THE CORPORATION OF THE MUNICIPALITY OF MCDOUGALL
COMMITTEE/COUNCIL MEETING

TO BE HELD WEDNESDAY, OCTOBER 6, 2021 AT 7:00 P.M.

AGENDA

1. **CALL TO ORDER**

2. **DECLARATIONS OF INTEREST**

3. **PRIORITIZATION OF AGENDA**

4. **ADOPTION OF MINUTES**

   i) THAT the minutes of the Committee/Council Meeting held on September 15, 2021 be adopted as circulated. **Rsl.**

5. **DEPUTATIONS**

   Matters Arising.

6. **PLANNING/BUILDING**

   i) John Jackson, Parry Sound Area Planning Board **(attachment)**
   Re: Consent Application B37/2021 (McD) McDevitt, 1 new lot fronting on Portage Lake.
   Staff comments.

   ii) Zoning By-Law Amendment Application Z01-2021 (279056 Ontario Limited) **(attachment) Rsl.**
   Re: 9 McDougall Road West – Deem Complete.

   iii) Zoning By-Law Amendment Application Z02-2021 (Waltmar) **(attachment) Rsl.**
   Re: Part Lot 24 Concession 1, Former McDougall Township, now in the Municipality of McDougall – Deem Complete.

   Matters Arising.

7. **BY-LAW ENFORCEMENT**

   Matters Arising.

8. **FIRE PROTECTION**

   Matters Arising.

9. **EMERGENCY MANAGEMENT**

Matters Arising.

10. **RECREATION**

Matters Arising.

11. **PUBLIC WORKS**

Matters Arising.

12. **ENVIRONMENT**

i) Waste Management**.**

ii) Report of the Environmental Services Supervisor ENV-8-2021. **(attachment) Rsl.**
Re: General Update, and Crawford Septic System Assessment RFP.

Matters Arising.

13. **FINANCE**

i) Accounts Payable. **Rsl.**

Matters Arising.

14. **ADMINISTRATION**

i) Ministry of Northern Development, Mines, Natural Resources and Forestry. **(attachment)**
Re: Watershed Conditions Statement – Flood Outlook, Parry Sound District, Including Muskoka River, Magnetawan River and Pickerel River Watersheds.

ii) 2022 Committee/Council Schedule. **(attachment)**

iii) 2022 Municipal Holiday Schedule. **(attachment)**

iv) Danny Whalen, President, The Federation of Northern Ontario Municipalities (FONOM). **(attachment)**

Re: FONOM resolution asking the Association of Municipalities of Ontario (AMO) to lobby the Premier of Ontario to grant Ontario Municipalities the same Municipal Revenue Tools as the City of Toronto.

Matters Arising.

15. **REQUESTS FOR SUPPORT**

i) Mac Bain, Executive Director, The Federation of Northern Ontario Municipalities (FONOM). **(attachment)**
Re: Consolidation of Agencies to address the Opioid, Mental Health and Addiction Crisis.

ii) City of Sarnia. **(attachment)**
Re: Request that the Government of Ontario take additional and meaningful steps to address the ever increasing problem of “Renovictions” in The Province of Ontario.

Matters Arising.

16. **MOTIONS OF WHICH NOTICE HAS BEEN PREVIOUSLY GIVEN**

17. **COMMITTEE REPORTS**

i) North Bay Parry Sound District Health Unit. **(attachments)**
Re: News Release and Public Service Announcements.
a. News Release - Protect Yourself from West Nile Virus and Eastern Equine Encephalitis.
b. News Release - Public Health Officials across Northern Ontario increase COVID-19 protection for all users of indoor sporting facilities.
c. Public Service Announcement - Mobile and Walk-in COVID-19 Vaccine Clinics to be Held September 20 to 25.
d. Public Service Announcement - Mobile and Walk-in COVID-19 Vaccine Clinics to be Held September 27 to October 3.
e. News Release - Vaccine Certificate Questions Call the Health Unit.
f. Public Service Announcement - Health Unit Warns of Potential Exposure to COVID-19 at The Boat.

Matters Arising.

THE CORPORATION OF THE MUNICIPALITY OF MCDOUGALL
COMMITTEE/COUNCIL MEETING

TO BE HELD WEDNESDAY, OCTOBER 6, 2021 AT 7:00 P.M.

AGENDA

18. **REPORT OF THE CAO**

    i) Report of the CAO.
    Re: General Update.

19. **GENERAL ITEMS AND NEW BUSINESS**

20. **BY-LAWS**

    i) By-law 2021-44. **(attachment)**
    Re: Being a By-law to appoint a Fire Chief for the Municipality of McDougall and to rescind By-law 2003-11.

    ii) By-law 2021-45. **(attachment)**
    Re: A By-law to deem certain lots in the Municipality of McDougall not to be a part of a registered Plan of Subdivision (Plan M-215) (Parejo)

    iii) By-law 2021-46. **(attachment)**
    Re: Being a by-law to enter into an agreement with Stephen Harrison as a condition of approval of Consent No. B44/2020 (McD)

21. **CLOSED SESSION**

22. **RATIFICATION OF MATTERS FROM CLOSED SESSION**

23. **CONFIRMATION BY-LAW**

    i) By-Law No. 2021-47.
    Re: To confirm the proceedings of the Committee/Council meeting held on October 6, 2021.

24. **ADJOURNMENT**

Resolution List for October 6, 2021

THAT the minutes of the Committee/Council Meeting held on September 15, 2021 be adopted as circulated.

\- - - - - - - -

THAT the Council for the Corporation of the Municipality of McDougall deems Application Z01-2021 (279056 Ontario Limited) to amend the Municipal Zoning By-law(s) a “Complete” Application under Subsection 34 of the Planning Act, R.S.O. 1990, c. P.13 as amended.

\- - - - - - - -

THAT the Council for the Corporation of the Municipality of McDougall deems Application Z02-2021 (Waltmar) to amend the Municipal Zoning By-law(s) a “Complete” Application under Subsection 34 of the Planning Act, R.S.O. 1990, c. P.13 as amended.

\- - - - - - - -

THAT the Council of The Corporation of the Municipality of McDougall does hereby accept the quote prepared by Tathan Engineering titled “Crawford Subdivision, Municipality of McDougall, Engineering Fee Proposal for Sewage Evaluations” in the amount of $13,080.00 (exclusive of expenses and taxes).

\- - - - - - - -

THAT the attached lists of Accounts Payable for September __, 2021 in the amount of $________ and payroll for September __, 2021 in the amount of $_______ be approved for payment.

\- - - - - - - -

BE IT RESOLVED that the next portion of the meeting be closed to the public at p.m. in order to address a matter pertaining to:

1. the security of the property of the municipality or local board;
2. personal matters about an identifiable individual, including municipal employees or local board employees;
3. a proposed or pending acquisition or disposition of land by the municipality or local board;
4. labour relations or employee negotiations;
5. litigation or potential litigation, including matters before administrative tribunals, affecting the municipality or local board;
6. the receiving of advice which is subject to solicitor/client privilege, including communications necessary for that purpose;
7. a matter in respect of which a council, board, committee or other body has authorized a meeting to be closed under another act;
8. an ongoing investigation respecting the municipality, a local board or a municipally-controlled corporation by the Ontario Ombudsman appointed under the Ombudsman Act, or a Municipal Ombudsman;
9. subject matter which relates to consideration of a request under the Municipal Freedom of Information and Protection of Privacy Act.
10. the meeting is held for the purpose of educating or training the members and no member discusses or otherwise deals with any matter in a way that materially advances the business or decision making of the Council, Board or Committee.

11. information provided in confidence by another level of government or Crown agency
12. a trade secret or scientific, technical , commercial, financial or labour relations information supplied in confidence which, if released, could significantly prejudice the competitive position of a person or organization
13. a trade secret or scientific, technical, commercial or financial information that belongs to the municipality or local board and has monetary value or potential monetary value
14. a position, plan, procedure, criteria or instruction to be applied to any negotiations carried, or to be carried, on by the municipality or local board

\- - - - - - - -

THAT Council reconvene in Open Session at p.m.

\- - - - - - - -

THAT we do now adjourn at _______ p.m.

THE CORPORATION OF THE MUNICIPALITY OF MCDOUGALL
COMMITTEE/COUNCIL MEETING

HELD WEDNESDAY, SEPTEMBER 15, 2021 AT 7:00 P.M.

MINUTES

Present Physically:

Mayor	D. Robinson (Chairperson)
Councillor	J. Constable
Councillor	L. Gregory
Councillor	L. Malott
Councillor	J. Ryman
CAO/Director of Operations	T. Hunt
Chief Building Official	K. Dixon
Chief Financial Officer	S. Brisbane

As a result of the COVID-19 pandemic, as well as the requirements for physical distancing, this Committee/Council meeting was held electronically in accordance with section 238 of the Municipal Act, 2001.

1. **CALL TO ORDER**
   Mayor Robinson called the meeting to order at 7.00 p.m.

2. **DECLARATIONS OF INTEREST**
   Nil

3. **PRIORITIZATION OF AGENDA**

   i) Section 5 Deputations item 1; Shawn Martin, and Maryann Weaver, Lake Forest Drive.
   Re: Drainage issues. – Additional Photos/Information

   ii) Addition to Section 13 Finance, item 3; Report of the Chief Financial Officer CFO-2021-9.
   Re: Community Building Fund Capital Stream Application.

4. **ADOPTION OF MINUTES**
   Resolution No. 2021-119 **Ryman/Gregory**
   THAT the minutes of the Committee/Council Meeting held on September 1, 2021, and the Special Meeting of Council held on September 2, 2021 be adopted as circulated.

   "Carried"

5. **DEPUTATIONS**

   i) Shawn Martin, and Maryann Weaver, Lake Forest Drive.

Re: Drainage issues. – Additional Photos/Information
Ms. Weaver and Mr. Martin gave an overview of drainage issues pertaining to 11 & 13 Lake Forest Drive.
Mayor Robinson thanked Ms. Weaver and Mr. Martin for their deputation and noted that discussion of this matter will take place further in the agenda under Public Works.

Matters Arising.
Nil

6. **PLANNING/BUILDING**

i) Jamie Robinson, Partner, and Patrick Townes, Associate, MHBC Planning Urban Design and Landscape Architecture.
Re: Draft Background Report, Municipality of McDougall Official Plan Review. Patrick Townes presenting
Patrick Townes gave an overview and update regarding the Draft Background Report and noted that this report is available online and encourages people to review it and provide comments.
Mayor Robinson noted concerns in the Draft Report regarding policies on Short Term Rentals, and Shoreline Structures.

Matters Arising.
Nil

7. **BY-LAW ENFORCEMENT**
Nil

Matters Arising.
Nil

8. **FIRE PROTECTION**
Nil

Matters Arising.
Nil

9. **EMERGENCY MANAGEMENT**
Nil
Matters Arising.
Nil

10. **RECREATION**
Nil

Matters Arising.
Nil

11. **PUBLIC WORKS**
Nil

Matters Arising.
Tim Hunt, CAO/Director of Operations addressed the drainage issues discussed in the earlier deputation presented by Maryann Weaver and Shawn Martin. He had visited 11 Lake Forest Drive following the rain last night and did not see any standing water on the property, it was recommended that the landowners at 11 & 13 Lake Forest Drive reinstate the drain between the two lots and this should solve the problem.

12. **ENVIRONMENT**

i) Waste Management**.**
Nil

Matters Arising.
Nil

13. **FINANCE**

i) Accounts Payable.
Resolution No. 2021-120 **Gregory/Ryman**
THAT the attached lists of Accounts Payable for September 16, 2021 in the amount of $509,740.54 and payroll for September 9, 2021 in the amount of $40,866.35 be approved for payment.
"Carried"

ii) Bob Griffiths, Chair, Parry Sound Area Community Business & Development Centre Inc.
Re: Municipality of McDougall Contribution to the Parry Sound Area CB&DC - 2021.
Council gave approval for payment of this contribution which noted by the Chief Financial Officer was budgeted in 2020.

iii) Report of the Chief Financial Officer CFO-2021-9.
Re: Community Building Fund Capital Stream Application.
The Chief Financial Officer gave an overview of the report. Council received the report as information and gave direction for Ms. Brisbane to submit a Community Building Fund Capital Stream application for the purpose of a trail extension from McDougall Trail to Kinsmen Park in the amount of $450,000.

Matters Arising.
Nil

14. ADMINISTRATION

i) Report of the Clerk C-2021-07.
Re: Application to Purchase the Original Shore Road Allowance: Deane et al Shore Road Allowance Application, Portage Lake, Municipality of McDougall.
The Clerk gave an overview of the report. Council received as information and gave direction to proceed with the application.

ii) Report of the Clerk C-2021-08.
Re: Deeming By-Law Application D-2021-01 (Parejo)
The Clerk gave an overview of the report. Council received as information and gave direction to proceed with the application.

iii) Federation of Northern Ontario Municipalities (FONOM).
Re: August 17, 2021 Media Release: FONOM discusses Homelessness, Mental Health, and Addictions (Opioid Crisis) with the Provincial Government.
Council received as information.

iv) Marcelo Levy, Principal, Responsible Forestry Solutions.
Re: Independent Forest Audit – French-Severn Forest.
Council received as information.

Matters Arising.
Nil

15. REQUESTS FOR SUPPORT
Nil

Matters Arising.
Nil

16. **MOTIONS OF WHICH NOTICE HAS BEEN PREVIOUSLY GIVEN**
Nil

17. **COMMITTEE REPORTS**

i) Joint Municipal Service Board for the West Parry Sound Recreation and Cultural Centre.
Re: Appointments.
Resolution No. 2021-121 **Malott/Constable**
THAT the Council of The Corporation of the Municipality of McDougall does hereby appoint Mayor Dale Robinson as the Municipality of McDougall representative on the Joint Municipal Service Board for the West Parry Sound Recreation and Cultural Centre, effective September 10, 2021.

AND THAT Councillor Joel Constable is hereby appointed as the alternate Municipality of McDougall representative on the Joint Municipal Service Board for the West Parry Sound Recreation and Cultural Centre.
"Carried"

Mayor Robinson thanked Council and staff for all the support and hard work in getting to this stage of the project. Mayor Robinson also expressed appreciation to Donald Sanderson for accepting the position of Interim Chair.

ii) North Bay Parry Sound District Health Unit.
Re: News Releases and Public Service Announcements.
a. News Release - Health Unit Reports Increase in COVID-19 Vaccination Rates, Rates Exceed 90 Per Cent in Individuals 60 Years and Older.
b. News Release - Kale and Chopped Salad Kits Recalled due to Potential Listeria Contamination.
c. News Release - Rapid Antigen Screening Tests Not For Symptomatic Use.
d. Public Service Announcement - COVID-19 Vaccine Clinics to be Held August 31 to September 4 Walk-ins Welcome.

e. Public Service Announcement - Mobile COVID-19 Vaccine Clinics to be Held September 7 to September 11.
Council received as information.

Matters Arising.
Nil

18. **REPORT OF THE CAO**

i) Report of the CAO.
Re: General Update.
The CAO noted the following:
- Update regarding construction on Lake Forest Dr.
- There was minimal road damage due to the storm last night, was reports of a couple fallen trees.
- The Steering Committee for the proposed Pool Complex is looking forward to getting necessary processes in place to move forward with the construction and is also looking forward to the completion of the facility.
- Update on the renovations and funding regarding the Nobel Church.
- The Municipal Office Building has had its first coat of fresh paint applied and the new Municipal sign should be ready for installation next week.

ii) Association of Municipalities of Ontario (AMO).
Re: Municipal Recognition of September 30th as National Day for Truth and Reconciliation – Draft Resolution.
Resolution No. 2021-122 **Constable/Malott**
WHEREAS the Truth and Reconciliation Commission released its final report on June 2, 2015, which included 94 Calls to Action to redress the legacy of residential schools and advance the process of Canadian reconciliation;

AND WHEREAS the recent discoveries of remains and unmarked graves across Canada have led to increased calls for all levels of government to address the recommendations in the TRC's Calls to Action;

AND WHEREAS all Canadians and all orders of government have a role to play in reconciliation;

AND WHEREAS Recommendation #80 of the Truth and Reconciliation Commission called upon the federal government, in collaboration with Aboriginal peoples, to establish, as a statutory holiday, a National Day for Truth and Reconciliation to ensure that public commemoration of the history and legacy of residential schools remains a vital component of the reconciliation process;

AND WHEREAS the Federal Government has announced September 30th, 2021, as the first National Day for Truth and Reconciliation (National Orange Shirt Day) and a statutory holiday;

THEREFORE, BE IT RESOLVED THAT the Council of the Municipality of McDougall does hereby commit to recognizing September 30th, 2021, as the National Day for Truth and Reconciliation (National Orange Shirt Day) by sharing the stories of residential school survivors, their families, and communities.

"Carried"

19. **GENERAL ITEMS AND NEW BUSINESS**
Nil

20. **BY-LAWS**

i) By-law 2021-41.
Being a By-law to authorize the execution of a West Parry Sound Recreation and Cultural Centre Joint Municipal Service Board Agreement for the purpose of acting as an agent on behalf of the Municipalities, in the constructing, maintaining, and operating of the West Parry Sound Recreation and Cultural Center.
Read a first, Second and Third Time, Passed, Signed and Sealed this 15th day of September, 2021.

Mayor Robinson noted that Council will now consider By-law No. 2021-42 being a By-law to declare to be surplus, stop up, close and sell Part of the Original Shore Road Allowance laid out along the Lake Manitouwabing, application SRA-2020-06 (STAAB).

Mayor Robinson then requested the Clerk to please provide the manner in which notice of the proposed by-law was given, and if any written correspondence was received on this matter.
The Clerk noted that notice of the proposed by-law was given by advertising in the Parry Sound North Star for four consecutive weeks, as well as by posting on the municipal website and bulletin board. No written correspondence received.

ii) By-law 2021-42.
Re: Being a By-law to declare to be surplus, stop up, close and sell: Part of the Original Shore Road Allowance laid out along the shore of Lake Manitouwabing in front of Lot 1 in Concession 11, in the geographic Township of McDougall, now in the Municipality of McDougall, in the District of Parry Sound, designated as Part 2 on 42R-21677 (STAAB).
Read a first, Second and Third Time, Passed, Signed and Sealed this 15th day of September, 2021.

21. **CLOSED SESSION**
Resolution No. 2021-123 **Ryman/Gregory**
BE IT RESOLVED that the next portion of the meeting be closed to the public at 8:01 p.m. in order to address a matter pertaining to:

i) Part Lot 5, Concession A
Re: A proposed or pending acquisition or disposition of land by the municipality or local board;

"Carried"

Resolution No. 2021-124 **Gregory/Ryman**
THAT Council reconvene in Open Session at 8.29 p.m.
"Carried"

22. **RATIFICATION OF MATTERS FROM CLOSED SESSION**
That Council has received information regarding the closed session items, and staff have been directed by Council how to proceed on all matters.

23. **CONFIRMATION BY-LAW**

i) By-Law No. 2021-43.

Re: To confirm the proceedings of the Special Meeting of Council held on September 2, 2021, and the Committee/Council meeting held on September 15, 2021.
Read a first, Second and Third Time, Passed, Signed and Sealed this 15th day of September, 2021.

24. **ADJOURNMENT**
Resolution No. 2021-125 **Malott/Constable**
THAT we do now adjourn at 8:30 p.m.

"Carried"

John Jackson planner, inc. 70 Isabella Street Unit #110, Parry Sound, Ontario P2A 1M6
Tel: (705) 746-5667 Fax: (705) 746-1439 E-mail: jjplan@Cogeco.net

REPORT TO PARRY SOUND AREA PLANNING BOARD

CONSENT APLICATION NO. B37/2021(McD)

MUNICIPALITY OF McDOUGALL

Part of Lot 23 & 24, Concession 7, Part 1 & 2, Plan 42R-10517

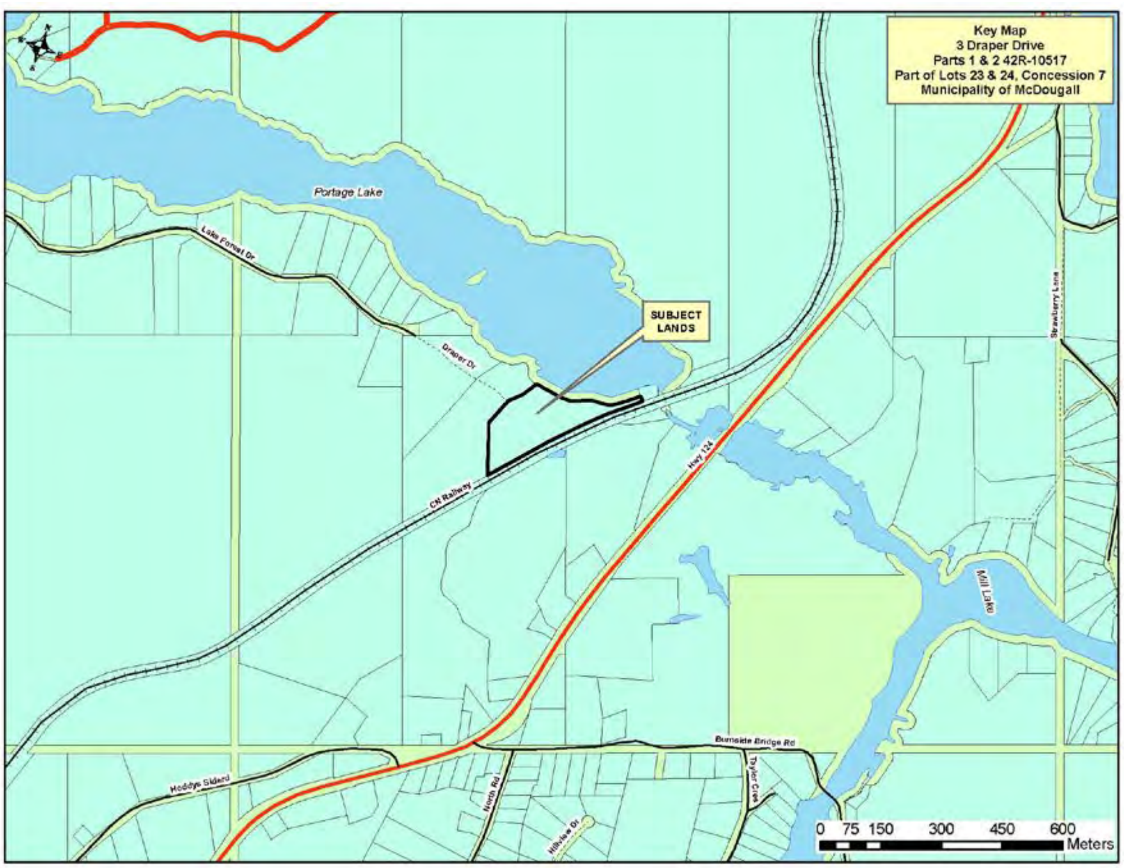
Roll # 493101000426220

3 Draper Drive

August 31, 2021

<u>Background/ Purpose</u>

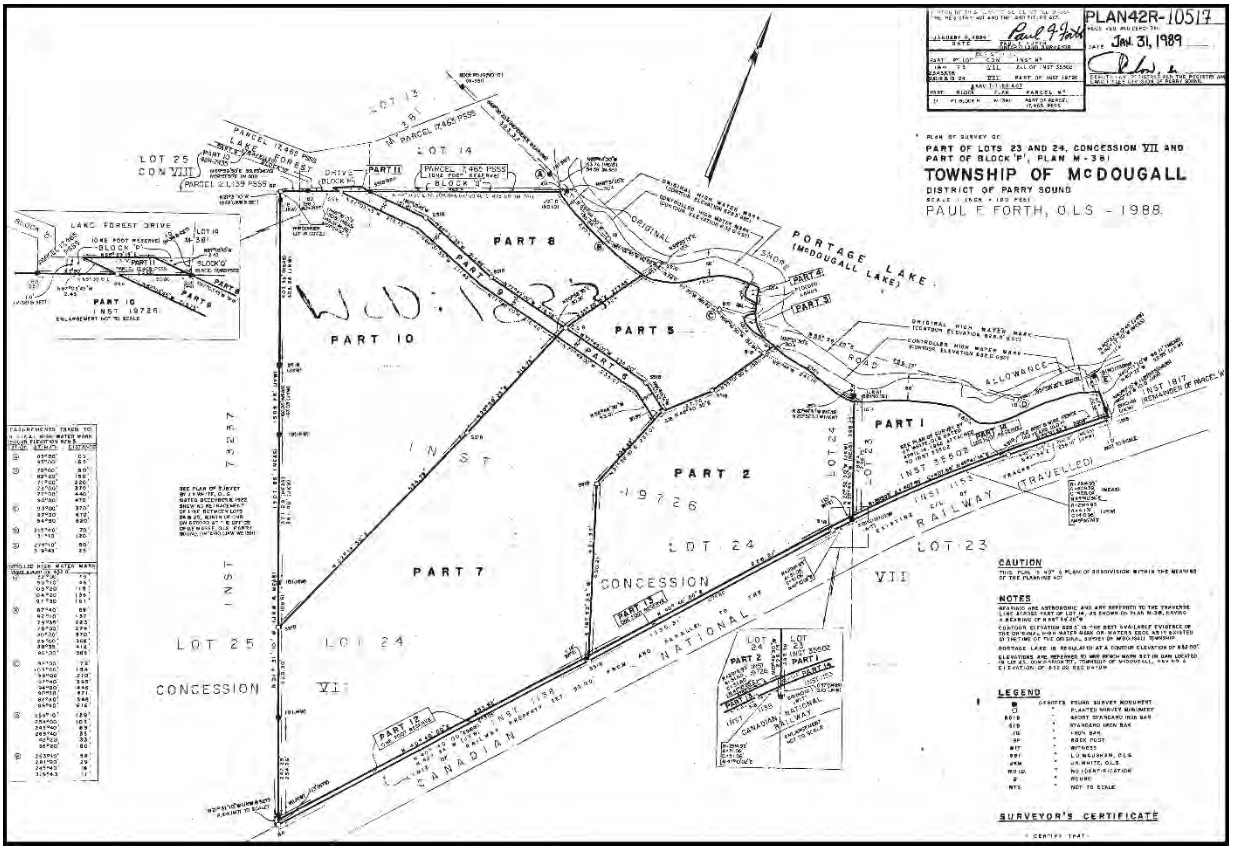
Barry and Lori McDevitt own a parcel of land at the east end of Partage Lake. They are proposing to create one new lakefront lot with access off Draper Drive.



Property Description

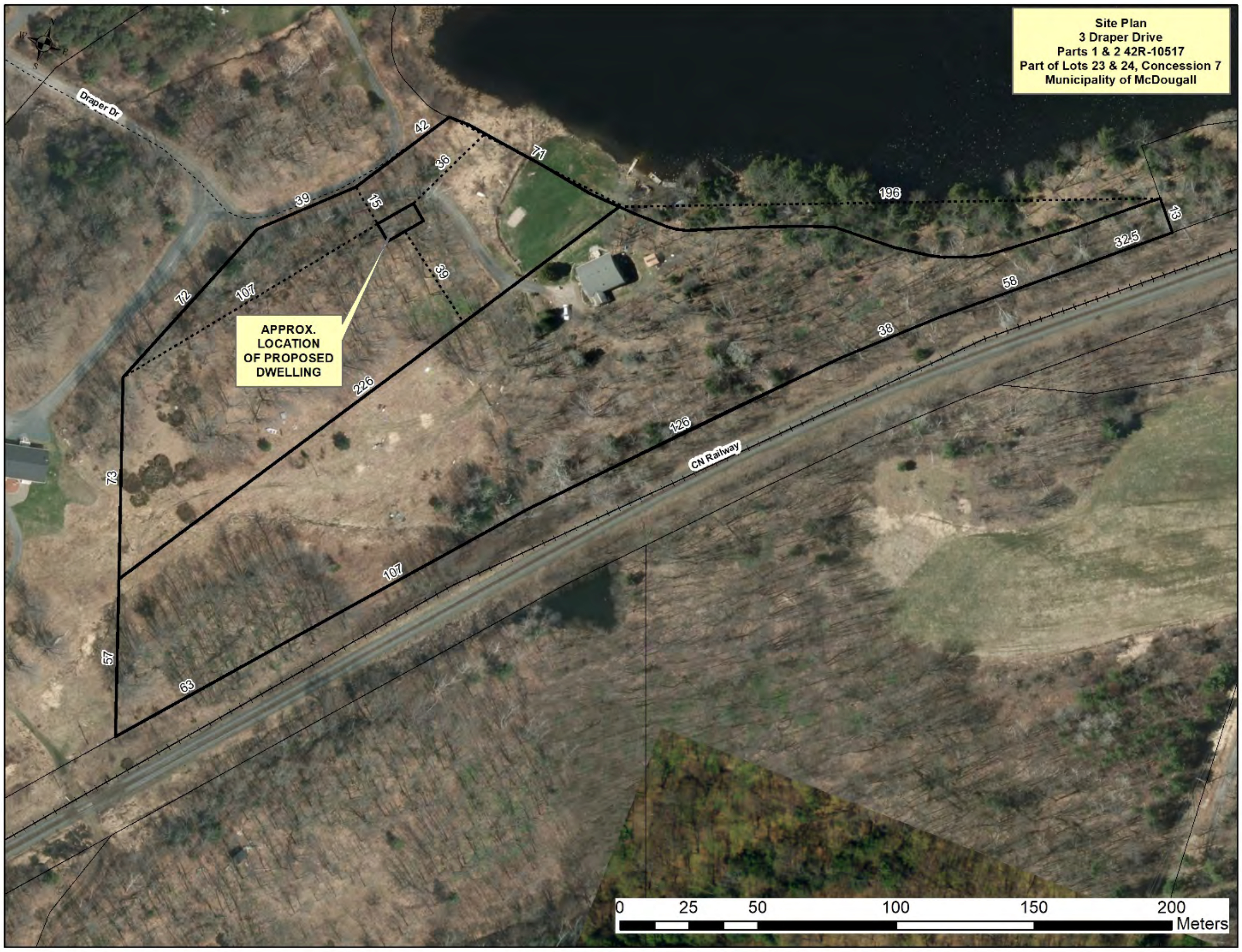
The McDevitt property is Part of Lot 23 & 24, Concession 7, Part 1 & Reference Plan 42R-10517.

The land is located between the Canadian National Railway and Portage Lake.



The lot is assessed as having 249 metres of frontage and 3.5 hectares.

There is an existing dwelling and accessory buildings on the property. A new dwelling is proposed to be constructed on the severed lot as shown below.

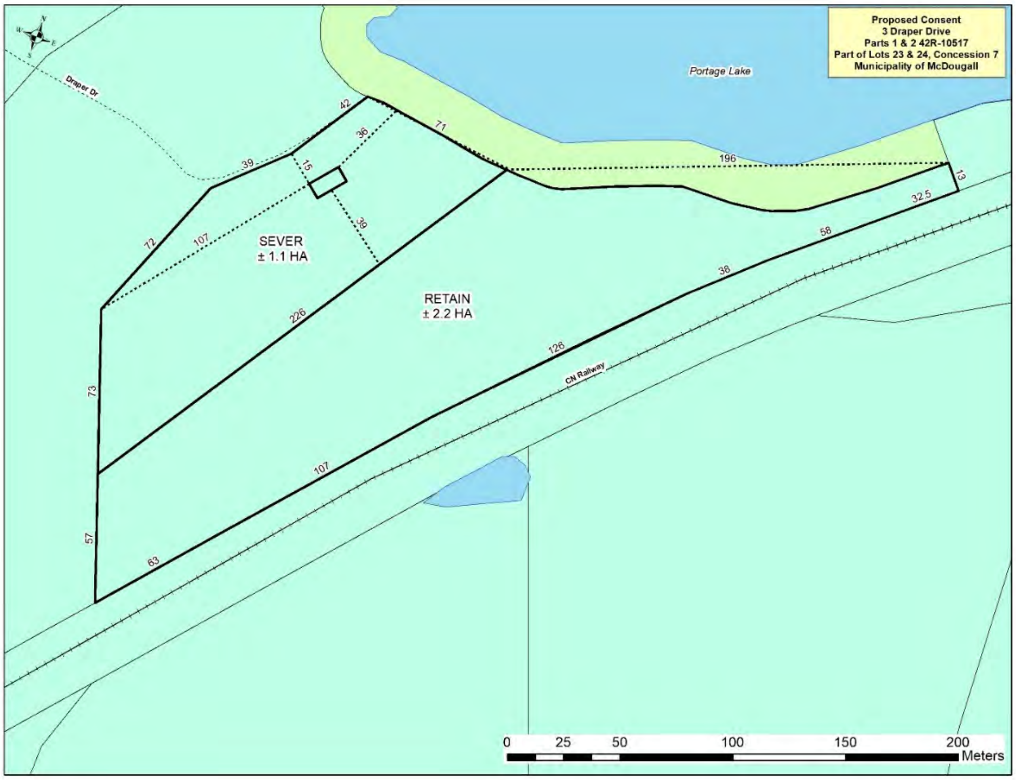


The lot is moderately treed and slopes to the lake. The tree cover provides a buffer between the existing dwelling, the proposed dwelling and the railway.

Proposed Consent

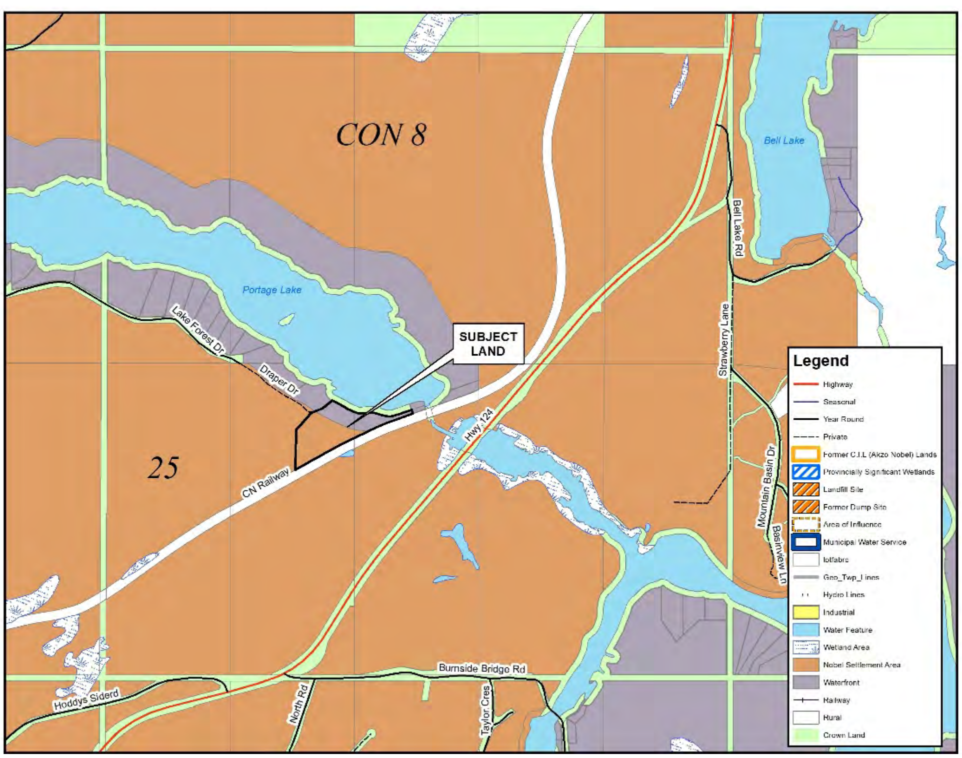
The McDevitt's are proposing to create one new waterfront lot on Portage Lake.

	LOT AREA	LOT FRONTAGE
RETAIN	±2.2 HA	±196 Metres
SEVER	±1.1 HA	±71 Metres



Official Plan

The subject lands are designated Waterfront and is within the Nobel Settlement Area in the official plan.



Because of the close proximity to the railway, the following official plan policies apply:

9.09 Railways

9.09.1 All proposed development within 120 metres of a railway right-of-way may be required to undertake noise studies, to the satisfaction of the Municipality in consultation with the appropriate railway, and shall undertake appropriate measures to mitigate any adverse effects from noise that were identified.

9.09.2 All proposed development within 75 metres of a railway right-of-way may be required to undertake vibration studies, to the satisfaction of the Municipality in consultation with the appropriate railway, and shall undertake appropriate measures to mitigate any adverse effects from vibration that were identified.

9.09.3 All proposed development adjacent to railways shall ensure that appropriate safety measures such as setbacks, berms and security fencing are provided, to the satisfaction of the Municipality in consultation with the appropriate railway.

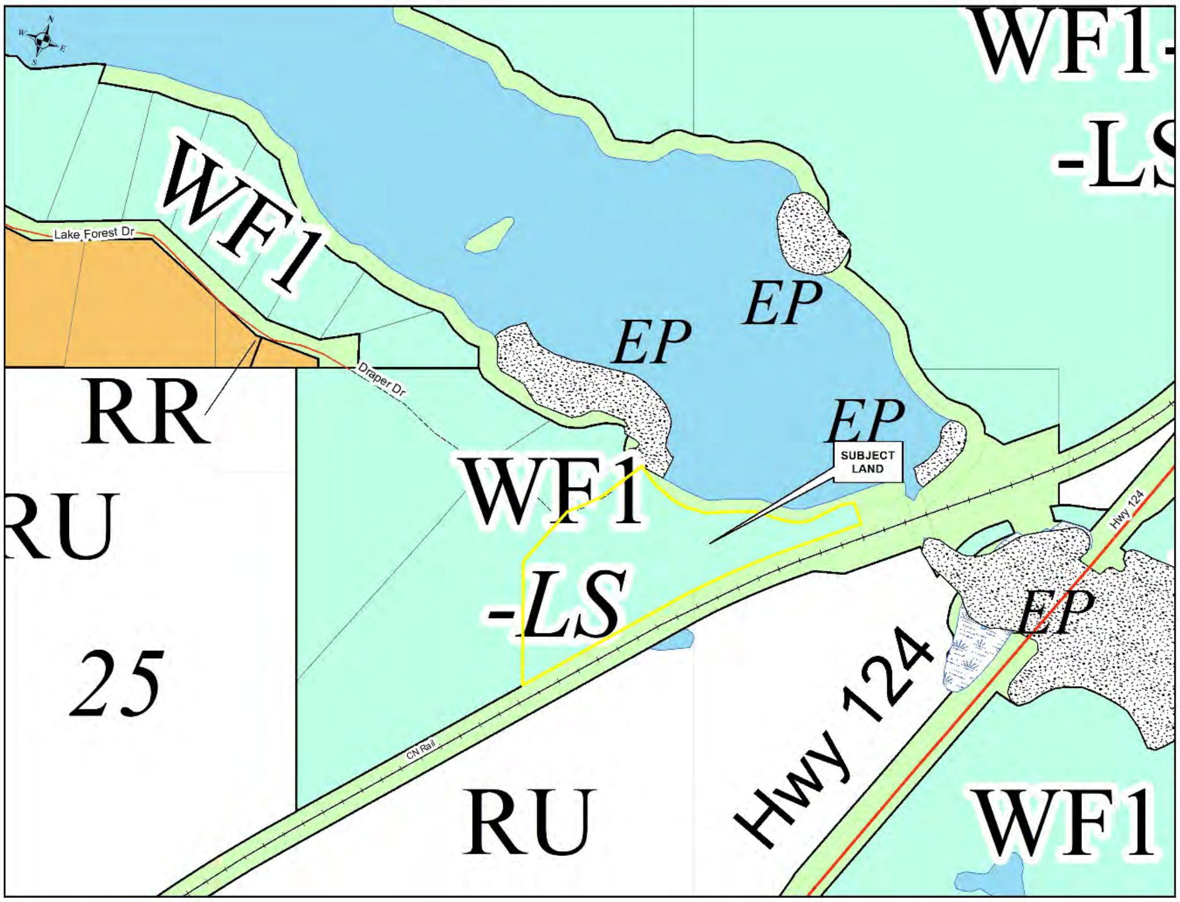
The proposed dwelling will be located more than 100 metres from the railway and the tree cover acts as a noise buffer. Therefore, a noise study is not required.

The applicant has undertaken a vibration study in order to satisfy the requirements of the official plan.

A copy of this report is attached.

Zoning By-Law

The lands are subject to the Waterfront Residential 1 – Limited Services (WF1-LS) Zone.



There is a small amount of Type 1 fish habitat (EP) identified in front of the proposed lot. However, there is approximately 45 metres of clear frontage where a dock could be located.

Matters to Regarded Under Section 51(24)

Consent applications are subject to the following criteria under section 57 (24) of the Planning Act.

(a) The effect of development on matters of provincial interest under section 2 of the Planning Act.

There are no conflicts with any of the matters of provincial interest in respect of the severed lot.

“ **<u>Provincial interest</u>**

2 The Minister, the council of a municipality, a local board, a planning board and the Tribunal, in carrying out their responsibilities under this Act, shall have regard to, among other matters, matters of provincial interest such as,

(a) the protection of ecological systems, including natural areas, features and functions;

(b) the protection of the agricultural resources of the Province;

(c) the conservation and management of natural resources and the mineral resource base;

(d) the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest;

(e) the supply, efficient use and conservation of energy and water;

(f) the adequate provision and efficient use of communication, transportation, sewage and water services and waste management systems;

(g) the minimization of waste;

(h) the orderly development of safe and healthy communities;

(h.1) the accessibility for persons with disabilities to all facilities, services and matters to which this Act applies;

(i) the adequate provision and distribution of educational, health, social, cultural and recreational facilities;

(j) the adequate provision of a full range of housing, including affordable housing;

(k) the adequate provision of employment opportunities;

(l) the protection of the financial and economic well-being of the Province and its municipalities;

(m) the co-ordination of planning activities of public bodies;

(n) the resolution of planning conflicts involving public and private interests;

(o) the protection of public health and safety;
(p) the appropriate location of growth and development;

(q) the promotion of development that is designed to be sustainable, to support public transit and to be oriented to pedestrians; “

(b) Is the consent premature or in the public interest?

Although the lot is within the Nobel Settlement Area, municipal water service is not available at this location. There is a strong demand for new waterfront lots.

(c) Does the consent conform to the official plan and adjacent plans?

The official plan policies support new, low density development on the shoreline subject to complying with the standards set out in the zoning by-law.

(d) Suitability of the Land.

There are no constraints to development of the subject lands.

(e) Access

There is existing access along Draper Drive to the severed and retained lands.

(f) Lot Sizes

The lots have adiquate frontages and areas and will easily be available for development.

(g) Restrictions

There are no restrictions to the proposed lot creation.

(h) Flood issues

The water level of Lake Manitouwabing is controlled by the dam at Hurdville. There are no flood issues.

(i) Parkland

The council of the Municipality of McDougall will require a fee in lieu of any parkland dedication.

(j) Municipal Services

Municipal water service is not available at this location. No additional services will be required.

(k) Schools

Not an issue.

(l) Road Dedications

None.

Recommendation

That the consent application by Barry and Lori McDevitt for the creation of one new lot on Portage Lake as applied for in Application No. B37/2021 (McD) be approved subject to:

1. Payment of any applicable parkland fees;

2. Obtaining 911 addressing, and

3. Payment of any applicable planning fees.

Respectfully submitted,

John Jackson

JJ:pc

PARRY SOUND AREA PLANNING BOARD - APPLICATION FOR CONSENT

70 Isabella Street, Unit #110, Parry Sound, Ontario P2A 1M6 (Phone 705-746-5216 Fax 705-746-1439)

No. B 37/2021 (McD)

1. Applicant Information

Name of Applicant: Lori McDevitt Barry McDevitt
Address: 3 Draper Drive
Postal Code: P2A 2W9
E-mail Address: NorthernRocklandscape@gmail.com

Note: By providing your E-mail address you consent to receiving correspondence regarding this file by E-mail.

Home Tel No. ( )
Business Tel No. ( )
Home Fax Tel No. ( )
Business Fax Tel No. ( )

1.2 Name of Owner(s) (if different from the applicant). **An owner's authorization is required in Section 12, if the applicant is not the owner.**

Name of Owner: Lori McDevitt Barry McDevitt
Address: 3 Draper Drive
Postal Code: P2A2W9
E-mail Address: NorthernRocklandscape@gmail.com

Note: By providing your E-mail address you consent to receiving correspondence regarding this file by E-mail.

Home Tel No. ( )
Business Tel No. ( )
Home Fax Tel No. ( )
Business Fax Tel No. ( )

1.3 Name of the person who is to be contacted about the application, if different than the applicant. (This may be a person or firm acting on behalf of the applicant.)

Name of Contact ______
Address ______
Postal Code ______
E-mail Address ______

Note: By providing your E-mail address you consent to receiving correspondence regarding this file by E-mail.

Home Tel No. ( )
Business Tel No. ( )
Home Fax Tel No. ( )
Business Fax Tel No. ( )

2. Purpose of this Application (check appropriate box)

2.1 Type and purpose of transaction for which application is being made

☑ creation of a new lot ☐ lot additions ☐ easement ☐ right-of-way ☐ lease

☐ correction of title ☐ charge ☐ other (specify, e.g., partial discharge of mortgage)

Explain: Seprate lots

3. Name of person(s) (purchaser, lessee, mortgage, etc.) to whom land or interest is intended to be transferred, charged or leased, if known and specify relationship to present owner, if any.

3.1 Lot 1 Barry McDevitt Lot 2 Barry McDevitt Lot 3 ______

4. Location of the Subject Land

Roll / PIN No.(s) 4931 010004226220

4.1 Municipality McDougall Lot(s) No.(s) 23 24 Concession No. 7

Street Name and No. Draper 3 M-Plan No. ______ Lot(s) ______

Registered Plan No. Part(s) 42R 10517 Pts Parcel No. ______

5. Easements or restrictive covenants

5.1 Are there any easements or restrictive covenants affecting the subject land? ✓ NO ☐ YES
If **YES**, describe the easement or covenant and its effect:

____

____

6. Description of Lands to be Divided and Servicing Information (Complete each subsection)

6.1

	Frontage (m)	Depth (m)	Area (ha)	Existing Uses	Proposed Uses	Existing Structures	Proposed Structures
Retained Lot	70	220	1.1hA		Resid'ial		hous
Lot Addition							
Right-of-way							
Benefiting Lot							
Severed Lot 1	196	300	2.2 hA	house	Res	house	1100 Sq
Severed Lot 2							
Severed Lot 3							

6.2 Access (check appropriate space)

	Name	Retained	Benefiting Lot	Sever (Lot 1)	Sever (Lot 2)	Sever (Lot 3)
Provincial Highway	Draper Drive					
Municipal (maintained all year)						
Municipal (Seasonal)						
Other public road						
Right of way						
Water Access						

If Water Access Only

	Retained	Benefiting Lot	Sever (Lot 1)	Sever (Lot 2)	Sever (Lot 3)
Parking and docking facilities to be used					
Approximate distance of these facilities from the subject land					
The nearest public road					

6.4 Water Supply (enter in appropriate space - **E for Existing or P for Proposed**

	Retained	Benefiting Lot	Sever (Lot 1)	Sever (Lot 2)	Sever (Lot 3)
Publicly owned and operated piped water system					
Privately owned and operated individual well					
Privately owned and operated communal well					
Other public road					
Lake or other waterbody	P		E		
Other means					

6.5 Sewage Disposal - enter in appropriate space - **E for Existing or P for Proposed**

	Retained	Benefiting Lot	Sever (Lot 1)	Sever (Lot 2)	Sever (Lot 3)
Publicly owned and operated sanitary sewage system					
Privately owned and operated individual septic tank	P		E		
Privately owned and operated communal well					
Privately owned and operated communal septic system					
Privately owned and operated communal septic system					
Privy					
Other means					

7. Official Plan

7.1 What is the current designation of the subject land in the Official Plan: Water Front

8. Current Application

8.1 Has the land ever been the subject of an application for approval of a plan of subdivision under section 51 of the Planning Act.

☐ YES ☑ NO ☐ UNKNOWN

If **YES**, and if known, specify the appropriate file number and status of application and/or Plan No.

____

8.2 Has the land ever been the subject of a consent under section 53 of the Planning Act.

☐ YES ☑ NO ☐ UNKNOWN

If **YES**, and if known, specify the appropriate file number and status of application.

____

8.3 Is the subject land currently the subject of an official plan amendment, zoning by-law, a Minister's zoning order, a minor variance, an approval of a plan of subdivision or a consent.

☐ YES ☑ NO ☐ UNKNOWN

If **YES**, and if known, specify the appropriate file number and status of application.

____

8.4 Are there additional consents being applied for on these holdings simultaneously with this application, or being considered for the future?

☐ YES ☑ NO ☐ UNKNOWN

9. Original Parcel

9.1 Has any land been severed from the parcel originally acquired by the owner of the subject land.

☐ YES ☑ NO ☐ UNKNOWN

If **YES**, and if known, specify the date of the transfer, the name of the transferee and the land use on the severed land. ____

10. Affidavit / Sworn Declaration

The contents of the application and appendices shall be validated by the Applicant (or authorized agent) in the form of the following Affidavit / Sworn Declaration before a Commissioner or other person empowered to take Affidavits.

Dated at the Town of ~~[illegible]~~ Parry Sound this 31st day of August 2021

I, Barry McDevitt of the Municipality of McDougall in the County/District/Regional Municipality of ~~McDougall~~ Parry Sound solemnly declare that all the statements contained in this application are true, and I 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.**

Signature of Applicant or Agent

DECLARED BEFORE ME at the Town of Parry Sound in the District of Parry Sound this 31st day of August 2021.

A Commissioner of Oaths

Patrick James Christie, a Commissioner, etc., Province of Ontario, for John Jackson Planner Inc., Expires October 12, 2024

11. Authorizations

11.1 If the applicant is not the owner of the land that is the subject of this application, the written authorization of the owner that the applicant is authorized to make the application must be included with this form or the authorizations set out below must be completed.

Authorization of Owner for Agent to Make the Application

I, ______________________, am the owner of the land that is the subject of this application for Consent and/or Zoning By-law Amendment and I authorize ______________________ to make this application on my behalf.

Date ______________________ Signature of Owner ______________________

11.2 If the applicant is not the owner of the land that is the subject of this application, complete the authorization of the owner concerning personal information set out below.

Authorization of Owner for Agent to Provide Personal Information

I, ______________________, am the owner of the land that is the subject of this application for Consent and for the purposes of the **Freedom of Information and Protection of Privacy Act**, I authorize ______________________, as my agent for this application, to provide any of my personal information that will be included in this application or collected during the processing of the application.

Date ______________________ Signature of Owner ______________________

12. **Consent of the Owner** (this section must be completed for the application to be processed)

12.1 Complete the consent of the owner concerning personal information set out below.

Consent of the Owner to the Use and Disclosure of Personal Information

I, Barry McDevitt, am the owner of the land that is the subject of this application and for the purposes of the **Freedom of Information and Protection of Privacy Act**, I authorize and consent to the use by or the disclosure to any person or public body of any personal information that is collected under the authority of the **Planning Act** for the purposes of processing this application.

Date July 7/21 Signature of Owner [signature]

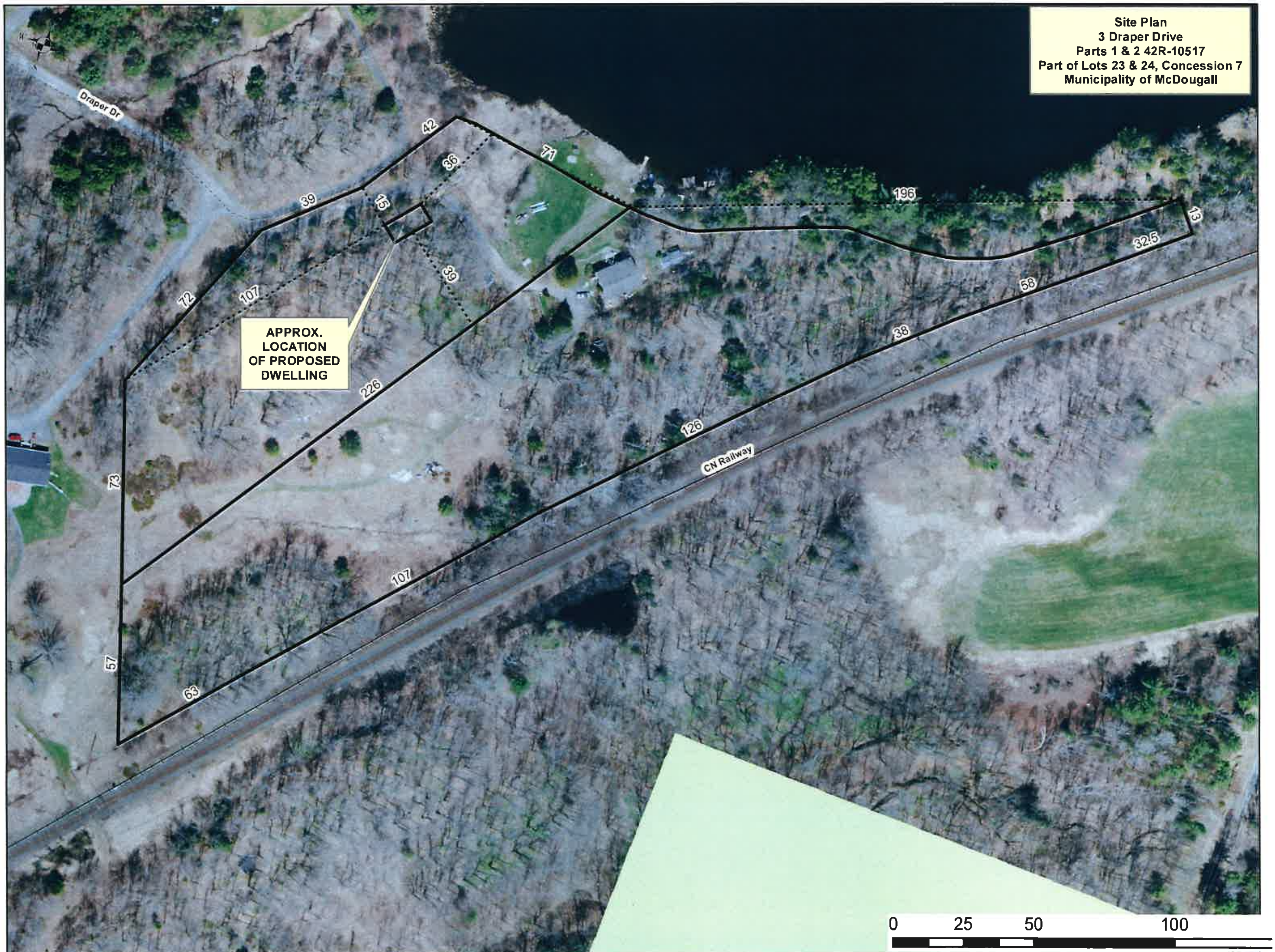
13. **Additional Fees**

The applicant hereby agrees:

(a) to reimburse the Parry Sound Area Planning Board for any costs incurred in processing this application which are above and beyond the amount of the application fee; and

(b) to pay all costs legal and otherwise, that may be incurred by the Parry Sound Area Planning Board with respect to an LPAT Hearing, that may be held as a result of this application for a consent and to provide a deposit for such costs at least 45 days prior to any scheduled hearing.

Date July 7/21 Signature of Owner [signature]



Site Plan
3 Draper Drive
Parts 1 & 2 42R-10517
Part of Lots 23 & 24, Concession 7
Municipality of McDougall
Draper Dr
APPROX. LOCATION OF PROPOSED DWELLING
CN Railway
42
36
71
39
15
196
13
32.5
39
72
107
58
38
226
126
73
107
57
63
0
25
50
100

NOISE IMPACT STUDY
3 DRAPER DRIVE
PARTS 1 & 2, 42R-10517
PART OF LOTS 23 & 24, CONCESSION 7
MCDOUGALL, ON

FOR

MR. ZACHARY MCDEVITT

BY

HOWARD R. PATLIK, C.E.T.

CHECKED BY

JOHN E. COULTER, B.A.Sc., P.ENG.

J.E. COULTER ASSOCIATES LIMITED
1210 SHEPPARD AVENUE EAST, SUITE 211
TORONTO, ONTARIO
M2K 1E3

AUGUST 31, 2021

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

INTRODUCTION

At the request of Mr. Zachary McDevitt, J.E. COULTER ASSOCIATES LIMITED has reviewed the plans for the proposed single-family dwelling at 3 Draper Drive (Parts 1 & 2, 42R-10517, Part of Lots 23 & 24, Concession 7) in McDougall, Ontario, for potential noise impact (see Appendix A, Figure 1).

The purpose of this study is to establish any noise mitigation measures that may be required from an acoustical viewpoint, to satisfy the noise requirements of the Ministry of Environment, Conservation and Parks (MECP) and the CN Railway.

The proposed development consists of a single-family dwelling to be constructed at 3 Draper Drive (see Appendix A, Figure 2). The proposed dwelling (east façade) is to be located approximately 132m from the centreline of the CN Railway tracks.

TRANSPORTATION SOURCES

All recommendations for noise control features are based on a minimum 10-year rail traffic projection (i.e., year 2031).

The main source of potential transportation noise in this development is the CN Rail Bala Subdivision to the east. This rail line is classified as a Principal Main Line, carrying rail (freight and passenger) traffic during both the daytime and nighttime. Rail traffic details are provided in Appendix B. For noise control purposes, we have assumed a 2.5% increase in rail per year (compounded) over a 10-year period; this is an overall increase of 28% in rail traffic (equivalent to a 1 dB increase in the sound level).

CN Rail

According to CN Rail, this line carries the following freight traffic (see Appendix B for CN letter):

Table 1: CN Rail Bala Subdivision
Existing Rail Traffic Volumes

Time	Train Type	# of Trains	# of Cars	# of Locomotives	Max Speed (kph)
07:00–23:00	Freight	10	140	4	105
	Passenger	1	10	2	153
23:00–07:00	Freight	3	140	4	105
	Passenger	0	10	2	153

Note: For calculations, rail data have been projected for the year 2031 at a rate of 2.5% growth per year, compounded.

There are 2 at-grade level crossings (Mile 153.82 and Mile 154.50) where whistles are sounded. These are included in the calculations.

NOISE CRITERIA – TRANSPORTATON SOURCES

Ministry of the Environment, Conservation and Parks

Outdoor Living Areas

The MECP and the Railway's noise criterion for new residential developments is 55 dB L_{eq} daytime in the outdoor amenity areas. If the 16-Hour Equivalent Sound Level, L_{eq} (16) in the OLA is greater than 55 dB L_{eq} and less than or equal to 60 dBA, noise control measures may be applied to reduce the sound level to 55 dBA. If measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A. If the 16-Hour Equivalent Sound Level, L_{eq} (16), in the OLA is greater than 60 dBA, noise control measures should be implemented to reduce the level to 55 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with a warning clause Type B. In the above situations, any excess above the limit will not be acceptable if it exceeds 55 dBA.

Ventilation Requirements – Daytime Period, 07:00–23:00 Hours

Noise control measures may not be required if the L_{eq} (16) daytime sound level in the plane of a bedroom or living/dining room window is less than or equal to 55 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 55 dBA and less than or equal to 65 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning Clause Type C is also recommended.

If the daytime sound level in the plane of a bedroom or living/dining room window is greater than 65 dBA, installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table 2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication *NPC-216* and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices or should comply with other criteria specified by the municipality.

Ventilation Requirements – Nighttime Period, 23:00–07:00 Hours

Noise control measures may not be required if the L_{eq} (8) nighttime sound level in the plane of a bedroom or living/dining room window is less than or equal to 50 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 50 dBA and less than or equal to 60 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning Clause Type C is also recommended. If the nighttime sound level in the plane of a bedroom or living/dining room window is greater than 60 dBA, installation of central air conditioning should be implemented, with a Warning Clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table 2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication *NPC-216* and guidelines contained in

Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, or should comply with other criteria specified by the municipality.

The interior noise criteria limits as required by MECP are as follows:

Table 2: Sound Level Limits – Road and Rail			
Type of Space	**Time Period**	**L_{eq} (dBA)**	
		Road	**Rail**
INDOOR LIMITS			
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00–23:00	45	**40**
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00–07:00	45	**40**
Sleeping quarters	07:00–23:00	45	**40**
	23:00–07:00	40	**35**
OUTDOOR LIMITS			
Outdoor recreation areas[1]	07:00–23:00	55	**55**
Outside bedroom window	23:00–07:00	50	**50**
Outside living room window	07:00–23:00	55	**55**

1 Up to 5 dB excess above criteria may be allowed, provided a warning clause is given. Above 60 dB L_{eq}, exterior noise mitigation measures (i.e., noise barriers, intervening structures, additional set back from source) are required.

CN Rail

The Railway requires a minimum 30m setback from the dwelling to the CNR R-O-W, which has been satisfied as shown on the plan. Normally, CN Railway requests a minimum 2.5m high safety earth berm, or at least a 2.5m rise, from the rail side of the slope. As the rail line is located in a cut and the building setback is approximately 132m from the rail tracks, there are no further measures required. This proposed development is well beyond the 75m limit such that vibration monitoring for ground-borne vibration is not required.

PROJECTED SOUND LEVELS

The sound levels generated by the Railway have been calculated for various locations at the exterior building façade and rear yard and are summarized in Table 3, below. The proposed dwelling (east façade) is to be setback approximately 132m from the centreline of the CN tracks.

Existing dense wooded areas (greater than 60m in depth) are present between the CN Rail line and the site. This will further attenuate the Railway sound levels and has been included in the calculations. The whistle activities at the grade-level crossings are also included in the calculations and are only applicable at the exterior building façade, not in the rear yard amenity space.

Table 3: L_{eq} Sound Level – No Barrier

Location	Daytime (dB L_{eq})	Nighttime (dB L_{eq})
	CN RAIL	CN RAIL
East Façade, Grade Level	54	52
East Façade, 2nd Storey	55	53
North & South Façades, 2nd Storey	52	50
North & South Façades, Grade Level	51	49
Rear yard (3m from rear wall of dwelling)	54	N/A

As noted in the above table, the sound levels generated by the CN Rail line will have a minor noise impact on the proposed development only at night. The projected sound levels are modest and standard noise control measures will be required as described below.

The daytime sound level in the rear yard outdoor amenity area meets MECP's and the Railway's noise criteria of 55 dB L_{eq} or less without the need for any additional exterior noise control measures.

NOISE CONTROL MEASURES

The analysis indicates that ventilation, façade, and warning clause requirements will be necessary, as described below, as a result of the sound levels from the CN Rail line.

VENTILATION AND WARNING CLAUSE REQUIREMENTS

Central air conditioning is required by MECP prior to building occupancy, if the sound levels exceed 65 dB L_{eq} daytime at the exterior living room window or 60 dB L_{eq} nighttime at the bedroom window. The sound levels at all locations at the proposed dwelling are less than these limits, so central air-conditioning is not required.

The dwelling will require a forced air heating system with provision to allow the homeowner to install central air conditioning, using an air-cooled condenser unit, in the future. The lot will also require a warning clause to be incorporated into the *Agreement of Purchase and Sale* indicating that the sound levels have exceeded the MECP's noise guidelines (see Appendix C, Warning Clauses A and C). The installation of window air conditioners is not a permissible noise mitigation measure as per MECP's noise guidelines.

All residential buildings within 300m of the CNR R-O-W will require a warning clause to be incorporated into the *Agreement of Purchase and Sale* (see Appendix C, CN Railway Warning Clause).

FAÇADE COMPONENTS

To meet CN Rail's and MECP's interior sound level criterion of 35 dB L_{eq} for bedrooms at night, no special exterior façade components are needed given the relatively low nighttime sound level, provided the bedroom window-area to floor-area ratio is less than 200%. This is an extraordinarily large window area for this type of room. Ontario Building Code (OBC) compatible construction with double glazing (3mm double glazing on a 13mm air space) rated at STC 27 will meet the requirements of MECP and the Railways for living rooms and bedrooms.

CONCLUSIONS

The projected sound levels generated by the CN Rail line were found to generate a minor (3 dB) excess above the Ministry of the Environment, Conservation and Parks' guidelines only at night at the exterior building façade. Based on our analysis, standard measures will be required to control the interior of the dwelling. There are no special requirements for the façades. The dwelling requires a forced air heating system with a provision for central air conditioning.

RECOMMENDATIONS

To meet the noise requirements of MECP and CN Rail, the following measures are recommended:

1. The dwelling unit must be equipped with forced air heating with fans, ducts, etc., sized to allow for the future installation of central air conditioning. The installation of standard window air conditioners is not a permissible noise mitigation measure as per MECP's noise guidelines.

2. The dwelling will require a warning clause to be incorporated into the *Agreement of Purchase and Sale,* indicating the sound levels have exceeded the Ministry of the Environment, Conservation and Parks' noise guidelines (see Appendix C, Warning Clauses A and C).

3. To meet CN Rail and MECP's interior sound level criterion of 35 dB L_{eq} for second-storey bedrooms at night, no special exterior façade components are needed, provided the bedroom window-area to floor-area ratio is 200% or less. Ontario Building Code (OBC) compatible construction with double glazing (3mm double glazing on a 13mm air space) rated at STC 27 will meet the requirements of MECP and the Railway for all rooms in the dwellings.

4. The dwelling unit is within 300m of the CNR R-O-W and requires that the Railway's warning clause be incorporated into the *Agreement of Purchase and Sale* (see Appendix C, CN Railway Warning Clause).

hp/pt

APPENDIX A: FIGURES

Site Plan
3 Draper Drive
Parts 1 & 2 42R-10517
Part of Lots 23 & 24, Concession 7
Municipality of McDougall
Draper Dr
APPROX. LOCATION OF PROPOSED DWELLING
132m (Facade to Centreline of Tracks)
CN Railway
42
36
71
39
15
196
13
32.5
72
107
39
58
38
226
126
73
107
57
63
FIGURE 2
0
25
50
100

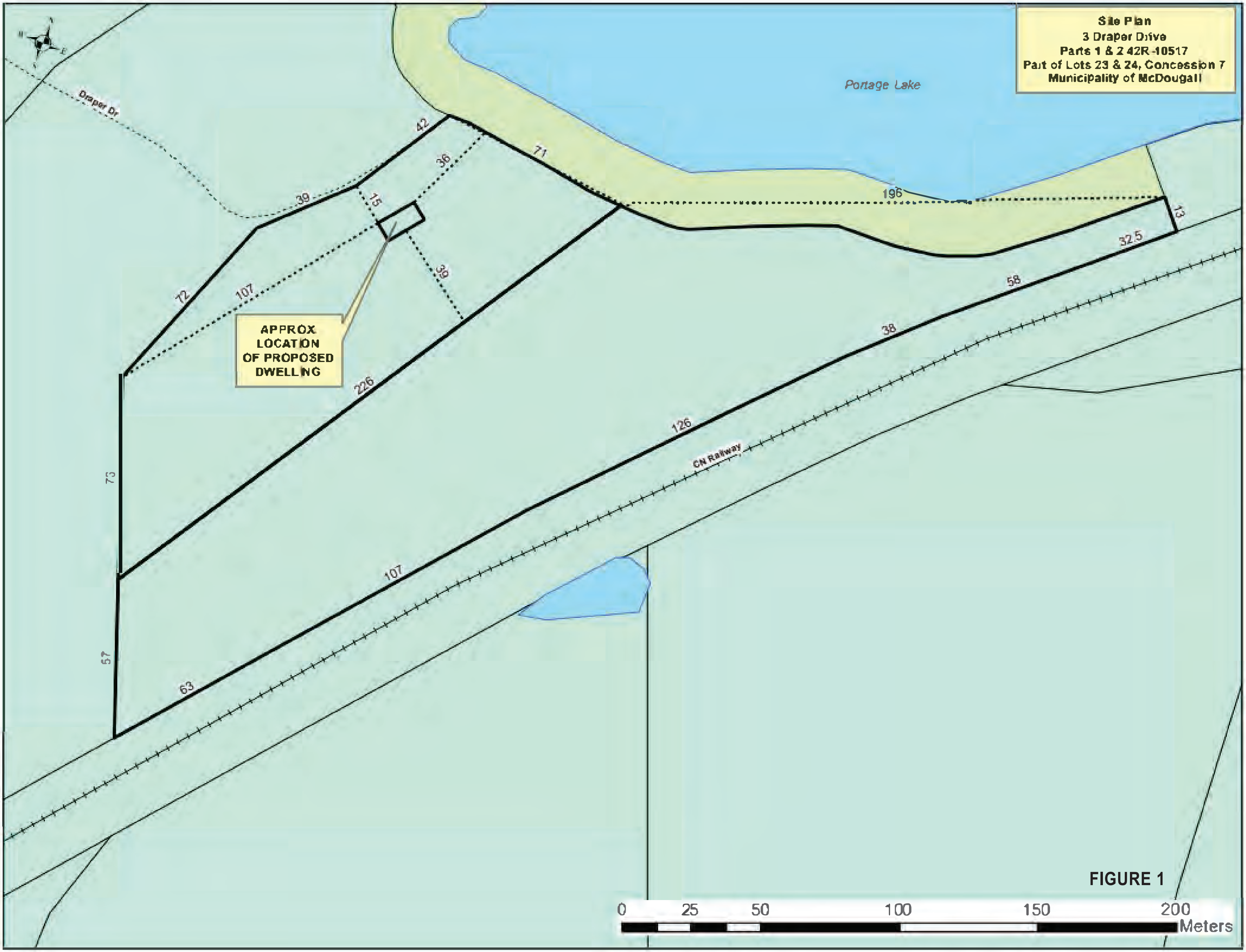

Site Plan
3 Draper Drive
Parts 1 & 2 42R-10517
Part of Lots 23 & 24, Concession 7
Municipality of McDougall
Portage Lake
Draper Dr
APPROX LOCATION OF PROPOSED DWELLING
CN Railway
42
71
36
39
15
196
13
32.5
72
107
39
58
38
226
126
73
107
57
63
0
25
50
100
150
200
Meters

FIGURE 1

APPENDIX B: SOUND LEVEL CALCULATIONS

Train Count Data

System Engineering
Engineering Services

1 Administration Road
Concord, ON, L4K 1B9
T: 905.669.3264
F: 905.760.3406

TRANSMITTAL

To: Destinataire :	Coulter J E Associates Limited 1210 Sheppard Ave E, North York, ON M2K 1E3	*Project :*	BAL – 153.9 – Draper Drive, Mcdougall ON
Att'n:	Howard R. Patlik	*Routing:*	hpatlik@jecoulterassoc.com
From: Expéditeur :	Michael Vallins	*Date:*	2021/08/30
Cc:	Adjacent Development CN via e-mail		

☐ Urgent ☐ For Your Use ☐ For Review ■ For Your Information ☐ Confidential

Re: Train Traffic Data – CN Bala West Subdivision near BAL – 153.9 – Near Draper Rd. in McDougall, ON

Please find attached the requested Train Traffic Data. The application fee in the amount of **$500.00** +HST will be invoiced.

Should you have any questions, please do not hesitate to contact the undersigned at permits.gld@cn.ca.

Sincerely,

Michael Vallins P.Eng
Manager, Public Works- Eastern Canada
Permits.gld@cn.ca

Date: 2021/08/30 Project Number: BAL – 153.9– Draper Drive, McDougal, ON

Dear Howard:

Re: Train Traffic Data CN Bala Subdivision near BAL – 153.9 – Draper Drive, McDougal, ON

The following is provided in response to Howard's 2021/07/08 request for information regarding rail traffic in the vicinity of Draper Drive in McDougal ON at approximately Mile 153.9 on CN's Bala Subdivision.

Typical daily traffic volumes are recorded below. However, traffic volumes may fluctuate due to overall economic conditions, varying traffic demands, weather conditions, track maintenance programs, statutory holidays and traffic detours that when required may be heavy although temporary. For the purpose of noise and vibration reports, train volumes must be escalated by 2.5% per annum for a 10-year period.

Typical daily traffic volumes at this site location are as follows:

***Maximum train speed is given in Miles per Hour**

	0700-2300			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	10	140	65	4
Way Freight	0	25	65	4
Passenger	1	10	100	2

	2300-0700			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	3	140	65	4
Way Freight	0	25	65	4
Passenger	0	10	100	2

The volumes recorded reflect northbound and southbound freight and passenger operations on CN's Bala Subdivision.

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There are two (2) at-grade crossings in the immediate vicinity of the study area at Mile 153.82 Farm Xing and Mile 154.50 Farm Xing. Anti-whistling bylaws are not in effect at this crossing. Please note that engine warning whistles may be sounded in cases of emergency, as a safety and or warning precaution at station locations and pedestrian crossings and occasionally for operating requirements.

With respect to equipment restrictions, the gross weight of the heaviest permissible car is 286,000 lbs.

The single mainline track is considered to be continuously welded rail throughout the study area.

The Canadian National Railway continues to be strongly opposed to locating developments near railway facilities and rights-of-way due to potential safety and environmental conflicts. Development adjacent to the Railway Right-of-Way is not appropriate without sound impact mitigation measures to reduce the incompatibility. For confirmation of the applicable rail noise, vibration and safety standards, Adjacent Development, Canadian National Railway Properties at Proximity@cn.ca should be contacted directly.

I trust the above information will satisfy your current request.

Sincerely,

Michael Vallins P.Eng
Manager, Public Works- Eastern Canada
Permits.gld@cn.ca

```
STAMSON 5.0        NORMAL REPORT       Date: 30-08-2021 21:19:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: e_fac_gr.te          Time Period: Day/Night 16/8 hours
Description: East Facade, Grade Level

Rail data, segment # 1: CN Bala (day/night)
-------------------------------------------
Train            ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------------+-------+------+------+------+----
  1. Freight     !   6.4/1.9   !   6.4/1.9   ! 105.0 !  4.0 !140.0 !Diesel! Yes
  2. Passenger   !   0.6/0.0   !   0.6/0.0   ! 150.0 !  2.0 ! 10.0 !Diesel! Yes

Data for Segment # 1: CN Bala (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      2       (Wood depth 60 metres or more)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 132.00 / 132.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :    -85 deg   Track 1

Rail data, segment # 2: CN X 153.82 (day/night)
-----------------------------------------------
Train            ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------------+-------+------+------+------+----
  1. Freight     !   6.4/1.9   !   6.4/1.9   ! 105.0 !  0.0 !  0.0 !Diesel! Yes
  2. Passenger   !   0.6/0.0   !   0.6/0.0   ! 150.0 !  0.0 !  0.0 !Diesel! Yes

Data for Segment # 2: CN X 153.82 (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      2       (Wood depth 60 metres or more)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 135.00 / 135.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :     57 deg   Track 1

Results segment # 1: CN Bala (day)
----------------------------------

LOCOMOTIVE (0.00 + 52.83 + 0.00) = 52.83 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.28  75.71 -12.14  -0.74 -10.00   0.00   0.00  52.83
----------------------------------------------------------------------

WHEEL (0.00 + 45.22 + 0.00) = 45.22 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.39  69.31 -13.13  -0.96 -10.00   0.00   0.00  45.22
----------------------------------------------------------------------
LEFT WHISTLE (0.00 + 22.13 + 0.00) = 22.13 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -86    -85   0.28  69.79 -12.14 -25.52 -10.00   0.00   0.00  22.13
----------------------------------------------------------------------
```

RIGHT WHISTLE (0.00 + 24.80 + 0.00) = 24.80 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	-83	0.28	69.79	-12.14	-22.85	-10.00	0.00	0.00	24.80

Segment Leq : 53.53 dBA

Results segment # 2: CN X 153.82 (day)

LOCOMOTIVE (0.00 + -23.00 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.28	0.00	-12.26	-0.74	-10.00	0.00	0.00	-23.00

WHEEL (0.00 + -24.22 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.39	0.00	-13.26	-0.96	-10.00	0.00	0.00	-24.22

LEFT WHISTLE (0.00 + 45.25 + 0.00) = 45.25 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	57	0.28	69.79	-12.26	-2.28	-10.00	0.00	0.00	45.25

RIGHT WHISTLE (0.00 + 36.87 + 0.00) = 36.87 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
57	77	0.28	69.79	-12.26	-10.65	-10.00	0.00	0.00	36.87

Segment Leq : 45.84 dBA

Total Leq All Segments: 54.21 dBA

Results segment # 1: CN Bala (night)

LOCOMOTIVE (0.00 + 50.45 + 0.00) = 50.45 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.28	73.33	-12.14	-0.74	-10.00	0.00	0.00	50.45

WHEEL (0.00 + 42.90 + 0.00) = 42.90 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.39	66.99	-13.13	-0.96	-10.00	0.00	0.00	42.90

LEFT WHISTLE (0.00 + 19.59 + 0.00) = 19.59 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-86	-85	0.28	67.25	-12.14	-25.52	-10.00	0.00	0.00	19.59

RIGHT WHISTLE (0.00 + 22.26 + 0.00) = 22.26 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	-83	0.28	67.25	-12.14	-22.85	-10.00	0.00	0.00	22.26

Segment Leq : 51.16 dBA

Results segment # 2: CN X 153.82 (night)

LOCOMOTIVE (0.00 + -21.93 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.19	0.00	-11.40	-0.52	-10.00	0.00	0.00	-21.93

WHEEL (0.00 + -23.17 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	0.00	-12.41	-0.77	-10.00	0.00	0.00	-23.17

LEFT WHISTLE (0.00 + 43.63 + 0.00) = 43.63 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	57	0.19	67.25	-11.40	-2.21	-10.00	0.00	0.00	43.63

RIGHT WHISTLE (0.00 + 35.57 + 0.00) = 35.57 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
57	77	0.19	67.25	-11.40	-10.27	-10.00	0.00	0.00	35.57

Segment Leq : 44.26 dBA

Total Leq All Segments: 51.97 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.21
(NIGHT): 51.97

```
STAMSON 5.0        NORMAL REPORT        Date: 30-08-2021 21:19:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: e_facade.te          Time Period: Day/Night 16/8 hours
Description: East Facade, 2nd Storey

Rail data, segment # 1: CN Bala (day/night)
-------------------------------------------
Train            ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------------+-------+------+------+------+----
  1. Freight     !   6.4/1.9   !   6.4/1.9   ! 105.0 !  4.0 !140.0 !Diesel! Yes
  2. Passenger   !   0.6/0.0   !   0.6/0.0   ! 150.0 !  2.0 ! 10.0 !Diesel! Yes

Data for Segment # 1: CN Bala (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      2       (Wood depth 60 metres or more)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 132.00 / 132.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :    -85 deg   Track 1

Rail data, segment # 2: CN X 153.82 (day/night)
-----------------------------------------------
Train            ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------------+-------+------+------+------+----
  1. Freight     !   6.4/1.9   !   6.4/1.9   ! 105.0 !  0.0 !  0.0 !Diesel! Yes
  2. Passenger   !   0.6/0.0   !   0.6/0.0   ! 150.0 !  0.0 !  0.0 !Diesel! Yes

Data for Segment # 2: CN X 153.82 (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      2       (Wood depth 60 metres or more)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 135.00 / 135.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :     57 deg   Track 1

Results segment # 1: CN Bala (day)
----------------------------------

LOCOMOTIVE (0.00 + 53.89 + 0.00) = 53.89 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.19  75.71 -11.29  -0.52 -10.00   0.00   0.00  53.89
----------------------------------------------------------------------

WHEEL (0.00 + 46.26 + 0.00) = 46.26 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.30  69.31 -12.28  -0.77 -10.00   0.00   0.00  46.26
----------------------------------------------------------------------
```

LEFT WHISTLE (0.00 + 23.97 + 0.00) = 23.97 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-86	-85	0.19	69.79	-11.29	-24.53	-10.00	0.00	0.00	23.97

RIGHT WHISTLE (0.00 + 26.54 + 0.00) = 26.54 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	-83	0.19	69.79	-11.29	-21.96	-10.00	0.00	0.00	26.54

Segment Leq : 54.59 dBA

Results segment # 2: CN X 153.82 (day)

LOCOMOTIVE (0.00 + -23.00 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.28	0.00	-12.26	-0.74	-10.00	0.00	0.00	-23.00

WHEEL (0.00 + -24.22 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.39	0.00	-13.26	-0.96	-10.00	0.00	0.00	-24.22

LEFT WHISTLE (0.00 + 45.25 + 0.00) = 45.25 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	57	0.28	69.79	-12.26	-2.28	-10.00	0.00	0.00	45.25

RIGHT WHISTLE (0.00 + 36.87 + 0.00) = 36.87 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
57	77	0.28	69.79	-12.26	-10.65	-10.00	0.00	0.00	36.87

Segment Leq : 45.84 dBA

Total Leq All Segments: 55.13 dBA

Results segment # 1: CN Bala (night)

LOCOMOTIVE (0.00 + 51.51 + 0.00) = 51.51 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.19	73.33	-11.29	-0.52	-10.00	0.00	0.00	51.51

WHEEL (0.00 + 43.94 + 0.00) = 43.94 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	66.99	-12.28	-0.77	-10.00	0.00	0.00	43.94

LEFT WHISTLE (0.00 + 21.43 + 0.00) = 21.43 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-86	-85	0.19	67.25	-11.29	-24.53	-10.00	0.00	0.00	21.43

RIGHT WHISTLE (0.00 + 24.00 + 0.00) = 24.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	-83	0.19	67.25	-11.29	-21.96	-10.00	0.00	0.00	24.00

Segment Leq : 52.22 dBA

Results segment # 2: CN X 153.82 (night)

LOCOMOTIVE (0.00 + -21.93 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.19	0.00	-11.40	-0.52	-10.00	0.00	0.00	-21.93

WHEEL (0.00 + -23.17 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	0.00	-12.41	-0.77	-10.00	0.00	0.00	-23.17

LEFT WHISTLE (0.00 + 43.63 + 0.00) = 43.63 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	57	0.19	67.25	-11.40	-2.21	-10.00	0.00	0.00	43.63

RIGHT WHISTLE (0.00 + 35.57 + 0.00) = 35.57 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
57	77	0.19	67.25	-11.40	-10.27	-10.00	0.00	0.00	35.57

Segment Leq : 44.26 dBA

Total Leq All Segments: 52.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.13
(NIGHT): 52.86

```
STAMSON 5.0        NORMAL REPORT       Date: 30-08-2021 21:19:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: n_facade.te          Time Period: Day/Night 16/8 hours
Description: North Facade, 2nd Storey

Rail data, segment # 1: CN Bala (day/night)
-------------------------------------------
Train             ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type              ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------------+-------+------+------+------+----
  1. Freight     !   6.4/1.9   !   6.4/1.9   ! 105.0 !  4.0 !140.0 !Diesel! Yes
  2. Passenger   !   0.6/0.0   !   0.6/0.0   ! 150.0 !  2.0 ! 10.0 !Diesel! Yes

Data for Segment # 1: CN Bala (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      2       (Wood depth 60 metres or more)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 128.00 / 128.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :    -85 deg   Track 1

Rail data, segment # 2: CN X 153.82 (day/night)
-----------------------------------------------
Train             ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type              ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------------+-------+------+------+------+----
  1. Freight     !   6.4/1.9   !   6.4/1.9   ! 105.0 !  0.0 !  0.0 !Diesel! Yes
  2. Passenger   !   0.6/0.0   !   0.6/0.0   ! 150.0 !  0.0 !  0.0 !Diesel! Yes

Data for Segment # 2: CN X 153.82 (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      2       (Wood depth 60 metres or more)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 135.00 / 135.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :     57 deg   Track 1

Results segment # 1: CN Bala (day)
----------------------------------

LOCOMOTIVE (0.00 + 51.04 + 0.00) = 51.04 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.19  75.71 -11.13  -3.54 -10.00   0.00   0.00  51.04
----------------------------------------------------------------------

WHEEL (0.00 + 43.42 + 0.00) = 43.42 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.30  69.31 -12.10  -3.78 -10.00   0.00   0.00  43.42
----------------------------------------------------------------------

LEFT WHISTLE (0.00 + 24.24 + 0.00) = 24.24 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -86    -85   0.19  69.79 -11.13 -24.42 -10.00   0.00   0.00  24.24
----------------------------------------------------------------------
```

RIGHT WHISTLE (0.00 + 26.89 + 0.00) = 26.89 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	-83	0.19	69.79	-11.13	-21.77	-10.00	0.00	0.00	26.89

Segment Leq : 51.75 dBA

Results segment # 2: CN X 153.82 (day)

LOCOMOTIVE (0.00 + -26.01 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.28	0.00	-12.26	-3.75	-10.00	0.00	0.00	-26.01

WHEEL (0.00 + -27.24 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.39	0.00	-13.26	-3.97	-10.00	0.00	0.00	-27.24

LEFT WHISTLE (0.00 + 42.16 + 0.00) = 42.16 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	0	0.00	69.79	0.00	-5.36	-10.00	0.00	0.00	42.16

Segment Leq : 42.16 dBA

Total Leq All Segments: 52.20 dBA

Results segment # 1: CN Bala (night)

LOCOMOTIVE (0.00 + 48.66 + 0.00) = 48.66 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.19	73.33	-11.13	-3.54	-10.00	0.00	0.00	48.66

WHEEL (0.00 + 41.10 + 0.00) = 41.10 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.30	66.99	-12.10	-3.78	-10.00	0.00	0.00	41.10

LEFT WHISTLE (0.00 + 21.70 + 0.00) = 21.70 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-86	-85	0.19	67.25	-11.13	-24.42	-10.00	0.00	0.00	21.70

RIGHT WHISTLE (0.00 + 24.35 + 0.00) = 24.35 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-85	-83	0.19	67.25	-11.13	-21.77	-10.00	0.00	0.00	24.35

Segment Leq : 49.38 dBA

Results segment # 2: CN X 153.82 (night)

LOCOMOTIVE (0.00 + -24.94 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.19	0.00	-11.40	-3.54	-10.00	0.00	0.00	-24.94

WHEEL (0.00 + -26.19 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.30	0.00	-12.41	-3.78	-10.00	0.00	0.00	-26.19

LEFT WHISTLE (0.00 + 40.54 + 0.00) = 40.54 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	0	0.00	67.25	0.00	-5.30	-10.00	0.00	0.00	40.54

Segment Leq : 40.54 dBA

Total Leq All Segments: 49.91 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.20
(NIGHT): 49.91

```
STAMSON 5.0        NORMAL REPORT       Date: 30-08-2021 21:20:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s_fac_gr.te          Time Period: Day/Night 16/8 hours
Description: South Facade, Grade level

Rail data, segment # 1: CN Bala (day/night)
-------------------------------------------
Train            ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------------+-------+------+------+------+----
  1. Freight     !   6.4/1.9   !   6.4/1.9   ! 105.0 !  4.0 !140.0 !Diesel! Yes
  2. Passenger   !   0.6/0.0   !   0.6/0.0   ! 150.0 !  2.0 ! 10.0 !Diesel! Yes

Data for Segment # 1: CN Bala (day/night)
-----------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      2       (Wood depth 60 metres or more)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 128.00 / 128.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :    -85 deg   Track 1

Rail data, segment # 2: CN X 153.82 (day/night)
-----------------------------------------------
Train            ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------------+-------+------+------+------+----
  1. Freight     !   6.4/1.9   !   6.4/1.9   ! 105.0 !  0.0 !  0.0 !Diesel! Yes
  2. Passenger   !   0.6/0.0   !   0.6/0.0   ! 150.0 !  0.0 !  0.0 !Diesel! Yes

Data for Segment # 2: CN X 153.82 (day/night)
---------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      2       (Wood depth 60 metres or more)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 135.00 / 135.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :     57 deg   Track 1

Results segment # 1: CN Bala (day)
----------------------------------

LOCOMOTIVE (0.00 + 49.99 + 0.00) = 49.99 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0     90   0.28  75.71 -11.96  -3.75 -10.00   0.00   0.00  49.99
----------------------------------------------------------------------

WHEEL (0.00 + 42.39 + 0.00) = 42.39 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0     90   0.39  69.31 -12.94  -3.97 -10.00   0.00   0.00  42.39
----------------------------------------------------------------------
```

```
LEFT WHISTLE (0.00 + 40.70 + 0.00) = 0.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0    -85   0.00  69.79   0.00  -5.15 -10.00   0.00   0.00  40.70
----------------------------------------------------------------------

Segment Leq : 50.69 dBA


Results segment # 2: CN X 153.82 (day)
--------------------------------------

LOCOMOTIVE (0.00 + -26.01 + 0.00) = 0.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0     90   0.28   0.00 -12.26  -3.75 -10.00   0.00   0.00 -26.01
----------------------------------------------------------------------

WHEEL (0.00 + -27.24 + 0.00) = 0.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0     90   0.39   0.00 -13.26  -3.97 -10.00   0.00   0.00 -27.24
----------------------------------------------------------------------

LEFT WHISTLE (0.00 + 42.31 + 0.00) = 42.31 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0     57   0.28  69.79 -12.26  -5.22 -10.00   0.00   0.00  42.31
----------------------------------------------------------------------

RIGHT WHISTLE (0.00 + 36.87 + 0.00) = 36.87 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
    57     77   0.28  69.79 -12.26 -10.65 -10.00   0.00   0.00  36.87
----------------------------------------------------------------------

Segment Leq : 43.40 dBA

Total Leq All Segments: 51.43 dBA
```

Results segment # 1: CN Bala (night)

LOCOMOTIVE (0.00 + 47.61 + 0.00) = 47.61 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.28	73.33	-11.96	-3.75	-10.00	0.00	0.00	47.61

WHEEL (0.00 + 40.07 + 0.00) = 40.07 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.39	66.99	-12.94	-3.97	-10.00	0.00	0.00	40.07

LEFT WHISTLE (0.00 + 42.31 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	-85	0.00	67.25	0.00	-5.22	-10.00	0.00	0.00	42.31

Segment Leq : 48.31 dBA

Results segment # 2: CN X 153.82 (night)

LOCOMOTIVE (0.00 + -24.94 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.19	0.00	-11.40	-3.54	-10.00	0.00	0.00	-24.94

WHEEL (0.00 + -26.19 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.30	0.00	-12.41	-3.78	-10.00	0.00	0.00	-26.19

LEFT WHISTLE (0.00 + 40.70 + 0.00) = 40.70 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	57	0.19	67.25	-11.40	-5.15	-10.00	0.00	0.00	40.70

RIGHT WHISTLE (0.00 + 35.57 + 0.00) = 35.57 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
57	77	0.19	67.25	-11.40	-10.27	-10.00	0.00	0.00	35.57

Segment Leq : 41.86 dBA

Total Leq All Segments: 49.20 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.43
(NIGHT): 49.20

```
STAMSON 5.0        NORMAL REPORT       Date: 30-08-2021 21:20:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s_facade.te          Time Period: Day/Night 16/8 hours
Description: South Facade, 2nd Storey

Rail data, segment # 1: CN Bala (day/night)
-------------------------------------------
Train            ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------------+-------+------+------+------+----
  1. Freight     !   6.4/1.9   !   6.4/1.9   ! 105.0 !  4.0 !140.0 !Diesel! Yes
  2. Passenger   !   0.6/0.0   !   0.6/0.0   ! 150.0 !  2.0 ! 10.0 !Diesel! Yes

Data for Segment # 1: CN Bala (day/night)
-----------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      2       (Wood depth 60 metres or more)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 128.00 / 128.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :    -85 deg   Track 1

Rail data, segment # 2: CN X 153.82 (day/night)
-----------------------------------------------
Train            ! Trains      ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             ! (Left)      ! (Right)     !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------------+-------+------+------+------+----
  1. Freight     !   6.4/1.9   !   6.4/1.9   ! 105.0 !  0.0 !  0.0 !Diesel! Yes
  2. Passenger   !   0.6/0.0   !   0.6/0.0   ! 150.0 !  0.0 !  0.0 !Diesel! Yes

Data for Segment # 2: CN X 153.82 (day/night)
---------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      2       (Wood depth 60 metres or more)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 135.00 / 135.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Whistle Angle             :     57 deg   Track 1
```

Results segment # 1: CN Bala (day)

LOCOMOTIVE (0.00 + 51.04 + 0.00) = 51.04 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.19	75.71	-11.13	-3.54	-10.00	0.00	0.00	51.04

WHEEL (0.00 + 43.42 + 0.00) = 43.42 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.30	69.31	-12.10	-3.78	-10.00	0.00	0.00	43.42

LEFT WHISTLE (0.00 + 40.70 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	-85	0.00	69.79	0.00	-5.15	-10.00	0.00	0.00	40.70

Segment Leq : 51.73 dBA

Results segment # 2: CN X 153.82 (day)

LOCOMOTIVE (0.00 + -26.01 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.28	0.00	-12.26	-3.75	-10.00	0.00	0.00	-26.01

WHEEL (0.00 + -27.24 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.39	0.00	-13.26	-3.97	-10.00	0.00	0.00	-27.24

LEFT WHISTLE (0.00 + 42.31 + 0.00) = 42.31 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	57	0.28	69.79	-12.26	-5.22	-10.00	0.00	0.00	42.31

RIGHT WHISTLE (0.00 + 36.87 + 0.00) = 36.87 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
57	77	0.28	69.79	-12.26	-10.65	-10.00	0.00	0.00	36.87

Segment Leq : 43.40 dBA

Total Leq All Segments: 52.33 dBA

Results segment # 1: CN Bala (night)

LOCOMOTIVE (0.00 + 48.66 + 0.00) = 48.66 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.19	73.33	-11.13	-3.54	-10.00	0.00	0.00	48.66

WHEEL (0.00 + 41.10 + 0.00) = 41.10 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.30	66.99	-12.10	-3.78	-10.00	0.00	0.00	41.10

LEFT WHISTLE (0.00 + 42.31 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	-85	0.00	67.25	0.00	-5.22	-10.00	0.00	0.00	42.31

Segment Leq : 49.36 dBA

Results segment # 2: CN X 153.82 (night)

LOCOMOTIVE (0.00 + -24.94 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.19	0.00	-11.40	-3.54	-10.00	0.00	0.00	-24.94

WHEEL (0.00 + -26.19 + 0.00) = 0.00 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.30	0.00	-12.41	-3.78	-10.00	0.00	0.00	-26.19

LEFT WHISTLE (0.00 + 40.70 + 0.00) = 40.70 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	57	0.19	67.25	-11.40	-5.15	-10.00	0.00	0.00	40.70

RIGHT WHISTLE (0.00 + 35.57 + 0.00) = 35.57 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
57	77	0.19	67.25	-11.40	-10.27	-10.00	0.00	0.00	35.57

Segment Leq : 41.86 dBA

Total Leq All Segments: 50.07 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.33
(NIGHT): 50.07

```
STAMSON 5.0        NORMAL REPORT        Date: 30-08-2021 21:20:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: rear.te               Time Period: Day/Night 16/8 hours
Description: Rear Yard - Grade level - No Barrier

Rail data, segment # 1: CN Bala (day/night)
-------------------------------------------
Train            ! Trains      ! Speed !# loc !# Cars! Eng  !Cont
Type             !             !(km/h) !/Train!/Train! type !weld
-----------------+-------------+-------+------+------+------+----
* 1. Freight     !  12.8/3.8   ! 105.0 !  4.0 !140.0 !Diesel! Yes
* 2. Passenger   !   1.3/0.0   ! 150.0 !  2.0 ! 10.0 !Diesel! Yes

* The identified number of trains have been adjusted for
  future growth using the following parameters:

Train type:          ! Unadj. ! Annual % ! Years of !
 No  Name            ! Trains ! Increase !  Growth  !
--------------------+--------+----------+----------+
  1. Freight        !  10.0/3.0   !    2.50  !   10.00  !
  2. Passenger      !   1.0/0.0   !    2.50  !   10.00  !

Data for Segment # 1: CN Bala (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      2       (Wood depth 60 metres or more)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 129.00 / 138.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
No Whistle

Results segment # 1: CN Bala (day)
----------------------------------

LOCOMOTIVE (0.00 + 52.97 + 0.00) = 52.97 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.28  75.71 -12.01  -0.74 -10.00   0.00   0.00  52.97
----------------------------------------------------------------------

WHEEL (0.00 + 45.36 + 0.00) = 45.36 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.39  69.31 -12.99  -0.96 -10.00   0.00   0.00  45.36
----------------------------------------------------------------------

Segment Leq : 53.66 dBA

Total Leq All Segments: 53.66 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.66
```

APPENDIX C: WARNING CLAUSES

MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS WARNING CLAUSES

TYPE A

"Purchasers/tenants are advised that sound levels due to increasing rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment, Conservation and Parks' noise criteria."

