling unit and 0.25 per unit for visitor parking spaces
Dwelling, semi-detached	2 per dwelling unit
Dwelling, Single detached	2 per dwelling unit
Dwelling, townhouse	2 per dwelling unit
Dwelling unit in mixed-use building	1 per dwelling unit
Garden suite	1 per dwelling unit
Group home	2 per dwelling unit
Home business	1 for any employee that is not a resident in the dwelling unit in addition to the required parking for the dwelling unit

Home industry	1 for any employee that is not a resident in the dwelling unit in addition to the required parking for the dwelling unit
Private home day care	The minimum parking space requirement for the principal dwelling unit
Retirement home	0.5 spaces per unit.

Table 5.3 Non-residential Parking Space Requirements

USE	MINIMUM PARKING SPACE REQUIREMENT (BASED ON NET FLOOR AREA UNLESS OTHERWISE NOTED)
Agricultural use	No requirement
Agriculture-related use	1 per 100 m ²
Agricultural service and supply establishments	1 per 40 m ²
Agricultural animal clinic	1 per 50 m ²
Animal clinic	1 per 20 m ²
Art gallery	1 per 30 m ²
Artisan studio	1 per 30 m ²
Asphalt plant	1 per 30 m ² for office component
Assembly hall	1 per 5 persons seating capacity or 1 per 10 m ² GFA where there are no seats
Auction sales establishment	1 per 15 m ²
Motor vehicle body shop	3 per service bay
Motor vehicle sales and rental establishment	1 per 30 m ² for office component
Motor vehicle service establishment	3 per service bay or 1 per 100 m ² or whichever is greater
Motor vehicle washing establishment	1 plus 6 waiting spaces per wash bay
Building supply store	1 per 100 m ²
Business or professional office	1 per 40 m ²
Caterer's establishment	1 per 40 m ²
Commercial mall	1 per 20 m ²
Commercial school or studio	1 per 30 m ²
Commercial self-storage facility	1 per 100 m ²
Community garden	1 per 100 m ² of area used for community garden purposes
Contractor's yard	1 per 50 m ²
Day care centre	1 per 40 m ²
Dry cleaning plant	1 per 40 m ²
Dry cleaning depot	1 per employee and 2 additional spaces for pickup / loading
Factory outlet	1 per 20 m ²
Farm related business	1 per 40 m ²
Farm greenhouse	No requirement
Financial institution	1 per 20 m ² or 1 per 30 m ² if the financial institution has a drive-through service facility

USE	MINIMUM PARKING SPACE REQUIREMENT (BASED ON NET FLOOR AREA UNLESS OTHERWISE NOTED)
Funeral establishment	1 per 20 m ²
Gas bar	1 per gas bar pump
Garden centre	1 per 35 m ²
Golf course	5 per hole
Golf driving range	1.5 per tee
Hospital	4 per bed
Hotel or motel	1 per guest room plus 1 per 20 m ² of floor area of each refreshment room or dining room
Industrial use	1/100 m ² for the first 10,000 m ² of floor area and 1/200 m ² for any floor area after the first 10,000 m ²
Kennel	1 per 30 m ² for office component
Laundromat	1 per 30 m ²
Long term care facility	1 per 4 beds and 1 per 2 employees
Marina	0.5 per boat slip and 1/20 m ² of total retail floor area
Medical office	1 per 25 m ²
Miniature golf course	1.5 per tee
Museum	1 per 30 m ²
Personal service establishment	1 per 20 m ²
Place of entertainment	1 per 20 m ²
Place of worship	1 per 4 persons seating capacity or 1 per 10 m ² , whichever is greater
Postal or courier outlet	1 per 30 m ²
Private club	1 per 4 persons seating capacity or 1 per 10 m ² , whichever is greater
Private school	1.5 per classroom for elementary schools 5.0 per classroom for secondary schools
Public buildings	1 per 30 m ²
Public school	1.5 per classroom for elementary schools 5.0 per classroom for secondary schools
Recreational vehicle sales or rental establishment	1 per 30 m ² for office component
Equipment rental establishment	1 per 50 m ²
Restaurant	1 per 10 m ² including outdoor patio area
Retail store	1 per 20 m ²
Salvage yard	1 per 20 m ²
Service or repair establishment	1 per 50 m ²
Short term accommodation	0.5 parking spaces per occupant or 1.0 parking space per guest room used for sleeping, whichever is the greater
Trade service establishment	1 per 50 m ²
Transport terminal	1 per 100 m ²
Warehouse	1 per 200 m ²
Any outdoor storage area involving the	1 per 100 m ² of net floor area and outdoor

USE	MINIMUM PARKING SPACE REQUIREMENT (BASED ON NET FLOOR AREA UNLESS OTHERWISE NOTED)
display and sale of goods and materials, including vehicles	storage area
Any other use permitted by this by-law other than those listed above	1 per 20 m ² of net floor area
Any other place of assembly permitted by this by-law other than those listed above	1 per permitted Fire Code Capacity

5.2.3 Dimensions of Parking Spaces

- a. A **parking space** required hereby shall have minimum rectangular dimensions of three (3) by six (6) metres, except that:
 - i. the minimum width of a **parking space** accessory to a **single detached, semi-detached or townhouse dwelling** shall be 2.5 metres; and,
 - ii. where the **principal** access to a **parking space** is provided on the longest dimension of such **parking space**, the minimum dimensions of the said **parking space** shall be three (3) by 6.7 metres.

5.2.4 Shared Parking Spaces

- a. Where more than one of the uses listed in Table 5.3 are located on the same **lot**, **parking spaces** may be shared between the uses, and the cumulative total of **parking spaces** required for all the uses on the **lot** may be reduced from that required in Table 5.4.
- b. To calculate the required parking using Table 5.4:
 - A. Determine the parking requirement for each use;
 - B. Calculate the parking requirement for each use;
 - C. Multiply the required parking by the percentage of peak period for each time period;
 - D. Calculate the total required parking for all uses in each time period, for both weekdays and Saturdays (excluding Sundays); and
 - E. The time period with the highest total parking requirement is the required parking for the **lot**.

Table 5.4 Percentage of Required Parking Permitted to be shared

USE	PERCENTAGE OF PEAK PERIOD							
	WEEKDAY				SATURDAY			
	Morning	Noon	Afternoon	Evening	Morning	Noon	Afternoon	Evening
Business or professional office	100	80	100	10	10	10	10	5
Financial institution	100	100	100	15	20	20	20	5
Hotel or motel	70	70	70	100	70	70	70	100
Place of entertainment or theatre	10	10	25	80	40	70	80	100
Restaurant	20	90	30	100	30	90	50	100
Retail store	75	80	90	90	80	100	100	50

5.2.5 Location of Parking Spaces

- a. All required **parking spaces** shall be provided on the same **lot** occupied by the **building, structure,** or use for which such **parking spaces** are required, and shall not form a part of any **street** or **lane**.
- b. **Parking spaces** shall not extend into any part of a **lot** that is required to be used for **planting strips** as specified by this By-law.