TYPE B

"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing rail traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment, Conservation and Parks' noise criteria."

TYPE C

"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks."

TYPE D

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the Municipality's and the Ministry of the Environment, Conservation and Parks' noise criteria."

CN RAILWAY WARNING CLAUSE

(Applicable to all residents within 300m of the Railway's Right-of-Way, regardless of exterior sound levels at dwelling unit)

The following clause should be inserted in all Occupancy Agreements:

> "Warning: Canadian National Railway Company or it assigns or successors in interest has or have a right-of-way within 300 metres from the land the subject thereof. There may be alterations to or expansions of the rail facilities on such right-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way."

APPENDIX D: CRITERIA

The noise study will be based on the following criteria for residential units as required by the Ministry of Environment, Conservation and Parks and CN Rail:

SOUND LEVEL LIMITS ROAD AND RAIL			
Type of Space	**Time Period**	**L_{eq} (dBA)**	
		Road	**Rail**
INDOOR LIMITS			
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00–23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00–07:00	45	40
Sleeping quarters	07:00–23:00	45	40
	23:00–07:00	40	35
OUTDOOR LIMITS			
Outdoor recreation areas[1]	07:00–23:00	55	55
Outside bedroom window	23:00–07:00	50	50
Outside living room window	07:00–23:00	55	55

[1] Up to 5 dB excess above criteria is allowed, provided a warning clause is given. Above 60 dB L_{eq}, exterior noise mitigation measures (i.e., noise barriers, intervening structures, additional set back from source) are required.

All sound level calculations are based on the Site Plan provided by the client.

L_{eq}

The L_{eq} is defined as the mean energy of the sound level averaged over the measurement period. It can be considered as the continuous steady sound level which would have the same acoustic energy as the real fluctuating noise measured over the same period of time.

APPENDIX E: REFERENCES

1. Ministry of the Environment's *STAMSON* Computer Programme (Version 5.04) for the IBM PC.

2. Ministry of the Environment, "Publication NPC-300, Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning," August 2013.

MUNICIPALITY OF McDOUGALL			
INTERNAL CIRCULATION CHECKLIST			
TYPE OF APPLICATION			
APPLICANT NAME			
CIRCULATE TO	**INDICATE WITH X**	**COMMENTS YES OR NO**	**NAME**
CHIEF BUILDING OFFICIAL	x	No	
MANAGER OF PUBLIC WORKS	x		
FIRE CHIEF	x		
MUNICIPAL ENFORCEMENT	x		
CAO	x	No	
PLANNER	x	Yes	L. West
TREASURER	x	No	
OTHER - Environmental Services	x	No	
COMMENTS OR ATTACH REPORT			

No concerns subject to the conditions set out in the report prepared by John Jackson Planner inc. and;

- that the applicant enter into a 51(26) development agreement to implement the recommendations of the Noise Impact Study prepared by J.E. Coulter Associates Ltd.
- Receiving adequate 911 addressing for the new lot.
- Confirmation from CN that they have no objection to the proposed Consent.

The Municipality of
McDougall
EST. 1872

MUNICIPALITY OF MCDOUGALL ZONING BY-LAW AMENDMENT APPLICATION

ZONING BY-LAW AMENDMENT APPLICATION CHECKLIST
Please ensure you have completed the following prior to submitting your application:

GENERAL INSTRUCTIONS: Read carefully before completing application.

- ☐ Complete Application and plans to be submitted.
- ☐ Application fees attached. Cheque made payable to the Municipality of McDougall
  - $1,000.00 deposit towards expenses
  - $300.00 non-refundable administration fee.

  All costs related to the rezoning will be the responsibility of theapplicant.
- ☐ Application to be signed by owner or authorized agent only.
- ☐ The consideration of this application does not make the Municipality liable for any of the applicant's costs for legal, surveying or any other professional costs.
- ☐ If there are objections to the amending by-law and a hearing of the Ontario Municipal Board is to be held, you should arrange to be present in person, or to be represented by your lawyer, at the meeting. All costs related to the hearing are the responsibility ofthe applicant.

NOTE

Any costs over and above the **$1000.00** deposit relating to this application, including but not limited to engineering studies, legal opinions, planning consultant fees, and Ontario Municipal Board hearing costs, will be the responsibility of the applicant.

Signature of Applicant or Agent

Aug 30/2021
Date

APPLICANTS POSTING INSTRUCTIONS

In order to facilitate consideration of your Application for Zoning By-law Amendment, we ask that you complete the following upon submission of the application to the Municipality.

- Mark out, on the ground, the location of the proposed lot lines - marking it clearly with stakes and coloredribbon.
- It is the responsibility of the Applicant to mark the property which is the subject of this Application.

Council members and/or Municipal staff may conduct site inspections of your lands. By submitting this application, you are authorizing the Municipality to access your lands for the purposes of conducting the required site inspection. Please be advised that where access is by water or by summer maintained municipal road or by private road, the consideration of the application may be delayed during the winter until safe access can be obtained to the lands.

You may be required to submit a copy of the Deed for the subject land. If access is provided by private road/right-of-way from a municipal road, attach a copy of the deed indicating if the access is registered on title.

Your application will not be processed until it is complete. A complete application will be determined in accordance with the requirements of the Planning Act, the Provincial Policy Statement, and the Municipality of McDougall Official Plan. Please be advised that technical and supporting studies submitted, as part of a complete application may be required to be peer reviewed. If a Peer Review is required, the cost will be at the expense of the applicant in accordance with policies of the McDougall Official Plan. The Planning Department will obtain prior authorization to proceed with the peer review from the applicant. To expedite the processing of your application please ensure it is complete upon submission. Incomplete applications will be returned for you to attend to the identified submission deficiencies. We will not hold incomplete applications in our office.

If you require additional assistance regarding this application, please contact the Planning Department at:

Municipality of McDougall
Phone: 705-342-5252 or;
E-mail: lwest@mcdougall.ca

The Municipality of
McDougall
EST. 1872

Municipality of McDougall
Application for
ZONING BY-LAW AMENDMENT

<table>
<tr><td colspan="2">OFFICE USE ONLY
Application No.: Z - ____
File Name: ____
Civic Address: ____</td><td rowspan="2">Date Stamp:</td></tr>
<tr><td>Application Complete:
❑ Yes
❑ No</td><td>Fee Received:
❑ Yes
❑ No</td></tr>
</table>

ROLL # 4931-010-003-07200**-0000**

1. CONTACT INFORMATION:

All communication will be directed to the Primary Contact only. Copies of correspondence will be sent to all parties and filed according to Municipal procedure.

Primary Contact Joshua Morgan, RPP of MORGAN Planning & Development Inc.

a) **Registered Owner(s):** 2799056 Ontario Limited

(List all owners and contact information if multiple exist)

Mailing address line 1: 22 Seguin Street

Mailing address line 2: ____

City: Parry Sound Postal code: P2A 1B1 Province/State: Ontario

Home phone: ____ Home fax: ____

Business phone: 705 746-2147 Business fax: ____

Email address: garrett@mcnabblumber.ca

b) **Agent:** Joshua Morgan, RPP of MORGAN Planning & Development Inc.

Mailing address line 1: P.O. Box 834

Mailing address line 2: ____

City: Orillia Postal Code: L3V 6K8 Province/State: Ontario

Home phone: ____ Home fax: ____

Business phone: 705 327-1873 Business fax: ____

Email address: jmorgan@morganplanning.ca

2. DESCRIPTION OF SUBJECT LANDS

a) Concession(s): 2

b) Lot(s): Part Lot 24

c) Registered Plan No.: ______ Lot(s)/Block(s): ______

d) Reference Plan No.: ______ Part(s): ______

e) Geographic Township (former municipality): McDougall

f) Civic Address: 9 McDougall Road West

g) Dimensions of subject lands:

Frontage (m)	Depth (m)	Area (ha)
250 (approx)	470 (approx)	11.7 (approx)

h) Official Plan (current designation of subject lands): Rural

i) How does the application conform to the Official Plan: Refer to Planning Justification Report

j) Are there any easements or right-of-ways affecting the subject lands?

☐ Yes ■ No

If yes, indicate and describe the purpose of the easement or right-of-ways:

k) The subject land is within an area where zoning with conditions apply:

☐ Yes ■ No

If yes, please attach an explanation of how the application conforms to the Official Plan policies relating to the zoning with conditions.

l) The subject land is within an area of land designated under any provincial plan or plans:

■ Yes ☐ No

If yes, does the application conform to or does not conflict with the applicable provincial plan or plans:

■ Yes ☐ No

3. ZONING BY-LAW AMENDMENT

a) The current zoning of thesubject land: Commercial (C1)

b) The nature and extent of theproposed rezoning: To permit a 'building supply'

c) The purpose of the proposedrezoning: The ZBA proposes to rezone the property from the Commerical (C1) to a site specific Commercial Exception (C1-#) Zone to add 'building supply' as an additional permitted use, to establish a 20 metre interior side yard setback and to establish a maximum height of 12 m for accessory buildings.

d) Dimensions of the proposed lands to berezoned:

If only a portion of the subject, property is being rezoned.

Frontage (m)	Depth (m)	Area (ha)

e) The application is to implement an alteration to the boundary of an area of settlement or to implement a new area of settlement:

☐Yes ▣No

If yes, attach details of the Official Plan or Official Plan amendment that deals with the above matter.

f) The application is to remove land from an area of employment:

☐Yes ▣No

If yes, attach details of the Official Plan or Official Plan amendment that deals with the above matter.

g) The requested amendment to the Zoning By-law is consistent with the policy statements issued under subsection 3 (1) of the Act:

▣Yes ☐No

4. EXISTING AND PROPOSED USES

a) Date the subject land was acquired by the current Owner: 2020

b) Existing uses of the subject land: Vacant

c) Length of time that the existing uses have continued: It is understood the property has always been vacant

d) Proposed uses of the subject land: Building suppy store

**Attach a separate description if necessary*

e) Date the existing building(s) or structure(s) on the subject land were constructed:

	Type of building/ structure	Date Constructed
1.	Not applicable	Not applicable
2		
3.		
4.		

f) Location of all **existing** structures on the subject land (metric):

	Type of building/ structure	Front Yard (m)	Interior Side Yard (m)	Exterior Side yard (m)	Rear yard (m)
1.	Not applicable				
2.					
3.					
4.					

**Attach separate sheet if more than 4 existing structures*

g) Location of all **Proposed** structures on the subject land (metric):

	Type of building/ structure	Front Yard (m)	Interior Side Yard (m)	Exterior Side yard (m)	Rear yard (m)
1.	To be determined				
2.					
3.					
4.					

**Attach separate sheet if more than 4 proposed structures*

h) Dimensions of all **existing** structures on subject land.

	Building	Ground Floor Area (m^2)	Gross Floor Area (m^2)	# of Stories	Length (m)	Width (m)	Height (m)
1.	Not applicable						
2.							
3.							
4.							

i) Dimensions of all Proposed structures on subject land

	Building	Ground Floor Area (m^2)	Gross Floor Area (m^2)	# of Stories	Length (m)	Width (m)	Height (m)
1.	To be determined						
2.							
3.							
4.							

j) What are the adjacent land uses:

To the north: McDougall Road West

To the south: Vacant rural lands

To the west: Highway 400 North

To the east: Rural residential properties and a motor vehicle salvage yard

k) Are any of the following uses or features on the subject land or within 500 metres of the subject land, unless otherwise specified. Please check the appropriate boxes, if any apply.

Use or Feature	On the Subject Land	Within 500 metres of the Subject Land, unless otherwise specified (indicate approx.. distance)
An agricultural operation, including livestock facility of stockyard	☐	☐
A landfill	☐	☐
A sewage treatment plant or waste stabilization plant	☐	☐
A Provincially significant wetland (Class 1,2 or 3 wetland)	☐	☐
Flood plain	☐	☐
A rehabilitated mine site	☐	☐
A non-operating mine site within 1 kilometre of the subject land	☐	☐
An active mine site	☐	☐
An industrial or commercial use, and specify the uses(s)	☐	☑
An active railway line	☐	☐
A municipal or federal airport	☐	☐

5. ACCESS

a) Access to the subject land is provided by: ______

☐ Provincial highway ☐ Municipal road (year round)
■ Municipal road (seasonal) ☐ Private road / Right-of-Way
☐ Other road ☐ Water

b) If access to the subject land is by water only, indicate the following:

Provide written confirmation of parking and docking facilities.

Docking facility: ______

Distance from docking to subject land: ______

Distance from docking to nearest public road: ______

Parking facility: ______

Distance from docking to parking: ______

Distance from parking to nearest public road: ______

c) Are there any easements or restrictive covenants affecting the subject land?

☐ Yes ■ No

If YES describe the easement or covenant and its effect. ______

9. AUTHORIZATION BY OWNER

Applicable if an Agent is making this application on your behalf.

If the Applicant is not the Owner of the subject land of this Application, the written authorization of the Owner stating that the Agent is authorized to make the Application on their behalf must be included with this application form or the authorization set out below must be completed.

Please Note: If the Owner is an incorporated company, authorization of the appropriate signing officer(s) is required in accordance with the company's by-laws.

I (we), Garrett McNabb of 2799056 Ontario Limited the undersigned,

(Registered Owner(s))

being the Registered Owner(s) of the subject land, hereby authorize Joshua Morgan, RPP

(Agent)

to act as my Agent with respect to the preparation and submission of this Application.

Signature of Owner	AUG 30/2021 Date
Signature of Owner	Date

10. FREEDOM OF INFORMATION AND PRIVACY

Personal information contained in this form, collected and maintained pursuant to Section 34 of The Planning Act, will be used for the purpose of responding to the Application and creating a public record. The Owner's Signature acknowledges that "personal information [is] collected and maintained specifically for the purpose of creating a record available to the general public;" per Section 14(1)(c) of the Municipal Freedom of Information and Protection of Privacy Act, R.S.O. 1990, c. M. 56.

The applicant acknowledges that the Municipality considers the application forms and all supporting materials, including studies and drawings, filed with this application to be public information and to form part of the public record. With the filing of an application, the applicant consents to the Municipality photocopying and releasing the application and any supporting material either for its own use in processing the application or at the request of a third party, without further notification to or permission from the applicant. The applicant also hereby states that it has authority to bind its consultants to the terms of this acknowledgement. Questions regarding the collection of information should be directed to the Clerk/Planner at the Municipality of McDougall 705-342-5252

Signature of Owner	AUG 30/2021 Date
Signature of Owner	Date
Signature of Witness	Date

11. DECLARATION OF OWNER/AGENT

Must be signed by the Owner(s)/Agent in the presence of a Commissioner.

I Joshua Morgan (Owner(s)/Agent) of the the City of Orillia in the County/District/Regional Municipality of Simcoe do solemnly declare that all of the statements contained in this Application are true and I 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 Orillia

in the County of Simcoe

this 6 day of August, 20 21.

Signature of Owner

Date

Signature of Agent (if Applicable)

Date Aug 6. 2021

Signature of Commissioner

DEANE EWART
LAW OFFICE
59 MISSISSAGA ST. W.
ORILLIA, ON L3V 3A7

Commissioners Stamp

12. ADDITIONAL FEES

If Planning, Engineering and/or legal fees are incurred by the Municipality pertaining to this Application, the Applicant, by endorsing below, hereby agrees to submit the balance due, upon receipt of an invoice for same.

Signature of Owner/Agent

Date Aug 30/2021

August 5, 2021 ***Delivered By Hand and Sent By Email**

Municipality of McDougall Office
Ms. Lori West, Clerk

Re: 9 McDougall Road West, District of Parry Sound
Zoning By-law Amendment
Planning Justification Report

1.0 Introduction

MORGAN Planning & Development Inc. ("MP&D" herein) was retained by 279056 Ontario Limited ("the Applicant") in September of 2020, to review the relevant Provincial and Municipal planning policies which apply to the subject property and to provide advice regarding the development of a building supply store.

After reviewing the applicable policies and consulting with the Planning Department, MP&D visited the property to better understand its physical relationship with the surrounding land uses and road fabric. The site visit was helpful and served to strengthen MP&D's opinion that the subject property is an appropriate location for a building supply store.

Once completing the site visit, MP&D was further retained to prepare this Planning Justification Report and to facilitate the zoning by-law amendment process.

1.1 Purpose of Planning Justification Report

The purpose of this Planning Justification Report (PJR) is to describe the subject property to describe the proposed Zoning By-law Amendment, to address the appropriateness of the proposed building supply store in relation to the subject property and its surroundings, and to review the land use policies which provide direction.

1.2 Ownership and Legal Description of Subject Property

The subject property is owned by 2799056 Ontario Limited, the Applicants. The property is known municipally as 9 McDougall Road West Parry Sound. The roll number of the property is 493101000307200, and the Property Identification Number is 52117-0083 (LT).

The property description from the Parcel Register is PT LT 24 CON 2 McDougall PT 142R6380 Except PT1, 2, 4R14887.

Photo 1 Image of Subject Property

2.0 Purpose of Application

The purpose of the zoning by-law amendment ("ZBA") application is to rezone the property from the Commercial (C1) Zone to a site specific Commercial (C1-##) Zone to add 'building supply' as an additional permitted use, to establish a 20 metre setback across the easterly lot line, and to permit accessory buildings with maximum heights of 12 metres.

3.0 Location and Description of Land

The subject property is rectangular in shape, located on the south side of McDougall Road West and the east side of Highway 400 North.

The property has approximately 250 m of frontage onto McDougall Road West and a total lot area of 117,100 m^2 (11.71 hectares/ 28.95 acres).

Figure 1 (top of following page) provides an aerial image of the subject property and illustrates the surrounding land uses and road fabric.

Figure 1 Aerial Image of Subject Property

Vehicular access onto the property is via a private laneway from McDougall Road West. There is no vehicular access from the subject property onto Highway 400. The western property line is within 21 m of the provincial Highway 400 and is separated from the highway by a chain link metal fence.

Photo 2 (top of following page) illustrates the driveway access to the property from McDougall Road West).

Photo 3 (bottom of following page) illustrates the west side of the property as viewed from Highway 400 North.

Photo 2 Illustrates the North facing frontage onto McDougall Road West

Photo 3 Illustrates the West facing side of the lot as seen from Highway 400

Photo 4 View from property facing north-west

3.1 Surrounding Uses

North: The property is bound to the north by McDougall Road West. Immediately north of McDougall Road West are rural residential properties.

East: The property is bound to the east by rural residential properties and a motor vehicle salvage yard.

South: The property is bound to the south by vacant rural lands.

West: The property is bound to the west by Highway 400 North.

4.0 Overview of Proposed Development

It is proposed that the north and central portions of the subject property be developed with a building supply store. It is understood that Site Plan Approval will be required prior to the issuance of any site alteration permissions or building permits. The submission requirements of a future Site Plan Application will be confirmed via a pre-consultation meeting following the completion of the zoning by-law amendment process.

The proposed development can have a maximum lot coverage of 25% and accommodate approximately 1 outdoor parking space for every 15 square metres of total floor area. The parking area surface, driveway or aisles connecting the parking areas with a street will be maintained with a stable and treated surface to prevent the raising of dust or loose particles and will be constructed in accordance with Section 3.50 (c) of the Zoning By-law.

4.1 Zone Matrix of Proposed Development

Zone Matrix – 9 McDougall Road West		
	C1 Zone	**Proposed C1-##**
Lot Frontage (Min) - ZBL Section 8.02 a)	60 m, applicable only when fronting directly on publicly maintained road.	250 m
Lot Area (Min) - ZBL Section 8.02 b)	0.2 hectares	11.71 hectares
Lot Depth (Min) - ZBL Section 8.02 c)	40 m	445.4 m
Yard Requirements (Min) - ZBL Section 8.02 d), e),f),g)	*Front, Exterior and Rear Yard* 10 m for each *Interior Side Yard* 5 m	The future site plan will be designed to comply or exceed the required 10 metre front, exterior and rear yard setbacks. The zoning by-law amendment seeks to establish a 20 metre structural setback and parking setback across the interior side lot line.
Building Height (Max) - ZBL Section 8.02 i)	12 m	The building will be designed to comply with the maximum height of 12 metres.
Commercial Accessory Building – Height - ZBL Section 8.02 k)	6 m	12 metres To be addressed by zoning by-law amendment.
Lot Coverage by building in percent (Max) - ZBL Section 8.02 l)	25%	The future Site Plan will be designed to comply with the maximum lot coverage provision of 25%.
Parking space setback to street (min) - ZBL Section 3.50 h)	1 m	The future site plan will be designed to comply with the minimum parking space setback to the street.
Parking space setback (min) to interior lot line	-	The zoning by-law amendment seeks to establish a 20 metre structural setback and parking setback across the interior side lot line.
Parking spaces (min) for other commercial uses - ZBL Section 3.50 a)	1 parking space for every 15 square metres of total floor area	The future Site Plan will be designed to comply with the parking provisions of the zoning by-law.

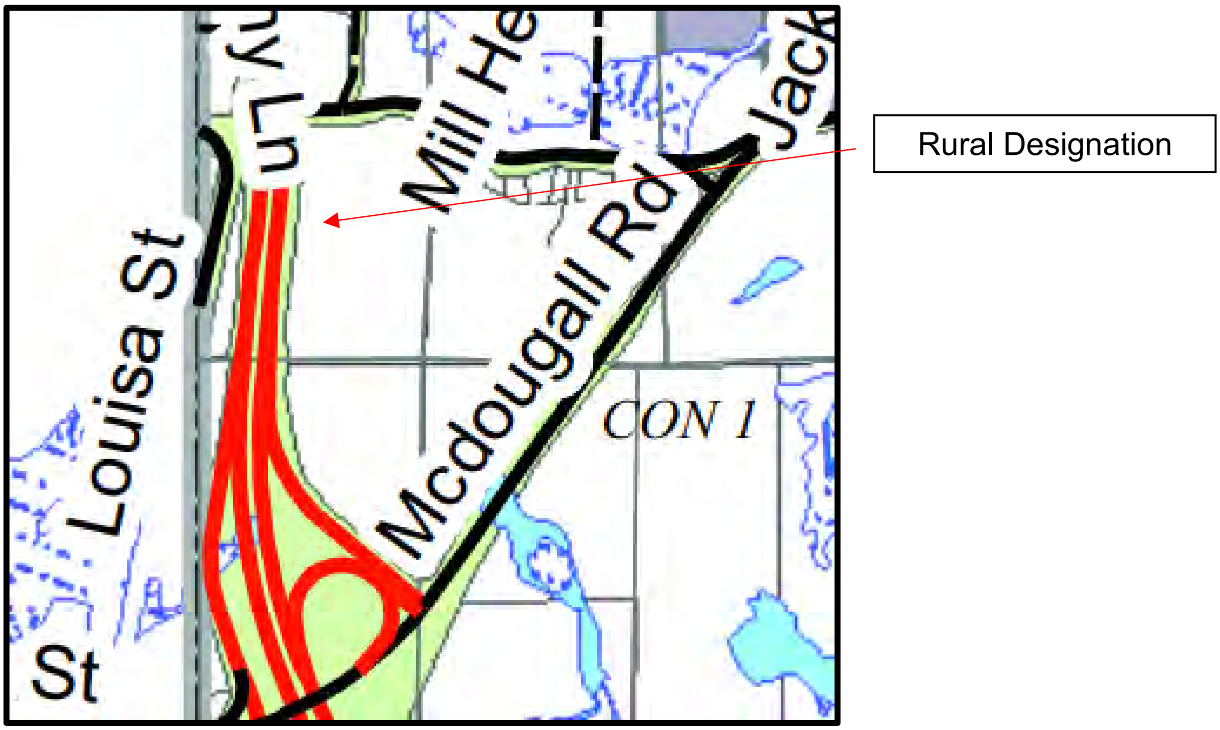
Parking space dimensions (min) - ZBL Section 3.50 b) (ii)	$3\ m$ x $6\ m$ with unobstructed access to a street directly or by way of a driveway, aisle lane or private road	The future Site Plan will be designed to comply with the parking provisions of the zoning by-law.
Aisle Width (min) - ZBL Section 3.50 d) (i), (ii)	Ingress and egress minimum passageway of 4 metres but no more than 10 metres in perpendicular width Ingress egress ramp 10 m width	The future Site Plan will be designed to comply with the aisle width provisions of the zoning by-law.
Distance and Angle between Driveway and an intersection of street lines (Min) - ZBL Section 3.50 d) (iii), (iv)	7 m, 60 degrees between driveway and street line.	The future Site Plan will be designed to comply with the driveway provisions of the zoning by-law.
Parking Area Surface - ZBL Section 3.50 c)	Maintained with a stable surface which is treated so as to prevent the raising of dust or loose particles. Constructed with select materials listed in ZBL.	The future Site Plan will be designed to comply with the parking surface provisions of the zoning by-law.
Illumination - ZBL Section 3.50 e)	Shall be no more than 8 metres above the finished grade of the parking area. Lighting designed and installed so that light point downward and deflected away from adjacent lots, roads and streets.	The future Site Plan will be designed to comply with the lighting provisions of the zoning by-law.
Number of driveways - ZBL Section 3.50 d) (v)	Up to the first 30 m of frontage, no more than 2 driveways and for each additional 30 m of frontage no more than 1 additional driveway.	The future Site Plan will be designed to comply with the driveway provisions of the zoning by-law.

5.0 Overview of Official Plans and Zoning By-law

5.1 Municipality of McDougall Official Plan (Consolidated 2015)

The subject property is located within the 'Rural' designation as denoted on Schedule 'A' Land Use Plan of the Municipality of McDougall Official Plan.

Figure 2 Municipality of McDougall Official Plan Schedule 'A' Land Use Plan



Section. 19.02.1 of the Official Plan directs that the 'Rural' designation will generally apply to most of the inland areas of the Planning Area which do not front on recreational water bodies.

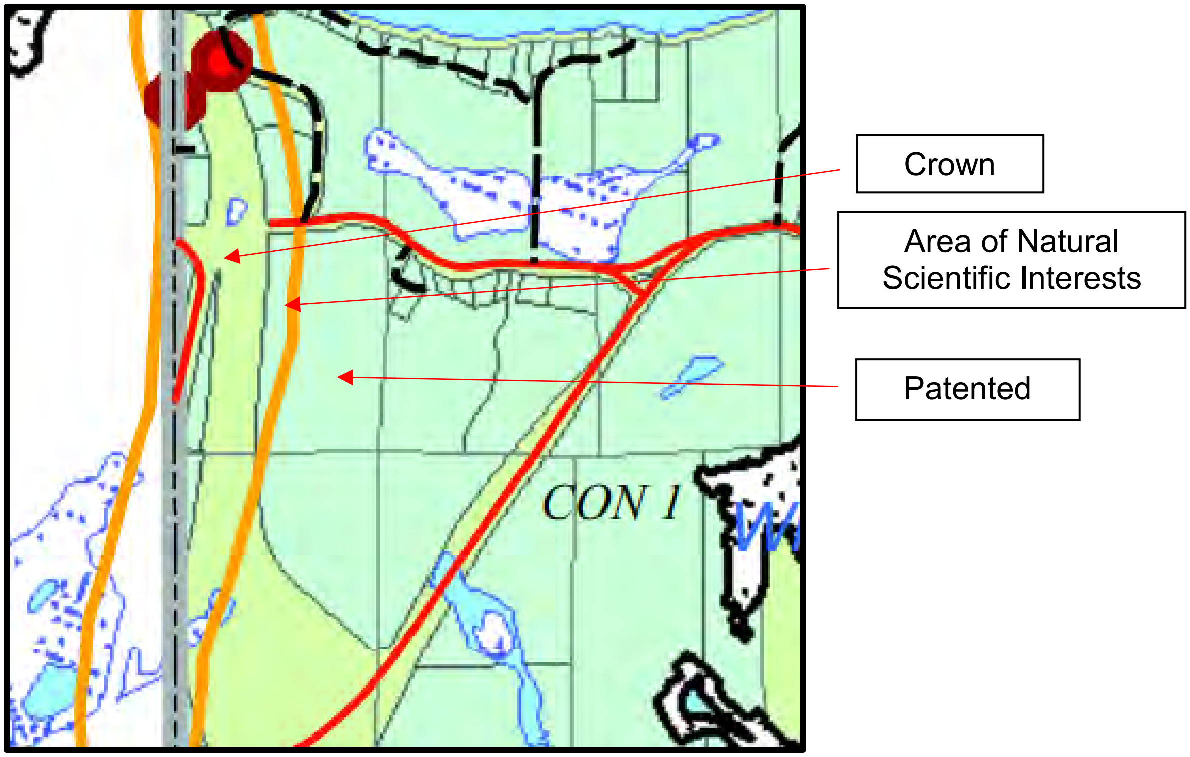
Section 19.02.2 of the Official Plan permits commercial and industrial development uses, pits and quarries and tourist commercial uses in Rural Areas subject to all other policies within the Plan.

Section 19.02.3 states that the basic objective is to require higher lot standards in the rural areas and along major public roads.

The proposed building supply store development within the 'Rural' land use designation and adjacent to Highway 400 of the Municipality of McDougall is supported by the policies of the Official Plan.

Figure 3 (top of following page) is an excerpt from Official Plan Schedule 'B' Natural Heritage. The property is denoted as 'Patented' as indicated by the 'light green' colour and an 'Area of Natural Scientific Interest' as indicated by the 'orange' colour. The subject property is additionally adjacent to Highway 400 that is designated 'crown' land and indicated by the 'mint green' colour.[1]

Figure 3 Municipality of McDougall Official Plan Schedule 'B' Natural Heritage



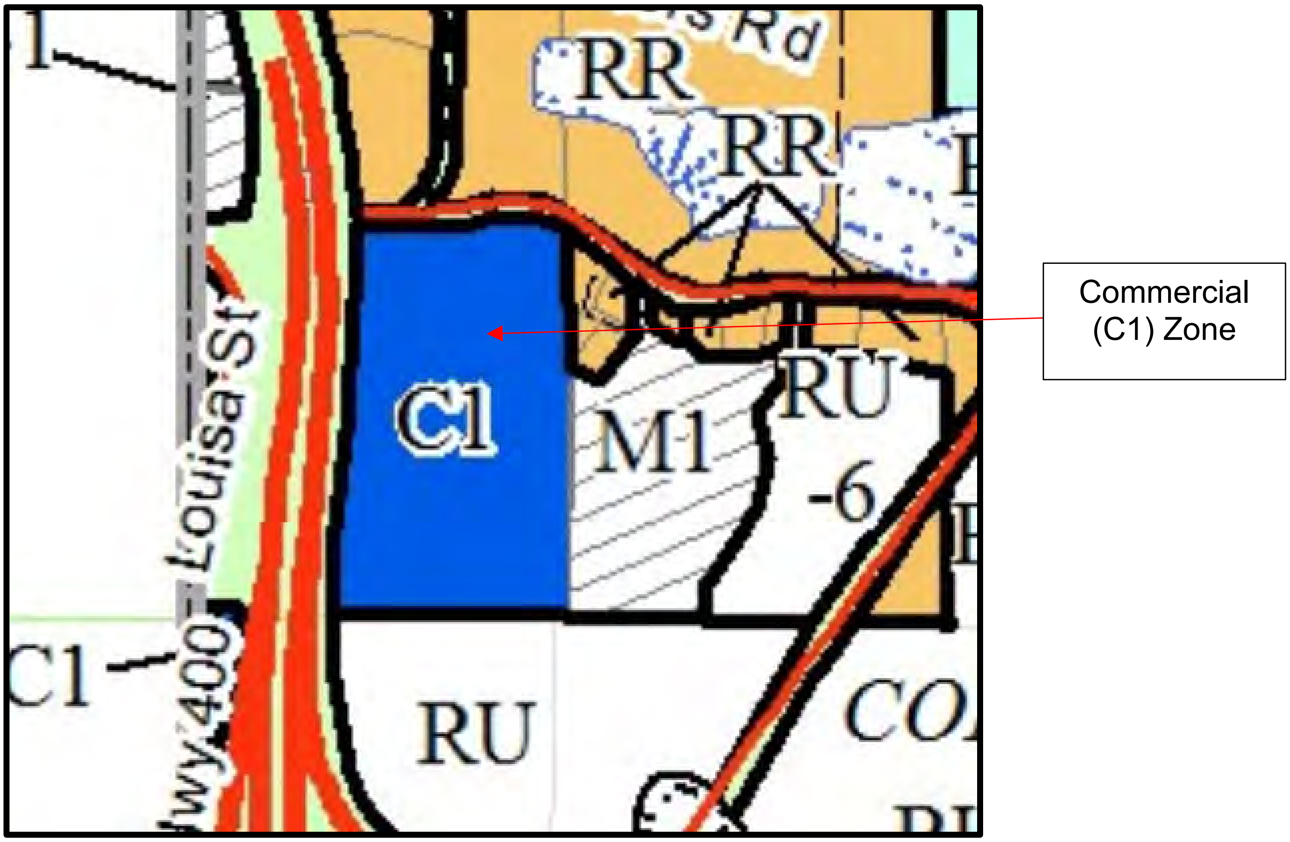
Official Plan Section 14.01.4 directs if development is proposed adjacent to any natural heritage features, a site assessment is required to determine if those features are present and to determine if further study is required to prevent negative mpacts on the feature or its ecological function. Following the rezoning process the Applicants will consult with the Municipality to discuss the scope of any site assessment in support of the future Site Plan Approval process.

5.2 Municipality of McDougall Zoning By-Law No. 2017-05

The subject property is zoned 'Commercial (C1) by the Municipality of McDougall Zoning By-law. Figure 4 (top of following page) bellow illustrates the existing zone fabric, together with the zoning of the adjacent lands.

- **Crown Land** is land held by the federal or provincial government in the name of the monarch.
- **Patent Land** is a legal transfer of Crown Land to a private owner.
- **Area of Natural and Scientific Interests** are areas of land and water containing natural landscapes or features which have been identified as having value related to protection, natural heritage appreciation, scientific study or education.

Figure 4 Municipality of McDougall Zoning By-law Schedule 'A' Sheet 3



Section 2.25 defines Building supply as a "*retail or wholesale store with or without a storage area used for the temporary storage and sale of building supplies such as lumber, cement, bricks and hardware*".

Section 8.01 b) lists the wide range of permitted commercial uses within the Commercial (C1) Zone. The development of a building supply store is not one of those permitted uses.

On this basis, the zoning by-law amendment application proposes to rezone the property from the Commercial (C1) Zone to a site-specific Commercial Exception (C1-#) Zone to add 'building supply' as an additional permitted use, to establish a 20 metre interior side yard setback across the easterly lot boundary, and to permit accessory buildings with maximum heights of 12 metres. The exact nature of the proposed ZBA is provided in Section 5.1 of this report.

6.0 Planning Instruments

6.1 Zoning By-law Amendment (ZBA)

The zoning by-law amendment application proposes to rezone the property from the Commercial (C1) Zone to a site specific Commercial Exception (C1-#) Zone.

It is proposed that the C1-## Zone include the following site-specific provisions:

i) Notwithstanding Section 8.01 b) of the Zoning By-law, and in addition to all uses permitted within the parent C1 Zone, a 'building supply' is an additional permitted use.

ii) A minimum 20 m interior side yard setback across the easterly lot boundary applicable to parking spaces, loading spaces and buildings.

iii) Notwithstanding Section 8.02(k) of the Zoning By-law, the maximum building height of an accessory building shall be 12 metres.

6.2 Site Plan Control Application

It is proposed that a Site Plan Control Application be submitted following the approval of the proposed Zoning By-law Amendment application.

The Site Plan Control Application will include (but not be limited to) a site plan, detailed building elevations, detailed civil engineering design drawings and a landscape plan.

7.0 Public Consultation Strategy

It is understood that a public meeting held in accordance with *The Planning Act* will be coordinated by the approval authorities and that notice of the meeting will be circulated to all property owners within 120 metres of the subject property.

Due to the Covid-19 pandemic, it is assumed that the statutory public meeting will be held via video conference.

8.0 Opinion of Land Use Compatibility

When considering the appropriateness of the development, land use compatibility is one of the most fundamental considerations. When undertaking this analysis, the author considered the built form and uses of the adjacent properties, the general character of the subject property, the proposed building supply use, and the how the future site plan can adequately mitigate adverse off-site impacts.

Based on this neighborhood analysis, the author is of the opinion that a building supply within the Rural land use designation will function compatibly with adjacent properties both from a use perspective, but also from an aesthetic perspective. This conclusion has been reached for the following reasons:

- The entire property is designated ‘Rural’ by the McDougall Official Plan. New commercial and industrial uses are permitted within rural areas, subject to suitable compatibility considerations and a zoning by-law amendment (as required).
- The Commercial (C1) Zone which applies to the property permits a multitude of commercial uses as-of-right. Those uses include, but are not limited to, retail stores, service shops, hotel, motel, tavern, gas station, automobile sales establishment, automobile service establishment, a tourist information centre, a marina, a trailer park, a place of entertainment, a light manufacturing establishment, a library, a hospital a nursing home, etc. In the opinion of the undersigned the proposed addition of a ‘building supply’ to the long list of uses that are currently permitted on the property is consistent with the Municipality’s vision for the property and is equally as compatible with the adjacent properties as most other uses that are permitted as-of-right.
- The subject property is vacant, underutilized and large enough in size to enable the placement of the future building supply store together with the associated parking, driveways and storage areas while still maintaining significant setbacks form adjacent properties.
- The Municipality of McDougall has a number of policies that support sustainable economic growth to strengthen and diversify the local economy. Section 4.18 of the Municipal Official Plan states that the Municipality will support industrial and commercial activities so that jobs may be provided on a year-round basis.
- The subject property is adjacent to the Highway 400, which provides strong exposure for the future building supply store and ease of vehicular access. This is important as Section 4.14 of the Official Plan encourages the Municipality to respond to demand for additional growth in order to buffer the effects of increased servicing costs. Additionally, the Municipality has stated within Section 4.17 of their Official Plan that they intend to take advantage of these opportunities to support new development.
- From a land use compatibility perspective, it is both appropriate and desirable to locate commercial development in close proximity to Highway 400.
- The subject property is less than 3 km from the Town of Parry Sound and will beneficially service the residences within the Municipality McDougall and Parry Sound.
- The proposed development will intentionally maintain the C1 Zone total lot coverage to a maximum of 25% to maintain the commercial uses compatibility within the rural designation.
- The site-specific zoning by-law amendment seeks to establish a 20 m setback to the residential dwellings which abut the property to the north-east. The intent of this provision is to mitigate light and noise pollution.

9.0 Policy Analysis

In formulating the planning rational for the proposed development, the Provincial Policy Statement (2020), the Growth Plan for Northern Ontario (2011), and the Municipality of McDougall Official Plan (2015) have been reviewed.

The following is an overview of the most directly applicable policies as they apply to proposed Zoning By-law Amendment.

9.1 Provincial Policy Statement (2020)

The 2020 Provincial Policy Statement (PPS) is issued under Section 3(1) of the Planning Act. Under Section 3(6) of the Act, municipal planning decisions are required to be consistent with the PPS. The PPS outlines the Province of Ontario's position on a wide range of land use planning matters and generally supports the planning and development of strong, healthy communities, the wise management and conservation of natural resources, and ensuring the protection of public health and safety from hazards.

Section 1.1.4 of the PPS provides direction regarding rural areas.

Section 1.1.4.1 of the PPS directs that healthy, integrated and viable rural areas should be supported by a) building upon the rural character, e) using rural infrastructure and public service facilities efficiently, and f) promote the diversification of the economic base and employment opportunities through goods and services.

MP&D Comment: The subject property is designated 'Rural' and zoned Commercial. The proposed zoning by-law amendment would enable the development of a building supply store on a vacant underutilized lot within a rurally designated commercially zoned area thereby promoting the diversification of the economic base and employment opportunities within the Municipality of McDougall.

Section 1.1.5.3 directs that that recreational, tourism and other economic opportunities be promoted

Section 1.1.5.4 encourages development that is compatible with the rural landscape and can be sustained by rural service levels.

Section 1.1.5.5 directs that development shall be appropriate to the infrastructure, which is planned or available, and avoid the need for the unjustified and/or uneconomical expansion of this infrastructure.

MP&D Comment: The proposed development is an opportunity to support and diversify the rural economy, and will not require the expansion of any infrastructure.

Section 1.3.1 directs planning authorities to promote economic development and competitiveness by (a) providing for an appropriate mix and range of employment to meet long-term needs (b) providing opportunities for a diversified economic base, including support for a wide range of economic activities and ancillary uses and take into account the needs of existing and future businesses and (c) facilitating the conditions for economic investment by identifying strategic sites for investment, monitoring the availability and suitability of employment sites, including market-ready sites, and seeking to address potential barriers to investment.

MP&D Comment: The zoning by-law amendment will enable the development of a large, vacant, underutilized property that is in a highly visible location. The proposed development will provide employment opportunities, diversify the local economy, and encourage economic investment within the region.

Section 2.1.1 directs that natural heritage features and areas shall be protected for the long term.

MP&D Comment: As identified by Schedule ‘B’ Natural Heritage of the Municipality of McDougall Official Plan, an Area of Natural and Scientific Interest intersects the subject property. The subsequent Site Plan Approval process will identify and delineate any natural heritage features and establish appropriate mitigation strategies to protect any features that may be identified.

It is the opinion of the undersigned that the zoning by-law amendment application is consistent with the direction provided within the Provincial Policy Statement (2020).

9.2 Growth Plan for Northern Ontario (2011)

The Growth Plan for Northern Ontario (“the Growth Plan”), was developed pursuant to the Places to Grow Act, 2005, and applies to the Northern Ontario Growth Plan Area as defined by Ontario Regulation 416/05, as amended. Northern Ontario includes 144 municipalities, 106 First Nations, Métis communities and more than 150 unincorporated communities.

Section 1.4 of the Growth Plans Guiding Principles includes but is not limited to 1) creating a highly productive region, with a diverse, globally competitive economy that offers a range of career opportunities for all residents.

Section 4.2 of the Growth Plan encourages municipalities to align their official plan policies with their long-term community strategies such as;

a) Economic, social and environmental sustainability;
b) Accommodation of the diverse needs of all residents, now and in the future;

c) Optimized use of existing infrastructure;
d) A high quality of place;
e) A vibrant, welcoming and inclusive community identity that builds on unique local features;
f) Local implementation of regional economic plans, where such plans have been completed.

It is the opinion of the undersigned that the zoning by-law amendment application is conforms to the direction provided within the Growth Plan for Northern Ontario (2011). This opinion has been reached for the following reasons:

- The subject land property is vacant, underutilized, highly visible and large enough to accommodate a significant employment generating use such as a building supply store. On this basis the proposed zoning by-law amendment provides a terrific opportunity for diversifying the local economy and strengthening opportunities for employment.
- The proposed development would optimize existing municipal infrastructure.

9.3 Municipality of McDougall Official Plan (2015)

As noted within Section 4.1 of this report, the subject property is located within the 'Rural' designation as denoted on Schedule 'A' of the Municipality of McDougall's Official Plan.

A summary of the most directly applicable Official Plan polices is provided below:

Section 9.01.3 directs that any development in proximity to existing or future provincial highways will require review by the Ministry of Transportation and may require permits from the Ministry of Transportation in accordance with the Public Transportation and Highway Improvement Act. The Ministry of Transportation's permit control jurisdiction can extend out to 800 metres from a Highway in some circumstances, and early consultation with the Ministry is encouraged prior to any development proceeding in order to ascertain Ministry interests and potential issues.

Section 9.01.4 directs that development adjacent to a provincial highway may be required to undertake various operational and safety studies, including but not necessarily limited to: traffic impact studies; drainage and stormwater management studies; exterior illumination studies; environmental studies; and, noise studies. The Ministry of Transportation does not pay for development-driven studies, or any highway improvements deemed necessary by the MTO through the review of those studies. These studies shall be in accord with applicable M.O.E.C.C. Noise Guidelines.

MP&D Comment: The subject property is adjacent to Highway 400 North and it is understood that a building and land use permit will be required prior to the issuance of any site alteration permission or building permit.

It is also understood that the MTO may require a Traffic Impact Study and Entrance Analysis as part of a future Site Plan Application.

Section 12.01 of the Official plan states that it is not possible to predict where new commercial or industrial development may wish to locate in the Municipality. McDougall supports new commercial and industrial uses in all areas of the Municipality subject to the following policies.

12.01.1 A planning report will be required from the applicant outlining the nature of the commercial or industrial use and what impacts may occur and what measures would be undertaken to mitigate against those impacts in accordance with M.O.E.C.C.'s D – Series and Noise Guidelines.

12.01.2 Where the existing zoning is not appropriate an amendment to the zoning by- law will be required for any new commercial or industrial use.

12.01.3 All commercial and industrial uses are subject to site plan control.

12.01.4 All new commercial and industrial uses are required to consult with relevant government agencies and shall comply with all relevant provincial standards.

12.01.5 All proponents of new commercial and industrial uses are required to demonstrate to the satisfaction of the council that there will be no adverse effects on adjacent sensitive uses.

12.01.6 Where new commercial and industrial uses are proposed on the basis of private services, a servicing options statement may be required. For private services to be considered appropriate, only low water demand commercial and industrial uses shall be permitted. Uses permitted shall not include any form of manufacturing or assembly operation that uses water in the processing, cooling, cleaning, or making of the product. Low water demand employment uses shall generally limit water demand and use to potable uses for staff and visitors. New commercial or industrial uses, which are not low water demand uses, will not be considered on the basis of partial services. Existing commercial or industrial uses, which are not low water demand uses, shall not be added to the water system if private sewage services are to continue to be used to service the commercial or industrial use, except to address circumstances where services have failed.

12.01.7 Consultation with the Provincial Ministry of Transportation is required where access is directly onto a provincial highway, even in those circumstances where an entrance permit has been issued. Where access onto an arterial roadway which intersects with a provincial highway is proposed, the Provincial Ministry of Transportation will need to be consulted if the development proposal is within 400 metres of a provincial highway.

MP&D Comments:

12.01.1 Agreed. The Planning Justification Report is provided herein.

12.01.2 Agreed. A zoning by-law amendment application is submitted together with this Planning Justification Report which seeks to permit a 'building supply' as an additional permitted use, while also establishing a minimum 20 metre interior side yard setback, and a maximum building height of 12 metres for accessory buildings.

12.01.3 Agreed.

12.01.4 Agreed. MP&D has been in consultation with the Municipality of McDougall and will comply with all relevant provincial standards.

12.01.5 Agreed. The zoning by-law amendment application proposes to establish a minimum 20 metre interior side yard setback to ensure compatibility with the adjacent land uses.

12.01.6 Agreed. The proposed commercial development has a low water demand and is not a form of manufacturing or assembly operation. Water demand will be limited to potable uses for staff and visitors.

12.01.7 Agreed. The proposed is not directly accessible to provincial highway.

Section 14.0 states that no development or site alteration is permitted within Provincially Significant Wetlands or significant coastal wetlands. If development is proposed adjacent to any significant natural heritage features, a site assessment is required to determine if those features are present and to determine if further study is required to prevent negative impacts on the feature or its ecological function.

14.01.5 Adjacent lands are those lands that are within

a) 120 metres of: significant habitat of endangered and threatened species; provincially significant wetlands; significant coastal wetlands; significant woodlands and valleylands; Areas of Natural and scientific Interest (life science); and fish habitat.
b) 50 metres of Areas of Natural and Scientific Interest (earth science)

Section 14.01.7 states that if there are significant gaps in the data respecting natural heritage features, the proponent(s) shall be required to undertake an ecological assessment at the proponent's expense to determine what, if any, natural heritage features are present. where natural heritage features are found, development or site alteration shall not be permitted within or adjacent to the natural heritage features unless it can be demonstrated that there will be no negative impacts on the natural features or on their ecological function.

MP&D Comment: Agreed. An area of Natural and Scientific Interest intersects the property as indicated by **Figure 3**. The subsequent Site Plan Approval process will identify and delineate any natural heritage features and establish appropriate mitigation strategies to protect any features that may be identified.

10.0 Concluding Remarks

The zoning by-law amendment application proposes to rezone the rurally designated and commercially zoned property from the parent Commercial (C1) Zone to a site specific Commercial Exception (C-#) Zone.

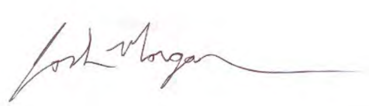
The proposed C1-# Zone would add a ‘building supply’ as an additional permitted use, permit an accessory building height of 12 metres, while establishing a 20 metre minimum interior side yard setback to ensure compatibility with adjacent land uses.

As outlined in the preceding sections of this report, the application is consistent with the policies of the Provincial Policy Statement (2020), and conforms with the policies of the Growth Plan of Northern Ontario (2011), and the Municipality of McDougall Official Plan (2015).

Furthermore, it is the opinion of the undersigned that rezoning the property to enable the future development of a building supply store represents good land use planning.

With this submission we respectfully request that the Municipality of McDougall schedule a public meeting at its next opportunity.

Respectfully submitted,
MORGAN Planning & Development Inc.



Joshua Morgan, RPP

Municipality of McDougall

Application for

ZONING BY-LAW AMENDMENT

OFFICE USE ONLY Application No.: Z - ______ File Name: ______ Civic Address: ______		Date Stamp:
Application Complete: ❑ Yes ❑ No	Fee Received: ❑ Yes ❑ No	

ROLL # 4931-010-003-01904**-0000**

1. CONTACT INFORMATION:

All communication will be directed to the Primary Contact only. Copies of correspondence will be sent to all parties and filed according to Municipal procedure.

Primary Contact John Jackson Planner Inc.

a) Registered Owner(s): WALTMAR INC

(List all owners and contact information if multiple exist)

Mailing address line 1: c/o Michelle Goodridge 7101 Syntex Dr

Mailing address line 2: ______

City: Mississauga Postal code: L5N 6H5 Province/State: Ontario

Home phone: ______ Home fax: ______

Business phone: ______ Business fax: ______

Email address: ______

b) Agent: John Jackson Planner Inc.

Mailing address line 1: 110-70 Isabella Street

Mailing address line 2: ______

City: Parry Sound Postal Code: P2A 1M6 Province/State: Ontario

Home phone: ______ Home fax: ______

Business phone: 705-746-5667 Business fax: ______

Email address: JJPlan@cogeco.net

2. DESCRIPTION OF SUBJECT LANDS

a) Concession(s): 1

b) Lot(s): Part Lot 24

c) Registered Plan No.: ____________ Lot(s)/Block(s): ____________

d) Reference Plan No.: 42R-14713 Part(s): Pt 10

e) Geographic Township (former municipality): McDougall

f) Civic Address: ____________

g) Dimensions of subject lands:

Frontage (m)	Depth (m)	Area (ha)
334	205	3.1

h) Official Plan (current designation of subject lands): Rural

i) How does the application conform to the Official Plan: Meets the rural policy requirement for commercial development

j) Are there any easements or right-of-ways affecting the subject lands?

☐ Yes ☒ No

If yes, indicate and describe the purpose of the easement or right-of-ways:

____

____

k) The subject land is within an area where zoning with conditions apply:

☐ Yes ☒ No

If yes, please attach an explanation of how the application conforms to the Official Plan policies relating to the zoning with conditions.

l) The subject land is within an area of land designated under any provincial plan or plans:

☒ Yes ☐ No

If yes, does the application conform to or does not conflict with the applicable provincial plan or plans:

☒ Yes ☐ No

3. ZONING BY-LAW AMENDMENT

a) The current zoning of thesubject land: Rural (RU)

b) The nature and extent of theproposed rezoning: Proposed Commercial Development

c) The purpose of the proposedrezoning: To allow commercial development on the subject lands.

____

____

____

d) Dimensions of the proposed lands to berezoned:

If only a portion of the subject, property is being rezoned.

Frontage (m)	Depth (m)	Area (ha)

e) The application is to implement an alteration to the boundary of an area of settlement or to implement a new area of settlement:

☐Yes ■No

If yes, attach details of the Official Plan or Official Plan amendment that deals with the above matter.

f) The application is to remove land from an area of employment:

☐Yes ■No

If yes, attach details of the Official Plan or Official Plan amendment that deals with the above matter.

g) The requested amendment to the Zoning By-law is consistent with the policy statements issued under subsection 3 (1) of the Act:

☐Yes ☐No

4. EXISTING AND PROPOSED USES

a) Date the subject land was acquired by the current Owner: 2013

b) Existing uses of the subject land: Vacant

c) Length of time that the existing uses have continued:

d) Proposed uses of the subject land: Commercial

**Attach a separate description if necessary*

e) Date the existing building(s) or structure(s) on the subject land were constructed:

	Type of building/ structure	Date Constructed
1.	None	
2		
3.		
4.		

f) Location of all **existing** structures on the subject land (metric):

	Type of building/ structure	Front Yard (m)	Interior Side Yard (m)	Exterior Side yard (m)	Rear yard (m)
1.					
2.					
3.					
4.					

**Attach separate sheet if more than 4 existing structures*

g) Location of all **Proposed** structures on the subject land (metric):

	Type of building/ structure	Front Yard (m)	Interior Side Yard (m)	Exterior Side yard (m)	Rear yard (m)
1.	Unknown				
2.					
3.					
4.					

**Attach separate sheet if more than 4 proposed structures*

h) Dimensions of all **existing** structures on subject land.

	Building	Ground Floor Area (m^2)	Gross Floor Area (m^2)	# of Stories	Length (m)	Width (m)	Height (m)
1.							
2.							
3.							
4.							

i) Dimensions of all Proposed structures on subject land

	Building	Ground Floor Area (m^2)	Gross Floor Area (m^2)	# of Stories	Length (m)	Width (m)	Height (m)
1.	Unknown						
2.							
3.							
4.							

j) What are the adjacent land uses:

To the north: Highway 400

To the south: Crown Land

To the west: Premium Dock Company

To the east: Highway 400

k) Are any of the following uses or features on the subject land or within 500 metres of the subject land, unless otherwise specified. Please check the appropriate boxes, if any apply.

Use or Feature	On the Subject Land	Within 500 metres of the Subject Land, unless otherwise specified (indicate approx.. distance)
An agricultural operation, including livestock facility of stockyard	☐	☐
A landfill	☐	☐
A sewage treatment plant or waste stabilization plant	☐	☐
A Provincially significant wetland (Class 1,2 or 3 wetland)	☐	☐
Flood plain	☐	☐
A rehabilitated mine site	☐	☐
A non-operating mine site within 1 kilometre of the subject land	☐	☐
An active mine site	☐	☐
An industrial or commercial use, and specify the uses(s)	☐	☐
An active railway line	☐	☐
A municipal or federal airport	☐	☐

5. ACCESS

a) Access to the subject land is provided by: Oastler Park Drive

☐Provincial highway ■Municipal road (year round)
☐Municipal road (seasonal) ☐Private road / Right-of-Way
☐Other road ☐Water

b) If access to the subject land is by water only, indicate the following:

Provide written confirmation of parking and docking facilities.

Docking facility: ______

Distance from docking to subject land: ______

Distance from docking to nearest public road: ______

Parking facility: ______

Distance from docking to parking: ______

Distance from parking to nearest public road: ______

c) Are there any easements or restrictive covenants affecting the subject land?

☐Yes ■No

If YES describe the easement or covenant and its effect. ______

d) If access to the subject land is by private road, or if "right-of-way" indicate who owns the land or road, who is responsible for its maintenance and whether it is maintains seasonally or all year. ______________________________

____

6. SERVICES

a) Water is provided to the subject land by:

- ☐ Private well
- ☐ Privately owned/operated communal well
- ☐ Lake or other water body
- ☒ Other:

b) Sewage disposal is provided to the subject land by:

- ☐ Private sewage system
- ☐ Privately owned/operated communal sewage system
- ☐ Privy
- ☒ Other:

c) Storm drainage is provided to the subject land by:

- ☐ Ditches
- ☐ Swales
- ☒ Natural

7. OTHER APPLICATIONS

a) Is the subject land currently the subject of an application for a Minor Variance, Consent or approval of a Plan of Subdivision?

- ☐ Yes
- ☒ No
- ☐ Unknown

If YES, and if known, specify the application number: ______________________________

b) Has the land ever been the subject of an Official Plan Amendment or Zoning By-Law Amendment?

- ☐ Yes
- ☒ No
- ☐ Unknown

If YES, and if known, specify the number for the amendment: ______________________________

8. DIRECTIONS: HOW TO GET THERE

Civic Address: 2 Oastler Park Drive

Directions from McDougall Municipal Office (5 Barager Blvd. McDougall) to your site:

Take Nobel Road. Turn left on Parry Sound Drive. Take Highway 400 to Exit 224

Merge onto Bowes Street. Turn left onto Oastler Park Drive

9. AUTHORIZATION BY OWNER

Applicable if an Agent is making this application on your behalf.

If the Applicant is not the Owner of the subject land of this Application, the written authorization of the Owner stating that the Agent is authorized to make the Application on their behalf must be included with this application form or the authorization set out below must be completed.

Please Note: If the Owner is an incorporated company, authorization of the appropriate signing officer(s) is required in accordance with the company's by-laws.

I (we), Waltmar Inc the undersigned,
(Registered Owner(s))
being the Registered Owner(s) of the subject land, hereby authorize John Jackson Planner Inc.
(Agent)
to act as my Agent with respect to the preparation and submission of this Application.

Signature of Owner — Date: AUGUST 9/21

Signature of Owner — Date

10. FREEDOM OF INFORMATION AND PRIVACY

Personal information contained in this form, collected and maintained pursuant to Section 34 of The Planning Act, will be used for the purpose of responding to the Application and creating a public record. The Owner's Signature acknowledges that "personal information [is] collected and maintained specifically for the purpose of creating a record available to the general public;" per Section 14(1)(c) of the Municipal Freedom of Information and Protection of Privacy Act, R.S.O. 1990, c. M.56.

The applicant acknowledges that the Municipality considers the application forms and all supporting materials, including studies and drawings, filed with this application to be public information and to form part of the public record. With the filing of an application, the applicant consents to the Municipality photocopying and releasing the application and any supporting material either for its own use in processing the application or at the request of a third party, without further notification to or permission from the applicant. The applicant also hereby states that it has authority to bind its consultants to the terms of this acknowledgement. Questions regarding the collection of information should be directed to the Clerk/Planner at the Municipality of McDougall 705-342-5252

Signature of Owner — Date: AUG - 9/21.

Signature of Owner — Date

Signature of Witness — Date: Aug 9/21

11. DECLARATION OF OWNER/AGENT

Must be signed by the Owner(s)/Agent in the presence of a Commissioner.

I John Jackson (Owner(s)/Agent) of the

Town of Parry Sound in the

County/District/Regional Municipality of Parry Sound do solemnly declare that all of the statements contained in this Application are true and I 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 Town of Parry Sound

in the District of Parry Sound

this 9th day of August, 20 21.

Signature of Owner

Date

Signature of Agent (if Applicable)

Date August 9/2021

Signature of Commissioner

Patrick James Christie, a Commissioner, etc., Province of Ontario, for John Jackson Planner Inc., Expires October 12, 2024

Commissioners Stamp

12. ADDITIONAL FEES

If Planning, Engineering and/or legal fees are incurred by the Municipality pertaining to this Application, the Applicant, by endorsing below, hereby agrees to submit the balance due, upon receipt of an invoice for same.

Signature of Owner/Agent

Date August 9/2021

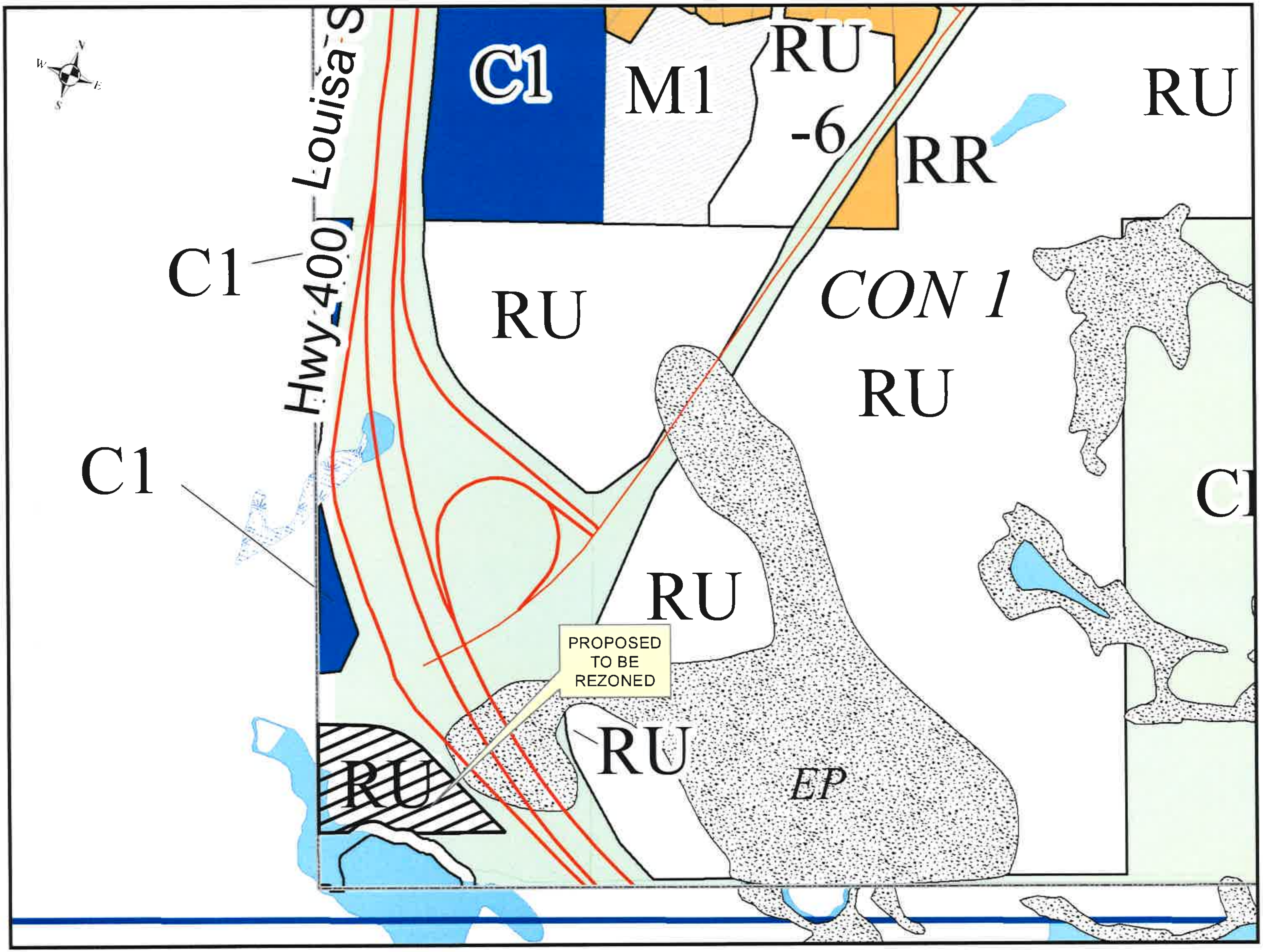
13. PLANS REQUIRED

Please attach 2 copies of the sketch, site plan or survey **drawn to scale, in metric.**

One copy must be submitted on 8.5" x 11" paper and an electronic version in Adobe Acrobat pdf format.

Minimum requirements will be a sketch showing the following:

- ❑ The boundaries and dimensions (frontage, depth and area) of the subject land.
- ❑ Indicate the area to be rezoned.
- ❑ The location, size and type of all existing and proposed buildings and structures on the subject land, indicating the distance of the buildings or structures from the front lot line, rear lot line and the side lot lines.
- ❑ The approximate location of all topographical, natural and artificial features on the subject land and on land that is adjacent to the subject land that, in the opinion of the Applicant, may affect the Application. Examples include buildings, railways, roads, watercourses, drainage ditches, river or stream banks, wetlands, wooded areas, wells and septic tanks.
- ❑ The current uses on land that is adjacent to the subject land.
- ❑ The location and name of any roads within or abutting the subject land, indicating whether it is an unopened road allowance, a public road, a private road or a right-of-way.
- ❑ If access to the subject land is by water only, the location of the parking and docking facilities to be used.
- ❑ If the subject land has Lake Frontage, label the lake name.
- ❑ The location and nature of any easement affecting the subject land.
- ❑ North arrow and scale.



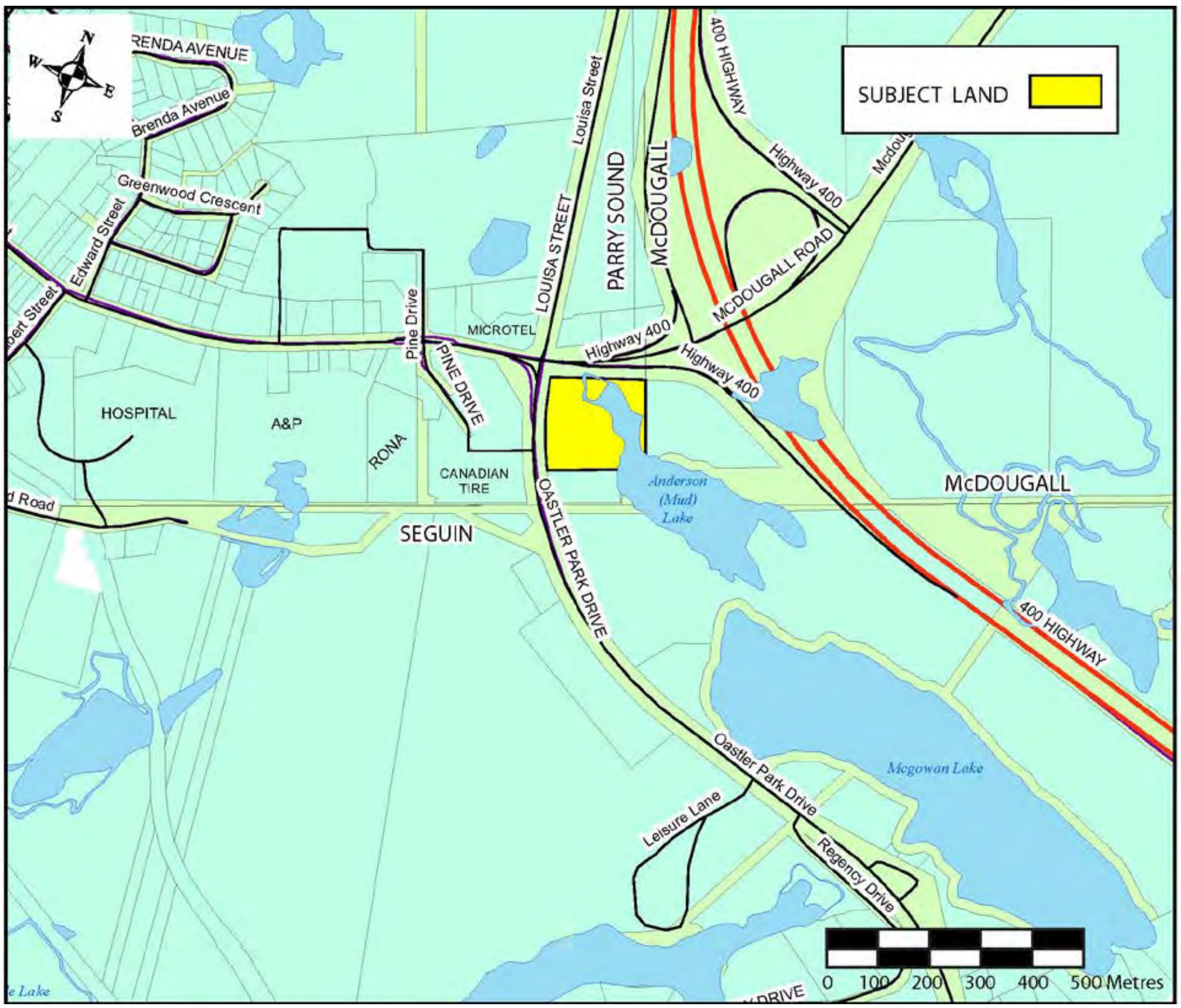
N
W
E
S
Louisa St
Hwy 400
C1
M1
RU
-6
RU
RR
C1
RU
CON 1
RU
C1
C1
RU
PROPOSED
TO BE
REZONED
RU
RU
EP

John Jackson planner, inc. 70 Isabella Street Unit #110, Parry Sound, Ontario P2A 1M6
Tel: (705) 746-5667 Fax: (705) 746-1439 E-mail: jjplan@Cogeco.net

Planning Summary -Waltmar Lands
Town of Parry Sound
Bowes Street and Oastler Park Drive
June 24, 2020

Background

Waltmar owns a parcel of land at the southeast corner of Bowes Street and Oastler Park Drive. These lands span the boundary of the Town of Parry Sound and the Municipality of McDougall.



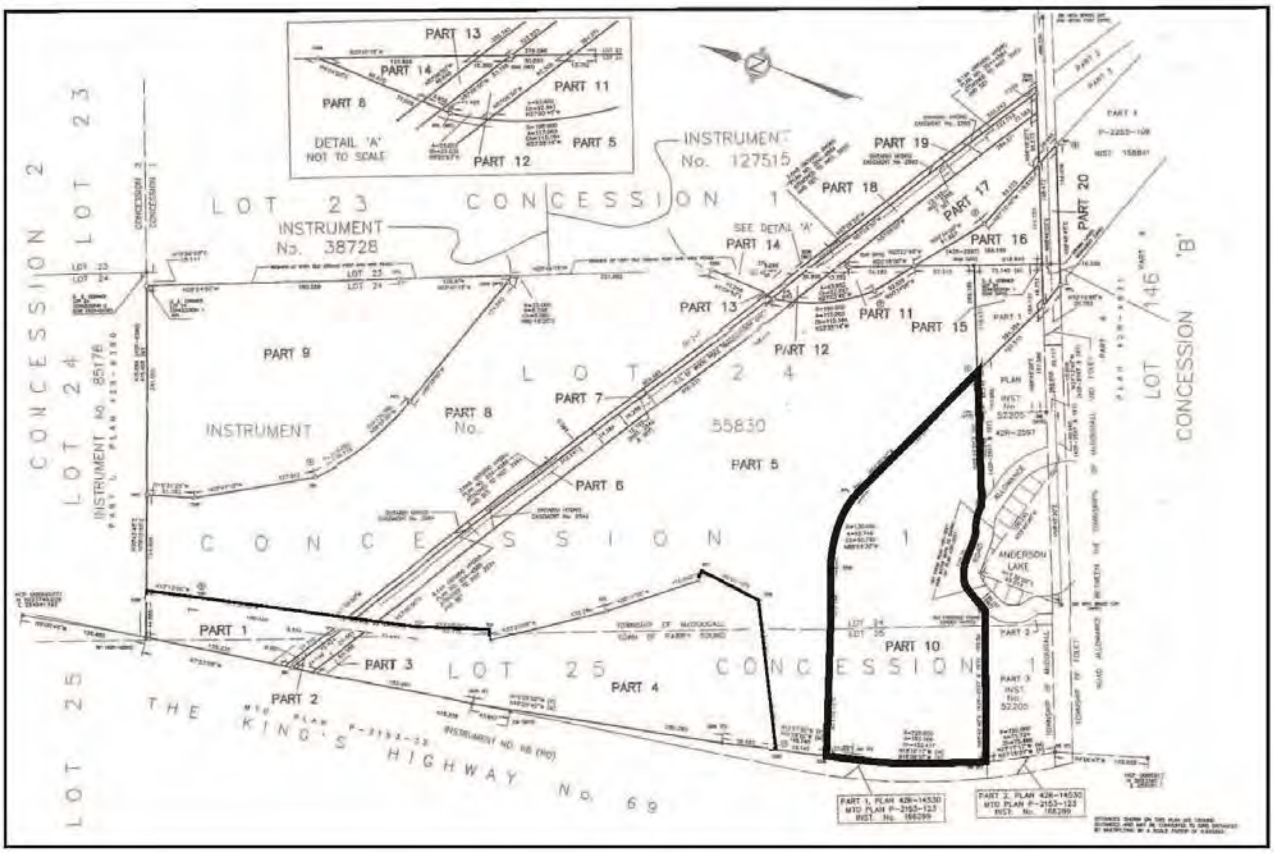
The lands are presently used as part of a seasonal dock sales that was authorized approximately five years ago. The current owner acquired the lands in 2014.

Purpose

The owner is proposing to develop the lands with an appropriate commercial development to take advantage of the strategic location of the subject lands. The specific use of the development is yet to be defined. It is anticipated that the use will be a combination of commercial/residential and service uses.

Property Description

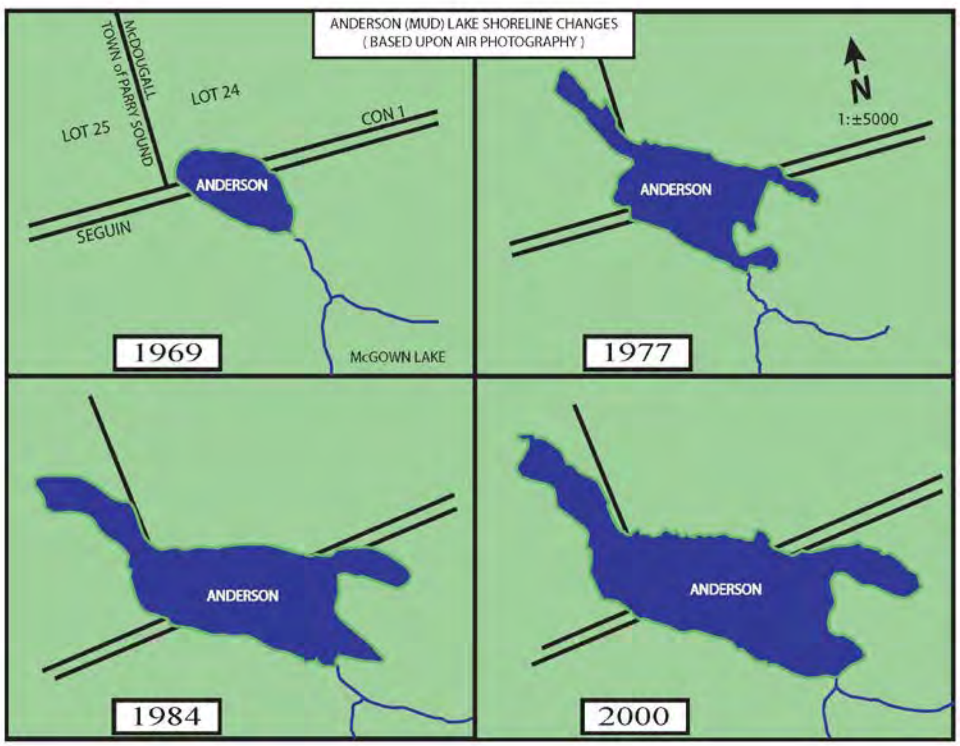
The subject lands are 5.2 hectares with about 3.2 hectares in the Town of Parry Sound and 2.0 hectares in McDougall. Approximately 25% of the portion of the property in the Town has been flooded on the subject lands from a bouldary dam built at the outlet of Anderson (Mud) Lake.



The property has a high traffic exposure next to the principal south entrance to the Town of Parry Sound. The high exposure provides both an asset and liability to the land. The Ministry of Transportation (M.T.O) has strict regulations related to projects adjacent to its highway corridors. These details are discussed below

The lands have moderate relief with two high points on the west and east ends of the land separated by a lower basin that has been flooded by the dam constructed at the outlet of Anderson Lake. The construction of the bouldary dam leading to McGowan Lake, together with extensive impacts of the new 400 Highway have artificially generated constraints on the subject lands that must now be regarded.

The sketch below illustrates how the subject lands, originally unaffected by the waters of Anderson Lake, are now bisected by an artificially embayment. This feature has attracted the need to address fishery issues, wildlife, habitat of threatened and endangered species and the resulting environmental protection (EP) zoning.



Adjoining Uses

The south entrance to the Town of Parry Sound is characterized by a heavily developed commercial corridor from Highway No. 400 into the core of the Town. The upper Bowes Street area is the location of big boxes, restaurants, gas stations, and hotels. The only undeveloped quadrant within this area include the subject lands at the south east corner of Bowes and Oastler Park Drive.

History of Land

The subject lands were part of a larger holding that belonged to the Tracey's east of former Highway No. 69 and spanned the boundary into the Municipality of McDougall. After the appropriation of part of the Tracey lands for the realignment of Highway 400, the subject lands were naturally separated.

The historical use of the lands was limited because of the access restriction associated with the former Highway No 69. Once the new highway was opened, the remnant parcels were available for development on new local roads being Louisa Street and Oastler Park Drive.

The current owner acquired the lands approximately six years ago. The intention is to take advantage of the high profile intersection and ultimately develop a signature project that will be appropriate for the main gateway in to the community.

The land is presently vacant excepting a seasonal open air commercial use where dock products are available for primarily residential waterfront property owners. This temporary use was originally expected to be replaced after a three year period that has long been surpassed.

The owner has been undertaking a number of investigations and carrying out assessments to enable the lands to be "development ready". These documents are referred to below.

Important Property Features

The subject lands have a number of important elements that are relevant to any development moving forward.

i) McDougall Lands – The east portion of the lands are located within the Municipality of McDougall. McDougall has indicated its willingness to support development at this location
ii) The Town of Parry Sound has acquired a parcel of land adjacent to the subject lands formerly owned by the M.T.O. Originally, M.T.O. was approached by the owner of the subject lands who is prepared to incorporate these lands into the proposed development.
iii) The lands north of Bowes Street were serviced with additional capacity to allow development on the subject lands.
iv) The subject lands have been zoned to accommodate commercial development
v) The adjoining lands to the south located in Seguin Township are within a corridor designated for future highway commercial development.

Policies

Provincial Policies (P.P.S.)

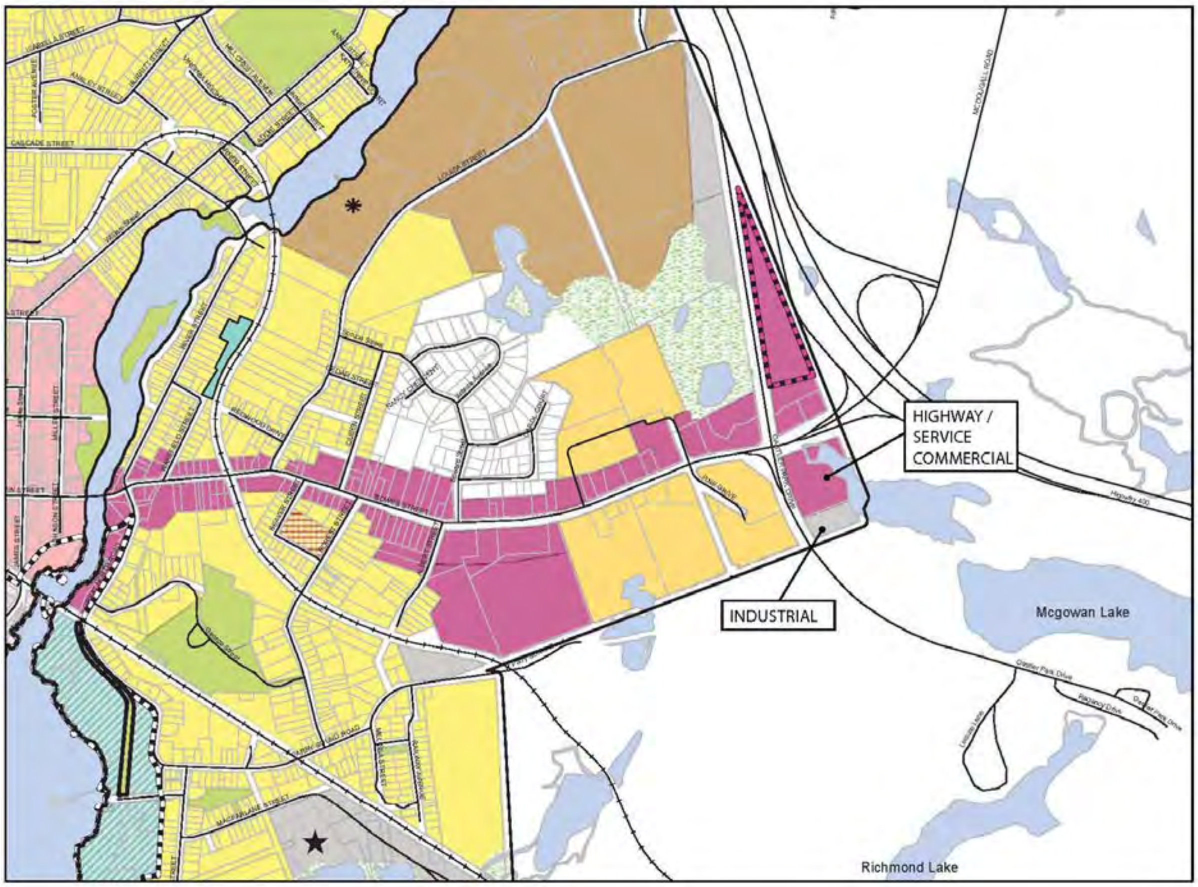
The 2020 provincial policy statements will have some limited application to this project. The P.P.S. is to be read in its entirety providing for coordination, economic opportunity and service consideration.

Because of the Towns' urban nature, the natural heritage features will continue to have limited application.

The growth plan for Northern Ontario applies to support such development pursuits.

<u>Official Plan</u>

The Town of Parry Sound official plan designates the lands as Highway/Service Commercial. Oddly, the parcel to the south formerly owned by the Ministry of Transportation and now in the Town's ownership is designated Industrial



The Highway/Service Commercial designation permits a wide range of commercial uses. These uses include:

- automotive
- restaurants
- hotels/motels
- recreation
- equipment/building material
- retail/office
- institutions
- residential uses

Retail Uses are restricted to 40,000 square feet as a tool to limit impacts on the downtown area.

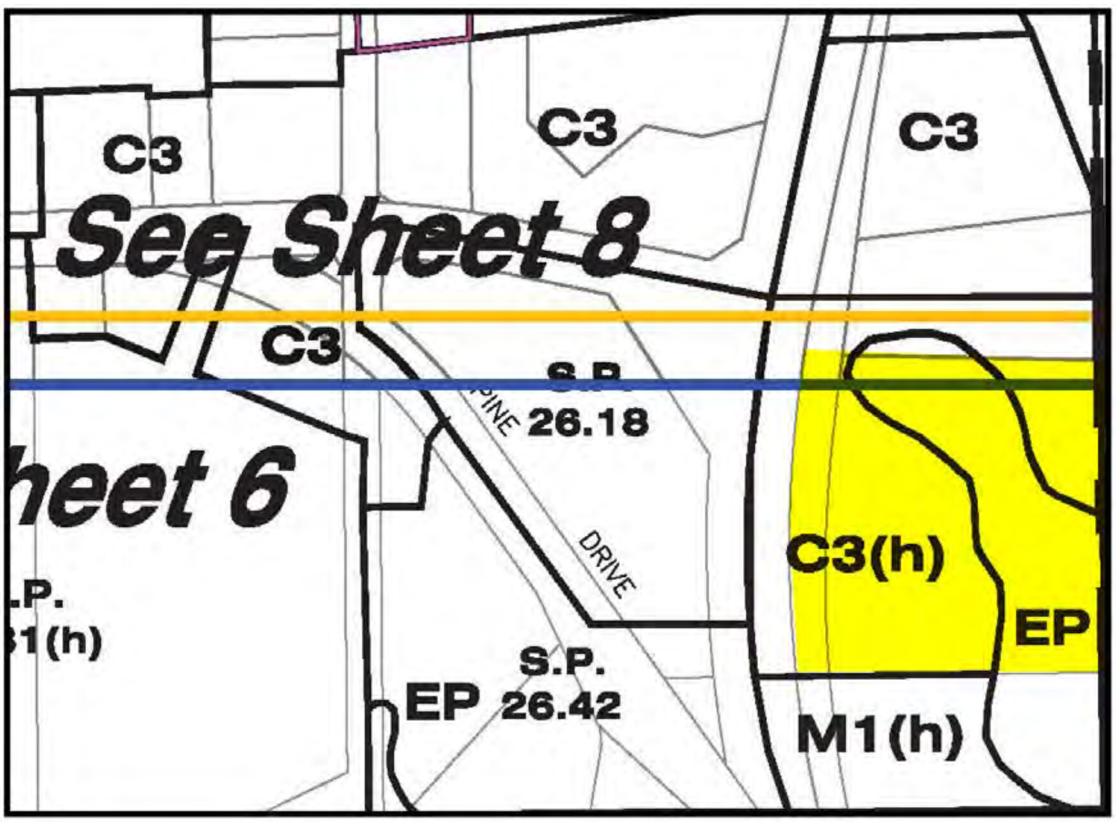
Most uses are to be restricted to municipal services. The existing service structures are shown on the attached sketch.

<u>McDougall Township</u>

The McDougall portion of the land is designated Rural in the official plan. This designation permits commercial uses. The proponent has engaged in discussion with the Town of Parry Sound, and the Municipality of McDougall to arrange for cross servicing agreement

<u>Zoning – Town of Parry Sound</u>

The subject lands are zoned in the Highway Commercial (C3) zone. There is an "h" holding symbol attached to the zoning.



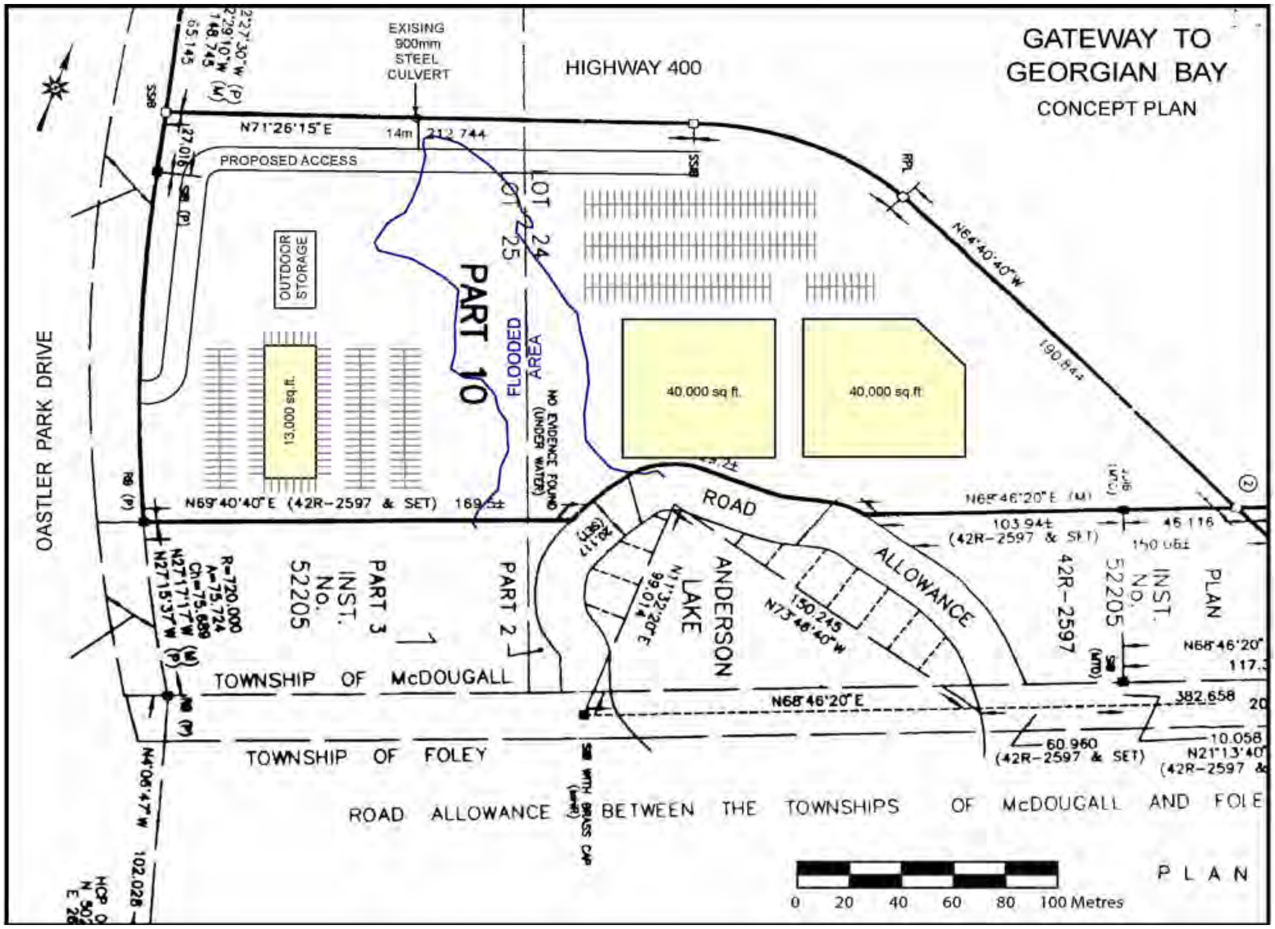
The C3 Zone permits the full range of commercial uses excepting banks, liquor stores and beer stores. The flooded portion of the lands are zoned Environmental Protection (EP)

The EP zone restricts uses to those items related to conservation. The proposed zoning amendment intends to reduce the EP zone extents to allow for the crossing of the flooded land and to ensure that specialty uses like boardwalks, private recreation and dock facilities are permitted.

There is no specific rationale for the application of the "h" symbol although it is anticipated that this symbol would be removed with the approval of a site plan for the property.

Development Proposal

The owner has not proposed a specific development for the subject lands although it is has been identified for certain core elements. These include some retail/hotel/institutional and residential uses.



Project Studies

The proposed use of the subject lands will require due diligence in respect of the Highway.

Traffic Impacts

The proposed development was assessed for traffic impacts in 2018/2019. The conclusions of the traffic consultants have determined that there will be no adverse impacts resulting from the development. No further operational changes to existing traffic patterns would be necessary to accommodate the development.

Drainage Report

A storm water management assessment has been undertaken for the property. The conclusion of the analysis is that there will be no adverse drainage impacts on the operation of the highway from the development of the subject lands.

Environmental Review

An environmental assessment report was prepared by a qualified consultant to determine the natural heritage constraints related to the property. The report specifically reviewed the provincial policy matters and natural heritage policies in the official plan. The conclusions respecting any environmental constraints are set out in the report.

These conclusions include permits, where and when required under the Federal Fisheries Act and The Endangered Species Act.

Planning Justification

This report summarizes the planning, environmental and servicing matters for a development project on the subject property. The lands are designated and zoned for commercial development. The subject lands are within the serviced area of the Town of Parry Sound. The lands are able to comply with the Provincial Policy Statement (P.P.S). Development of the subject lands comply with the Growth Plan for Northern Ontario.

The commercial development of this property is consistent with the development that exists on the three quadrants of Bowes Street and Oastler Park Drive.

Proposed Zoning

As previously mentioned in this report, the subject lands are zoned in the Highway Commercial (C3) zone and there is an “h” holding symbol attached to the zoning. The Flooded lands are zoned Environmental Protection (EP).The C3 zoning is satisfactory for the proposed uses going forward. The “road bridge” crossing the EP zoned lands needs amendment to allow the filling for the roadway.

The purpose and the basis for removing the “h” holding symbol must be included in the zoning by-law to allow an understanding of the matters to be undertaken for removal of the “h”

The permitted uses in the EP zone needs adjustments to allow for the kinds of low impact uses that may be expected on these lands that have been mentioned above.

The applicant also would appreciate a continued recognition of the existing outdoor dock sales.

Finally, the owner has expressed an interest in lands to the south of the subject lands (currently owned by the Town of Parry Sound). These lands are zoned Industrial (MI) and a commercial zoning consistent with the commercial proposal would seem more logical for these lands regardless of their ultimate disposition

Respectfully,

John Jackson

John Jackson

Preliminary Environmental Site Assessment Report

Proposed Access Road and Commercial Development

Parry Sound, Ontario

Part of Lots 24 & 25, Concession 1, Geographic Township of McDougall

Town of Parry Sound

September 23, 2019

FRICORP
ECOLOGICAL SERVICES

TABLE OF CONTENTS

INTRODUCTION

FRi Ecological Services was retained by John Jackson Planner Inc. to prepare a Preliminary Environmental Site Assessment for the client Waltmar Inc. for a proposed access road and commercial development at the entrance to Parry Sound. The site is bounded by Bowes Street to the north, Oastler Park Drive to the west and Highway 400 and 69 to the east (**Figure 1**).

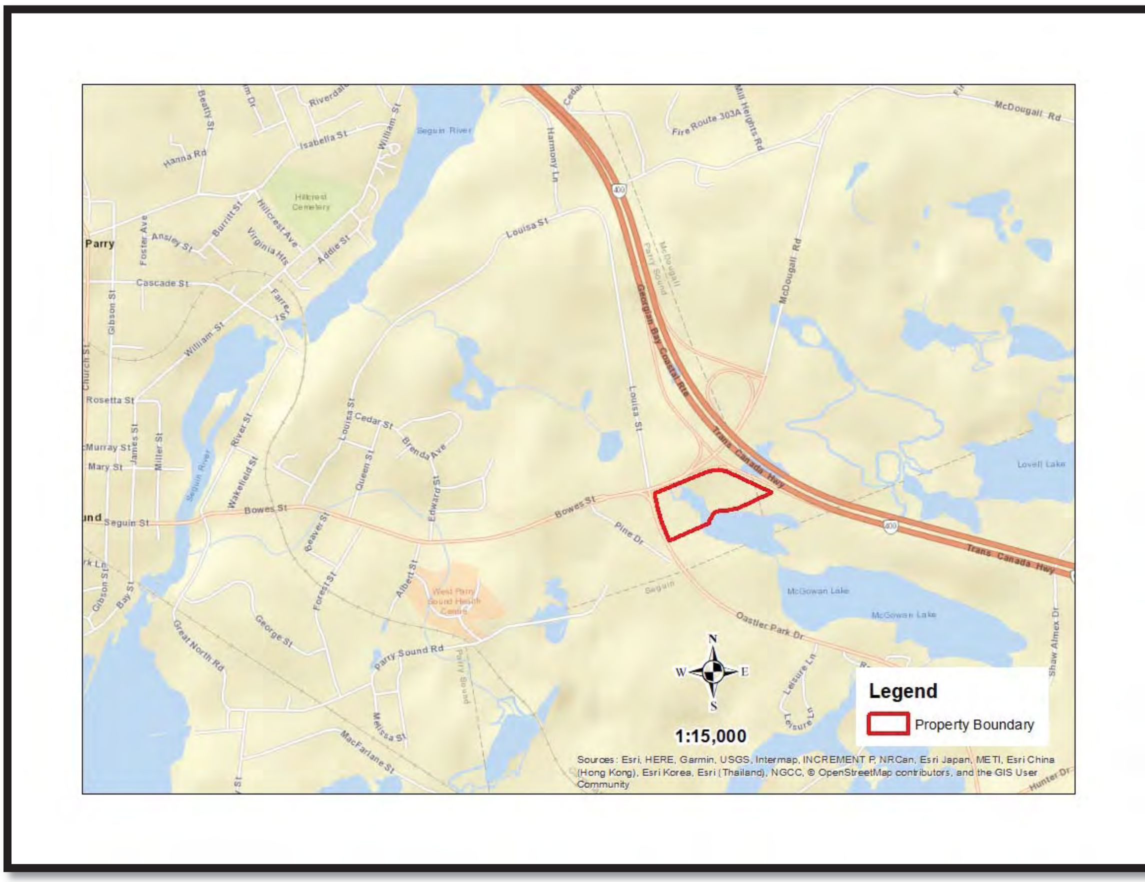


Figure 1 Location Map

A desktop review of the available information related to natural heritage values on or within 120 metres of the study area was conducted prior to field investigations on August 11 and November 28, 2017 and July 25, 2019. The following sources of information were consulted:

- Make-a-Map, Ministry of Natural Resources and Forestry, Natural Heritage Values

- Lands Information Ontario
- Parry Sound District Species At Risk Tool (Version 7.0)
- Parry Sound Official Plan

APPROACH

Based on the pre-consultation with John Jackson, the focus of this PESA was a habitat-based assessment of the existing conditions of the property. The work plan was to assess the current conditions and determine the potential for significant natural heritage features that could be impacted by the proposed. In addition, the proposed access road traverses a flooded bay of Anderson Lake. **Figures 2 & 3** are a conceptual plan of the proposed access road and commercial development. Engineered drawings of the proposed access road are contained in **Appendix 1.**

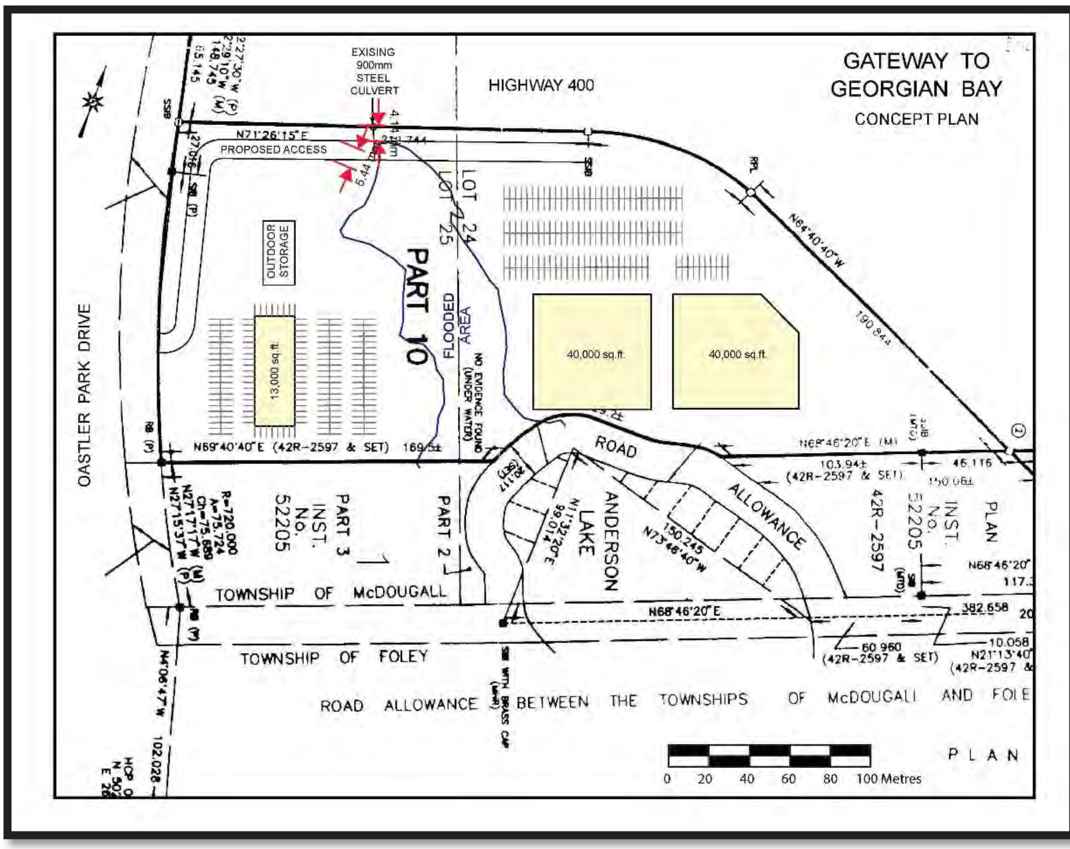


Figure 2 Conceptual Development Plan

ECOLOGICAL LAND CLASSIFICATION

The baseline for the natural heritage assessment is the determination of the ecological land classification ecosites. The ecosites were determined and mapped using the most current methodology.[1] There are five distinct ecosites on the subject property (**Table 1**). Detailed descriptions of each ecosite can be found in **Appendix 2**.

G064TT MOIST, COARSE: RED PINE – WHITE PINE CONIFER

This forested terrestrial ecosite occurs in two locations within the study area (**Figure 4**). The soils are shallow where they are adjacent to bedrock outcrops but become deeper as they approach lower elevations. The soils are mainly medium sandy loams. The dominant conifer species is white pine with younger balsam fir and white spruce. There is a deciduous component as well composed of white birch, trembling aspen and red maple (**Photos 1 - 3**). The topography of this ecosite is gently sloping towards the wetland and lake ecosites.

G148N: MINERAL SHALLOW MARSH

This ecosite is the shallowest portion of the bay of Anderson Lake immediately adjacent to Bowes Street. It is characterized by sedges and cattails on the fringes and floating macrophytes such as white water lily and watershield in the open water portions (**Photos 4 & 5**).

G151N: OPEN WATER MARSH: MINERAL

This ecosite joins Anderson Lake to the G148 Mineral Shallow Marsh and contains a significant amount of open water. It is dominated by floating aquatics (**Photo 3**). White water lily, floating burred and pondweed are represented in this ecosite.

---

[1] Ecosites of Ontario. 2009. Ecological Land Classification Working Group. 383 p.

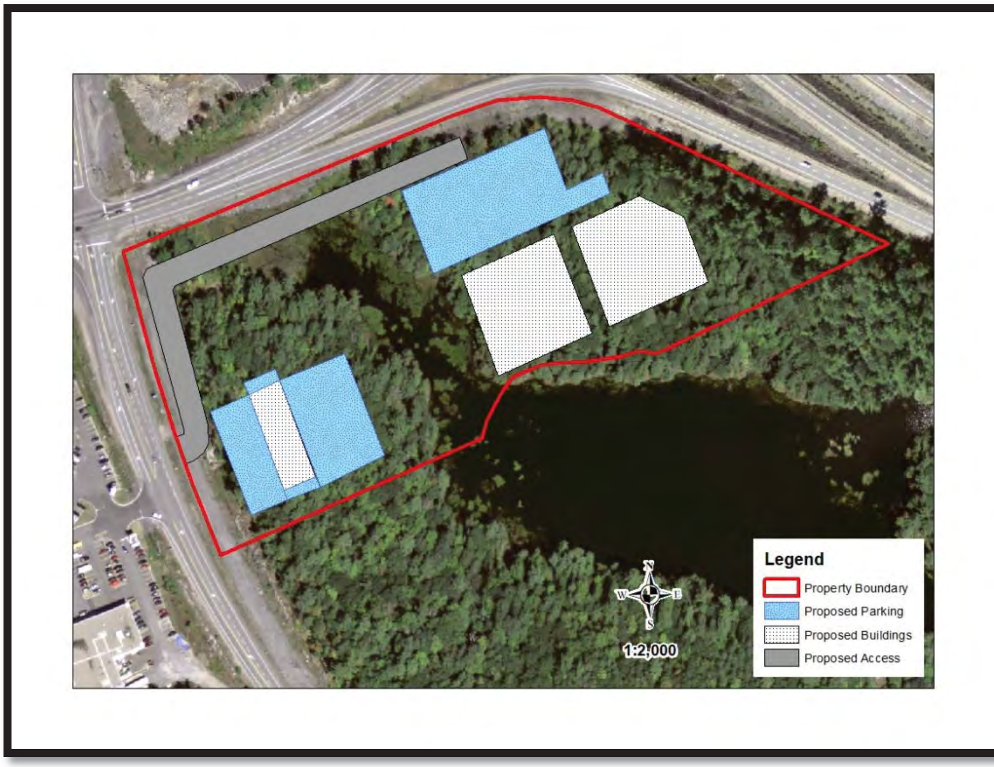


Figure 3 Proposed Access Road and Commercial Development

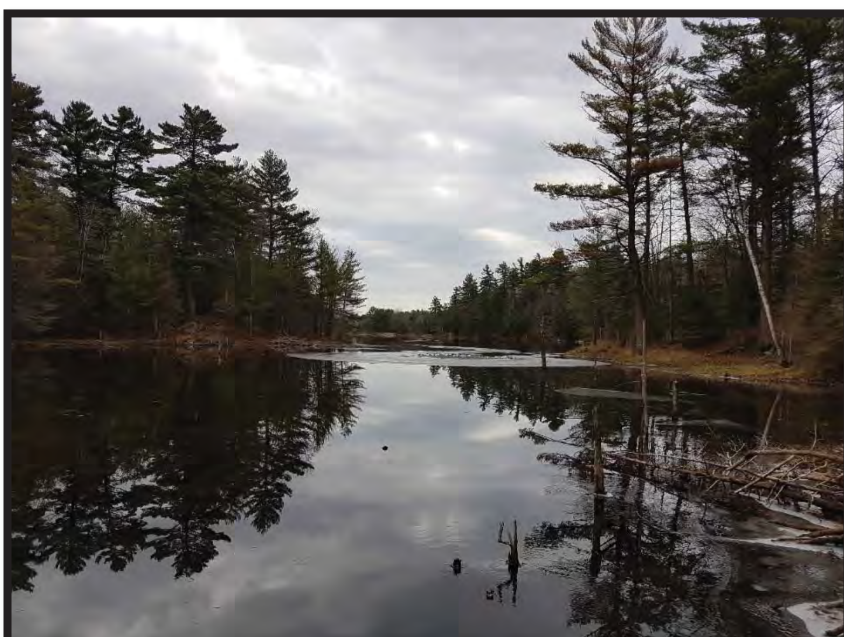


Photo 1 Looking South Over G155 Lake Habitat at Adjacent G064 Conifer Ecosite

Photo 2 Looking Northeast Towards G064 Conifer Ecosite

Photo 3 Looking South from Bowes Street During Summer Conditions

G155N: ACTIVE LIMNETIC MINERAL

This ecosite is the original unflooded basin of Anderson Lake. It is mainly greater than 2m deep with aquatic vegetation present along the shoreline and shallower bays. The outlet is a manmade rock dam that artificially raised the water level likely in the 1970's. The outlet drains into

G199X: COMPACT MINERAL SURFACE

This is a cultural unit that includes the filled area along Oastler Park Drive and Bowes Street. It does not have any natural analog.

Table 1 Summary of Ecosite Areas

Ecosite	Area in Hectares	Area as Percentage of Study Area
G064Tt	5.14	75.26
G148N	0.25	3.66
G151N	0.58	8.49
G155N	0.10	1.46
G199X	0.76	11.13

HABITAT OF ENDANGERED AND THREATENED SPECIES

The Parry Sound Species at Risk (SAR) Tool was consulted. The results for geographic Township of McDougall and the Town of Parry Sound was used as a guide. The Natural Heritage Information Centre database was queried for any confirmed observations in or adjacent to the study area. There is a single confirmed observation of a Blanding's turtle from 2008 within the one square kilometre that overlaps the study area. There is a list of confirmed or presumed species at risk (3 endangered, 12 threatened) present in the township as summarized in **Table 2.**

LITTLE BROWN MYOTIS (MYOTIS LUCIFUGUS) *FORMERLY LITTLE BROWN BAT

NORTHERN MYOTIS (MYOTIS SEPTENTRIONALIS) *FORMERLY NORTHERN LONG-EARED BAT

EASTERN SMALL-FOOTED MYOTIS (MYOTIS LEIBII)

The Little Brown Myotis (*Myotis lucifugus*) and the Northern Myotis (*Myotis septentrionalis*) were 'emergency' listed on Ontario's Species at Risk list in January 2013. Eastern Small-footed Myotis (*Myotis leibii*) was listed in June 2014. The Tri-coloured bat (*Perimyotis subflavus*) was listed as endangered by COSSARO[2] in June 2016. A disease called white nose syndrome poses a very serious threat to bat populations in North America, threatening to extirpate the species in many locations. During the active season, bats feed on insects at night and roost during the day. The roost either individually (males) or in groups (females with pups), usually in warm, elevated spaces. Bats often choose human-created roosts such as attics and abandoned buildings as these offer optimum habitat for summer roosts, usually close to water and open areas for foraging. Natural roosts include large hollow trees and spaces behind loose bark. Both species hibernate in caves and abandoned mines in October through April where temperatures remain above freezing and humidity levels are high.[3] [4] For all three of Little Brown Myotis, Northern Myotis and Eastern Small-footed Myotis, the SWH Ecoregion 5E Criterion Schedule lists G158, G159, G164, G180 and G181 as ecosites where hibernacula may be found. The criterion schedule was produced in 2015 and is specific to significant wildlife habitat, however the ecosites where the species are expected hasn't changed.

---

[2] https://www.ontario.ca/page/tri-colored-bat

[3] Dobbyn, S. 1994. Atlas of the Mammals of Ontario. Federation of Ontario Naturalists. 120 pp.

[4]Ontario Ministry of Natural Resources. 2000. Significant Wildlife Habitat Technical Guide. Toronto:

Queen's Printer for Ontario. 151pp.

For Little Brown Myotis and Northern Myotis, the *Species at Risk (SAR) Bats Technical Note*[5] lists the following ecosites which could have maternity roosts: G015 – G019, G023 – G028, G039 – G043, G054 – G059, G069 – G076 and G087 – G092. Maternity colonies for Little Brown and Northern Myotis are found in large cavity trees in an early state of decay. These are usually situated in contiguous mature forest, typically deciduous trees; ecosites G016- G019, G028, G040-G043, G055-G059, G070-G076, G088-G092, G103- G108, and G118-G125 are listed as suitable forested ecosites.[6] According to a 2008 study by Johnson et al., Eastern small-footed bats most commonly use ground level rocks, talus slopes, rock fields and vertical cliff faces for their summer roosts.[7]

---

[5] Technical Note, Species at Risk (SAR) Bats, Little brown myotis and Northern myotis. Regional Operations Division, June 2015.

[6] Ontario Ministry of Natural Resources. 2012. Draft Significant Wildlife Habitat Ecoregion 5E Criterion Schedule. 46 pp.

[7] Johnson, J.S., J,D, Kiser., K.S. Wareous., T.S. Peterson (2011) "Day-Roost of *Myotis leibii* in the Appalachian Ridge and valley of Western Virginia", "Northern Naturalist", 18(1):96-106.

Figure 4 Ecological Land Classification Ecosites

Table 2 List of Endangered and Threatened Species for the Township of McDougall and the Town of Parry Sound

Species	Designation	Presence	Potential
Little Brown Myotis	Endangered	Presumed to Occur	Low
Northern Myotis	Endangered	Presumed to Occur	Low
Eastern Small-footed Myotis	Endangered	Presumed to Occur	Low
Whip-poor-will	Threatened	Known to Occur	Low
Least Bittern	Threatened	Known to Occur	Low
Barn Swallow	Threatened	Known to Occur	None
Bank Swallow	Threatened	Known to Occur	None
Blanding's Turtle	Threatened	Known to Occur	Confirmed
Bobolink	Threatened	Known to Occur	None

Eastern Meadowlark	Threatened	Known to Occur	None
Chimney Swift	Threatened	Known to Occur	Low
Eastern Hog-nosed Snake	Threatened	Known to Occur	Low
Massasauga	Threatened	Known to Occur	Low
Lake Sturgeon	Threatened	Known to Occur	None
Eastern Foxsnake	Threatened	Known to Occur	None

LITTLE BROWN MYOTIS

According to the Significant Wildlife Habitat Technical Guide, Appendix G4, Table G4, little brown myotis use caves, quarries, tunnels, hollow trees or buildings for roosting. Maternity colonies are most often found in warm dark areas, like barns, attics and old buildings. They overwinter in caves and mine adits (horizontal mine shafts) in Ontario. This species forages mainly over open areas including wetlands and near forest edges where insect densities are greater. [8]

NORTHERN MYOTIS

According to the Significant Wildlife Habitat Technical Guide, Appendix G4, Table G4, Northern myotis roost in hollow trees or under loose bark. Males roost individually while females are found in maternity colonies of up to 60 adults. They overwinter in mines and caves similar to other species which hibernate in Ontario. Unlike little brown myotis, Northern myotis hunt primarily in forested areas, below the canopy.

EASTERN SMALL-FOOTED MYOTIS

According to the Significant Wildlife Habitat Technical Guide, Appendix G, Table G4, Eastern Small-footed Myotis roost in caves, mine shafts, crevices or buildings

[8] Forbes, G. 2012. COSEWIC. Technical Summary and Supporting Information for an Emergency Assessment of the Little Brown Myotis, *Myotis lucifugus*. 25pp.

that are in or near a woodland. According to Bat Conservation International, Small-footed Myotis generally roost on the ground under rocks and in crevices and occasionally under tree bark or in buildings.[9] They hibernate in cold dry caves or mines; maternity colonies are in caves or buildings. They hunt primarily in forests.

ASSESSMENT

We did not conduct any acoustic monitoring surveys because of the timing of the study but have employed a habitat-based approach. None of the ecosites present are listed as potential maternity roosting or hibernation habitat for any of the species listed. There is a mining adit approximately 300m south of the study area near the outlet of Anderson Lake that could potentially be used as a hibernation site but none of the proposed activities would impact that feature.

EASTERN WHIP-POOR-WILL (ANTROSTOMUS VOCIFERUS)

Eastern Whip-poor-wills are found in a variety of open habitats and avoid areas where the forest canopy is extensive and closed. Breeding habitat is considered suitable when it contains features related to the following life processes: territory establishment, nesting, foraging and roosting. Whip-poor-wills typically select rock or sand barrens with scattered trees, savannahs, old burns, and open conifer plantations. These and other sites in a state of early to mid-forest succession are preferred for breeding.

Whip-poor-wills have been documented in a variety of semi-open habitats, usually near wetlands. Their eggs are laid directly on the ground in an area that provides sparse ground cover and offers shade and tree cover as well. Nest sites are usually close to open areas which are necessary for foraging. They are crepuscular

[9] http://www.batcon.org/resources/media-education/species-profiles/detail/2014

insectivores, feeding predominantly on Lepidopterans (moths). Breeding is typically mid-May through mid-July.[10] [11] [12] [13]

ASSESSMENT

The densely forested site does not have the patchy distribution characteristic of many sites in the Parry Sound area comprised of forests, rock barrens and wetlands. No further studies required.

LEAST BITTERN (IXOBRYCHUS EXILIS)

Least Bitterns are a secretive marsh bird, the smallest in the heron family in North America. They are found in large freshwater emergent marshes, usually those greater than 5 hectares and dominated by cattails (*Typha* spp). Most often, they are identified by their call; rarely seen, especially during the breeding season.

Bitterns build platform nests in marshes with bent emergent vegetation usually within 10 metres of open water. They are an ambush predator and require clear open water for foraging. Four to five eggs are laid mid-May through June and incubated 17 – 20 days. The young are fed at the nest for two weeks; they often fall

[10] Desy, G. 2010. Habitat Description, Whip-poor-will (Caprimulgus vociferus): Threatened. Ontario Ministry of Natural Resources. 16 pp. DRAFT.

[11] Ontario Ministry of Natural Resources. 2013. General Habitat Description for the Eastern Whip-poor-will (*Caprimulgus vociferous*)

[12] COSEWIC. 2009. COSEWIC assessment and status report on the Whip-poor-will Caprimulgus vociferus in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 28 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

[13] Cink, Calvin L. 2002. Eastern Whip-poor-will (Antrostomus vociferus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/620

prey to a number of other marsh inhabitants including raptors, snakes, snapping turtles, mink and raccoons.

Habitat loss and alteration are the most significant threats to Least Bitterns. Sudden changes in water levels and excessive wave action can result in the loss of nests. Bitterns migrate at night and sometimes collide with towers and powerlines.[14] [15]

ASSESSMENT

The G148N wetland is partially composed of cattails but the area of 0.25ha is far too small to provide habitat for this species. No further studies are required.

BARN SWALLOW (*Hirundo rustica*)

Barn swallows are an aerial insectivore, known to build nests on barns, bridges and other buildings especially in open areas near water. Open habitats including grasslands, fields, rights-of-way, shorelines and wetlands are particularly important for foraging. They live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures. Swallows prefer structures with rough-surfaced ledges where they can build their nests. The cup-shaped mud nests are the critical habitat feature used for egg laying, incubation, feeding, resting and rearing of young. Barn swallows will use artificial nest cups

[14] COSEWIC. 2009. COSEWIC assessment and update status report on the Least Bittern Ixobrychus exilis in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 36 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

[15] http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_LST_BTTRN_EN.html

and ledges; and are known to use the same nests in subsequent years. They are often found in colonies; breeding takes place from May through August. [16] [17] [18]

ASSESSMENT

There is no habitat present for this species. No further studies are required.

BANK SWALLOW (*RIPARIA RIPARIA*)

As their latin name suggests, Bank Swallows are most often found in riparian areas, specifically nesting along the steep, sandy banks of rivers. Less often, they use steep sandy slopes in aggregate pits/quarries and cut banks along roadways. They nest colonially, with males excavating a burrow prior to pair formation. Once pairs are formed, nest-building begins immediately in the excavated burrow.[19]

They are an aerial insectivore, eating a variety of insects on the wing; though sometimes they take land and water-based insects when they are available.[20] They

---

[16] COSEWIC. 2011. COSEWIC assessment and status report on the Barn Swallow *Hirundo rustica* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 37 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

[17] http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_BRN_SWLLW_EN.html

[18] Ontario Ministry of Natural Resources. 2013. General Habitat Description for the Barn Swallow *Hirundo rustica*.http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@species/documents/document/mnr_sar_ghd_brn_swllw_en.pdf

[19] Garrison, Barrett A. 1999. Bank Swallow (Riparia riparia), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/414

[20] http://www.ontario.ca/page/bank-swallow

forage in open areas, including lakes, ponds, rivers, meadows, fields, pastures, and bogs; occasionally over forests and woodlands. During the breeding season, adults are usually within 200 metres of their young for feeding purposes.

ASSESSMENT

There is no habitat for this species. No further studies are required.

BLANDING'S TURTLE (*EMYDOIDEA BLANDINGII*)

The Blanding's turtle is a mostly aquatic turtle found in a variety of habitats, including lakes, ponds, marshes, ditches, creeks, rivers, and bogs. Within these habitats, the species generally prefers shallow water, organic substrates and dense submergent and/or emergent vegetation. Basking sites are a critical component of suitable habitat. These are characteristically floating vegetation mats, hummocks, partially submerged logs, rocks, bog mats, or suitable shoreline areas with access to full sunlight.

Blanding's turtles hibernate from October through April, usually in permanent bodies of water, often the same wetlands they utilize during the active season. Recent studies confirm seasonally isolated wet areas, ditches for example, are used for hibernacula in some years.

Blanding's turtles will travel up to 6 km or more to nesting sites that are usually within 250 m from the shore of some waterbody. Nesting activities generally occur at the end of June through the beginning of July. Nest sites are chosen in areas that offer suitable substrate for digging (e.g. loose soil), well-drained, open locations which increases the incubation temperatures because of sunlight exposure. This in turn increases nest success.

Upland areas adjacent wetlands can be used for nesting, basking and travel between summer activity areas. Turtles regularly move up to 1 km between wetlands and will chose a 'wetted' corridor, rather than a direct route.[21] [22] [23] [24] [25]

ASSESSMENT

As indicated in a previous section, there is a confirmed observation of this species within 2km of the study area. The 2km distance is relevant because it refers to the general habitat description for Blanding's turtle.[26] The process for mapping and identifying habitat for this species starts from a confirmed observation. All suitable wetlands and waterbodies within a 2km radius of the occurrence that are within 500m of each other are considered habitat. The habitat is further subdivided into categories from most to least sensitive. Category 1 habitat includes nests and overwintering sites and a 30m buffer and is the most sensitive to disturbance or alterations. Category 2 habitat includes all the identified wetlands and waterbodies and a 30m buffer on these as outlined in the habitat delineation from an occurrence.

---

[21] COSEWIC 2005. COSEWIC assessment and update status report on the Blanding's Turtle *Emydoidea blandingii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. viii + 40 pp. (www.sararegistry.gc.ca/status/status_e.cfm)

[22] Edge, C. B. 2008. Multiple Scale Habitat Selection by Blanding's Turtles (*Emydoidea blandingii*). Master's Thesis. School of Graduate Studies, Laurentian University.

[23] Ontario Ministry of Natural Resources. 2012. Survey Protocol: Blanding's Turtle (*Emydoidea blandingii*). Policy Division, Species at Risk Branch. 15pp.

[24] Seburn, D. C. 2007. Recovery Strategy for Species at Risk Turtles in Ontario. Ontario Multi-Species Turtles at Risk Recovery Team. 83pp.

[25] Ontario Ministry of Natural Resources. 2013. General Habitat Description for the Blanding's turtle (*Emydoidea blandingii*).

[26] https://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_ghd_bln_trtl_en.pdf

Category 2 habitat has a moderate tolerance to disturbance or alteration. Category 3 habitat extends from the edge of the Category 2 habitat for an additional 220m. It has the highest tolerance to alteration and is primarily a movement corridor between wetlands and other habitat features. **Figure 5** identifies the mapped Category 2 and 3 habitat for this species. In addition to the available background information, an adult Blanding's turtle was observed basking on a log in the G148N ecosite on July 25, 2019 (**Photo 4**).The wetland communities G142N and G130Tt would likely be considered suitable wetland ecosites for this species and would form the basis of the Category 2 habitat. Without the benefit of targeted surveys, it is impossible to determine if there is any Category 1 habitat within the study area. The entire proposed development is either Category 2 or 3 habitat. The proposed development removes about 0.16ha of Category 2 habitat. This represents about 3% of the 5.22ha of Anderson Lake and associated wetlands that would be considered Category 2 habitat. Category 3 habitat is primarily utilized as a movement corridor to other wetland features or nesting areas. Since the property is bounded by Highway 400 to the east, Bowes Street to the north and Oastler Park Drive to the west, there is little safe opportunity for individual turtles to reach adjacent wetlands. The quantity of habitat lost is relatively low and mitigation measures shall be implemented to ensure no individuals are harmed during the construction.

Photo 4 Blanding's Turtle Basking on Log and Painted Turtle Basking Beside Log on July 25, 2019

BOBOLINK (DOLICHONYX ORYZIVORUS)

Bobolinks are associated with open habitats, specifically grasslands, meadows and agricultural fields. They use fields with a mix of grasses and broad-leaved forbs like clover (*Trifolum* sp.); generally avoiding habitats with woody vegetation. A dense thatch layer is required for nests which are built out of sight close to the ground. Defended territories average 0.33 – 2 hectares, while much larger habitat patches are required to avoid predators and reduce brood parasitism by cowbirds. Literature suggests a minimum 5 hectares is required to support breeding, while sites 10 – 30 hectares are more likely to support successful nests.

Areas that have little interior habitat, defined as 100 metres or more from an edge, are not likely to be suitable for breeding. Nesting occurs in mid-May and subsequent broods have usually fledged by early July. Nestlings in July are likely a result of a second brood or renesting. Bobolinks have usually left Ontario by the end of July on their migration south for the winter. .[27] [28] [29] [30] [31]

ASSESSMENT

There is no habitat present for this species. No further studies are required.

EASTERN MEADOWLARK (*STURNELLA MAGNA*)

The Eastern Meadowlark is most often found in grasslands, pastures, hay fields, old fields and native prairies in Ontario. They prefer habitats with good grass and litter cover, with defended territories averaging 2.8 – 3.2 hectares and are not deterred by the presence of shrubs and low woody vegetation.

They don't appear to be as area-sensitive as other grassland species like Bobolink. According to some researchers, Meadowlark breeding density doesn't seem to be

---

[27] Martin, Stephen G. and Thomas A. Gavin. 1995. Bobolink (Dolichonyx oryzivorus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/176

[28] McCracken, J.D., R.A. Reid, R.B. Renfrew, B. Frei, J.V. Jalava, A. Cowie, and A.R. Couturier. 2013. Recovery Strategy for the Bobolink (Dolichonyx oryzivorus) and Eastern Meadowlark (Sturnella magna) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. viii+ 88 pp.

[29] Ontario Ministry of Natural Resources. 2011. Draft Survey Methodology under the Endangered Species Act, 2007: D*olichonyx oryzivorus* (Bobolink). Ministry of Natural Resources Policy Division, Species at Risk Branch. 2pp.

[30] http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_BBLNK_EN.html

[31] Ontario Ministry of Natural Resources. 2013. General Habitat Description for the Bobolink (*Dolichonyx oryzivorus*) http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@species/documents/document/mnr_sar_ghd_bblnk_en.pdf

influenced by patch size or edge density while others note that larger tracts of grasslands are preferred over smaller patches.

Nesting begins in early May; females construct the nest, usually partly covered or roofed by woven vegetation. The last broods leave the nest in early August. Simultaneous and shortly following this, meadowlarks leave breeding habitat for southern wintering areas. [32] [33] [34]

ASSESSMENT

There is no habitat present for this species. No further studies are required.

CHIMNEY SWIFT (CHAETURA PELAGICA)

Chimney swifts are an aerial insectivore; commonly seen foraging over open areas and wetlands. According to the Chimney Swift COSEWIC Status Report (2007), cavity trees with a diameter breast height (DBH) greater than 50 cm are required for nesting. Common tree species hosting nesting or roosting sites are white pine, yellow birch and sometimes aspen. While not common, pileated woodpecker cavities are sometimes used for nesting and roosting. Communities supporting

---

[32] Jaster, Levi A., William E. Jensen and Wesley E. Lanyon. 2012. Eastern Meadowlark (Sturnella magna), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/160

[33] http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_ESTRN_MDWLRK_EN.html

[34] Ontario Ministry of Natural Resources. 2013. General Habitat Description for the Eastern Meadowlark (*Sturnella magna*) http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@species/documents/document/mnr_sar_ghd_est_mdwlrk_en.pdf

trees >50 cm DBH and pileated woodpecker cavities are typical of old growth forests.

More typically, swifts nest and roost in human-created structures such as brick chimneys. At times, especially during migration and inclement weather, roosts may host hundreds or even thousands of birds. Structures functioning as nest features are usually occupied by a single breeding pair. Breeding pairs exhibit high site fidelity for structures used as nests and roosts and will continue to use these features as long as they are functional. In Ontario, swifts return in late April through early May and breed May through July. Migration begins in late August and is usually complete by mid-October.

The loss of artificial nest features (brick chimneys) has resulted in significant population declines over a short time period. Secondarily, the loss of old growth forests and large cavity trees has resulted in fewer natural nesting (and roosting) structures.[35] [36] [37] [38] [39]

ASSESSMENT

---

[35] OMNR. 2013. General Habitat Description for the Chimney Swift. http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@species/documents/document/mnr_sar_ghd_chmny_swft_en.pdf

[36] http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=951

[37] http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_CHMNY_SWFT_EN.html

[38] Cink, Calvin L. and Charles T. Collins. 2002. Chimney Swift (Chaetura pelagica), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/646

[39] COSEWIC 2007. COSEWIC assessment and status report on the Chimney Swift Chaetura pelagica in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 49 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

There are no man-made structures on the property suitable for nesting or roosting of this species. There are a few white pine trees that would meet the minimum size of 50cm in diameter as potential roost trees.

EASTERN HOG-NOSED SNAKE (*HETERODON PLATIRHINOS*)

Eastern hog-nosed snakes are highly mobile and have large home ranges. This makes it especially challenging to define a particular habitat as important. Features which are required by hog-nosed are widespread and in relatively abundant supply at the northern edge of the species' range.[40] [41] [42]

Ontario has adopted the federal recovery strategy for hog-nosed snakes and included an addendum which outlines the recommended areas to be considered for a habitat regulation. Oviposition and hibernation sites are the areas described as critical habitat; essential for the long-term persistence of the species. Habitat used for foraging, thermoregulating, mating and dispersal is also important. Contiguous natural habitat is generally described as open areas (meadow, sand, beach and beach dunes, open forest, brushland, rock barrens), wetlands, forest and forest edge in the species range.[43]

[40,k] Kraus, T. 2011. Recovery Strategy for the Eastern Hog-nosed Snake (*Heterodon platirhinos)* in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. i + 6 pp + Appendix vi + 24 pp. Adoption of the Recovery Strategy for the Eastern Hog-nosed Snake (*Heterodon platirhinos*) in Canada Seburn, 2009).

[41] COSEWIC. 2007. COSEWIC assessment and update status report on the Eastern Hog-nosed Snake Heterodon platirhinos in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. viii + 36 pp. (www.sararegistry.gc.ca/status/status_e.cfm)

[42] http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_ESTRN_HG_NSD_SNK_EN.html

As outlined in the Recovery Strategy for the Eastern Hog-nosed Snake in Canada states the five physical features that are used to describe preferred habitat. They include well-drained loose or sandy soil, open vegetative cover such as open woods, brush land or forest edge, proximity to water and climatic conditions typical of the eastern deciduous forest biome.

Females lay eggs beginning in late June in sandy soils, sometimes under rocks and driftwood and tend to use the same general area for nesting in subsequent years. Hibernation sites are also found in sandy soils; and unlike other snakes, the Eastern hog-nosed usually hibernates alone. Hibernation takes place from October through April. The sites have been documented in upland intolerant forests below the frost line.

ASSESSMENT

There is no sandy soils or open forests associated with this site. Only the wetland areas and forest edges would meet the description of habitat for this species. Any protections for Blanding's turtle habitat would also provide protection for this species as well.

MASSASAUGA (*SISTRURUS CATENATUS*)

Massasauga's are a large-bodied, viviparous snake with relatively small home ranges. They rely on rock barren habitat for gestation, shedding, thermoregulation and foraging; while conifer swamps and similar hummocky wetland areas provide over-wintering habitat.

Massasauga's are Ontario's only venomous snake; they have grey – dark brown bodies with darker 'saddle-like' blotches on their backs. Males and females use open areas (rock barrens, wetlands) and the shorelines of lakes and rivers for foraging and movement. Because female snakes give birth to live young, they require specific habitats for gestation that provide appropriate thermal conditions and cover. Females show fidelity to their chosen gestation site, and can be found from about mid-June through August in these locations.

ASSESSMENT

The Parry Sound District of the Ministry of Natural Resources and Forestry has provided in the past a feature class used in a geographic information system (GIS) environment of all known observations of this species including a 1.2km radius of potential habitat around each of the observations. None of these observations overlap the study area. There are no rock barren features or conifer swamps that may provide gestation or hibernation habitat respectively. The edges of the wetland features could provide suitable foraging and limited thermoregulation habitat.

LAKE STURGEON (ACIPENSER FULVESCENS)

Lake sturgeon are a long-lived, late maturing freshwater fish. They are the largest freshwater fish in Canada that can exceed lengths of 2 metres and weights of 90 kilograms. Sturgeon are a cartilaginous bottom-feeder, with pronounced bony scutes (more so in young fishes) and four ventral sensory barbels near their mouth to facilitate feeding.

They are a migratory species, moving long distances over the course of a year to access specialized habitats. Most lake sturgeon spawn in rivers at the base of the first impassible structure. Historically this would have been rapids with fast flows and clean substrate; but for the past century or so, human constructed dams also represent barriers. Males and females congregate at traditional spawning sites, and eggs incubate and hatch within a few weeks. Depending on temperature, larvae drift downstream to suitable nursery habitat. This downstream drift usually occurs at night. Recent genetic studies have confirmed that there are unique spawning/sub-populations within the same lake/riverine systems.

Nursery habitat is characterized by shallow, slow-moving waters with sandy bottoms. This habitat type is often found at the mouth of a large river where it meets the lake. Juvenile fishes are found in deeper water, foraging over a variety of substrates, but usually at different depths compared to their adult counterparts. Sub-adult and adult lake sturgeon forage and over-winter in shallow to deep lacustrine habitats, typically over substrates that support molluscs, crayfish and larger prey items.

Commercial over-harvesting for caviar and fuel as well as human-constructed barriers (dams), are the primary threats to the species. Most commercial harvest in

Ontario has been suspended since the 1970's – 1990's; small-scale subsistence harvest is still known to occur, but in many populations is not thought to be a threat. Currently, maintaining connectivity between staging, foraging, over-wintering and spawning habitats is critical for the long-term recovery and survival of lake sturgeon.[44] [45]

ASSESSMENT

There is no habitat for this species within the study area. No further studies are required.

EASTERN FOXSNAKE (*PANTHEROPHIS GLOYDI*) (GEORGIAN BAY POPULATION)

Eastern foxsnakes are a large oviparous snake that prefers rock barrens and meadow marshes along the Georgian Bay coast. Most individuals are found within 150 metres of the shore, and are known to use the water to move between terrestrial habitats.

Habitats for thermoregulation and shelter include rocky sites, brush piles, root systems, and the base of common junipers. Oviposition sites are typically in rock crevices and composting vegetation piles. Foxsnakes are active from mid-April through early October; mating occurs in late May to early June; eggs are laid in late June through early July. Hatching follows in late August through early October, likely closer to October for the majority of the Georgian Bay population. They hibernate, often communally from October through April in fissures in the bedrock.

---

[44] COSEWIC 2006. COSEWIC assessment and update status report on the lake sturgeon *Acipenser fulvescens* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

xi + 107 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

[45] Golder Associates Ltd. 2011. Recovery Strategy for Lake Sturgeon (*Acipenser fulvescens*) – Northwestern Ontario, Great Lakes-Upper St. Lawrence River and Southern Hudson Bay-James Bay populations in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vii + 77 pp.

Habitat alteration, fragmentation and loss of connectivity between key features i.e. hibernacula and foraging area are considered causative of population declines. Human persecution and road mortality are also significant threats to foxsnakes. [46] [47] [48] [49] [50]

ASSESSMENT

The study area does not fall within the boundaries of the regulated habitat for this species. No further studies are required.

SIGNIFICANT WETLANDS

---

[46] http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_ESTRN_FOXSNK_EN.html

[47] Government of Canada. 2013. Species Profile, Eastern Foxsnake, Great Lakes/St. Lawrence population. http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1022

[48] COSEWIC. 2008. COSEWIC assessment and update status report on the Eastern Foxsnake Elaphe gloydi, Carolinian population and Great Lakes/St. Lawrence population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 45 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

[49] OMNR. 2012. Habitat Protection Summary for Eastern Foxsnake (Georgian Bay Population). http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@species/documents/regulation/stdprod_096829.pdf

[50] Eastern Foxsnake Recovery Team. 2010. Recovery strategy for the Eastern Foxsnake (Pantherophis gloydi) – Carolinian and Georgian Bay populations in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vi + 39 pp.

There are no significant wetlands on or within 120m of the site.

SIGNIFICANT WILDLIFE HABITAT

No significant wildlife habitat was identified during the desktop review of available information. The site was investigated for significant wildlife habitat including seasonal concentration areas, rare vegetation communities and specialized habitats for wildlife, habitat for species of conservation concern, and animal movement corridors. The Significant Wildlife Habitat Criteria Schedules for Ecoregion 5E was used to identify potential significant wildlife habitat.[51] Table 5 represents the screened list based on ecosites.

Table 2 Summary of Potential Significant Wildlife Habitat

Significant Wildlife Habitat		Type	Ecosite	Present
1	Waterfowl Stopover and Staging Areas (Aquatic)	Seasonal Concentration Area	G148, G151	No
2	Raptor Wintering Area	Seasonal Concentration Area	G064	No
3	Turtle Wintering Areas (Hibernacula)	Seasonal Concentration Area	G148, G151	Potential
4	Colonially-Nesting Bird Breeding Habitat (Tree/Shrub)	Seasonal Concentration Area	G130	No
5	Shallow Atlantic Coastal Marsh	Rare Vegetation Community	G148, G151	No
6	Old Growth Forest	Rare Vegetation Community	G064	No
7	Waterfowl Nesting Area	Specialized Habitat for Wildlife	G148, G151	Potential

[51] Ontario Ministry of Natural Resources and Forestry. January 2015. Significant Wildlife Habitat Criteria Schedules for Ecoregion 5E. 45pp.

8	Turtle Nesting Area	Specialized Habitat for Wildlife	G148	Potential
9	Aquatic Feeding Habitat (Moose, White-tailed Deer)	Specialized Habitat for Wildlife	G148, G151	No
10	Amphibian Breeding Habitat (Wetlands)	Specialized Habitat for Wildlife	G148, G151	Potential
11	Marsh Bird Breeding Habitat	Specialized Habitat for Wildlife	G148, G151	Potential
12	Special Concern and Rare Wildlife Species	Habitat for Species of Conservation Concern	All	Potential

WATERFOWL STOPOVER AND STAGING AREAS (AQUATIC) (G148, G151)

These typically occur in agricultural fields that are flooded during the spring freshet. The foraging potential for the G148 or G151 ecosite is quite low and it is very unlikely that it would meet the minimum threshold of aggregations of 100 or more waterfowl on an annual basis. No further studies are required.

RAPTOR WINTERING AREA (G064)

Raptor wintering forested ecosites need to be greater than 20ha in area and adjacent to field/meadow habitats greater than 15ha. The study area does not meet that minimum threshold for this feature. No further studies are required.

TURTLE WINTERING AREAS (G148, G151)

Overwintering habitat for some turtle species only requires pooled water over hummocky terrain. Both of the listed ecosites are large enough and have the potential of meeting the minimum threshold of five overwintering painted turtles or one Northern map turtle or snapping turtle. It is assumed that this feature is present.

COLONIALLY-NESTING BIRD BREEDING HABITAT (TREE/SHRUB)(G148, G151)

There is no colonially-nesting bird breeding habitat associated with this ecosite. The nests of herons are quite large and noticeable and our site visit on November 28 in the leaf-off condition provided excellent observation conditions. No further studies are required.

SHALLOW ATLANTIC COASTAL MARSH(G148, G151)

This feature is unlikely to occur in either ecosite since this is a recently flooded site. It does not have the sandy characteristics. No further studies are required.

OLD GROWTH FOREST (G064)

Forest stands of 30ha or greater with at least 10ha of interior habitat assuming a 100m buffer from forest edge are required. Dominant tree species must be greater than 140 years old. These criteria are not met. No further studies.

WATERFOWL NESTING AREA (G148, G151)

These two wetland ecosites do not entirely meet the criteria of having at least 120m of upland area surrounding them to reduce predation on nests. The G148 wetland does not meet the minimum size requirement of 0.5ha. The threshold is three or more nesting pairs of the listed species or ten or more nesting pairs including Mallards or a single nest of a Black Duck. It is very unlikely that this would meet that criteria. No further study is required.

TURTLE NESTING AREA (G148)

There are no obvious sandy areas immediately adjacent to the G148 ecosite that would be suitable for nesting. The only suitable nesting habitat is the shoulder of the surrounding roads. No further study is required.

AQUATIC FEEDING HABITAT (MOOSE, WHITE-TAILED DEER) (G148, G151)

These wetland features do not support significant quantities of indicator species such as yellow water lilies. No further studies are required.

AMPHIBIAN BREEDING HABITAT (WETLANDS)(G148, G151)

No targeted amphibian breeding surveys were conducted. It is assumed that both the G148 and G151 ecosite may be significant for this function. The threshold for significance is relatively low for this feature. Just three or more listed frog/toad species with a minimum of 20 individuals are required. Based on the habitat present, it is expected that American toad, gray treefrog and green frog at a minimum would be present in numbers great enough to meet the threshold of significance. Gray tree frogs were heard calling during the July site visit. No further studies are required.

MARSH BIRD BREEDING HABITAT (G148, G151)

The listed indicator species would be very unlikely at these sites and most of the listed species do not appear in this square of the Breeding Bird Atlas of Ontario for square 17NL72. No further studies are required.

SPECIAL CONCERN AND RARE WILDLIFE SPECIES

There were 12 special concern species listed in the Parry Sound Species at Risk (SAR) Tool. Each is discussed below.

CANADA WARBLER

Canada Warbler's are most often found in cool, wet, low-lying areas; including swamps, sphagnum bogs and moist forest edges and openings. They are often associated with sites that have a dense understory near open water, vegetation associations including alder and willow.

Female Canada Warblers build a loosely constructed cup-shaped nest on or near the ground in early May. The nest is well-concealed, often in thickets or areas with dense ferns. These are typically wet, mossy areas within forest among ferns, stumps, and fallen logs. Nests have been documented in a variety of micro-habitats including within a recessed hole of upturned tree root mass, rotting tree stump or sphagnum moss hummock. They're less often reported within clump of grass, at base of tree stump, tucked under overhanging bank, beside fallen log, in rock cavity, at base of sedge tussock, under leaf on forest floor, at base of moss-covered logs/rocks, or in brush pile. Eggs are laid at the end of May, fledglings leave the nest and are ready to migrate by the end of July, early August. Migration peaks at the end of August, beginning of September.

The loss of forested habitat on the wintering grounds is thought to be the primary reason for the Canada Warbler decline. In addition, habitats in Ontario considered suitable for breeding are often lost to development.[52] [53] [54]

The shoreline areas of the wetland and lake have some potential for this species.. Restricting vegetation clearing outside of the breeding season of April 15 to August 31 will provide appropriate protection.

COMMON FIVE-LINED SKINK

The common five-lined skink is a small, secretive lizard with shiny, smooth skin and is the only lizard in Ontario. There are two populations in Ontario; the Southern Shield and Carolinian populations, the former is present in the study area. Preferred habitat for the Southern Shield population is rock outcrops, with loose rocks within mixed forests. Within these areas, access to shelter such as rocks and logs for refuge and a permanent body of water to avoid dehydration are essential habitat components.

The active season is from mid-April through late September, during which time the lizards mate and the females lay eggs in a nest, usually under a rock. The nest is never left unattended and hatching occurs in late July or early August. Skinks

[52] COSEWIC. 2008. COSEWIC assessment and status report on the Canada Warbler Wilsonia Canadensis

in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 35 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

[53] Reitsma, Len, Marissa Goodnow, Michael T. Hallworth and Courtney J. Conway. 2010. Canada Warbler (Cardellina canadensis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/421

[54]

http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_CND_WRBLR_EN.html hibernate in small groups inside rotting wood, under rocks or tree trunks or buried in the soil.

Alterations to site-specific habitat features like rock-flipping, rock removal, and vegetation clearing are detrimental to five-lined skinks. Skinks rely on microhabitat elements, and changes to elements within these can result in population declines.[55] [56] [57] [58]

There is no suitable habitat for this species. No further study is required.

COMMON NIGHTHAWK

Common nighthawks are a medium-sized insectivore that traditionally use open habitats such as rock barrens, forest clearings, gravel beaches and areas recently impacted by forest fire. They nest on open ground in these areas and are also known to use anthropogenic sites, especially flat gravel roofs in urban areas. No nest materials are used; ground cover at the nest sites includes gravel, sand, bare rock, leaves and lichen.

---

[55] Government of Canada. 2013. Species Profile, Five-lined Skink Great Lakes/St. Lawrence population. http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=973

[56] COSEWIC 2007. COSEWIC assessment and update status report on the Five-lined Skink Eumeces fasciatus (Carolinian population and Great Lakes/St. Lawrence population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 50 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

[57] http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_CMN_5LND_SKNK_EN.html

[58] Environment Canada. 2013. Management Plan for the Five-lined Skink (Plestiodon fasciatus), Great Lakes/St. Lawrence population, in Canada. Species at Risk Act Management Plan Series. Environment Canada, Ottawa.iv + 17pp.

Similar to Whip-poor-wills, Common Nighthawks are crepuscular (most active at dusk and dawn) insectivores. They commonly forage over open areas, often resting on gravel roads and airport runways or other similar features.

Threats to nighthawks include impacts of pesticide use on prey populations and conversion of open habitats to shrubby or reforested areas and gravel roofs that are converted to rubber roofs. [59]

There is no suitable habitat for this species. No further study is required.

EASTERN RIBBONSNAKE

The Eastern Ribbonsnake is a slender snake with three bright yellow stripes running down its back and sides, contrasting sharply with its black back. Eastern Ribbonsnakes have a white chin, whitish-yellow belly and a distinct white crescent in front of each eye that can be used to distinguish it from a gartersnake. Adults grow to about 70 centimetres long, and females are typically larger than males.

Eastern Ribbonsnakes are active during the day and feed primarily on amphibians, particularly frogs.

An adult female gives birth to between five and 12 live young in late summer. The newly born snakes are independent and begin hunting for insects to eat almost immediately.

The Eastern Ribbonsnake is usually found close to water, especially in marshes, where it hunts for frogs and small fish. A good swimmer, it will dive in shallow water, especially if it is fleeing from a potential predator. At the onset of cold weather, these snakes congregate in underground burrows or rock crevices to hibernate together.[60]

[59] Brigham, R. M., Janet Ng, R. G. Poulin and S. D. Grindal. 2011. Common Nighthawk (Chordeiles minor), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/213

[60] https://www.ontario.ca/page/eastern-ribbonsnake

There is some potential for this species in the wetland ecosites and fringe shorelines.

EASTERN WOOD PEWEE

Eastern Wood Pewee's are found in almost every forested ecosite in Ontario, usually associated with edge habitat and less often found in wetter sites. They are a medium-sized flycatcher with a signature 'pee-a-wee' call. Wood Pewee's perch on dead branches in the mid-canopy and sally out after flying insects. Its diet includes flies, bugs, butterflies, moths, bees, wasps, beetles, grasshoppers, crickets, stoneflies, and mayflies. The pewee also eats small amounts of vegetable matter, including the berries and seeds of dogwood, blueberry, raspberry, and poison ivy.[61]

They nest mainly in deciduous trees (saplings) including oak and maple, and less so in conifer, usually restricted to *Pinus* sp. A small, inconspicuous cup nest is built along a branch, woven with grasses and other vegetation and covered with lichen. Their size and design provide superb camouflage. Pewees are territorial, averaging territories 2 – 8 hectares in size.

Significant population declines over the past 25 years are thought to be due to artificially high densities of white tailed deer.

Restricting vegetation clearing outside of the breeding season of April 15 to August 31 will provide appropriate protection.

GOLDEN-WINGED WARBLER

Golden-winged warblers are one of the many wood warblers found in Ontario. They prefer habitats with dense herbaceous cover and shrubs for nesting. Site area usually associated with a forested edge and result from natural or anthropogenic disturbance.[62] They forage for moths, winged-insects and larvae in the upper branches and foliage of shrubs.

[61] http://www.allaboutbirds.org/guide/Eastern_Wood-Pewee/lifehistory

[62] Confer, John L., Patricia Hartman and Amber Roth. 2011. Golden-winged Warbler (Vermivora chrysoptera), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/020 doi:10.2173/bna.20

Females build a nest, usually on the ground and always include a stem in the basal material which is used when landing at the nest. Eggs are laid from mid-May through early June and the young hatch approximately 10 days later, and following another ~ 8 days later. Migration out of Ontario peaks in late August – early September. [63]

There is no habitat for this species. No further studies are required.

MONARCH

Monarch's are a bright orange and black butterfly with white spots. They are similar in appearance to the Viceroy, another butterfly species found in Ontario in similar habitats.

In Ontario, monarch butterflies have two habitat requirements. Firstly, adults lay their eggs on common milkweed (*Asclepias syriaca*) and the resultant caterpillar eats milkweed leaves exclusively. Common milkweed is most often found in disturbed sites growing in a variety of soils. Adult butterflies also require nectar from wildflowers which are found in a variety of habitats and soil types. Wildflowers are typically found on open sites; such as grasslands, road sides, agricultural areas and residential gardens.

[63] Confer, John L., Patricia Hartman and Amber Roth. 2011. Golden-winged Warbler (Vermivora chrysoptera), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/020

Monarch's overwinter in Central Mexico in the Oyamel Fir Forests. Habitat loss, specifically the clearing of this forested land for agriculture has been identified as the biggest threat to monarchs. [64] [65]

The G199X ecosite likely has some habitat for this species since it is a disturbed edge habitat where milkweed may be present.

NORTHERN MAP TURTLE

The Northern map turtle is a highly aquatic turtle found in well oxygenated rivers, lakes and streams in areas where the shoreline is natural. They prefer shallow habitats with soft bottoms and abundant objects like rocks and logs for basking. They are nocturnal to slightly crepuscular, sleeping in the sunshine for most of the daylight hours. Map turtles feed primarily on molluscs and occasionally crayfish and aquatic insect larvae.

They hibernate communally from October through April in deep, highly oxygenated, slow moving water. Mating occurs at the hibernation site; subsequently, females nest inland in late June – early July. Sex determination is temperature-dependent with hatchlings emerging in late August or early September. Map turtles show site fidelity to both hibernacula and nest sites.

Because of their highly aquatic nature and affinity for natural shorelines, Northern map turtles are vulnerable to shoreline development, mortality from boats, water

[64] COSEWIC. 2010. COSEWIC assessment and status report on the Monarch Danaus plexippus in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 43 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

[65] http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_MNRCH_BTTRFLY_EN.html

control structures (dams) and unnaturally high levels of nest predation by mammals.[66] [67] [68]

It is unlikely that the habitat is suitable for this species. However, any mitigation required for other turtle species would also benefit this species.

OLIVE-SIDED FLYCATCHER

In the Ontario portion of its range, the Olive-sided Flycatcher breeds in the boreal forest, specifically riparian zones, bogs, cutovers and areas of recent fire. Olive-sided Flycatchers are a late migrant, arriving in Ontario from mid-May through mid-June. This late migration often results in migrating individuals incorrectly being identified as breeders.

Olive-sided flycatchers are aerial insectivores, foraging above or near the top of the adjacent forest canopy. They use a technique known as 'sallying' to capture flying insects including bees, wasps, flying ants and less frequently moths from a perch. Coniferous trees, tall snags and semi-open areas for foraging are important features in a breeding territory.

Males and females build open-cup nests usually in a conifer tree; approximately 1 metre away from the trunk of the tree and between 3 and 15 metres off the ground although there is some variability in nest heights. Typical clutch includes 3 – 4 eggs

---

[66] Government of Canada. 2013. Species Profile, Northern Map Turtle. http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=712

[67] http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_NRTHRN_MAP_TRTL_EN.html

[68] COSEWIC. 2012. COSEWIC assessment and status report on the Northern Map Turtle *Graptemys geographica* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 63 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

which incubate for approximately two weeks. Hatchlings are fed at the nest for another two weeks.

Fire suppression, changes to habitat including those related to forest management practices have resulted in this species decline. Maintaining habitat with suitable nest trees and snags is recommended.[69]

This species does not appear in the breeding bird atlas square for this area and the habitat is likely not suitable. No further studies are required.

SNAPPING TURTLE

The Snapping turtle is Canada's largest freshwater turtle, reaching an average length of 20-36 cm and a weight of 4.5-16.0 kg. Snapping turtles have large black, olive or brown shells typically covered in algae. Their tails, which can be longer than their bodies, have "dinosaur-like" triangular crests along their length. Hatchlings are about the size of a loonie and are smaller and darker than adults, with pronounced ridges along the length of their shell.[70]

Snapping turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe.

During the nesting season, from early to mid summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. Snapping turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.

[69] Altman, Bob and Rex Sallabanks. 2012. Olive-sided Flycatcher (Contopus cooperi), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/502

[70] https://www.ontario.ca/page/snapping-turtle

This species is very likely present within the wetlands and lake ecosites. Any mitigation required for other turtle species would also benefit this species.

UPPER GREAT LAKES KIYI

The kiyi lives in the clear, cold-water of the Great Lakes at depths ranging from 35 to 200 metres and feeds on deep-water crustaceans. It is rarely found in waters less than 100 metres deep.

This species generally spawns in the late fall, at depths greater than 100 metres. The age of maturity is two to three years. Females have been found to live for up to ten years, and up to seven years for males.

There is no habitat for this species. No further studies are required.

WOOD THRUSH

Wood Thrush are found nesting primarily in mature deciduous and mixedwood forests, usually in association with moderate shrub density and relatively open forest floor.[71] Dead grasses, stems and leaves are used to construct a cup-shaped nest in saplings or shrubs, usually in the crotch or over a horizontal branch where twigs provide support. Thrushes eat a variety of invertebrates, gleaning from vegetation and the ground.

Restricting vegetation clearing outside of the breeding season of April 15 to August 31 will provide appropriate protection.

SIGNIFICANT AREAS OF NATURAL AND SCIENTIFIC INTEREST

There are no areas of natural and scientific interest within the study area.

[71] Evans, Melissa, Elizabeth Gow, R. R. Roth, M. S. Johnson and T. J. Underwood. 2011. Wood Thrush (Hylocichla mustelina), The

Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America

Online: http://bna.birds.cornell.edu/bna/species/246

FISH HABITAT

Anderson Lake originally had a surface are of about 1.2ha in 1969. Following the installation of a dam at the outlet, the water level has raised and the surface area has grown to about 4.9ha currently draining an area of about 20ha. A historic MNRF document indicated that bass species, pumpkinseed and minnows compose the fish community. The larger McGowan Lake immediately downstream has smallmouth bass, Norther pike, rock bass, pumpkinseed, white sucker and yellow perch. Fish community collections in the shallow embayment where the work will take place yielded brook stickleback, Northern redbelly dace and finescale dace. This flooded area apparently used to be grazing pasture before the lake was flooded and it is now a shallow emergent wetland bay approximately 1.0m deep or less. There is a small tributary that drains int the bay intermittently from the north under Bowes Street. There is another intermittent tributary that drains into the embayment from the west on Oastler Park Drive and another that drains from the east intermittently from a wetland on the east side of Highway 69. This site is heavily influenced by the roads and highway infrastructure that encloses it. There are no aquatic SAR species listed for this waterbody according to map 18 of 27 Ontario North East.

ASSESSMENT

There will be a permanent fill of wetland habitat that is both direct and indirect fish habitat. It is generally unspecialized habitat for baitfish and potentially bass species for a total area of 1100 square metres. The rock fill used to construct the roadway may provide some diversity of habitat that does not currently exist in the lake and be beneficial as cover for small fish. A Request For Review has been completed and submitted to Fisheries and Oceans Canada. A site visit with Fisheries and Oceans staff also occurred on September 4, 2019 and consultation continues with this agency.

SUMMARY

The purpose of this PESA is to assess the suitability of this site for the proposed access road and commmercial development. As demonstrated throughout the report, a comprehensive review of the site and site conditions can lead to a solution that is appropriate for the location. Many natural heritage features were able to be screened out based on the habitats present on the site. Perhaps the most significant constraint is the presence of Category 2 Blanding's turtle habitat.

Based on our evaluation, the following constraints have been confirmed or there are potential constraints:

1. As discussed previously, the entire study area is either Category 2 or 3 Blanding's turtle habitat;
2. Infilling of wetlands and/or Anderson Lake shall occur during the active season for Blanding's turtles (May 1 to September 30);
3. Thorough and targeted searches for Blanding's turtles shall occur immediately prior to infilling operations to ensure no harm to individuals;
4. Temporary exclusion fencing shall be implemented prior to May 1 and remain functional until September 30 for all work areas and shall be consistent with <u>Best Management Practices for Mitigating the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario</u>;
5. All construction staff working on the site shall be provided training and information about any species at risk that may occur at the site and delivered by a Qualified Professional;
6. Turtle wintering areas in the G148 and G151 ecosites have some potential. Any protection afforded to the Blanding's turtle would protect other turtle species as well;
7. Amphibian breeding habitat in the G148 and G151 is expected to be considered to meet the threshold for significant wildlife habitat. Any protection afforded to the Blanding's turtle would protect this value as well;
8. The presence of any special concern bird species will be mitigated by applying a vegetation clearing restriction timing window of April 15 to August 31;
9. The presence of any special concern reptile species will be afforded protection through measures to protect Blanding's turtle habitat; and
10. Fish habitat shall be protected as per the Request for Review Process with Fisheries and Oceans Canada (**Appendix 3**).

This PESA meets or exceeds the requirements outlined Section 5.3 of the Natural Heritage Reference Manual (2010), Provincial Policy Statement and the Official Plan. Further study would be required to move forward with this site and permits and approvals may be required from Fisheries and Oceans Canada and the Ministry of Environment, Conservation and Parks to proceed with this site.

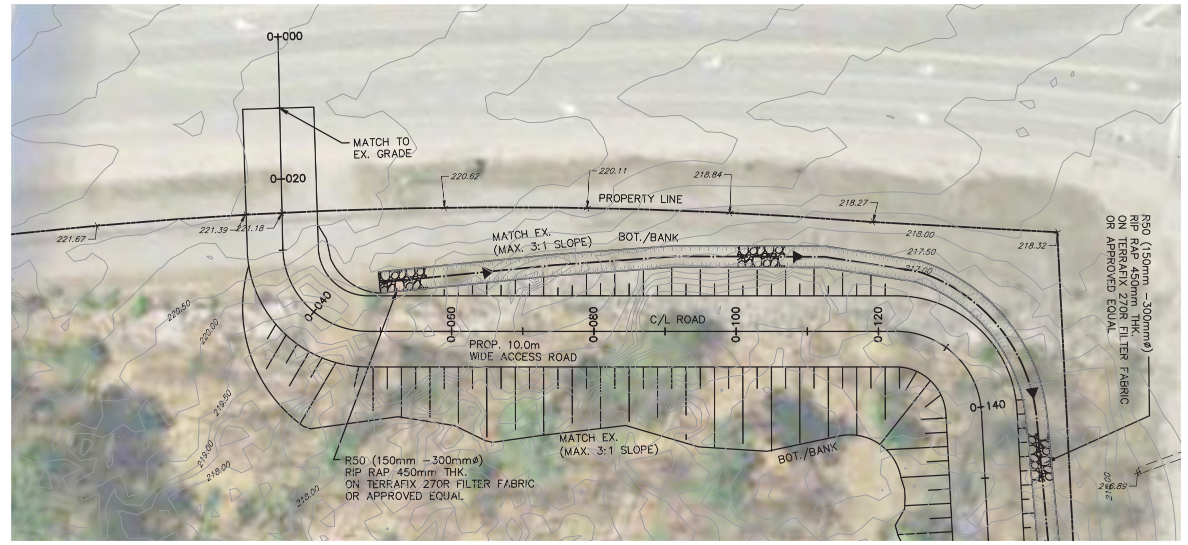
Respectfully submitted,

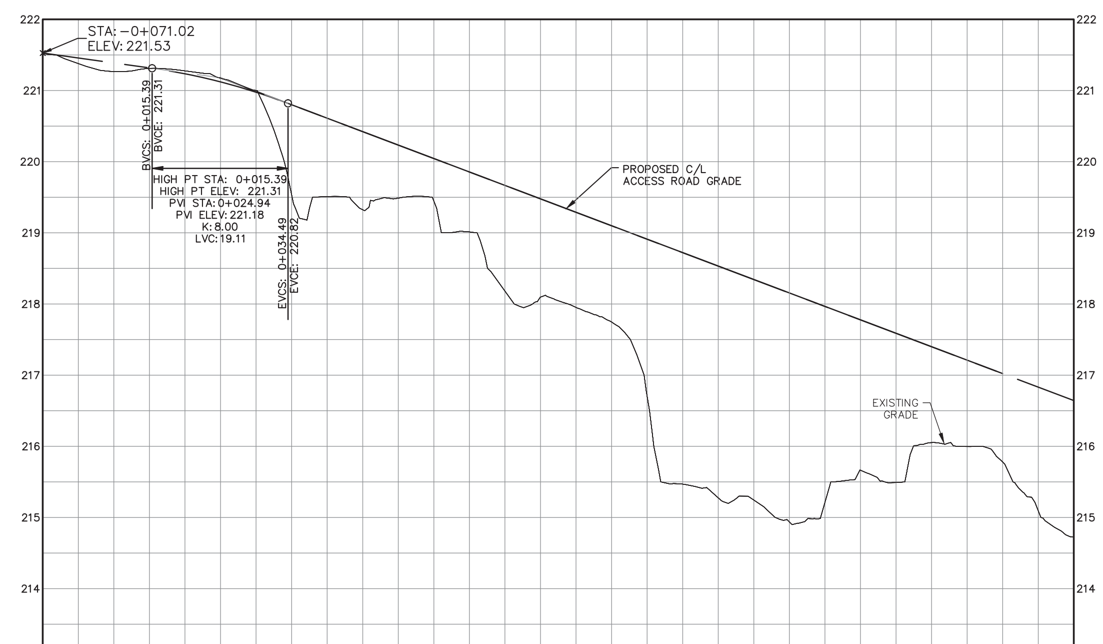
Rod Bilz
Environmental Specialist

APPENDIX 1

Engineered Drawings

OASTLER PARK DRIVE





PROPOSED C/L ELEV	221.24	220.61	219.86	219.10	218.34	217.59	216.83
EXISTING C/L ELEV	221.28	219.51	219.01	217.75	215.24	215.49	215.09
CHAINAGE	0+020	0+040	0+060	0+080	0+100	0+120	0+140

DISCLAIMER AND COPYRIGHT

BENCHMARKS

NOTES

1. WATER LEVEL BASED ON AREIAL IMAGERY.
2. TOPOGRAPHIC DATA OBTAINED FROM THE SOUTHERN CENTRAL ONTARIO ORTHOPHOTOGRAPHY PROJECT (SCOOP) 2013 DIGITAL SURFACE MODEL AND DIGITAL TERRAIN MODEL (2 METRE RASTER ELEVATION DATA).
3. PRELIMINARY GRADING SUBJECT TO CHANGE BASED ON FUTURE TOPOGRAPHIC SURVEY.
4. GEOTECHNICAL SURVEY REQUIRED TO DETERMINE SUBSURFACE CONDITIONS ON SITE.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

HWY 400 & BOWES, PARRY SOUND
PROPOSED ACCESS ROAD
PLAN & PROFILE

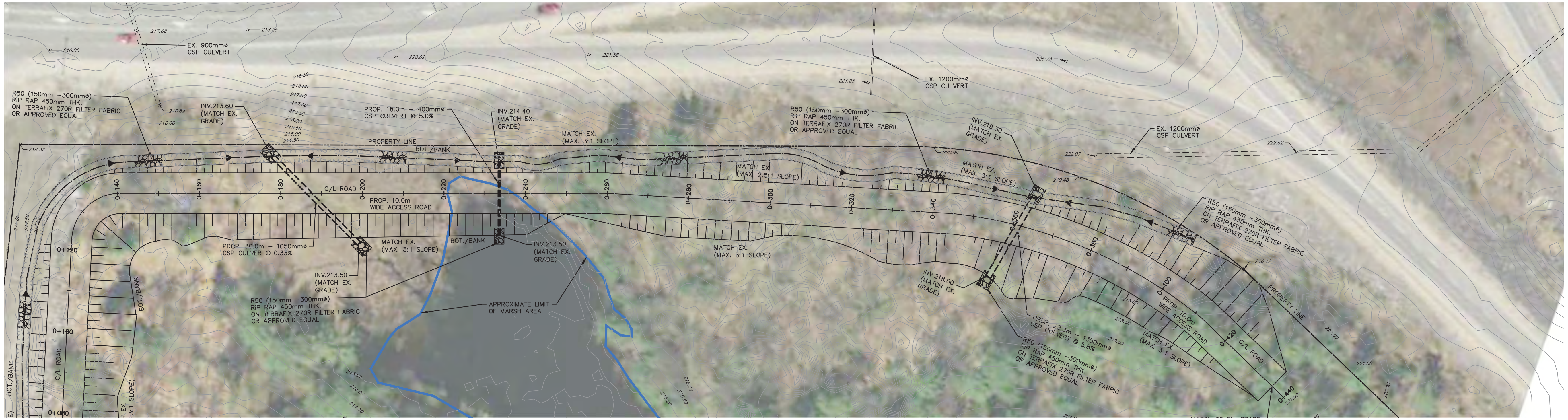
TATHAM ENGINEERING

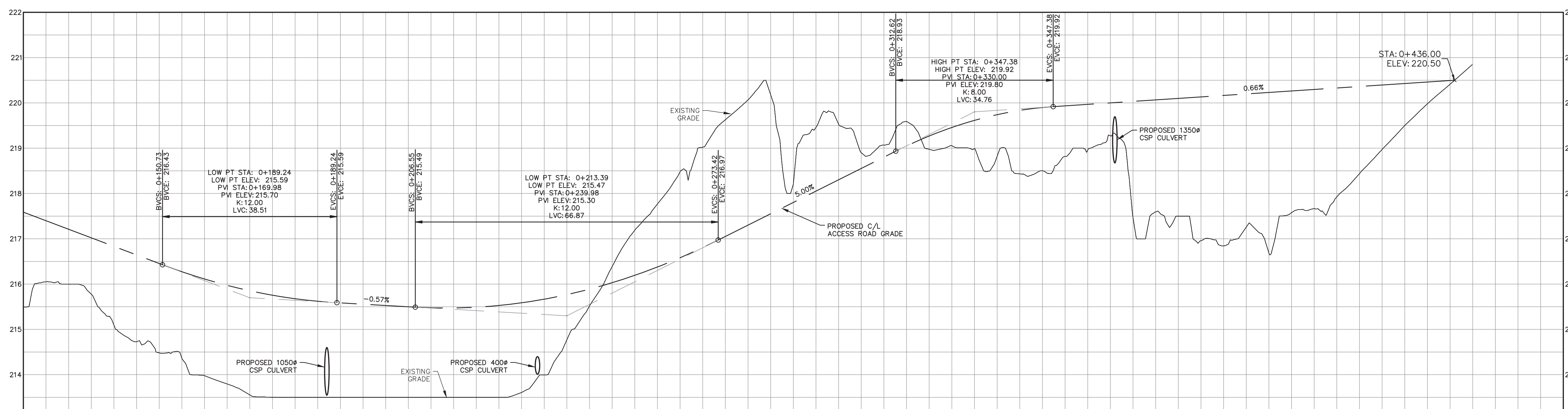
PLAN & PROFILE
PROPOSED ACCESS ROAD

DESIGN: AOR	FILE: 118158	DWG: **PP-1**
DRAWN: DEP	DATE: MAR 2019	
CHECK: DRT	SCALE: HORIZ. 1:500, VERT. 1:50	

Drawing Name: 118158_PP-1.dwg, Plotted: Jul 16, 2019

BOWES STREET





CHAINAGE	PROPOSED C/L ELEV	EXISTING C/L ELEV
0+140	216.83	215.09
0+160	216.11	213.98
0+180	215.68	213.50
0+200	215.53	213.50
0+220	215.49	213.50
0+240	215.77	214.77
0+260	216.38	217.77
0+280	217.30	220.07
0+300	218.30	219.53
0+320	219.27	218.97
0+340	219.83	218.43
0+360	220.00	219.28
0+380	220.13	216.96
0+400	220.26	217.58
0+420	220.39	218.97
0+440		

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

BENCHMARKS

NOTES

1. WATER LEVEL BASED ON AREIAL IMAGERY.
2. TOPOGRAPHIC DATA OBTAINED FROM THE SOUTHERN CENTRAL ONTARIO ORTHOPHOTOGRAPHY PROJECT (SCOOP) 2013 DIGITAL SURFACE MODEL AND DIGITAL TERRAIN MODEL (2 METRE RASTER ELEVATION DATA).
3. PRELIMINARY GRADING SUBJECT TO CHANGE BASED ON FUTURE TOPOGRAPHIC SURVEY.
4. GEOTECHNICAL SURVEY REQUIRED TO DETERMINE SUBSURFACE CONDITIONS ON SITE.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

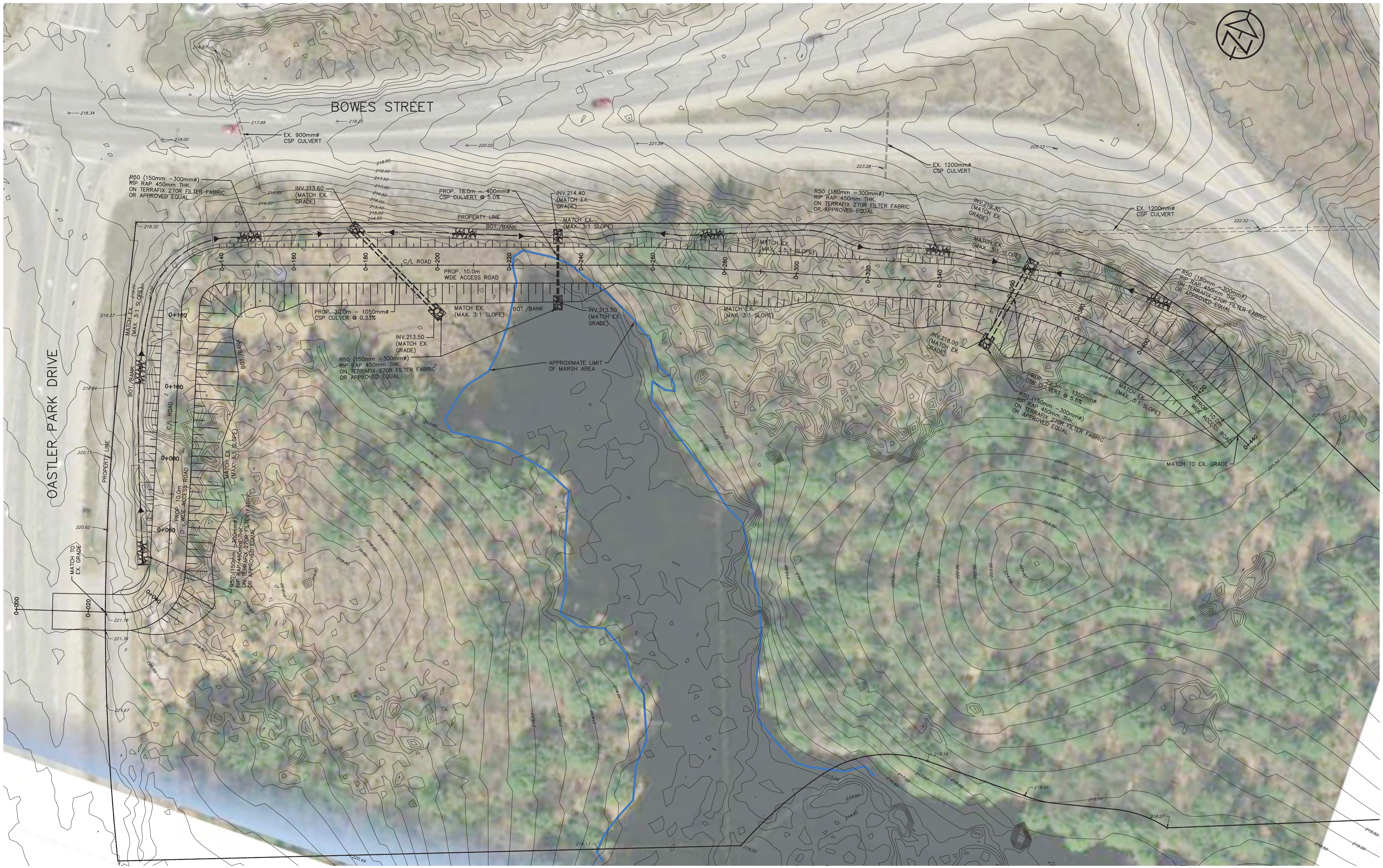
HWY 400 & BOWES, PARRY SOUND
PROPOSED ACCESS ROAD
PLAN & PROFILE

PLAN & PROFILE
PROPOSED ACCESS ROAD

TATHAM ENGINEERING

DESIGN: AOR	FILE: 118158	DWG: PP-2
DRAWN: DEP	DATE: MAR 2019	
CHECK: DRT	SCALE: HORIZ. 1:500, VERT. 1:50	

Drawing Name: 118158_PP-1.dwg, Plotted: Jul 16, 2019



DISCLAIMER AND COPYRIGHT	BENCHMARKS	NOTES
CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED. TATHAM ENGINEERING LIMITED CLAIMS COPYRIGHT TO THIS DRAWING WHICH MAY NOT BE USED FOR ANY PURPOSE OTHER THAN THAT PROVIDED IN THE CONTRACT BETWEEN THE OWNER/CLIENT AND THE ENGINEER WITHOUT THE EXPRESS CONSENT OF TATHAM ENGINEERING LIMITED.		1. WATER LEVEL BASED ON AREIAL IMAGERY. 2. TOPOGRAPHIC DATA OBTAINED FROM THE SOUTHERN CENTRAL ONTARIO ORTHOPHOTOGRAPHY PROJECT (SCOOP) 2013 DIGITAL SURFACE MODEL AND DIGITAL TERRAIN MODEL (2 METRE RASTER ELEVATION DATA). 3. PRELIMINARY GRADING SUBJECT TO CHANGE BASED ON FUTURE TOPOGRAPHIC SURVEY. 4. GEOTECHNICAL SURVEY REQUIRED TO DETERMINE SUBSURFACE CONDITIONS ON SITE.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

HWY 400 & BOWES, PARRY SOUND
PROPOSED ACCESS ROAD
PLAN & PROFILE

POTENTIAL PROPOSED DEVELOPMENT PLAN

TATHAM ENGINEERING

DESIGN: AOR	FILE: 118158	DWG: **PD-1**
DRAWN: DEP	DATE: MAR 2019	
CHECK: DRT	SCALE: 1:500	

Drawing Name: 118158_SD-1.dwg, Plotted: Jul 16, 2019

APPENDIX 2

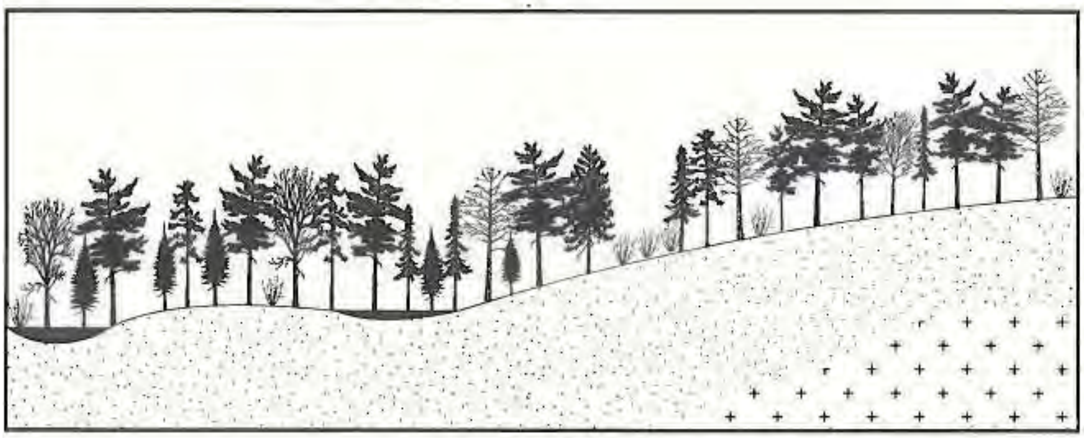
Ecosites

Moist, Coarse: Red Pine - White Pine Conifer

G064Tt/Tl

L | M | H

Profile/Slope Sequence



approximately 250m

Ecosite Description

Conifer canopy consisting of eastern white and red pine. May contain large-tooth aspen, white birch, red maple, white spruce, trembling aspen, and balsam fir. Understory tree species consisting of moderate levels of balsam fir, red maple, and eastern white pine. Shrub and herb moderately poor. Ground surface mostly conifer and broadleaf litter with occurrences of feathermoss and variable stones. Substrate sandy to coarse loamy. Mostly > 15 cm deep and moist (MR = 4 or 5).