5.2.6 Parking in Residential Zones

- a. The maximum width of a **driveway** leading to a **private garage** or carport in the **front** or **exterior side yards** shall be:
 - i. Six (6) metres for a **lot** having a **lot frontage** of 12 metres or less;
 - ii. Equal to 50 percent of the **lot frontage** on a **lot** having greater than 12 metres and less than 18 metres of **lot frontage**; or
 - iii. Nine (9) metres for a **lot** having a **lot frontage** equal to or greater than 18 metres.
- b. The width of the **lot** specified in subsection (a) above is the horizontal distance between the **interior side** and/or **exterior side lot lines**, with such distance being measured perpendicularly to the line joining the mid-point of the **front lot line** with the mid-point of the **rear lot line** at a point on that line six (6) metres from the **front lot line**.

- c. The width of the **private garage** specified in subsection (a) above is the width of interior wall(s). In the case of a carport, the width is measured from the wall of the **principal building** to the outside of the post supporting the roof of the carport.
- d. Where a **private garage** is detached from the **principal building** and is accessed by a **driveway** crossing the **front lot line**, the **driveway** shall be located no closer to the **interior side lot line** than the minimum setback required for **accessory buildings or structures**.
- e. Where a **private garage** is detached from the **principal building** and is accessed by a **driveway** crossing the **exterior side lot line**, the **driveway** shall be located no closer to the **rear lot line** than the minimum setback required for **accessory buildings or structures**.
- f. Notwithstanding subsections (b) and (c) above, the setback for the **driveway** may be less to match the setback of a **private garage** that existed on the effective date of this By-law.

5.2.7 Yards Where Permitted

- a. Except as otherwise provided herein, uncovered surface **parking areas** shall be permitted in any part of any **yard**, provided that any part of a **parking area** located within a **required yard** shall be separated from any **lot lines** adjacent to such **required yard** by a **planting strip** no less than one (1) metre in width. This provision does not apply to a **parking area** accessory to a **single detached dwelling**.

5.2.8 Parking Structures

- a. Parking **structures** shall comply with the provisions for the **principal building** in accordance with this By-law.
- b. No setbacks or **yards** shall be required for any portion of a parking **structure** that is entirely below **grade**. This exemption also applies to external ventilation shafts, stairwells, landings, and other similar facilities.

5.2.9 Access to Parking Areas and Structures

- a. Access to **parking areas** shall be provided from a **street** by means of one or more unobstructed **driveways**, provided that no **lot** shall have more than two **driveways** for the first 30 metres of **street** line thereof plus one **driveway** for each additional 30 metres of **street** line.
- b. **Driveways** that are accessory to a single **dwelling unit** shall not exceed six (6) metres in width, and any other **driveway** shall not exceed 10 metres in width, measured parallel to the said **street**, at any point on the **lot** closer to the said **street** than the **street** setback required therefrom.

- c. **Driveways** and **parking aisles** shall have a minimum unobstructed width of six (6) metres where two-way traffic is permitted and three (3) metres **driveway** where only one-way direction of traffic flow is permitted and is clearly indicated by signs, pavement markings or both, except that the minimum width required for any **driveway** accessory to a **single detached, semi-detached** or **townhouse dwelling** shall be 2.5 metres.

5.2.10 Surfacing of Parking Areas, Driveways and Loading Spaces

- a. All **parking areas, driveways, and loading spaces** in any **zone** other than a Parks and Open Space **Zone**, an Industrial **Zone**, or an Agricultural **Zone** shall be provided and maintained with a stable treated surface so as to prevent the raising of dust or loose particles, such surface to be constructed of: asphalt, concrete, brick, interlocking brick, permeable paving, cement, or other similar hardscape surface, sufficient to provide stability, prevent erosion, be usable in all seasons, and provide adequate drainage facilities.

5.2.11 Addition to Existing Use

- a. Where an **existing** use has insufficient **parking spaces** on the date of passing of this By-Law to conform to the requirements herein, this By-Law shall not be interpreted to require that the deficiency be made up prior to the construction of any addition or a change of use, provided that any additional **parking spaces** required by this By-Law for such addition or change of use are provided in accordance with all provisions hereof respecting **parking spaces** and **parking areas**.

5.2.12 Parking of Commercial Motor vehicles in Residential Zones

- a. The following provisions apply to the parking of **commercial motor vehicles** in Residential **Zones**:
 - i. Only one (1) **commercial motor vehicle** may be parked on a **lot**;
 - ii. Only a permanent resident of the dwelling unit may park a **commercial motor vehicle** on the **lot**;
 - iii. The **commercial motor vehicle** shall be parked in a **private garage** or on a **driveway**;
 - iv. A **commercial motor vehicle** shall not be permitted on any **lot** unless the principal dwelling has been constructed on that same **lot**;
 - v. The **commercial motor vehicle** shall be no more than 7.5 metres in length (exclusive of hitch/tongue); and
 - vi. The **commercial motor vehicle** shall be no more than 3.2 metres in **height**, measured from the ground to the highest point of the **commercial motor vehicle**.

5.2.13 Parking of Recreational Vehicles and Boats

- a. The following provisions apply to the outdoor parking or storage of any **recreational vehicle** or boat in a Residential **Zone**:

- i. The **recreational vehicle** or boat shall not be used for human habitation purposes while parked on the **lot**;
- ii. A total of one **recreational vehicle** and one boat shall be permitted on a **lot**;
- iii. The **recreational vehicle** or boat shall be parked in the **interior** or **rear yards**, or in a **yard** between a **building** and a lake or watercourse deemed to be a **front yard**, and/or on a **driveway** extending from a **private garage** or carport;
- iv. A **recreational vehicle** and a boat shall not be parked on the same **driveway**.
- v. A **recreational vehicle** or boat shall not occupy required **parking spaces**.
- vi. A **recreational vehicle** or boat, if located on the **driveway**, shall be located no closer than 0.5 metres from the edge of the **lot** line.

5.2.14 Barrier-Free Parking

- a. Where the parking requirement for any use is 4 or more spaces, **barrier-free parking spaces** shall be provided in accordance with the following:
 - i. Each **barrier-free parking space** shall have a minimum width of 3.6 metres and minimum depth of 6.0 metres;
 - ii. Each **barrier-free parking space** shall be hard-surfaced and level;
 - iii. Each **barrier-free parking space** shall be located near and accessible to an entrance; and,
 - iv. Each **barrier-free parking space** shall be appropriately identified for its intended use by persons with limited mobility or other disabilities
- b. The number of **barrier-free parking spaces** shall be determined in accordance with Table 5.5 below.