Substrate Description

Substrate Series	S1 M3 **M5** M10 **MD3** **MD5** MD14 **D3** **D5** D14													
Mode of Deposition	RO	CO	MO	GF	FL	LA	GL	EO	OR	GW	WA	CX	AN	
Family	Sandy	Coarse Loamy	Silty	Fine Loamy	Clayey	Peat	Folic							
Humus Form	Mull	Moder	Fibrimor	Humimor	Peatymor	Anmoor								
Moisture Regime	Θ	0	1	2	3	4	5	6	7	8	9	x	h	s
Moisture	d	f	m	v	w	x	h	s						
Depth	R	VS	S	M	MD	D								
Chemistry	k	n	z											

Vegetation Description

Tall treed (> 10 m) and low treed (≤ 10 m) ecosites common. Canopy closure generally closed. Low treed condition often indicative of younger trees. Ecosite is mostly conifer (> 50% relative cover). Eastern white and/or red pine ≥ 20% absolute cover is diagnostic. Ecosite variable from dominant stands of eastern white and/or red pine to mixed conditions dominated by conifer. Common understory vegetation includes beaked hazel, low sweet blueberry, fly honeysuckle, wild lily-of-the-valley, bracken fern, wild sarsaparilla, and Schreber's moss. May contains Central v-types V29, V25, V30, and V31; NE v-types V10.

Trees	*Pinus strobus, P. resinosa, Populus grandidentata, Betula papyrifera, Acer rubrum, Picea glauca, Populus tremuloides, Abies balsamea*
Shrubs	*Corylus cornuta* ssp. *cornuta, Vaccinium angustifolium, Diervilla lonicera, Gaultheria procumbens, Linnaea borealis* ssp. *longifolia, Lonicera canadensis, Vaccinium myrtilloides*
Vascular Herbaceous	*Maianthemum canadense* ssp. *canadense, Pteridium aquilinum, Aralia nudicaulis, Eurybia macrophyllus, Trientalis borealis* ssp. *borealis, Cornus canadensis*
Non-vascular	*Pleurozium schreberi, Bazzania trilobata* var. *trilobata, Cladonia coniocraea*

Ecology

Substrate has a low nutrient holding capacity resulting in decreased growth rates and low vegetation diversity. Limitations to tree growth can also be the result of high coarse fragment concentrations in morainal deposits. Shrub and herb poor with a closed canopy. Species diversity increases as canopy becomes more open. Under red pine dominated stands, shrub and herb sparse with abundant conifer litter. Maintenance of structure and composition associated with low to moderate intensity fire. In the absence of fire this ecosite will succeed to a spruce and balsam fir or mixedwood ecosite near the northern boundaries of 4E and tolerant hardwood in the southern portion of 4E and throughout 5E.

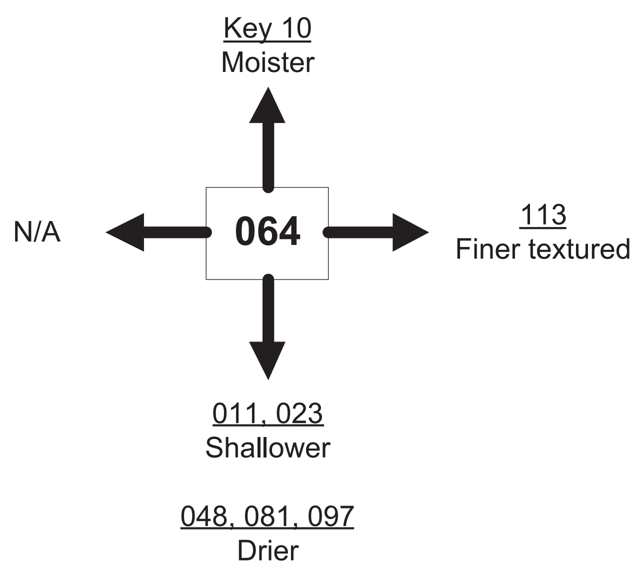
Ecoregional Variability

Widespread across Great Lakes-St. Lawrence range. More common and abundant in 4E-4, 4E-5, and 5E. Present but limited abundance in northern portions of 4E. Generally flat to rolling morainal deposits with occurrences of glaciofluvial material found in large river valleys throughout the range. Rugged bedrock controlled topography occurs in 5E-1, 5E-3, 5E-5, and 5E-13. Typically non-calcareous. Wide variety of associated vegetation including eastern white cedar, yellow birch, red maple, basswood, and red oak in the southern portion of 4E and throughout 5E. Boreal hardwoods, trembling aspen and white birch, more common in the northern portion of 4E.

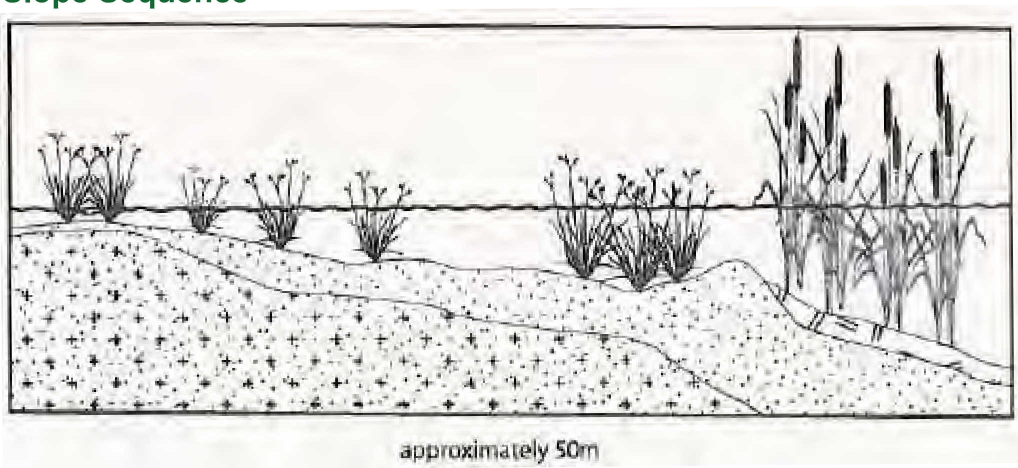
Edaphic Variability

Typically uniform in nutrient availability with variable moisture due to inconsistency of substrate depth over bedrock. Generally moderately deep to deep substrate. Depth of coarse moranial deposits variable which may result in bedrock controlled wetlands. Abundant stoniness in morainal deposits is common. Ecosite commonly on middle, lower, or level slope positions. Increased species diversity and abundance likely over base-rich bedrock or inclusions of fine textured materials. Occasional moist inclusions may contain speckled alder, *Sphagnum* species, sedges, and conifer species reflecting hydric conditions.

Related Ecosites



Profile/Slope Sequence



Ecosite Description

Herbaceous vegetation community typically composed of emergent grasses, rushes, sedges, forbs (occasionally), or horsetails. Floating-leaved herbaceous species may also be present. Water normally above the substrate surface (less than 2 m deep). Substrate mineral. Mostly deep and saturated.

Substrate Description

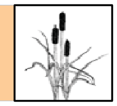
Substrate Series	L4 L5													
Mode of Deposition	RO	CO	MO	GF	FL	LA	GL	EO	OR	GW	WA	CX	AN	
Family	Sandy	Coarse Loamy	Silty	Fine Loamy	Clayey	Peat	Folic							
Moisture Regime	Θ	0	1	2	3	4	5	6	7	8	9	x	h	s
Moisture	d	f	m	v	w	x	h	s						

Vegetation Description

Herbaceous dominated community with > 25% emergent vegetation. Submergent and floating-leaved vegetation variable. Ecosite may be dominated by one specie or have a variable composition. Emergent species may include cattails, woolgrass, and arrowheads. Floating-leaved species may include duckweed and fragrant white water lily. Submergent species may include coontail and common waterweed.

Herbs and Graminoids	*Typha* spp., *Scirpus cyperinus, Sagittaria* spp., *Eleocharis palustris, Sparganium eurycarpum, Pontederia cordata, Schoenoplectus* spp., *Equisetum fluviatile, Carex aquatilis, C. vesicaria, C. utriculata, Dulichium arundinaceum*
Floating-leaved	*Lemna spp., Nymphaea odorata* ssp. *tuberosa, Potamogeton* spp., *Nuphar variegata, Eriocaulon aquaticum*
Submergent	*Ceratophyllum demersum, Elodea canadensis, Potamogeton* spp., *Stuckenia pectinatus, Myriophyllum sibiricum*

G148N Mineral Shallow Marsh



Ecology

Nutrient levels typically high due to abundant waterflow, and periodic exposure and aeration of the substrate. Dominant plants are tolerant of persistently deep water levels. Variation in species composition over time is in response to changes in hydrological conditions. May contain standing dead trees. In communities with a stable water level species diversity decreases and the area is often dominated by a single species. Ecosite is exposed regularly to wave action, river currents, ice-scouring, or drawdowns preventing the accumulation of organic material. Mineral shallow marshes are early-seral ecosites forming naturally in recently created wetland environments. This ecosite will persist as long as the hydrological regime is maintained.

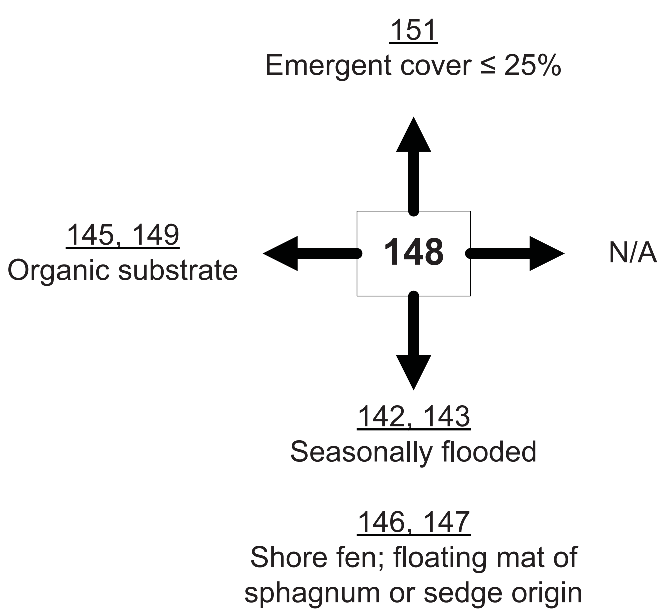
Ecoregional Variability

Widespread across Great Lakes-St.Lawrence range in wave-washed lakeshores, stream floodplains, and back-levees. May also occur at seepage sites. Atlantic coast plain species may occur along the shores of lake in Parry Sound and Muskoka. These species may include Virginia meadow-beauty, Carolina yellow-eyed-grass, tow-cupped pondweed, conifervoid pondweed, bayonet rush, hidden-fruited bladderwort, and floating-heart. Heart-leaved pickerel-weed may occur in 4E and 5E and Purple bladderwort may occur along the southern edge of 5E.

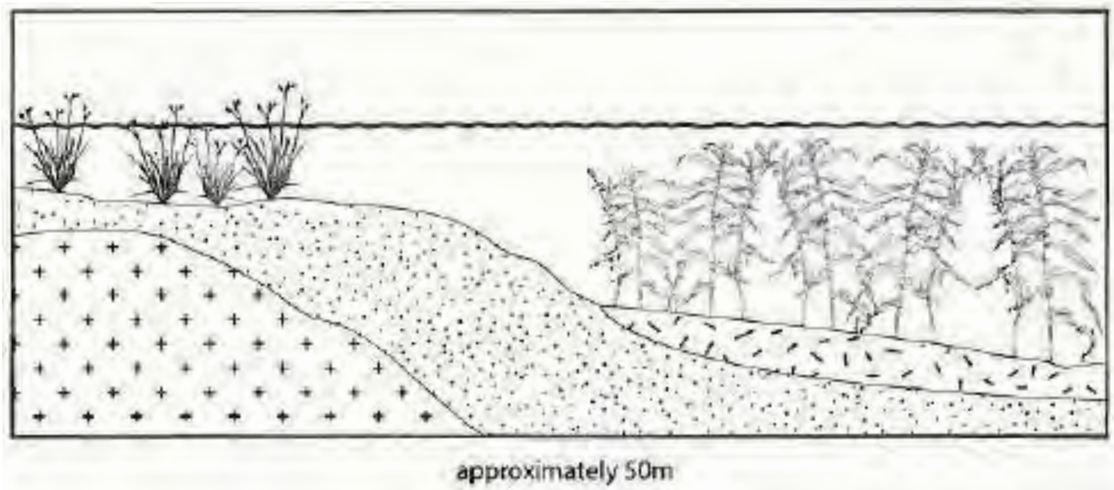
Edaphic Variability

Hydric. Typically uniform in nutrient and moisture availability. Generally on lower or level slopes, or in depressions. Often found as a part of a wetland complex adjacent to open water marshes and meadow marshes. Sandy or fine textured mineral substrate. Water depth variable. Submergent and floating-leaved vegetation more prevalent in deeper water.

Related Ecosites



Profile/Slope Sequence



Ecosite Description

Herbaceous vegetation community typically composed of submergent aquatic vegetation. Emergent and floating-leaved species may also be present. Water normally above the substrate surface (less than 2 m deep). Substrate typically mineral and deep. Moisture regime is saturated.

Substrate Description

Substrate Series	L4 L5

Mode of Deposition	RO	CO	MO	GF	FL	LA	GL	EO	OR	GW	WA	CX	AN

Family	Sandy	Coarse Loamy	Silty	Fine Loamy	Clayey	Peat	Folic

Moisture Regime	Θ	0	1	2	3	4	5	6	7	8	9	x	h	s
Moisture	d		f			m		v	w			x	h	s

Vegetation Description

Herbaceous dominated community with ≤ 25 % emergent vegetation and ≤ 50% floating-leaved vegetation. The area is dominated by submergent aquatic plant species. The ecosite may represent a simple community dominated by one to several species. Emergent species may include marsh spikerush, floating-leaved burreed, and softstem bulrush. Floating-leaved species may include yellow-pond lily and pondweeds. Submergent species may include pondweeds, common bladderwort, and spiked water-milfoil.

Emergent	*Eleocharis palustris, Sparganium fluctuans, Schoenoplectus tabernaemontani, S. carinatus*
Floating-leaved	*Nuphar variegata, Potamogeton* spp.
Submergent	*Potamogeton* spp., *Utricularia vulgaris., Myriophyllum sibiricum, Ceratophyllum demersum, Lobelia dortmanna*

Ecology

Dominant plants are tolerant of persistently deep water levels. Plant species distribution is affected by water chemistry (acidic to basic gradient), substrate quality, turbidity (amount of light available), and waterflow. Water table above the surface for most of the growing season. Drawdowns are rare. Ecosites often exposed to high wave energy. Low species diversity common.

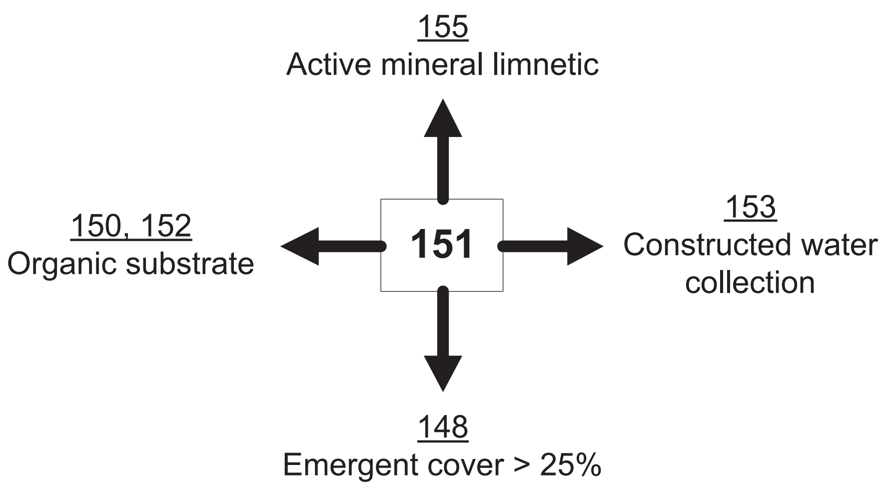
Ecoregional Variability

Widespread across Great Lakes-St.Lawrence range typically on wave-washed lakeshores and streams. Slender water-milfoil found in 5E.

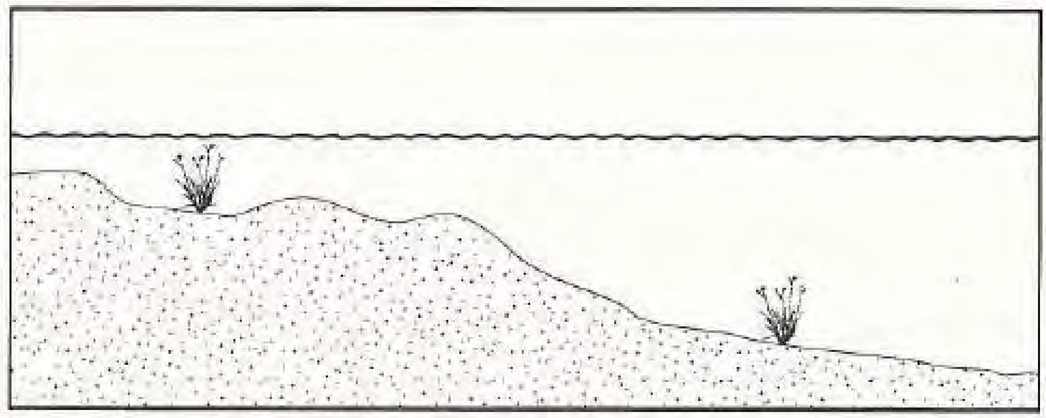
Edaphic Variability

Hydric. Generally on lower or level slopes, or in depressions. Often transitional to deep, unvegetated waters of lakes. Typically occurring on nutrient poor (oligotrophic) acidic mineral substrates.

Related Ecosites



Profile/Slope Sequence



approximately 50m

Ecosite Description

Submerged mineral material communities associated with the shorelines of large lakes, rivers, streams, and ponds. These communities occur in high energy limnetic zones where the water is normally above the substrate surface but does not exceed 2 m. Vascular vegetation cover ≤ 25%. Shoreline processes such as waves, currents, periodic flooding, ice scour, and high winds are common. Substrate texture variable, typically consisting of wave-washed sands. Mostly deep and saturated.

Substrate Description

Substrate Series	L1 L4 L5													
Mode of Deposition	RO	CO	MO	GF	FL	LA	GL	EO	OR	GW	WA	CX	AN	
Family	Sandy	Coarse Loamy	Silty	Fine Loamy	Clayey	Peat	Folic							
Moisture Regime	Θ	0	1	2	3	4	5	6	7	8	9	x	h	s
Moisture	d	f	m	v	w	x	h	s						

Vegetation Description

Vegetation cover is very limited and varies seasonally. Vegetation species highly variable consisting of species that are adapted to disturbance by flooding, ice-scouring, and strong currents and waves. Common species include pipewort, water lobelia, and spiny-spored quillwort.

Emergent	*Eriocaulon aquaticum, Lobelia dortmanna*
Submergent	*Isoetes echinospora*

G155N Active Limnetic Mineral

Ecology

Dominant plants are tolerant of high energy or are able to colonize an area quickly. Ecosite is maintained by high energy in the form of waves, currents, periodic flooding, ice scour, and high winds. Variability in aquatic species increases with a decrease in energy. These sites are usually permanently flooded; rarely they may become exposed during extreme drought years.

Ecoregional Variability

Widespread but uncommon across Great Lakes-St.Lawrence range associated with the high energy shorelines of large lakes, rivers, streams, and ponds.

Edaphic Variability

Shoreline communities produce characteristic zonal patterns due to the amount and frequency of wave, currents, periodic flooding, ice, and wind influences. This ecosite is found just below the exposed shoreline.

Related Ecosites

N/A

154
Rock substrate

155

156
Organic substrate

151
Vascular vegetation cover > 2%

153
Constructed water collection

APPENDIX 3

Fish Habitat Report Submitted to Fisheries and Oceans Canada

Documentation Memorandum

To: Steve Cho
From: Rod Bilz
Date: September 23, 2019
Subject: **Fish Habitat Destruction and Alteration Calculations - Waltmar**

Introduction

Based on our field visit and your follow-up email, you had requested a detailed breakdown on the types of fish habitat impacted. I georeferenced the site plan (**Appendix 1**) provided by C.C. Tatham and Associates over our GIS mapping so I could accurately measure each type of habitat and the amount of habitat destroyed or altered. The road fill slopes are a 3:1 slope and the water depths across the profile vary from zero to about one metre in depth. The areas of the various types of habitat changes depending on the year of the imagery.

Results

Figure 1 is a representation of the impact zone on fish habitat. The red cross hatch represents the area of habitat that will be destroyed and the yellow diagonal hatching represents the habitat that will be partially filled and altered. Under the zone of impact, three different habitat types were mapped: Heavily Vegetated (Pink), Semi-Open (Green) and Open Water (Blue). The two rectangular projections along the southern edge of the altered zone represent the locations of the culvert outlet scour pads that will be lined with rip rap. **Table 1** below documents all of the fish habitat quantities affected by this proposal.

Table 1 Summary of Fish Habitat Impacts

Impact Type	Habitat Type			Total (m^2)
	Open Water (m^2)	Semi-Open (m^2)	Heavily Vegetated (m^2)	
Harmful Alteration	7.96	48.77	161.09	213.43
Destruction	167.94	153.68	1075.17	1401.18
Total	175.90	202.45	1236.26	1614.61

Summary

The vast majority of the impacts will occur in the lower quality heavily vegetated habitat that is mainly used by tolerant forage fish species like brook stickleback. The semi-open habitats may be more conducive to the dace species and likely bass and pumpkinseed. The open water habitats and the fringe of floating aquatics may serve as foraging habitat for smallmouth bass. There are no critical or specialized spawning habitats that would be affected by the proposed works. All of the proposed works would occur outside of the original basin of Anderson Lake. All existing drainage into the lake would be maintained by the proposed culverts and drainage ditches.

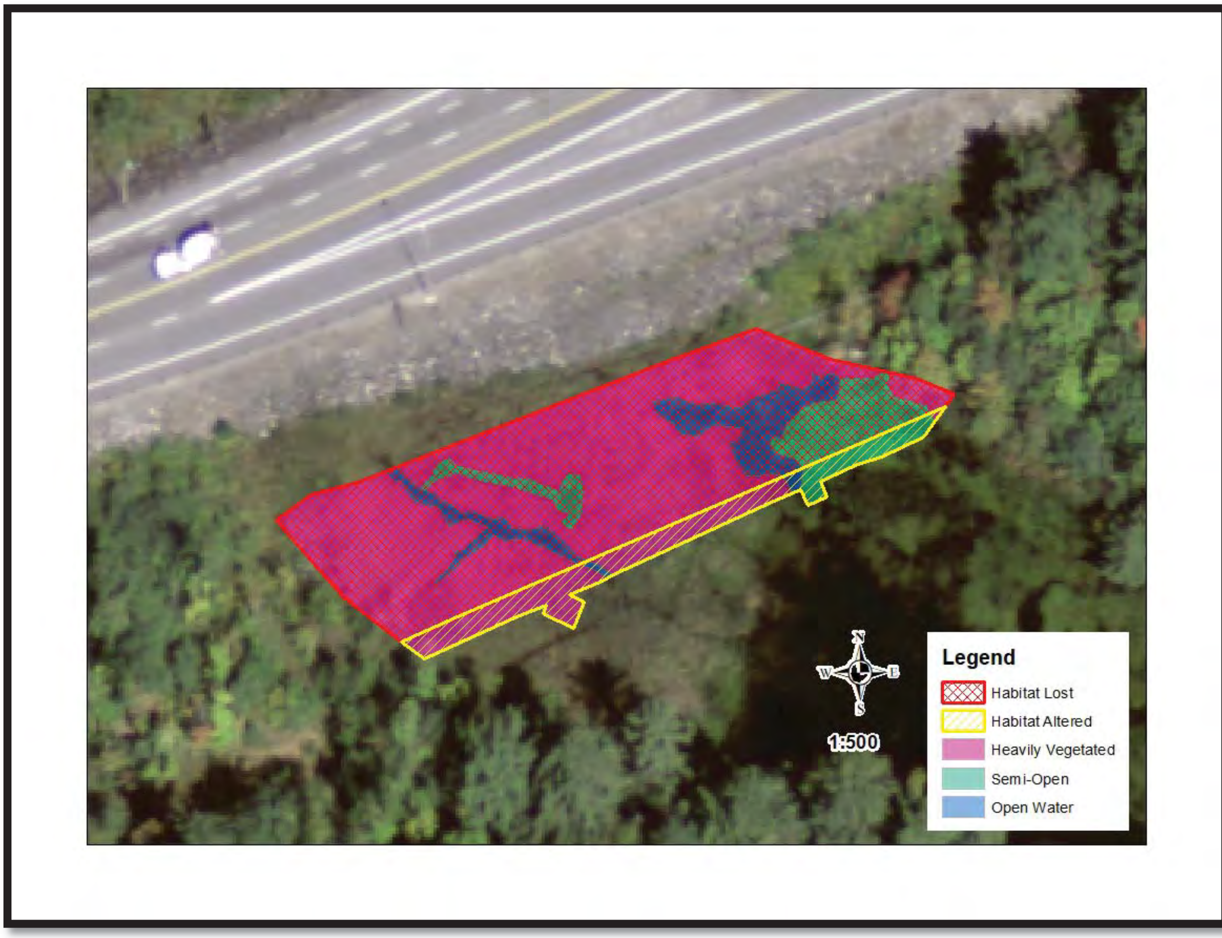


Figure 1 Impacted Fish Habitat

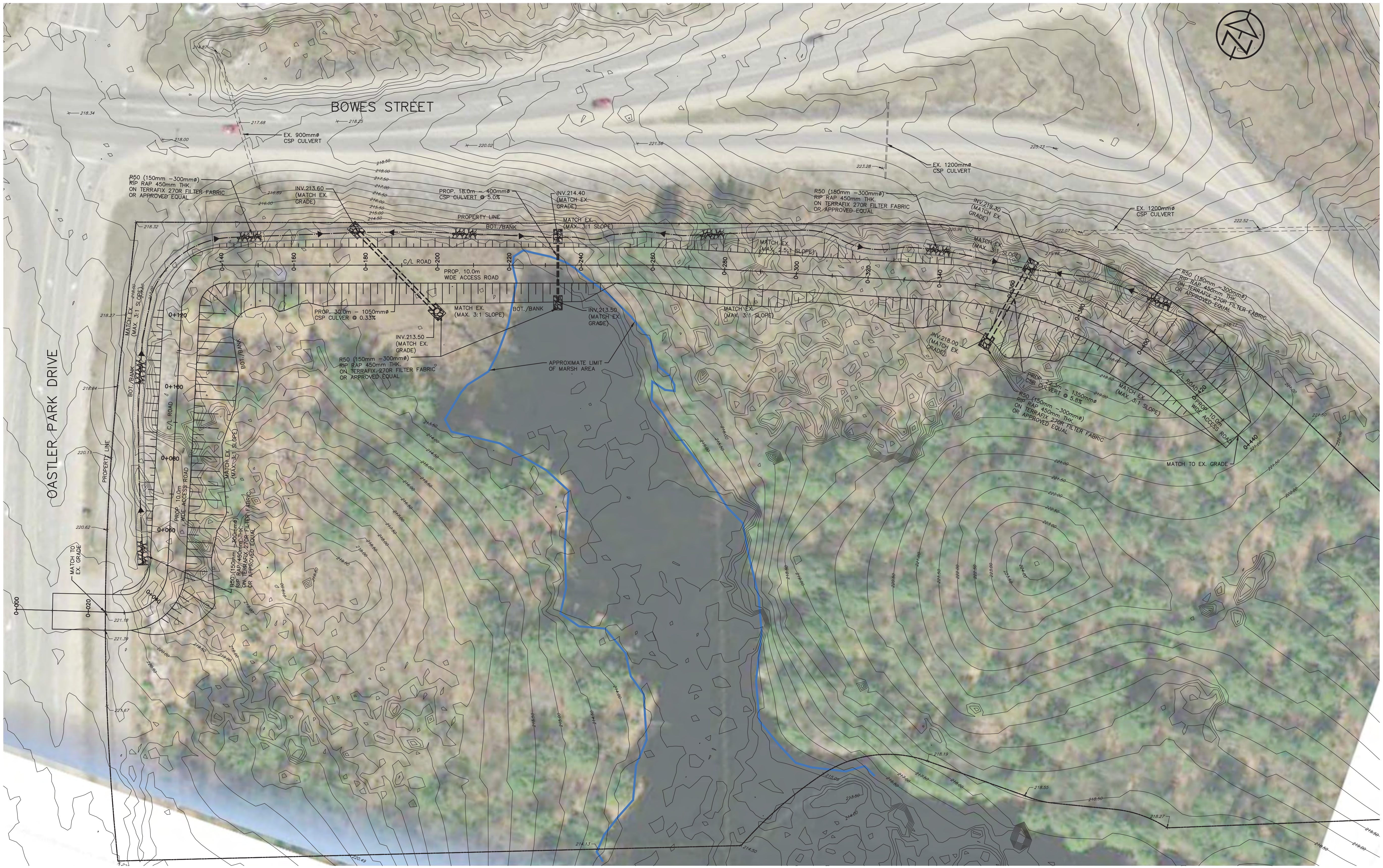
Sincerely,

Rod Bilz
Environmental Specialist

FRICORP ECOLOGICAL SERVICES
1875A Seymour Street
North Bay ON P1A0C7
705-476-0085

APPENDIX 1
Site Plan

FRICORP
ECOLOGICAL SERVICES
1875A Seymour Street
North Bay ON P1A0C7
705-476-0085



DISCLAIMER AND COPYRIGHT	BENCHMARKS	NOTES
CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED. TATHAM ENGINEERING LIMITED CLAIMS COPYRIGHT TO THIS DRAWING WHICH MAY NOT BE USED FOR ANY PURPOSE OTHER THAN THAT PROVIDED IN THE CONTRACT BETWEEN THE OWNER/CLIENT AND THE ENGINEER WITHOUT THE EXPRESS CONSENT OF TATHAM ENGINEERING LIMITED.		1. WATER LEVEL BASED ON AREIAL IMAGERY. 2. TOPOGRAPHIC DATA OBTAINED FROM THE SOUTHERN CENTRAL ONTARIO ORTHOPHOTOGRAPHY PROJECT (SCOOP) 2013 DIGITAL SURFACE MODEL AND DIGITAL TERRAIN MODEL (2 METRE RASTER ELEVATION DATA). 3. PRELIMINARY GRADING SUBJECT TO CHANGE BASED ON FUTURE TOPOGRAPHIC SURVEY. 4. GEOTECHNICAL SURVEY REQUIRED TO DETERMINE SUBSURFACE CONDITIONS ON SITE.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

HWY 400 & BOWES, PARRY SOUND
PROPOSED ACCESS ROAD
PLAN & PROFILE

POTENTIAL PROPOSED
DEVELOPMENT PLAN

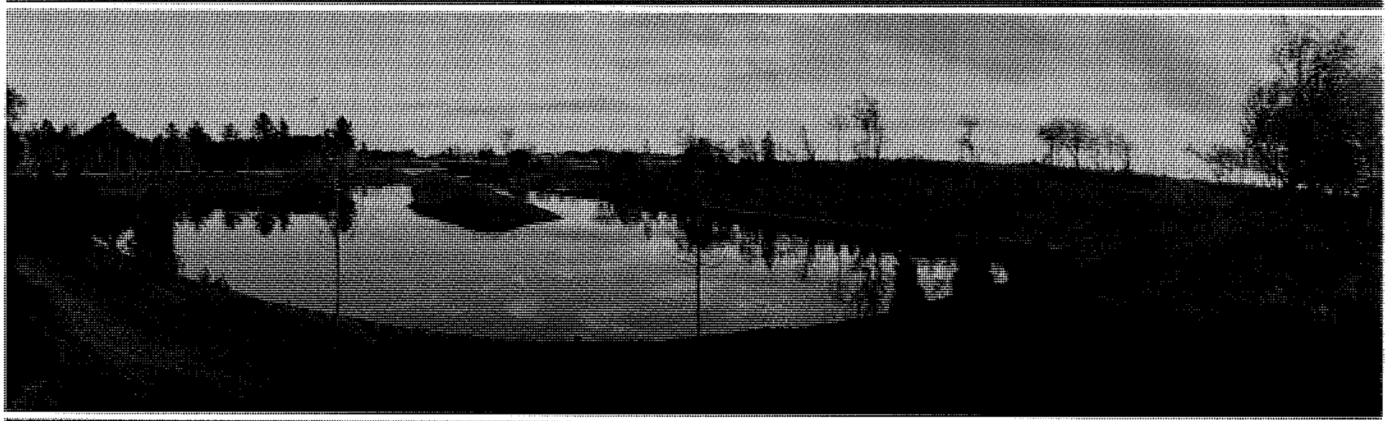
TATHAM ENGINEERING

DESIGN: AOR	FILE: 118158	DWG:
DRAWN: DEP	DATE: MAR 2019	**PD-1**
CHECK: DRT	SCALE: 1:500	

Drawing Name: 118158_SD-1.dwg, Plotted: Jul 16, 2019

TATHAM
ENGINEERING

Enhancing our communities



Highway 400 & Bowes Street

DRAINAGE REPORT

Waltmar Inc.

File 118158 | November 27, 2019

Document Control

File: 118158

Date: November 27, 2019

Prepared by:

Tatham Engineering Limited
115 Sandford Fleming Drive,
Suite 200
Collingwood, Ontario
L9Y5A6

T 705-444-2565
tathameng.com

Prepared for:

Waltmar Inc.
7101 Syntex Drive
Mississauga, Ontario L5N 6H5

Authored by:	Reviewed by:
Avneet Button, M.A.Sc., P. Eng. Intermediate Engineer	Daniel Twigger, B.Sc.Eng., P.Eng. Senior Engineer, Group Leader

Disclaimer	Copyright
The information contained in this document is solely for the use of the Client identified on the cover sheet for the purpose for which it has been prepared and Tatham Engineering Limited undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.	

Issue	Date	Description
1	November 27, 2019	MTO Submission

Document Contents

1 Introduction

Tatham Engineering Limited has been retained by Waltmar Inc. to prepare a drainage report in support of an access road for the proposed development located at the southwest corner of Bowes Street and Highway 400 in the Town of Parry Sound. This report has been prepared to assess the impacts, if any, the construction of the access road will have on local drainage conditions and, if necessary, provide a drainage design to address the impacts.

1.1 SITE LOCATION

The subject site is located at the southwest corner of Bowes Street and Highway 400 in the Town of Parry Sound (as per Figure 1). The site is bound by Oastler Park Drive to the west, Bowes Street and Highway 400 southbound ramp to the north and east and Anderson (Mud) Lake to the south. The northern extent of Anderson (Mud) Lake bisects the subject property.

1.2 PROPOSED DEVELOPMENT

The proposed development is planned to include a retail/restaurant pad, a hotel and a condominium building. A site plan is not available at this time and will be developed at a later stage in the project. At this time, it is proposed to construct an access road from Oastler Park Drive along the northern property line across Anderson (Mud) Lake to connect the two halves of the site.

2 Existing Conditions

2.1 SITE TOPOGRPAHY

The South Central Ontario Orthophotgraphy Project (SCOOP) GIS data was used to establish the topographic features of the subject property for this report. The site slopes steeply at grades of approximately 10% generally towards Anderson (Mud) Lake located centrally on-site. Surface runoff generated on-site drains overland as sheet flow into Anderson (Mud) Lake.

2.2 SOIL CLASSIFICATION

The Ontario Soil Survey of Parry Sound District Map No. 31 classifies the on-site soils as Monteagle sandy loam overlying bedrock.

2.3 CROSSING CULVERTS

Three culverts, each of which is owned and maintained by the Ministry of Transportation of Ontario (MTO), exist under Bowes Street and the Highway 400 southbound ramp and outlet onto the subject property and into Anderson (Mud) Lake. The following information regarding the culverts was determined from MTO Drawing B-452-400-1 (enclosed):

- Existing Culvert 1: 38.3 m - 900 mm dia. CSP culvert underneath Bowes Street;
- Existing Culvert 2: 21.3 m - 300 mm dia. concrete pipe underneath the Highway 400 southbound ramp; and
- Existing Culvert 3: 75.8 m - 1200 mm dia. concrete culvert underneath the Highway 400 southbound ramp.

Existing Culvert 1 discharges directly into the northern most extent of Anderson (Mud) Lake. Flows from Existing Culvert 2 and 3 drain southwest into Anderson (Mud) Lake overland as sheet flow and through a channel respectively.

In the absence of information regarding the design and capacity of the existing culverts, conveyance calculations were preformed to establish each culvert's conveyance capacity. From the background information available (MTO Drawing B-452-400-1) it is believed that the culverts will function under inlet control. Table 1 summarizes the conveyance capacity of each culvert determined from MTO Design Charts 2.31 and 2.32 (*MTO Drainage Management Manual*, 1997). The existing culvert capacity sizing calculations are provided in Appendix A for reference.

Table 1: Existing Culvert Conveyance Capacity

CULVERT	HEAD AT INLET (m)	INLET TYPE	CONVEYANCE CAPACITY (m^3/s)
Existing Culvert 1	3.5	Projecting	2.50
Existing Culvert 2	1.5	Catchbasin	0.25
Existing Culvert 3	1.5	Projecting	2.75

3 Proposed Conditions

3.1 ACCESS ROAD

Under proposed conditions, an access road will be constructed to service the site. Originating at an intersection with Oastler Park Drive, the access road will run north parallel to Oastler Park Drive then east parallel to Bowes Street and the Highway 400 southbound ramp, crossing the northern extent of Anderson (Mud) Lake downstream of the three existing culvert crossings.

The proposed location and alignment of the access road is illustrated on the Proposed Access Road Plan (Drawing PD-1) and corresponding Plan & Profile drawings (PP-1 and PP-2), all of which are enclosed.

3.2 CROSSING CULVERTS

Three culvert crossings under the access road are proposed to convey the external flows and on-site drainage to Anderson (Mud) Lake, details of which are as follows (refer also to Drawing PD-1):

- Proposed Culvert 1: 1200 mm dia. CSP culvert;
- Proposed Culvert 2: 400 mm dia. CSP culvert; and
- Proposed Culvert 3: 1350 mm dia. CSP culvert.

The proposed culverts have been sized to convey the peak flows generated on-site plus the conveyance capacity of the existing culverts upstream. Proposed Culvert 1 has been designed to convey the flows of Existing Culvert 1, whereas Proposed Culvert 3 will convey the flows from Existing Culverts 2 and 3. Proposed Culvert 2 will serve a localized area due to the prevailing topography.

The 1:100-year return frequency design storm peak flows generated on-site have been established using the rational method and climate data for Parry Sound. The conveyance capacity of each culvert was determined from MTO Design Chart 2.32 (MTO Drainage Management Manual, 1997). A summary of the capacities is provided in Table 2; the rational method and proposed culvert capacity sizing calculations are provided in Appendix B for reference.

As shown in Table 2, the proposed culverts are designed to convey the total peak flows. As such, no adverse drainage impacts are expected as a result of the proposed development.

Table 2: Proposed Culvert Conveyance Capacity

CULVERT	EXISTING CULVERT CAPACITY[1] (m^3/s)	1:100-YEAR PEAK FLOW[2] (m^3/s)	TOTALPEAK FLOW (m^3/s)	CONVEYANCE CAPACITY (m^3/s)
Proposed Culvert 1	2.50	0.42	2.92	3.00
Proposed Culvert 2	-	0.07	0.07	0.28
Proposed Culvert 3	3.00	0.21	3.21	5.00

[1] Existing culvert capacity of the upstream culvert(s)
[2] Additional peak flow generated upstream of the proposed culvert crossings

3.3 DRAINAGE SWALES

To collect and direct drainage from the access road and external sources to the proposed culverts (and ultimately to Anderson (Mud) Lake), drainage swales are proposed on the west and north side of the access road.

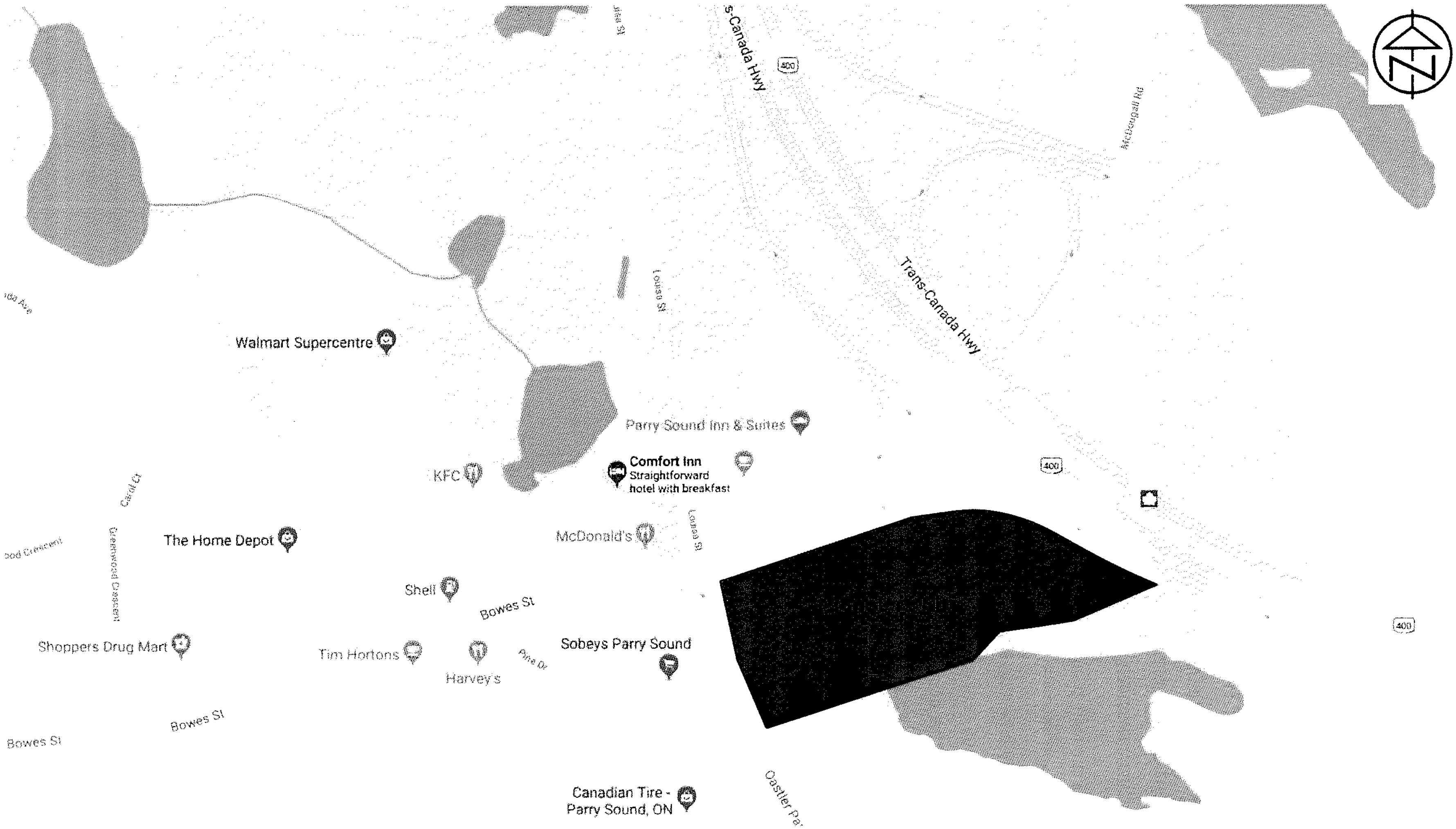
To provide erosion protection, it is recommended that the drainage swales be lined with 150 to 300 mm rip-rap. The rip rap sizing calculations are provided in Appendix C for reference.

4 Summary

The subject site, located at the southwest corner of Highway 400 and Bowes Street, is the outlet for three existing culverts under Bowes Street and the Highway 400 southbound ramp. Flow from the culverts drains across the subject property to Anderson (Mud) Lake which divides the subject property into two halves.

The current proposal for the site is to construct an access road across Anderson (Mud) Lake to connect the two halves of the property to facilitate future development of the site. The access road will be constructed between the existing culverts and Anderson (Mud) Lake. Three culvert crossings under the access road are proposed to convey the external flows and on-site drainage across the access road to Anderson (Mud) Lake to mitigate any potential impact the proposed access road will have on local drainage. Drainage swales will be constructed beside the access road to collect and convey the external drainage and drainage from the access road to the proposed culverts.

The proposed culverts have been sized to convey the external drainage and drainage from the access road downstream to Anderson (Mud) Lake. The proposed culverts have been sized to convey the peak flows generated on-site plus the conveyance capacity of the existing culverts upstream. As such, no adverse drainage impacts are expected as a result of the proposed development.



source: maps.google.ca

BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 1: Site Location

Appendix A:
Existing Conveyance Calculations

TATHAM ENGINEERING	Project:	Highway 400 & Bowes Street	Date:	7/18/2019
	File No.:	118158	Designed By:	ASB
	Subject:	Existing Culvert 1 Capacity	Checked By:	DRT

Material = CSP

Diameter = 0.9 m

Head = 3.5 m
(Based on contours generated using SCOOP GIS data)

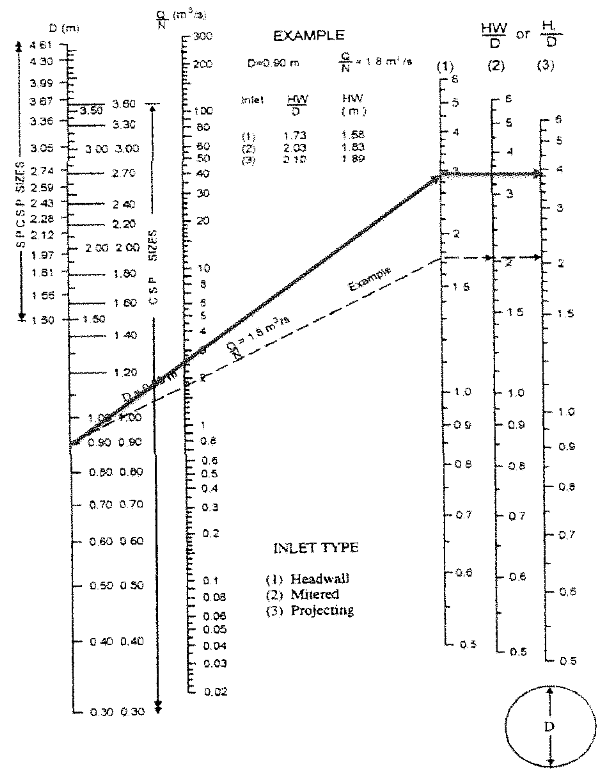
H/D = 3.9

Barrels = 1

Inlet Type = Projecting

Q = 2.5 m^3/s

DESIGN CHART 2.32



Source: Herr (1977)

TATHAM ENGINEERING				
	Project:	Highway 400 & Bowes Street	Date:	7/18/2019
	File No.:	118158	Designed By:	ASB
	Subject:	Existing Culvert 2 Capacity	Checked By:	DRT

Material = Concrete

Diameter = 0.3 m

Head = 1.5 m
(Based on contours generated using SCOOP GIS data)

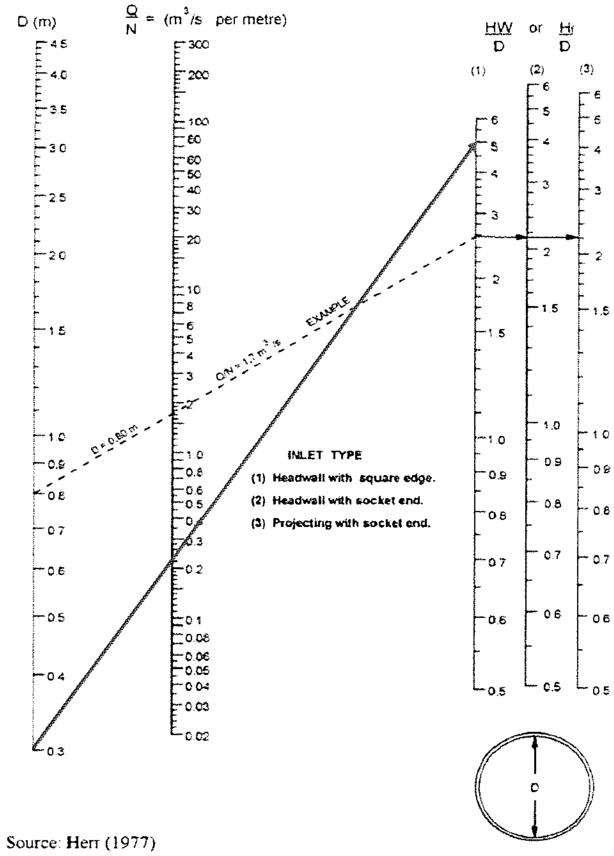
H/D = 5

Barrels = 1

Inlet Type = Headwall with square edge

Q = 0.25 m³/s

DESIGN CHART 2.31



Source: Herr (1977)

TATHAM ENGINEERING	Project:	Highway 400 & Bowes Street	Date:	11/25/2019
	File No.:	118158	Designed By:	ASB
	Subject:	Existing Culvert 2 Capacity	Checked By:	DRT

Check:

Assuming Single CB

Head = 1.5 m
(Based on contours generated using SCOOP GIS data)

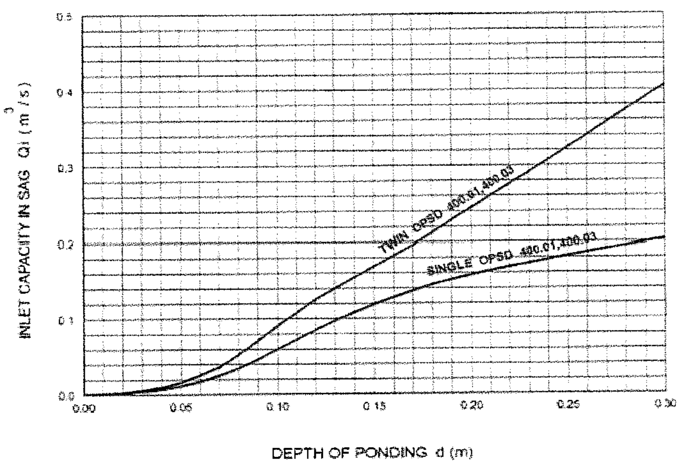
Q = 0.68 m³/s
(Extraploted from Design Chart 4.19)

LINEAR EXTRAPOLATION

$x_1 = 0.20$	$x_2 = 0.30$	$x_3 = 1.50$
$y_1 = 0.16$	$y_2 = 0.2$	$y_3 = 0.68$

Limiting Capacity = 0.25 m³/s
(Pipe capacity)

DESIGN CHART 4.19



TATHAM ENGINEERING	Project: Highway 400 & Bowes Street	Date: 7/18/2019
	File No.: 118158	Designed By: ASB
	Subject: Existing Culvert 3 Capacity	Checked By: DRT

Material = Concrete

Diameter = 1.2 m

Head = 1.5 m
(Based on contours generated using SCOOP GIS data)

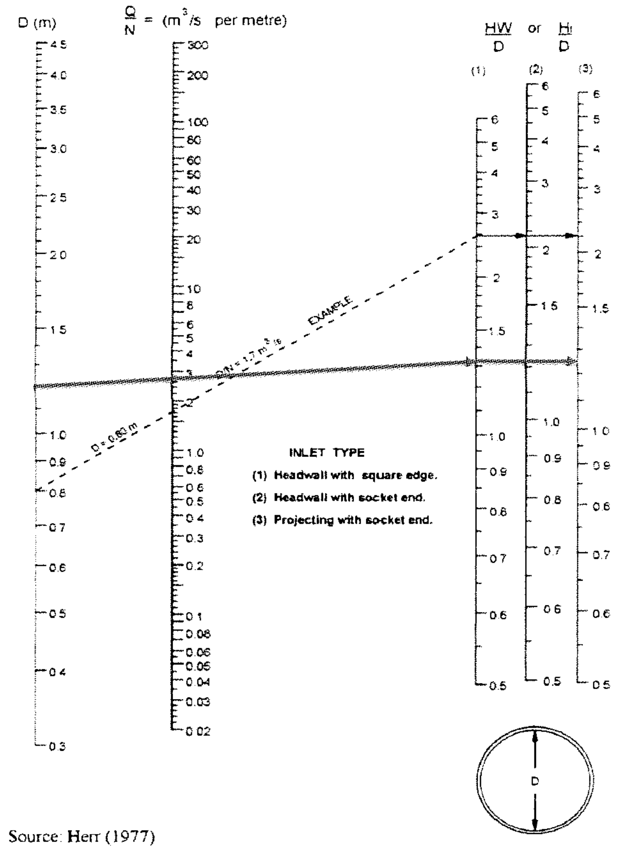
H/D = 1.25

Barrels = 1

Inlet Type = Projecting

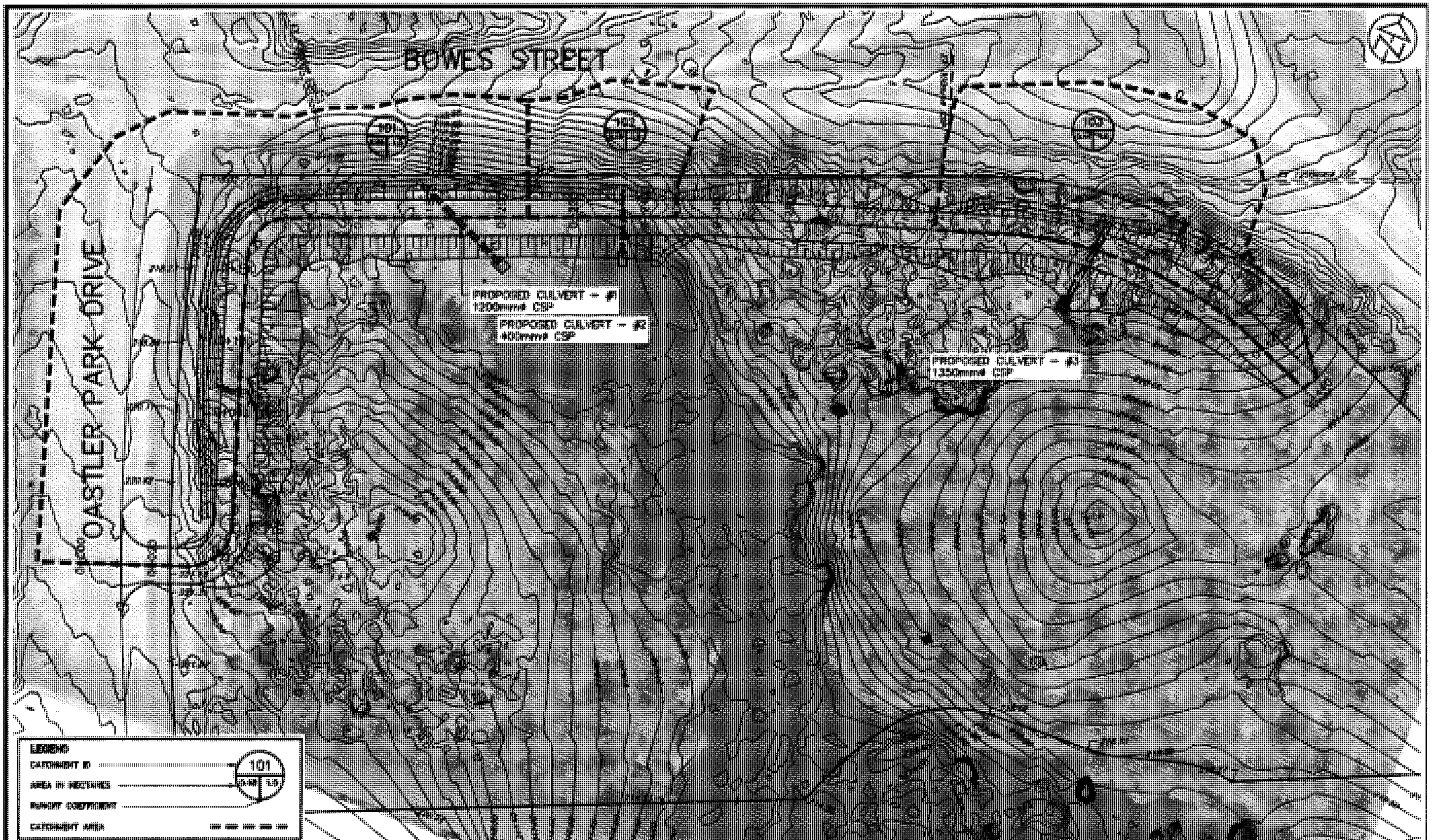
Q = 2.75 m^3/s

DESIGN CHART 2.31



Source: Herr (1977)

Appendix B:
Proposed Conveyance Calculations



CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

TATHAM
ENGINEERING

HWY 400 & BOWES, PARRY SOUND
PROPOSED ACCESS ROAD
DRAINAGE PLAN

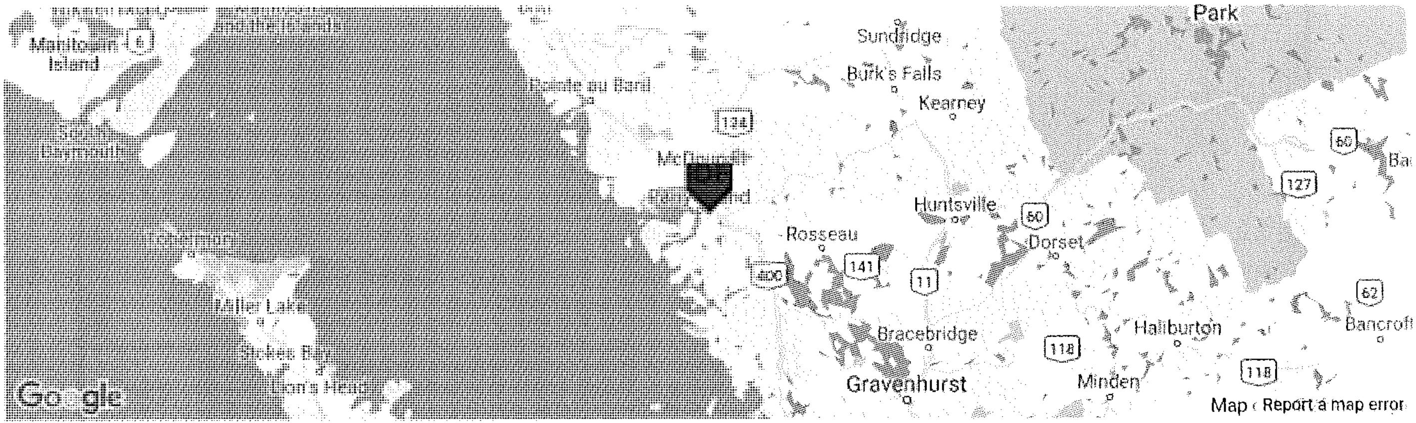
SCALE: 1:500	DRAWN: DEP	DATE: AUG./19	JOB NO. 118158

DWG. No.
DP-1

Active coordinate

45° 20' 45" N, 80° 0' 14" W (45.345833,-80.004167)

Retrieved: Thu, 18 Jul 2019 18:20:11 GMT



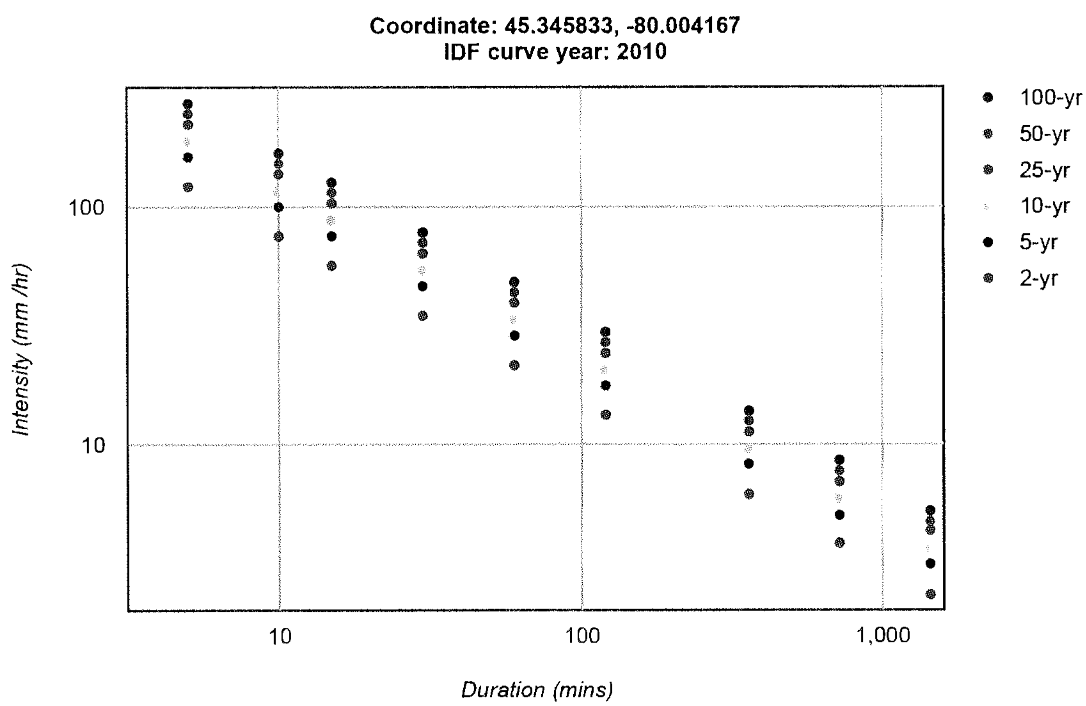
Location summary

These are the locations in the selection.

IDF Curve: 45° 20' 45" N, 80° 0' 14" W (45.345833,-80.004167)

Results

An IDF curve was found.



Coefficient summary

IDF Curve: 45° 20' 45" N, 80° 0' 14" W (45.345833,-80.004167)

Retrieved: Thu, 18 Jul 2019 18:20:11 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	21.4	28.6	33.3	39.2	43.6	48.0
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	121.6	74.9	56.4	34.7	21.4	13.2	6.1	3.8	2.3
5-yr	162.4	100.1	75.4	46.4	28.6	17.6	8.2	5.0	3.1
10-yr	189.1	116.5	87.8	54.1	33.3	20.5	9.5	5.9	3.6
25-yr	222.7	137.2	103.3	63.6	39.2	24.1	11.2	6.9	4.3
50-yr	247.6	152.6	114.9	70.8	43.6	26.9	12.5	7.7	4.7
100-yr	272.6	167.9	126.5	77.9	48.0	29.6	13.7	8.5	5.2

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	10.1	12.5	14.1	17.4	21.4	26.4	36.7	45.2	55.7
5-yr	13.5	16.7	18.8	23.2	28.6	35.2	49.0	60.4	74.4
10-yr	15.8	19.4	21.9	27.0	33.3	41.0	57.1	70.4	86.7
25-yr	18.6	22.9	25.8	31.8	39.2	48.3	67.2	82.8	102.0
50-yr	20.6	25.4	28.7	35.4	43.6	53.7	74.8	92.1	113.5
100-yr	22.7	28.0	31.6	39.0	48.0	59.1	82.3	101.4	124.9

Terms of Use

TATHAM ENGINEERING

Project:	Hwy 400 & Bowes St	**Prepared By:**	ASB
File No.:	118158	**Reviewed By:**	DRT
Revision:	1	**Date:**	18-Jul-19
Description:	Rational Method Calculation		

Municipality: Parry Sound

AREA 101 (U/S of Proposed Culvert 1)

Runoff Coefficient (Municipal Standard)

100 Year 1.00 (Assuming full-build out)

Peak Rainfall Intensity Parry Sound

	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
A	21.4	28.6	33.3	39.2	43.6	48.0
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

2 Year	74.88	mm/hr	T_C =	10
5 Year	100.07	mm/hr	T_C =	10
10 Year	116.51	mm/hr	T_C =	10
25 Year	137.16	mm/hr	T_C =	10
50 Year	152.55	mm/hr	T_C =	10
100 Year	167.95	mm/hr	T_C =	10

Peak Runoff Rate - Rational Method (Q=CiA/360)

Drainage Area 0.890 ha

2 Year	0.19	m^3/s
5 Year	0.25	m^3/s
10 Year	0.29	m^3/s
25 Year	0.34	m^3/s
50 Year	0.38	m^3/s
100 Year	0.42	m^3/s

AREA 102 (U/S of Proposed Culvert 2)

Runoff Coefficient (Municipal Standard)

100 Year 1.00 (Assuming full-build out)

Peak Rainfall Intensity Parry Sound

	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
A	21.4	28.6	33.3	39.2	43.6	48.0
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

2 Year	74.88	mm/hr	T_C =	10
5 Year	100.07	mm/hr	T_C =	10
10 Year	116.51	mm/hr	T_C =	10
25 Year	137.16	mm/hr	T_C =	10
50 Year	152.55	mm/hr	T_C =	10
100 Year	167.95	mm/hr	T_C =	10

Peak Runoff Rate - Rational Method (Q=CiA/360)

Drainage Area 0.160 ha

2 Year	0.03	m^3/s
5 Year	0.04	m^3/s
10 Year	0.05	m^3/s
25 Year	0.06	m^3/s
50 Year	0.07	m^3/s
100 Year	0.07	m^3/s

TATHAM ENGINEERING

Project:	Hwy 400 & Bowes St	**Prepared By:**	ASB
File No.:	118158	**Reviewed By:**	DRT
Revision:	1	**Date:**	18-Jul-19
Description:	Rational Method Calculation		

Municipality: Parry Sound

AREA 103 (U/S of Proposed Culvert 3)

Runoff Coefficient (Municipal Standard)

100 Year 1.00 (Assuming full-build out)

Peak Rainfall Intensity Parry Sound

	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
A	21.4	28.6	33.3	39.2	43.6	48.0
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

2 Year	74.88	mm/hr	T_C =	10
5 Year	100.07	mm/hr	T_C =	10
10 Year	116.51	mm/hr	T_C =	10
25 Year	137.16	mm/hr	T_C =	10
50 Year	152.55	mm/hr	T_C =	10
100 Year	167.95	mm/hr	T_C =	10

Peak Runoff Rate - Rational Method (Q=CiA/360)

Drainage Area 0.440 ha

2 Year	0.09	m^3/s
5 Year	0.12	m^3/s
10 Year	0.14	m^3/s
25 Year	0.17	m^3/s
50 Year	0.19	m^3/s
100 Year	0.21	m^3/s

TATHAM ENGINEERING	Project:	Highway 400 & Bowes Street	Date:	8/8/2019
	File No.:	118158	Designed By:	ASB
	Subject:	Proposed Culvert 1 Capacity	Checked By:	DRT

Material = CSP

Diameter = 1200 mm

Head = 1.89 m

H/D = 1.575

Barrels = 1

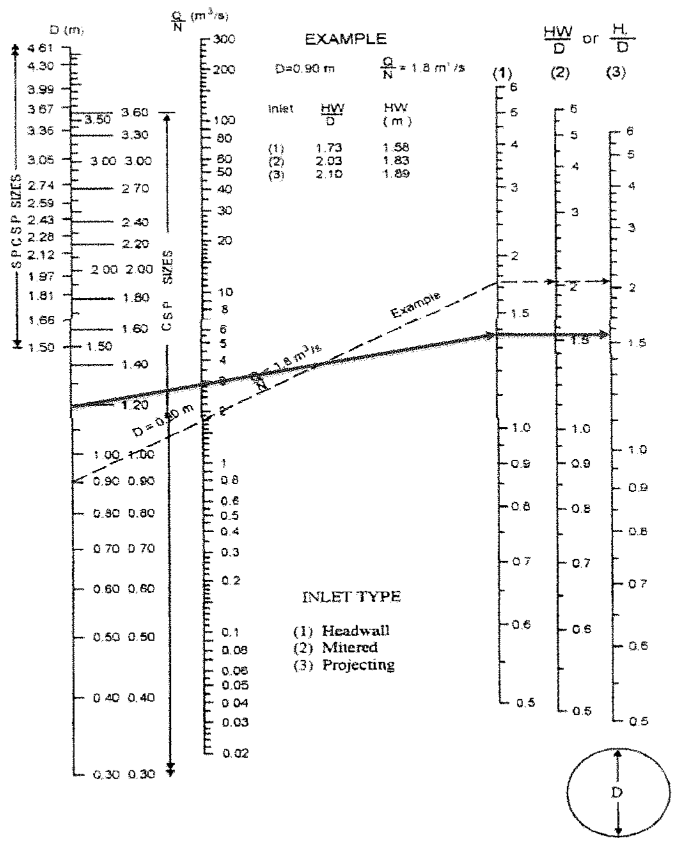
Design Inlet Elevation = 213.60m

Inlet Type = Projecting

Q/N = 3.5

Q = 3.5 m^3/s

DESIGN CHART 2.32



TATHAM ENGINEERING				
	Project:	Highway 400 & Bowes Street	Date:	8/8/2019
	File No.:	118158	Designed By:	ASB
	Subject:	Proposed Culvert 2 Capacity	Checked By:	DRT

Material = CSP

Diameter = 0.40 m

Head = 1.09 m

H/D = 2.73

Barrels = 1

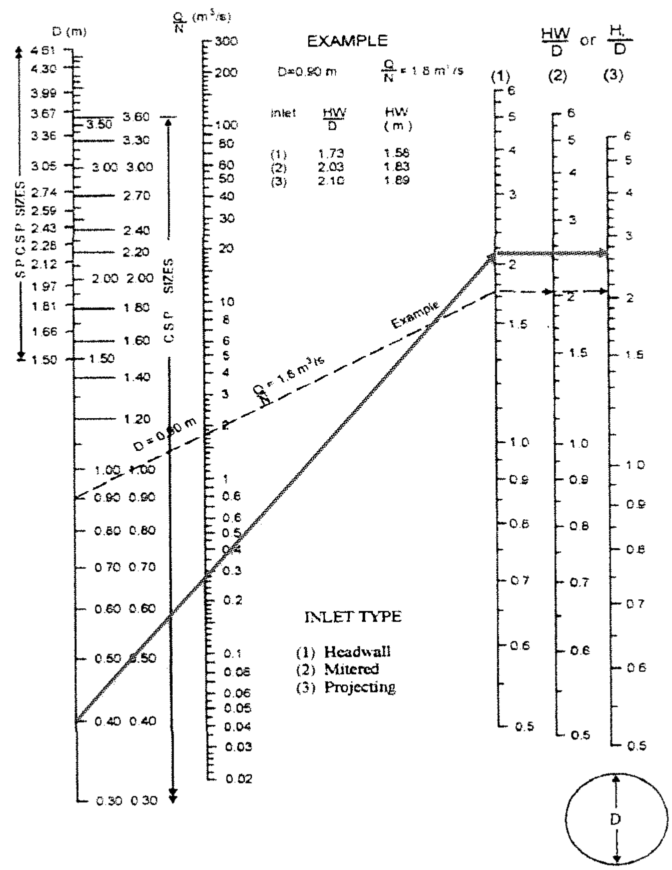
Design Inlet Elevation = 214.40m

Inlet Type = Projecting

Q/N = 0.28

Q = 0.28 m^3/s

DESIGN CHART 2.32



TATHAM ENGINEERING	Project:	Highway 400 & Bowes Street	Date:	8/8/2019
	File No.:	118158	Designed By:	ASB
	Subject:	Proposed Culvert 3 Capacity	Checked By:	DRT

Material = CSP

Diameter = 1.35 m

Head = 2.2 m

H/D = 1.63

Barrels = 1

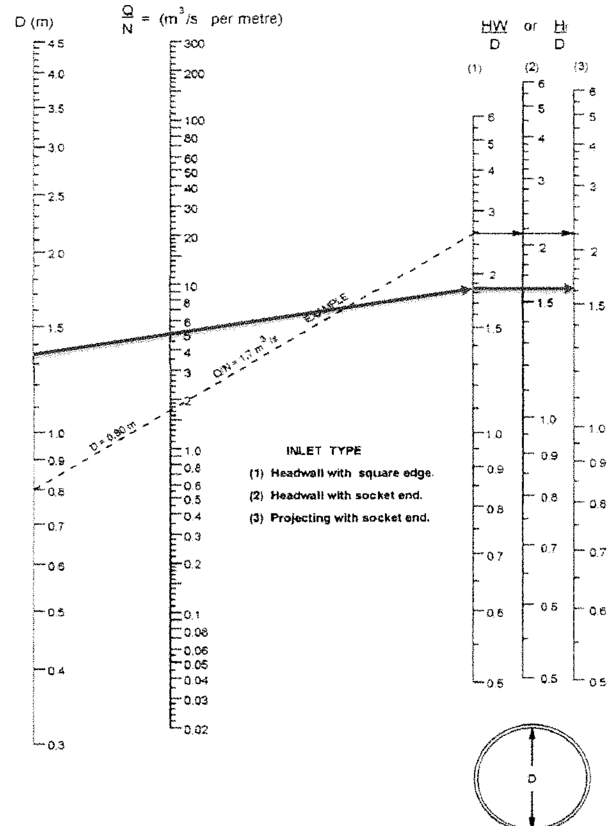
Design Inlet Elevation = 217.00m

Inlet Type = Projecting

Q/N = 5

Q = 5 m³/s

DESIGN CHART 2.32



Source: Herr (1977)

Appendix C: Rip-Rap Calculations

TATHAM ENGINEERING

Project:	Hwy 400 & Bowes St	**Prepared By:**	ASB
File No.:	118158	**Reviewed By:**	DRT
Revision:	1	**Date:**	25-Nov-19
Description:	Rational Method Calculation for Rip Rap Sizing		

Municipality: Parry Sound

Rational Method

Runoff Coefficient (Municipal Standard)

100 Year 1.00 (Assuming full-build out)

Peak Rainfall Intensity Parry Sound

	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
A	21.4	28.6	33.3	39.2	43.6	48.0
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

2 Year	74.88	mm/hr	T_C =	10
5 Year	100.07	mm/hr	T_C =	10
10 Year	116.51	mm/hr	T_C =	10
25 Year	137.16	mm/hr	T_C =	10
50 Year	152.55	mm/hr	T_C =	10
100 Year	167.95	mm/hr	T_C =	10

Peak Runoff Rate - Rational Method (Q=CiA/360)

Drainage Area 0.810 ha *Pro-rated (91% of Catchment 101 - 0.89 ha)

2 Year	0.17	m^3/s
5 Year	0.23	m^3/s
10 Year	0.26	m^3/s
25 Year	0.31	m^3/s
50 Year	0.34	m^3/s
100 Year	0.38	m^3/s

Note: The drainage swale starting from Oastler Park Drive access to Proposed Culvert 1 has the highest drainage area and is expected to convey the highest flows. The Rational method was used to determine the 100-year peak flow for this section of the drainage swale. Subsequently, Manning's formula was used to calculate 100-year depth in the drainage swale in support of the rip rap sizing calculations.

Manning's Equation

Manning's n	0.035
Slope	0.038 m/m
Bottom Width	0 m
Side Slopes	3 :1
Slope Width	0.88 m
Area	0.26 m^2
Perimeter	1.84 m
Hydraulic Radius	0.14 m
100-year Peak Flow	**0.38** m^3/s

$$Q = \frac{1}{n} \cdot A \cdot R^{2/3} \cdot S^{1/2}$$

Depth	**0.29 m**

TATHAM ENGINEERING

PROJECT	Hwy 400 & Bowes Street	FILE	118158
		DATE	7/18/2019
SUBJECT	Rip Rap Sizing - US Army Corp of Engineers Manual EM 1110-2-1601	DESIGNED	ASB
		CHECKED	DRT

Required Rip Rap size, $D_{30} = S_f \times C_s \times C_v \times C_T \times d \times \{[y_w/(y_s - y_w)]^{1/2} \times [V/(Kgd)^{1/2}]\}^{2.5}$
(US Army Corp of Engineers, EM 1110-2-1601, Chapter 3: Rip Rap Protection, Eq. 3-3)

where:
- D_{30} = rip rap size of which 30% is finer by weight (m)
- S_f = factor of safety (unitless)
- C_s = stability coefficient for incipient failure (unitless)
- C_v = vertical velocity distribution coefficient (unitless)
- C_T = thickness coefficient (unitless)
- d = depth of flow (m)
- y_w = unit weight of water (kg/m^3)
- y_s = unit weight of rip rap (kg/m^3)
- V = depth -average velocity (m/s)
- K_{ss} = side slope correction factor (unitless)
- K_b = bed correction factor (unitless)
- g = gravitational constant (m/s^2)

where:		Value	Unit	Notes
	S_f =	1.10		
	C_s =	0.30		Angular Rock
	C_v =	1.16		7 m radius bend, 1.74 m depth
	C_T =	1.00		
	d =	0.29	m	
	y_w =	1000	kg/m^3	
	y_s =	2650	kg/m^3	
	V =	1.46	m/s	
	K_{ss} =	0.87		where: $K_{ss} = [1-(\sin\theta)^2/(\sin\Phi)^2]^{1/2}$
	K_b =	1.00		θ = angle of side slope = 18.4 °
	g =	9.81	m/s^2	ϕ = angle of repose = 40.0 °
therefore:	D_{30} =	49	mm	
	D_{50} =	62	mm	Required rip rap size on side slopes
	t =	92	mm	Minimum rip rap thickness on side slopes lesser of t or D_{100}
	D_{30} =	41	mm	
	D_{50} =	52	mm	Required rip rap size on channel bed
	t =	78	mm	Minimum rip rap thickness on channel bed lesser of t or D_{100}

TATHAM ENGINEERING

PROJECT	Hwy 400 & Bowes Street	FILE	118158
		DATE	7/18/2019
SUBJECT	Rip Rap Sizing - US DOT FHA	DESIGNED	ASB
	Hydraulic Engineering Circular No. 15	CHECKED	DRT

Required Channel Bottom Rip Rap Size, $D_{50B} \geq (S_f * d * s)/[F*(SG-1)]$

(US DOT FHA Hydraulic Engineering Circular No. 15, Chapter 6: Riprap, Cobble and Gravel Lining Design, Eq. 6.8)

where:
D_{50} = mean rip rap diameter (m)
S_f = factor of safety (unitless)
d = depth of flow (m)
s = channel slope (m/m)
F = Shield's parameter (unitless)
SG = specific gravity of rip rap (unitless)

Notes

where:
S_f = 1.11
d = 0.29 m
s = 0.038 m/m
SG 2.65
F = 0.069

D_{50B} = **107** mm — Required rip rap size on channel bottom
t_B = **161** mm — Minimum rip rap thickness on channel bottom lesser of t_B or D_{100}

Required Channel Side Slope Rip Rap Size, $D_{50SS} \geq (K_1/K_2)*D_{50B}$

where:
D_{50SS} = D_{50} required for a stable side slope (m)
K_1 = ratio of channel side to bottom shear stress (unitless)
K_2 = tractive force ratio (unitless)
D_{50B} = D50 required for a stable channel bottom (m)

Notes

where: K_1 = 0.87

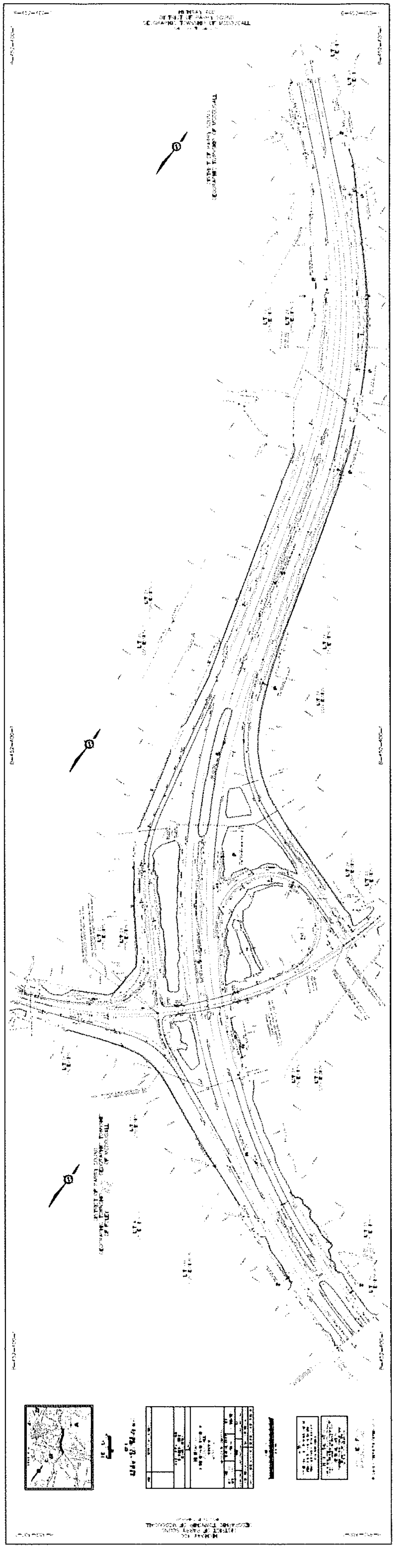
where: K_1 = 0.77, $Z \leq 1.5$
0.066*Z+0.67, $1.5 < Z < 5$
1.0, $Z \geq 5$

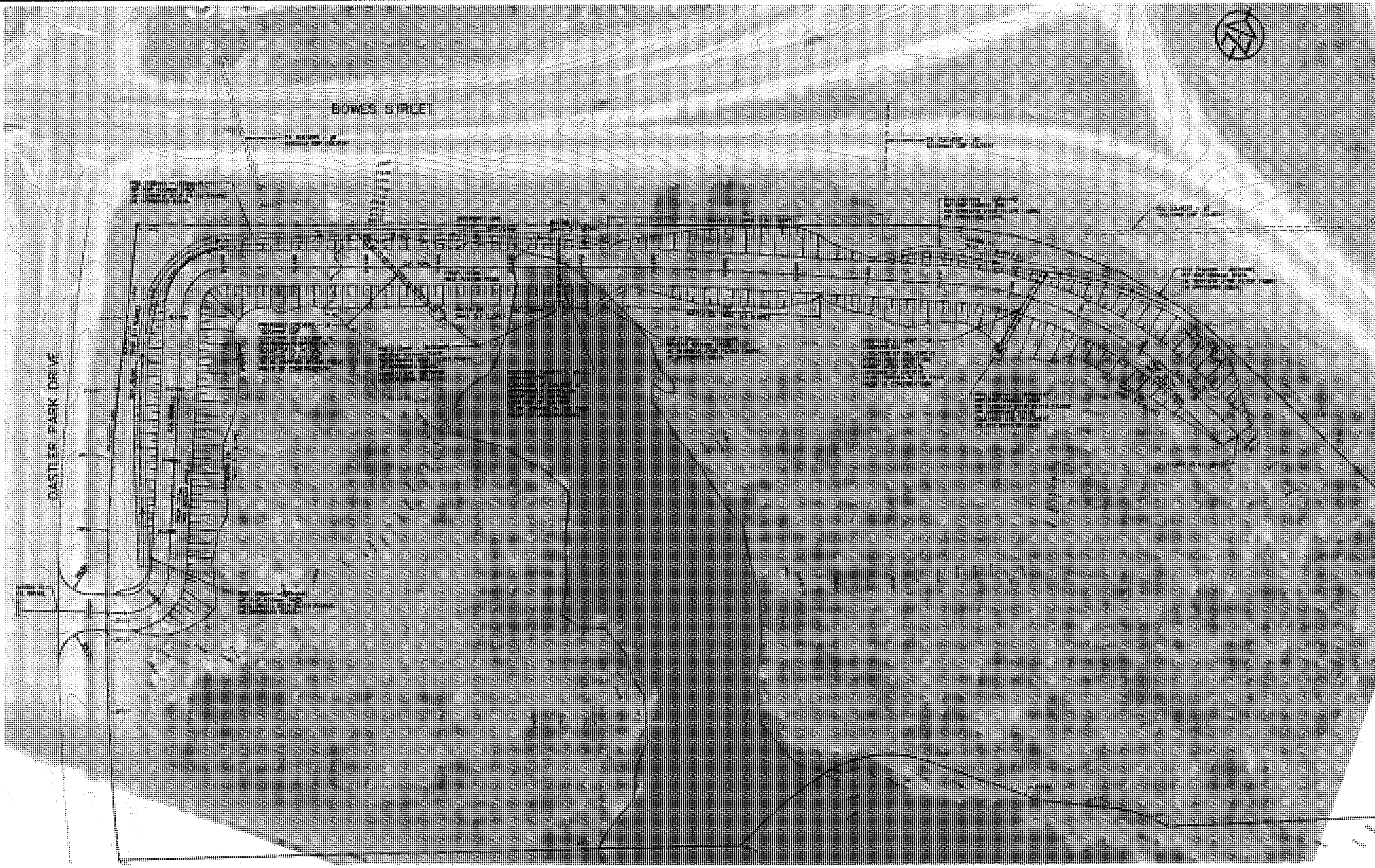
Z = horizontal dimension of side slope, 1:Z (V:H)
Z = 3

K_2 = 0.87

where: K_2 = $[1-(\sin\theta/\sin\Phi)^2]^{1/2}$
θ = angle of side slope = 18.4 °
ϕ = angle of repose = 40.0 °

D_{50SS} = **107** mm — Required rip rap size on channel side slope
t_{SS} = **161** mm — Minimum rip rap thickness on channel side slope lesser of t_{SS} or D_{100}





DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

Drawing Name: 118158_SD-1.dwg, Plotted: Nov 27, 2019

BENCHMARKS

NOTES

1. WATER LEVEL BASED ON AREIAL IMAGERY.
2. TOPOGRAPHIC DATA OBTAINED FROM THE SOUTHERN CENTRAL ONTARIO ORTHOPHOTOGRAPHY PROJECT (SCOOP) 2013 DIGITAL SURFACE MODEL AND DIGITAL TERRAIN MODEL (2 METRE RASTER ELEVATION DATA).
3. PRELIMINARY GRADING SUBJECT TO CHANGE BASED ON FUTURE TOPOGRAPHIC SURVEY.
4. GEOTECHNICAL SURVEY REQUIRED TO DETERMINE SUBSURFACE CONDITIONS ON SITE.