Table 5.5 **Barrier-Free Parking Space** Requirements

TOTAL NUMBER OF PARKING SPACES REQUIRED ON THE LOT	MINIMUM NUMBER OF REQUIRED PARKING SPACES DEDICATED AS BARRIER-FREE
3-25	1
26-100	1 + 3% of total number of parking spaces on lot

TOTAL NUMBER OF PARKING SPACES REQUIRED ON THE LOT	MINIMUM NUMBER OF REQUIRED PARKING SPACES DEDICATED AS BARRIER-FREE
101-200	4 + 2% of total number of parking spaces on lot
201 or greater	8 + 2% of total number of parking spaces on lot

5.2.15 Bicycle Parking

- a. Bicycle parking spaces shall be required for the uses listed in Table 5.6 below in addition to any required **parking spaces**.
- b. Each bicycle parking space shall be a minimum of 60 centimetres wide and 1.8 metres long.

Table 5.6 Bicycle Parking Space Requirements

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

**Tree Inventory and Preservation Plan
7456 McLean Road West
Puslinch, Ontario**

prepared for

**DAAZ Inc.
8290 17th Sideroad East
Acton, Ontario L7J 2M1**

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25 July 2025

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 transport truck gas bar, and a small vehicle gas bar. 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-ways 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 (i.e. between September 1st and April 1st) to avoid impacts to birds in the area and to ensure compliance with the Migratory Birds Convention Act. Tree removal or vegetation clearing within the breeding bird window may be possible; however, a pre-clearance nest sweep, performed by a qualified ecologist, would be required to prevent contravention of the Act. Respect of the breeding bird window will also serve to avoid incidental impacts to species at risk bats.

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.

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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	<i>Crataegus sp.</i>	~12, ~12	FG	F	F	30	3	Union at base, epicormic branching (M), lean (L)	Township (Right-of-Way)	Preserve
NT590	White Elm	<i>Ulmus americana</i>	~26	D	D	D	100	-	Dead	Township (Right-of-Way)	Preserve
NT591	Manitoba Maple	<i>Acer negundo</i>	~80, ~58	P	P	P	90	7	V-union at 1m with included bark, lean (M), moribund	Subject	Remove
NT592	Manitoba Maple	<i>Acer negundo</i>	~59	F	PF	PF	20	8	Lean (M), poor branch unions, epicormic branching (H), poor form (M)	Subject	Remove
NT593	Manitoba Maple	<i>Acer negundo</i>	~30	PF	PF	PF	20	6	Bow (H), epicormic branching (H)	Subject	Remove
NT594	Manitoba Maple	<i>Acer negundo</i>	~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	<i>Acer negundo</i>	~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	<i>Acer negundo</i>	~44, ~30	P	P	P	80	6	Failed at base, broken branches (H), epicormic branching (H), poor form (H)	Subject	Remove
NT597	Manitoba Maple	<i>Acer negundo</i>	~60	P	P	P	80	10	Failed at base, broken branches (H), epicormic branching (H), poor form (H)	Subject	Remove
NT598	White Spruce	<i>Picea glauca</i>	~28	G	F	F	30	3		Subject	Remove
NT599	White Spruce	<i>Picea glauca</i>	~40	FG	F	F	30	4	Lean (L)	Subject	Remove
601	Willow species	<i>Salix sp.</i>	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	<i>Acer platanoides</i>	33	FG	FG	FG		7	Lean (L), crowded by Tree 601	Subject	Remove
603	Sugar Maple	<i>Acer saccharum</i>	37.5	F	F	F		5	V-union at 3m with included bark, epicormic branching (L)	Subject	Remove
604	Black Walnut	<i>Juglans nigra</i>	38.5	F	F	F		6	Burls (M), asymmetrical crown (L)	Subject	Remove
605	Scots Pine	<i>Pinus sylvestris</i>	16	D	D	D	100	-	Dead	Subject	Remove
606	Norway Maple	<i>Acer platanoides</i>	11	F	G	FG		4	Lean (L), seam (L)	Subject	Remove
607	Scots Pine	<i>Pinus sylvestris</i>	20	G	F	F		3	Vine competition (H), asymmetrical crown (M)	Subject	Remove
608	Willow species	<i>Salix sp.</i>	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	<i>Acer platanoides</i>	17, 10	F	F	FG		4	Union at base, lean (L), crowded by Tree 608, multiple branch attachments	Subject	Remove
610	Norway Maple	<i>Acer platanoides</i>	21.5	FG	F	F		5	Lean (L), asymmetrical crown (M)	Subject	Remove
611	Norway Maple	<i>Acer platanoides</i>	18, 14.5	FG	G	G		4	Lean (L), union at base	Subject	Remove
612	Willow species	<i>Salix sp.</i>	27	FG	PF	F	30	5	Broken branches (M), bow (L)	Subject	Remove
613	Eastern White Cedar	<i>Thuja occidentalis</i>	13.5	F	PF	PF	40	2	Crook (M), decay (L) in trunk	Subject	Remove
614	Eastern White Cedar	<i>Thuja occidentalis</i>	18.5	PF	PF	PF	40	2	Lean (L), decay (M) in trunk, cavities (M)	Subject	Remove
615	Eastern White Cedar	<i>Thuja occidentalis</i>	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	<i>Thuja occidentalis</i>	19.5	P	PF	P	40	2	Lean (M), cavities (H), decay (H) in trunk	Subject	Remove
617	Eastern White Cedar	<i>Thuja occidentalis</i>	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	<i>Juglans nigra</i>	28	F	F	FG		6	Canker (L)	Subject	Remove
619	Manitoba Maple	<i>Acer negundo</i>	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	<i>Acer saccharum</i>	32	G	F	F		5	Asymmetrical crown (M), epicormic branching (L)	Subject	Remove
621	Sugar Maple	<i>Acer saccharum</i>	24	G	PF	PF	10	4	Asymmetrical crown (M), epicormic branching (H)	Subject	Remove
622	Sugar Maple	<i>Acer saccharum</i>	26	G	F	F	10	4	Epicormic branching (M)	Subject	Remove
623	Black Walnut	<i>Juglans nigra</i>	44	PF	F	PF	10	7	Canker (M), cavities (M)	Subject	Remove
624	Sugar Maple	<i>Acer saccharum</i>	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	<i>Acer saccharum</i>	11	G	PF	PF	40	2	Crowded by Trees 624 and 626, epicormic branching (M), asymmetrical crown (M)	Subject	Remove
626	Sugar Maple	<i>Acer saccharum</i>	25	G	F	F	20	4	Asymmetrical crown (M)	Subject	Remove
627	Black Walnut	<i>Juglans nigra</i>	30	F	FG	F	10	6	Lean (L), crook (M)	Subject	Remove
628	Eastern White Cedar	<i>Thuja occidentalis</i>	11.5	FG	F	F	20	3	Asymmetrical crown (M), lean (L)	Subject	Remove
629	Apple species	<i>Malus sp.</i>	39.5	F	F	F	30	4	Lean (M), union at 1.5m, epicormic branching (M)	Subject	Remove
630	White Pine	<i>Pinus strobus</i>	35	G	F	F	20	5	Vine competition (M)	Subject	Remove