No.	REVISION DESCRIPTION	DATE
1.	MTO/DFO FIRST SUBMISSION	NOV./19

ENGINEER STAMP

Nov. 27, 2019

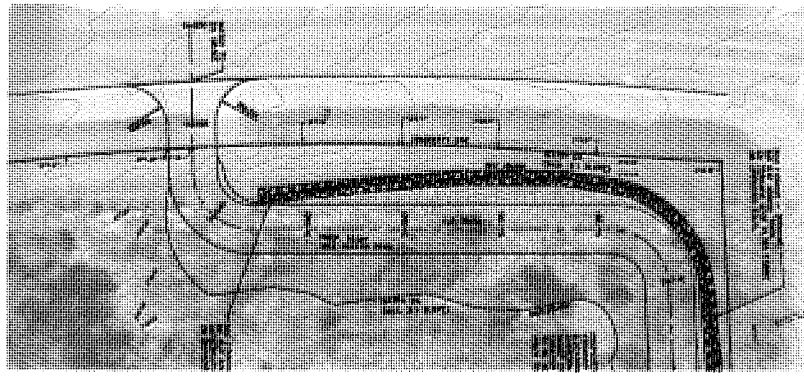
HWY 400 & BOWES
PARRY SOUND

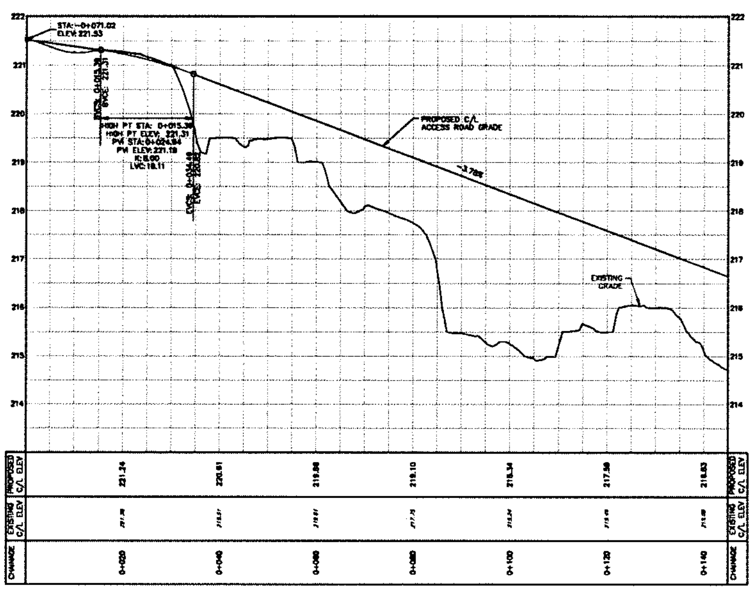
PROPOSED ACCESS
ROAD PLAN

TATHAM ENGINEERING

DESIGN: AOR	FILE: 118158	DWG: PD-1
DRAWN: DEP	DATE: MAR 2019	
CHECK: DRT	SCALE: 1:500	

OASTLER PARK DRIVE





DISCLAIMER AND COPYRIGHT

BENCHMARKS

NOTES

1. WATER LEVEL BASED ON AREAL IMAGERY.
2. TOPOGRAPHIC DATA OBTAINED FROM THE SOUTHERN CENTRAL ONTARIO ORTHOPHOTOGRAPHY PROJECT (SCOOP) 2013 DIGITAL SURFACE MODEL AND DIGITAL TERRAIN MODEL (2 METRE RASTER ELEVATION DATA).
3. PRELIMINARY GRADING SUBJECT TO CHANGE BASED ON FUTURE TOPOGRAPHIC SURVEY.
4. GEOTECHNICAL SURVEY REQUIRED TO DETERMINE SUBSURFACE CONDITIONS ON SITE.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

HWY 400 & BOWES
PARRY SOUND

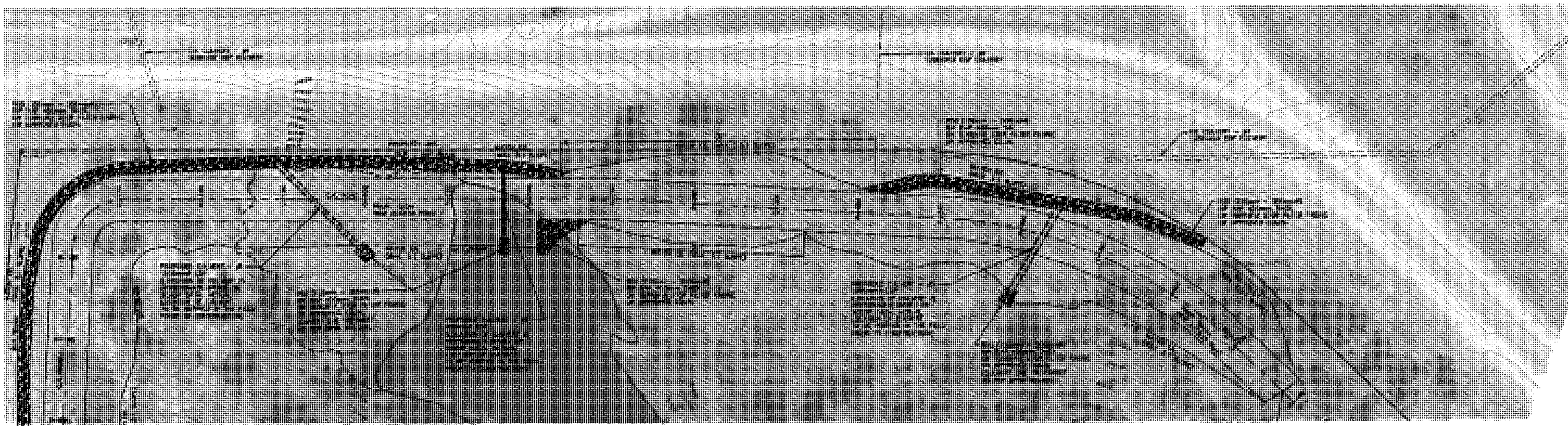
PLAN & PROFILE
PROPOSED ACCESS ROAD

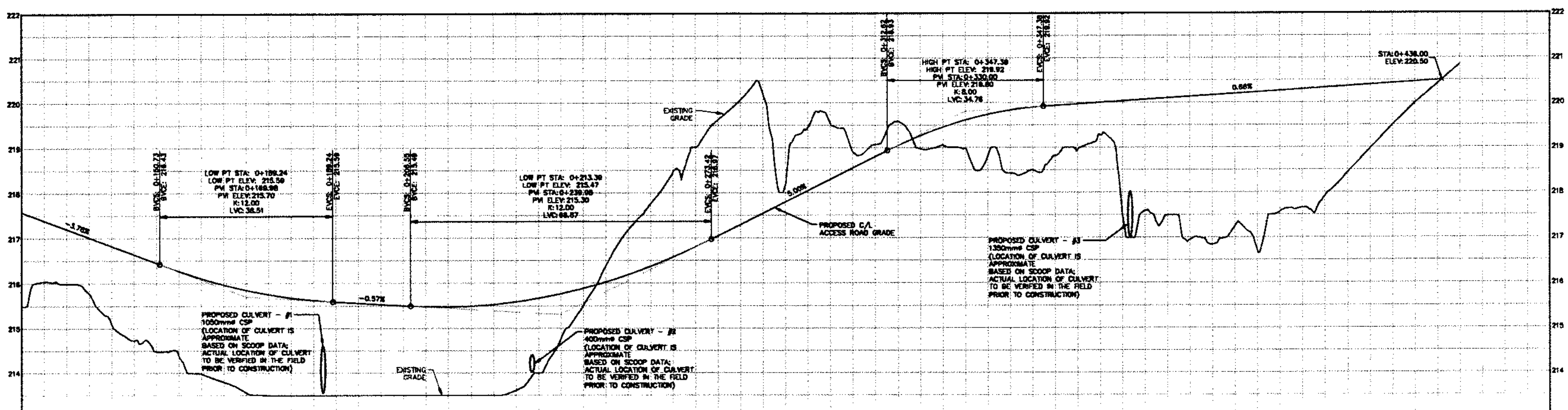
TATHAM ENGINEERING

DESIGN: ADR	FILE: 118158	DWG: **PP-1**
DRAWN: DEP	DATE: MAR 2019	
CHECK: DRT	SCALE: HORIZ. 1:500 VERT. 1:50	

Drawing Name: 118158_PP-1.dwg, Plotted: Dec 03, 2019

BOWES STREET





CHAINAGE	PROPOSED C/L ELEV	EXISTING C/L ELEV
0+140	216.53	[illegible]
0+160	216.11	[illegible]
0+180	215.80	[illegible]
0+200	215.53	[illegible]
0+220	215.49	[illegible]
0+240	215.77	[illegible]
0+260	216.38	[illegible]
0+280	217.30	[illegible]
0+300	218.30	[illegible]
0+320	219.27	[illegible]
0+340	219.83	[illegible]
0+360	220.00	[illegible]
0+380	220.13	[illegible]
0+400	220.28	[illegible]
0+420	220.38	[illegible]
0+440		

BENCHMARKS

NOTES

1. WATER LEVEL BASED ON AREIAL IMAGERY.
2. TOPOGRAPHIC DATA OBTAINED FROM THE SOUTHERN CENTRAL ONTARIO ORTHOPHOTOGRAPHY PROJECT (SCOOP) 2013 DIGITAL SURFACE MODEL AND DIGITAL TERRAIN MODEL (2 METRE RASTER ELEVATION DATA).
3. PRELIMINARY GRADING SUBJECT TO CHANGE BASED ON FUTURE TOPOGRAPHIC SURVEY.
4. GEOTECHNICAL SURVEY REQUIRED TO DETERMINE SUBSURFACE CONDITIONS ON SITE.

No.	REVISION DESCRIPTION	DATE

ENGINEER STAMP

Nov 27, 2019

HWY 400 & BOWES
PARRY SOUND

PLAN & PROFILE
PROPOSED ACCESS ROAD

TATHAM ENGINEERING

DESIGN: AOR	FILE: 118158	DWG: PP-2
DRAWN: DEP	DATE: MAR 2019	
CHECK: DRT	SCALE: HORIZ. 1:500 VERT. 1:50	

Drawing Name: 118158_PP-1.dwg, Plotted: Dec 02, 2019

TATHAM
ENGINEERING

Enhancing our communities

Highway 400 & Bowes Street

TRAFFIC IMPACT STUDY

Waltmar Inc.

File 118158 | July 17, 2019

Document Control

File:	Prepared by:	Prepared for:
118158	**Tatham Engineering Limited** 115 Sandford Fleming Drive, Suite 200 Collingwood, Ontario L9Y 5A6 **T** 705-444-2565 **tathameng.com**	**Waltmar Inc.** 7101 Syntex Drive Mississauga, Ontario L5N 6H5
Date: July 17, 2019		

Authored by:	Reviewed by:
	LICENSED PROFESSIONAL ENGINEER M. J. CULLIP 90512237 July 17/19 PROVINCE OF ONTARIO
Jacob Losole, B.Eng., EIT Intern Engineer	Michael Cullip, P.Eng. Vice President Head Office Operations

Disclaimer	Copyright
The information contained in this document is solely for the use of the Client identified on the cover sheet for the purpose for which it has been prepared and Tatham Engineering Limited undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.	This document may not be used for any purpose other than that provided in the contract between the Owner/Client and the Engineer nor may any section or element of this document be removed, reproduced, electronically stored or transmitted in any form without the express written consent of Tatham Engineering Limited.

Issue	Date	Description
1	July 17, 2019	Final report

Document Contents

Tables

Figures

Appendices

1 Introduction

Tatham Engineering Limited (Tatham) was retained by Waltmar Inc. to address the traffic impacts associated with the proposed commercial/hotel/residential development to be located at the southwest corner of Bowes Street and Highway 400 in the Town of Parry Sound. The location of the development site is illustrated in Figure 1.

The purpose of this study is to address the requirements of the Town of Parry Sound and MTO with respect to the potential transportation impacts of the development on the area road network. In particular, the following will be discussed:

- the operations of the road system through the study area prior to the proposed development;
- an estimation of the growth in the traffic volumes not otherwise attributed to the development (i.e. from overall growth in the area and/or other developments);
- an estimation of the number of new trips the proposed development is likely to generate;
- the operations of the study area road system upon completion of the development; and
- the resulting impacts and need for mitigating measures (if required) to ensure acceptable overall road operations.

Chapter 2 of this report addresses the existing conditions, detailing the road system and corresponding traffic operations. Chapter 3 addresses future conditions, prior to the completion of the proposed development, and will address the expected growth in the traffic levels and the resulting operating conditions. Chapters 4 and 5 address the proposed development, the ensuing vehicle trips that it will generate, and the associated impacts on the road system. Lastly, Chapter 6 summarizes the report and the key findings.

2 Existing Conditions

This chapter will describe the road network, traffic volumes and operations for the existing conditions.

2.1 ROAD NETWORK

The road network to be addressed by this study consists of Bowes Street, Pine Drive, Oastler Park Drive, Louisa Street, McDougall Road, Highway 400 and the following intersections:

- Bowes Street with Pine Drive;
- Bowes Street with Oastler Park Drive/Louisa Street;
- Bowes Street with Highway 400 (southbound ramp);
- McDougall Road with Highway 400 (northbound ramp); and
- Oastler Park Drive with Commercial Access.

Photographs of the road system are provided in Figure 2.

2.1.1 Road Sections

Bowes Street

Bowes Street is an arterial road under the jurisdiction of the Town of Parry Sound. The road is oriented east-west through the study area and has a posted speed limit of 50 km/h and thus a design speed of 60 km/h has been assumed (posted speed limit + 10 km/h on lower speed roads). West of Pine Drive, Bowes Street has a 5-lane urban (i.e. curb and gutter) cross section, providing two lanes of travel per direction with a continuous two-way left turn lane and sidewalks on both sides of the road. East of Pine Drive, Bowes Street provides two lanes of travel per direction and sidewalks on the north side of the road. Bowes Street transitions to Highway 400 under the jurisdiction of MTO, slightly east of Oastler Park Drive. As an arterial road, Bowes Street has an assumed planning capacity in the order of 700 to 800 vehicles per hour per lane (vphpl). With two travel lanes per direction, the directional capacity of the road is therefore 1,400 to 1,600 vehicles per hour.

Pine Drive

As per the *Official Plan for the Town of Parry Sound*[1], Pine Drive is classified as a local road. South of Bowes Street, the road has a 2-lane urban cross-section providing one lane of travel per direction (not including exclusive turn lanes) transitioning to a 4-lane urban cross-section north of Bowes Street. A sidewalk exists on the east side of the road. North of Bowes Street, Pine Drive provides access to the Walmart Supercentre whereas south of Bowes Street, Pine Drive provides access to the Canadian Tire and Sobeys commercial plaza. The unposted (assumed) speed limit is 50 km/h and thus a design speed of 60 km/h would apply. As a local road, Pine Drive has an assumed planning capacity in the order of 400 to 600 vphpl.

Oastler Park Drive

Oastler Park Drive is designated as a collector road in the Town's *Official Plan.* The road is oriented north-south and has a 2-lane rural cross section (i.e. gravel shoulders and open ditches) providing one lane of travel per direction (not including exclusive turn lanes). The posted speed limit is 50 km/h and thus a design speed of 60 km/h has been assumed. As a collector road, Oastler Park Drive has an assumed planning capacity of 600 vphpl.

Lousia Street

Lousia Street is a collector road under the jurisdiction of the Town of Parry Sound. The road is oriented north-south and has a 2-lane rural cross section (i.e. gravel shoulders and open ditches) providing one lane of travel per direction (not including exclusive turn lanes). The posted speed limit is 50 km/h and thus a design speed of 60 km/h has been assumed. As a collector road, Louisa has an assumed planning capacity of 600 vphpl.

McDougall Road

McDougall Road is a year round maintained road under the jurisdiction of the Municipality of McDougall. The road has a 2-lane rural cross section (i.e. gravel shoulders and open ditches) providing one lane of travel per direction. The posted speed limit is 50 km/h and thus a design speed of 60 km/h has been assumed. The function of McDougall Road is consistent with that of a collector road, as such, a theoretical planning capacity of 600 vehicles per hour per lane (vphpl) has been assumed.

---

[1] *Official Plan for The Town of Parry Sound.* Planscape Inc., Approved April 29th, 2014.

2.1.2 Key Intersections

Bowes Street with Pine Drive

The intersection of Bowes Street with Industrial Pine Drive is a 4-leg signalized intersection. The east and west approaches (Bowes Street) each consist of an exclusive left turn lane, exclusive through lane and a shared through/right lane. The south approach (Pine Drive) provides an exclusive left turn lane, exclusive through lane and a shared through/right lane, whereas the north approach (Pine Drive) provides an exclusive left turn lane and a shared through/right turn lane.

Bowes Street with Oastler Park Drive/Louisa Street

The intersection of Bowes Street with Oastler Park Drive/Louisa Street is a 4-leg signalized intersection. The north and south approaches (Louisa Street and Oastler Park Drive) consist of exclusive left, through and right turn lanes. The west approach (Bowes Street) provides a shared through/left turn lane, an exclusive through lane and a channelized right turn lane. The east approach (Bowes Street) provides a shared through/left turn lane and shared through/right turn lane.

Oastler Park Drive with Commercial Access

The intersection of Oastler Park Drive with the commercial access point is a 3-leg, T-intersection with stop control on the minor approach (commercial access). The north approach has an exclusive right turn lane and an exclusive through lane, whereas the south approach has an exclusive left turn lane and an exclusive through lane. The commercial access (west approach) is a full-moves driveway providing two-lanes of travel.

Bowes Street & Highway 400 Ramps (SB)

The intersection of Bowes Street with the Highway 400 southbound ramps is a 4-leg intersection with stop control on the minor approach (Highway 400 SB off-ramp). The west approach (Bowes Street) provides a single through lane and a channelized right turn lane operating under yield control. The east approach (Bowes Street) provides an exclusive through lane and a shared left/through lane. The north approach (Highway 400 SB off-ramp) offers a single left/through turn lane and a channelized right turn lane with a receiving westbound taper lane. The south approach (Highway 400 SB on-ramp) provides a single receiving lane.

McDougall Road & Highway 400 Ramps (NB)

The intersection of McDougall Road with the Highway 400 northbound ramps is a 4-leg intersection with stop control on the minor approach (Highway 400 NB off-ramp). The west approach (McDougall Road) provides a single through lane and an exclusive left turn lane

(McDougall Road is referenced as east-west, such that Highway 400 remains north-south) . The east approach (McDougall Road) provides an exclusive through lane and right turn taper lane. The north approach (Highway 400 SB off-ramp) offers a single left turn lane and a channelized right turn lane with a second westbound receiving lane on Bowes Street (i.e. the ramp exit becomes the 2nd westbound lane).

2.2 EXISTING TRAFFIC VOLUMES

To determine existing traffic volumes, traffic counts were conducted at the intersections of Bowes Street with Pine Drive, Bowes Street with Louisa Street/Oastler Park Drive and Oastler Park Drive with the commercial access on Friday August 10, 2018 from 7:00 to 10:00 and 16:00 to 19:00 and Saturday August 11, 2018 from 11:00 to 14:00. For the intersections of the Highway 400 ramps with Bowes Street and McDougall Road, traffic counts were obtained from MTO, conducted on Tuesday August 29, 2017 from 7:00 to 9:00, 11:00 to 14:00 and 15:00 to 18:00. Additional counts were conducted on Saturday August 11, 2018 from 11:00 to 14:00.

In review of the conducted counts, the PM and Saturday peak hours were determined to be the most critical periods (such is not unexpected given the commercial nature of the surround lands) and have been chosen as the analysis periods for the study.

To reflect 2019 conditions traffic counts were increased by a growth rate of 2% (consistent with discussions in Section 3.2.1). Furthermore, to ensure consistency between the study area intersections, eastbound exiting and westbound entering volumes on the east leg of the Bowes Street with Louisa Street/Oastler Park intersection have been carried easterly and applied to the through volumes at the Highway 400 ramp intersections.

The corresponding traffic count details are provided in Appendix A, whereas the resulting weekday PM and Saturday peak hour volumes are illustrated in Figure 3.

2.3 EXISTING TRAFFIC OPERATIONS

2.3.1 Intersection Operations

The assessment of existing conditions provides the baseline from which the future traffic volumes and operations (both with and without the subject development) can be assessed. The capacity, and hence operations, of a road system is effectively dictated by its intersections. As such, the analysis focused on the operations of the noted key intersections. The analysis is based on the 2019 traffic volumes, the existing intersection configurations and controls (including optimization of traffic signal timings) and procedures outlined in the *2000 Highway Capacity Manual*[2] (using Synchro v.10 software). For a signalized intersection, the review considers the average delay

---

[2] *Highway Capacity Manual*. Transportation Research Board, Washington DC, 2000.

(measured in seconds), level of service (LOS) and volume to capacity (v/c) for each approach and the overall intersection. For an unsignalized intersection, the analysis considers the same metrics for the critical movements, namely the stop controlled movements on the minor approaches. A summary of the analysis is provided in Table 1. Level of service A corresponds to the best operating condition with minimal delays whereas level of service F corresponds to poor operations resulting from high intersection delays. A v/c ratio of less than 1.0 indicates the intersection movement/approach is operating at less than capacity while v/c of 1.0 indicates capacity has been reached. Detailed operations worksheets for the existing traffic conditions are included in Appendix B.

Table 1: Intersection Operations - 2019 Conditions

INTERSECTION & MOVEMENT		CONTROL	WEEKDAY PM PEAK HOUR			WEEKEND SAT PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Bowes Street & Pine Drive	EB	signal	20	B	0.71	18	B	0.53
	WB		19	B	0.62	20	C	0.70
	NB		12	B	0.34	12	B	0.41
	SB		14	B	0.47	13	B	0.49
	overall		17	B	0.56	17	B	0.57
Bowes Street & Oastler Park Drive/Louisa Street	EB	signal	12	B	0.65	11	B	0.60
	WB		14	B	0.70	14	B	0.76
	NB		9	A	0.26	11	B	0.33
	SB		8	A	0.17	10	A	0.22
	overall		12	B	0.53	12	B	0.63
Oastler Park Drive & Commercial Access	EB	stop	13	B	0.26	14	B	0.30
Bowes Street & 400 Highway (SB)	SB	stop	14	B	0.46	15	C	0.52
McDougall Road & 400 Highway (NB)	EB	stop	24	C	0.05	19	C	0.04

Based on the existing volumes and intersection configuration and control, the study area intersections provide good overall levels of service (LOS C or better) with average delays during peak hours. As such, no improvements are required to support the existing conditions.

2.3.2 Road Section Operations

As previously noted, the following lane capacities have been assumed for the adjacent road network (for the purpose of this study, and to ensure a conservative approach, the lower capacity threshold has been considered for those roads where a lane capacity range was provided):

- Bowes Street - 700 to 800 vphpl;
- Louisa Street - 600 vphpl; and
- Oastler Park Drive - 600 vphpl;

The existing road section operations are summarized in Table 2, reflective of the peak directional volumes during each of the noted peak hours. As indicated, the study area road network is operating at 64% of capacity or less (i.e. v/c $\leq$ 0.64), thus indicating that the network has excess reserve capacity. No improvements are recommended to address capacity under existing conditions.

Table 2: Road Section Operations - 2019 Conditions

ROAD & LANES PER DIRECTION		CAPACITY[1]		TRAFFIC VOLUMES		VOLUME TO CAPACITY	
		NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB
Bowes Street (W of Pine)	2	1,400	1,400	816	748	0.58	0.53
Bowes Street (between Pine & Oastler)	2	1,400	1,400	850	893	0.61	0.64
Bowes Street (E of Oastler)	2	1,400	1,400	798	854	0.57	0.61
Louisa Street	1	600	600	226	238	0.38	0.40
Oastler Park Drive	1	600	600	267	276	0.45	0.46

[1] Capacity is noted at vehicles per hour per direction.

3 Future Background Conditions

This chapter will describe the road network and background traffic volumes expected for the years 2023, 2028 and 2033. The 2023 horizon year has been adopted to reflect full build-out and operation of the proposed development whereas the 2028 and 2033 horizons will address the longer-term impacts (5 and 10 years beyond build-out).

3.1 ROAD NETWORK

It is noted that there are no improvements currently being considered by the Town or MTO for the study area road network, other than routine maintenance. As such, the road network as described in Section 2.1 has been maintained through the future horizons.

3.2 FUTURE BACKGROUND TRAFFIC VOLUMES

Background traffic volumes expected for the 2023, 2028 and 2033 horizon years have been determined based on the existing traffic volumes and historical and projected growth.

3.2.1 Background Growth

Historic Traffic Growth

Historic traffic volumes were obtained from MTO for the 2.4 km segment of Highway 400 encompassing the Bowes Street and McDougall Road ramps, within the study area. The Annual Average Daily Traffic (AADT) volumes on Highway 400 for the period of 2011 to 2016 show an average annual decrease of 0.1% whereas the Summer Average Daily Traffic (SADT) volumes show an average annual decrease of 0.8%.

Population Growth

Statistics Canada provides a 2016 census profile with information on population change between 2011 and 2016 for the Town Parry Sound. The profile indicates a population growth from 6,078 in 2011 to 6,321 in 2016 for Parry Sound, translating to an annual growth rate of 0.8%.

Although the Town's *Official Plan* does not provide any population data, it does provide the comment that there had been little population growth in the Town over the past several decades.

Overall Background Growth

In consideration of the historic traffic and population growth in the area and future growth projections for the Township, a background growth rate of 2% per annum has been applied to the traffic volumes on the road network. This is considered conservative given the relative static population growth and decreasing traffic growth along Highway 400. No background growth has been applied to the commercial accesses recognizing that ambient background growth is not anticipated to affect existing commercial developments.

3.2.2 Development Growth

Through discussion with Township, no other developments were identified in the immediate area that would otherwise significantly increase traffic volumes through the study area. While there may be developments in the area (or beyond the study area) that are unknown at this time, their traffic increases will be assumed accounted for in the noted growth rates.

3.2.3 Background Traffic Volumes

The resulting 2023, 2028 and 2033 background traffic volumes are illustrated in Figure 4 through Figure 6. The background volumes are based on the 2018 traffic volumes, adjusted to reflect an annual background growth rate of 2% per annum.

3.3 BACKGROUND TRAFFIC OPERATIONS

3.3.1 Intersection Operations

The study area intersections were again analyzed for each horizon year given the projected background volumes. The results are summarized in Table 3 through Table 5 (detailed worksheets are provided in Appendix C). The existing intersection configurations have been maintained in the analysis and the signal timings at the signalized intersections have been optimized to ensure efficient operations.

As indicated, the study area intersections will provide acceptable overall operations (LOS E or better) with average delays through the 2033 horizon given the projected total volumes and thus no further improvements are considered necessary.

Table 3: Intersection Operations – 2023 Background Conditions

INTERSECTION & MOVEMENT		CONTROL	WEEKDAY PM PEAK HOUR			WEEKEND SAT PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Bowes Street & Pine Drive	EB	signal	20	C	0.75	18	B	0.56
	WB		19	B	0.63	20	C	0.72
	NB		12	B	0.34	12	B	0.42
	SB		13	B	0.47	14	B	0.50
	overall		17	B	0.58	17	B	0.59
Bowes Street & Oastler Park Drive/Louisa Street	EB	signal	12	B	0.27	11	B	0.29
	WB		14	B	0.74	15	B	0.79
	NB		9	A	0.29	13	B	0.37
	SB		9	A	0.19	12	B	0.26
	overall		12	B	0.58	13	B	0.68
Oastler Park Drive & Commercial Access	EB	stop	14	B	0.27	14	B	0.31
Bowes Street & 400 Highway (SB)	SB	stop	13	B	0.37	17	C	0.58
McDougall Road & 400 Highway (NB)	EB	stop	26	D	0.07	21	C	0.05

Table 4: Intersection Operations – 2028 Background Conditions

INTERSECTION & MOVEMENT		CONTROL	WEEKDAY PM PEAK HOUR			WEEKEND SAT PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Bowes Street & Pine Drive	EB	signal	20	C	0.77	18	B	0.60
	WB		19	B	0.67	21	C	0.76
	NB		13	B	0.35	13	B	0.43
	SB		14	B	0.49	14	B	0.51
	overall		18	B	0.61	18	B	0.61
Bowes Street & Oastler Park Drive/Louisa Street	EB	signal	12	B	0.69	11	B	0.69
	WB		15	B	0.76	19	B	0.87
	NB		12	B	0.34	15	B	0.44
	SB		11	B	0.23	13	B	0.30
	overall		13	B	0.64	15	B	0.77
Oastler Park Drive & Commercial Access	EB	stop	14	B	0.29	15	B	0.32
Bowes Street & 400 Highway (SB)	SB	stop	14	B	0.43	21	C	0.67
McDougall Road & 400 Highway (NB)	EB	stop	32	D	0.09	24	C	0.07

Table 5: Intersection Operations - 2033 Background Conditions

INTERSECTION & MOVEMENT		CONTROL	WEEKDAY PM PEAK HOUR			WEEKEND SAT PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Bowes Street & Pine Drive	EB	signal	22	C	0.81	19	B	0.64
	WB		19	B	0.69	23	C	0.80
	NB		13	B	0.36	13	B	0.44
	SB		15	B	0.49	15	B	0.52
	overall		19	B	0.63	19	B	0.64
Bowes Street & Oastler Park Drive/Louisa Street	EB	signal	11	B	0.71	13	B	0.78
	WB		15	B	0.79	33	C	0.97
	NB		15	B	0.42	17	B	0.50
	SB		13	B	0.28	15	B	0.34
	overall		13	B	0.71	22	C	0.88
Oastler Park Drive & Commercial Access	EB	stop	15	C	0.31	16	C	0.34
Bowes Street & 400 Highway (SB)	SB	stop	16	C	0.50	28	D	0.78
McDougall Road & 400 Highway (NB)	EB	stop	40	E	0.12	28	D	0.09

3.3.2 Road Section Operations

The road section capacity operations have been reviewed for the 2033 horizon period (considered the critical horizon as volumes will be greatest) based on the projected background volumes and the existing road network. The results are summarized in Table 6.

As noted, the study area road network is expected to operate at 84% of capacity or less through the 2033 horizon period (i.e. v/c ≤ 0.84) under background conditions. Thus, no improvements are required to increase road section capacity given the projected background conditions.

Table 6: Road Section Operations – 2033 Background Conditions

ROAD & LANES PER DIRECTION		CAPACITY[1]		TRAFFIC VOLUMES		VOLUME TO CAPACITY	
		NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB
Bowes Street (W of Pine)	2	1,400	1,400	971	890	0.69	0.64
Bowes Street (between Pine & Oastler)	2	1,400	1,400	1121	1178	0.80	0.84
Bowes Street (E of Oastler)	2	1,400	1,400	1052	1126	0.75	0.80
Louisa Street	1	600	600	299	314	0.50	0.52
Oastler Park Drive	1	600	600	321	343	0.54	0.57

[1] Capacity is noted at vehicles per hour per direction.

4 Proposed Development

This section will provide additional details with respect to the proposed Bowes Street & Highway 400 development, including its location, the projected site generated traffic volumes and the assignment of such to the adjacent road network.

4.1 SITE LOCATION

The subject site is located at the southwest corner of Bowes Street and Highway 400 in the Town of Parry Sound (as per Figure 1). The site is bound by Oastler Park Drive to the west, Bowes Street and Highway 400 southbound ramp to the north and east and Anderson (Mud) Lake to the south.

4.2 PROPOSED LAND-USE

The proposed development is planned to include a retail/restaurant pad, a hotel and a condominium building.

The initial retail/restaurant pad is expected to be 2,323 m^2 (25,000 ft^2) with the potential for an additional 3,716 m^2 (40,000 ft^2) as part of a future phase. As such, consideration has been given to a total retail gross floor area of 6,039 m^2 (65,000 ft^2). Both the hotel and condominium buildings are expected to be 3716 m^2 (40,000 ft^2) consisting of 40 rooms and 90 units, respectively.

A site plan is provided in Figure 7. Timing for full build-out and operation is assumed to be 2023.

Currently, a retail dock company known as *Premium Dock & Marine Systems* occupies a northwest portion of the subject site. An existing gravel access on Oastler Park Drive, adjacent to the commercial access, provides seasonal access to the site. It is assumed that at the time of construction, the dock company will vacate the lands and the gravel access will be paved becoming a full-moves driveway. The paved driveway will form the 4th leg of the Oastler Park Drive/commercial access intersection.

4.3 SITE TRAFFIC

4.3.1 Trip Generation

The number of vehicle trips to be generated by the proposed development has been determined based on type of use, development size, and trip generation rates as per the *ITE Trip Generation*

Manual[3] *10th Edition*. Based on the proposed development, the proposed development, the following ITE land-uses have been considered:

- multi-family housing (mid-rise) (ITE code 221);
- hotel (ITE code 310);
- high turnover (sit-down) restaurant (ITE code 932); and
- shopping centre (ITE 820).

Given that unit sizes and specific uses have not yet been determined for the proposed retail/restaurant block a restaurant size of 464 m^2 (5,000 ft^2) has been assumed (the average size from compiled ITE data) while the remaining 5,574 m^2 (60,000 ft^2) has been assumed retail space.

The associated trip rates and trip estimates are provided in Table 7 and Table 8 respectively.

Table 7: Trip Generation Rates

LAND USE	VARIABLE	WEEKDAY PM PEAK HOUR			WEEKEND SAT PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
multi-family housing (mid-rise)	units	0.27	0.17	0.44	0.22	0.22	0.44
hotel	occupied rooms	0.36	0.37	0.73	0.44	0.44	0.87
high turnover (sit-down) restaurant	1,000 ft^2 GFA	6.06	3.71	9.77	8.00	6.04	14.04
shopping centre	1,000 ft^2 GFA	1.83	1.98	3.81	2.34	2.16	4.50

[3] *ITE Trip Generation Manual, 10th Edition*. Institute of Transportation Engineers, 2017.

Table 8: Trip Generation Estimates

LAND USE	SIZE	WEEKDAY PM PEAK HOUR			WEEKEND SAT PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
multi-family housing (mid-rise)	90 units	24	15	39	20	20	40
hotel	40 rooms	14	15	29	17	17	34
high turnover (sit-down) restaurant	5,000 ft^2	30	19	49	40	30	70
shopping centre	60,000 ft^2	119	129	248	152	140	292
Total		**187**	**178**	**365**	**229**	**207**	**436**

Overall, the proposed development is expected to generate 365 trips during the weekday PM peak hour and 436 trips during the Saturday peak hour (total of inbound and outbound trips).

However, this is not to suggest that all of these trips will be new trips generated by the development. Rather, given the proposed uses of the development, a portion of the trips generated by the site are expected to be pass-by trips. These are trips that are already on the road system and will simply visit the site as they are driving past (e.g. on their way to work, on their way home, etc.). As per the *ITE Trip Generation Handbook, 3rd Edition* and in considering the proposed land uses, a pass-by rate of 43% is suggested for the retail and restaurant uses. However, to ensure a conservative approach, a pass-by rate of 35% has been applied. Of the 35% pass-by rate, 50% has been applied to trips along Bowes Street (i.e. trips traveling east/west along Bowes Street will divert south along Oastler Park Drive to access the site, and exit north back to Bowes Street to carry on their original route) and 50% has been applied to trips along Oastler Park Drive (i.e. trips travelling north/south along Oastler Park Drive will enter the site and exit back onto Oastler Park Drive).

The site is also expected to experience shared/internal trips. A shared/internal trip occurs when there is interaction between the uses on the site (i.e. staff/customers/tenants of hotel and condominiums visiting the restaurant). For shared/internal trips, it is common practice to apply a reduction to the trip estimates in order to avoid double counting. In this case, a 10% reduction has been applied to the restaurant land use.

A summary of the resulting estimates of pass-by trips, internal/shared trips and new trips is provided in Table 9.

Table 9: Pass-by, Internal/Shared & New Trips

LAND USE	PASS-BY TRIPS			INTERNAL/SHARED TRIPS			NEW TRIPS	
	%	PM PEAK	SAT PEAK	%	PM PEAK	SAT PEAK	PM PEAK	SAT PEAK
multi-family housing (mid-rise)	-	-	-	-	-	-	39	40
hotel	-	-	-	-	-	-	29	34
high turnover (sit-down) restaurant	35%	17	25	10%	5	7	27	39
shopping centre	35%	87	102	-	-	-	161	190
Total		**104**	**127**		**5**	**7**	**256**	**303**

As noted, when considering pass-by trips, the site is expected to generate 256 new trips during the PM peak hour and 303 new trips during the Saturday peak hour.

4.3.2 Trip Distribution & Assignment

The distribution of site generated trips has considered both pass-by trips and new trips. As previously indicated, pass-by trips are those trips already on the road system that are expected to stop at the site as they travel past. As such, the distribution of the pass-by trips was based on the directional volumes on Bowes Street and Oastler Park Drive, as observed during the August 2018 conducted traffic counts.

The distribution of the new trips generated by the site has been developed based on the location of the site in relation surrounding development, travel patterns observed on the adjacent road network and the proximity of the site to major travel routes. The following distribution has been assumed:

- to/from the West (via Bowes Street) - 60%;
- to/from the North (via 400 Highway) - 15%;
- to/from the South (via 400 Highway) - 15%; and
- to/from the South (via Oastler Park Drive) - 10%.

The assignment of the trips generated by the development to the area road network and site accesses is based on the trip distribution noted above with consideration given to the expected travel routes. The resulting site generated traffic volumes assigned to the road network are illustrated in Figure 8 (pass-by trips), Figure 9 (new trips) and Figure 10 (total trips).

5 Transportation Impacts

This chapter will address the resulting impacts of the proposed development on the adjacent road system. The following areas are to be addressed:

- operations at the key intersections and site access points;
- road section operations; and
- potential improvements to the study area road network, if necessary.

5.1 FUTURE TRAFFIC VOLUMES

To assess the impacts of the increased traffic volumes resulting from the proposed development, the site generated traffic was combined with the 2023, 2028, and 2033 background traffic volumes. The resulting future total traffic volumes are presented in Figure 11 through Figure 13.

5.2 FUTURE TRAFFIC OPERATIONS

5.2.1 Intersection Operations - 2023 Horizon

The operations of the study area intersections were again investigated considering the total traffic volumes for the 2023 horizon year (adopted to reflect full build-out and operation of the proposed development). The existing intersection configurations have been maintained in the analysis and the signal timings have been optimized to ensure efficient operations. As previously mentioned, a paved driveway access will accompany the site build-out, forming the 4th leg of the Oastler Park Drive / commercial access intersection. As such, the site access onto Oastler Park Drive has been modelled as a 4-leg intersection with single lane approaches (i.e. no exclusive turn lanes) and stop control on the minor approach (i.e. the exit movement from the site).

Furthermore, given the presence of the existing northbound left turn lane at the commercial access, a southbound left turn lane on Oastler Park Drive will be required to ensure a lane balance through the intersection and to serve the proposed development. This can be achieved by repainting the existing hatched lane at the north leg of the intersection and converting it into a TWLTL (two-way left turn lane). The intersection has been modelled as such.

The results of the operational review are provided in Table 10, whereas detailed worksheets are provided in Appendix D.

Table 10: Intersection Operations – 2023 Total Conditions

INTERSECTION & MOVEMENT		CONTROL	WEEKDAY PM PEAK HOUR			WEEKEND SAT PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Bowes Street & Pine Drive	EB	signal	21	C	0.79	19	B	0.68
	WB		18	B	0.67	21	C	0.77
	NB		13	B	0.36	13	B	0.44
	SB		15	B	0.49	15	B	0.53
	overall		18	B	0.61	18	B	0.63
Bowes Street & Oastler Park Drive/Louisa Street	EB	signal	10	B	0.61	10	B	0.61
	WB		16	B	0.80	26	C	0.93
	NB		13	B	0.49	17	B	0.61
	SB		11	B	0.21	12	B	0.26
	overall		13	B	0.74	17	B	0.89
Oastler Park Drive & Commercial Access/Site Access	EB	stop	19	C	0.38	42	E	0.66
	WB	stop	13	B	0.30	14	B	0.38
Bowes Street & 400 Highway (SB)	SB	stop	14	B	0.41	19	C	0.63
McDougall Road & 400 Highway (NB)	EB	stop	28	D	0.07	22	C	0.26

As indicated, the study area intersection will provide acceptable overall operations (LOS E or better) with average delays for the 2023 horizon given the projected total volumes. It is noted that the 2023 total operations are comparable to those experienced under background conditions (i.e. the proposed development has minimal impact on the intersection operations). As such, no improvements are required to support the 2023 total traffic conditions and build-out of the proposed development.

5.2.2 Intersection Operations – 2028 & 2033

The operations of the study area intersections were again investigated considering the total traffic volumes for the 2028 and 2033 horizon year. The aforementioned two-way left turn lane, site access configuration and control have been carried forward 2028 and 2033 horizon years. The results of the operational review are provided in Table 11 and Table 12.

Table 11: Intersection Operations – 2028 Total Conditions

INTERSECTION & MOVEMENT		CONTROL	WEEKDAY PM PEAK HOUR			WEEKEND SAT PEAK HOUR		
			delay	LOS	v/c	delay	LOS	v/c
Bowes Street & Pine Drive	EB	signal	23	C	0.83	20	C	0.71
	WB		20	C	0.73	22	C	0.80
	NB		13	B	0.36	14	B	0.46
	SB		15	B	0.50	16	B	0.54
	overall		19	B	0.64	19	B	0.66
Bowes Street & Oastler Park Drive/Louisa Street	EB	signal	10	B	0.62	11	B	0.69
	WB		18	B	0.84	27	C	0.92
	NB		16	B	0.57	26	C	0.71
	SB		13	B	0.25	19	B	0.31
	overall		14	B	0.81	20	C	0.91
Oastler Park Drive & Commercial Access/Site Access	EB	stop	20	C	0.40	49	E	0.71
	WB	stop	13	B	0.31	15	B	0.39
Bowes Street & 400 Highway (SB)	SB	stop	15	C	0.47	24	C	0.73
McDougall Road & 400 Highway (NB)	EB	stop	34	D	0.10	25	D	0.07

Table 12: Intersection Operations – 2033 Total Conditions

INTERSECTION & MOVEMENT		CONTROL	WEEKDAY PM PEAK HOUR			WEEKEND SAT PEAK HOUR		
			delay	LOS	v/c	delay	LOS	v/c
Bowes Street & Pine Drive	EB	signal	25	C	0.87	20	C	0.74
	WB		21	C	0.77	23	C	0.84
	NB		13	B	0.37	14	B	0.47
	SB		16	B	0.50	16	B	0.55
	overall		21	C	0.66	20	B	0.68
Bowes Street & Oastler Park Drive/Louisa Street	EB	signal	11	B	0.35	11	B	0.67
	WB		26	C	0.93	33	C	0.97
	NB		18	B	0.63	38	D	0.86
	SB		14	B	0.29	24	C	0.39
	overall		17	B	0.90	25	C	0.99
Oastler Park Drive & Commercial Access/Site Access	EB	stop	22	C	0.42	61	**F**	0.77
	WB	stop	14	B	0.32	15	C	0.40
Bowes Street & 400 Highway (SB)	SB	stop	17	C	0.54	34	D	0.84
McDougall Road & 400 Highway (NB)	EB	stop	43	E	0.13	30	D	0.10

As indicated, the study area intersection will provide acceptable overall operations (LOS E or better) with average delays for the 2033 horizon given the projected total volumes with the exception of the eastbound movement at the intersection of Oastler Park Drive with Commercial Access/Site Access. During the 2033 horizon year, the eastbound movement will experience poor conditions (LOS F) during the Saturday peak hour. While traffic signals would address the operating conditions, such are not considered necessary given that the delays are only experienced during the Saturday peak hour and are not considered onerous (the delay threshold for LOS F is >50 seconds). Despite the poor operating conditions, the approaches will continue to operate well below capacity. It is further noted that the intersection volumes do not warrant the implementation of traffic signals (completed traffic signal warrants are provided in Appendix E). As such, no intersection improvements are required to support the 2028 and 2033 traffic conditions.

5.2.3 Road Section Operations

The road section operations were reviewed again with consideration of the projected total traffic volumes for the 2033 horizon period (considered the critical period as volumes highest). The results are provided in Table 13.

Table 13: Road Section Operations - 2033 Total Conditions

ROAD & LANES PER DIRECTION		CAPACITY[1]		TRAFFIC VOLUMES		VOLUME TO CAPACITY	
		NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB
Bowes Street (W of Pine)	2	1,400	1,400	1051	975	0.75	0.70
Bowes Street (between Pine & Oastler)	2	1,400	1,400	1201	1263	0.86	0.90
Bowes Street (E of Oastler)	2	1,400	1,400	1090	1175	0.78	0.84
Louisa Street	1	600	600	299	314	0.50	0.52
Oastler Park Drive	1	600	600	480	488	0.80	0.81

As noted, the study area road network is expected to operate at 90% of capacity or less through the 2033 horizon period (i.e. v/c ≤ 0.90) under future total conditions. Thus, no improvements are required to increase road section capacity given the projected total conditions.

5.3 SITE ACCESS

As per the site plan, the site access will be provided along the east side of Oastler Park Drive, opposite the existing commercial access. The existing seasonal gravel access is expected to be paved to become a full-moves driveway, providing two way operations (one inbound lane and one outbound lane). The access is located approximately 165 metres south of Bowes Street. In context of the expected traffic volumes and types of vehicles accessing the site (predominantly passenger cars), the access configuration for the site as proposed is considered appropriate.

5.4 SIGHT LINE ANALYSIS

Based on MTO geometric design standards, the minimum stopping sight distance for a design speed of 60 km/h (posted 50 km/h + 10 km/h) is 85 metres. This provides a sufficient distance for an approaching motorist to observe a stationary hazard in the road and bring their vehicle to a complete stop prior to the hazard.

The sight distances to the north and south along Oastler Park Drive are in excess of 150 metres. Thus, the available sight distances at all of the access points satisfy the MTO minimum stopping sight distance requirement for the noted design speed.

6 Summary

6.1 PROPOSED DEVELOPMENT

This study has addressed the transportation impacts associated with the proposed restaurant/retail/ hotel/condo residential development to be located at the southwest corner of Bowes Street and Highway 400 in the Town of Parry Sound. The proposed development will consist of a 2,323 m^2 (25,000 ft^2) retail/restaurant pad with the potential for an additional 3,716 m^2 (40,000 ft^2) as part of a future phase, a 3716 m^2 (40,000 ft^2) 40-room hotel and a 3716 m^2 (40,000 ft^2) 90-unit condominium building.

Upon build-out (assumed 2023) the proposed development is expected to generate 256 new trips during the PM peak hour and 303 new trips during the Saturday peak hour. It is noted that the trip estimates are considered conservative in that a reduced pass-by rate has been considered.

6.2 TRAFFIC OPERATIONS

In addressing the study area traffic operations, the intersections of Bowes Street with Pine Drive, Bowes Street with Oastler Park Drive/Louisa Street, Oastler Park Drive with commercial access/site access, Bowes Street with Highway 400 southbound ramp and McDougall Road with Highway 400 northbound ramp were analysed under existing conditions (2018), and future conditions (2023, 2028 and 2033) both without and with the proposed development.

The results of the operational analyses indicate that the study area intersections will provide acceptable overall conditions through 2033 under both future background and future total conditions with the exception of the eastbound movement at the intersection of Oastler Park Drive with commercial access/site access.

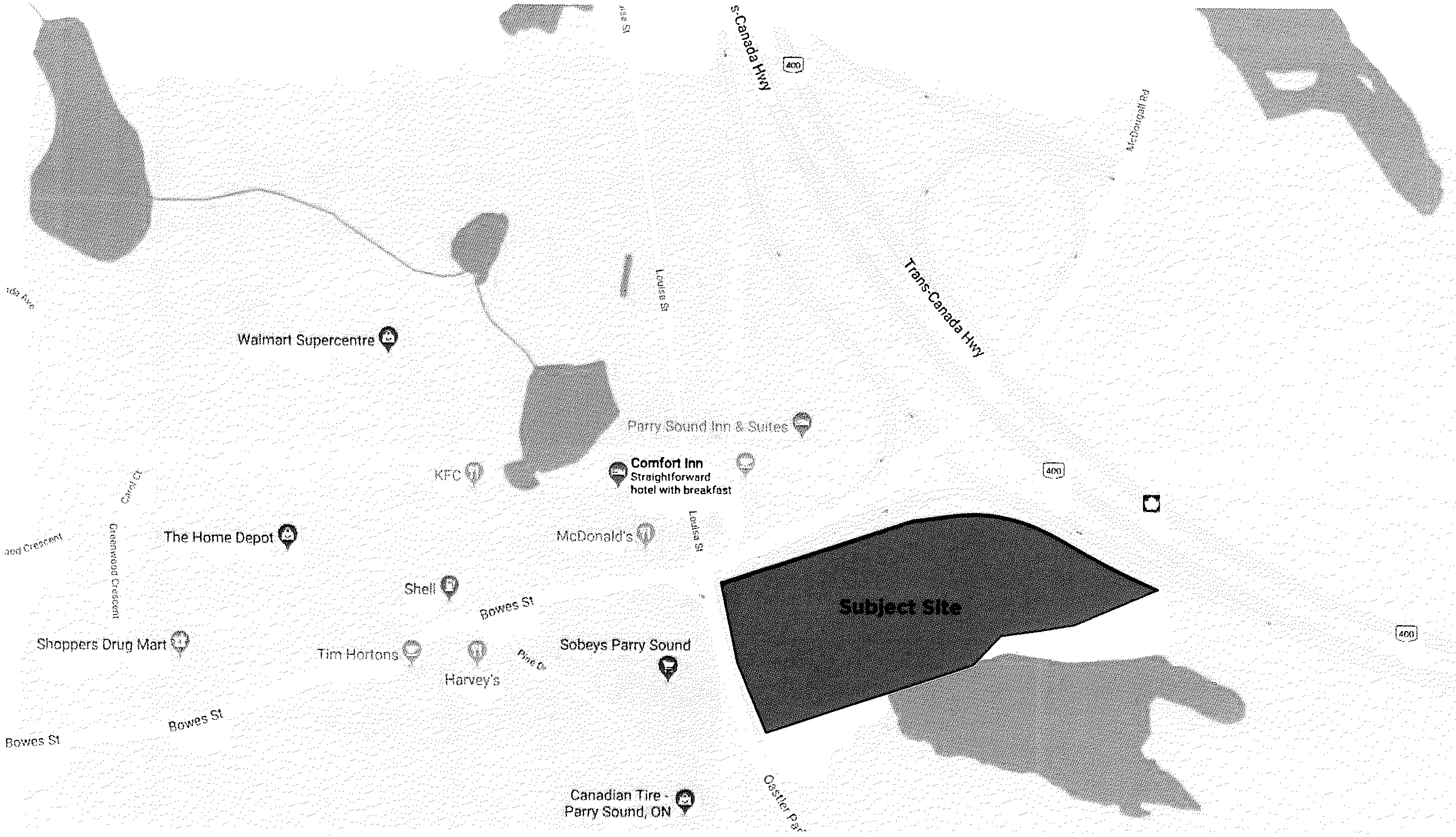
During the 2033 horizon year the eastbound movement at the Oastler Park Drive with commercial access/site access intersection will experience poor conditions (LOS F) during the Saturday peak hour. While traffic signals would address the operating conditions, such are not considered necessary given that the delays are only experienced during the Saturday peak hour and are not considered onerous. Despite the poor operating conditions, the approaches will continue to operate well below capacity. It is further noted that the intersection volumes do not warrant the implementation of traffic signals. As such, no improvements are warranted.

The capacity of the adjacent road network was reviewed under both background and future traffic conditions. The roads within the study area are expected to operate below capacity through the 2033 horizon. As such, no improvements to the road network are considered necessary to accommodate the future background or total volumes.

Given the conservative approach applied with respect to the site trip generation (i.e. reduced pass-by rate, high background growth rate), the actual impacts of the development will be somewhat less than has been reported (albeit, the trip generation as assumed is not such that requires any improvements to the existing road network).

6.3 SIGHT LINES

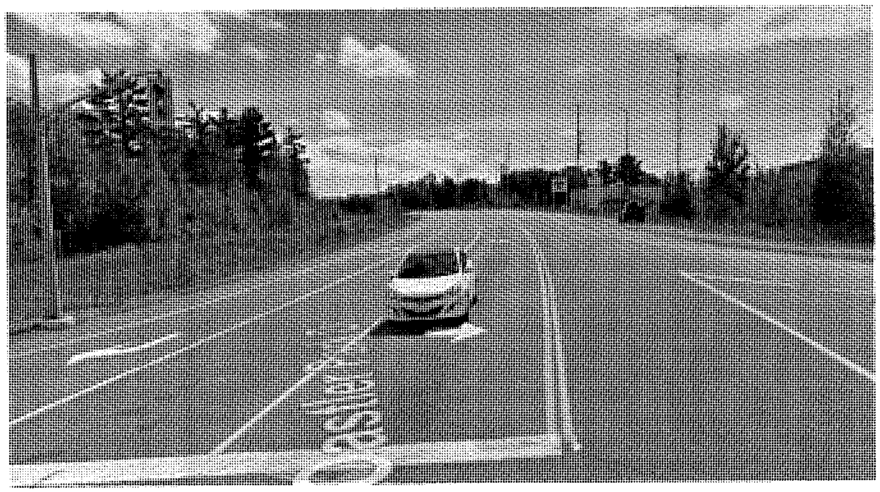
The available sight lines along Oastler Park Drive at the proposed site access point were reviewed and are considered acceptable in consideration of the MTO design standards and minimum sight distance requirements.



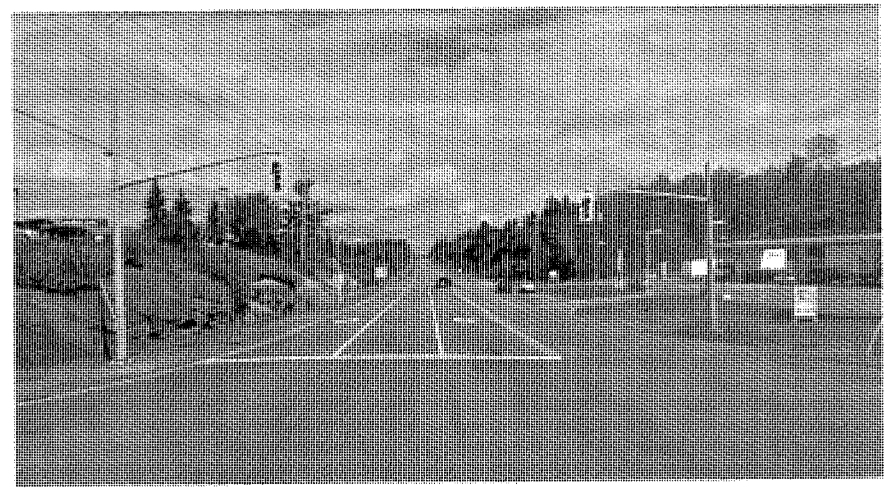
source: maps.google.ca

BOWES STREET & HIGHWAY 400 DEVELOPMENT

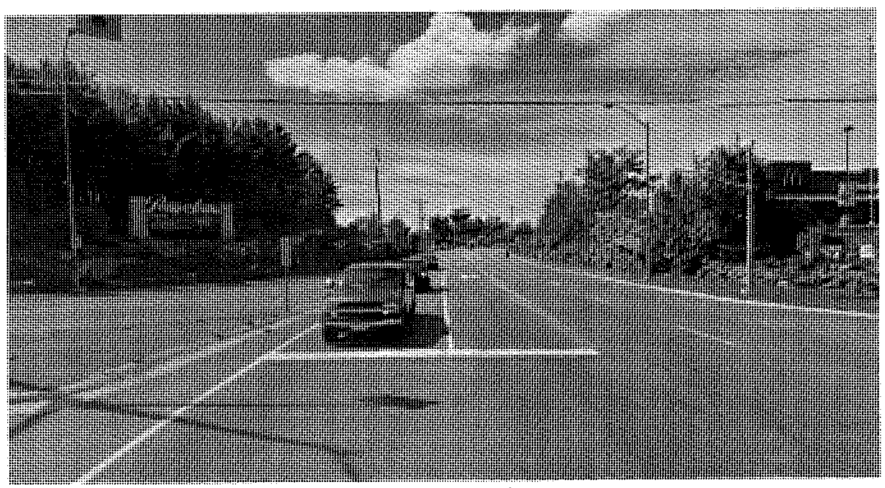
Figure 1: Site Location



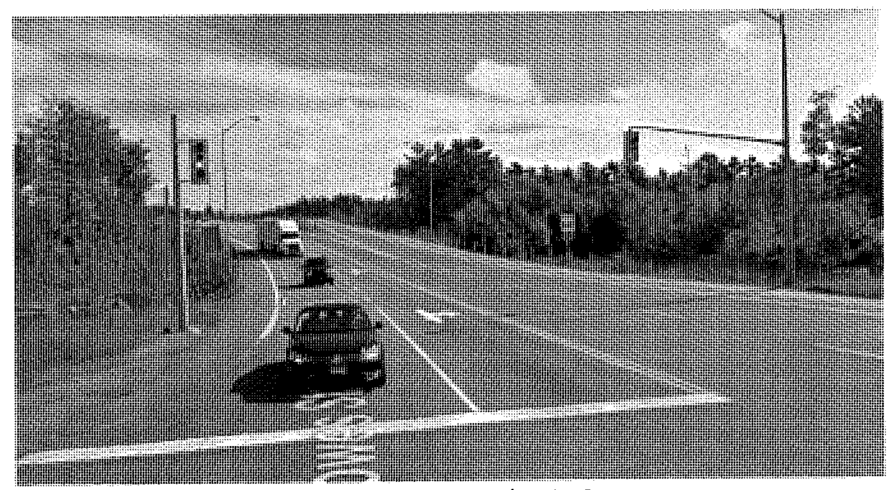
Looking south along Oastler Park Drive at Bowes Street



Looking north along Louisa Street at Bowes Street



Looking west along Bowes Street at Oastler Park Drive / Louisa Street

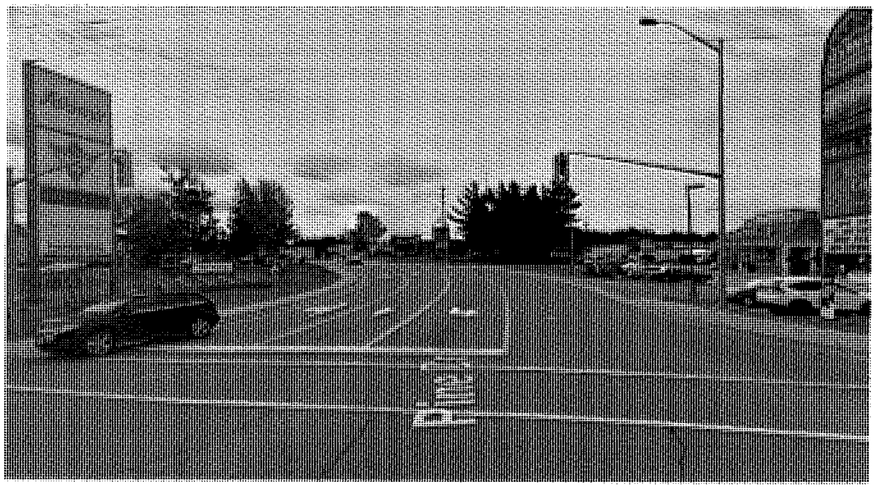


Looking east along Bowes Street at Oastler Park Drive / Louisa Street

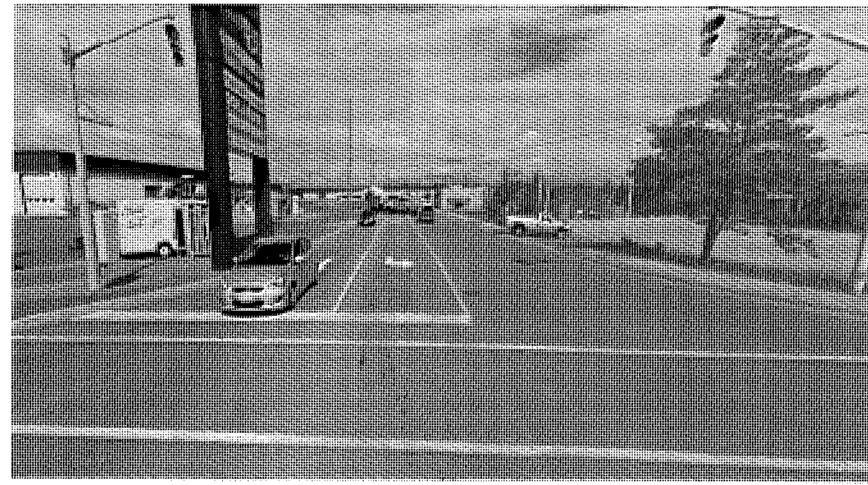
source: Google Streetview

BOWES STREET & HIGHWAY 400 DEVELOPMENT

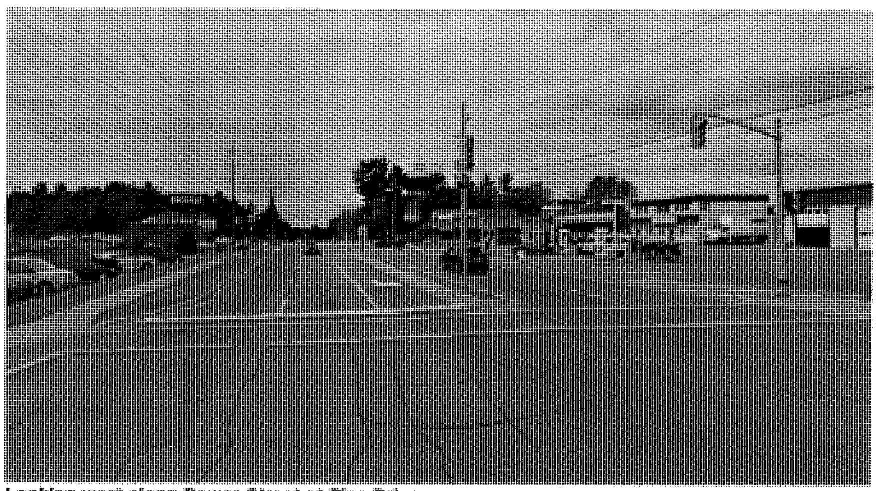
Figure 2A: Area Road Network



Looking south along Pine Drive at Bowes Street



Looking north along Pine Drive at Bowes Street



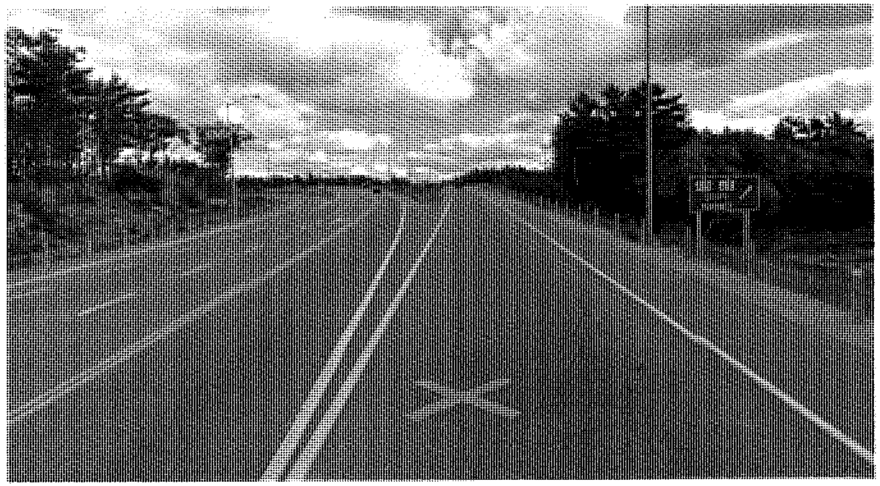
Looking west along Bowes Street at Pine Drive

Looking east along Bowes Street at Pine Drive

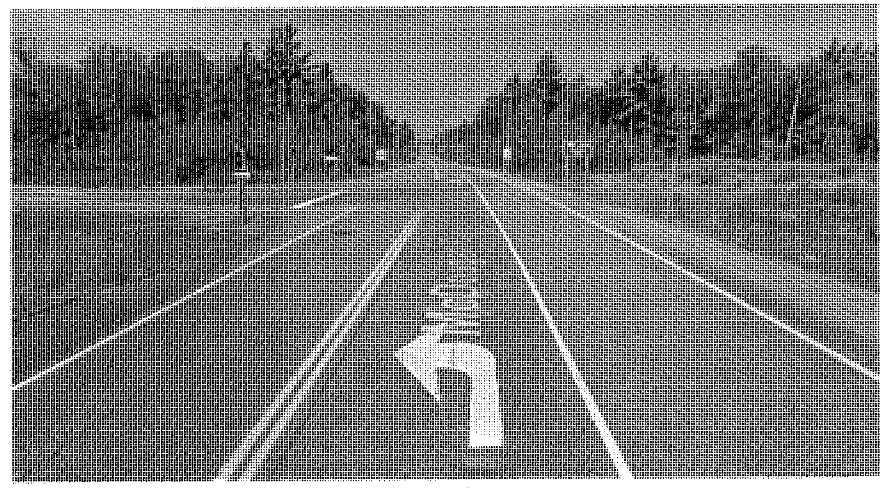
source: Google Streetview

BOWES STREET & HIGHWAY 400 DEVELOPMENT

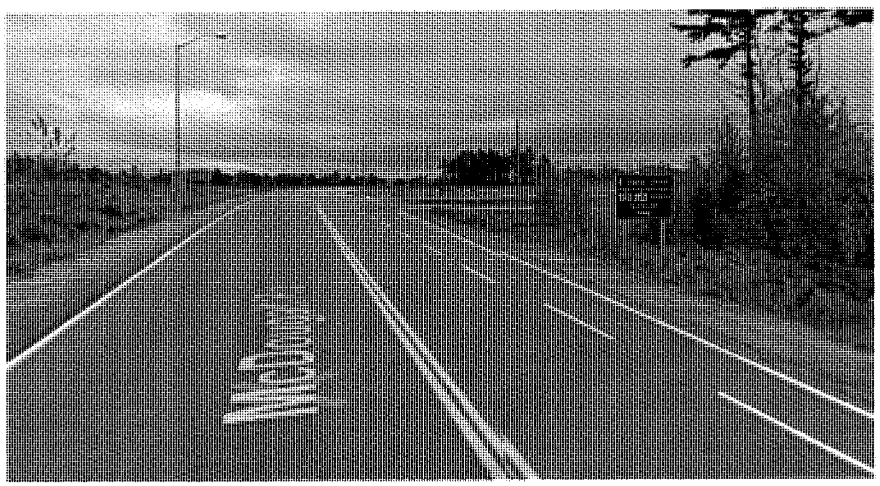
Figure 2B: Area Road Network



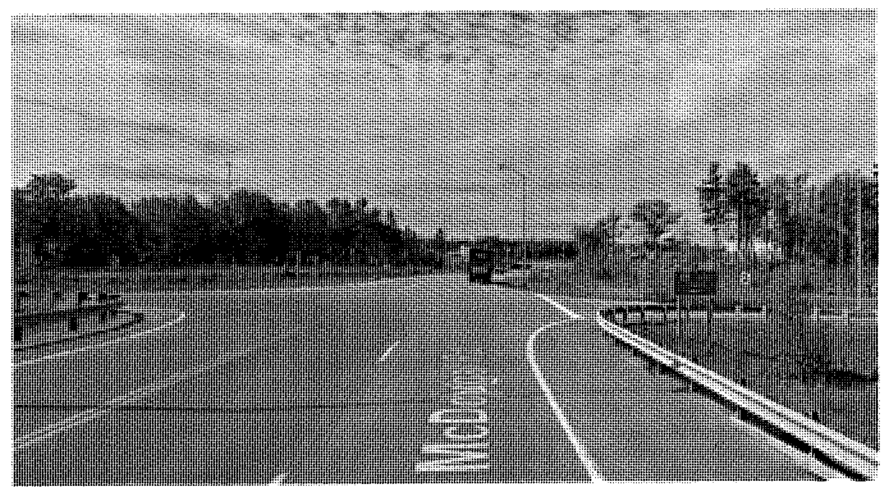
Looking east along Bowes Street at Highway 400 west ramp



Looking east along McDougall Road at Highway 400 east ramp



Looking west along McDougall Road at Highway 400 east ramp

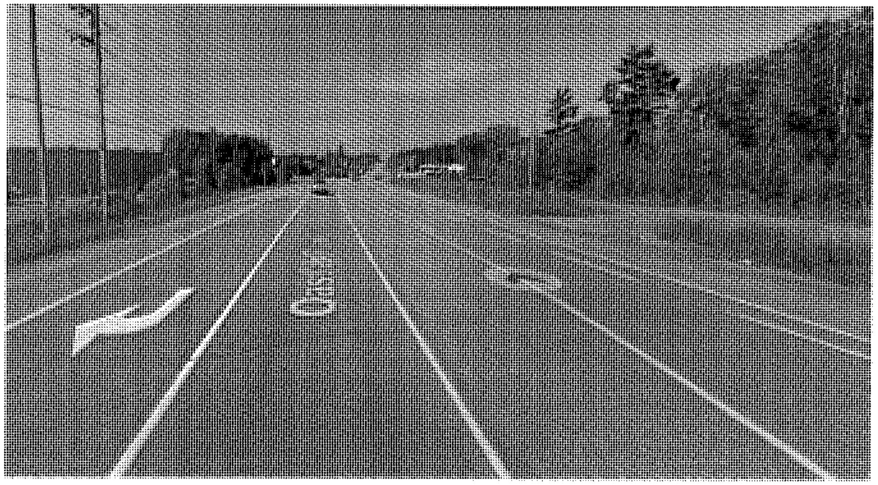


Looking west along McDougall Road at Highway 400 west ramp

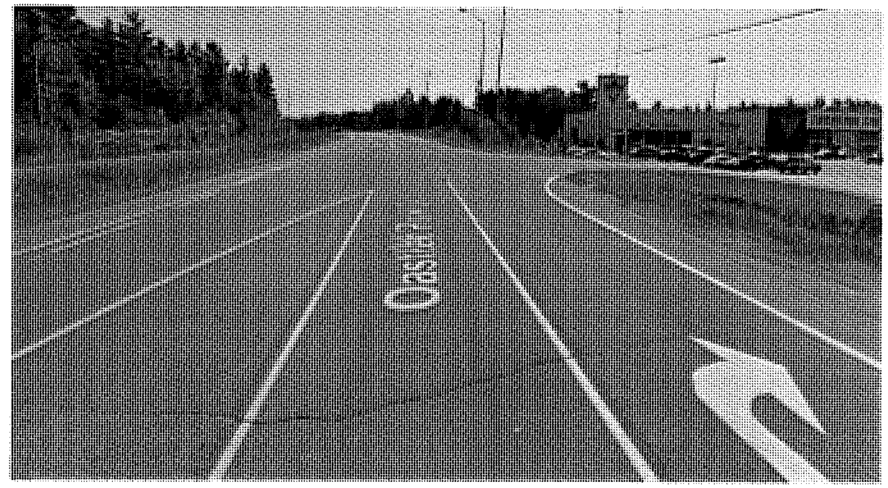
source: Google Streetview

BOWES STREET & HIGHWAY 400 DEVELOPMENT

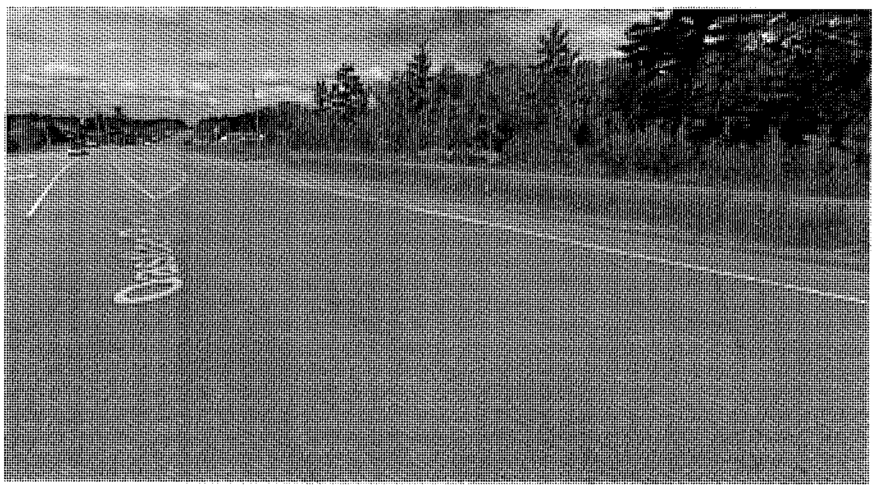
Figure 2C: Area Road Network



Looking north along Oastler Park Drive at proposed Site Access



Looking south along Oastler Park Drive at proposed Site Access

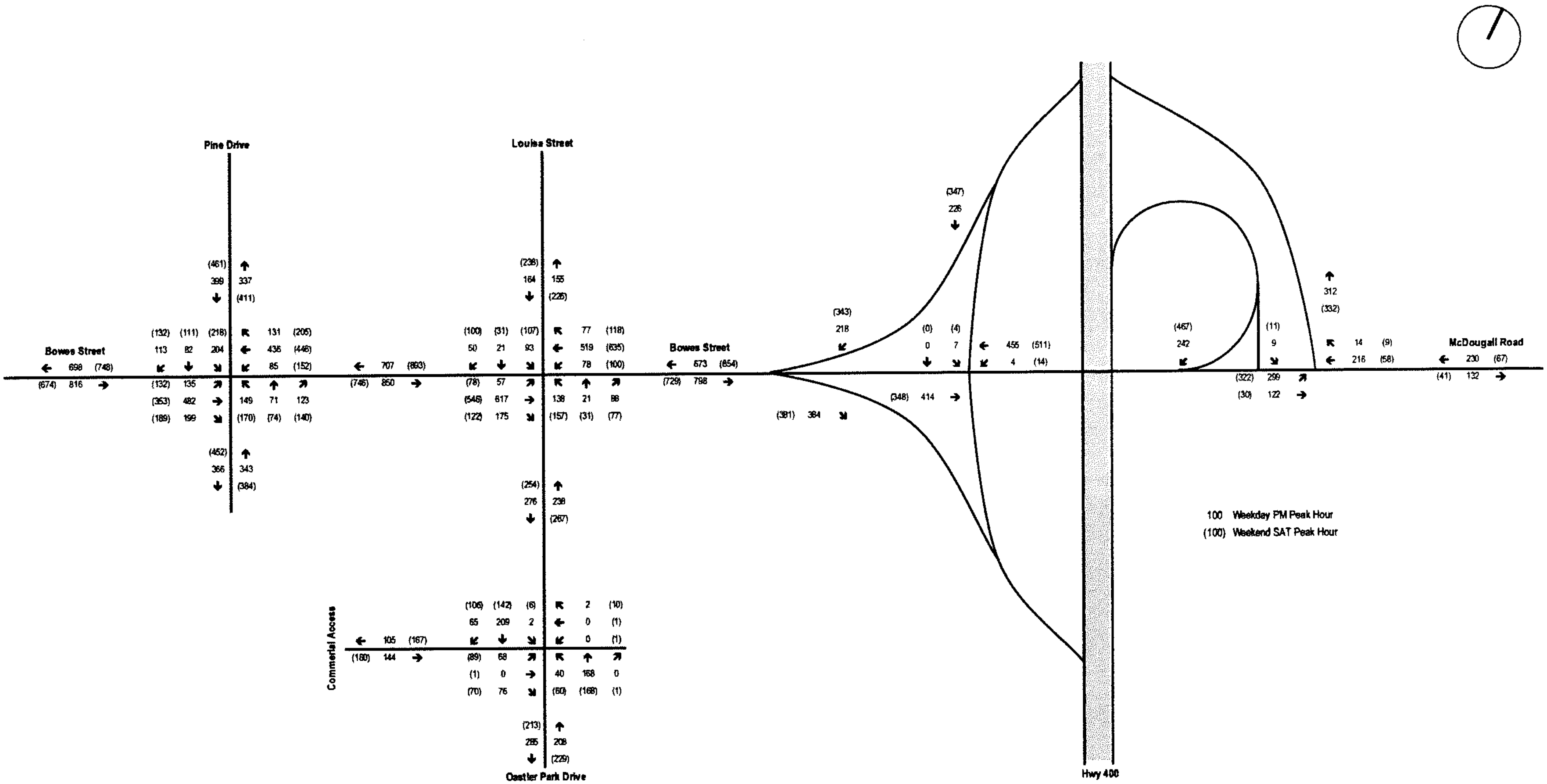


Looking east at proposed Site Access from Oastler Park Drive

source: Google Streetview

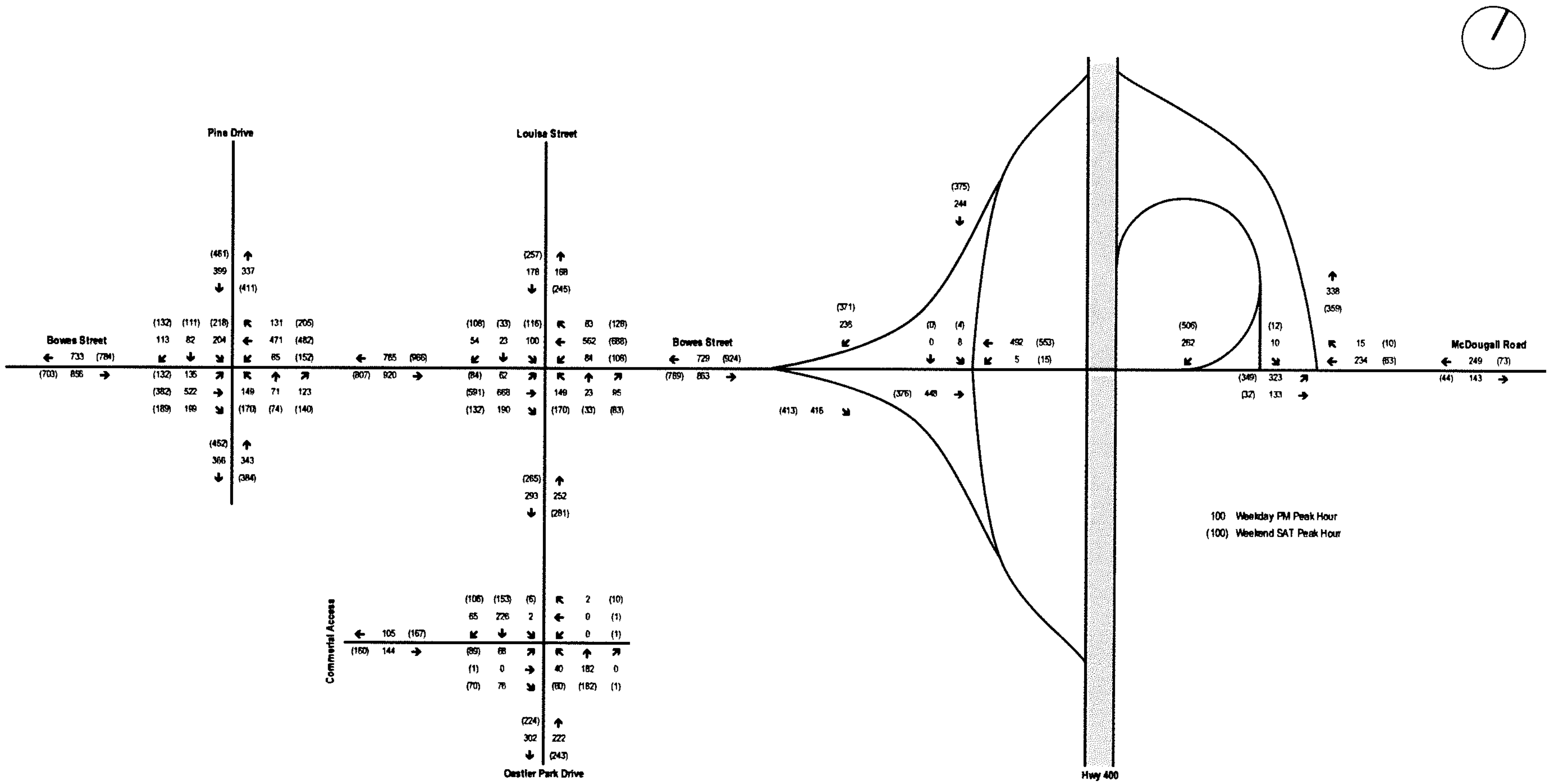
BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 2D: Area Road Network



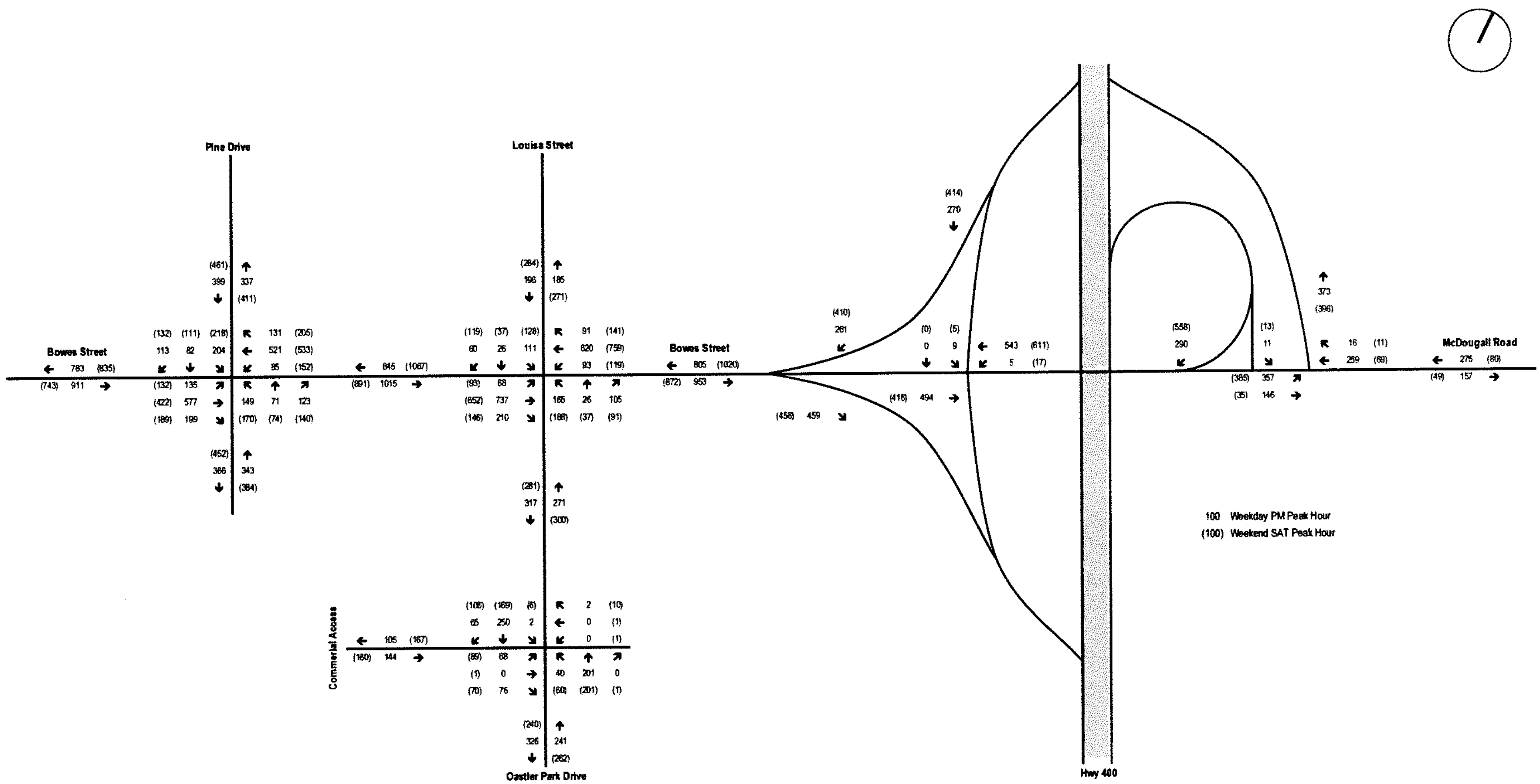
BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 3: 2019 Traffic Volumes



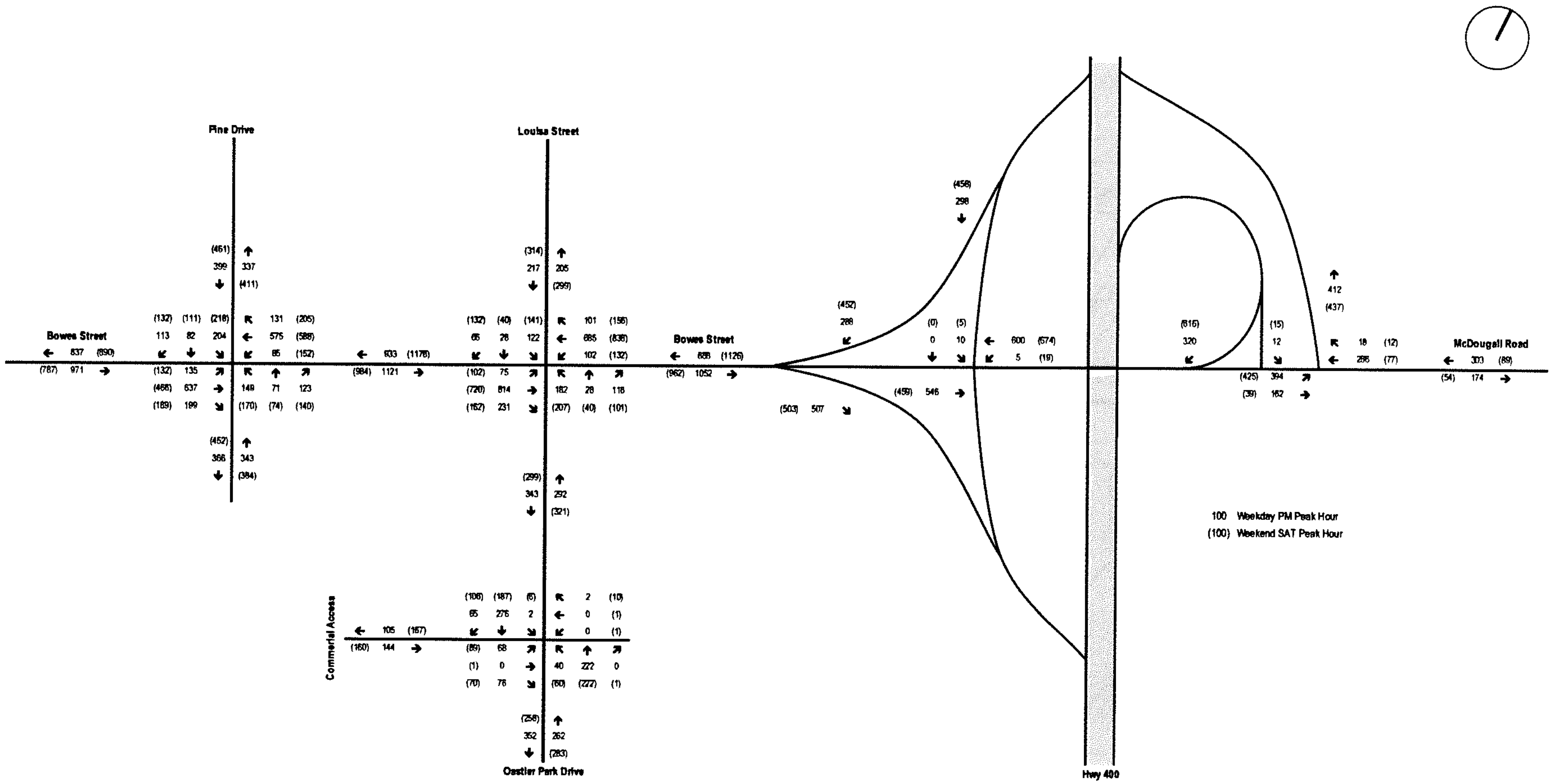
BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 4: 2023 Background Traffic Volumes



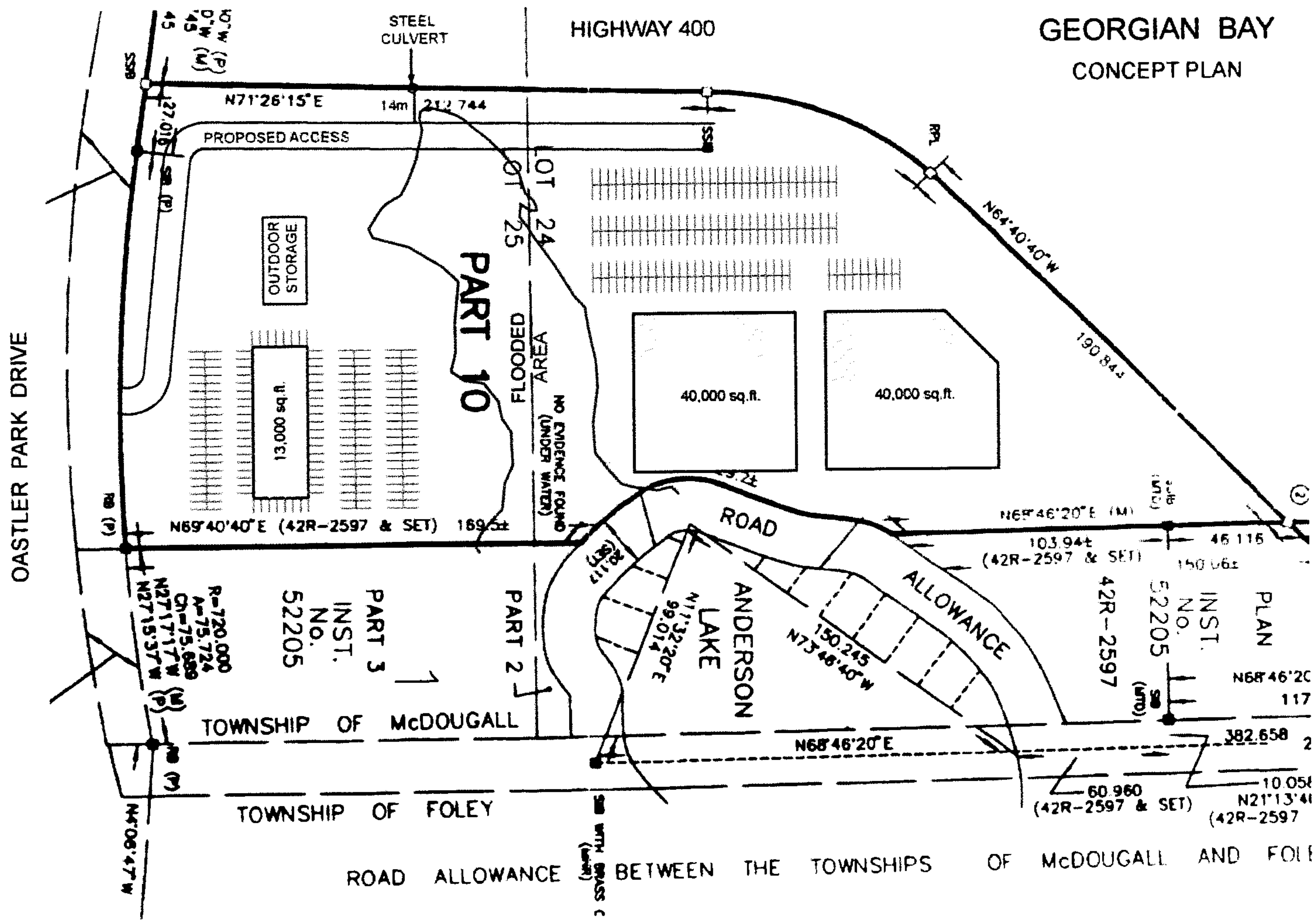
BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 5: 2028 Background Traffic Volumes



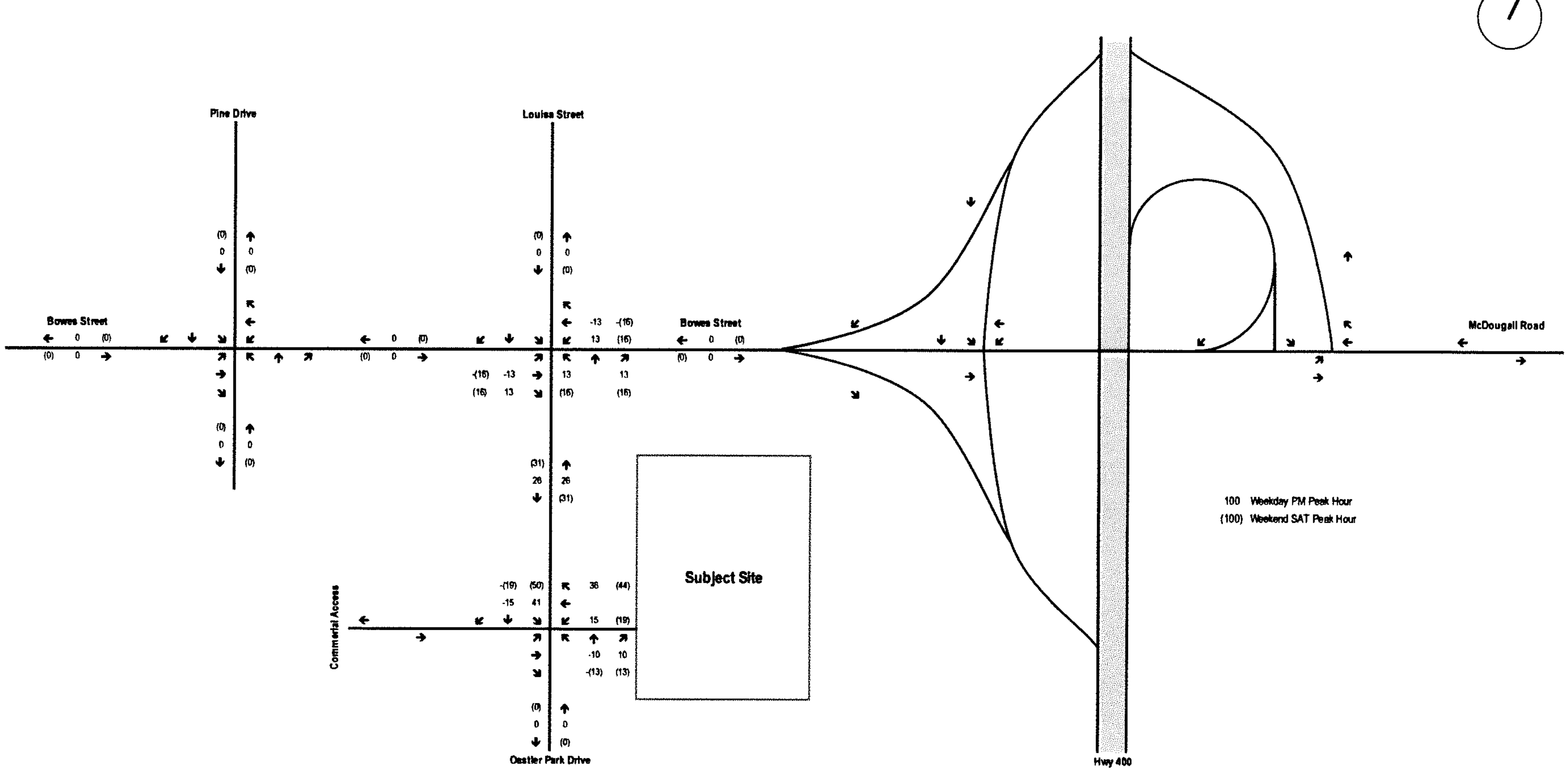
BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 6: 2033 Background Traffic Volumes



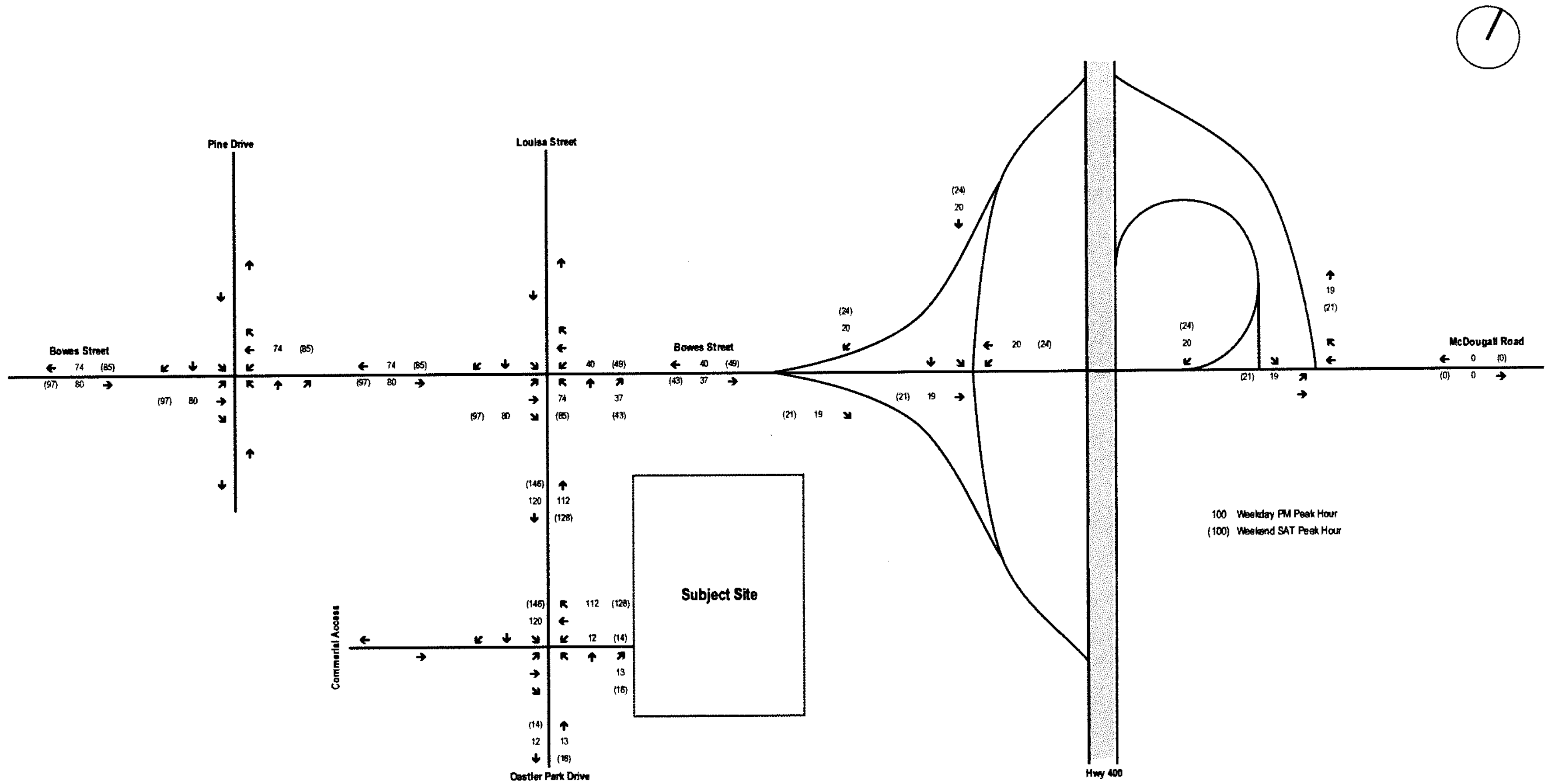
BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 7: Site Plan



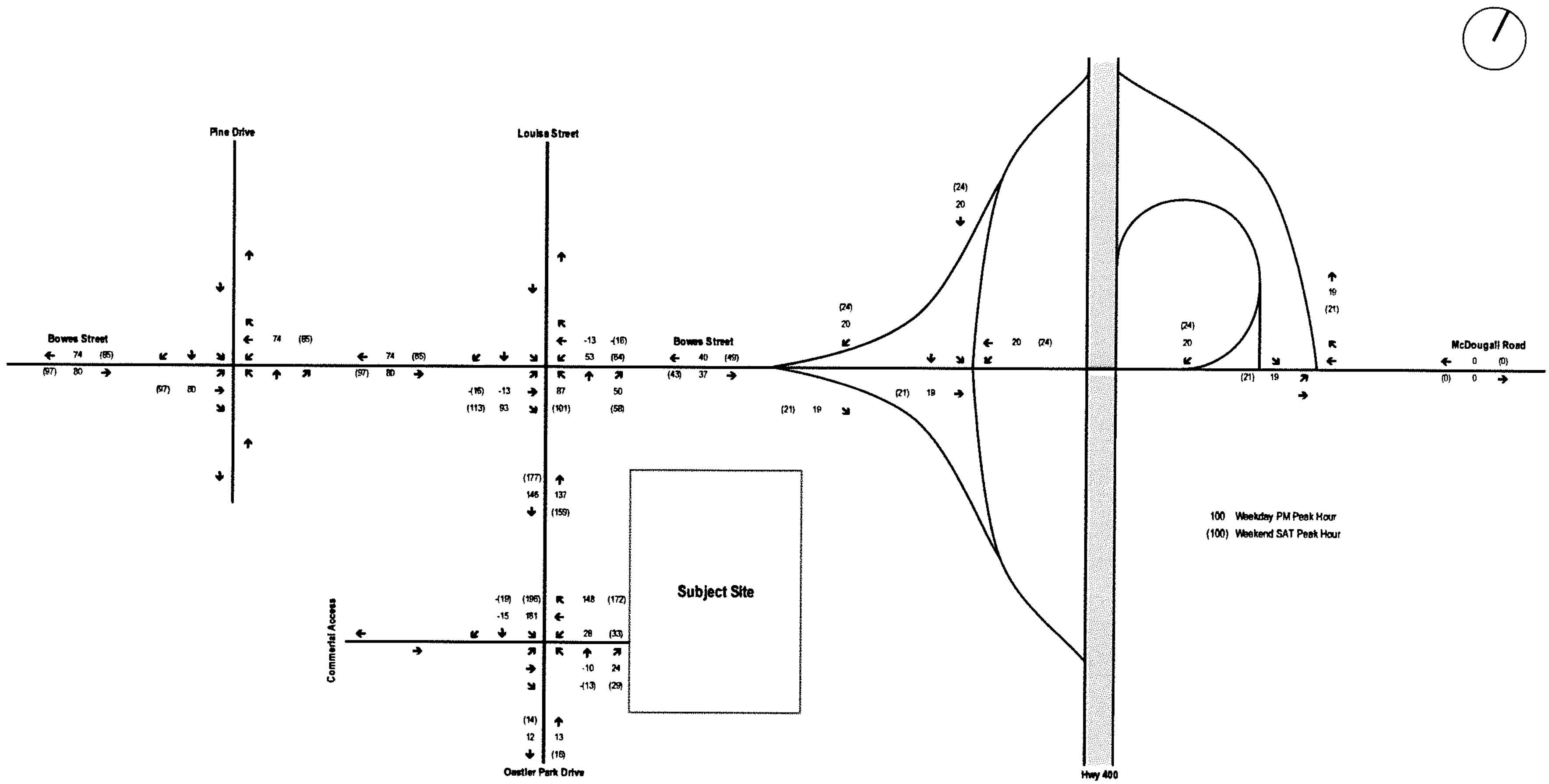
BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 8: Site Traffic (Pass-by Trips)



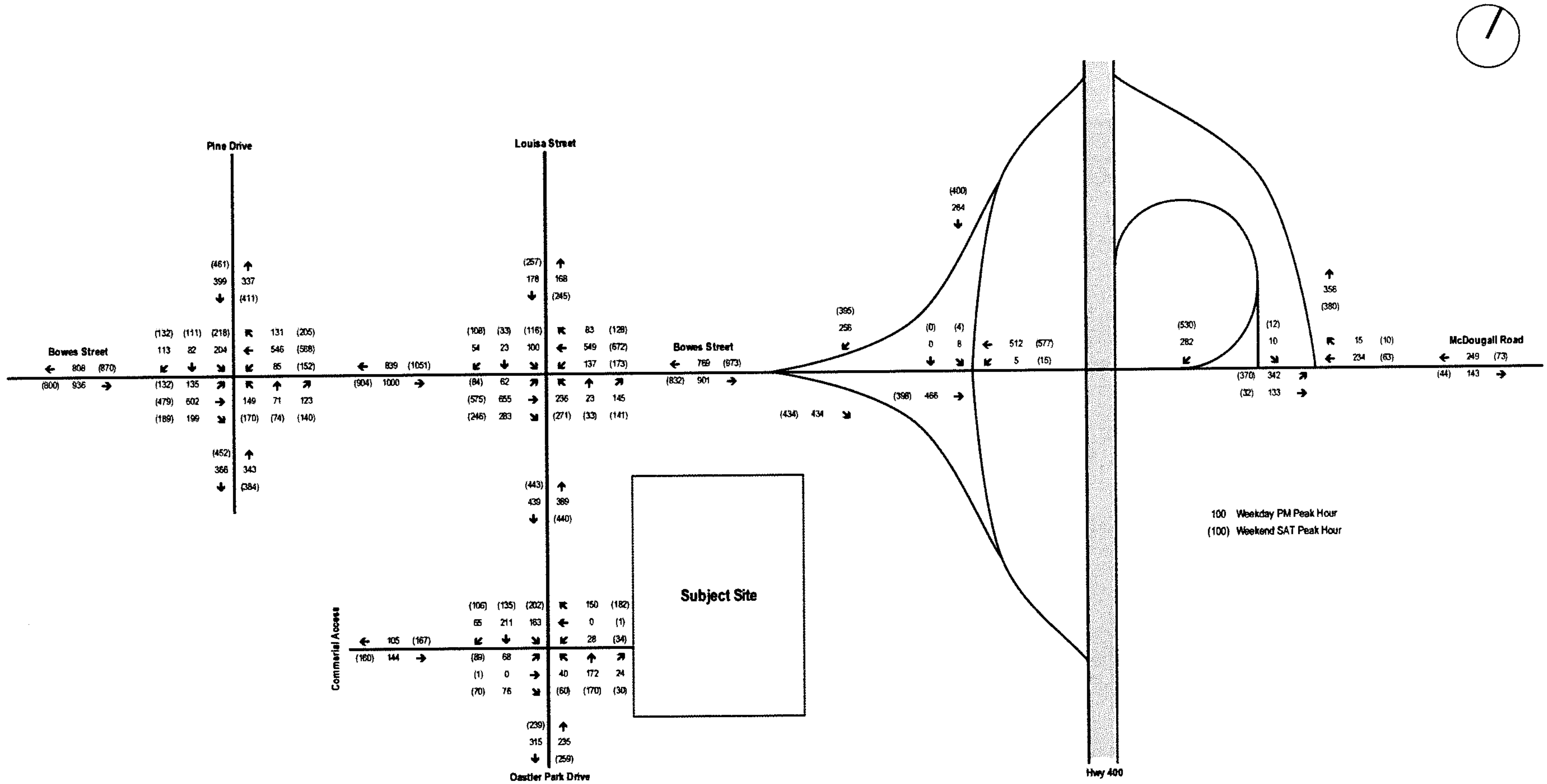
BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 9: Site Traffic (New Trips)



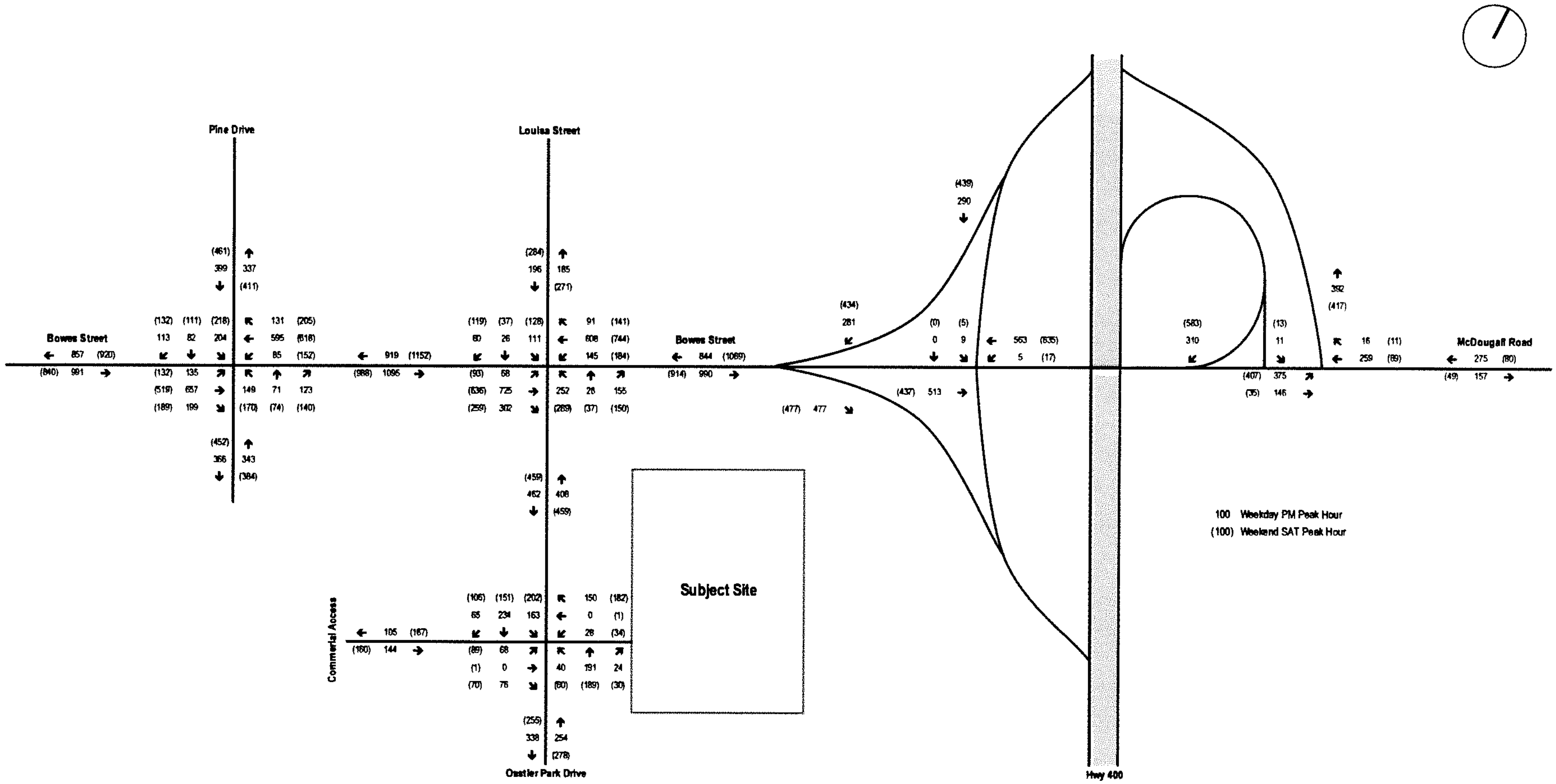
BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 10: Site Traffic (Total Trips)



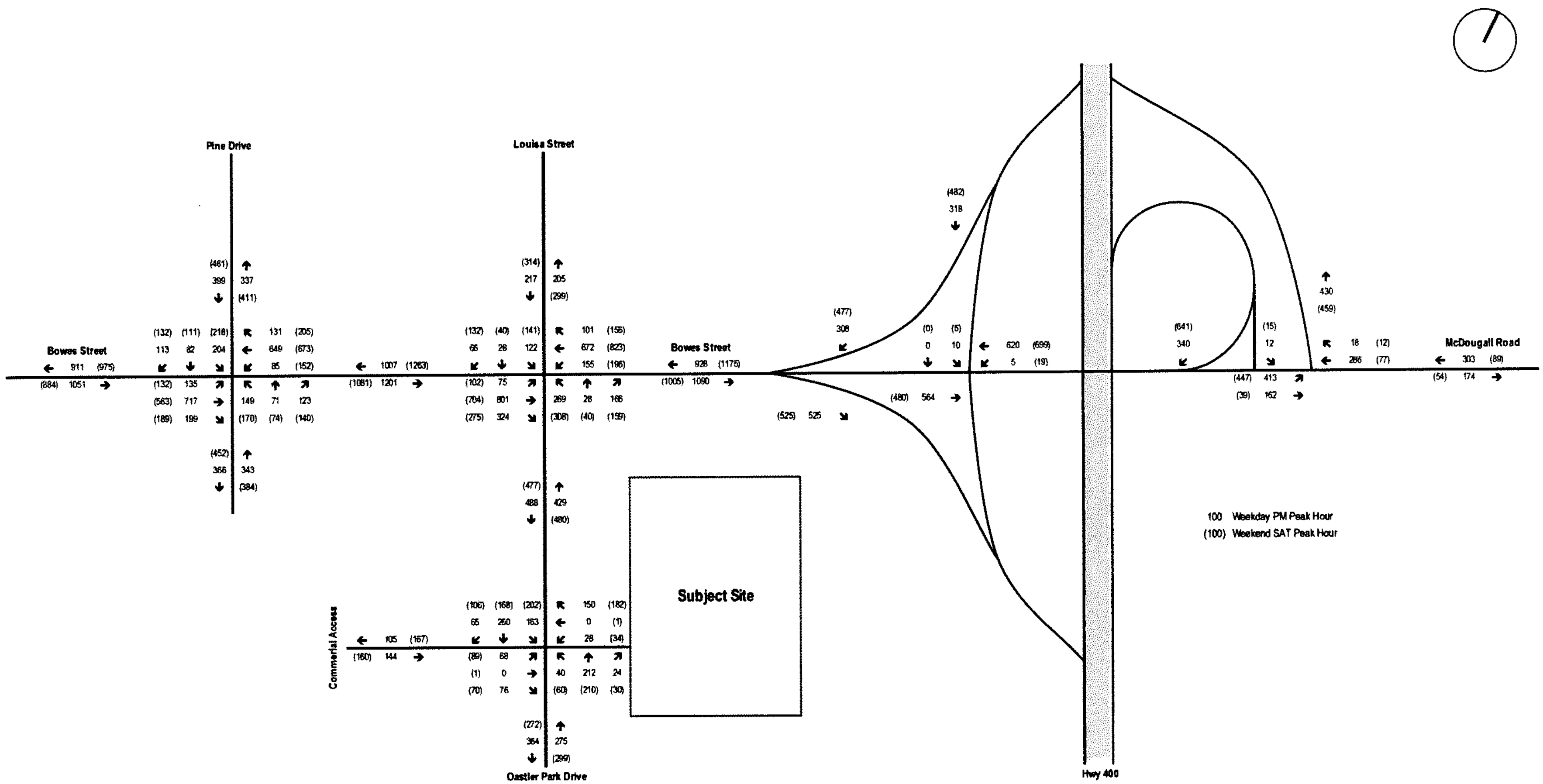
BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 11: 2023 Total Traffic Volumes



BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 12: 2028 Total Traffic Volumes



BOWES STREET & HIGHWAY 400 DEVELOPMENT

Figure 13: 2033 Total Traffic Volumes

Appendix A: Traffic Counts

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 9:00:00
To: 10:00:00

Municipality: Parry Sound
Site #: 1810300001
Intersection: Bowes St & Pine Dr
TFR File #: 1
Count date: 10-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Bowes St runs W/E

North Leg (Pine Dr)

North Leg Total: 504
North Entering: 220
North Peds: 1
Peds Cross: ⋈

Heavys	1	0	2	3
Trucks	2	1	1	4
Cars	75	55	83	213
Totals	78	56	86	

Heavys	2
Trucks	3
Cars	279
Totals	284

Pine Dr

East Leg (Bowes St)

East Leg Total: 1001
East Entering: 586
East Peds: 4
Peds Cross: ⧗

Cars	Trucks	Heavys	Totals
117	2	1	120
407	8	7	422
44	0	0	44
568	10	8	

Bowes St

Cars	Trucks	Heavys	Totals
397	7	11	415

West Leg (Bowes St)

Heavys	Trucks	Cars	Totals
8	14	619	641

Bowes St

Heavys	Trucks	Cars	Totals
1	0	113	114
8	5	275	288
0	0	131	131
9	5	519	

N
W E
S

Peds Cross: ⧗
West Peds: 7
West Entering: 533
West Leg Total: 1174

South Leg (Pine Dr)

Pine Dr

Cars	230
Trucks	1
Heavys	0
Totals	231

Cars	137	49	39	225
Trucks	4	1	1	6
Heavys	0	0	1	1
Totals	141	50	41	

Peds Cross: ⋈
South Peds: 1
South Entering: 232
South Leg Total: 463

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Afternoon Peak Diagram

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

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

Municipality: Parry Sound
Site #: 1810300001
Intersection: Bowes St & Pine Dr
TFR File #: 1
Count date: 10-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Bowes St runs W/E

North Leg Total: 736
North Entering: 399
North Peds: 3
Peds Cross: ⋈

Heavys	1	0	1	2
Trucks	1	0	2	3
Cars	111	82	201	394
Totals	113	82	204	

Heavys	5
Trucks	1
Cars	331
Totals	337

East Leg Total: 1443
East Entering: 643
East Peds: 3
Peds Cross: ⧗

Pine Dr

Heavys	Trucks	Cars	Totals
5	5	679	689

Cars	Trucks	Heavys	Totals
125	1	5	131
420	4	3	427
84	1	0	85
629	6	8	

Bowes St

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	135	135
1	3	469	473
0	0	199	199
1	3	803	

Bowes St

Cars	Trucks	Heavys	Totals
791	6	3	800

Pine Dr

Peds Cross: ⧗
West Peds: 6
West Entering: 807
West Leg Total: 1496

Cars	365
Trucks	1
Heavys	0
Totals	366

Cars	148	71	121	340
Trucks	0	0	1	1
Heavys	1	0	1	2
Totals	149	71	123	

Peds Cross: ⋈
South Peds: 5
South Entering: 343
South Leg Total: 709

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Total Count Diagram

Municipality: Parry Sound
Site #: 1810300001
Intersection: Bowes St & Pine Dr
TFR File #: 1
Count date: 10-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Bowes St runs W/E

North Leg (Pine Dr)

North Leg Total: 2909
North Entering: 1492
North Peds: 10
Peds Cross: ⋈

Heavys	5	0	21	26
Trucks	5	1	11	17
Cars	474	307	668	1449
Totals	484	308	700	

Heavys	19
Trucks	13
Cars	1385
Totals	1417

Pine Dr

East Leg (Bowes St)

East Leg Total: 6294
East Entering: 3252
East Peds: 24
Peds Cross: ⧗

	Cars	Trucks	Heavys	Totals
	593	10	16	619
	2228	24	24	2276
	348	4	5	357
	3169	38	45	

Bowes St

Cars	Trucks	Heavys	Totals
2954	36	52	3042

West Leg (Bowes St)

Heavys	Trucks	Cars	Totals
30	33	3408	3471

Bowes St

Heavys	Trucks	Cars	Totals
2	1	549	552
26	23	1861	1910
0	1	792	793
28	25	3202	

N
W E
S

Peds Cross: ⧗
West Peds: 25
West Entering: 3255
West Leg Total: 6726

South Leg (Pine Dr)

Pine Dr

Cars	1447
Trucks	6
Heavys	5
Totals	1458

Cars	706	243	425	1374
Trucks	4	2	2	8
Heavys	1	1	5	7
Totals	711	246	432	

Peds Cross: ⋈
South Peds: 14
South Entering: 1389
South Leg Total: 2847

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 9:00:00
To: 10:00:00

Municipality: Parry Sound
Site #: 1810300002
Intersection: Bowes St & Oastler Park Dr
TFR File #: 1
Count date: 10-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Bowes St runs W/E

North Leg Total: 264
North Entering: 132
North Peds: 1
Peds Cross: ⋈

Louisa St

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	59	17	56	132
Totals	59	17	56	

Heavys	2
Trucks	0
Cars	130
Totals	132

East Leg Total: 980
East Entering: 581
East Peds: 0
Peds Cross: ⧗

Bowes St

Heavys	Trucks	Cars	Totals
8	5	617	630

Cars	Trucks	Heavys	Totals
78	0	0	78
432	3	7	442
58	0	3	61
568	3	10	

N W E S

Heavys	Trucks	Cars	Totals
0	0	46	46
7	3	286	296
3	2	91	96
10	5	423	

Bowes St

Cars	Trucks	Heavys	Totals
382	3	14	399

Oastler Park Dr

Peds Cross: ⧗
West Peds: 0
West Entering: 438
West Leg Total: 1068

Cars	166
Trucks	2
Heavys	6
Totals	174

Cars	126	6	40	172
Trucks	2	0	0	2
Heavys	1	2	7	10
Totals	129	8	47	

Peds Cross: ⋈
South Peds: 0
South Entering: 184
South Leg Total: 358

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Afternoon Peak Diagram

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

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

Municipality: Parry Sound
Site #: 1810300002
Intersection: Bowes St & Oastler Park Dr
TFR File #: 1
Count date: 10-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Bowes St runs W/E

North Leg Total: 313
North Entering: 161
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	1	1
Trucks	0	0	0	0
Cars	49	21	90	160
Totals	49	21	91	

Heavys	1
Trucks	1
Cars	150
Totals	152

East Leg Total: 1442
East Entering: 660
East Peds: 0
Peds Cross: ⧗

Louisa St

Heavys	Trucks	Cars	Totals
8	4	681	693

Bowes St

N
W E
S

Cars	Trucks	Heavys	Totals
75	0	0	75
499	3	7	509
73	0	3	76
647	3	10	

Heavys	Trucks	Cars	Totals
0	0	56	56
2	3	600	605
2	0	170	172
4	3	826	

Bowes St

Cars	Trucks	Heavys	Totals
773	3	6	782

Oastler Park Dr

Peds Cross: ⧗
West Peds: 0
West Entering: 833
West Leg Total: 1526

Cars	264
Trucks	0
Heavys	5
Totals	269

Cars	133	19	83	235
Trucks	1	1	0	2
Heavys	1	1	3	5
Totals	135	21	86	

Peds Cross: ⋈
South Peds: 0
South Entering: 242
South Leg Total: 511

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Total Count Diagram

Municipality: Parry Sound
Site #: 1810300002
Intersection: Bowes St & Oastler Park Dr
TFR File #: 1
Count date: 10-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Bowes St runs W/E

North Leg Total: 1551
North Entering: 786
North Peds: 3
Peds Cross: ⋈

Heavys	1	2	2	5
Trucks	1	0	1	2
Cars	292	87	400	779
Totals	294	89	403	

Heavys	8
Trucks	3
Cars	754
Totals	765

East Leg Total: 6403
East Entering: 3300
East Peds: 2
Peds Cross: ⧗

Louisa St

Heavys	Trucks	Cars	Totals
48	17	3442	3507

Bowes St

Cars	Trucks	Heavys	Totals
379	2	3	384
2501	11	41	2553
343	4	16	363
3223	17	60	

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	289	289
40	15	2267	2322
12	7	608	627
52	22	3164	

Bowes St

Cars	Trucks	Heavys	Totals
3012	19	72	3103

Oastler Park Dr

Peds Cross: ⧗
West Peds: 0
West Entering: 3238
West Leg Total: 6745

Cars	1038
Trucks	11
Heavys	30
Totals	1079

Cars	649	86	345	1080
Trucks	5	1	3	9
Heavys	6	5	30	41
Totals	660	92	378	

Peds Cross: ⋈
South Peds: 0
South Entering: 1130
South Leg Total: 2209

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 11:15:00
To: 12:15:00

Municipality: Parry Sound
Site #: 1810300002
Intersection: Bowes St & Oastler Park Dr
TFR File #: 1
Count date: 11-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Bowes St runs W/E

North (Louisa St)

North Leg Total: 455
North Entering: 233
North Peds: 1
Peds Cross: ⋈

Heavys	0	0	0	0
Trucks	0	1	0	1
Cars	98	29	105	232
Totals	98	30	105	

Heavys	0
Trucks	2
Cars	220
Totals	222

Louisa St

East (Bowes St)

East Leg Total: 1552
East Entering: 837
East Peds: 1
Peds Cross: ⧗

Cars	Trucks	Heavys	Totals
115	1	0	116
615	2	6	623
96	1	1	98
826	4	7	

Bowes St

Cars	Trucks	Heavys	Totals
708	2	5	715

West (Bowes St)

Heavys	Trucks	Cars	Totals
7	2	866	875

Bowes St

Heavys	Trucks	Cars	Totals
0	1	75	76
4	2	529	535
1	0	119	120
5	3	723	

Peds Cross: ⧗
West Peds: 0
West Entering: 731
West Leg Total: 1606

N
W E
S

South (Oastler Park Dr)

Oastler Park Dr

Cars	244
Trucks	2
Heavys	2
Totals	248

Cars	153	30	74	257
Trucks	0	0	0	0
Heavys	1	0	1	2
Totals	154	30	75	

Peds Cross: ⋈
South Peds: 0
South Entering: 259
South Leg Total: 507

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Total Count Diagram

Municipality: Parry Sound
Site #: 1810300002
Intersection: Bowes St & Oastler Park Dr
TFR File #: 1
Count date: 11-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

**** Signalized Intersection ****

Major Road: Bowes St runs W/E

North Leg (Louisa St)

North Leg Total: 1170
North Entering: 594
North Peds: 6
Peds Cross: ⋈

Heavys	0	1	0	1
Trucks	0	1	0	1
Cars	208	68	316	592
Totals	208	70	316	

Heavys	2
Trucks	2
Cars	572
Totals	576

East Leg (Bowes St)

East Leg Total: 4413
East Entering: 2228
East Peds: 2
Peds Cross: ⧗

Cars	Trucks	Heavys	Totals
305	1	1	307
1670	7	13	1690
228	1	2	231
2203	9	16	

Bowes St

Cars	Trucks	Heavys	Totals
2167	9	9	2185

West Leg (Bowes St)

Heavys	Trucks	Cars	Totals
18	7	2252	2277

Bowes St

Heavys	Trucks	Cars	Totals
1	1	194	196
8	9	1638	1655
3	1	358	362
12	11	2190	

N, E, S, W

Peds Cross: ⧗
West Peds: 2
West Entering: 2213
West Leg Total: 4490

South Leg (Oastler Park Dr)

Cars	654
Trucks	3
Heavys	6
Totals	663

Cars	374	73	213	660
Trucks	0	0	0	0
Heavys	5	0	1	6
Totals	379	73	214	

Peds Cross: ⋈
South Peds: 1
South Entering: 666
South Leg Total: 1329

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 9:00:00
To: 10:00:00

Municipality: Parry Sound
Site #: 1810300003
Intersection: Oastler Park Dr & Commercial Acc
TFR File #: 1
Count date: 10-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: Oastler Park Dr runs N/S

North Leg Total: 358
North Entering: 175
North Peds: 0
Peds Cross: ⋈

Heavys	0	7	0	7
Trucks	1	1	0	2
Cars	51	111	4	166
Totals	52	119	4	

Heavys	7
Trucks	7
Cars	169
Totals	183

East Leg Total: 11
East Entering: 6
East Peds: 0
Peds Cross: ⧗

Oastler Park Dr

Heavys	Trucks	Cars	Totals
0	1	110	111

Cars	Trucks	Heavys	Totals
0	0	0	0
2	0	0	2
4	0	0	4
6	0	0	

Commercial Access

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	26	26
0	0	1	1
1	0	42	43
1	0	69	

driveway

Cars	Trucks	Heavys	Totals
5	0	0	5

Oastler Park Dr

Peds Cross: ⧗
West Peds: 0
West Entering: 70
West Leg Total: 181

Cars	157
Trucks	1
Heavys	8
Totals	166

Cars	57	143	0	200
Trucks	0	7	0	7
Heavys	0	7	0	7
Totals	57	157	0	

Peds Cross: ⋈
South Peds: 0
South Entering: 214
South Leg Total: 380

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Afternoon Peak Diagram

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

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

Municipality: Parry Sound
Site #: 1810300003
Intersection: Oastler Park Dr & Commercial Acc
TFR File #: 1
Count date: 10-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: Oastler Park Dr runs N/S

North Leg Total: 507
North Entering: 272
North Peds: 0
Peds Cross: ⋈

Heavys	0	4	0	4
Trucks	1	2	0	3
Cars	64	199	2	265
Totals	65	205	2	

Heavys	5
Trucks	1
Cars	229
Totals	235

East Leg Total: 4
East Entering: 2
East Peds: 0
Peds Cross: ⧗

Oastler Park Dr

Heavys	Trucks	Cars	Totals
0	1	104	105

Commercial Access

Cars	Trucks	Heavys	Totals
2	0	0	2
0	0	0	0
0	0	0	0
2	0	0	

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	68	68
0	0	0	0
0	0	76	76
0	0	144	

driveway

Cars	Trucks	Heavys	Totals
2	0	0	2

Oastler Park Dr

Peds Cross: ⧗
West Peds: 0
West Entering: 144
West Leg Total: 249

Cars	275
Trucks	2
Heavys	4
Totals	281

Cars	40	159	0	199
Trucks	0	1	0	1
Heavys	0	5	0	5
Totals	40	165	0	

Peds Cross: ⋈
South Peds: 0
South Entering: 205
South Leg Total: 486

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Total Count Diagram

Municipality: Parry Sound
Site #: 1810300003
Intersection: Oastler Park Dr & Commercial Acc
TFR File #: 1
Count date: 10-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: Oastler Park Dr runs N/S

North Leg Total: 2197
North Entering: 1082
North Peds: 1
Peds Cross: ⋈

Heavys	1	30	0	31
Trucks	3	11	0	14
Cars	306	718	13	1037
Totals	310	759	13	

Heavys	38
Trucks	18
Cars	1059
Totals	1115

East Leg Total: 34
East Entering: 17
East Peds: 0
Peds Cross: ⧗

Oastler Park Dr

Heavys	Trucks	Cars	Totals
2	6	531	539

Commercial Access

Cars	Trucks	Heavys	Totals
4	0	0	4
6	0	0	6
7	0	0	7
17	0	0	

N
W E
S

Heavys	Trucks	Cars	Totals
2	1	269	272
0	0	2	2
2	0	290	292
4	1	561	

driveway

Cars	Trucks	Heavys	Totals
17	0	0	17

Oastler Park Dr

Peds Cross: ⧗
West Peds: 0
West Entering: 566
West Leg Total: 1105

Cars	1015
Trucks	11
Heavys	32
Totals	1058

Cars	219	786	2	1007
Trucks	3	17	0	20
Heavys	1	36	0	37
Totals	223	839	2	

Peds Cross: ⋈
South Peds: 0
South Entering: 1064
South Leg Total: 2122

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Mid-day Peak Diagram

Specified Period		One Hour Peak	
From:	11:00:00	From:	11:15:00
To:	14:00:00	To:	12:15:00

Municipality: Parry Sound
Site #: 1810300003
Intersection: Oastler Park Dr & Commercial Acc
TFR File #: 1
Count date: 11-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: Oastler Park Dr runs N/S

North Leg Total: 515
North Entering: 251
North Peds: 0
Peds Cross: ⋈

Heavys	1	1	0	2
Trucks	0	2	0	2
Cars	105	136	6	247
Totals	106	139	6	

Heavys	2
Trucks	1
Cars	261
Totals	264

East Leg Total: 20
East Entering: 12
East Peds: 0
Peds Cross: ⧗

Oastler Park Dr

Heavys	Trucks	Cars	Totals
1	1	165	167

Commercial Access

Cars	Trucks	Heavys	Totals
10	0	0	10
1	0	0	1
1	0	0	1
12	0	0	

N
W E
S

driveway

Heavys	Trucks	Cars	Totals
1	0	88	89
0	0	1	1
0	0	70	70
1	0	159	

Cars	Trucks	Heavys	Totals
8	0	0	8

Oastler Park Dr

Peds Cross: ⧗
West Peds: 0
West Entering: 160
West Leg Total: 327

Cars	207
Trucks	2
Heavys	1
Totals	210

Cars	59	163	1	223
Trucks	1	1	0	2
Heavys	0	1	0	1
Totals	60	165	1	

Peds Cross: ⋈
South Peds: 0
South Entering: 226
South Leg Total: 436

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Total Count Diagram

Municipality: Parry Sound
Site #: 1810300003
Intersection: Oastler Park Dr & Commercial Acc
TFR File #: 1
Count date: 11-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: Oastler Park Dr runs N/S

North Leg Total: 1328
North Entering: 668
North Peds: 0
Peds Cross: ⋈

Heavys	1	5	0	6
Trucks	0	5	0	5
Cars	239	403	15	657
Totals	240	413	15	

Heavys	6
Trucks	2
Cars	652
Totals	660

East Leg Total: 42
East Entering: 22
East Peds: 1
Peds Cross: ⧗

Oastler Park Dr

Heavys	Trucks	Cars	Totals
1	3	401	405

Commercial Access

Cars	Trucks	Heavys	Totals
14	0	0	14
4	0	0	4
4	0	0	4
22	0	0	

N
W E
S

Heavys	Trucks	Cars	Totals
1	0	223	224
0	0	3	3
0	0	221	221
1	0	447	

driveway

Cars	Trucks	Heavys	Totals
20	0	0	20

Oastler Park Dr

Peds Cross: ⧗
West Peds: 0
West Entering: 448
West Leg Total: 853

Cars	628
Trucks	5
Heavys	5
Totals	638

Cars	158	415	2	575
Trucks	3	2	0	5
Heavys	0	5	0	5
Totals	161	422	2	

Peds Cross: ⋈
South Peds: 2
South Entering: 585
South Leg Total: 1223

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 11:45:00
To: 12:45:00

Municipality: Parry Sound
Site #: 1810300004
Intersection: Bowes St & HWY 400 West termin
TFR File #: 1
Count date: 11-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: Bowes St runs W/E

North Leg Total: 340
North Entering: 340
North Peds: 0
Peds Cross: ⋈

Heavys	2	0	0	2
Trucks	2	0	0	2
Cars	332	0	4	336
Totals	336	0	4	

Heavys	0
Trucks	0
Cars	0
Totals	0

East Leg Total: 874
East Entering: 489
East Peds: 0
Peds Cross: ⧗

HWY 400 West terminal

Heavys	Trucks	Cars	Totals
4	4	803	811

Cars	Trucks	Heavys	Totals
0	0	0	0
471	2	2	475
14	0	0	14
485	2	2	

Bowes St

N
W E
S

Bowes St

Heavys	Trucks	Cars	Totals
0	0	0	0
4	1	376	381
1	4	369	374
5	5	745	

Cars	Trucks	Heavys	Totals
380	1	4	385

HWY 400 West terminal

Peds Cross: ⧗
West Peds: 0
West Entering: 755
West Leg Total: 1566

Cars	383
Trucks	4
Heavys	1
Totals	388

Cars	0	0	0	0
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	0	0	0	

Peds Cross: ⋈
South Peds: 0
South Entering: 0
South Leg Total: 388

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Total Count Diagram

Municipality: Parry Sound
Site #: 1810300004
Intersection: Bowes St & HWY 400 West termin
TFR File #: 1
Count date: 11-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: Bowes St runs W/E

North Leg (HWY 400 West terminal)

North Leg Total: 962
North Entering: 962
North Peds: 0
Peds Cross: ⋈

Heavys	3	0	1	4
Trucks	6	0	0	6
Cars	942	1	9	952
Totals	951	1	10	

Heavys	0
Trucks	0
Cars	0
Totals	0

HWY 400 West terminal

East Leg (Bowes St)

East Leg Total: 2469
East Entering: 1359
East Peds: 0
Peds Cross: ⧗

Cars	Trucks	Heavys	Totals
0	0	0	0
1307	5	12	1324
35	0	0	35
1342	5	12	

Bowes St

Cars	Trucks	Heavys	Totals
1100	4	6	1110

West Leg (Bowes St)

Heavys	Trucks	Cars	Totals
15	11	2249	2275

Bowes St

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	0	0
5	4	1091	1100
4	15	1067	1086
9	19	2158	

Peds Cross: ⧗
West Peds: 0
West Entering: 2186
West Leg Total: 4461

South Leg (HWY 400 West terminal)

HWY 400 West terminal

Cars	1103
Trucks	15
Heavys	4
Totals	1122

Cars	0	0	0	0
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	0	0	0	

Peds Cross: ⋈
South Peds: 0
South Entering: 0
South Leg Total: 1122

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 11:30:00
To: 12:30:00

Municipality: Parry Sound
Site #: 1810300005
Intersection: McDougall Rd & HWY 400 East ter
TFR File #: 1
Count date: 11-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: McDougall Rd runs N/S

North Leg Total: 134
North Entering: 64
North Peds: 0
Peds Cross: ⋈

Heavys	1	0	1
Trucks	0	0	0
Cars	8	55	63
Totals	9	55	

Heavys	1
Trucks	0
Cars	69
Totals	70

McDougall Rd

Heavys	Trucks	Cars	Totals
5	0	320	325

HWY 400 East terminal

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	11	11
2	3	453	458
2	3	464	

McDougall Rd

Peds Cross: ⧗
West Peds: 0
West Entering: 469
West Leg Total: 794

Cars	508
Trucks	3
Heavys	2
Totals	513

Cars	312	58	370
Trucks	0	0	0
Heavys	4	1	5
Totals	316	59	

Peds Cross: ⋈
South Peds: 0
South Entering: 375
South Leg Total: 888

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis

Accu-Traffic Inc.

Total Count Diagram

Municipality: Parry Sound
Site #: 1810300005
Intersection: McDougall Rd & HWY 400 East ter
TFR File #: 1
Count date: 11-Aug-18

Weather conditions:

Person counted:
Person prepared:
Person checked:

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

Major Road: McDougall Rd runs N/S

North Leg Total: 367
North Entering: 173
North Peds: 0
Peds Cross:

Heavys	1	1	2
Trucks	0	0	0
Cars	24	147	171
Totals	25	148	

Heavys	2
Trucks	0
Cars	192
Totals	194

McDougall Rd

Heavys	Trucks	Cars	Totals
5	1	973	979

HWY 400 East terminal

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	36	36
11	4	1202	1217
11	4	1238	

McDougall Rd

Peds Cross:
West Peds: 0
West Entering: 1253
West Leg Total: 2232

Cars	1349
Trucks	4
Heavys	12
Totals	1365

Cars	949	156	1105
Trucks	1	0	1
Heavys	4	2	6
Totals	954	158	

Peds Cross:
South Peds: 0
South Entering: 1112
South Leg Total: 2477

Comments

Ministry of Transportation
Ministère des Transports
2017

Version: 1.0 Feb 1, 2016

Intersection Layout Sheet

Contract # 2015-E-0010
Work Order # 207

Date: August / 25 Day: Tu / Hrs: 7 - 9 + 11 - 14 + 15 - 18

Location: HWY400 @ BOWES ST/MCDOUGALL DR IC224 Ramps: East 125,26,42

Reg/Mun: NER Town/City: Parry Sound Area:

File Name: 3470830000 Device: Gretch / Jamar Unit #: 16 / Interval 1: (AM) NN / PM

Observer: Alena Mariyskaya Weather: Cloudy / Cloudy Road Condition: Dry / Dry

LHRS & O/S: 47083 0

GPS: G-Star IV

Datum: WGS 84 (Y) / N

Lat: 45.348622

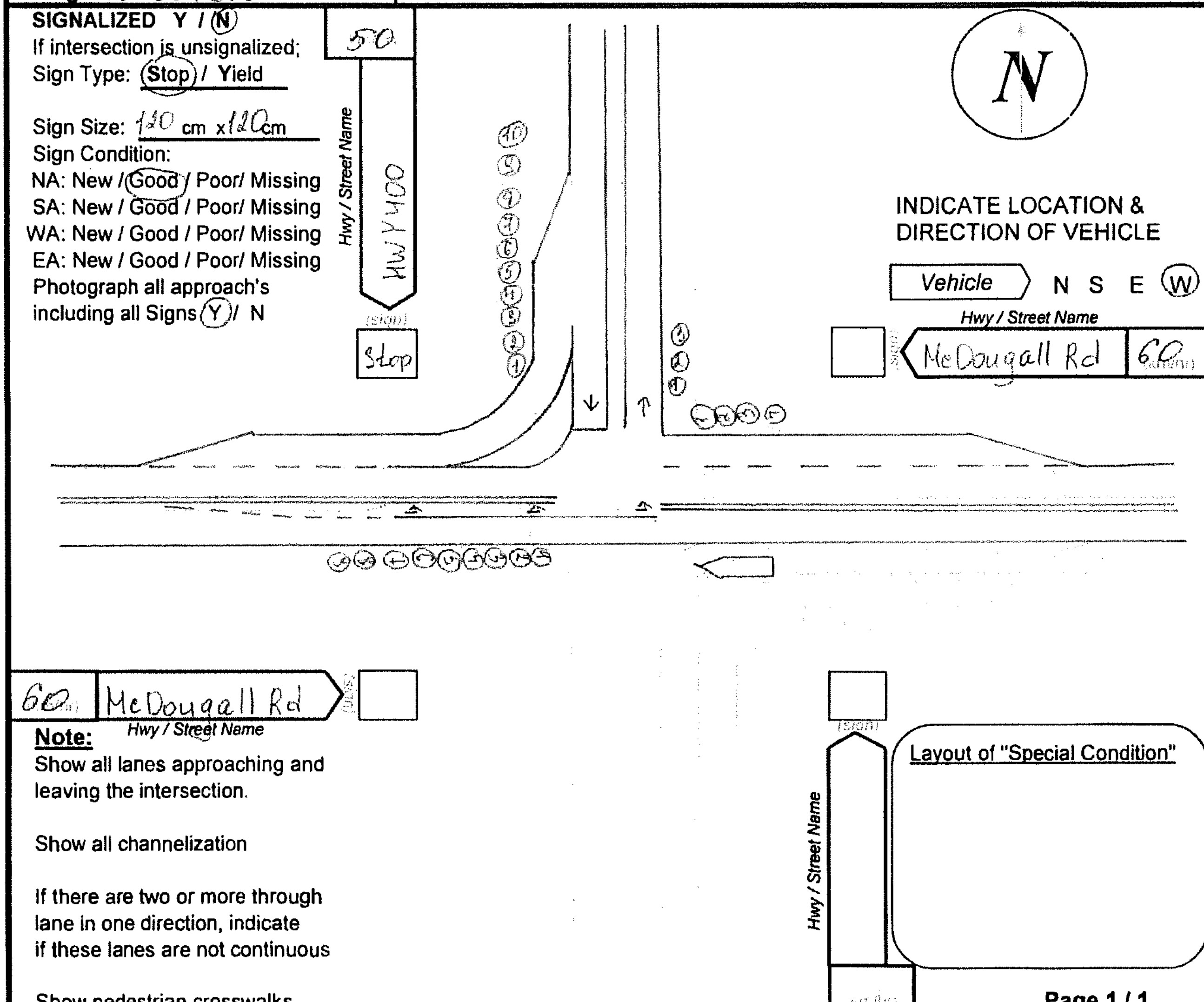
Long: -80.001380

Comments:

SIGNALIZED Y / (N)

If intersection is unsignalized;
Sign Type: (Stop) / Yield

Sign Size: 120 cm x 120 cm
Sign Condition:
NA: New / (Good) / Poor/ Missing
SA: New / Good / Poor/ Missing
WA: New / Good / Poor/ Missing
EA: New / Good / Poor/ Missing
Photograph all approach's including all Signs (Y) / N



Note:
Show all lanes approaching and leaving the intersection.

Show all channelization

If there are two or more through lane in one direction, indicate if these lanes are not continuous

Show pedestrian crosswalks

Layout of "Special Condition"

Page 1 / 1

Ministry of Transportation
Ministère des Transports
2017

Intersection Layout Sheet

Contract # 8015-E-0010
Work Order # 206

Date: August / 28 Day: Tu / Hrs: 7 - 9 + 11 - 14 + 15 - 18

Location: HWY400@ BOWES ST/MCDOUGALL DR IC 224 Ramps: West / 35, 36 58, 63

Reg/Mun: NER Town/City: Parry Sound Area:

File Name: 44702 30000 Device: Gretch / Jamar Unit # 16 / Interval 1: AM / NN / PM

Observer: Olena Mariyshays Weather: Cloudy / Cloudy Road Condition: Dry / Dry

LHRS & O/S: 47023 0

GPS: G-Star IV

Datum: WGS 84 Y / N

Lat: 45.345764

Long: -80.004421

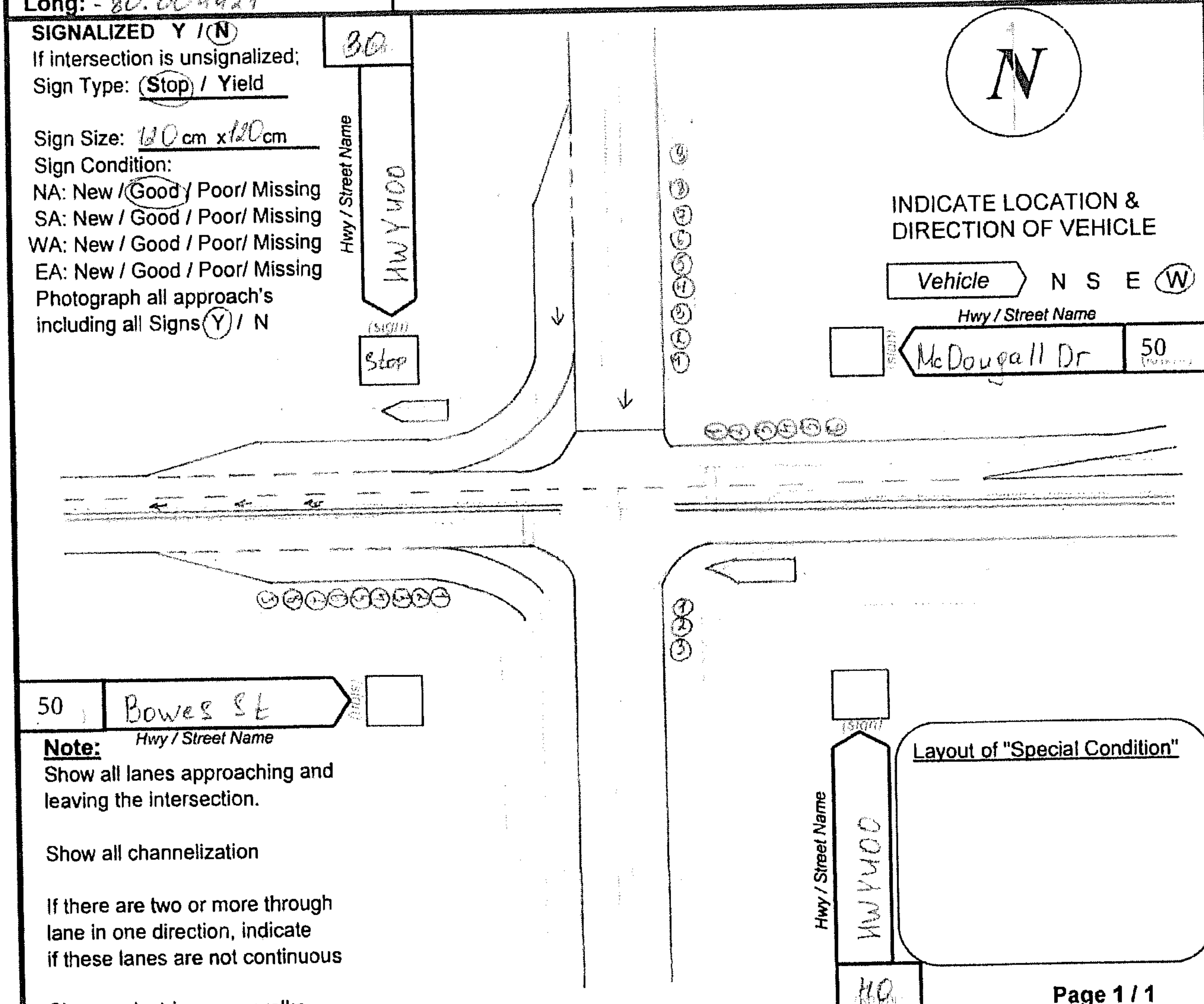
Comments:

SIGNALIZED Y / N
If intersection is unsignalized;
Sign Type: Stop / Yield

Sign Size: 120 cm x 120 cm
Sign Condition:
NA: New / Good / Poor/ Missing
SA: New / Good / Poor/ Missing
WA: New / Good / Poor/ Missing
EA: New / Good / Poor/ Missing
Photograph all approach's including all Signs Y / N

INDICATE LOCATION & DIRECTION OF VEHICLE

Vehicle N S E W



Layout of "Special Condition"

Note:
Show all lanes approaching and leaving the intersection.

Show all channelization

If there are two or more through lane in one direction, indicate if these lanes are not continuous

Show pedestrian crosswalks

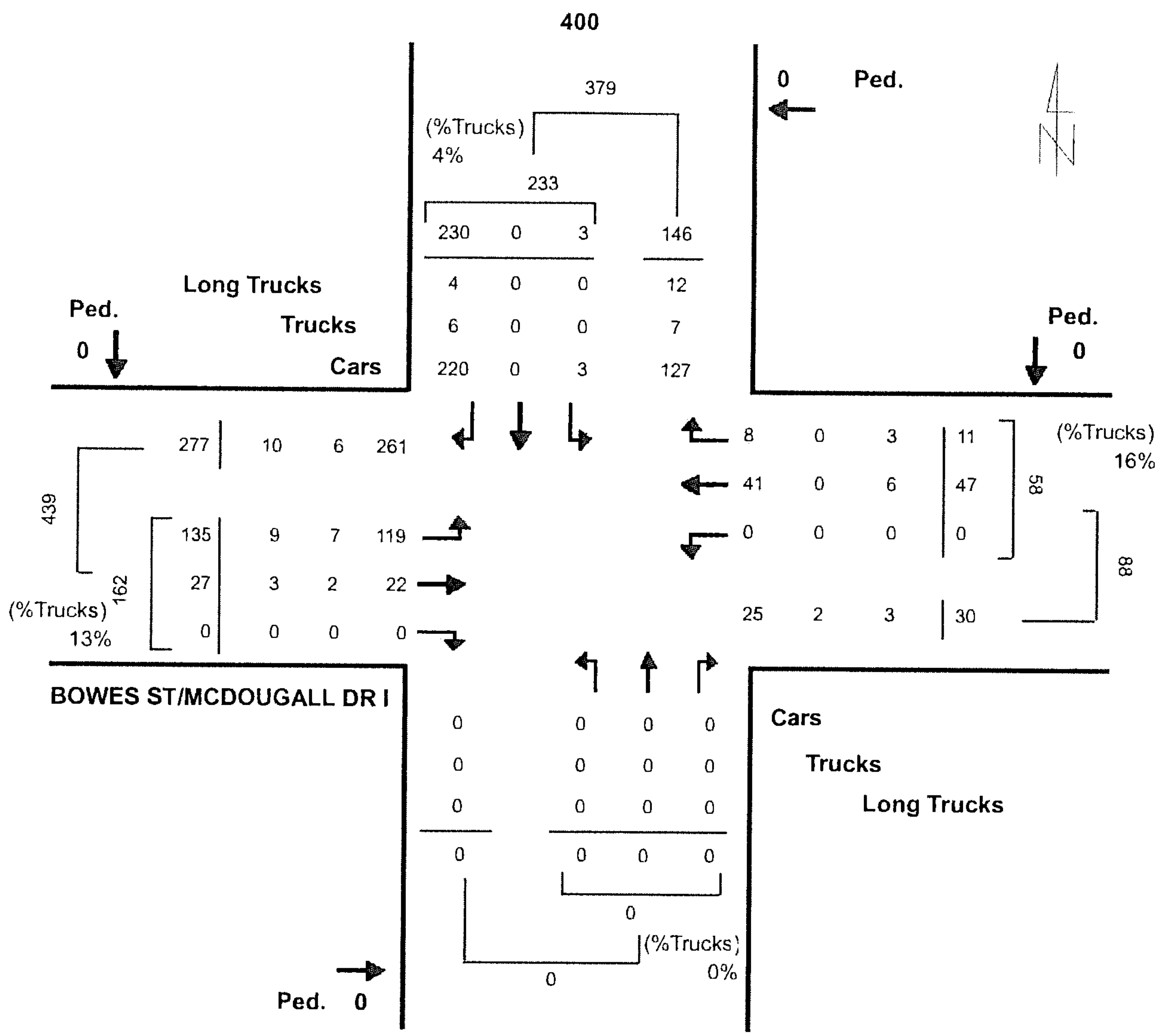
Traffic
Engineering
Software

AM Peak Hour Diagram

HWY 400 @ BOWES ST/MCDOUGALL DR IC 224

Northern

Intersection ID:470230000(--E--) PK HR End: 8:45 Day: Tuesday Date:29-Aug-2017



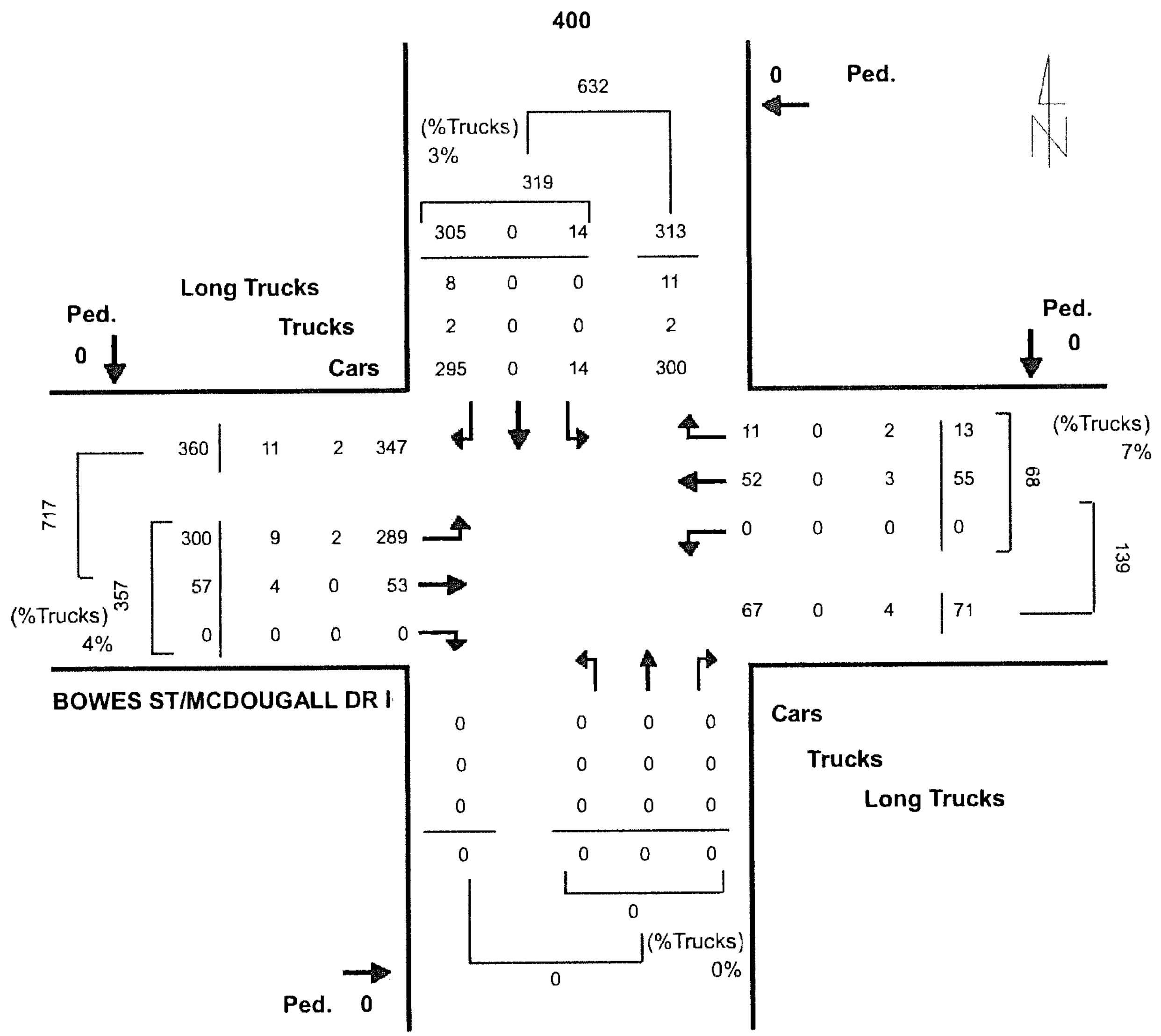
MD Peak Hour Diagram

Traffic
Engineering
Software

HWY 400 @ BOWES ST/MCDOUGALL DR IC 224

Northern

Intersection ID:470230000(--E--) **PK HR End: 13:00** **Day: Tuesday** **Date:29-Aug-2017**



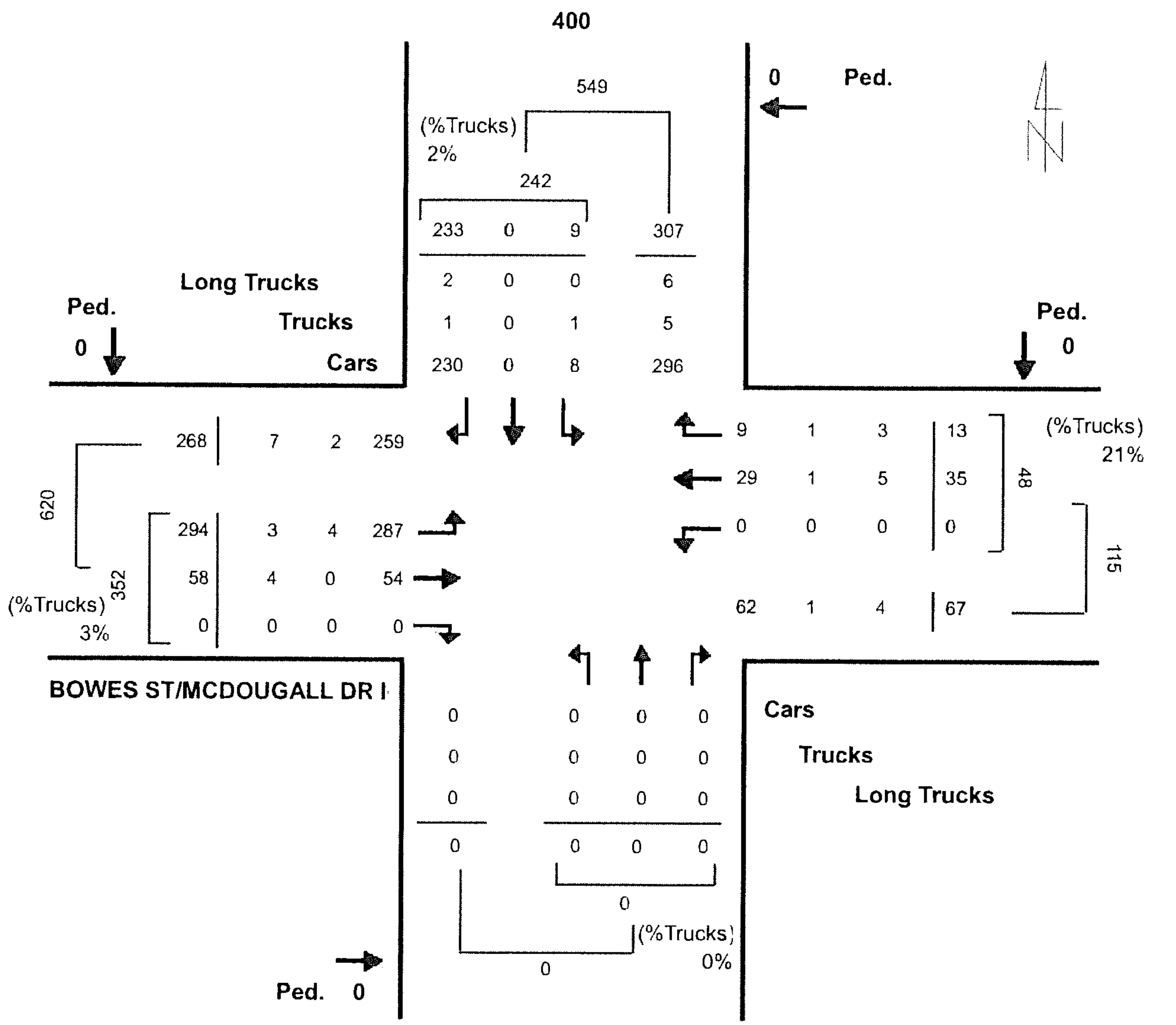
Traffic
Engineering
Software

PM Peak Hour Diagram

HWY 400 @ BOWES ST/MCDOUGALL DR IC 224

Northern

Intersection ID:470230000(--E--) **PK HR End: 16:30** **Day: Tuesday** **Date:29-Aug-2017**

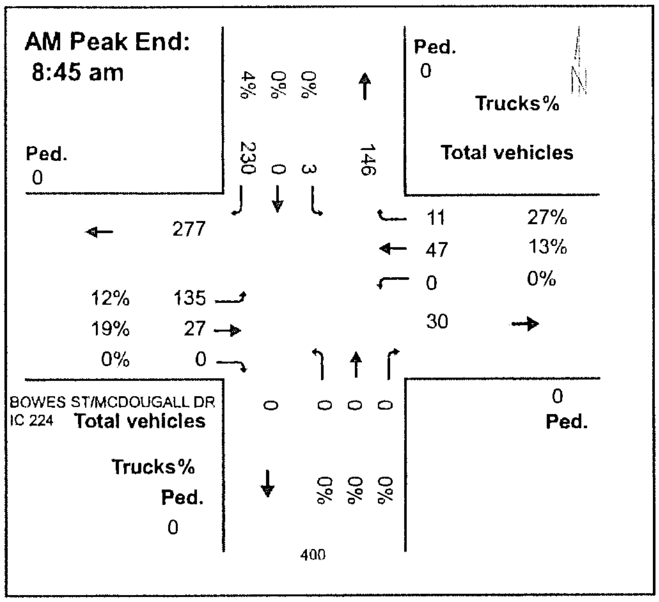


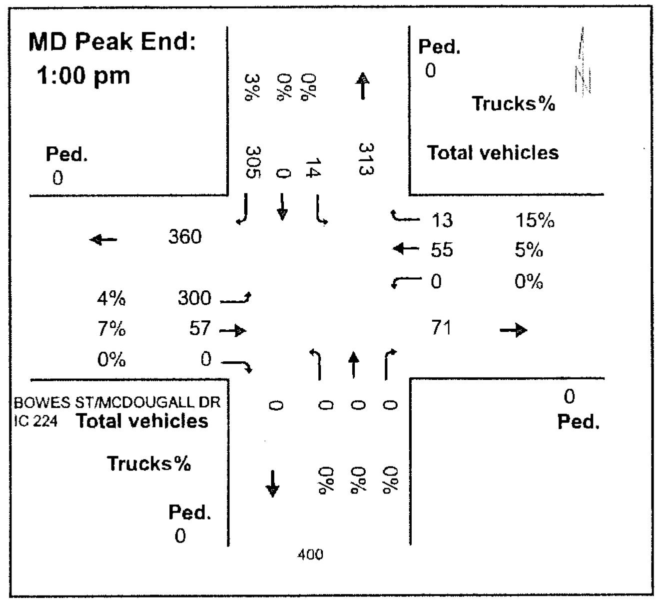
Ontario

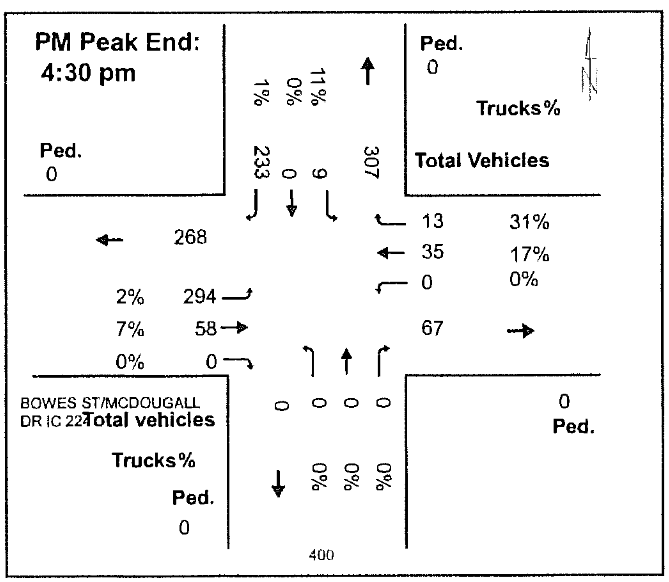
HWY 400 @ BOWES ST/MCDOUGALL DR IC 224

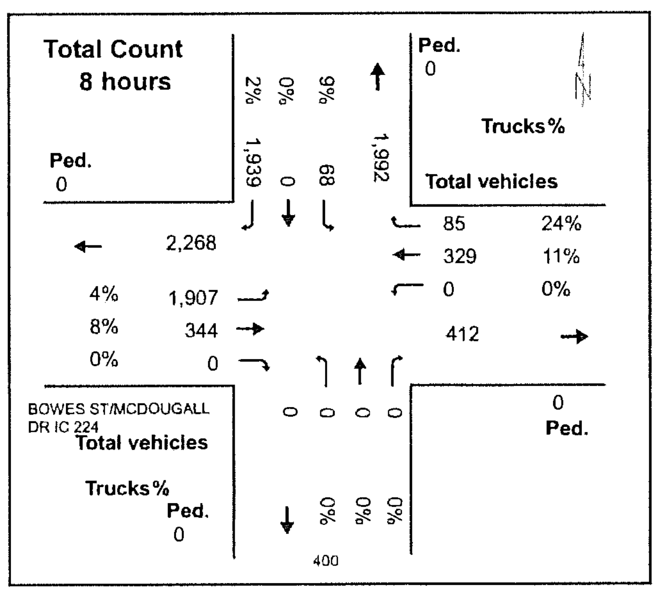
Northern

Intersection ID:470230000(--E--) Count Day: Tuesday Count Date: 29-Aug-2017









15 MIN REPORT

Intersection ID:470230000(--E--) **HWY 400 @ BOWES ST/MCDOUGALL DR IC 224** **Municipality: Northern** **Date: 29-Aug-2017**

NORTH APPROACH / EAST APPROACH

Time	NORTH Cars Left	NORTH Cars Thru	NORTH Cars Right	NORTH Trucks Left	NORTH Trucks Thru	NORTH Trucks Right	NORTH Heavies Left	NORTH Heavies Thru	NORTH Heavies Right	NORTH Ped	EAST Cars Left	EAST Cars Thru	EAST Cars Right	EAST Trucks Left	EAST Trucks Thru	EAST Trucks Right	EAST Heavies Left	EAST Heavies Thru	EAST Heavies Right	EAST Ped
Period1																				
7:15	0	0	27	0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	1	0
7:30	1	0	48	0	0	3	0	0	1	0	0	6	1	0	0	0	0	0	0	0
7:45	0	0	33	0	0	1	0	0	1	0	0	7	0	0	0	0	0	0	0	0
8:00	0	0	61	0	0	3	0	0	1	0	0	9	0	0	0	0	0	3	0	0
8:15	2	0	49	0	0	1	0	0	1	0	0	11	1	0	0	0	0	2	0	0
8:30	0	0	53	0	0	1	0	0	2	0	0	15	6	0	0	0	0	0	1	0
8:45	1	0	57	0	0	1	0	0	0	0	0	6	1	0	0	0	0	1	2	0
9:00	0	0	60	0	0	2	1	0	3	0	0	4	2	0	0	0	0	0	0	0
Period2																				
11:15	4	0	69	0	0	0	0	0	0	0	0	10	2	0	1	0	0	3	0	0
11:30	1	0	84	0	0	0	1	0	0	0	0	9	1	0	0	0	0	3	0	0
11:45	2	0	59	0	0	0	0	0	1	0	0	11	3	0	0	0	0	2	0	0
12:00	1	0	98	0	0	1	0	0	0	0	0	7	5	0	0	1	0	1	2	0
12:15	3	0	68	0	0	1	0	0	2	0	0	8	1	0	0	0	0	0	0	0
12:30	5	0	77	0	0	0	0	0	2	0	0	10	4	0	0	0	0	1	0	0
12:45	4	0	76	0	0	0	0	0	2	0	0	16	2	0	0	0	0	1	1	0
13:00	2	0	74	0	0	1	0	0	2	0	0	18	4	0	0	0	0	1	1	0
13:15	0	0	76	0	0	2	2	0	1	0	0	10	5	0	1	0	0	2	0	0
13:30	4	0	67	0	0	0	1	0	0	0	0	8	1	0	0	0	0	1	1	0
13:45	6	0	56	0	0	0	0	0	1	0	0	17	2	0	0	0	0	0	1	0
14:00	4	0	68	0	0	0	0	0	0	0	0	9	2	0	0	0	0	1	1	0
Period3																				
15:15	1	0	50	0	0	1	0	0	0	0	0	11	3	0	0	0	0	2	0	0
15:30	3	0	51	0	0	1	0	0	0	0	0	12	2	0	1	0	0	0	2	0
15:45	3	0	53	0	0	0	0	0	1	0	0	9	1	0	1	1	0	2	2	0
16:00	2	0	58	1	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0
16:15	1	0	52	0	0	1	0	0	1	0	0	6	1	0	0	0	0	2	0	0
16:30	2	0	67	0	0	0	0	0	0	0	0	10	3	0	0	0	0	1	1	0
16:45	3	0	53	0	0	1	0	0	1	0	0	4	2	0	0	0	0	0	0	0
17:00	2	0	42	0	0	1	0	0	0	0	0	9	1	0	0	0	0	2	1	0
17:15	1	0	55	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
17:30	2	0	51	0	0	0	0	0	0	0	0	9	1	0	0	0	0	0	0	0
17:45	1	0	49	0	0	0	0	0	1	0	0	6	1	0	0	0	0	0	1	0
18:00	1	0	52	0	0	0	0	0	0	0	0	2	2	0	0	0	0	1	0	0

SOUTH APPROACH / WEST APPROACH

Time	SOUTH Cars Left	SOUTH Cars Thru	SOUTH Cars Right	SOUTH Trucks Left	SOUTH Trucks Thru	SOUTH Trucks Right	SOUTH Heavies Left	SOUTH Heavies Thru	SOUTH Heavies Right	SOUTH Ped	WEST Cars Left	WEST Cars Thru	WEST Cars Right	WEST Trucks Left	WEST Trucks Thru	WEST Trucks Right	WEST Heavies Left	WEST Heavies Thru	WEST Heavies Right	WEST Ped	Total
Period1																					
7:15	0	0	0	0	0	0	0	0	0	0	21	2	0	0	1	0	2	0	0	0	65
7:30	0	0	0	0	0	0	0	0	0	0	31	5	0	1	0	0	1	0	0	0	98
7:45	0	0	0	0	0	0	0	0	0	0	27	6	0	1	0	0	2	0	0	0	78
8:00	0	0	0	0	0	0	0	0	0	0	27	7	0	2	2	0	0	1	0	0	116
8:15	0	0	0	0	0	0	0	0	0	0	32	4	0	0	0	0	2	1	0	0	106
8:30	0	0	0	0	0	0	0	0	0	0	29	8	0	4	0	0	3	1	0	0	123
8:45	0	0	0	0	0	0	0	0	0	0	31	3	0	1	0	0	4	0	0	0	108
9:00	0	0	0	0	0	0	0	0	0	0	33	6	0	0	0	0	1	0	0	0	112
Period2																					
11:15	0	0	0	0	0	0	0	0	0	0	48	10	0	2	1	0	2	1	0	0	153
11:30	0	0	0	0	0	0	0	0	0	0	48	7	0	0	0	0	1	1	0	0	156
11:45	0	0	0	0	0	0	0	0	0	0	54	6	0	1	0	0	2	0	0	0	141
12:00	0	0	0	0	0	0	0	0	0	0	56	12	0	1	0	0	1	0	0	0	186
12:15	0	0	0	0	0	0	0	0	0	0	68	16	0	2	0	0	3	2	0	0	174
12:30	0	0	0	0	0	0	0	0	0	0	86	9	0	0	0	0	0	1	0	0	195
12:45	0	0	0	0	0	0	0	0	0	0	56	15	0	0	0	0	4	1	0	0	178
13:00	0	0	0	0	0	0	0	0	0	0	79	13	0	0	0	0	2	0	0	0	197
13:15	0	0	0	0	0	0	0	0	0	0	55	11	0	1	0	0	3	0	0	0	169
13:30	0	0	0	0	0	0	0	0	0	0	71	9	0	2	0	0	0	0	0	0	165
13:45	0	0	0	0	0	0	0	0	0	0	64	12	0	1	1	0	6	2	0	0	169
14:00	0	0	0	0	0	0	0	0	0	0	74	11	0	1	0	0	3	2	0	0	176
Period3																					
15:15	0	0	0	0	0	0	0	0	0	0	94	12	0	1	1	0	1	2	0	0	179
15:30	0	0	0	0	0	0	0	0	0	0	56	13	0	0	0	0	3	0	0	0	144
15:45	0	0	0	0	0	0	0	0	0	0	60	16	0	1	0	0	0	1	0	0	151
16:00	0	0	0	0	0	0	0	0	0	0	79	8	0	1	0	0	1	1	0	0	159
16:15	0	0	0	0	0	0	0	0	0	0	77	16	0	1	0	0	1	1	0	0	160
16:30	0	0	0	0	0	0	0	0	0	0	71	14	0	1	0	0	1	1	0	0	172
16:45	0	0	0	0	0	0	0	0	0	0	68	11	0	0	0	0	1	0	0	0	144
17:00	0	0	0	0	0	0	0	0	0	0	74	14	0	0	0	0	0	0	0	0	146
17:15	0	0	0	0	0	0	0	0	0	0	92	9	0	1	0	0	1	1	0	0	170
17:30	0	0	0	0	0	0	0	0	0	0	65	13	0	1	0	0	1	0	0	0	143
17:45	0	0	0	0	0	0	0	0	0	0	50	12	0	1	0	0	2	0	0	0	124
18:00	0	0	0	0	0	0	0	0	0	0	49	8	0	0	0	0	0	0	0	0	115

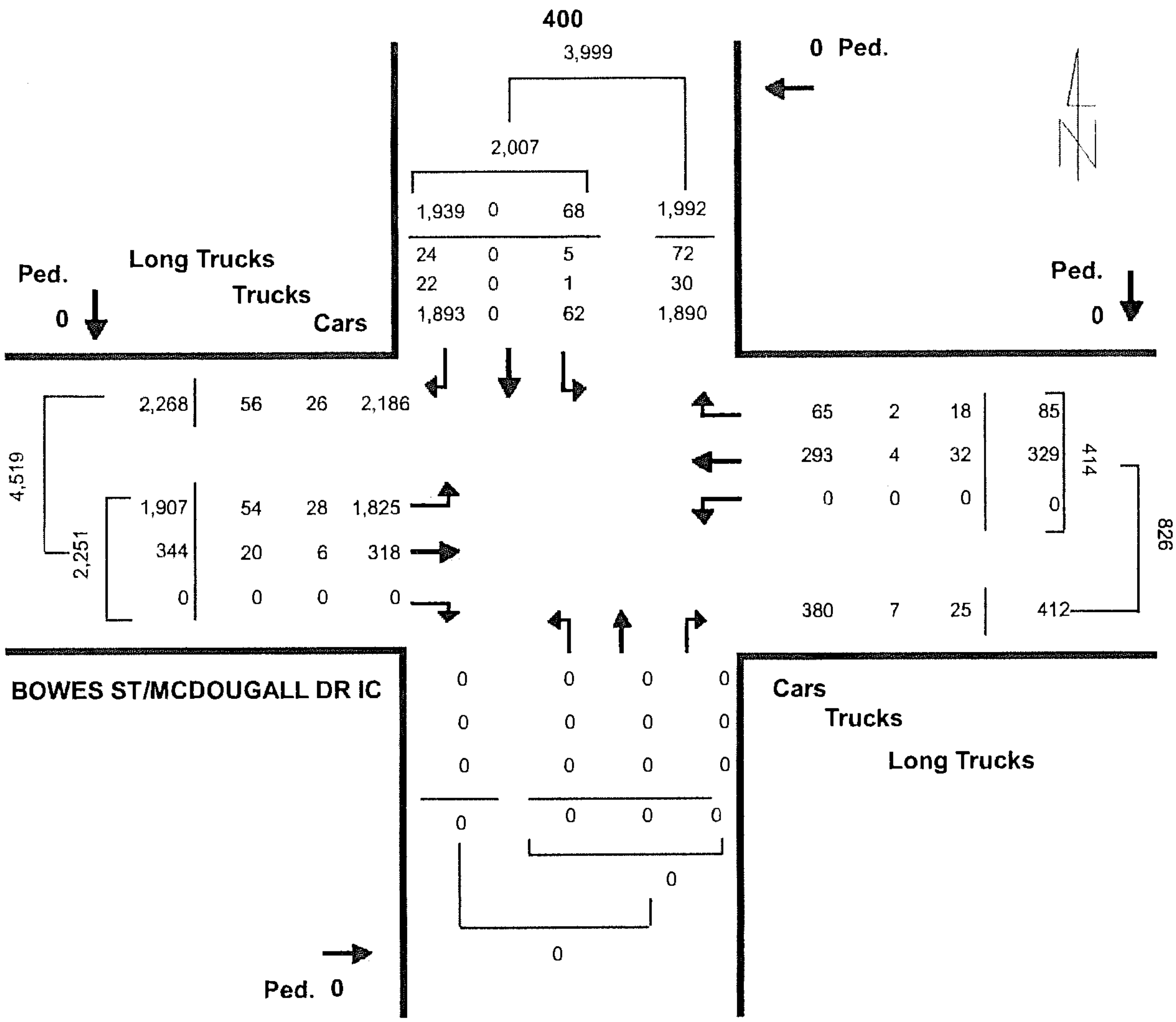
Traffic
Engineering
Software

COUNT TOTAL

HWY 400 @ BOWES ST/MCDOUGALL DR IC 224

Northern

Intersection ID:470230000(--E--) **Date: 29-Aug-2017**



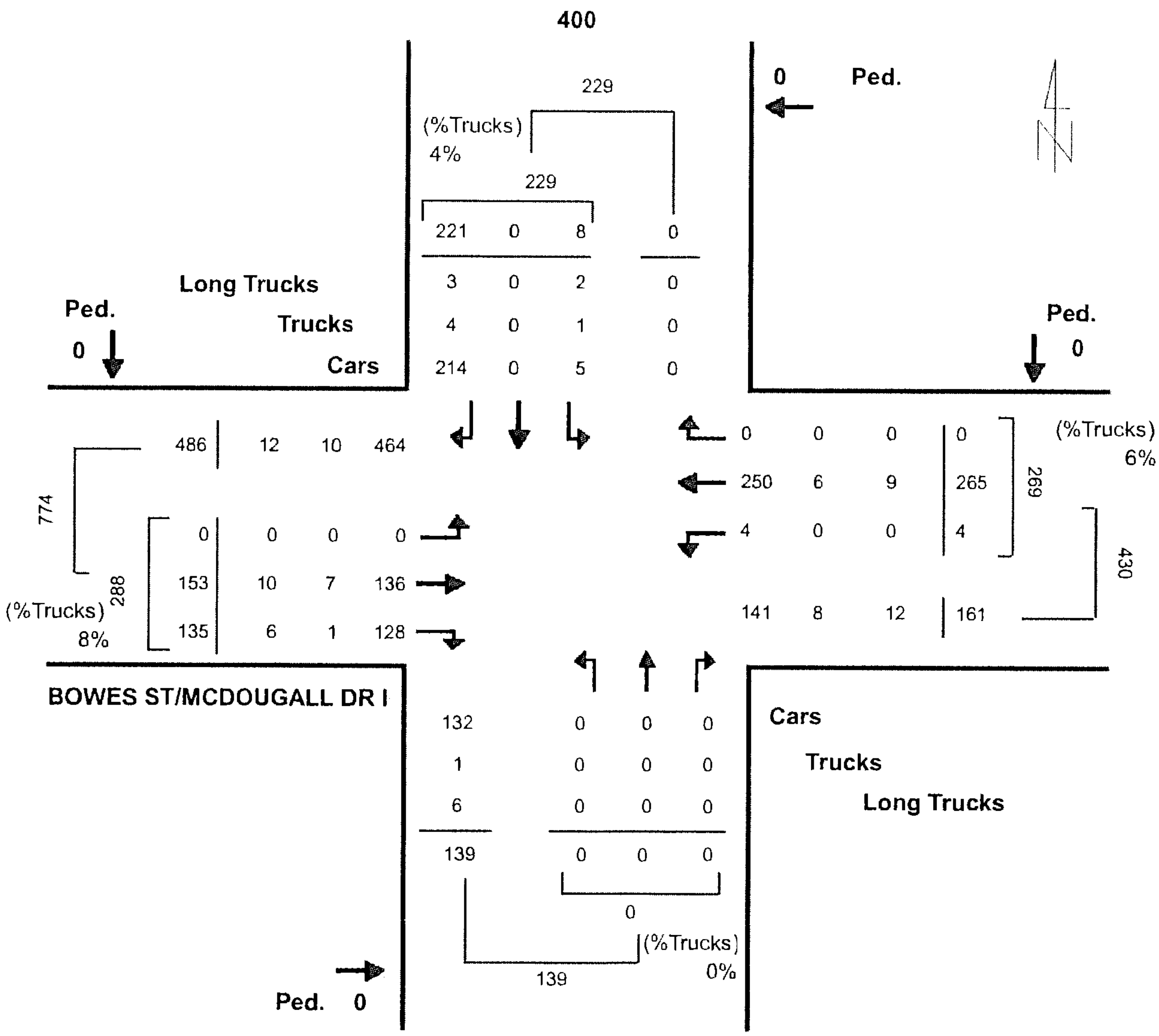
Traffic
Engineering
Software

AM Peak Hour Diagram

HWY 400 @ BOWES ST/MCDOUGALL DR IC 224

Northern

Intersection ID:470230000(--W--) **PK HR End: 8:45** **Day: Tuesday** **Date:29-Aug-2017**