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631	Willow species	<i>Salix sp.</i>	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	<i>Salix sp.</i>	15.5	PF	F	F		5	Crook (H), asymmetrical crown (M), crowded by Tree 631	Subject	Remove
633	Manitoba Maple	<i>Acer negundo</i>	20	PF	PF	PF	40	5	Lean (M), crook (M), cavities (L), epicormic branching (M)	Subject	Remove
634	Silver Maple	<i>Acer saccharinum</i>	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	<i>Acer saccharinum</i>	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	<i>Salix sp.</i>	94	D	D	D	100	-	Dead	Subject	Remove
637	Poplar species	<i>Populus sp.</i>	41	F	F	F	20	5	Crook (M)	Subject	Remove
638	Silver Maple	<i>Acer saccharinum</i>	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	<i>Acer saccharinum</i>	28, 21, 11	F	F	F	20	6	V-union at 0.5m with included bark, epicormic branching (L)	Subject	Remove
640	Willow species	<i>Salix sp.</i>	45	F	F	F		6	Lean (M), crook (M), seam (L), epicormic branching (M), broken branches (L)	Subject	Remove
641	Black Walnut	<i>Juglans nigra</i>	15.5	F	G	F		4	Lean (L), canker (L)	Subject	Remove
642	Black Walnut	<i>Juglans nigra</i>	44	FG	F	F	10	8	Lean (L), broken branches (L)	Subject	Remove
643	Eastern White Cedar	<i>Thuja occidentalis</i>	~28, ~12	P	F	PF	20	3	Union at 0.5m, cavities (H)	Subject	Remove
644	White Spruce	<i>Picea glauca</i>	29	G	F	F	20	4		Subject	Remove
645	Silver Maple	<i>Acer saccharinum</i>	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	<i>Acer negundo</i>	20	PF	F	PF	30	4	Lean (M), decay (L) in trunk, epicormic branching (M)	Subject	Remove
647	White Spruce	<i>Picea glauca</i>	12	FG	G	G		2	Lean (L)	Subject	Remove
648	Manitoba Maple	<i>Acer negundo</i>	20	PF	F	PF	30	2	Lean (M), epicormic branching (M), cavities (L)	Subject	Remove
649	White Spruce	<i>Picea glauca</i>	20	FG	FG	F	10	2	Lean (L)	Subject	Remove
650	Manitoba Maple	<i>Acer negundo</i>	22	FG	F	F	30	5	Lean (L), epicormic branching (M)	Subject	Remove
651	White Spruce	<i>Picea glauca</i>	19	G	FG	F	10	2		Subject	Remove
652	Manitoba Maple	<i>Acer negundo</i>	30	F	PF	PF	30	4	V-union at 3m with included bark, poor form (L), epicormic branching (M)	Subject	Remove
653	Poplar species	<i>Populus sp.</i>	54	D	D	D	100	-	Dead	Subject	Remove
654	White Spruce	<i>Picea glauca</i>	15	FG	P	F		2	Top lost at 2m, lean (L)	Subject	Remove
655	Manitoba Maple	<i>Acer negundo</i>	27	FG	F	F	20	4	Lean (L), epicormic branching (M)	Subject	Remove
656	Eastern White Cedar	<i>Thuja occidentalis</i>	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	<i>Picea glauca</i>	19.5	G	FG	F	10	3		Subject	Remove
658	White Spruce	<i>Picea glauca</i>	20	G	FG	F	10	3		Subject	Remove
659	White Spruce	<i>Picea glauca</i>	20	FG	FG	F	10	3	Crook (L)	Subject	Remove
660	White Spruce	<i>Picea glauca</i>	50.5	G	F	F	20	5	Broken branches (L)	Subject	Remove
661	Manitoba Maple	<i>Acer negundo</i>	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	<i>Acer saccharum</i>	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	<i>Acer platanoides</i>	57	G	FG	F	10	9		Subject	Remove
664	Black Walnut	<i>Juglans nigra</i>	22	FG	FG	F	10	5	Included fence (L)	Subject	Remove
665	Bur Oak	<i>Quercus macrocarpa</i>	21	G	PF	PF	20	4	Epicormic branching (H)	Subject	Remove
666	Willow species	<i>Salix sp.</i>	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	<i>Ulmus americana</i>	39	D	D	D	100	-	Dead	Subject	Remove
668	Apple species	<i>Malus sp.</i>	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	<i>Tilia cordata</i>	50, 19	F	F	F		6	Union at base, poor branch unions, burls (L), bow (L)	Subject	Remove
670	Eastern White Cedar	<i>Thuja occidentalis</i>	10	F	F	FG		2	Asymmetrical crown (M), crook (M)	Subject	Remove
671	Norway Spruce	<i>Picea abies</i>	47.5	G	F	F	10	4	Epicormic branching (L)	Subject	Remove
672	Manitoba Maple	<i>Acer negundo</i>	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	<i>Acer saccharinum</i>	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	<i>Picea abies</i>	36	G	F	F	20	4	Epicormic branching (M)	Subject	Remove
675	Blue Spruce	<i>Picea pungens</i>	26	G	F	F	20	3	Epicormic branching (M)	Subject	Remove
676	Blue Spruce	<i>Picea pungens</i>	26.5	G	F	F	20	3	Epicormic branching (M)	Subject	Remove

677	Black Walnut	<i>Juglans nigra</i>	13	G	F	G		4	Asymmetrical crown (M)	Subject	Remove
678	Willow species	<i>Salix sp.</i>	39	G	PF	PF	40	5	Asymmetrical crown (L), epicormic branching (M)	Subject	Remove
679	Black Walnut	<i>Juglans nigra</i>	22.5	F	F	F	20	3	Crook (M)	Subject	Remove
680	Black Walnut	<i>Juglans nigra</i>	35	G	F	F	20	7	Epicormic branching (L)	Subject	Remove
681	Willow species	<i>Salix sp.</i>	~160	P	P	PF	30	14	Failed at base, epicormic branching (M), union at base with cavities (H)	Subject	Remove
682	Black Walnut	<i>Juglans nigra</i>	29.5	G	G	FG		7		Subject	Remove
683	Poplar species	<i>Populus sp.</i>	19	F	FG	F	10	4	Crook (M)	Subject	Remove
684	Poplar species	<i>Populus sp.</i>	11.5	FG	FG	F	10	3	Crook (L)	Subject	Remove
685	Silver Maple	<i>Acer saccharinum</i>	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	<i>Populus sp.</i>	13	FG	F	F	30	4	Lean (L), asymmetrical crown (L)	Subject	Remove
687	Poplar species	<i>Populus sp.</i>	16	F	PF	PF	30	4	Lean (L), crook (L), asymmetrical crown (H), epicormic branching (M)	Subject	Remove
688	Silver Maple	<i>Acer saccharinum</i>	~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	<i>Acer saccharinum</i>	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	<i>Populus sp.</i>	22.5	PF	P	P	90	3	Moribund, crook (L), decay (M) in trunk, top dead	Subject	Remove
691	Poplar species	<i>Populus sp.</i>	19, 15	F	F	F	20	4	Union at base, crook (L), decay (L) in trunk	Subject	Remove
692	Poplar species	<i>Populus sp.</i>	21	FG	F	F	20	4	Crook (L)	Subject	Remove
693	Black Walnut	<i>Juglans nigra</i>	33	G	FG	F	10	5		Subject	Remove
694	Poplar species	<i>Populus sp.</i>	30	PF	P	P	90	4	Decay (M) in trunk, moribund	Subject	Remove
695	Poplar species	<i>Populus sp.</i>	16	G	FG	FG	10	4		Subject	Remove
696	Poplar species	<i>Populus sp.</i>	18	G	FG	FG	10	4		Subject	Remove
697	Poplar species	<i>Populus sp.</i>	22.5	G	F	F	20	4		Subject	Remove
698	Poplar species	<i>Populus sp.</i>	22.5	G	FG	FG	10	4		Subject	Remove
699	Poplar species	<i>Populus sp.</i>	27.5	G	F	F	20	4		Subject	Remove
700	Poplar species	<i>Populus sp.</i>	20	F	PF	PF	40	4	Crook (M), asymmetrical crown (M)	Subject	Remove
701	Poplar species	<i>Populus sp.</i>	21	G	F	F	20	4		Subject	Remove
702	Poplar species	<i>Populus sp.</i>	13	F	F	F	20	3	Crook (M)	Subject	Remove
703	Mountain Ash species	<i>Sorbus sp.</i>	16	P	P	P	80	2	Top lost at 3m, epicormic branching (M), decay (M) in trunk, lean (L)	Subject	Remove
704	Poplar species	<i>Populus sp.</i>	11	F	P	P	70	3	Lean (L), crook (L)	Subject	Remove
705	Poplar species	<i>Populus sp.</i>	13	D	D	D	100	-	Dead	Subject	Remove
706	Poplar species	<i>Populus sp.</i>	11.5	D	D	D	100	-	Dead	Subject	Remove
707	Poplar species	<i>Populus sp.</i>	20	FG	FG	F	10	4	Crook (L)	Subject	Remove
708	Poplar species	<i>Populus sp.</i>	28	PF	PF	P	60	4	Top dead, epicormic branching (M), decay (M) in trunk	Subject	Remove
709	Poplar species	<i>Populus sp.</i>	10	G	FG	FG	10	3		Subject	Remove
710	Poplar species	<i>Populus sp.</i>	17	G	FG	FG	10	4		Subject	Remove
711	White Elm	<i>Ulmus americana</i>	41	G	F	F	30	5	Pruning wounds (L), epicormic branching (M)	Township (Right-of-Way)	Remove
712	Siberian Elm	<i>Ulmus pumila</i>	15	G	F	F	30	3	Epicormic branching (M)	Subject	Remove
713	Poplar species	<i>Populus sp.</i>	14	FG	F	F	10	3	Crook (L), epicormic branching (L)	Subject	Remove
714	Siberian Elm	<i>Ulmus pumila</i>	13	G	F	F	20	3	Epicormic branching (L)	Subject	Remove
715	Siberian Elm	<i>Ulmus pumila</i>	11	G	PF	PF	40	3		Subject	Remove
716	Poplar species	<i>Populus sp.</i>	24.5	PF	F	PF	30	4	Vine competition (M), decay (M) in trunk, crook (L), epicormic branching (M)	Subject	Remove
717	Poplar species	<i>Populus sp.</i>	23	F	F	F	10	5	Lean (L), crook (M), epicormic branching (L)	Subject	Remove
718	Poplar species	<i>Populus sp.</i>	14	G	F	FG	10	3	Asymmetrical crown (L)	Subject	Remove
719	Eastern White Cedar	<i>Thuja occidentalis</i>	~10	FG	F	FG		2	Lean (L), asymmetrical crown (M)	Subject	Remove
720	Silver Maple	<i>Acer saccharinum</i>	~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	<i>Populus sp.</i>	25.5	F	F	F	10	4	Lean (L), multiple branch attachments, poor branch unions, vine competition (L)	Subject	Remove
722	Silver Maple	<i>Acer saccharinum</i>	35	FG	PF	PF	30	6	Poor branch unions, poor form (L), asymmetrical crown (L), epicormic branching (M)	Subject	Remove
723	Silver Maple	<i>Acer saccharinum</i>	~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

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724	Balsam Fir	<i>Abies balsamea</i>	20	F	F	F	20	3	Stem wounds (M), rope girdling trunk (L)	Subject	Remove
725	Manitoba Maple	<i>Acer negundo</i>	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	<i>Betula papyrifera</i>	~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	<i>Pinus nigra</i>	37	FG	PF	PF	40	4	Lean (L)	Subject	Remove
728	Black Walnut	<i>Juglans nigra</i>	33	FG	FG	FG		5	Lean (L), asymmetrical crown (L)	Subject	Remove
729	Sugar Maple	<i>Acer saccharum</i>	21	PF	F	PF		4	Cavities (M), epicormic branching (M), asymmetrical crown (M), lean (L)	Subject	Remove
730	Austrian Pine	<i>Pinus nigra</i>	24.5	D	D	D	100	-	Dead	Subject	Remove
731	Norway Maple	<i>Acer platanoides</i>	27.5	G	F	F	20	5		Subject	Remove
732	Sugar Maple	<i>Acer saccharum</i>	37	G	F	F	20	5		Subject	Remove
733	Black Walnut	<i>Juglans nigra</i>	18	G	FG	FG	10	5		Subject	Remove
734	Apple species	<i>Malus sp.</i>	15.5	D	D	D	100	-	Dead	Subject	Remove
735	Austrian Pine	<i>Pinus nigra</i>	47	F	F	F	20	6	V-union at 5m with included bark	Subject	Remove
736	Tamarack	<i>Larix laricina</i>	34.5	FG	F	F	20	5	Lean (L), epicormic branching (L)	Subject	Remove
737	Norway Spruce	<i>Picea abies</i>	20	FG	F	F	10	3	Lean (L), asymmetrical crown (L)	Subject	Remove
738	Sugar Maple	<i>Acer saccharum</i>	16	G	F	FG		4	Asymmetrical crown (M)	Subject	Remove
739	White Spruce	<i>Picea glauca</i>	20, 19	F	FG	FG		3	V-union at 0.5m with included bark	Subject	Remove
740	Scots Pine	<i>Pinus sylvestris</i>	32.5	FG	F	F	10	4	Lean (L), asymmetrical crown (L)	Subject	Remove
741	White Birch	<i>Betula papyrifera</i>	30, 25	F	F	F	10	5	V-union at 0.5m with included bark, lean (L)	Subject	Remove
742	Sugar Maple	<i>Acer saccharum</i>	~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	<i>Acer saccharum</i>	~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	<i>Pinus nigra</i>	32	F	F	F	30	4	Included chain (H)	Subject / Township (Right-of-Way)	Remove
745	Austrian Pine	<i>Pinus nigra</i>	40.5	F	F	F	30	4	Lean (L)	Township (Right-of-Way)	Remove
746	Blue Spruce	<i>Picea pungens</i>	37	F	PF	PF	30	4	Asymmetrical crown (L), top dead	Subject	Remove
747	Austrian Pine	<i>Pinus nigra</i>	38	G	PF	F	30	5	Asymmetrical crown (M)	Subject	Remove
748	Austrian Pine	<i>Pinus nigra</i>	35	G	PF	F	30	5	Asymmetrical crown (M)	Subject	Remove
749	Norway Maple	<i>Acer platanoides</i>	52	F	F	F	10	6	Multiple branch attachments, poor branch unions, epicormic branching (L)	Subject	Remove
750	Hawthorn species	<i>Crataegus sp.</i>	16, 16	PF	PF	PF	40	3	V-union at 1m with included bark and cavities (M)	Subject	Remove
751	Norway Maple	<i>Acer platanoides</i>	24	FG	G	FG		4	Lean (L)	Subject	Remove
752	Eastern White Cedar	<i>Thuja occidentalis</i>	10, 10	G	F	F		2	Union at 1m, asymmetrical crown (M)	Subject	Remove
753	Scots Pine	<i>Pinus sylvestris</i>	14	FG	F	F	20	2	Lean (L)	Subject	Remove
754	Poplar species	<i>Populus sp.</i>	15.5	F	F	F	30	3	Top dead	Subject	Remove
755	Scots Pine	<i>Pinus sylvestris</i>	18.5	FG	FG	FG	10	3	Lean (L)	Subject	Remove
756	Poplar species	<i>Populus sp.</i>	15	G	G	G		3		Subject	Remove
757	Poplar species	<i>Populus sp.</i>	11	G	G	G		2		Subject	Remove
758	Poplar species	<i>Populus sp.</i>	11	G	G	G		2		Subject	Remove
759	Scots Pine	<i>Pinus sylvestris</i>	17	F	F	F	20	3	Lean (L), crook (L)	Subject	Remove
760	Poplar species	<i>Populus sp.</i>	13	F	F	F	10	3	Sweep (L), seam (L), crook (L)	Subject	Remove
761	Scots Pine	<i>Pinus sylvestris</i>	14.5	FG	F	F	20	2	Lean (L), asymmetrical crown (L)	Subject	Remove
762	Scots Pine	<i>Pinus sylvestris</i>	19.5	G	FG	FG	10	3		Subject	Remove
763	Scots Pine	<i>Pinus sylvestris</i>	11	G	G	G		2		Subject	Remove
764	Apple species	<i>Malus sp.</i>	17.5, 17	F	F	F	20	4	Union at base, bow (L), epicormic branching (M), lean (L)	Subject	Remove
765	Norway Maple	<i>Acer platanoides</i>	20	FG	FG	G		4	Sweep (L), asymmetrical crown (L)	Township (Right-of-Way)	Remove
766	Apple species	<i>Malus sp.</i>	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	<i>Acer saccharum</i>	14.5	PF	F	F	20	3	Bow (M), crook (M), poor form (M)	Subject	Remove
768	Apple species	<i>Malus sp.</i>	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