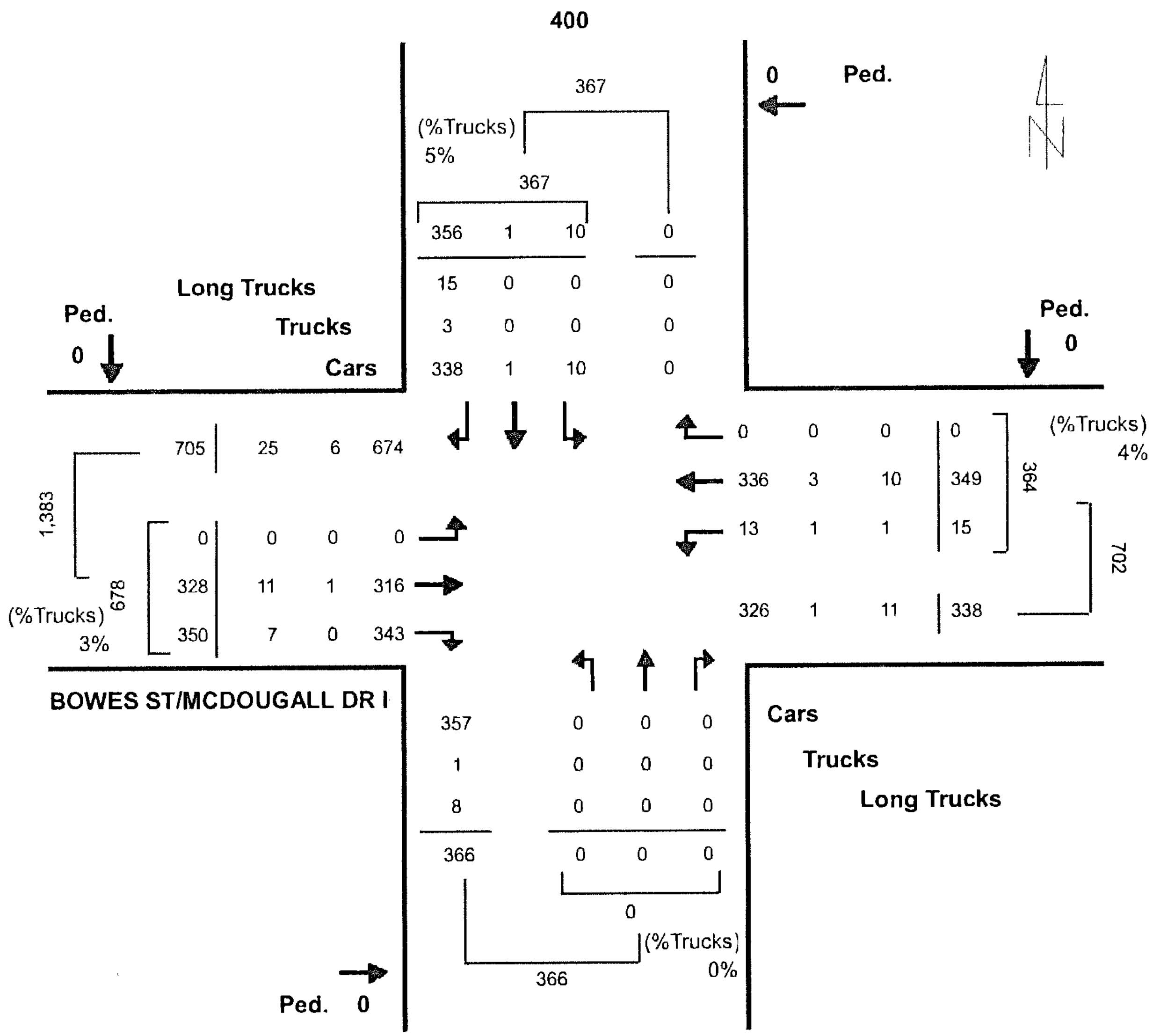
Traffic
Engineering
Software

MD Peak Hour Diagram

HWY 400 @ BOWES ST/MCDOUGALL DR IC 224

Northern

Intersection ID:470230000(--W--) **PK HR End: 13:15** **Day: Tuesday** **Date:29-Aug-2017**



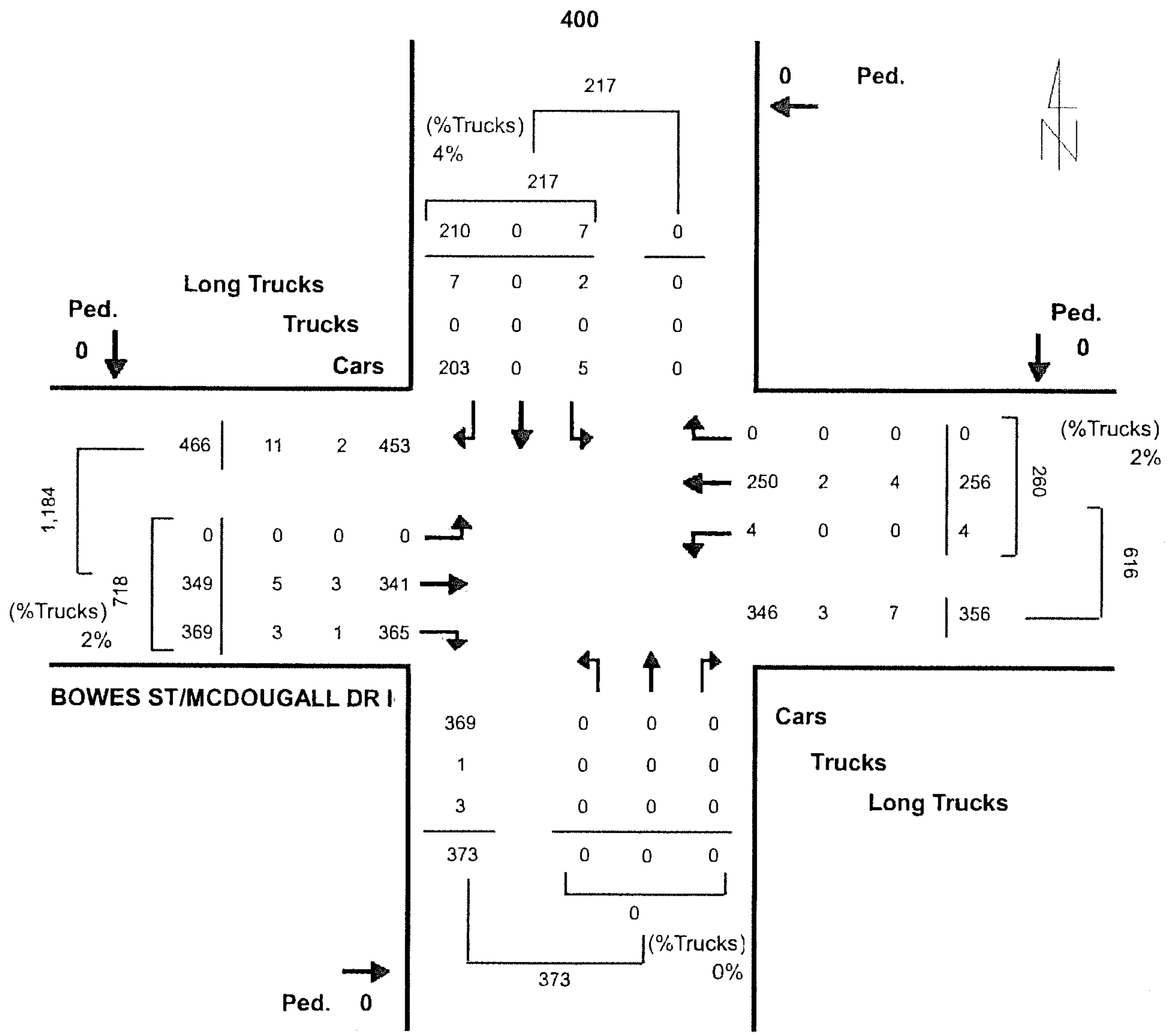
Traffic
Engineering
Software

PM Peak Hour Diagram

HWY 400 @ BOWES ST/MCDOUGALL DR IC 224

Northern

Intersection ID:470230000(--W--) **PK HR End: 16:45** **Day: Tuesday** **Date:29-Aug-2017**

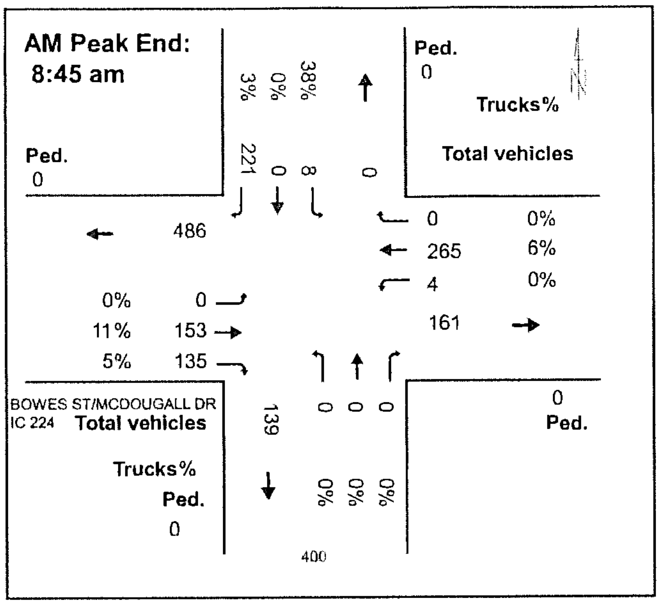


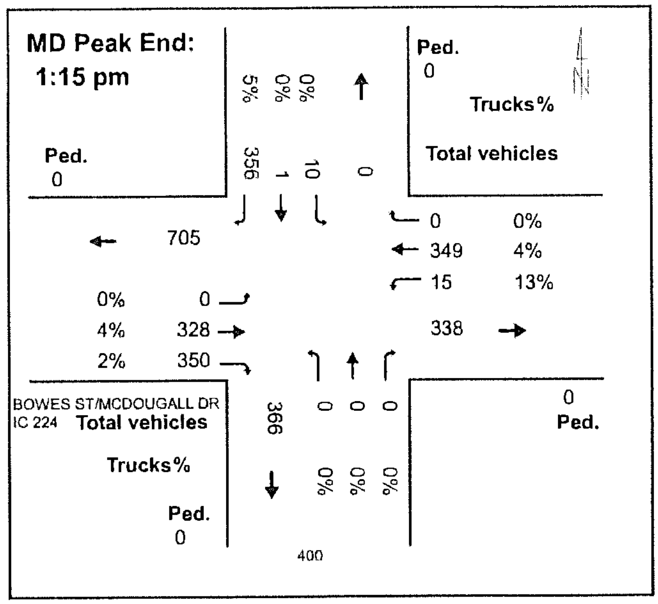
Ontario

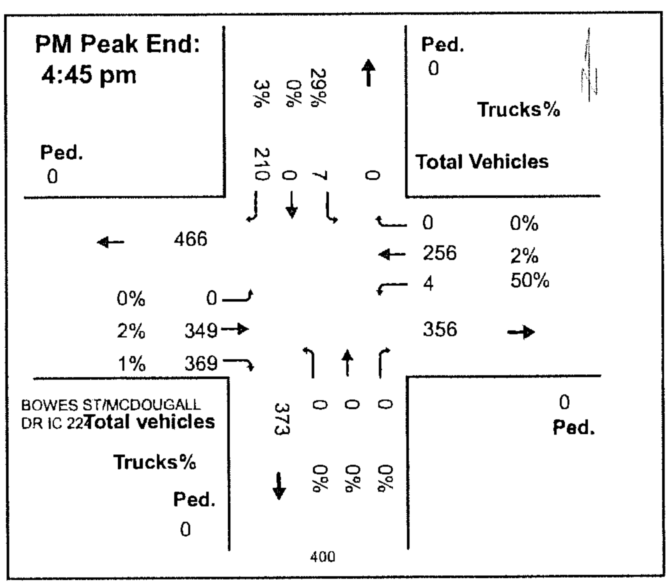
HWY 400 @ BOWES ST/MCDOUGALL DR IC 224

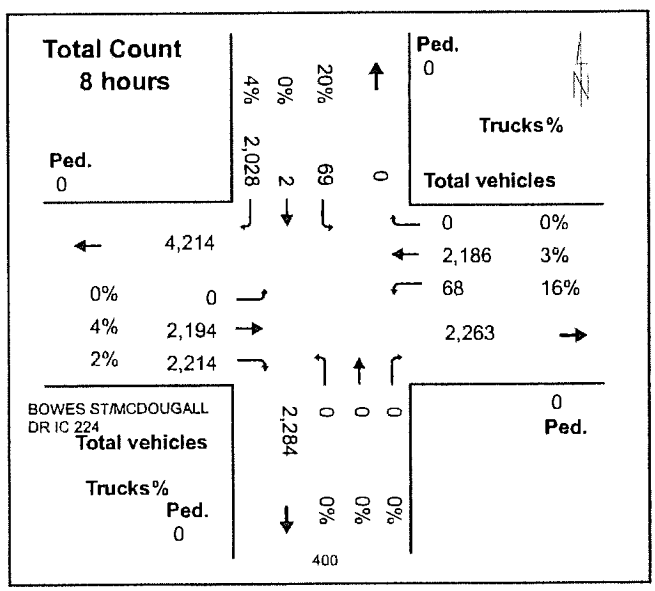
Northern

Intersection ID:470230000(--W--) **Count Day:Tuesday** **Count Date: 29-Aug-2017**









15 MIN REPORT

Intersection ID:470230000(--W--) **HWY 400 @ BOWES ST/MCDOUGALL DR IC 224** **Municipality: Northern** **Date: 29-Aug-2017**

	NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										
Time	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Period1																																									
7:15	0	0	41	1	0	0	0	0	1	0	0	36	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	22	0	0	0	0	2	3	0	132
7:30	2	0	37	0	0	1	0	0	1	0	1	53	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	33	35	0	2	0	0	1	1	0	171
7:45	0	0	50	0	0	0	0	0	1	0	2	37	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	33	28	0	0	0	0	2	0	0	156
8:00	1	0	66	1	0	1	0	0	1	0	1	70	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	38	26	0	1	0	0	1	3	0	216
8:15	1	0	43	0	0	0	2	0	1	0	2	59	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	32	28	0	1	0	0	3	1	0	177
8:30	2	0	48	0	0	1	0	0	0	0	1	61	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	34	32	0	4	1	0	2	0	0	189
8:45	1	0	57	0	0	2	0	0	1	0	0	60	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	32	42	0	1	0	0	4	2	0	204
9:00	2	0	52	0	0	1	0	0	2	0	0	63	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	37	29	0	0	0	0	1	2	0	194
Period2																																									
11:15	1	0	62	1	0	0	0	0	2	0	2	76	0	0	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	59	76	0	2	0	0	3	1	0	289
11:30	2	0	78	0	0	0	1	0	4	0	2	90	0	0	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	53	66	0	0	0	0	1	1	0	302
11:45	0	0	83	0	0	1	0	0	1	0	4	70	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	62	60	0	1	0	0	2	1	0	288
12:00	0	1	64	0	0	0	0	0	5	0	1	96	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	66	81	0	1	0	0	1	1	0	319
12:15	0	0	78	0	0	0	1	0	5	0	4	85	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	92	72	0	2	0	0	4	1	0	347
12:30	1	0	86	0	0	1	0	0	3	0	4	81	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	88	82	0	0	0	0	1	2	0	352
12:45	4	0	69	0	0	0	0	0	3	0	3	86	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	64	83	0	0	0	0	5	0	0	320
13:00	4	1	98	0	0	1	0	0	4	0	4	84	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	90	93	0	0	0	0	2	2	0	387
13:15	1	0	85	0	0	1	0	0	5	0	2	85	0	1	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	74	85	0	1	0	0	3	3	0	350
13:30	3	0	62	0	0	2	0	0	2	0	4	75	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	93	0	2	1	0	0	0	0	321
13:45	3	0	60	0	0	1	1	0	1	0	1	70	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	73	77	0	3	2	0	7	0	0	301
14:00	3	0	72	0	0	0	1	0	2	0	1	74	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	75	99	0	0	0	0	4	1	0	334
Period3																																									
15:15	0	0	69	1	0	0	1	0	0	0	2	57	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	109	69	0	3	0	0	2	1	0	317
15:30	3	0	51	0	0	0	0	0	0	0	3	59	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61	76	0	0	1	0	3	1	0	260
15:45	2	0	55	0	0	1	0	0	3	0	0	61	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	78	86	0	1	1	0	1	0	0	292
16:00	0	0	49	0	0	0	0	0	1	0	0	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	75	0	1	0	0	3	0	0	285
16:15	0	0	55	0	0	0	1	0	1	0	0	54	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	90	98	0	1	0	0	0	3	0	307
16:30	3	0	55	0	0	0	1	0	0	0	2	72	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	78	80	0	1	1	0	1	0	0	295
16:45	2	0	44	0	0	0	0	0	5	0	2	58	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	83	112	0	0	0	0	1	0	0	308
17:00	5	0	55	0	0	0	0	0	1	0	5	43	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	80	77	0	0	0	0	0	1	0	270
17:15	2	0	54	0	0	1	1	0	4	0	2	63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96	75	0	1	0	0	1	1	0	301
17:30	3	0	57	0	0	1	0	0	1	0	1	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	77	0	1	0	0	1	0	0	279
17:45	3	0	67	0	0	0	0	0	1	0	0	51	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	60	73	0	0	0	0	2	0	0	258
18:00	1	0	47	0	0	0	0	0	1	0	1	58	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	63	67	0	0	0	0	0	1	0	240

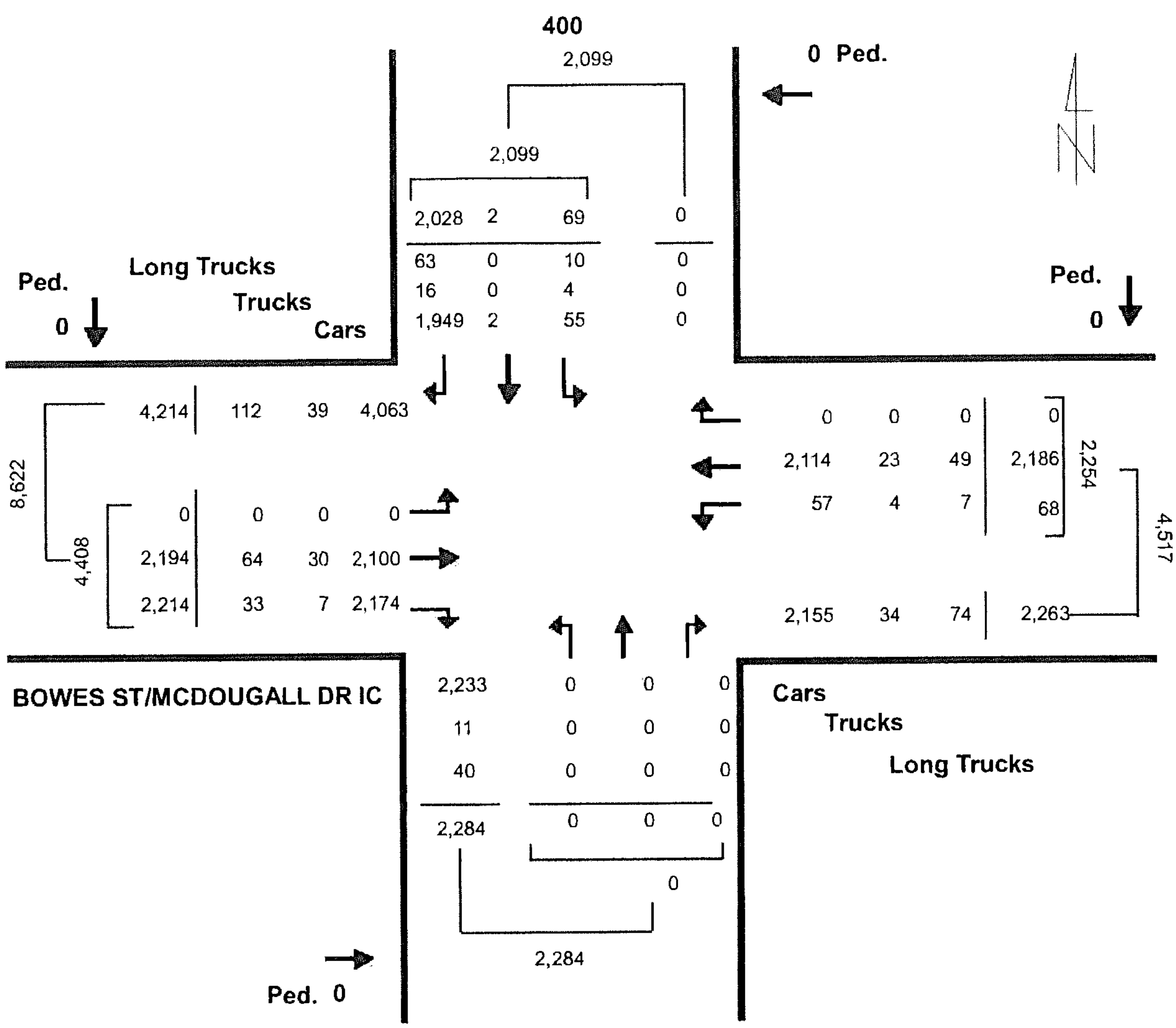
Traffic
Engineering
Software

COUNT TOTAL

HWY 400 @ BOWES ST/MCDOUGALL DR IC 224

Northern

Intersection ID:470230000(--W--) **Date: 29-Aug-2017**



Appendix B:
Existing Operations

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱		↰	↑↑↱		↰	↑↑↱		↰	↱	
Traffic Volume (vph)	135	482	199	85	436	131	149	71	123	204	82	113
Future Volume (vph)	135	482	199	85	436	131	149	71	123	204	82	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.90		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3422		1789	3455		1789	3238		1789	1720	
Flt Permitted	0.28	1.00		0.27	1.00		0.63	1.00		0.62	1.00	
Satd. Flow (perm)	529	3422		516	3455		1178	3238		1167	1720	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	524	216	92	474	142	162	77	134	222	89	123
RTOR Reduction (vph)	0	79	0	0	49	0	0	80	0	0	73	0
Lane Group Flow (vph)	147	661	0	92	567	0	162	131	0	222	139	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.0	15.1		19.0	14.6		22.4	22.4		22.4	22.4	
Effective Green, g (s)	20.0	15.1		19.0	14.6		22.4	22.4		22.4	22.4	
Actuated g/C Ratio	0.36	0.27		0.34	0.26		0.40	0.40		0.40	0.40	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	302	932		278	910		476	1309		471	695	
v/s Ratio Prot	c0.04	c0.19		0.03	0.16			0.04			0.08	
v/s Ratio Perm	0.13			0.09			0.14			c0.19		
v/c Ratio	0.49	0.71		0.33	0.62		0.34	0.10		0.47	0.20	
Uniform Delay, d1	12.6	18.2		13.0	18.0		11.4	10.2		12.1	10.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	2.5		0.7	1.3		1.9	0.2		3.4	0.6	
Delay (s)	13.8	20.7		13.7	19.3		13.3	10.4		15.5	11.3	
Level of Service	B	C		B	B		B	B		B	B	
Approach Delay (s)		19.5			18.6			11.7			13.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	55.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	57	617	175	78	519	77	138	21	88	93	21	50
Future Volume (vph)	57	617	175	78	519	77	138	21	88	93	21	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3563	1601		3497		1789	1883	1601	1789	1883	1601
Flt Permitted		0.84	1.00		0.78		0.74	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)		3015	1601		2741		1398	1883	1601	1398	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	671	190	85	564	84	150	23	96	101	23	54
RTOR Reduction (vph)	0	0	119	0	17	0	0	0	56	0	0	31
Lane Group Flow (vph)	0	733	71	0	716	0	150	23	40	101	23	23
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		16.2	16.2		16.2		18.2	18.2	18.2	18.2	18.2	18.2
Effective Green, g (s)		16.2	16.2		16.2		18.2	18.2	18.2	18.2	18.2	18.2
Actuated g/C Ratio		0.37	0.37		0.37		0.42	0.42	0.42	0.42	0.42	0.42
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1125	597		1023		586	789	671	586	789	671
v/s Ratio Prot								0.01			0.01	
v/s Ratio Perm		0.24	0.04		c0.26		c0.11		0.03	0.07		0.01
v/c Ratio		0.65	0.12		0.70		0.26	0.03	0.06	0.17	0.03	0.03
Uniform Delay, d1		11.3	8.9		11.5		8.2	7.4	7.5	7.9	7.4	7.4
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.4	0.1		2.1		1.1	0.1	0.2	0.6	0.1	0.1
Delay (s)		12.6	9.0		13.7		9.2	7.5	7.7	8.5	7.5	7.5
Level of Service		B	A		B		A	A	A	A	A	A
Approach Delay (s)		11.9			13.7			8.5			8.1	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	43.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↱			↑	↱
Traffic Volume (veh/h)	68	0	76	0	0	2	40	168	0	2	209	65
Future Volume (Veh/h)	68	0	76	0	0	2	40	168	0	2	209	65
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	0	83	0	0	2	43	183	0	2	227	71
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	502	500	227	583	571	183	298			183		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	502	500	227	583	571	183	298			183		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	84	100	90	100	100	100	97			100		
cM capacity (veh/h)	466	456	812	370	415	859	1263			1392		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	157	2	43	183	229	71
Volume Left	74	0	43	0	2	0
Volume Right	83	2	0	0	0	71
cSH	601	859	1263	1700	1392	1700
Volume to Capacity	0.26	0.00	0.03	0.11	0.00	0.04
Queue Length 95th (m)	7.9	0.1	0.8	0.0	0.0	0.0
Control Delay (s)	13.1	9.2	8.0	0.0	0.1	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	13.1	9.2	1.5		0.1	
Approach LOS	B	A				

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	414	384	4	455	0	0	0	0	7	0	318
Future Volume (Veh/h)	0	414	384	4	455	0	0	0	0	7	0	318
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	450	417	4	495	0	0	0	0	8	0	346
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	495			450			706	953	450	953	953	248
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	495			378			651	916	378	916	916	248
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	96	100	54
cM capacity (veh/h)	1065			1102			178	253	580	212	253	753

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	450	417	169	330	8	346
Volume Left	0	0	4	0	8	0
Volume Right	0	417	0	0	0	346
cSH	1700	1700	1102	1700	212	753
Volume to Capacity	0.26	0.25	0.00	0.19	0.04	0.46
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.9	18.5
Control Delay (s)	0.0	0.0	0.2	0.0	22.6	13.8
Lane LOS			A		C	B
Approach Delay (s)	0.0		0.1		14.0	
Approach LOS					B	

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰		↰	↑	↑	↱
Traffic Volume (veh/h)	9	0	299	122	216	14
Future Volume (Veh/h)	9	0	299	122	216	14
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)	10	0	325	133	235	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1018	235	250			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1018	235	250			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	100	75			
cM capacity (veh/h)	198	804	1316			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	10	325	133	235	15
Volume Left	10	325	0	0	0
Volume Right	0	0	0	0	15
cSH	198	1316	1700	1700	1700
Volume to Capacity	0.05	0.25	0.08	0.14	0.01
Queue Length 95th (m)	1.2	7.4	0.0	0.0	0.0
Control Delay (s)	24.1	8.6	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	24.1	6.1		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↱	
Traffic Volume (vph)	132	353	189	152	446	205	170	74	140	218	111	132
Future Volume (vph)	132	353	189	152	446	205	170	74	140	218	111	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.95		1.00	0.95		1.00	0.90		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3392		1789	3409		1789	3227		1789	1730	
Flt Permitted	0.28	1.00		0.31	1.00		0.57	1.00		0.61	1.00	
Satd. Flow (perm)	527	3392		580	3409		1075	3227		1144	1730	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	384	205	165	485	223	185	80	152	237	121	143
RTOR Reduction (vph)	0	125	0	0	95	0	0	88	0	0	66	0
Lane Group Flow (vph)	143	464	0	165	613	0	185	144	0	237	198	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.5	14.3		18.5	14.3		23.4	23.4		23.4	23.4	
Effective Green, g (s)	18.5	14.3		18.5	14.3		23.4	23.4		23.4	23.4	
Actuated g/C Ratio	0.33	0.26		0.33	0.26		0.42	0.42		0.42	0.42	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	271	875		285	879		454	1363		483	730	
v/s Ratio Prot	0.04	0.14		c0.04	c0.18			0.04			0.11	
v/s Ratio Perm	0.14			0.15			0.17			c0.21		
v/c Ratio	0.53	0.53		0.58	0.70		0.41	0.11		0.49	0.27	
Uniform Delay, d1	13.8	17.7		13.7	18.6		11.2	9.7		11.7	10.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.6		2.8	2.4		2.7	0.2		3.5	0.9	
Delay (s)	15.6	18.3		16.6	21.0		13.9	9.8		15.2	11.3	
Level of Service	B	B		B	C		B	A		B	B	
Approach Delay (s)		17.8			20.2			11.6			13.2	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	55.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	78	546	122	100	635	118	157	31	77	107	31	100
Future Volume (vph)	78	546	122	100	635	118	157	31	77	107	31	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3556	1601		3484		1789	1883	1601	1789	1883	1601
Flt Permitted		0.73	1.00		0.79		0.73	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		2604	1601		2769		1384	1883	1601	1384	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	593	133	109	690	128	171	34	84	116	34	109
RTOR Reduction (vph)	0	0	76	0	20	0	0	0	52	0	0	68
Lane Group Flow (vph)	0	678	57	0	907	0	171	34	32	116	34	41
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		20.6	20.6		20.6		18.1	18.1	18.1	18.1	18.1	18.1
Effective Green, g (s)		20.6	20.6		20.6		18.1	18.1	18.1	18.1	18.1	18.1
Actuated g/C Ratio		0.43	0.43		0.43		0.38	0.38	0.38	0.38	0.38	0.38
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1124	691		1195		525	714	607	525	714	607
v/s Ratio Prot								0.02			0.02	
v/s Ratio Perm		0.26	0.04		c0.33		c0.12		0.02	0.08		0.03
v/c Ratio		0.60	0.08		0.76		0.33	0.05	0.05	0.22	0.05	0.07
Uniform Delay, d1		10.4	8.0		11.5		10.5	9.4	9.4	10.0	9.4	9.4
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.9	0.1		2.8		1.6	0.1	0.2	1.0	0.1	0.2
Delay (s)		11.3	8.0		14.3		12.1	9.5	9.5	11.0	9.5	9.6
Level of Service		B	A		B		B	A	A	B	A	A
Approach Delay (s)		10.8			14.3			11.1			10.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↱			↑	↱
Traffic Volume (veh/h)	89	1	70	1	1	10	60	168	1	6	142	106
Future Volume (Veh/h)	89	1	70	1	1	10	60	168	1	6	142	106
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	1	76	1	1	11	65	183	1	7	154	115
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	492	482	154	558	596	184	269			184		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	492	482	154	558	596	184	269			184		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	79	100	91	100	100	99	95			99		
cM capacity (veh/h)	459	457	892	385	394	859	1295			1391		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	174	13	65	184	161	115
Volume Left	97	1	65	0	7	0
Volume Right	76	11	0	1	0	115
cSH	583	725	1295	1700	1391	1700
Volume to Capacity	0.30	0.02	0.05	0.11	0.01	0.07
Queue Length 95th (m)	9.5	0.4	1.2	0.0	0.1	0.0
Control Delay (s)	13.8	10.1	7.9	0.0	0.4	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.8	10.1	2.1		0.2	
Approach LOS	B	B				

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰	↱
Traffic Volume (veh/h)	0	348	381	14	511	0	0	0	0	4	0	343
Future Volume (Veh/h)	0	348	381	14	511	0	0	0	0	4	0	343
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	378	414	15	555	0	0	0	0	4	0	373
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked												
vC, conflicting volume	555			378			686	963	378	963	963	278
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	555			378			686	963	378	963	963	278
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	98	100	48
cM capacity (veh/h)	1011			1177			159	251	620	208	251	720

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	378	414	200	370	4	373
Volume Left	0	0	15	0	4	0
Volume Right	0	414	0	0	0	373
cSH	1700	1700	1177	1700	208	720
Volume to Capacity	0.22	0.24	0.01	0.22	0.02	0.52
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.4	22.9
Control Delay (s)	0.0	0.0	0.7	0.0	22.6	15.3
Lane LOS			A		C	C
Approach Delay (s)	0.0		0.3		15.3	
Approach LOS					C	

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	0	322	30	58	9
Future Volume (Veh/h)	11	0	322	30	58	9
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)	12	0	350	33	63	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	796	63	73			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	796	63	73			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	100	77			
cM capacity (veh/h)	274	1002	1527			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	350	33	63	10
Volume Left	12	350	0	0	0
Volume Right	0	0	0	0	10
cSH	274	1527	1700	1700	1700
Volume to Capacity	0.04	0.23	0.02	0.04	0.01
Queue Length 95th (m)	1.0	6.7	0.0	0.0	0.0
Control Delay (s)	18.7	8.1	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	18.7	7.4		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix C:
Future Background Operations

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	522	199	85	471	131	149	71	123	204	82	113
Future Volume (vph)	135	522	199	85	471	131	149	71	123	204	82	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.90		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3430		1789	3462		1789	3238		1789	1720	
Flt Permitted	0.27	1.00		0.26	1.00		0.63	1.00		0.62	1.00	
Satd. Flow (perm)	512	3430		483	3462		1178	3238		1167	1720	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	567	216	92	512	142	162	77	134	222	89	123
RTOR Reduction (vph)	0	69	0	0	44	0	0	79	0	0	73	0
Lane Group Flow (vph)	147	714	0	92	610	0	162	132	0	222	139	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	19.7	15.6		19.7	15.6		22.9	22.9		22.9	22.9	
Effective Green, g (s)	19.7	15.6		19.7	15.6		22.9	22.9		22.9	22.9	
Actuated g/C Ratio	0.35	0.28		0.35	0.28		0.41	0.41		0.41	0.41	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	273	953		265	962		480	1321		476	702	
v/s Ratio Prot	c0.04	c0.21		0.03	0.18			0.04			0.08	
v/s Ratio Perm	0.15			0.10			0.14			c0.19		
v/c Ratio	0.54	0.75		0.35	0.63		0.34	0.10		0.47	0.20	
Uniform Delay, d1	13.2	18.5		13.0	17.7		11.4	10.2		12.1	10.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	3.3		0.8	1.4		1.9	0.2		3.3	0.6	
Delay (s)	15.2	21.7		13.8	19.1		13.3	10.4		15.4	11.3	
Level of Service	B	C		B	B		B	B		B	B	
Approach Delay (s)		20.7			18.5			11.7			13.4	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	56.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	668	190	84	562	83	149	23	95	100	23	54
Future Volume (vph)	62	668	190	84	562	83	149	23	95	100	23	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3563	1601		3497		1789	1883	1601	1789	1883	1601
Flt Permitted		0.83	1.00		0.76		0.74	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)		2977	1601		2663		1396	1883	1601	1396	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	67	726	207	91	611	90	162	25	103	109	25	59
RTOR Reduction (vph)	0	0	125	0	16	0	0	0	61	0	0	35
Lane Group Flow (vph)	0	793	82	0	776	0	162	25	42	109	25	24
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		17.8	17.8		17.8		18.2	18.2	18.2	18.2	18.2	18.2
Effective Green, g (s)		17.8	17.8		17.8		18.2	18.2	18.2	18.2	18.2	18.2
Actuated g/C Ratio		0.40	0.40		0.40		0.40	0.40	0.40	0.40	0.40	0.40
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1177	633		1053		564	761	647	564	761	647
v/s Ratio Prot								0.01			0.01	
v/s Ratio Perm		0.27	0.05		c0.29		c0.12		0.03	0.08		0.01
v/c Ratio		0.67	0.13		0.74		0.29	0.03	0.06	0.19	0.03	0.04
Uniform Delay, d1		11.2	8.7		11.6		9.0	8.1	8.2	8.7	8.1	8.1
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.5	0.1		2.7		1.3	0.1	0.2	0.8	0.1	0.1
Delay (s)		12.7	8.8		14.3		10.3	8.2	8.4	9.4	8.2	8.2
Level of Service		B	A		B		B	A	A	A	A	A
Approach Delay (s)		11.9			14.3			9.4			8.9	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣		↰	↱			↑	↱
Traffic Volume (veh/h)	68	0	76	0	0	2	40	182	0	2	226	65
Future Volume (Veh/h)	68	0	76	0	0	2	40	182	0	2	226	65
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	0	83	0	0	2	43	198	0	2	246	71
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	536	534	246	617	605	198	317			198		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	536	534	246	617	605	198	317			198		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	100	90	100	100	100	97			100		
cM capacity (veh/h)	442	436	793	350	397	843	1243			1375		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	157	2	43	198	248	71
Volume Left	74	0	43	0	2	0
Volume Right	83	2	0	0	0	71
cSH	577	843	1243	1700	1375	1700
Volume to Capacity	0.27	0.00	0.03	0.12	0.00	0.04
Queue Length 95th (m)	8.4	0.1	0.8	0.0	0.0	0.0
Control Delay (s)	13.6	9.3	8.0	0.0	0.1	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	13.6	9.3	1.4		0.1	
Approach LOS	B	A				

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰	↱
Traffic Volume (veh/h)	0	414	450	5	473	0	0	0	0	9	0	256
Future Volume (Veh/h)	0	414	450	5	473	0	0	0	0	9	0	256
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	450	489	5	514	0	0	0	0	10	0	278
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	514			450			717	974	450	974	974	257
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	514			388			671	943	388	943	943	257
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	95	100	63
cM capacity (veh/h)	1048			1102			201	245	576	204	245	742

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	450	489	176	343	10	278
Volume Left	0	0	5	0	10	0
Volume Right	0	489	0	0	0	278
cSH	1700	1700	1102	1700	204	742
Volume to Capacity	0.26	0.29	0.00	0.20	0.05	0.37
Queue Length 95th (m)	0.0	0.0	0.1	0.0	1.2	13.3
Control Delay (s)	0.0	0.0	0.3	0.0	23.5	12.7
Lane LOS			A		C	B
Approach Delay (s)	0.0		0.1		13.1	
Approach LOS					B	

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	0	350	72	194	16
Future Volume (Veh/h)	11	0	350	72	194	16
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)	12	0	380	78	211	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1049	211	228			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1049	211	228			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	100	72			
cM capacity (veh/h)	181	829	1340			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	380	78	211	17
Volume Left	12	380	0	0	0
Volume Right	0	0	0	0	17
cSH	181	1340	1700	1700	1700
Volume to Capacity	0.07	0.28	0.05	0.12	0.01
Queue Length 95th (m)	1.6	8.9	0.0	0.0	0.0
Control Delay (s)	26.4	8.7	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	26.4	7.3		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱		↰	↑↑↱		↰	↑↑↱		↰	↑↱	
Traffic Volume (vph)	132	382	189	152	482	205	170	74	140	218	111	132
Future Volume (vph)	132	382	189	152	482	205	170	74	140	218	111	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.95		1.00	0.96		1.00	0.90		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3401		1789	3418		1789	3227		1789	1730	
Flt Permitted	0.26	1.00		0.29	1.00		0.57	1.00		0.61	1.00	
Satd. Flow (perm)	499	3401		552	3418		1068	3227		1144	1730	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	415	205	165	524	223	185	80	152	237	121	143
RTOR Reduction (vph)	0	107	0	0	83	0	0	89	0	0	66	0
Lane Group Flow (vph)	143	513	0	165	664	0	185	143	0	237	198	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	19.2	15.1		19.2	15.1		23.0	23.0		23.0	23.0	
Effective Green, g (s)	19.2	15.1		19.2	15.1		23.0	23.0		23.0	23.0	
Actuated g/C Ratio	0.34	0.27		0.34	0.27		0.41	0.41		0.41	0.41	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	266	921		281	926		441	1332		472	714	
v/s Ratio Prot	0.04	0.15		c0.04	c0.19			0.04			0.11	
v/s Ratio Perm	0.15			0.16			0.17			c0.21		
v/c Ratio	0.54	0.56		0.59	0.72		0.42	0.11		0.50	0.28	
Uniform Delay, d1	13.5	17.4		13.4	18.4		11.6	10.0		12.1	10.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	0.7		3.1	2.7		2.9	0.2		3.8	1.0	
Delay (s)	15.6	18.2		16.5	21.0		14.5	10.2		15.9	11.8	
Level of Service	B	B		B	C		B	B		B	B	
Approach Delay (s)		17.7			20.2			12.1			13.7	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	55.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	84	591	132	108	688	128	170	33	83	116	33	108
Future Volume (vph)	84	591	132	108	688	128	170	33	83	116	33	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3556	1601		3484		1789	1883	1601	1789	1883	1601
Flt Permitted		0.71	1.00		0.77		0.73	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		2527	1601		2690		1382	1883	1601	1382	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	642	143	117	748	139	185	36	90	126	36	117
RTOR Reduction (vph)	0	0	77	0	19	0	0	0	58	0	0	75
Lane Group Flow (vph)	0	733	66	0	985	0	185	36	32	126	36	42
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		23.5	23.5		23.5		18.1	18.1	18.1	18.1	18.1	18.1
Effective Green, g (s)		23.5	23.5		23.5		18.1	18.1	18.1	18.1	18.1	18.1
Actuated g/C Ratio		0.46	0.46		0.46		0.36	0.36	0.36	0.36	0.36	0.36
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1173	743		1249		494	673	572	494	673	572
v/s Ratio Prot								0.02			0.02	
v/s Ratio Perm		0.29	0.04		c0.37		c0.13		0.02	0.09		0.03
v/c Ratio		0.62	0.09		0.79		0.37	0.05	0.06	0.26	0.05	0.07
Uniform Delay, d1		10.2	7.6		11.5		12.1	10.6	10.7	11.5	10.6	10.7
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.0	0.1		3.4		2.2	0.2	0.2	1.2	0.2	0.2
Delay (s)		11.3	7.6		14.8		14.2	10.8	10.8	12.7	10.8	11.0
Level of Service		B	A		B		B	B	B	B	B	B
Approach Delay (s)		10.7			14.8			12.8			11.7	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	50.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↱			↑	↱
Traffic Volume (veh/h)	89	1	70	1	1	10	60	182	1	6	153	106
Future Volume (Veh/h)	89	1	70	1	1	10	60	182	1	6	153	106
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	1	76	1	1	11	65	198	1	7	166	115
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	520	509	166	585	624	198	281			199		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	520	509	166	585	624	198	281			199		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	78	100	91	100	100	99	95			99		
cM capacity (veh/h)	441	441	878	369	380	843	1282			1373		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	174	13	65	199	173	115
Volume Left	97	1	65	0	7	0
Volume Right	76	11	0	1	0	115
cSH	563	707	1282	1700	1373	1700
Volume to Capacity	0.31	0.02	0.05	0.12	0.01	0.07
Queue Length 95th (m)	9.9	0.4	1.2	0.0	0.1	0.0
Control Delay (s)	14.2	10.2	8.0	0.0	0.4	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	14.2	10.2	2.0		0.2	
Approach LOS	B	B				

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰	↱
Traffic Volume (veh/h)	0	376	413	15	553	0	0	0	0	4	0	371
Future Volume (Veh/h)	0	376	413	15	553	0	0	0	0	4	0	371
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	409	449	16	601	0	0	0	0	4	0	403
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				1.00			1.00	1.00	1.00	1.00	1.00	
vC, conflicting volume	601			409			742	1042	409	1042	1042	300
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	601			405			739	1040	405	1040	1040	300
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	98	100	42
cM capacity (veh/h)	972			1146			127	225	593	182	225	696

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	409	449	216	401	4	403
Volume Left	0	0	16	0	4	0
Volume Right	0	449	0	0	0	403
cSH	1700	1700	1146	1700	182	696
Volume to Capacity	0.24	0.26	0.01	0.24	0.02	0.58
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.5	28.5
Control Delay (s)	0.0	0.0	0.7	0.0	25.2	17.1
Lane LOS			A		D	C
Approach Delay (s)	0.0		0.3		17.1	
Approach LOS					C	

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	0	349	32	63	10
Future Volume (Veh/h)	12	0	349	32	63	10
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)	13	0	379	35	68	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	861	68	79			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	861	68	79			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	100	75			
cM capacity (veh/h)	245	995	1519			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	13	379	35	68	11
Volume Left	13	379	0	0	0
Volume Right	0	0	0	0	11
cSH	245	1519	1700	1700	1700
Volume to Capacity	0.05	0.25	0.02	0.04	0.01
Queue Length 95th (m)	1.3	7.5	0.0	0.0	0.0
Control Delay (s)	20.5	8.2	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	20.5	7.5		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	577	199	85	521	131	149	71	123	204	82	113
Future Volume (vph)	135	577	199	85	521	131	149	71	123	204	82	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.90		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3441		1789	3471		1789	3238		1789	1720	
Flt Permitted	0.24	1.00		0.25	1.00		0.62	1.00		0.62	1.00	
Satd. Flow (perm)	448	3441		462	3471		1173	3238		1167	1720	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	627	216	92	566	142	162	77	134	222	89	123
RTOR Reduction (vph)	0	59	0	0	38	0	0	82	0	0	75	0
Lane Group Flow (vph)	147	784	0	92	670	0	162	129	0	222	137	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.4	16.8		20.4	16.3		22.0	22.0		22.0	22.0	
Effective Green, g (s)	21.4	16.8		20.4	16.3		22.0	22.0		22.0	22.0	
Actuated g/C Ratio	0.38	0.30		0.36	0.29		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	279	1024		263	1003		457	1263		455	670	
v/s Ratio Prot	c0.04	c0.23		0.03	0.19			0.04			0.08	
v/s Ratio Perm	0.16			0.10			0.14			c0.19		
v/c Ratio	0.53	0.77		0.35	0.67		0.35	0.10		0.49	0.20	
Uniform Delay, d1	12.3	18.0		12.7	17.7		12.2	10.9		13.0	11.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	3.5		0.8	1.7		2.1	0.2		3.7	0.7	
Delay (s)	14.1	21.5		13.5	19.4		14.3	11.1		16.7	12.1	
Level of Service	B	C		B	B		B	B		B	B	
Approach Delay (s)		20.4			18.7			12.5			14.4	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	56.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	737	210	93	620	91	165	26	105	111	26	60
Future Volume (vph)	68	737	210	93	620	91	165	26	105	111	26	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3563	1601		3498		1789	1883	1601	1789	1883	1601
Flt Permitted		0.81	1.00		0.73		0.74	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)		2892	1601		2568		1392	1883	1601	1392	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	801	228	101	674	99	179	28	114	121	28	65
RTOR Reduction (vph)	0	0	128	0	15	0	0	0	71	0	0	41
Lane Group Flow (vph)	0	875	100	0	859	0	179	28	43	121	28	24
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		21.4	21.4		21.4		18.2	18.2	18.2	18.2	18.2	18.2
Effective Green, g (s)		21.4	21.4		21.4		18.2	18.2	18.2	18.2	18.2	18.2
Actuated g/C Ratio		0.44	0.44		0.44		0.37	0.37	0.37	0.37	0.37	0.37
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1273	704		1130		521	705	599	521	705	599
v/s Ratio Prot								0.01			0.01	
v/s Ratio Perm		0.30	0.06		c0.33		c0.13		0.03	0.09		0.02
v/c Ratio		0.69	0.14		0.76		0.34	0.04	0.07	0.23	0.04	0.04
Uniform Delay, d1		10.9	8.1		11.4		10.9	9.7	9.8	10.4	9.7	9.7
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.6	0.1		3.1		1.8	0.1	0.2	1.0	0.1	0.1
Delay (s)		12.5	8.2		14.5		12.7	9.8	10.0	11.5	9.8	9.8
Level of Service		B	A		B		B	A	A	B	A	A
Approach Delay (s)		11.6			14.5			11.5			10.7	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	48.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣		↰	↱			↑	↱
Traffic Volume (veh/h)	68	0	76	0	0	2	40	201	0	2	250	65
Future Volume (Veh/h)	68	0	76	0	0	2	40	201	0	2	250	65
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	0	83	0	0	2	43	218	0	2	272	71
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	582	580	272	663	651	218	343			218		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	582	580	272	663	651	218	343			218		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	82	100	89	100	100	100	96			100		
cM capacity (veh/h)	411	410	767	325	373	822	1216			1352		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	157	2	43	218	274	71
Volume Left	74	0	43	0	2	0
Volume Right	83	2	0	0	0	71
cSH	545	822	1216	1700	1352	1700
Volume to Capacity	0.29	0.00	0.04	0.13	0.00	0.04
Queue Length 95th (m)	9.0	0.1	0.8	0.0	0.0	0.0
Control Delay (s)	14.3	9.4	8.1	0.0	0.1	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	14.3	9.4	1.3		0.1	
Approach LOS	B	A				

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	48.9%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰	↱
Traffic Volume (veh/h)	0	457	497	5	522	0	0	0	0	9	0	283
Future Volume (Veh/h)	0	457	497	5	522	0	0	0	0	9	0	283
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	497	540	5	567	0	0	0	0	10	0	308
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	567			497			790	1074	497	1074	1074	284
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	567			402			724	1034	402	1034	1034	284
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	94	100	57
cM capacity (veh/h)	1001			1053			162	210	546	170	210	713

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	497	540	194	378	10	308
Volume Left	0	0	5	0	10	0
Volume Right	0	540	0	0	0	308
cSH	1700	1700	1053	1700	170	713
Volume to Capacity	0.29	0.32	0.00	0.22	0.06	0.43
Queue Length 95th (m)	0.0	0.0	0.1	0.0	1.4	16.6
Control Delay (s)	0.0	0.0	0.3	0.0	27.5	13.8
Lane LOS			A		D	B
Approach Delay (s)	0.0		0.1		14.3	
Approach LOS					B	

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	0	386	80	214	17
Future Volume (Veh/h)	12	0	386	80	214	17
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)	13	0	420	87	233	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1160	233	251			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1160	233	251			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	100	68			
cM capacity (veh/h)	147	806	1314			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	13	420	87	233	18
Volume Left	13	420	0	0	0
Volume Right	0	0	0	0	18
cSH	147	1314	1700	1700	1700
Volume to Capacity	0.09	0.32	0.05	0.14	0.01
Queue Length 95th (m)	2.2	10.6	0.0	0.0	0.0
Control Delay (s)	31.8	9.0	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	31.8	7.5		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↱	
Traffic Volume (vph)	132	422	189	152	533	205	170	74	140	218	111	132
Future Volume (vph)	132	422	189	152	533	205	170	74	140	218	111	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.95		1.00	0.96		1.00	0.90		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3413		1789	3429		1789	3227		1789	1730	
Flt Permitted	0.25	1.00		0.27	1.00		0.56	1.00		0.61	1.00	
Satd. Flow (perm)	477	3413		502	3429		1062	3227		1144	1730	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	459	205	165	579	223	185	80	152	237	121	143
RTOR Reduction (vph)	0	88	0	0	70	0	0	90	0	0	67	0
Lane Group Flow (vph)	143	576	0	165	732	0	185	142	0	237	197	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	19.9	15.8		19.9	15.8		22.9	22.9		22.9	22.9	
Effective Green, g (s)	19.9	15.8		19.9	15.8		22.9	22.9		22.9	22.9	
Actuated g/C Ratio	0.35	0.28		0.35	0.28		0.41	0.41		0.41	0.41	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	264	957		271	962		431	1312		465	703	
v/s Ratio Prot	0.04	0.17		c0.04	c0.21			0.04			0.11	
v/s Ratio Perm	0.15			0.17			0.17			c0.21		
v/c Ratio	0.54	0.60		0.61	0.76		0.43	0.11		0.51	0.28	
Uniform Delay, d1	13.4	17.5		13.3	18.5		12.0	10.4		12.5	11.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	1.1		3.8	3.6		3.1	0.2		4.0	1.0	
Delay (s)	15.7	18.6		17.1	22.1		15.1	10.5		16.5	12.2	
Level of Service	B	B		B	C		B	B		B	B	
Approach Delay (s)		18.1			21.3			12.6			14.2	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	13.5
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	93	652	146	119	769	141	188	37	91	128	37	119
Future Volume (vph)	93	652	146	119	769	141	188	37	91	128	37	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3556	1601		3485		1789	1883	1601	1789	1883	1601
Flt Permitted		0.66	1.00		0.73		0.73	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		2378	1601		2565		1377	1883	1601	1377	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	709	159	129	836	153	204	40	99	139	40	129
RTOR Reduction (vph)	0	0	81	0	18	0	0	0	65	0	0	85
Lane Group Flow (vph)	0	810	78	0	1100	0	204	40	34	139	40	44
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		26.3	26.3		26.3		18.1	18.1	18.1	18.1	18.1	18.1
Effective Green, g (s)		26.3	26.3		26.3		18.1	18.1	18.1	18.1	18.1	18.1
Actuated g/C Ratio		0.49	0.49		0.49		0.34	0.34	0.34	0.34	0.34	0.34
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1171	788		1263		466	638	542	466	638	542
v/s Ratio Prot								0.02			0.02	
v/s Ratio Perm		0.34	0.05		c0.43		c0.15		0.02	0.10		0.03
v/c Ratio		0.69	0.10		0.87		0.44	0.06	0.06	0.30	0.06	0.08
Uniform Delay, d1		10.4	7.2		12.0		13.7	11.9	11.9	13.0	11.9	12.0
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.8	0.1		6.8		3.0	0.2	0.2	1.6	0.2	0.3
Delay (s)		12.2	7.3		18.9		16.7	12.1	12.1	14.6	12.1	12.3
Level of Service		B	A		B		B	B	B	B	B	B
Approach Delay (s)		11.4			18.9			14.8			13.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	53.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	89	1	70	1	1	10	60	201	1	6	169	106
Future Volume (Veh/h)	89	1	70	1	1	10	60	201	1	6	169	106
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	1	76	1	1	11	65	218	1	7	184	115
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	558	547	184	623	662	218	299			219		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	558	547	184	623	662	218	299			219		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	77	100	91	100	100	99	95			99		
cM capacity (veh/h)	415	419	858	347	361	821	1262			1350		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	174	13	65	219	191	115
Volume Left	97	1	65	0	7	0
Volume Right	76	11	0	1	0	115
cSH	536	682	1262	1700	1350	1700
Volume to Capacity	0.32	0.02	0.05	0.13	0.01	0.07
Queue Length 95th (m)	10.6	0.4	1.2	0.0	0.1	0.0
Control Delay (s)	14.9	10.4	8.0	0.0	0.3	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	14.9	10.4	1.8		0.2	
Approach LOS	B	B				

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	45.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	416	456	17	611	0	0	0	0	5	0	410
Future Volume (Veh/h)	0	416	456	17	611	0	0	0	0	5	0	410
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	452	496	18	664	0	0	0	0	5	0	446
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				0.97			0.97	0.97	0.97	0.97	0.97	
vC, conflicting volume	664			452			820	1152	452	1152	1152	332
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	664			417			797	1140	417	1140	1140	332
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	100	97	100	33
cM capacity (veh/h)	921			1102			87	190	566	149	190	664

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	452	496	239	443	5	446
Volume Left	0	0	18	0	5	0
Volume Right	0	496	0	0	0	446
cSH	1700	1700	1102	1700	149	664
Volume to Capacity	0.27	0.29	0.02	0.26	0.03	0.67
Queue Length 95th (m)	0.0	0.0	0.4	0.0	0.8	39.3
Control Delay (s)	0.0	0.0	0.8	0.0	30.0	20.8
Lane LOS			A		D	C
Approach Delay (s)	0.0		0.3		20.9	
Approach LOS					C	

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰		↰	↑	↑	↱
Traffic Volume (veh/h)	13	0	385	35	69	11
Future Volume (Veh/h)	13	0	385	35	69	11
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)	14	0	418	38	75	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	949	75	87			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	949	75	87			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	100	72			
cM capacity (veh/h)	209	986	1509			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	14	418	38	75	12
Volume Left	14	418	0	0	0
Volume Right	0	0	0	0	12
cSH	209	1509	1700	1700	1700
Volume to Capacity	0.07	0.28	0.02	0.04	0.01
Queue Length 95th (m)	1.6	8.7	0.0	0.0	0.0
Control Delay (s)	23.5	8.3	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	23.5	7.6		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↱	
Traffic Volume (vph)	135	637	199	85	575	131	149	71	123	204	82	113
Future Volume (vph)	135	637	199	85	575	131	149	71	123	204	82	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.90		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3451		1789	3479		1789	3238		1789	1720	
Flt Permitted	0.23	1.00		0.23	1.00		0.62	1.00		0.62	1.00	
Satd. Flow (perm)	433	3451		433	3479		1168	3238		1167	1720	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	692	216	92	625	142	162	77	134	222	89	123
RTOR Reduction (vph)	0	51	0	0	33	0	0	82	0	0	76	0
Lane Group Flow (vph)	147	857	0	92	734	0	162	129	0	222	136	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.5	17.4		21.5	17.4		21.9	21.9		21.9	21.9	
Effective Green, g (s)	21.5	17.4		21.5	17.4		21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.38	0.31		0.38	0.31		0.38	0.38		0.38	0.38	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	261	1055		261	1063		449	1246		449	662	
v/s Ratio Prot	c0.04	c0.25		0.03	0.21			0.04			0.08	
v/s Ratio Perm	0.17			0.11			0.14			c0.19		
v/c Ratio	0.56	0.81		0.35	0.69		0.36	0.10		0.49	0.21	
Uniform Delay, d1	12.5	18.2		12.5	17.4		12.5	11.2		13.3	11.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	4.9		0.8	1.9		2.2	0.2		3.9	0.7	
Delay (s)	15.3	23.1		13.4	19.3		14.7	11.4		17.1	12.4	
Level of Service	B	C		B	B		B	B		B	B	
Approach Delay (s)		22.0			18.7			12.8			14.8	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	814	231	102	685	101	182	28	116	122	28	66
Future Volume (vph)	75	814	231	102	685	101	182	28	116	122	28	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3563	1601		3497		1789	1883	1601	1789	1883	1601
Flt Permitted		0.78	1.00		0.70		0.74	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)		2791	1601		2469		1389	1883	1601	1389	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	885	251	111	745	110	198	30	126	133	30	72
RTOR Reduction (vph)	0	0	128	0	14	0	0	0	83	0	0	48
Lane Group Flow (vph)	0	967	123	0	952	0	198	30	43	133	30	24
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		26.1	26.1		26.1		18.1	18.1	18.1	18.1	18.1	18.1
Effective Green, g (s)		26.1	26.1		26.1		18.1	18.1	18.1	18.1	18.1	18.1
Actuated g/C Ratio		0.49	0.49		0.49		0.34	0.34	0.34	0.34	0.34	0.34
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1369	785		1211		472	640	544	472	640	544
v/s Ratio Prot								0.02			0.02	
v/s Ratio Perm		0.35	0.08		c0.39		c0.14		0.03	0.10		0.02
v/c Ratio		0.71	0.16		0.79		0.42	0.05	0.08	0.28	0.05	0.05
Uniform Delay, d1		10.6	7.5		11.2		13.5	11.8	11.9	12.8	11.8	11.8
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.7	0.1		3.4		2.7	0.1	0.3	1.5	0.1	0.2
Delay (s)		12.2	7.6		14.7		16.2	11.9	12.2	14.3	11.9	11.9
Level of Service		B	A		B		B	B	B	B	B	B
Approach Delay (s)		11.3			14.7			14.4			13.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	53.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	0	76	0	0	2	40	222	0	2	276	65
Future Volume (Veh/h)	68	0	76	0	0	2	40	222	0	2	276	65
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	0	83	0	0	2	43	241	0	2	300	71
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	633	631	300	714	702	241	371			241		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	633	631	300	714	702	241	371			241		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	81	100	89	100	100	100	96			100		
cM capacity (veh/h)	380	383	740	299	349	798	1188			1326		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	157	2	43	241	302	71
Volume Left	74	0	43	0	2	0
Volume Right	83	2	0	0	0	71
cSH	512	798	1188	1700	1326	1700
Volume to Capacity	0.31	0.00	0.04	0.14	0.00	0.04
Queue Length 95th (m)	9.8	0.1	0.9	0.0	0.0	0.0
Control Delay (s)	15.1	9.5	8.1	0.0	0.1	0.0
Lane LOS	C	A	A		A	
Approach Delay (s)	15.1	9.5	1.2		0.1	
Approach LOS	C	A				

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰	↱
Traffic Volume (veh/h)	0	504	548	6	576	0	0	0	0	10	0	312
Future Volume (Veh/h)	0	504	548	6	576	0	0	0	0	10	0	312
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	548	596	7	626	0	0	0	0	11	0	339
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				0.89			0.89	0.89	0.89	0.89	0.89	
vC, conflicting volume	626			548			875	1188	548	1188	1188	313
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	626			426			795	1148	426	1148	1148	313
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	92	100	50
cM capacity (veh/h)	952			1001			124	174	511	136	174	683

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	548	596	216	417	11	339
Volume Left	0	0	7	0	11	0
Volume Right	0	596	0	0	0	339
cSH	1700	1700	1001	1700	136	683
Volume to Capacity	0.32	0.35	0.01	0.25	0.08	0.50
Queue Length 95th (m)	0.0	0.0	0.2	0.0	2.0	21.1
Control Delay (s)	0.0	0.0	0.3	0.0	33.9	15.4
Lane LOS			A		D	C
Approach Delay (s)	0.0		0.1		15.9	
Approach LOS					C	

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	0	426	88	236	19
Future Volume (Veh/h)	13	0	426	88	236	19
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)	14	0	463	96	257	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1279	257	278			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1279	257	278			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	100	64			
cM capacity (veh/h)	117	782	1285			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	14	463	96	257	21
Volume Left	14	463	0	0	0
Volume Right	0	0	0	0	21
cSH	117	1285	1700	1700	1700
Volume to Capacity	0.12	0.36	0.06	0.15	0.01
Queue Length 95th (m)	3.0	12.6	0.0	0.0	0.0
Control Delay (s)	39.8	9.4	0.0	0.0	0.0
Lane LOS	E	A			
Approach Delay (s)	39.8	7.8		0.0	
Approach LOS	E				

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↱	
Traffic Volume (vph)	132	466	189	152	588	205	170	74	140	218	111	132
Future Volume (vph)	132	466	189	152	588	205	170	74	140	218	111	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.90		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3424		1789	3440		1789	3227		1789	1730	
Flt Permitted	0.24	1.00		0.24	1.00		0.56	1.00		0.61	1.00	
Satd. Flow (perm)	454	3424		454	3440		1055	3227		1144	1730	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	507	205	165	639	223	185	80	152	237	121	143
RTOR Reduction (vph)	0	75	0	0	60	0	0	91	0	0	68	0
Lane Group Flow (vph)	143	637	0	165	802	0	185	141	0	237	196	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.8	16.6		20.8	16.6		22.9	22.9		22.9	22.9	
Effective Green, g (s)	20.8	16.6		20.8	16.6		22.9	22.9		22.9	22.9	
Actuated g/C Ratio	0.36	0.29		0.36	0.29		0.40	0.40		0.40	0.40	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	263	993		263	998		422	1291		458	692	
v/s Ratio Prot	0.04	0.19		c0.05	c0.23			0.04			0.11	
v/s Ratio Perm	0.16			0.18			0.18			c0.21		
v/c Ratio	0.54	0.64		0.63	0.80		0.44	0.11		0.52	0.28	
Uniform Delay, d1	13.4	17.7		13.2	18.8		12.5	10.8		13.0	11.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	1.4		4.6	4.8		3.3	0.2		4.1	1.0	
Delay (s)	15.7	19.1		17.8	23.6		15.8	10.9		17.1	12.6	
Level of Service	B	B		B	C		B	B		B	B	
Approach Delay (s)		18.6			22.6			13.1			14.7	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	720	162	132	838	156	207	40	101	141	40	132
Future Volume (vph)	102	720	162	132	838	156	207	40	101	141	40	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3556	1601		3484		1789	1883	1601	1789	1883	1601
Flt Permitted		0.63	1.00		0.69		0.73	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		2247	1601		2416		1373	1883	1601	1373	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	111	783	176	143	911	170	225	43	110	153	43	143
RTOR Reduction (vph)	0	0	86	0	17	0	0	0	74	0	0	96
Lane Group Flow (vph)	0	894	90	0	1207	0	225	43	36	153	43	47
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		28.5	28.5		28.5		18.1	18.1	18.1	18.1	18.1	18.1
Effective Green, g (s)		28.5	28.5		28.5		18.1	18.1	18.1	18.1	18.1	18.1
Actuated g/C Ratio		0.51	0.51		0.51		0.33	0.33	0.33	0.33	0.33	0.33
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1151	820		1238		446	612	521	446	612	521
v/s Ratio Prot								0.02			0.02	
v/s Ratio Perm		0.40	0.06		c0.50		c0.16		0.02	0.11		0.03
v/c Ratio		0.78	0.11		0.97		0.50	0.07	0.07	0.34	0.07	0.09
Uniform Delay, d1		11.0	7.0		13.2		15.1	12.9	12.9	14.2	12.9	13.0
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		3.4	0.1		19.6		4.0	0.2	0.3	2.1	0.2	0.3
Delay (s)		14.3	7.1		32.8		19.2	13.2	13.2	16.3	13.2	13.4
Level of Service		B	A		C		B	B	B	B	B	B
Approach Delay (s)		13.1			32.8			16.7			14.7	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	55.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	89	1	70	1	1	10	60	222	1	6	187	106
Future Volume (Veh/h)	89	1	70	1	1	10	60	222	1	6	187	106
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	1	76	1	1	11	65	241	1	7	203	115
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	600	589	203	665	704	242	318			242		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	600	589	203	665	704	242	318			242		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	75	100	91	100	100	99	95			99		
cM capacity (veh/h)	389	397	838	324	341	797	1242			1324		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	174	13	65	242	210	115
Volume Left	97	1	65	0	7	0
Volume Right	76	11	0	1	0	115
cSH	508	656	1242	1700	1324	1700
Volume to Capacity	0.34	0.02	0.05	0.14	0.01	0.07
Queue Length 95th (m)	11.5	0.5	1.3	0.0	0.1	0.0
Control Delay (s)	15.7	10.6	8.1	0.0	0.3	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	15.7	10.6	1.7		0.2	
Approach LOS	C	B				

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰	↱
Traffic Volume (veh/h)	0	459	503	19	674	0	0	0	0	5	0	452
Future Volume (Veh/h)	0	459	503	19	674	0	0	0	0	5	0	452
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	499	547	21	733	0	0	0	0	5	0	491
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	733			499			908	1274	499	1274	1274	366
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	733			432			868	1259	432	1259	1259	366
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	100	96	100	22
cM capacity (veh/h)	868			1054			50	156	536	118	156	630

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	499	547	265	489	5	491
Volume Left	0	0	21	0	5	0
Volume Right	0	547	0	0	0	491
cSH	1700	1700	1054	1700	118	630
Volume to Capacity	0.29	0.32	0.02	0.29	0.04	0.78
Queue Length 95th (m)	0.0	0.0	0.5	0.0	1.0	56.3
Control Delay (s)	0.0	0.0	0.9	0.0	37.0	27.9
Lane LOS			A		E	D
Approach Delay (s)	0.0		0.3		28.0	
Approach LOS					D	

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	0	425	39	77	12
Future Volume (Veh/h)	15	0	425	39	77	12
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)	16	0	462	42	84	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1050	84	97			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1050	84	97			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	100	69			
cM capacity (veh/h)	174	975	1496			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	16	462	42	84	13
Volume Left	16	462	0	0	0
Volume Right	0	0	0	0	13
cSH	174	1496	1700	1700	1700
Volume to Capacity	0.09	0.31	0.02	0.05	0.01
Queue Length 95th (m)	2.3	10.1	0.0	0.0	0.0
Control Delay (s)	27.8	8.5	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	27.8	7.8		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D:
Future Total Operations

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↱	
Traffic Volume (vph)	135	602	199	85	546	131	149	71	123	204	82	113
Future Volume (vph)	135	602	199	85	546	131	149	71	123	204	82	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.90		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3445		1789	3475		1789	3238		1789	1720	
Flt Permitted	0.24	1.00		0.24	1.00		0.62	1.00		0.62	1.00	
Satd. Flow (perm)	443	3445		443	3475		1171	3238		1167	1720	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	654	216	92	593	142	162	77	134	222	89	123
RTOR Reduction (vph)	0	55	0	0	36	0	0	82	0	0	75	0
Lane Group Flow (vph)	147	815	0	92	699	0	162	129	0	222	137	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.1	17.0		21.1	17.0		21.9	21.9		21.9	21.9	
Effective Green, g (s)	21.1	17.0		21.1	17.0		21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.37	0.30		0.37	0.30		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	263	1036		263	1045		453	1255		452	666	
v/s Ratio Prot	c0.04	c0.24		0.03	0.20			0.04			0.08	
v/s Ratio Perm	0.17			0.11			0.14			c0.19		
v/c Ratio	0.56	0.79		0.35	0.67		0.36	0.10		0.49	0.21	
Uniform Delay, d1	12.5	18.1		12.5	17.3		12.3	11.0		13.1	11.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.6	4.0		0.8	1.6		2.2	0.2		3.8	0.7	
Delay (s)	15.1	22.1		13.3	18.9		14.5	11.2		16.9	12.2	
Level of Service	B	C		B	B		B	B		B	B	
Approach Delay (s)		21.1			18.3			12.6			14.6	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	56.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	62	665	283	134	549	83	236	23	145	100	23	54
Future Volume (vph)	62	665	283	134	549	83	236	23	145	100	23	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3563	1601		3490		1789	1883	1601	1789	1883	1601
Flt Permitted		0.83	1.00		0.66		0.74	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)		2962	1601		2326		1396	1883	1601	1396	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	67	723	308	146	597	90	257	25	158	109	25	59
RTOR Reduction (vph)	0	0	172	0	15	0	0	0	99	0	0	37
Lane Group Flow (vph)	0	790	136	0	818	0	257	25	59	109	25	22
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		21.3	21.3		21.3		18.1	18.1	18.1	18.1	18.1	18.1
Effective Green, g (s)		21.3	21.3		21.3		18.1	18.1	18.1	18.1	18.1	18.1
Actuated g/C Ratio		0.44	0.44		0.44		0.37	0.37	0.37	0.37	0.37	0.37
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1303	704		1023		522	704	598	522	704	598
v/s Ratio Prot								0.01			0.01	
v/s Ratio Perm		0.27	0.08		c0.35		c0.18		0.04	0.08		0.01
v/c Ratio		0.61	0.19		0.80		0.49	0.04	0.10	0.21	0.04	0.04
Uniform Delay, d1		10.3	8.3		11.7		11.6	9.6	9.8	10.3	9.6	9.6
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.8	0.1		4.6		3.3	0.1	0.3	0.9	0.1	0.1
Delay (s)		11.2	8.4		16.3		14.9	9.7	10.2	11.2	9.7	9.7
Level of Service		B	A		B		B	A	B	B	A	A
Approach Delay (s)		10.4			16.3			12.9			10.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	48.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	0	76	28	0	150	40	172	24	163	211	65
Future Volume (Veh/h)	68	0	76	28	0	150	40	172	24	163	211	65
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	0	83	30	0	163	43	187	26	177	229	71
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	1019	882	229	952	940	200	300			213		
vC1, stage 1 conf vol	583	583		286	286							
vC2, stage 2 conf vol	436	299		666	654							
vCu, unblocked vol	1019	882	229	952	940	200	300			213		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	72	100	90	90	100	81	97			87		
cM capacity (veh/h)	264	370	810	295	341	841	1261			1357		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	157	193	43	213	177	229	71
Volume Left	74	30	43	0	177	0	0
Volume Right	83	163	0	26	0	0	71
cSH	410	653	1261	1700	1357	1700	1700
Volume to Capacity	0.38	0.30	0.03	0.13	0.13	0.13	0.04
Queue Length 95th (m)	13.4	9.4	0.8	0.0	3.4	0.0	0.0
Control Delay (s)	19.1	12.8	8.0	0.0	8.0	0.0	0.0
Lane LOS	C	B	A		A		
Approach Delay (s)	19.1	12.8	1.3		3.0		
Approach LOS	C	B					

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	432	468	5	493	0	0	0	0	9	0	276
Future Volume (Veh/h)	0	432	468	5	493	0	0	0	0	9	0	276
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	470	509	5	536	0	0	0	0	10	0	300
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	536			470			748	1016	470	1016	1016	268
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	536			421			712	993	421	993	993	268
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	95	100	59
cM capacity (veh/h)	1028			1083			179	232	555	190	232	730

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	470	509	184	357	10	300
Volume Left	0	0	5	0	10	0
Volume Right	0	509	0	0	0	300
cSH	1700	1700	1083	1700	190	730
Volume to Capacity	0.28	0.30	0.00	0.21	0.05	0.41
Queue Length 95th (m)	0.0	0.0	0.1	0.0	1.3	15.3
Control Delay (s)	0.0	0.0	0.3	0.0	25.0	13.3
Lane LOS			A		C	B
Approach Delay (s)	0.0		0.1		13.7	
Approach LOS					B	

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	0	368	72	194	16
Future Volume (Veh/h)	11	0	368	72	194	16
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)	12	0	400	78	211	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1089	211	228			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1089	211	228			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	100	70			
cM capacity (veh/h)	167	829	1340			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	400	78	211	17
Volume Left	12	400	0	0	0
Volume Right	0	0	0	0	17
cSH	167	1340	1700	1700	1700
Volume to Capacity	0.07	0.30	0.05	0.12	0.01
Queue Length 95th (m)	1.7	9.6	0.0	0.0	0.0
Control Delay (s)	28.2	8.8	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	28.2	7.4		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↱	
Traffic Volume (vph)	132	479	189	152	568	205	170	74	140	218	111	132
Future Volume (vph)	132	479	189	152	568	205	170	74	140	218	111	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.90		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3427		1789	3436		1789	3227		1789	1730	
Flt Permitted	0.25	1.00		0.24	1.00		0.56	1.00		0.61	1.00	
Satd. Flow (perm)	477	3427		454	3436		1054	3227		1144	1730	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	521	205	165	617	223	185	80	152	237	121	143
RTOR Reduction (vph)	0	72	0	0	64	0	0	92	0	0	68	0
Lane Group Flow (vph)	143	654	0	165	776	0	185	140	0	237	196	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	19.9	15.8		21.5	16.6		22.3	22.3		22.3	22.3	
Effective Green, g (s)	19.9	15.8		21.5	16.6		22.3	22.3		22.3	22.3	
Actuated g/C Ratio	0.35	0.28		0.38	0.29		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	263	958		288	1009		416	1273		451	682	
v/s Ratio Prot	0.04	0.19		c0.05	c0.23			0.04			0.11	
v/s Ratio Perm	0.15			0.17			0.18			c0.21		
v/c Ratio	0.54	0.68		0.57	0.77		0.44	0.11		0.53	0.29	
Uniform Delay, d1	13.5	18.1		12.5	18.2		12.6	10.8		13.1	11.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	2.0		2.7	3.6		3.4	0.2		4.3	1.1	
Delay (s)	15.8	20.1		15.3	21.8		16.0	11.0		17.4	12.7	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		19.4			20.7			13.2			14.9	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	56.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	84	575	246	173	672	128	271	33	141	116	33	108
Future Volume (vph)	84	575	246	173	672	128	271	33	141	116	33	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3556	1601		3477		1789	1883	1601	1789	1883	1601
Flt Permitted		0.69	1.00		0.67		0.73	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		2479	1601		2351		1382	1883	1601	1382	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	625	267	188	730	139	295	36	153	126	36	117
RTOR Reduction (vph)	0	0	140	0	17	0	0	0	100	0	0	76
Lane Group Flow (vph)	0	716	127	0	1040	0	295	36	53	126	36	41
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		24.6	24.6		24.6		18.0	18.0	18.0	18.0	18.0	18.0
Effective Green, g (s)		24.6	24.6		24.6		18.0	18.0	18.0	18.0	18.0	18.0
Actuated g/C Ratio		0.48	0.48		0.48		0.35	0.35	0.35	0.35	0.35	0.35
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1181	763		1120		482	656	558	482	656	558
v/s Ratio Prot								0.02			0.02	
v/s Ratio Perm		0.29	0.08		c0.44		c0.21		0.03	0.09		0.03
v/c Ratio		0.61	0.17		0.93		0.61	0.05	0.10	0.26	0.05	0.07
Uniform Delay, d1		9.9	7.7		12.7		13.9	11.2	11.3	12.0	11.2	11.2
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.9	0.1		13.0		5.7	0.2	0.3	1.3	0.2	0.3
Delay (s)		10.8	7.8		25.6		19.6	11.3	11.7	13.4	11.3	11.5
Level of Service		B	A		C		B	B	B	B	B	B
Approach Delay (s)		10.0			25.6			16.5			12.3	
Approach LOS		A			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	51.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣		↰	↱		↰	↑	↱
Traffic Volume (veh/h)	89	1	70	34	1	182	60	170	30	202	135	106
Future Volume (Veh/h)	89	1	70	34	1	182	60	170	30	202	135	106
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	1	76	37	1	198	65	185	33	220	147	115
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	1100	935	147	995	1034	202	262			218		
vC1, stage 1 conf vol	587	587		332	332							
vC2, stage 2 conf vol	514	348		664	702							
vCu, unblocked vol	1100	935	147	995	1034	202	262			218		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	42	100	92	86	100	76	95			84		
cM capacity (veh/h)	169	327	900	268	290	839	1302			1352		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	174	236	65	218	220	147	115
Volume Left	97	37	65	0	220	0	0
Volume Right	76	198	0	33	0	0	115
cSH	262	626	1302	1700	1352	1700	1700
Volume to Capacity	0.66	0.38	0.05	0.13	0.16	0.09	0.07
Queue Length 95th (m)	32.4	13.3	1.2	0.0	4.4	0.0	0.0
Control Delay (s)	42.1	14.2	7.9	0.0	8.2	0.0	0.0
Lane LOS	E	B	A		A		
Approach Delay (s)	42.1	14.2	1.8		3.7		
Approach LOS	E	B					

Intersection Summary			
Average Delay	11.1		
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰	↱
Traffic Volume (veh/h)	0	398	434	15	577	0	0	0	0	4	0	395
Future Volume (Veh/h)	0	398	434	15	577	0	0	0	0	4	0	395
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	433	472	16	627	0	0	0	0	4	0	429
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked												
vC, conflicting volume	627			433			778	1092	433	1092	1092	314
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	627			433			778	1092	433	1092	1092	314
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	98	100	37
cM capacity (veh/h)	951			1123			105	210	571	167	210	682

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	433	472	225	418	4	429
Volume Left	0	0	16	0	4	0
Volume Right	0	472	0	0	0	429
cSH	1700	1700	1123	1700	167	682
Volume to Capacity	0.25	0.28	0.01	0.25	0.02	0.63
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.6	33.9
Control Delay (s)	0.0	0.0	0.7	0.0	27.1	18.8
Lane LOS			A		D	C
Approach Delay (s)	0.0		0.2		18.9	
Approach LOS					C	

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	0	370	32	63	10
Future Volume (Veh/h)	12	0	370	32	63	10
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)	13	0	402	35	68	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	907	68	79			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	907	68	79			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	100	74			
cM capacity (veh/h)	225	995	1519			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	13	402	35	68	11
Volume Left	13	402	0	0	0
Volume Right	0	0	0	0	11
cSH	225	1519	1700	1700	1700
Volume to Capacity	0.06	0.26	0.02	0.04	0.01
Queue Length 95th (m)	1.4	8.1	0.0	0.0	0.0
Control Delay (s)	22.0	8.2	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	22.0	7.6		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	37.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: Pine Drive & Bowes Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↱	
Traffic Volume (vph)	135	657	199	85	595	131	149	71	123	204	82	113
Future Volume (vph)	135	657	199	85	595	131	149	71	123	204	82	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.97		1.00	0.97		1.00	0.90		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3454		1789	3482		1789	3238		1789	1720	
Flt Permitted	0.23	1.00		0.24	1.00		0.62	1.00		0.62	1.00	
Satd. Flow (perm)	428	3454		443	3482		1166	3238		1167	1720	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	714	216	92	647	142	162	77	134	222	89	123
RTOR Reduction (vph)	0	48	0	0	32	0	0	83	0	0	76	0
Lane Group Flow (vph)	147	882	0	92	757	0	162	128	0	222	136	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	22.5	17.6		21.3	17.0		21.9	21.9		21.9	21.9	
Effective Green, g (s)	22.5	17.6		21.3	17.0		21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.39	0.31		0.37	0.30		0.38	0.38		0.38	0.38	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	284	1060		265	1033		445	1237		446	657	
v/s Ratio Prot	c0.04	c0.26		0.03	0.22			0.04			0.08	
v/s Ratio Perm	0.16			0.10			0.14			c0.19		
v/c Ratio	0.52	0.83		0.35	0.73		0.36	0.10		0.50	0.21	
Uniform Delay, d1	12.2	18.5		12.8	18.1		12.7	11.4		13.5	11.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	5.7		0.8	2.7		2.3	0.2		3.9	0.7	
Delay (s)	13.8	24.2		13.6	20.8		15.0	11.6		17.4	12.6	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		22.7			20.1			13.1			15.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	13.5
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	725	302	145	608	91	252	26	155	111	26	60
Future Volume (vph)	68	725	302	145	608	91	252	26	155	111	26	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3563	1601		3491		1789	1883	1601	1789	1883	1601
Flt Permitted		0.81	1.00		0.64		0.74	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)		2890	1601		2243		1392	1883	1601	1392	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	788	328	158	661	99	274	28	168	121	28	65
RTOR Reduction (vph)	0	0	171	0	13	0	0	0	108	0	0	42
Lane Group Flow (vph)	0	862	157	0	905	0	274	28	60	121	28	23
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		24.9	24.9		24.9		18.1	18.1	18.1	18.1	18.1	18.1
Effective Green, g (s)		24.9	24.9		24.9		18.1	18.1	18.1	18.1	18.1	18.1
Actuated g/C Ratio		0.48	0.48		0.48		0.35	0.35	0.35	0.35	0.35	0.35
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1383	766		1074		484	655	557	484	655	557
v/s Ratio Prot								0.01			0.01	
v/s Ratio Perm		0.30	0.10		c0.40		c0.20		0.04	0.09		0.01
v/c Ratio		0.62	0.21		0.84		0.57	0.04	0.11	0.25	0.04	0.04
Uniform Delay, d1		10.1	7.8		11.8		13.8	11.2	11.5	12.1	11.2	11.2
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.9	0.1		6.1		4.7	0.1	0.4	1.2	0.1	0.1
Delay (s)		10.9	8.0		18.0		18.5	11.3	11.9	13.3	11.3	11.3
Level of Service		B	A		B		B	B	B	B	B	B
Approach Delay (s)		10.1			18.0			15.7			12.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	52.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	0	76	28	0	150	40	191	24	163	234	65
Future Volume (Veh/h)	68	0	76	28	0	150	40	191	24	163	234	65
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	0	83	30	0	163	43	208	26	177	254	71
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	1065	928	254	998	986	221	325			234		
vC1, stage 1 conf vol	608	608		307	307							
vC2, stage 2 conf vol	457	320		691	679							
vCu, unblocked vol	1065	928	254	998	986	221	325			234		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	70	100	89	89	100	80	97			87		
cM capacity (veh/h)	250	356	785	282	330	819	1235			1333		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	157	193	43	234	177	254	71
Volume Left	74	30	43	0	177	0	0
Volume Right	83	163	0	26	0	0	71
cSH	391	632	1235	1700	1333	1700	1700
Volume to Capacity	0.40	0.31	0.03	0.14	0.13	0.15	0.04
Queue Length 95th (m)	14.4	9.8	0.8	0.0	3.5	0.0	0.0
Control Delay (s)	20.3	13.2	8.0	0.0	8.1	0.0	0.0
Lane LOS	C	B	A		A		
Approach Delay (s)	20.3	13.2	1.2		2.9		
Approach LOS	C	B					

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰	↱
Traffic Volume (veh/h)	0	475	515	5	542	0	0	0	0	9	0	303
Future Volume (Veh/h)	0	475	515	5	542	0	0	0	0	9	0	303
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	516	560	5	589	0	0	0	0	10	0	329
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				0.93			0.93	0.93	0.93	0.93	0.93	
vC, conflicting volume	589			516			820	1115	516	1115	1115	294
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	589			437			766	1084	437	1084	1084	294
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	94	100	53
cM capacity (veh/h)	982			1036			143	199	525	158	199	702

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	516	560	201	393	10	329
Volume Left	0	0	5	0	10	0
Volume Right	0	560	0	0	0	329
cSH	1700	1700	1036	1700	158	702
Volume to Capacity	0.30	0.33	0.00	0.23	0.06	0.47
Queue Length 95th (m)	0.0	0.0	0.1	0.0	1.5	19.1
Control Delay (s)	0.0	0.0	0.3	0.0	29.3	14.6
Lane LOS			A		D	B
Approach Delay (s)	0.0		0.1		15.0	
Approach LOS					C	

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰		↰	↑	↑	↱
Traffic Volume (veh/h)	12	0	405	80	214	17
Future Volume (Veh/h)	12	0	405	80	214	17
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)	13	0	440	87	233	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1200	233	251			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1200	233	251			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	100	67			
cM capacity (veh/h)	136	806	1314			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	13	440	87	233	18
Volume Left	13	440	0	0	0
Volume Right	0	0	0	0	18
cSH	136	1314	1700	1700	1700
Volume to Capacity	0.10	0.33	0.05	0.14	0.01
Queue Length 95th (m)	2.4	11.3	0.0	0.0	0.0
Control Delay (s)	34.2	9.1	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	34.2	7.6		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↱	
Traffic Volume (vph)	132	519	189	152	618	205	170	74	140	218	111	132
Future Volume (vph)	132	519	189	152	618	205	170	74	140	218	111	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.90		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3435		1789	3445		1789	3227		1789	1730	
Flt Permitted	0.24	1.00		0.23	1.00		0.56	1.00		0.61	1.00	
Satd. Flow (perm)	457	3435		435	3445		1046	3227		1144	1730	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	564	205	165	672	223	185	80	152	237	121	143
RTOR Reduction (vph)	0	63	0	0	56	0	0	93	0	0	68	0
Lane Group Flow (vph)	143	706	0	165	839	0	185	139	0	237	196	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.6	16.5		22.2	17.3		21.9	21.9		21.9	21.9	
Effective Green, g (s)	20.6	16.5		22.2	17.3		21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.36	0.29		0.39	0.30		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	261	997		286	1049		403	1244		441	667	
v/s Ratio Prot	0.04	0.21		c0.05	c0.24			0.04			0.11	
v/s Ratio Perm	0.16			0.18			0.18			c0.21		
v/c Ratio	0.55	0.71		0.58	0.80		0.46	0.11		0.54	0.29	
Uniform Delay, d1	13.3	18.0		12.3	18.2		13.0	11.2		13.5	12.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	2.3		2.8	4.5		3.7	0.2		4.6	1.1	
Delay (s)	15.7	20.3		15.1	22.6		16.8	11.4		18.2	13.2	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		19.6			21.4			13.8			15.6	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	56.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	93	636	259	184	744	141	289	37	150	128	37	119
Future Volume (vph)	93	636	259	184	744	141	289	37	150	128	37	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3556	1601		3478		1789	1883	1601	1789	1883	1601
Flt Permitted		0.64	1.00		0.64		0.73	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		2294	1601		2236		1377	1883	1601	1377	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	691	282	200	809	153	314	40	163	139	40	129
RTOR Reduction (vph)	0	0	125	0	12	0	0	0	110	0	0	87
Lane Group Flow (vph)	0	792	157	0	1150	0	314	40	53	139	40	42
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		41.7	41.7		41.7		24.2	24.2	24.2	24.2	24.2	24.2
Effective Green, g (s)		41.7	41.7		41.7		24.2	24.2	24.2	24.2	24.2	24.2
Actuated g/C Ratio		0.56	0.56		0.56		0.32	0.32	0.32	0.32	0.32	0.32
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1277	891		1244		444	608	517	444	608	517
v/s Ratio Prot								0.02			0.02	
v/s Ratio Perm		0.35	0.10		c0.51		c0.23		0.03	0.10		0.03
v/c Ratio		0.62	0.18		0.92		0.71	0.07	0.10	0.31	0.07	0.08
Uniform Delay, d1		11.2	8.2		15.2		22.2	17.5	17.7	19.1	17.5	17.6
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.9	0.1		11.5		9.2	0.2	0.4	1.8	0.2	0.3
Delay (s)		12.2	8.3		26.6		31.4	17.7	18.1	20.9	17.7	17.9
Level of Service		B	A		C		C	B	B	C	B	B
Approach Delay (s)		11.2			26.6			26.2			19.3	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	74.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↱		↰	↑	↱
Traffic Volume (veh/h)	89	1	70	34	1	182	60	189	30	202	151	106
Future Volume (Veh/h)	89	1	70	34	1	182	60	189	30	202	151	106
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	1	76	37	1	198	65	205	33	220	164	115
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	1138	972	164	1032	1070	222	279			238		
vC1, stage 1 conf vol	604	604		352	352							
vC2, stage 2 conf vol	534	368		680	719							
vCu, unblocked vol	1138	972	164	1032	1070	222	279			238		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	38	100	91	86	100	76	95			83		
cM capacity (veh/h)	156	316	881	259	282	818	1284			1329		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	174	236	65	238	220	164	115
Volume Left	97	37	65	0	220	0	0
Volume Right	76	198	0	33	0	0	115
cSH	245	608	1284	1700	1329	1700	1700
Volume to Capacity	0.71	0.39	0.05	0.14	0.17	0.10	0.07
Queue Length 95th (m)	36.4	13.9	1.2	0.0	4.5	0.0	0.0
Control Delay (s)	49.2	14.6	8.0	0.0	8.2	0.0	0.0
Lane LOS	E	B	A		A		
Approach Delay (s)	49.2	14.6	1.7		3.6		
Approach LOS	E	B					