Tree Inventory and Preservation Plan
7456 McLean Road West, Puslinch, Ontario

769	Apple species	<i>Malus sp.</i>	35, 24	P	P	P	60	4	Union at 1m, cavities (H), decay (M) in trunk, epicormic branching (M)	Subject	Remove
770	Black Walnut	<i>Juglans nigra</i>	37	G	FG	F	10	7		Subject	Remove
771	Black Cherry	<i>Prunus serotina</i>	42	P	P	P	90	5	Cavities (H), decay (H) in trunk, asymmetrical crown (H), broken branches (H), moribund	Subject	Remove
772	Austrian Pine	<i>Pinus nigra</i>	19	D	D	D	100	-	Dead	Subject	Remove
773	Austrian Pine	<i>Pinus nigra</i>	14.5	G	PF	PF	40	3		Subject	Remove
774	Scots Pine	<i>Pinus sylvestris</i>	16.5	FG	FG	FG	10	3	Lean (L)	Subject	Remove
775	Scots Pine	<i>Pinus sylvestris</i>	27	FG	FG	FG	10	4	Lean (L)	Subject	Remove
776	Norway Spruce	<i>Picea abies</i>	35	G	FG	F	10	5		Subject	Remove
777	Austrian Pine	<i>Pinus nigra</i>	41	F	F	F	10	5	V-union at 4m with included bark	Subject	Remove
778	Sugar Maple	<i>Acer saccharum</i>	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	<i>Tilia americana</i>	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	<i>Salix sp.</i>	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	<i>Pinus strobus</i>	28	G	FG	FG	10	5		Subject	Remove
782	White Spruce	<i>Picea glauca</i>	11	G	FG	G		2	Asymmetrical crown (L)	Subject	Remove
783	White Spruce	<i>Picea glauca</i>	14	G	G	G		3		Subject	Remove
784	White Spruce	<i>Picea glauca</i>	11	G	F	F	20	2	Asymmetrical crown (M)	Subject	Remove
785	White Spruce	<i>Picea glauca</i>	14	G	F	F	20	3	Asymmetrical crown (L)	Subject	Remove
786	Silver Maple	<i>Acer saccharinum</i>	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	<i>Acer saccharinum</i>	14	FG	F	F		4	Bow (L), epicormic branching (M)	Subject	Remove
788	Silver Maple	<i>Acer saccharinum</i>	12	F	PF	F	20	4	Asymmetrical crown (H), canker (L)	Subject	Remove
789	Silver Maple	<i>Acer saccharinum</i>	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	<i>Acer saccharinum</i>	18	FG	F	F	10	5	Epicormic branching (M), crook (L)	Subject	Remove
791	White Spruce	<i>Picea glauca</i>	15	G	G	G		3		Subject	Remove
792	Silver Maple	<i>Acer saccharinum</i>	29	FG	F	F	10	7	Lean (L), asymmetrical crown (L)	Subject	Remove
793	White Spruce	<i>Picea glauca</i>	~14	G	G	G		3		Subject	Remove
794	Silver Maple	<i>Acer saccharinum</i>	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	<i>Ulmus americana</i>	~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	<i>Ulmus americana</i>	~82	G	PF	F	30	10	Epicormic branching (M), broken branches (M)	Subject	Remove
797	Manitoba Maple	<i>Acer negundo</i>	36	F	F	F	30	7	Growth deficit (L), asymmetrical crown (L), lean (L), epicormic branching (M)	Subject	Remove
798	Manitoba Maple	<i>Acer negundo</i>	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	<i>Acer negundo</i>	38	F	PF	F	30	7	Asymmetrical crown (M), lean (L), crook (L), epicormic branching (M)	Subject	Remove
800	Manitoba Maple	<i>Acer negundo</i>	28	PF	PF	PF	30	6	Sweep (M), bow (M), broken branches (H), asymmetrical crown (H), epicormic branching (M)	Subject	Remove
801	Manitoba Maple	<i>Acer negundo</i>	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	<i>Acer negundo</i>	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	<i>Acer negundo</i>	~34	PF	PF	PF	30	6	Lean (H), epicormic branching (H), asymmetrical crown (M)	Subject	Remove
804	Manitoba Maple	<i>Acer negundo</i>	~40	P	P	P	80	8	Failed at base, broken branches (H), epicormic branching (H), poor form (H)	Subject	Remove
805	Manitoba Maple	<i>Acer negundo</i>	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	<i>Acer negundo</i>	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	<i>Juglans nigra</i>	20, 18.5	F	F	F	10	5	V-union at 1m with included bark	Subject	Remove
808	Manitoba Maple	<i>Acer negundo</i>	~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	<i>Populus sp.</i>	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	<i>Populus sp.</i>	18	F	G	G		4	Sweep (M), lean (L), vine competition (L)	Subject	Remove
811	Poplar species	<i>Populus sp.</i>	15	G	G	G		3	Vine competition (L)	Subject	Remove
812	Black Walnut	<i>Juglans nigra</i>	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	(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	
	AGS	UGS	AGS	UGS	AGS	UGS	AGS	UGS
Species								
Eastern White Cedar (<i>Thuja occidentalis</i>)	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	
	AGS	UGS	AGS	UGS	AGS	UGS	AGS	UGS	AGS	UGS
Species										
Norway Maple (<i>Acer platanoides</i>)	4	0	0	0	0	0	0	0	4	0
White Mulberry (<i>Morus alba</i>)	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	
	AGS	UGS	AGS	UGS	AGS	UGS	AGS	UGS	AGS	UGS
Species										
Willow species (<i>Salix sp.</i>)	3	0	0	0	0	0	0	0	3	0
Manitoba Maple (<i>Acer negundo</i>)	7	0	0	0	0	0	0	0	7	0
Poplar species (<i>Populus sp.</i>)	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	
	AGS	UGS	AGS	UGS	AGS	UGS	AGS	UGS	AGS	UGS
Species										
Poplar species (<i>Populus sp.</i>)	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	
	AGS	UGS	AGS	UGS	AGS	UGS	AGS	UGS	AGS	UGS
Species										
Austrian Pine (<i>Pinus nigra</i>)	2	0	0	0	0	0	0	0	2	0
Poplar species (<i>Populus sp.</i>)	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 (<i>Acer negundo</i>)	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 (<i>Acer saccharum</i>)	0	1	0	2	3
Black Walnut (<i>Juglans nigra</i>)	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 (<i>Populus sp.</i>)	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 (<i>Pinus sylvestris</i>)	1	3	3	0	7
Poplar species (<i>Populus sp.</i>)	2	2	2	0	6
Willow species (<i>Salix sp.</i>)	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 (<i>Populus sp.</i>)	6	0	0	0	6
Scots Pine (<i>Pinus sylvestris</i>)	0	1	0	0	1
Total Number of Trees	6	1	0	0	7



Township of Puslinch
7404 Wellington Road 34,
Puslinch, ON, N0B 2J0
T: (519) 763 – 1226
F: (519) 763 – 5846
www.puslinch.ca

Zoning By-law Amendment Application

Date submitted: _____

The Amendment:

Type of amendment:

Site specific:

Other (specify):

N/A

Purpose of and reasons for the proposed amendment(s):

To rezone the subject site (7456 McLean Road W & 197 Brock Road S) from the IND (sp54) Zone and the IND(h5) Zone to the Highway Commercial (HC) Zone to permit a small-scale multi-tenant commercial development with a Gas Bar, Convenience Store and Drive-Through Restaurant.

General Information:

1. Applicant Information:

Registered Owner's Name(s): DAAZ Inc.

Address: _____

City: _____

Postal Code: _____

Email Address: _____

Telephone Number: _____

Fax: _____

Applicant (Agent) Name(s): Siv-ik Planning & Design Inc. (c/o Michael Davis)
Address: 14 Glendale Avenue N
City: Hamilton, ON.
Postal Code: L8L7J3
Email Address: mdavis@siv-ik.ca
Telephone Number: 905-921-9029
Fax: _____

Other Name(s): N/A
Address: _____
City: _____
Postal Code: _____
Email Address: _____
Telephone Number: _____
Fax: _____

Name, address, and phone number of all persons having any mortgages, charges, or encumbrances on the property.

None.

Send correspondence to: Owner: Agent: Other: _____

When did the current owner acquire the subject land? Date: July 14, 2022

4. What does the amendment cover?

The "entire" property:

A "portion" of the property:

(This information should be illustrated on the required drawing under item 24 of this application)

5. Provide a description of the "entire" property:

Municipal address: 7456 McLean Road W & 197 Brock Road S

Concession: 7 Lot: PT Lot 25

Registered Plan Number: PARTS 1 & 2 61R7239

Area: 1.62 ha Depth: 135.2 m Frontage: 101 m
_____ ac _____ ft. _____ ft.

6. Provide a description of the area to be amended if only a "portion" of the property:

Area: _____ ha Depth: _____ m Frontage: _____ m
_____ ac _____ ft. _____ ft.

7. Is the application to amend the zoning by-law consistent with the Provincial Policy Statement?

Yes: No:

8. Is the subject land within an area of land designated under any provincial plan or plans?

Greenbelt Plan: Places to Grow: Other: (specify): _____

If yes, does the application conform to and not conflict with the application provincial plan or plans?

Yes: No:

9. County Official Plan

What is the current County Official Plan designation of the subject property?

Rural Employment

List land uses permitted by the current Official Plan designation:

Dry industrial and commercial uses requiring large lots, major road access or proximity to rural resources are permitted in rural employment areas. Areas designated Rural Employment in Puslinch are permitted to have the following additional uses: complementary commercial uses such as automotive uses, restaurants, motels and limited retail; offices, including a head office and/or research centre.

How does the application conform to the Official Plan?

The proposed ZBA will enable the development of a range of "complementary" commercial uses that will support the function of the broader employment area between 401 & Aberfoyle. The site is limited in size and the development can be serviced by private on-site services (see Functional Servicing Report)

If the application is to implement an alteration to the boundary of an area of settlement or to implement a new area of settlement, provide details of the Official Plan or Official Plan amendment that deals with the matter.

N/A

If the application is to remove land from an area of employment, provide details of the Official Plan or Official Plan amendment that deals with the matter.

N/A

If the subject land is within an area where zoning with conditions may apply, provide an explanation of how the application conforms to the Official Plan policies relating to zoning with conditions.

N/A

10. Zoning:

What is the current zoning of the property? IND(sp54) & IND(h5)

What uses are permitted? Industrial

If the subject land is within an area where zoning with conditions may apply, provide an explanation of how the application conforms to the Official Plan policies relating to zoning with conditions.

N/A

If the subject land is within an area where the municipality has pre-determined minimum and maximum density requirements or the minimum and maximum height requirements provide a statement of these requirements.

N/A

Existing and Proposed Land Uses and Buildings:

11. What is the "existing" use(s) of the subject land?

Vacant/undeveloped.

12. How long has the "existing" use(s) continued on the subject land?

N/A

13. What is the "proposed" use(s) of the subject land?

Gas Bar(s), Convenience Store & Drive-Through Restaurant.

14. Provide the following details for all buildings or structures on the subject land: More space required - see detailed breakdown on pg. 12-13 of PJR.

Building Details	Existing		Proposed	
Type of Building(s) or structures				
Date of construction				
Building height	m	ft	m	ft
Number of floors				
* Total floor area	m ²	ft ²	m ²	ft ²
Ground floor area (exclude basement)	m ²	ft ²	m ²	ft ²
Distance from building structure to the:				
Front lot line	m	ft	m	ft
Side lot line	m	ft	m	ft
Other side lot line	m	ft	m	ft
Rear lot line	m	ft	m	ft

Building Details	Existing		Proposed	
*Percentage lot coverage				
*Number of parking spaces				
*Number of loading spaces				

Existing and Proposed Services:

15. What is the access to the subject property?

- Provincial Highway:
- Continually maintained municipal road:
- Right-of-way:
- Seasonally maintained municipal road:
- Water access:
- Other (please specify):

16. What is the name of the road or street that provides access to the subject property.

McLean Road W & Brock Road S

17. If access is by water only, please describe the parking and docking facilities used or to be used and the approximate distance of these facilities from subject land to the nearest public road.

N/A

(This information should be illustrated on the required drawing under item 24 of this application)

18. Indicate the applicable water supply and sewage disposal:

Water Supply	Existing		Proposed	
Municipal water				

Water Supply	Existing	Proposed
Communal water		
Private well		<input checked="" type="checkbox"/>
Other water supply		
Water sewers		
Municipal sewers		
Communal sewers		
Private septic		<input checked="" type="checkbox"/>
Other sewage disposal		

19. If the application would permit development on privately owned and operated individual or communal septic systems, would more than 4500 litres of effluent be produced per day as a result of the development being completed?

Yes: No:

If yes, the following reports are required:

Servicing options report

A hydrogeological report

20. How is storm drainage provided?

Storm Sewers:

Ditches:

Swales:

Other: (explain below)

On-site quantity and quality control systems are proposed. Stormwater will outlet to existing sewers located on McLean Road W. See the Functional Servicing Report prepared by Crozier & Associates for further details.

Other Related Planning Applications:

21. Has the current owner (or any previous owner) made application for any of the following, either on the subject property or within 120 metres of the subject lands?

Planning Application	Yes	No	*File Number	Approval Authority	Subject Lands	Purpose	*Status
Official Plan Amendment							
Zoning By-Law Amendment							
Minor Variance							
Plan of Subdivision							
Consent (Severance)							
Site Plan Control							

22. Has the subject land ever been the subject of a Minister's Zoning Order?

Yes: No:

If yes, provide the Ontario Regulation number of that order, if known: N/A

Other Supporting Information

23. Please list the titles of any supporting documents: (e.g. Environmental Impacts Study, Hydrogeological Report, Servicing Options Report, Traffic Study, Market Area Study, Aggregate Licence Report, Stormwater Management Report, etc.)

1. Planning Justification Report; 2. Transportation Impact Study; 3. Functional Servicing Report; 4. Hydrogeological Report; 5. Scoped EIS Review; 6. Sourcewater Screening Form; 7. Conceptual Site Plan.

Application Drawing

24. Please provide an accurate drawing of the proposal, preferably prepared by a qualified professional. In some cases, it may be more appropriate to submit additional drawings at varying scales a lot better illustrate the proposal. The drawing must include the following information (see on following page):

- Owner/applicant's names;
 - Legal description of the property;
 - Boundaries and dimensions of the subject and its current land use;
 - Dimensions of area of amendment (if not, the entire property);
 - The size and use of all abutting land;
 - All existing and proposed parking and loading areas, driveways, and lanes;
 - The location and nature of any easements or restrictive covenants on the property;
 - The location of any existing drains or award drains;
 - Woodlots, forested areas, ANSIs, ESAs, wetlands, floodplain, and all natural watercourses (rivers, stream banks, etc.);
- The location, size , and type of all existing and proposed buildings and structures on the subject land , indicating their distance from the front lot line, rear lot line, and side lot lines;
- The name, location, and width of each abutting public or private road, unopened road allowance or right-of-way;
- If access to the subject land is by water only, provide the location of the parking and docking facilities to be used;
 - Other features both on site or nearby that in the opinion of the applicant will have an effect on the application (such as bridges, railways, airports, roads, drainage ditches, wells, septic systems, springs, slopes, gravel pits); and
 - The drawing should also include the scale, north arrow, and date when the drawing was prepared.

Authorization for Agent/Solicitor to act for Owner

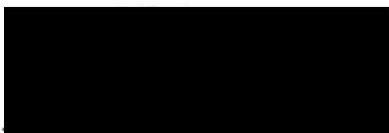
(If affidavit is signed by an Agent/Solicitor on Owner's behalf, the Owner's written authorization below shall be completed)

I (we) ISHWINDERPREET (HARRY) WADHWA (of Daaz Inc.) of the

Town of Acton County/Region of

Wellington do hereby authorize

Siv-ik Planning & Design Inc. (Michael Davis) to act as my agent in this application.



Signature of Owner(s)

October 3, 2023
Date

Affidavit

I (we) Michael Davis of the

City of Hamilton County/Region of

Hamilton solemnly declare that all the statements

contained in this application are true, and I, (we), make this solemn declaration

conscientiously believing it to be true, and knowing that it is of the same force and effect

as if made under oath and by virtue of the CANADA EVIDENCE ACT. DECLARED

before me at the city of Orleans in the

County/Region of Ontario this 22nd day of

September, 2023.

[Redacted Signature]

Signature of Owner or authorized solicitor or agent

September 22, 2023

Date

[Redacted Signature]

Signature of Commissioner



September 22, 2023

Date

Agreement to Post Sign and Permit Site Visits

For the purpose of public notification and staff identification, I agree to erect a sign in accordance with the Township of Puslinch's sign requirements within one week of the date Township staff has deemed that the application is complete, and remove the sign when the application has been given final approval.

Furthermore, for the purposes of processing this application, I permit staff/representatives of the Township of Puslinch to enter onto my lands and inspect my property at the following times (please check one of the following boxes):

Any and all times: Certain days as specified: By appointment only:

[Redacted Signature]

Signature

September 22, 2023

Date

born remotely by Michael stated as being located in the city of Hamilton in the province of Ontario, before me, Fatima Farooq 606S, in Orleans, ON on the 22nd day of September, 2023, in accordance with Reg 431/20 administering Oath Declaration remotely.

For Administrative Purposes Only:

Application fee of \$ _____ received by the municipality

Date Fee Received: _____

Date Application Filed: _____

File Number: _____

Application deemed complete:

Signature of Municipal Employee

Date

Personal information on this form is collected under the authority of the Planning Act. The information is used for the purpose of processing this application and administering the legislation and is maintained in accordance with the Municipal Freedom of Information and Protection of Privacy Act. Questions regarding the collection of this information may be directed to the Township Clerk's office.

The Township of Puslinch is committed to providing accessible formats and communication supports for people with a disability. If another format would work better for you, please contact the Township Clerk's office for assistance.