Intersection Summary			
Average Delay	11.8		
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰	↱
Traffic Volume (veh/h)	0	437	477	17	635	0	0	0	0	5	0	434
Future Volume (Veh/h)	0	437	477	17	635	0	0	0	0	5	0	434
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	475	518	18	690	0	0	0	0	5	0	472
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	690			475			856	1201	475	1201	1201	345
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	690			418			820	1184	418	1184	1184	345
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	100	96	100	27
cM capacity (veh/h)	900			1078			69	175	553	135	175	651

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	475	518	248	460	5	472
Volume Left	0	0	18	0	5	0
Volume Right	0	518	0	0	0	472
cSH	1700	1700	1078	1700	135	651
Volume to Capacity	0.28	0.30	0.02	0.27	0.04	0.73
Queue Length 95th (m)	0.0	0.0	0.4	0.0	0.9	47.1
Control Delay (s)	0.0	0.0	0.8	0.0	32.7	23.7
Lane LOS			A		D	C
Approach Delay (s)	0.0		0.3		23.8	
Approach LOS					C	

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	0	407	35	69	11
Future Volume (Veh/h)	13	0	407	35	69	11
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)	14	0	442	38	75	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	997	75	87			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	997	75	87			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	100	71			
cM capacity (veh/h)	191	986	1509			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	14	442	38	75	12
Volume Left	14	442	0	0	0
Volume Right	0	0	0	0	12
cSH	191	1509	1700	1700	1700
Volume to Capacity	0.07	0.29	0.02	0.04	0.01
Queue Length 95th (m)	1.8	9.4	0.0	0.0	0.0
Control Delay (s)	25.3	8.4	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	25.3	7.7		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	39.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↱	
Traffic Volume (vph)	135	717	199	85	649	131	149	71	123	204	82	113
Future Volume (vph)	135	717	199	85	649	131	149	71	123	204	82	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.97		1.00	0.97		1.00	0.90		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3462		1789	3489		1789	3238		1789	1720	
Flt Permitted	0.22	1.00		0.23	1.00		0.62	1.00		0.62	1.00	
Satd. Flow (perm)	414	3462		428	3489		1161	3238		1167	1720	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	779	216	92	705	142	162	77	134	222	89	123
RTOR Reduction (vph)	0	42	0	0	29	0	0	83	0	0	77	0
Lane Group Flow (vph)	147	953	0	92	818	0	162	128	0	222	135	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	23.1	18.2		21.9	17.6		21.8	21.8		21.8	21.8	
Effective Green, g (s)	23.1	18.2		21.9	17.6		21.8	21.8		21.8	21.8	
Actuated g/C Ratio	0.40	0.31		0.38	0.30		0.38	0.38		0.38	0.38	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	282	1090		263	1062		437	1221		440	648	
v/s Ratio Prot	c0.04	c0.28		0.03	0.23			0.04			0.08	
v/s Ratio Perm	0.16			0.11			0.14			c0.19		
v/c Ratio	0.52	0.87		0.35	0.77		0.37	0.10		0.50	0.21	
Uniform Delay, d1	12.3	18.7		12.9	18.3		13.0	11.7		13.8	12.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	7.9		0.8	3.5		2.4	0.2		4.1	0.7	
Delay (s)	14.0	26.7		13.7	21.8		15.4	11.8		17.9	12.9	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		25.0			21.0			13.4			15.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	57.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	75	801	324	155	672	101	269	28	166	122	26	66
Future Volume (vph)	75	801	324	155	672	101	269	28	166	122	26	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3563	1601		3491		1789	1883	1601	1789	1883	1601
Flt Permitted		0.77	1.00		0.61		0.74	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)		2748	1601		2141		1392	1883	1601	1389	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	871	352	168	730	110	292	30	180	133	28	72
RTOR Reduction (vph)	0	0	176	0	13	0	0	0	91	0	0	48
Lane Group Flow (vph)	0	953	176	0	995	0	292	30	89	133	28	24
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		27.1	27.1		27.1		18.1	18.1	18.1	18.1	18.1	18.1
Effective Green, g (s)		27.1	27.1		27.1		18.1	18.1	18.1	18.1	18.1	18.1
Actuated g/C Ratio		0.50	0.50		0.50		0.33	0.33	0.33	0.33	0.33	0.33
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1374	800		1070		464	628	534	463	628	534
v/s Ratio Prot								0.02			0.01	
v/s Ratio Perm		0.35	0.11		c0.46		c0.21		0.06	0.10		0.02
v/c Ratio		0.69	0.22		0.93		0.63	0.05	0.17	0.29	0.04	0.05
Uniform Delay, d1		10.4	7.6		12.7		15.2	12.2	12.7	13.3	12.2	12.2
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.5	0.1		13.6		6.3	0.1	0.7	1.6	0.1	0.2
Delay (s)		11.9	7.8		26.3		21.6	12.4	13.4	14.9	12.3	12.4
Level of Service		B	A		C		C	B	B	B	B	B
Approach Delay (s)		10.8			26.3			18.1			13.8	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	54.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↱		↰	↑	↱
Traffic Volume (veh/h)	68	0	76	28	0	150	40	212	24	163	260	65
Future Volume (Veh/h)	68	0	76	28	0	150	40	212	24	163	260	65
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	74	0	83	30	0	163	43	230	26	177	283	71
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	1116	979	283	1049	1037	243	354			256		
vC1, stage 1 conf vol	637	637		329	329							
vC2, stage 2 conf vol	479	342		720	708							
vCu, unblocked vol	1116	979	283	1049	1037	243	354			256		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	69	100	89	89	100	80	96			86		
cM capacity (veh/h)	235	342	756	268	317	796	1205			1309		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	157	193	43	256	177	283	71
Volume Left	74	30	43	0	177	0	0
Volume Right	83	163	0	26	0	0	71
cSH	370	609	1205	1700	1309	1700	1700
Volume to Capacity	0.42	0.32	0.04	0.15	0.14	0.17	0.04
Queue Length 95th (m)	15.6	10.3	0.8	0.0	3.6	0.0	0.0
Control Delay (s)	21.7	13.6	8.1	0.0	8.2	0.0	0.0
Lane LOS	C	B	A		A		
Approach Delay (s)	21.7	13.6	1.2		2.7		
Approach LOS	C	B					

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰	↱
Traffic Volume (veh/h)	0	523	567	5	596	0	0	0	0	10	0	332
Future Volume (Veh/h)	0	523	567	5	596	0	0	0	0	10	0	332
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	568	616	5	648	0	0	0	0	11	0	361
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				0.89			0.89	0.89	0.89	0.89	0.89	
vC, conflicting volume	648			568			902	1226	568	1226	1226	324
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	648			457			831	1193	457	1193	1193	324
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	91	100	46
cM capacity (veh/h)	934			983			108	165	492	127	165	672

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	568	616	221	432	11	361
Volume Left	0	0	5	0	11	0
Volume Right	0	616	0	0	0	361
cSH	1700	1700	983	1700	127	672
Volume to Capacity	0.33	0.36	0.01	0.25	0.09	0.54
Queue Length 95th (m)	0.0	0.0	0.1	0.0	2.1	24.5
Control Delay (s)	0.0	0.0	0.2	0.0	36.1	16.4
Lane LOS			A		E	C
Approach Delay (s)	0.0		0.1		17.0	
Approach LOS					C	

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	65.1%	ICU Level of Service		C
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	0	445	88	236	19
Future Volume (Veh/h)	13	0	445	88	236	19
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)	14	0	484	96	257	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1321	257	278			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1321	257	278			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	100	62			
cM capacity (veh/h)	108	782	1285			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	14	484	96	257	21
Volume Left	14	484	0	0	0
Volume Right	0	0	0	0	21
cSH	108	1285	1700	1700	1700
Volume to Capacity	0.13	0.38	0.06	0.15	0.01
Queue Length 95th (m)	3.3	13.5	0.0	0.0	0.0
Control Delay (s)	43.4	9.5	0.0	0.0	0.0
Lane LOS	E	A			
Approach Delay (s)	43.4	7.9		0.0	
Approach LOS	E				

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱		↰	↑↑↱		↰	↑↑↱		↰	↑↱	
Traffic Volume (vph)	132	563	189	152	673	205	170	74	140	218	111	132
Future Volume (vph)	132	563	189	152	673	205	170	74	140	218	111	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.90		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3444		1789	3453		1789	3227		1789	1730	
Flt Permitted	0.23	1.00		0.22	1.00		0.55	1.00		0.61	1.00	
Satd. Flow (perm)	435	3444		419	3453		1039	3227		1144	1730	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	612	205	165	732	223	185	80	152	237	121	143
RTOR Reduction (vph)	0	55	0	0	49	0	0	94	0	0	69	0
Lane Group Flow (vph)	143	762	0	165	906	0	185	138	0	237	195	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.5	17.3		22.9	18.0		21.9	21.9		21.9	21.9	
Effective Green, g (s)	21.5	17.3		22.9	18.0		21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.37	0.30		0.40	0.31		0.38	0.38		0.38	0.38	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	261	1034		283	1079		395	1226		434	657	
v/s Ratio Prot	0.04	0.22		c0.05	c0.26			0.04			0.11	
v/s Ratio Perm	0.16			0.18			0.18			c0.21		
v/c Ratio	0.55	0.74		0.58	0.84		0.47	0.11		0.55	0.30	
Uniform Delay, d1	13.3	18.1		12.4	18.5		13.5	11.6		14.0	12.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	2.8		3.0	5.9		3.9	0.2		4.9	1.2	
Delay (s)	15.7	20.9		15.4	24.3		17.4	11.7		18.8	13.6	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		20.1			23.0			14.3			16.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	57.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	102	704	275	196	823	156	308	40	159	141	40	132
Future Volume (vph)	102	704	275	196	823	156	308	40	159	141	40	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		0.95	1.00		0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00		0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3556	1601		3478		1789	1883	1601	1789	1883	1601
Flt Permitted		0.61	1.00		0.62		0.73	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)		2180	1601		2173		1373	1883	1601	1373	1883	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	111	765	299	213	895	170	335	43	173	153	43	143
RTOR Reduction (vph)	0	0	119	0	12	0	0	0	124	0	0	102
Lane Group Flow (vph)	0	876	180	0	1266	0	335	43	49	153	43	41
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		48.6	48.6		48.6		23.0	23.0	23.0	23.0	23.0	23.0
Effective Green, g (s)		48.6	48.6		48.6		23.0	23.0	23.0	23.0	23.0	23.0
Actuated g/C Ratio		0.60	0.60		0.60		0.29	0.29	0.29	0.29	0.29	0.29
Clearance Time (s)		4.5	4.5		4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1314	965		1310		391	537	456	391	537	456
v/s Ratio Prot								0.02			0.02	
v/s Ratio Perm		0.40	0.11		c0.58		c0.24		0.03	0.11		0.03
v/c Ratio		0.67	0.19		0.97		0.86	0.08	0.11	0.39	0.08	0.09
Uniform Delay, d1		10.6	7.2		15.2		27.2	21.1	21.2	23.2	21.1	21.1
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.3	0.1		17.3		20.8	0.3	0.5	2.9	0.3	0.4
Delay (s)		11.9	7.3		32.6		48.1	21.4	21.7	26.1	21.4	21.5
Level of Service		B	A		C		D	C	C	C	C	C
Approach Delay (s)		10.7			32.6			37.7			23.6	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	89	1	70	34	1	182	60	210	30	202	168	106
Future Volume (Veh/h)	89	1	70	34	1	182	60	210	30	202	168	106
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	1	76	37	1	198	65	228	33	220	183	115
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (m)											175	
pX, platoon unblocked												
vC, conflicting volume	1180	1014	183	1074	1112	244	298			261		
vC1, stage 1 conf vol	623	623		374	374							
vC2, stage 2 conf vol	556	391		700	738							
vCu, unblocked vol	1180	1014	183	1074	1112	244	298			261		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	32	100	91	85	100	75	95			83		
cM capacity (veh/h)	142	304	859	249	273	794	1263			1303		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	174	236	65	261	220	183	115
Volume Left	97	37	65	0	220	0	0
Volume Right	76	198	0	33	0	0	115
cSH	225	588	1263	1700	1303	1700	1700
Volume to Capacity	0.77	0.40	0.05	0.15	0.17	0.11	0.07
Queue Length 95th (m)	41.9	14.6	1.2	0.0	4.6	0.0	0.0
Control Delay (s)	60.7	15.2	8.0	0.0	8.3	0.0	0.0
Lane LOS	F	C	A		A		
Approach Delay (s)	60.7	15.2	1.6		3.5		
Approach LOS	F	C					

Intersection Summary				
Average Delay	13.2			
Intersection Capacity Utilization	59.2%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰	↱
Traffic Volume (veh/h)	0	480	525	19	699	0	0	0	0	5	0	477
Future Volume (Veh/h)	0	480	525	19	699	0	0	0	0	5	0	477
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	522	571	21	760	0	0	0	0	5	0	518
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		305										
pX, platoon unblocked				0.93			0.93	0.93	0.93	0.93	0.93	
vC, conflicting volume	760			522			944	1324	522	1324	1324	380
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	760			453			905	1312	453	1312	1312	380
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	100	95	100	16
cM capacity (veh/h)	848			1031			34	144	517	107	144	618

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	522	571	274	507	5	518
Volume Left	0	0	21	0	5	0
Volume Right	0	571	0	0	0	518
cSH	1700	1700	1031	1700	107	618
Volume to Capacity	0.31	0.34	0.02	0.30	0.05	0.84
Queue Length 95th (m)	0.0	0.0	0.5	0.0	1.1	68.6
Control Delay (s)	0.0	0.0	0.8	0.0	40.3	33.8
Lane LOS			A		E	D
Approach Delay (s)	0.0		0.3		33.9	
Approach LOS					D	

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰		↰	↑	↑	↱
Traffic Volume (veh/h)	15	0	447	39	77	12
Future Volume (Veh/h)	15	0	447	39	77	12
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)	16	0	486	42	84	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1098	84	97			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1098	84	97			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	100	68			
cM capacity (veh/h)	159	975	1496			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	16	486	42	84	13
Volume Left	16	486	0	0	0
Volume Right	0	0	0	0	13
cSH	159	1496	1700	1700	1700
Volume to Capacity	0.10	0.32	0.02	0.05	0.01
Queue Length 95th (m)	2.5	10.8	0.0	0.0	0.0
Control Delay (s)	30.2	8.6	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	30.2	7.9		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix E:
Traffic Signal Warrants

TATHAM ENGINEERING

8-HOUR TRAFFIC SIGNAL WARRANT

Project & No.: Hwy 400 & Bowes Development 118158

GENERAL INFORMATION

Analyst	JL	**Jurisdiction/Area**	Parry Sound **Date** 17 Jul 2019
Agency or Company	Tatham Eng	**East-West Street**	Commercial Access / Site Acces
Analysis Period	TT 2033	**North-South Street**	Oastler Park Drive
Flow Conditions	Restricted flow (urban)	**Major Street**	Oastler Park Drive
T Intersection	No	**Approach Lanes per Direction**	1
		Hours of Traffic Volume Data	AM & PM peaks only
Additional Comments			

JUSTIFICATION 1 - MINIMUM VEHICLE VOLUME

JUSTIFICATION	GUIDANCE	HOUR ENDING: AM Peak	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	PM Peak	No. of hours with compliance		
1A	TOTAL TRAFFIC VOLUME ENTERING INTERSECTION (vph) (2 way Total)	1086	560	560	560	560	560	560	1153	100%	80%+	Average Compliance
	COMPLIANCE % VOL x 100 / 720 (1 lane approach on main road) OR VOL x 100 / 900 (2 or more lane approach on main road)	100%	78%	78%	78%	78%	78%	78%	100%	2	2	83%
1B	TRAFFIC VOLUME ON MINOR STREET (vph) (2 way Total)	322	175	175	175	175	175	175	377	100%	80%+	Average Compliance
	COMPLIANCE % VOL x 100 / 170 (full intersection) OR VOL x 100 / 255 (tee intersection)	100%	100%	100%	100%	100%	100%	100%	100%	8	8	100%

(RESTRICTED FLOW)	BOTH 1A AND 1B 100% FULFILLED EACH OF 8 HOURS	NO
SIGNAL JUSTIFICATION 1:	LESSER OF 1A OR 1B AT LEAST 80% FULFILLED EACH OF 8 HOURS	NO

JUSTIFICATION 2 - DELAY TO CROSS TRAFFIC

JUSTIFICATION	GUIDANCE	HOUR ENDING: Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	No. of hours with compliance		
2A	MAIN ROAD TRAFFIC VOLUME (vph) (2 way Total)	764	385	385	385	385	385	385	776	100%	80%+	Average Compliance
	COMPLIANCE % VOL x 100 / 720 (1 lane approach on main road) OR VOL x 100 / 900 (2 or more lane approach on main road)	100%	53%	53%	53%	53%	53%	53%	100%	2	2	65%
2B	CROSSING TRAFFIC VOLUME (vph) (2 way Total)	96	50	50	50	50	50	50	105	100%	80%+	Average Compliance
	COMPLIANCE % VOL x 100 / 75	100%	67%	67%	67%	67%	67%	67%	100%	2	2	75%

(RESTRICTED FLOW)	BOTH 2A AND 2B 100% FULFILLED EACH OF 8 HOURS	NO
SIGNAL JUSTIFICATION 2:	LESSER OF 2A OR 2B AT LEAST 80% FULFILLED EACH OF 8 HOURS	NO

JUSTIFICATION 3 - COLLISION EXPERIENCE

	Preceding Months	Number of Collisions	% Fulfillment
A. Number of reportable collisions susceptible to prevention by a traffic signal.	1 - 12	-	-
	13 - 24	-	-
	25 - 36	-	-
	annual average	-	-
B. Adequate trial of less restrictive remedies has failed to reduce collision frequency.	☐ YES	☐ NO	n/a
C. Either Justification 1 (Minimum Vehicular Volume) or Justification 2 (Delay to Cross Traffic) satisfied to 80% or more.	☐ YES	☐ NO	n/a
SIGNAL JUSTIFICATION 3: ALL OF 3A, 3B & 3C FULFILLED TO 100%?	NO		

JUSTIFICATION 4 - COMBINATION JUSTIFICATION

JUSTIFICATION SATISFIED 80% OR MORE			Two Justifications Satisfied 80% or more
Justification 1 -	Minimum Vehicle Volume	NO	NO
Justification 2 -	Delay to Cross Traffic	NO	
Justification 3 -	Collision Experience	-	

JUSTIFICATION SUMMARY

ARE TRAFFFIC SIGNALS JUSTIFIED FOR THE INTERSECTION IN QUESTION?	NO

REPORT TO COUNCIL

Report No.:	ENV-8-2021
Council Date:	Oct 6, 2021
From:	Steve Goman
Subject:	Environmental Services Report

Background:

Dept. Wide: COVID-19 procedures are still in place to reduce the potential spread of the virus. We have made keeping our Essential Services running a priority. We have been able to maintain regulatory compliance within the Department.

Landfill Leachate:
We have seen a lot of rain in the past few weeks and have adjusted the flow at the treatment plant. We are monitoring the facility closely and don't' anticipate any major problems.

Nobel Water:
The water system is operating well within set MECP regulations. We plan on flushing the fire hydrants during October as per our routine and regulated maintenance.

Crawford Septic:
The Crawford Septic bed is nearing the end of its viable life span. We have received three quotes from Engineering companies with proposals on assessing the current status along with design and plans for the future of the Crawford Septic system. The amounts came in as listed:

Tatham Engineering, $13,080
RHH Engineering, $17,250
Tulloch Engineering, $27,500

Recommendation:

Landfill Leachate:
Accept this report as information.

Nobel Water:
Accept this report as information.

Crawford Septic:
That you accept my recommendation to move ahead with the Tatham Engineering proposal for $13,080

8 Barron Drive
Bracebridge, Ontario P1L 0H3

T 705-645-7756
E info@tathameng.com
tathameng.com

File 221000

September 7, 2021

Steve Goman
Environmental Services Supervisor
Municipality of McDougall
5 Barager Blvd.
McDougall, ON P2A 2W9
sgoman@mcdougall.ca

Re: Crawford Subdivision, Municipality of McDougall
Engineering Fee Proposal for Sewage Evaluations

Dear Steve:

Thank you for the opportunity to present our proposal for engineering services for the Crawford Subdivision Sewage System Evaluation in Nobel. The proposed evaluation includes reviewing the existing sewage system and effluent disposal tile bed. Test pits will be dug within the existing tile bed and locations adjacent, and samples from the test pits analyzed for T time. This will help evaluate the current bed performance.

After a high-level review of the background information and historical system flows it appears that the design flowrate of 68m^3/day is exceeded yearly in the spring. Our evaluation will include a deeper review of the historical data and existing system size and evaluate the tile bed sizing based off the more recent flow data. In addition, our evaluation will provide recommendations for future upgrades and rehabilitation works for the sewage disposal system while maximizing the existing footprint on site if the evaluation deems tile bed expansion is required. If tile bed expansion is required, an optional pre-consultation with the Ministry of the Environment, Conservation and Parks (MECP) can be preformed to review the expanded tile bed capacity.

WORK PLAN

We propose to complete the work using a 3-stage approach summarized as follows:

1. Stage 1 will include onsite investigation of the existing tile beds and sewage system including test pits dug by the Municipality. We will inspect the test pits and collect soil samples sent for analysis. The onsite work will be summarized in an email report with photographs and the soil analysis to document the findings.

2. Stage 2 will involve the review of the historical flow data, system design flowrates, and background reports. We will also review details of the original tile bed design and modifications made since initial construction.
3. Stage 3 we will summarize the findings and recommendations in a final report and include a conceptual cost of the solution and sketch if the solution includes further modifications to the system.

We have assumed that existing drawings can be used to detail a conceptual sketch of system modifications. If these drawings lack accuracy and a new topographical survey of the tiled bed area is required, this can be provided as a provisional item.

Our work plan is described in more detail below:

STAGE 1

Task 1.1 On-Site Sewage System Investigation

We have assumed the Municipality of McDougall will supply an excavator and an operator to dig test pits between and around the existing tile bed. Care will be taken to ensure no disruption to the existing leaching tiles. Soil samples from within the bed are necessary to confirm the filtering time (T-time) of the current bed. We will also collect samples from open areas adjacent to the bed for T-time analysis in the event the tile bed requires additional capacity after the system review. We will also inspect the remainder of the sewage collection system while at the site.

Task 1.1 Site Report

A site report in email format will be generated with supporting information including photographs and the soils analysis once results are received. Soil testing costs have not been estimated as the number of samples is currently unknow.

STAGE 2

Once the site work has been completed, we will begin to review the existing design and flow data. Stage 2 is summarized as follows:

Task 2.1 Review Historical Data

We will review and analyze the historical flow data and compare it to the original design flowrates used. We will also review background and supporting reports along with the soils analysis in order to determine if the existing tile bed has enough capacity to handle the current daily loading rates.

Task 2.2 Review Existing Tile Bed Design and Modifications

We will review the existing design and modifications to assess recommendations for a path forward on bed rehabilitation, reconstruction or expansion, etc.

STAGE 3

The findings from the investigation will be summarized in a final report and presented to the Municipality as follows:

Task 3.1 Summary Report and Conceptual Cost Estimate

We will summarize all findings and recommendations in a final report. This report will include a conceptual cost estimate of the preposed solution as well as a conceptual sketch if required. As previously mentioned, it is assumed that existing drawings will be available and accurate enough to provide this sketch on.

Task 3.2 Municipality Meeting and Consultation

We will present the findings to the Municipality and be made available for consultation on the proposed solution. This does not include a letter or pre-consultation meeting with the MECP if the proposed solution requires this. This service could be provided as a provisional item to be discussed later.

PROJECT FEES

The summary of our fees for Stage 1, 2, and 3 are provided below. We suggest 1.1, 1.2, 2.1, 2.2, and 3.1 can be considered lump sum fees as the level of effort and required deliverables are clearly defined. The fee for Task 3.2 is a recommended allowance, given that we can not confirm the amount of effort required during the consultation. As such, efforts under this task will be invoiced on a time basis; the noted allowance will not be exceeded without your prior approval.

Table 1: Proposed Engineering Fees and Expenses

TASK	FEE	FEE BASIS
Stage 1		
Task 1.1 Onsite Investigation	$2,290	Lump sum
Task 1.2 Site Report Email	$1,280	Lump sum
Sub Total Stage 1	**$3,570**	
Stage 2		
Task 2.1 Review Historical Data	$1,560	Lump sum
Task 2.2 Review Existing Tile Bed Design & Modifications	$1,560	Lump sum
Sub Total Stage 2	**$3,120**	
Stage 3		
Task 3.1 Summary Report & Conceptual Cost Estimate	$4,660	Lump sum
Task 3.2 Municipality Meeting & Consultation	$1,730	Allowance
Sub Total Stage 3	**$6,390**	
Total (exclusive of expenses and taxes)	**$13,080**	

Schedule

We assure you that we will endeavour to complete our work in an efficient and cost-effective manner. Our goal will be to provide value added service throughout the development process, identifying means of increasing efficiency in the design as much as possible in a timely and informed manner. We anticipate completing Stage 1 works within 4 to 6 weeks including completion of the onsite investigation and soils analysis. We expect Stages 2 & 3 to be completed within 3 to 4 weeks after the site report email.

Expenses

Kilometrage, plotting, drawing copies, colour printing, photocopies (more than 80) and all other expenses incurred in connection to the project will be invoiced as incurred.

Invoices

Invoices will be issued on a monthly basis, detailing the fees and expenses for that month. A summary of work completed during the billing period will be provided with each invoice. We require payment within 28 days of invoicing.

Additional Services (Out of Scope Work)

Additional services considered to be outside of the scope of work covered by the fees presented herein include the following and will be completed upon your request:

- Work tasks beyond those noted above;
- Topographical Survey
- MECP Pre-consultation Letter and coordination meeting
- Preparation of a construction ready drawings or designs, tender document; and
- Construction inspection and certification.

We propose to complete any out-of-scope work on a time and expense basis, following receipt of your approval in advance.

CLOSING

We would like to thank you for providing us with the opportunity to submit this proposal. We have completed several similar projects and will leverage our past experience and lessons learned to benefit of this project.

Should you find this proposal satisfactory, we will prepare an Engineering Services Agreement to confirm the scope of work and budgets described above. In the meantime, please call if you have any questions or require clarification of the information presented herein. We look forward to working with the Municipality of McDougall on this project.

Yours truly,
Tatham Engineering Limited

Jeff Cobbledick, P.Eng., M.A.Sc.,
Intermediate Engineer & Project Manager
JC:rlh;pt

Bill Van Ryn, B.Eng., P.Eng.
Executive Vice President

RHH ENGINEERING
70 Isabella Street, Unit 111,
P.O. BOX 675, Parry Sound, ON
P2A 2Z1 **(705) 746-1196**
Email: bob.rhhengineering@cogeco.net **Cell 705 774-5058**

September 20, 2021

Municipality of McDougall
5 Barager Blvd,
McDougall, ON
P2A 2W9

Att: Tim Hunt CAO, Mr. Steve Gorman, Environmental Services Supervisor

Re: Crawford Subdivision Quote

Dear Steve,

In response to you email requesting a quotation for engineering services with regard to the Crawford septic bed.

As we understand the project, the following is required:-

- the engineer is to undertake an assessment to the existing septic bed to determine the present condition of the septic bed and tanks, this would involve re-establishing the piezometers in the septic bed and monitoring the effluent levels in the septic bed to determine if the bed is functioning correctly,
In addition to the piezometer readings, the distribution pipe should be undercovered in approximately 10 locations to check the stone layer to determine if any biomass has accumulated in the stone layer,

- we understand that the municipality has kept records of the daily effluent volumes pumped to the septic bed, these should be reviewed to determine the if the flows are within the design limits of the septic bed,

- the septic tank is approximately 35 years old and should be checked for the deterioration, baffles, hatch, to determine whether it and/or the pump chamber need to be replaced,

- based on the findings of the above a determination will be made regarding whether the septic bed needs to be replaced, if it needs to be replaced then the following will be required,

- prepare design drawings for the replacement system,

- prepare an application package for a MECP ECA application, (presently takes 8 – 12 months for an approval),

- prepare a tender for the septic bed replacement based on the ECA approval, Schedule of Fees

The request for proposals is very general and does not provide any indication of the existing bed condition the schedule of fees is just an estimate based on very limited information.

Hourly Rates

Engineer	$ 155.00 / hr
CIT, draftsperson, field technician	$ 90.00 / hr
2 person field survey crew	$ 150.00 / hr

1. Septic Assessment

Supervise installation of piezometers by the municipality staff, inspect condition of stone layer in approximately 10 bed locations (excavated by township), inspect septic tank and pump chamber when pumped by municipality, review municipal flow data to the septic bed

40 hr. x $ 90.00 / hr		= $ 3,600.00

Prepare a condition report with recommendations

30 hr. x $ 155.00		= $ 4,650.00

2. Prepare Design Drawings

Field topo survey of septic area	$ 3,000.00	
Prepare design drawings, and cost estimate	$ 6,000.00	
Total	$ 9,000.00	= $ 9,000.00

If a poured in place septic tank is required add $ 10,000.00 for the design and drawings. It is unclear if the tank and/or pump chamber will need to be replaced

Note: replacement of septic tank and pump chamber may require well points due to the wet soil conditions. A soils report will be required for the tank replacement.

3. Prepare MRCP ECA Application Package

Prepare approval drawings, design report, and ECA application, submit to MECP North Bay District office for preconsultation letter, submit with preconsultation letter to MECP Client Services and Permissions Branch in Toronto		$ 15,000.00

3. Tender for Replacement of Septic Bed, Inspections, Contract Administration

Prepare Tender Document	$ 5,000.00	
Inspections 30 hr.	$ 2,700.00	
Contract Adiministration and Certification for MECP 25 hr	$ 3,875.00	
Total	$ 11,575.00	$ 11,575.00
TOTAL		$ 43,825.00

Plus taxes

Quotation does not include

1. OLS surveyor if lot bars cannot be found.
2. Geotechnical investigation if required.
3. Environmental Report / Review (should not normally be required for replacement system)
4. Review of sanitary sewers and collection system in Crawford Subdivision
5. Application fees.

Yours Truly,

Robert Hughes P. Eng.

Septic Designs by RHH Engineering and Georgian Engineering
in the Parry Sound Area by Robert Hughes

2021 RHH Engineering

- Glenn Burney Lodge septic system 23,300 L./d.

- Bob Rumball Deaf of the Camp 34,900 L./d.

- S.C. Johnson and Son Limited Camp, 15,900 L./d.

- Valentine 17,030 L./d.

2020 RHH Engineering

- septic design 22,000 s.f. warehouse for Crofter's Foods, 3,000 L./d.

- design of onsite septic systems for Crane Lake Discovery Camp, applications to Township of Archipelago and MECP, 16,500 L./d.

2019 RHH Engineering

- Iron City Fishing Club septic expansion, septics and lagoon 20,000 L./d.

- Parry Sound Airport Expansion Septic Services 9,000 l./d.

- Crofters Expansion Septic Bed, 7,000 L./d.

2018 Georgian Engineering

- Tim Horton Camp Review of Septic Services 60,000 L./d.

- Ojibway Club septic expansion, 9,000 l./d.

- Bay Hill Condo Septic Review, 16,500 L./d.

2017 Georgian Engineering

- Crofter's Foods Phase IV, 18,000 s.f. warehouse, 3,000 L./d.

- Perry Twp Firehall, 2,000 L./d.

- Carling Twp Rec Centre Septic Systems 21,100 L./d.

2016 Georgian Engineering

- design McKellar Fire Hall septic, 1.500 L./d.

- preliminary engineering for Tim Horton's Camp expansion, McKellar Township, 9,000 L./d.

2015 Georgian Engineering

- Servicing Option Report for Crane Lake House conversion to condos, 28,000 L./d.

- design, approval for large septic disposal system at former Inn at Manitou property, 17,030 L./d.

2014 Georgian Engineering

- design septic Glenn Burney Lodge 17,030 L./d.

- design sewage disposal system comfort stations Seguin Valley Golf Club, 3,000 L./d.

- design, septic Foley Fire Hall in Seguin Township, 1,100 L./d.

2013 Georgian Engineering

- design septic for phase II at Crofter's Foods, 3,000 L./d.

- design, septic for renovation, expansion Foley Agricultural Hall and Business Centre, 10,000 L./d.

- patio bar septic Glen Burney Lodge expansion, 3,000 L./d.

- site services Camp Hurontario in Township of the Archipelago, 3,000 l./d

2012 Georgian Engineering

- Rose Point Marina septic replacement, 3,000 l./d.

- septic services, site expansion for Iron Worker, in Pointe Au Baril, 2,000 L./d.

2011 Georgian Engineering

- design of septic upgrades District of Parry Sound Social Services Administration Board, in Magnetawan, 12,000 L./d.

- design of new onsite septic system for Canadian National Institute for the Blind at their Lake Joseph Camp 16,000 L./d.

2010 Georgian Engineering

- design of site and new onsite septic system for McKellar Community Centre and Ice Rink / Pavilion 9,000 L./d.

- design of septic McDougall Township Ice Rink / Pavilion 1,500 L./d.

- design of onsite septic system for Seguin Valley Golf and Country Club clubhouse 14,000 L./d.

- design of onsite septic systems and water supply for Whitestone Lake Resort development involving 28 fractional ownership units. 30,000 l./d.

- Servicing Options Report on servicing Inverlochy fractional ownership development.

2009 Georgian Engineering

- design of onsite septic system and water supply for Seasons of Muskoka Resort. 10,000 L./d.

2008 Georgian Engineering

- septic design for Near North Recreation, McDougall Twp 2,000 L./d.

- repair and replacement of onsite septic system for Humphrey Community Centre 7,000 L./d.

2007 Georgian Engineering

- septic design Glenn Burney Marina, Parry Sound, 2,000 L./d.

- design of septic services Desmasdon's Marina and Resort 10,000 L./d.

- septic suitability report for Steel Crown subdivision Ahmic Lake 8 lots.

– septic suitability report for Badgley Point development Killarney, 11 lots

- septic design Archipelago Township municipal yard 2,000 l./d.

- sewage design S.C. Johnson Camp and Resort, Segiun Township 1,100 L./d.

2005 Georgian Engineering

- design of Georgian Bay Travel Centre septic on Highway 400, 40,000 L./d.

2001 Georgian Engineering

- design of Orrville Community Centre, 10,000 L./d.

2000 Georgian Engineering

- design of Kinsmen Park and septic design 3,000 L./d.

1991 Georgian Engineering

- design of septic system Bayhill Condominiums 16,500 L./d.

The Municipality of McDougall

5 Badger Blvd.
McDougall, ON
P2A 2W9

Proposal for Engineering Services for Subsurface Wastewater Disposal System for Crawford Subdivision

September 28, 2021

ATTN: Steve Goman

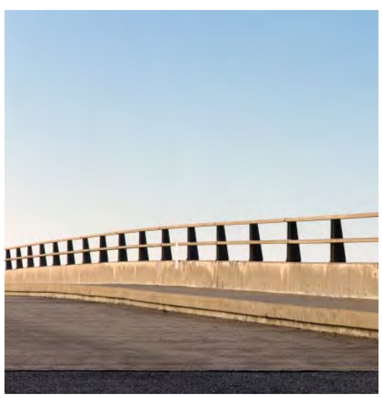



TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

TULLOCH Engineering Inc. (TULLOCH) is pleased to provide the Municipality of McDougall the following proposal to complete a hydrogeological assessment and large subsurface wastewater disposal system design for a replacement subsurface disposal system located off of Nobel Road (and Parkway Avenue), in the Municipality of McDougall, ON (Site) to service the existing Crawford residential subdivision.

It is understood that the existing system has a daily wastewater flow rated capacity of 77 m^3/day; that the system was constructed in about 1980 and was modified in about 2000; has a Health Unit Permit based on the original 1980 design; is believed to be at or near its useful life; as such, design and approval for a replacement wastewater system will require an Environmental Compliance Approval from the Ministry of the Environment, Conservation and Parks (MECP). The MECP will likely require a hydrogeological assessment for the wastewater system for the ECA submission. An assessment following the MECP's Design Guidelines for Sewage Works for the design of Large Subsurface Sewage Disposal Systems will be completed for the proposed sewage works.

Based on a review of available mapping, it is assumed that the direction of groundwater flow is likely towards the south, towards Parry Sound (Georgian Bay), although the eastern property occurs before a creek. As such, the Ministry will be concerned with primary nitrate concentrations in the groundwater and also potential phosphorus loading to the surface water system.

An assessment following the MECP's Design Guidelines for Sewage Works for the design of Large Subsurface Sewage Disposal Systems will be completed for the proposed sewage works.

2. PROJECT TEAM

2.1 Staff Organization

TULLOCH will be the Prime Consultant, managing all work on this assignment. We will be responsible for coordinating all work activities, directing progress meetings, liaison with outside agencies and the public, and ensuring the timely submission of final deliverables to the Municipality.

To complete the project in the most efficient and timely manner, TULLOCH will dedicate the following staff to the project. The project will be completed from our Parry Sound and Huntsville offices.

The CV's for TULLOCH key staff are included in Appendix A of this proposal. The educational background and relevant project experience of the team member is included.

TULLOCH will partner with Cambium Inc. (Cambium) for hydrogeology and specialized system design. Cambium is a consulting and engineering company, focused on providing innovative and practical solutions for sustainable development and environmental stewardship. They offer integrated professional services designed to provide governments, corporations, and individuals with innovative, sustainable answers to everyday issues. Cambium works with clients to provide solutions grounded in a sound conservation ethic, designed with leading edge technologies, and tailored to reflect legislative and regulatory realities. Their philosophy is such that each client and project deserve an effective, sustainable, and affordable solution.

2.2 Key Project Team Members

Chris Stilwell, P. Eng., Sr. Engineer, will be the Project Manager responsible for the overall delivery of the project as the Municipalities primary contact. Chris will arrange and oversee all internal meetings with the project team, progress meetings with the Municipality and required discussions with key stakeholders and property owners. Chris' day-to-day role will include cost control, coordination of personnel, ensuring that high quality work is produced, and verifying that all deliverable dates are met.

Kevin Louch, EIT, Designer and Construction Administration / Inspection. Mr. Louch will complete engineering design coordination and on-site work during the design stage. He will complete Contract Administration services and will be responsible for the Construction Inspection for the duration of the project. Mr. Louch has previously worked in TULLOCH's Contract Administration and surveying divisions completing numerous inspections for Municipalities including, watermains, roadways and bridges over the past 5 years. Kevin has previously worked on large MTO projects which has provided him with an extensive knowledge of contract requirements which will be a great asset for this project.

Mr. Kevin Warner, M.Sc., P.Geo.(Ltd), with Cambium is the Manager of the Water & Wastewater group and a Senior Hydrogeologist at Cambium. He has extensive experience practicing as a hydrogeologist in environmental consulting since 2000. He holds a Bachelors of Environmental Studies (Honours) from the University of Waterloo and a Master of Science (Hydrology and Biogeochemistry) from McMaster University, and became a registered Professional Geoscientist with a Limited License in Ontario in 2007. Mr. Warner has managed and directed numerous hydrogeological assessments and impact studies in various industrial and commercial applications, namely water supply and management (municipal and residential water supply, water bottling facilities, aggregate washing plants, golf courses, etc.) and wastewater facilities for subsurface disposal (for residential, commercial and municipal servicing). He has conducted numerous hydraulic pumping tests for aquifer exploitation of groundwater resources, to both determine the potential for water supply for municipal, commercial or industrial supply wells, as well as assessing the potential for interference of water takings on surrounding water wells or surface water features (groundwater springs and seeps, streams, wetlands, lakes, etc.). These studies are completed in support of Permit-To-Take-Water (PTTW) applications or Class Environmental Assessments (for Municipal supply wells). Mr. Warner has conducted groundwater investigations and designed small and large subsurface disposal systems (both under and over 10,000 L/day) for a variety of residential, commercial and industrial uses as well as leading Class Environmental Assessments for Municipal systems. Mr. Warner has conducted numerous water budgets for impact assessments and hydrogeological assessments for residential subdivisions following MOECC D-5-4 and D-5-5 regulations for determining water supply yield and wastewater attenuation. He has also provided technical peer review services for privately serviced developments. Mr. Warner has attended numerous Public Meetings before Township Council and has appeared as an expert witness in hydrogeology at Municipal Board Hearings (OMB). He also serves on the Board of Directors with the Ontario On-site Wastewater Association (OOWA).

3. SUBSURFACE WASTEWATER DISPOSAL SYSTSEM EXPERTISE

Our Team has extensive expertise in investigating, assessing, and obtaining agency approvals for numerous hydrogeological assessments and impact studies in various residential, industrial and commercial applications, namely water supply and management (municipal and residential water supply, water bottling facilities, aggregate washing plants, golf courses, etc.) and wastewater facilities for subsurface disposal (for residential, commercial and municipal servicing). The team is experienced in undertaking hydraulic pumping tests for exploitation of groundwater resources, to both determine the potential for water supply for municipal, commercial or industrial supply wells, as well as assessing the potential for interference of water takings on surrounding water wells or surface water features (groundwater springs and seeps, streams, wetlands, lakes, etc.). These studies are completed in support of Permit-To-Take-Water (PTTW) applications or Class Environmental Assessments (for Municipal supply wells). The team has completed numerous groundwater investigations and designed small and large subsurface disposal systems (both under and over 10,000 L/day) for a variety of residential, commercial and industrial uses as well as leading Class Environmental Assessments for Municipal systems. The members of the hydrogeology team have also conducted numerous water budgets for impact assessments and hydrogeological assessments for residential subdivisions following MECP regulations for determining water supply yield and wastewater attenuation as well as for the development of municipal secondary plans.

4. SCOPE OF SERVICES

4.1 Field Investigation

The proposed scope of work for the site investigations is outlined below and was developed based on our expertise in conducting hydrogeological assessments for wastewater system ECA requirements and information provided by the Municipality of McDougall.

4.1.1 Utility Locates, Topographical Survey and Background Information

Buried utility clearances will be obtained as necessary for all borehole locations prior to undertaking field work. We will apply for all necessary permits, licenses and agreements required to carry out the proposed field investigation. We would verify gas, hydro, telephone, cable locations, and any existing water and sewer pipes within the proposed vicinity using Ontario OneCall services. It is recommended that private locates be acquired if the Client is unsure of underground services on Site. In the event that private locates are not requested by the Client, the Client will be held solely responsible for any utilities damaged during the investigation. We have included private locates in our scope and fees.

All snow removal and tree clearing required to access borehole, well and borehole locations will be the financial and logistical responsibility of the client.

We will complete a topographical survey of the site including desktop legal boundary search. Drawings will be based on the survey information.

We will request all available background from the Township, MECP and Health Unit.

4.1.2 Borehole Investigation

All fieldwork will be carried out in full compliance with the proposal request, Occupational Health and Safety Act (OHSA) and regulations, and Ministry of Labour (MOL) requirements. Prior to completing the field work, a Site-specific Health and Safety Plan (HASP) will be prepared.

Based on the site area and Ministry requirements, a total of 7 boreholes will be required to be drilled on the Site, with 4 boreholes in the vicinity of the proposed wastewater system and 3 boreholes in monitoring well locations (typically 1 up-gradient and 2 down-gradient of the wastewater system area). The boreholes will be advanced using a track-mounted drill-rig equipped with continuous flight solid/hollow stem augers and split spoon (SPT) sampling equipment. Boreholes will be advanced to a depth of 3 mbgs in the vicinity of the proposed wastewater system and 15 mbgs for the monitoring well locations. A qualified TULLOCH technician will supervise all borehole advancement and will log and sample the boreholes at 0.75 m intervals for the top 3.0 m and at 1.5 m intervals thereafter. Soil samples will be recovered and retained in moisture-preserving labelled containers for subsequent review and possible laboratory testing. Samples will be retained in our storage facility for a minimum of three (3) months after completion of the project.

Three (3) monitoring wells will be installed in the deep boreholes to measure the static groundwater levels, collect baseline water quality samples and to determine the direction of groundwater flow. Dependent on actual Site conditions, it is assumed that the drilling investigation may be modified, subject to approval from the Client, as deeper drillings depths may be required to intersect the water table. It is assumed that the water table will be encountered within 12-15 m of the ground surface .

All boreholes will be backfilled or completed as monitoring wells in accordance with O.Reg. 903, as amended, and the property will be reinstated to as close to pre-existing conditions as possible.

At the completion of the field investigation, the boreholes and monitoring wells will be surveyed relative to a site benchmark provided by the Client, or a relative benchmark selected by the technician to establish ground surface elevations to an accuracy of 0.01 m. Water levels in the groundwater monitoring wells will be used to determine the direction of shallow groundwater flow.

4.1.3 Physical Soil Testing

In order to determine the soil texture and classification, soil laboratory analyses will be completed for representative samples from the site. The overall testing program is outlined below and includes the proposed number of tests for the entire project. The overall proposed testing program, as outlined below, will be completed at TULLOCH’s materials testing laboratory in Sault Ste. Marie.

Test	Standard	Number
Sieve and Hydrometer	LS-702	3

4.1.4 Hydrogeological Field Testing

Single Well Hydraulic Tests (SWHTs) will be completed on the three newly installed monitoring wells. The SWHTs are completed by monitoring water level response to an instantaneous change in water head. The results of the SWHTs will be used to estimate potential groundwater infiltration and hydraulic conductivity of the water bearing unit. Static water levels will be measured prior to the SWHTs, on the day of testing.

One (1) water quality sample will be obtained from each monitoring well for a total of three (3) samples. Water samples will be analyzed for general and organic water quality parameters and compared to the Ontario Drinking Water Quality Standards (ODWQS) to determine if the proposed wastewater disposal system will impact the shallow groundwater aquifer or nearby surface water resources and the capacity of the receiving aquifer to accept effluent discharge from the on-site disposal systems.

4.2 Subsurface Wastewater Treatment and Disposal System Design and Approvals

4.2.1 Conceptual Design and Preliminary Hydrogeological Assessment

A conceptual wastewater design will be developed for the Site prior to undertaking the detailed design. The conceptual design will be provided to the client for review and comment, prior to proceeding with the remaining work program. Where possible and in suitable condition, components of the existing wastewater system (i.e. septic tanks) may be incorporated with the new design. The conceptual design will be provided to the client for review and comment, prior to proceeding with the remaining work program.

Following completion of the Site investigation program, qualified hydrogeologists and engineers will complete an assessment of the Site. The assessment of the shallow soil conditions will be undertaken to determine the receiving groundwater system for the sewage effluent, and whether the sewage effluent may impact adjacent surface water resources or nearby water supply wells. The groundwater and surface water assessment will be undertaken following the Ministry's procedures for determining reasonable use criteria (RUC) and Chapter 22 (Large Subsurface Sewage Disposal Systems) of the MECP's Design Guidelines for Sewage Works. Recommendations will be provided based on the assessment, with respect to the suitability of the Site for the proposed wastewater system.

A groundwater assessment report summarizing the objectives, methodology, and results of the analysis will be prepared. Recommendations will be provided based on the assessment, with respect to the suitability of the Site for the proposed wastewater system.

The hydrogeological assessment and conceptual design will also be used in discussions with the MECP for documentation and reference at the pre-consultation meeting.

4.2.2 Pre-Consultation Meeting with MECP

Considering that the wastewater system on the property will have a total theoretical daily sewage flow in excess of 10,000 L/day, the wastewater system will be required to be submitted to the MECP for approval (Environmental Compliance Approval or ECA). The MECP requires a pre-consultation meeting with the Technical Support Section (TSS) to review the groundwater and surface water conditions and potential impacts, prior to submitting the ECA application. The TSS reviewers may have specific requirements for the system design which may affect how the system is designed or if additional wastewater treatment systems may have to be included (i.e. tertiary treatment or phosphorous reduction). It would be prudent to present the assessment of the proposed wastewater systems and conceptual design to discuss these issues with the MECP, prior to completing the detailed design of the system. As such, a meeting with the MECP District Office and Technical Support Service (TSS) will be scheduled as soon as possible.

4.2.3 Detailed Design

We will create a Site-specific design for the wastewater system based on the existing background information and the subsurface investigation. The design will include a calculation of the theoretical daily wastewater flow based on the Table 8.2.1.3.A. and/or Table 8.2.1.3.B. of the Ontario Building Code and our experience with wastewater treatment system design. Upon calculating the daily wastewater flow rate, the Site-specific treatment system can then be designed based on the wastewater strength, volume, Site topography, horizontal Site clearances, and the receiving subsurface soil conditions.

The design will include a detailed Site plan detailing the layout of the wastewater treatment system and cross section figure detailing the profile of the subsurface system. Detailed design drawings of the wastewater systems will be included with the design report, including location of the system components, depths/heights of the system components compared to existing grades, construction recommendations, and system specifications. The design drawings are intended for the review of the MECP staff for the ECA.

A draft report will be prepared for review and comment, which will include the detailed design and the groundwater and surface water assessment following the Ministry’s procedures for determining reasonable use criteria (RUC) and chapter 22 (Large Subsurface Sewage Disposal Systems) of the MECP’s Design Guidelines for Sewage Works.

All comments received will be included in the report or discussed with the client if not suitable, prior to completing the final report. A final report will be prepared within two (2) weeks of received draft report comments.

4.2.4 Environmental Compliance Application

Considering the wastewater systems on the property have a design daily sewage flow in excess of 10,000 L/day, the Site requires an ECA to allow it to legally operate. This task includes preparing an application for a new ECA.

The ECA application fee is not included and must be paid directly by the Owner.

4.3 Tendering

4.3.1 Wastewater System Tender Drawings

The detailed design of the wastewater system will be provided in tender drawings and will include specifications for the installation of the new system, for the purpose of tendering the construction of the system by the client.

4.3.2 Contract Administration

Prepare one tender and contract documents based on the Wastewater System Tender Drawings, assist with a tender call, and respond to queries from Contractor(s) and suppliers during the tendering period. This process may be simplified to a form of quotation with the Owner's preferred contractor(s) if suitable; and, invitation of a pre-approved list of contractors, and that may be bondable. It would be up to the client as to whether performance and material bonds are necessary with the tender.

TULLOCH would complete the following tasks as part of general administration during construction:

- Assist with receipt of tenders, analysis of tenders received and submission of recommendations therein, and preparation of contract documents for execution;
- Review all contract-related claims and process contractor's progress and final requisitions and issue progress payments and final certificates to you and such certificates, etc. as necessary under the Construction Act;
- Issue change orders in consultation with you as required;
- Provide advice and maintain records related to contracts;
- Prepare contract status reports and cost estimates as required;
- Review and approve construction schedules and report progress;
- Arrange and conduct site meetings as required to ensure contractor compliance with contract specifications and schedule;
- Advisory and administration services following issuance of payment certificates; and,
- Complete acceptance protocol and forms required by the Municipality at initial acceptance and final assumption.

4.3.3 Construction System Inspections

TULLOCH will complete four (4) general conformance inspections that will be followed up by inspection reports detailing our observations, recommendations, and conclusions. The four inspections will occur at the following stages of construction:

1. Subgrade inspection for weeping tile trenches;
2. Weeping tile run inspections after pipe and aggregate installation;
3. Septic / pump tank installation; and
4. Final inspection to witness pump, etc. operation.

5. CONSULTING FEES

The Estimated Cost for the proposed scope of work is **$57,000**. The Estimated Cost is based on the identified scope of work and is exclusive of taxes and external fees, unless otherwise indicated. Schedules of Professional Services and Disbursement costs are provided as Table 1. Professional services costs include professional fees, consumables, communication, and printing. Although costs may vary between parts of the work program, the Estimated Cost for the items quoted will not be exceeded without Client authorization. The costs presented in this proposal will be honoured for 90 days. Charges will be based on Time and Expenses incurred.

Table 1 Professional Services Schedule of Costs

Service		Notes	Cost
4.1 Field Investigation			
4.1.1	Utility Locates, Topographical Survey and Background Information	*Coordination of Ontario One-Call locates and background information review*	$ 5,000
4.1.2	Borehole Investigation	*Includes 4 boreholes in proposed leaching bed area, 3 monitoring wells (15 m),*	$20,000
4.1.3	Soil Testing	*Includes 3 hydrometers*	
4.1.4	Hydrogeological Field Testing	*Hydraulic testing of monitoring wells and shallow receiving aquifer; 3 water quality samples*	$ 2,500
4.2 Wastewater Treatment System Design and Approvals			
4.2.1	Conceptual Design and Preliminary Hydrogeological Assessment	*Development of a conceptual design for wastewater systems; preliminary hydrogeological assessment*	$ 9,000
4.2.2	Pre-Consultation Meeting	*Coordination, prep and meeting with Ministry Technical Support Section*	$ 1,500
4.2.3	Detailed Design Drawings and Assessment Report	*Detailed design of wastewater system, hydrogeological assessment*	$ 6,500
4.2.4	ECA Application	*Prepare ECA application and coordination of submission*	$ 1,000
4.3 Tendering			
4.3.1	Tender Drawings, Specifications and Tendering	*Preparation of tender drawings and installation specifications*	$ 7,500
4.3.2	Contract Administration	*Administration of contract including payments, RFI response, certification*	$ 2,000
4.3.3	Construction Inspections	*Occasional inspections to confirm general compliance*	$ 2,000
	Total		**$57,000**

6. SUMMARY OF ASSUMPTIONS

TULLOCH has developed the costs presented above based upon the best information available and previous experience conducting this type of work and the following assumptions:

- Copies of all relevant information including historical correspondence and reports, design reports, records, site plans, etc. will be provided to Tulloch by the Township
- TULLOCH has assumed that full, unrestricted access to all areas of the site(s) and adjacent land areas, watercourses, etc. will be available during sampling, monitoring, and site visit events.
- A track mounted geotechnical drilling rig is required for the field investigation.
- It is assumed that there is good access to the borehole locations (i.e. no tree clearing required).
- Monitoring wells can be installed within the overburden deposits and rock coring into the underlying bedrock is not required.
- The application fee for the ECA will be paid by the owner.

This proposal, the work program, and report are governed by the engineering services agreement to be executed between TULLOCH and the Township. It is possible that unforeseen or unknown conditions or occurrences will be encountered, which could alter the services described above. If it is anticipated that the Estimated Cost will be exceeded as a result of a change in the program scope or additional services.

The hourly rates for identified project staff are as follows:

- Senior Engineer & Hydrogeologist — $200.00 per hour
- Engineer — $130.00 per hour
- Engineer-In-Training — $105.00 per hour
- Technologist/Technician — $80.00 to 90.00 per hour

Vehicle costs are charged as a disbursement at $0.55 per km. Sub-consultants are charged at cost plus 10%.

H.S.T. is additional.

Additional work requested by and/or approved by the Municipality will be billed at the hourly rates and expenses provided.

7. INSURANCE COVERAGE & WSIB CERTIFICATE

TULLOCH carries Professional Liability insurance of $5,000,000 and Comprehensive General Liability and Automobile Insurance Coverage of $5,000,000. TULLOCH will provide a current copy of these certificates. TULLOCH will provide a current copy of a WSIB clearance certificate upon commencement of the project if required.

8. CONCLUSION

TULLOCH Engineering is pleased to have the opportunity to submit this proposal to the Municipality of McDougall for the engineering services for the design and construction of a subsurface wastewater disposal system for the Crawford residential subdivision.

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

Respectfully submitted,

TULLOCH ENGINEERING INC.

Chris J. Stilwell

Chris Stilwell, P Eng.
Project Manager / Principle
chris.stilwell@TULLOCH.ca

APPENDIX A

Curriculum Vitae

CHRIS STILWELL, P. Eng.

SENIOR PROJECT MANAGER & PRINCIPLE

PROFILE

Chris Stilwell is a Senior Project Manager and Associate with TULLOCH Engineering. He is a Professional Engineer with 30 years of experience in municipal engineering for private and public capital works, including design and contract administration of roads, watermain, sanitary and storm sewer projects, sewage treatment plants, pumping stations and force main, stormwater management, estimating and tender preparation, report writing, scheduling and project coordination.

EDUCATION

B.A. Sc., Civil Engineering
Management Sciences and Water
Resources Options
University of Waterloo
1991

PROFESSIONAL ASSOCIATIONS

- Professional Engineers Ontario (1993) License # 90328063

PROFESSIONAL EXPERIENCE

TULLOCH Engineering, October 2015-Present

- Project Manager

AECOM Canada Ltd. 2009-2015

- Operations Manager
- Project Manager

KWH Pipe (Canada) Limited 1996-2009

- Plant Manager
- Fittings Division Manager
- Plant Engineer
- Product Engineer

KMK Consultants Ltd. 1991-1996

- Senior Project Engineer

CIVIL

MUNICIPAL

GEOMATICS

ENVIRONMENTAL

TRANSPORTATION

GEOTECHNICAL

MAPPING

STRUCTURAL

MATERIALS TESTING

Huntsville Office
80 Main Street West
Huntsville, ON
P1H 1W9

P: 705-789-7851
F: 705-789-7891
1-877-535-0558

huntsville@tulloch.ca
www.TULLOCH.ca

PROJECT EXPERIENCE

Water and Wastewater Linear

Town of Huntsville, Storm Sewer System Mapping and Condition Assessment
Mainline PACP CCTV and structure MACP for the entire Huntsville storm sewer system of about 19 km and over 100 structures. Work involved conditions assessments, GIS mapping with Google Earth export.
Value $300,000

District of Muskoka, Holditch St.
Project management, tender preparation, design, construction administration and inspection for reconstruction of sanitary sewers and water main.
Value $200,000

Village of South River, Water Main and Road Reconstruction
Project management, design and construction administration for water main replacement, storm sewer installation and road reconstruction.
Value $500,000

Town of Bracebridge, Kimberley, Ontario and Nelson Street
Project management, tender preparation and design for reconstruction of roads, sidewalk, curb and gutter, storm and sanitary sewer and water main. *Value $2.0M*

Town of Bracebridge, Ann Street
Project management, tender preparation and design for road reconstruction including storm sewer, asphalt resurfacing, curb and gutter and sidewalk. *Value $50,000 (fees only)*

District of Muskoka Decommission Abbey Lane Sewage
Pumping Station, Gravenhurst, Ontario
Project management, design, and construction administration for decommissioning of an existing sewage pumping station and construction of new sewage force main and sanitary sewers. *Value $500,000*

District of Muskoka, Front Street
Project management, tender preparation and design for reconstruction of sanitary sewers and water main by trenchless techniques. *Value $500,000*

County of Haliburton, Storm Sewer Design and ECA Application, Eagle Lake, Ontario
Design confirmation, storm sewer sizing, ECA application for storm sewer system upgrades.
Value $200,000

Muskoka Lakes Twp., Bala Falls Road Reconstruction
Design of road grades and storm sewer, tender preparation and contract administration. *Value $400,000*

Bridge and Culvert

Township of Minden Hills, Sedgwick Road Bridge Replacement
Schedule A+ Class Environmental Assessment, detailed design, tender preparation, construction stage services for bridge replacement using 16 m span open bottom arch culvert. *Value $1,200,000*

Township of Armour, North Pickerel Lake Road Bridge and Road Reconstruction
Schedule B Class Environmental Assessment, detailed design and tender preparation for bridge replacement and road improvements using 14 m span open bottom arch culvert. *Value $1,200,000*

Township of Armour, Pickerel & Jack Lake Road Bridge
Schedule B Class Environmental Assessment, detailed design, tender, construction services and project management for bridge replacement using 14 m span open bottom arch culvert with pile foundation. *Value $1,000,000*

Town of Huntsville, South Lancelot Road Bridge Replacement
Project management, Schedule A+ Class Environmental Assessment Study, detailed design, tendering and construction services for replacement of rigid frame bridge with pre-cast concrete arch culvert. *Value $600,000*

Town of Huntsville, Etwell Road Bridge Replacement
Project management, Schedule A+ Class Environmental Assessment Study, detailed design, tendering and construction services for replacement of rigid frame bridge with pre-cast concrete arch culvert. *Value $600,000*

Township of Ryerson, Nipissing Road Bridge
Detailed design, tender and project management for shovel-ready design for a bridge replacement using twin box culvert of reinforced soil foundation.
Value $800,000

Township of Minden Hills, Rehabilitation of Soyer's Lake Road Bridge, Ritchie Falls Road A Bridge and Ritchie Falls Road Bridge
Project management, Schedule A+ Class Environmental Assessment Study, detailed design, tendering and construction services for replacement of three bridges. *Value $500,000*

Municipality of Dysart Et Al, Paddy's Pond Bridge Rehabilitation
Project management, detailed design, tendering and construction services for replacement of timber superstructure and retaining walls. *Value $200,000*

2016 & 2018 OSIM Inspections, Haliburton County
OSIM inspection project for 78 culverts and bridges in Haliburton County. *Value $40,000.*

District of Muskoka, Rehabilitation of Two Bridges on MR 169, Bala, Ontario
Project management, design, tender and contract administration for rehabilitation of two bridges over CNR and CPR tracks. *Value $3.0M*

Township of Armour, Magnetawan River Bridge
Project management and contract administration for a bridge replacement in the Community of Katrine.
Value $2.5M

Township of Armour, Pickerel & Jack Lake Road, North Pickerel Lake Road and South Horn Lake Road Bridges
Project management and Schedule B Class Environmental Study for replacement of three bridges. *Value $50,000 (study only)*

Township of Lake of Bays, Brown's Brae Road Bridge
Municipal Class EA, detailed design, tender, project management and contract administration for a bridge replacement. *Value $300,000*

District Municipality of Muskoka, Rehabilitation of Hoc Roc River Culvert and Replacement of South Beaver Creek Twin Culverts
Project management, Schedule A+ Class Environmental Assessment Study, detailed design, tendering and construction services for replacement of twin culverts and rehabilitation of large CIP concrete box culvert. *Value $350,000*

County of Haliburton, County Road 1 Culvert Replacement, Ontario
Project management, design, and construction administration for replacement of a 3.6-metre x 2.3-metre pipe arch culvert including dewatering plan and surface water control plan. *Value $200,000*

Land Development

Greystone Project Management Inc., Fairvern Road, Huntsville
Civil engineering studies, design, approvals and construction stage services for 400 m of new road with full urban services. *Value $1,500,000*

Township of Armour, Highway 520 Commercial Develop
Consulting and detailed engineering for stormwater management and road design to MTO standards including traffic impact studies.
Value $30,000 (study only)

Ahjo Living, Retirement Home Development
Functional Servicing Report including water, sewer and storm water for four storey 100 unit retirement home in Gravenhurst. *Value $10,000 (study only)*

Muskoka Terrace, Residential Development
Site plan and design of storm water management system for single lot five unit development in Huntsville. *Value $10,000 (study only)*

Municipality Peer Review Engineer
Project management, peer review engineer and coordination of multi-discipline peer reviewers on behalf of the Municipality of Dysart's Planning Department for proposed development projects.
Value $50,000

Terracorp, Waterways of Muskoka, Residential Subdivision, Bracebridge, Ontario
Project management for final completion and municipal assumption for 88-lot residential development. *Value $500,000 (fees only)*

Trillium Lakelands District School Board, Muskoka Adminstration Building
Project management, preliminary design/ functional servicing report and final detailed design for site, water service, septic system and stormwater management. *Value $5.0M*

Batavia Homes Inc., Residential Subdivision
Design, project management and engineer of record for Phase 2 of a multiple phase 190 lot residential development including full site servicing with stormwater management pond; utility design, including electrical distribution, streetlighting, mail, telephone, and cable television, lot grading, sewers and water mains. *Value $1.0M*

Pace Credit Union, Inverary Glen Phase 3, Residential Subdivision, Bracebridge, Ontario
Project management for final completion and municipal assumption for residential development.
Value $500,000

Fowler Construction Co., Industrial Park, Bracebridge, Ontario
Project management and full site servicing design for the 22-lot South Bracebridge Business Park including roads, sewers, watermain, sewage pumping station and force main, and stormwater management facilities. *Value $3.0M*

County of Haliburton, Minden EMS Building
Owner's representative for design-build construction of a new 430m^2 land ambulance base.
Value $1.5 M

Lakeland Power, Site Plan Design/Stormwater Management, Bracebridge, Ontario
Provided site plan design and stormwater management facility design. *Value $10,000 (fees only)*

Water and Wastewater Facility

District of Muskoka, River Road Sewage Pumping Station Upgrades, Bracebridge, Ontario
Project management, environmental assessment, design, tender preparation, and contract administration for upgrades to existing 85 LPS sewage pumping station. *Value $3.5M*

Village of Sundridge, Sanitary Sewer System Rehabilitation
Senior project management, design, tender preparation and contract administration for rehabilitation of sanitary sewers by trenchless techniques and upgrades to the existing sewage lagoons and sewage pumping stations.
Value $8.0M

District of Muskoka, Medora St. Wastewater Treatment Plant Upgrades, Port Carling, Ontario
Project management, design, tender preparation, and contract administration for upgrades to existing 1,200 cu.m./d sewage treatment plant.
Value $15.0M

YMCA Camp Cedar Glen, Site Plan and Septic System, Schomberg, Ontario
Project management and design for stormwater management and septic system. *Value $50,000*

YMCA, Camp Pinecrest, Torrance, Ontario
Provide onsite sewage treatment facility design, Ministry of the Environment certificate of approvals applications, and construction inspection. Coordinate and manage a lake capacity study. OMB expert witness duties. *Value $100,000*

District of Muskoka, Elizabeth St. Elevated Water Tower Rehabilitation, MacTier, Ontario
Project management, tender preparation, design, construction administration and inspection for repainting and rehabilitation of elevated water storage tank. *Value $750,000*

Transportation Planning

District of Muskoka, Bracebridge North Transportation Corridor Class EA, Bracebridge
Project management and environmental assessment for new arterial road around north end of Bracebridge.
Value $400,000 (study only)

Township of Minden Hills, Minden Village Master Development Plan
Project management, preliminary design/ functional servicing report and final detailed design for site, water service, septic system and stormwater management. *Value $80,000 (study only)*

Retaining Wall

District Municipality of Muskoka, Chaffey Street Retaining Wall in The Town of Huntsville
Design and project management for replacement of approximately 100 m of retaining wall with precast concrete retaining wall.
Value $300,000

Geomembrane Design and Construction

Township of Minden Hills, IGA Road Reconstruction

Project management, detailed design, tendering and construction services for reconstruction of 300m of IGA Road including extensive use of geosynthetics.
Value $500,000

TOWN OF GRAVENHURST, JAMES ST. RECONSTRUCTION
Project management, detailed design, tendering and construction services for reconstruction of 380m of James St. from Fernwood Drive to North Muldrew Lake Road including extensive use of geosynthetics.
Value $500,000

TOWN OF BRACEBRIDGE, DOWNTOWN BEAUTIFICATION
Project management, design, tender preparation and construction administration for multiple-contract project to repave Taylor Road and Manitoba Street. Replaced streetlights and constructed concrete crosswalks in downtown Bracebridge.
Value $500,000

Surface Water Control and Management

TOWNSHIP OF GEORGIAN BAY, STEWART LAKE WEIR
Project management, design and approvals for replacement of a culvert and weir facility near MacTier. *Value $20,000 (study only)*

TOWN OF HUNTSVILLE, STORM SEWER STUDY
Project management and senior engineering for multi-year / phase program to flush, video, assess and rate all 20 km of storm sewers in Huntsville. Project deliverable was NAASCO compliant reporting and Town GIS up-loadable information. *Value $250,000*

BROOKFIELD GIS, SUDBURY GOVERNMENT COMPLEX, PERIMETER PARKING LOT RENEWAL AND PERIMETER DRAINAGE
Senior project management and senior civil engineer for rehabilitation of parking area and site drainage for Ontario Government Complex. *Value $850,000*

BROOKFIELD GIS, MNRF COCHRANE FIRE MANAGEMENT HEADQUARTERS PARKING LOT PAVING
Senior project management and senior civil engineer for rehabilitation of parking area and site drainage for Ontario Government Complex. *Value $250,000*

BROOKFIELD GIS, SOUTH PORCUPINE GOVERNMENT COMPLEX, PEDESTRIAN PAVING ROADWAY RENEWAL
Senior project management and senior civil engineer for rehabilitation of parking area and site drainage for Ontario Government Complex. *Value $400,000*

SNC LAVALIN O&M, NORTH BAY GOVERNMENT COMPLEX SITE UPGRADE
Senior civil engineer responsible for oversight of contract administration and completion of construction for rehabilitation of a large parking area and associated drainage. *Value 1,500,000*

HWY 17 DRAINAGE AND HYDROLOGY INVESTIGATION MINISTRY OF TRANSPORTATION
Senior Engineer responsible for performing a hydrology study and hydraulic analysis on existing culverts on Hwy 17 in the Township of Farris, North Bay and Highway 35 in Carnarvon. The investigation included calculating flows, modelling the original conditions and providing a new culvert and ditching recommendations. *Value $30,000 (study only)*

DISTRICT OF MUSKOKA, STISTED LANDFILL COMPOST FACILITY, ONTARIO
Project management, design, tender preparation, and contract administration for an expansion to the existing compost facility and SWM ponds.
Value $500,000

KEVIN LOUCH, E.I.T.

ENGINEER IN TRAINING

PROFILE

Kevin is an Engineer-in-Training (EIT) with TULLOCH Engineering. Kevin has a variety of experience in the civil and structural engineering disciplines, including municipal engineering for private and public capital works. Design and contract administration of roads, bridges, culverts, wind and solar projects, buildings, estimating and tender preparation, report writing, and project coordination.

EDUCATION

B.Sc. Civil Engineering
Lakehead University
Thunder Bay, ON
2017

Construction Engineering Technician
Algonquin College
Ottawa, ON
2013

Civil Engineering Technologist
Algonquin College
Ottawa, ON
2014

PROFESSIONAL EXPERIENCE

TULLOCH Engineering, May 2014 – Present

- Engineer in Training May 2017 - Present
- EIT/Sr. Inspector May 2017 – Mar 2019
- Survey Crew Chief 2015 – 2017
- Survey Technician May – Sept 2014

Parry Sound Operations, 2011 – 2014

- Parks and Recreation

PROFESSIONAL AFFILIATIONS

- Professional Engineers Ontario 2017 - Present
- Canadian Society for Civil Engineering 2018

CONTINUING EDUCATION

- TechComm Fundamentals Bootcamp (Jan 2021)
- OGRA Bridge and Structure Inspection Training (2019)
- OBOA – Small Buildings Course (Jan 2019)
- Working at Heights (2019)
- Hilti Profis Anchor
- MTO – WBCMS
- Nuclear Gauge Transportation Certification
- Chain Saw Course

CIVIL

MUNICIPAL

GEOMATICS

ENVIRONMENTAL

TRANSPORTATION

GEOTECHNICAL

MAPPING

STRUCTURAL

MATERIALS TESTING

Huntsville Office
80 Main Street West
Huntsville, ON
P1H 1W9

P: 705-789-7851
F: 705-789-7891
1-877-535-0558

huntsville@tulloch.ca
www.TULLOCH.ca

PROJECT EXPERIENCE

Engineering

PREMIUM DOCK PROJECTS

Provide structural design services for various projects including floating docks/shelters, deck platforms, and stairs. Assist is all aspects of the project including client communication, design, and site inspections.

PARRY SOUND HOSPITAL DEMO (2020)

Assist in producing a demolition plan for the Towns permit requirements. Acted as the primary contact for the Contractor. Assist in pre plan site review. Complete all site inspections and provide detailed inspection reports throughout demolition.

CASHMAN CREEK BRIDGE (2020)

Provide complete construction review and contract administration services throughout the duration of the contract. Primary contact between Contractor and Township throughout construction.

BGIS STRUCTURAL CONDITION ASSESSMENTS (2020)

Assist in site investigations and testing for three MNRF buildings. Review of background studies and correspondence from client. Complete detailed report for deficiencies and recommended work. Detailed cost analysis completed as part of Tulloch's deliverables.

ECHO BAY ROAD RECONSTRUCTION (2020)

Assist in the development of tender documents for the contract deliverables. Provide drafting review support to expedite project timelines.

HALIBURTON CULVERT 648 REHABILITATION (2019/2020)

Completed a topographic survey of existing conditions for design. Assisted in the detailed design of the undermined footing repair. Design included shotcrete, platform design, and various site protection details.

ARMOUR COMMERCIAL PIT ENTRANCE (2019)

Completed a topographic survey of existing conditions for design. Assisted in the detailed design of the entrance, culvert location, size, and provide layout services for the Township.

CAMP HURUNDA BUILDING CONDITION ASSESSMENTS (2020)

Conducted building condition assessments for various structures throughout the camp property. Completed code review and provided the client with a detailed report with recommendations for repairs.

COLEMAN BRIDGE REHABILITATION (2019/2020)

Completed initial site investigations of the damaged timber deck. Assisted in the detailed design to replace the existing timber deck with a concrete deck. Design also included guiderail replacement, scour protection for undermined wingwalls, and paving.

RYERSON GARAGE ROOF REHABILITATION (2019/2020)

Assisted in a preliminary condition assessment of the steel roof. Conducted a structural analysis of the existing roof framing and assisted in the detailed design of a new standing seem panel roof. New structural supports were designed to support the additional weight of the new roof panels. Provided the Township with construction review and contract administration services throughout construction.

PICKEREL & JACK BRIDGE CONSTRUCTION (2019/2020) (1.1M)

Provided construction review and contract administration services throughout all construction phases. Phases included but were not limited to: the demolition of the existing rigid frame concrete structure, environmental protection, substructure installation, rebar and concrete inspections, arch culvert installation, wing wall construction, guiderail, and paving.

KEARNEY BOAT LAUNCH REHABILITATION (2019/2020)

Completed the detailed design of 2 boat launch rehabilitations. Design included retaining walls, granular base, dock anchorage design, and ramp improvements. Acted at the primary contact between the Contractor and the Township. Provided on site construction review and contract administration services for the duration of the contract.

MINDEN SAND STORAGE RETAINING WALL DESIGN (2019/2020)

Assisted in the detailed design of a failed concrete end wall located at the gable of an existing sand storage building. The design included a new retaining wall and footing details.

Clinto Lake Boat Launch Rehabilitation (2019/2020) (0.2m)
Completed the detailed design for the rehabilitation of a boat launch. Design included retaining walls, granular base, dock anchorage design, and ramp improvements. Acted at the primary contact between the Contractor and the Township. Provided on site construction review and contract administration services for the duration of the contract.

Megnetawan Bridge 18 Design/Reconstruction (2019) (0.5m)
Assisted in the design of a concrete abutment substructure supporting a steel modular bridge for the Township. Design included demolition of the existing rigid frame bridge, abutments, bearing detail, guiderail, and road improvements. Provided complete construction review and contract administration for the duration of the contract.

Canusa Steel Frame (2019)
Assist in the design of a large steel frame to support new roof top AC units for a factor building in Huntsville Ontario. Initial site inspection was conducted, with design, and periodic inspection of the frame fabrication to follow.

McKellar Church Foundation Design (2019)
Assist in the design of two concrete block foundations for existing churches, with the contractor as our client. Included in the project was initial inspection, structural design, and site inspections during construction.

Ferguson Road Boat Launch – Armour Twp (2019)
New construction of a boat launch. Assist in tender preparation, drawing and design checking. Provided project planning, on-site visual inspection, and coordination.

Bala Area Inspection (2019)
Assist in the structural condition assessment of the Bala area. Inspection included a visual inspection of all areas of the building, interior finishes, fixtures, steel frame, purlins, various floor systems, various roof systems and exterior finishes.

Parry Island Swing Bridge Pile Repair (2019)
Assist in design and report writing for pile repair of existing bridge pile foundation. On site for visual inspection of construction operations.

Henvey Inlet Roof Assessments (2019)
Review the existing conditions of 15 residential roof systems for the Henvey Inlet Reserve. Assisted in design for structural repairs to several existing roof trusses. Check building code compliance and report writing.

Solar Energy Projects (Various)
Conducted several visual inspections on various solar energy projects in Ontario. Inspections included, pile bedding, baseplate grouting, civil site work, road construction, access, and backfill.

South River Watermain (Happy Landing) (0.2m)
Assisted in tender preparation for Contract. Acted as Assistant Contract Administrator and inspector throughout the Contract. Project included watermain installation, live tapping, watermain testing/disinfection, granular compaction, and paving.

McKellar Township Building Condition Assessments (2019)
Assisted in the inspection and assessments of three abandoned residential buildings for the Township of McKellar our client. Purpose was to comment on adequacy and safety of the buildings, and provide our recommendations for required repairs or demolition.

OSIM Bridge Inspections
Responsible for the detailed visual inspection of various bridges, culverts in conformance with the Ontario Structural Inspection Manual. Clients include Town of Huntsville, Township of Minden Hills, Municipality of Highlands East, Township of Algonquin Highlands, Armour Township, Town of Kearney, Township of Ryerson, and The County of Haliburton.

York River Bridge Rehabilitation (2019)
Tender preparation and review for bridge rehabilitation including design of underpinning and sheet pile cutoff wall for the County of Haliburton.

Sedgewick Bridge Replacement (2019)
Preliminary investigation and detailed structural review of an existing 80 year old rigid frame structure. Construction challenges include long detour route and narrow existing right of way.

Miscellaneous Structural Designs

Design of various building components for residential, commercial, institutional and industrial buildings. Materials include steel, wood, concrete and masonry.

Contract Administration

HENVEY INLET WIND FARM (2018-2019) - CER (1.0B)

Project Management assistance and quality control field engineer. Kevin was contracted out for CER (Construction Energy Renewable) to help with managing subcontractors, managing logistics, reviewing and writing contracts for subcontractors, managing field work, quality control for foundations, culverts, and bridge construction.

CHAPLEAU MTO CONTRACT #2017-5100 (2017) (8.5M)

Project included Grading, Drainage, Granular Base, Hot Mix Paving, Electrical and Structural Replacement. Kevin (Sr. Office administrator and Sr. inspector) Worked closely with the Contract Administrator to review deliverables, contract documents, issue payments and track quantities. Inspection of culvert installation, paving, and all structure aspects of the project were required.

Geomatics

POWERTEL WIND FARM TRANSMISSION LINE

Subcontractors for PowerTel on a transmission line stretching from South of Parry Sound to Henvey Inlet (over 100km). Kevin and the Tulloch team were the first boots on the ground establishing the boundary for the transmission line corridor. Once the entire corridor was flagged and brushed, they were sent back in to locate and stake the locations for over 400 wood pole and 70 steel pole locations. The teams worked side by side with drillers and PowerTel line installers to complete the staking.

TOPOGRAPHIC SURVEY – HWY 400, HWY 124, HWY 518

A three Hwy topographic survey for the MTO. The project spanned over 30km in total. The survey requirements were to complete a sweep from the shoulder of the road to 10m past the Hwy corridors. Kevin acting Crew Chief submitted deliverables at the end of each day for plan processing. Kevin completed a portion of the control installation and leveling for the 30km stretch.

407 ETR 16-4517

Crew Chief. 14km of soft surface topo along the 407 south of Markham. Work included setting up the control network for the project. Topographic surveys of soft surfaces along the job limits. GPS was used for topo. Total station was used under structural bridges to establish features.

PARRY SOUND LOCAL SURVEYS

Survey Technician for various local work. Working under senior surveyor. Many jobs were 1 day – a few days long mostly in the Parry Sound/Huntsville area. Work consisted of; Building layouts – locating building corners, footing placements and excavation layouts. Legal surveys – establish property lines, locate and place property bars, and severances. Line cutting – flagging and cutting property lines. Topographic surveys - show land and building features, Hwy and soft surface mapping.

BELLE RIVER WIND FARM

Crew Chief for project. Conducted the preliminary survey for proposed turbine sites near Windsor ON. Surveying included locating control points, survey monuments and topo of existing land features. GPS and total station were used to conduct the follow work.

HENVEY INLET WIND FARM

Crew Chief for wind farm project layout in Henvey Inlet. Main tasks included flagging and staking turbine sites and access roads, setting control in order to adjust aerial data, and inspecting areas of interest with RES Canada representatives. Planned how to most efficiently approach and complete the job with Native, Pattern and RES Canada representatives.

GARDINER EXPRESSWAY, TORONTO

Crew Chief for a topographic survey on the Gardiner Expressway in Toronto. This project was ordered by the City of Toronto and involved the resurfacing of a large stretch of highway in the downtown core of the city. The highway was closed for the better part of two days to complete this project. This project included establishing project control, transferring elevation benchmarks, and conducting a topographic survey of the highway structure after the asphalt was stripped, and once again when it was repaved.

TRILLIUM GAS – TRANS CANADA PIPELINE

Crew Chief. Project stretched from Markham ON - Iroquois ON, 350+km. Work included legal surveys to establish the property lines and easements where existing pipelines were located. Survey monuments were located from block maps and survey plans, using GPS and various survey equipment. Daily progress reports/data were completed and submitted to the project manager.

CAMBIUM

KEVIN WARNER, M.Sc., P.Geo (Ltd) *Manager-Water & Wastewater, Senior Hydrogeologist*

SUMMARY OF PROFESSIONAL EXPERIENCE

2009 - Present	Senior Project Manager, Senior Hydrogeologist. Cambium Inc., Peterborough, ON, Canada
2009 - 2009	Project Manager, Hydrogeologist. Genivar Ontario Inc. (WSP), Markham, ON, Canada
2002 - 2009	Project Manager, Hydrogeologist. Gartner Lee Ltd. (AECOM), Markham, ON, Canada
2000 - 2002	Project Manager, Hydrogeologist. Gibson Associates Ltd., Bowmanville, ON, Canada

EDUCATION & TRAINING

1999	Master of Science. School of Geography and Geology, McMaster University Hamilton, ON, Canada
1997	Honours Bachelor of Environmental Studies. University of Waterloo Waterloo, ON, Canada

PROFESSIONAL ACCREDIATION

- Professional Geoscientist (Limited) with the Association of Professional Geoscientists of Ontario (Limited to Environmental Geoscience excluding Environmental Site Assessment and Site Remediation)
- Qualified wastewater designer and inspector through Ministry of Municipal Affairs and Housing (BCIN 44074)

PROFESSIONAL ASSOCIATIONS

- Association of Professional Geoscientists of Ontario
- Ontario Stone, Sand, and Gravel Association
- Ontario On-site Wastewater Association
- Camping in Ontario Association

PUBLICATIONS

Waddington, J.M., Warner, K.D., and Kennedy, G., 2002. Cutover peatlands: A persistent source of atmospheric CO2. *Global Biogeochemical Cycles, DOI: 10.1029/2001GB001398.*

Waddington, J.M. and Warner, K.D., 2001. Restoring the carbon sink function of cut-over peatlands. *Écoscience, 8(3): 359-368.*

Warner, K.D., 2014. Decentralized Subsurface Disposal System Solves Wastewater Woes. *Water Canada.*

Dolstra, S. and K.D. Warner, 2015. Your Septic System and Some Easy Tips to Prolong its Life and Preserve Your Water Quality. *Kawartha Cottage Magazine, June 2015.*

Warner, K.D., 2017. Soils and Standard Systems. *Onsite Vol 17, Issue 2. Ontario Onsite Wastewater Association Newsletter*.

PRESENTATIONS

- Appeared before various Town Councils numerous times as a technical representative for proponents, both to present technical findings and to respond to hydrogeological questions or issues.
- Appeared in numerous Open House and Town Hall Public Meetings to present hydrogeological information regarding pending applications (ARA Licences) to the public as well as to answer public inquiries regarding the applications.
- Presented to geoscientists, environmental professionals and industrial stakeholders various technical talks regarding hydrogeology and issues arising in the field of hydrogeology (e.g. Source Water Protection).
- Presented technical talks regarding source water projection to the membership of OSSGA.
- Presented technical talks regarding water treatment and discharge from aggregate sites to the membership of OSSGA.
- Presented technical talks regarding large subsurface disposal systems for Camping in Ontario.
- Participated in panel discussion with Ministry of Environment regarding sewage flow rates from PMUs for Camping in Ontario.
- Presented technical talk regarding the design of a large subsurface disposal system for OOWA AGM.
- Participated in panel discussion for OOWA and the PPCHU to discuss various septic system issues.

SELECTED EXPERIENCE

PROJECT MANAGEMENT

- Managed numerous hydrogeological projects, from simple to long-term and complex studies. Project management skills include the preparation of budgets and proposals, managing project schedules and costs, liaising with clients, agencies and stakeholders, collaborating with multi-disciplinary teams or managing other technical staff, and the approval of client invoices and collection of fees.

- Liaised with approval and review agencies (Ministry of the Environment and Climate Change (MOECC), Ministry of Natural Resources and Forestry (MNRF), Municipalities, Department of Fisheries and Oceans (DFO), Conservation Authorities) regarding applications for Permits-To-Take-Water (PsTTW), MNR Aggregate Resource Act (ARA) Licences, Environmental Compliance Approvals (ECA's) and zoning changes and approvals. Responds to agencies concerns and negotiates clear and pragmatic solutions.

LAND USE DEVELOPMENT / SITE SERVICING / WASTEWATER

- Hydrogeological assessments for developments (Municipal Secondary Plans, privately serviced residential developments). Aquifer and well capacity assessment to support development. Nitrate dilution assessment for development. Evaluation and design of sub-surface sewage systems.
- *Hydrogeological Investigation for Wastewater Treatment, Blue Pigeon Resort, Trent Lakes*: Expansion of a resort to include a multi-use commercial centre and 14 additional cottages. The wastewater assessment included a geological investigation to determine composition of native soils and the installation of groundwater monitoring wells, the characterization of groundwater quality, the design of a large wastewater treatment system (WSB Clean Pro) and the calculation of nitrate and phosphorus loading on groundwater and surface water resources. The wastewater system design was approved by the Ministry of the Environment and Climate Change (MOECC) with an Environmental Compliance Approval (ECA).
- *Hydrogeological Investigation and Wastewater System Design, Deer Run Golf Course, Little Britain:* Existing 12-hole golf course with 26 trailer sites, serviced by two communal septic systems. A proposed on-site development of 25 additional campground sites required a new wastewater treatment system, which would also replace the existing septic systems. A subsurface investigation was undertaken to characterize native soil composition, as well as groundwater quality with the installation of groundwater monitoring wells. The nutrient loading of nitrate and phosphorus was calculated to determine possible impacts on both the neighbouring water supply wells and the adjacent Mariposa Brook. A large subsurface disposal system was designed utilizing EcoPods situated on a Type A area bed. The wastewater system design was approved by the Ministry of the Environment and Climate Change (MOECC) with an Environmental Compliance Approval (ECA).
- Hydrogeological Assessment, Hidden Ridge Subdivision, Zephyr: Undertook a hydrogeological assessment of 11 ha parcel of land proposed for residential development, according to MOE D-5-4 regulations. Subsurface investigations were undertaken to assess the composition of the native soils. The nutrient loading assessment determined that up to 23 lots were feasible on the property. Additionally, the potential impacts from the development were assessed on the adjacent Provincially Significant Wetland complex.
- *Hydrogeological Assessment, Tower Land Development, Norwood*: Completed a hydrogeological assessment for a 35 unit residential development which, although is municipally serviced for water and wastewater, is located in a wellhead protection area. The study included a soils assessment and water balance as well as an assessment on the potential effects that the development may have on the wellhead protection area.
- *Hydrogeological Investigation, Septage Disposal Site, Algonquin Highlands*: The assessment included a hydrogeological investigation and terrain analysis / impact assessment to assess the use of septage dewatering trenches. The study included an investigation of native soil composition, installation of monitoring wells, measurement of groundwater elevations, assessment of groundwater quality and the estimation of nitrate and phosphorus loading to groundwater and surface water resources.
- *Hydrogeological Investigation and Wastewater System Design, Home Hardware, Peterborough*: Completed a hydrogeological investigation and detailed design for a new wastewater system to service an expansion of the Home Hardware retail store. The investigation included the installation of monitoring wells, an assessment of the existing soil and shallow aquifer conditions, and an assessment of nitrate and phosphorus attenuation for the expansion. The wastewater system design was approved by the Ministry of the

Environment and Climate Change (MOECC) with an Environmental Compliance Approval (ECA) approved for the system.

- *Viamede Resort, Woodview*: completed a hydrogeological assessment and wastewater system design for the expansion of their existing wastewater treatment system which services the existing resort facilities, situated on the northern shoreline of Stoney Lake. The main lodge, boathouse pub, and motel are serviced by a raised Class 4 wastewater treatment system. The expansion of the seating capacity of the boathouse pub and construction of an indoor pool will result in an increase of the daily sewage loading rate to 60,000 L/day. The additional capacity for the system was accommodated through treatment by an advanced treatment system, which utilized the existing raised leaching bed for disposal. The wastewater system design was approved by Ministry of the Environment and Climate Change (MOECC) for an Environmental Compliance Approval (ECA).
- *Wastewater System Design, 61 Shipman's Point Lane, Lansdowne, Ivy Lea Club*: completed designs for one new and one replacement wastewater treatment systems to service a proposed fitness centre and shoreline cottage. Advanced treatment systems with area beds were utilized for the wastewater systems to reduce the footprint of the systems on the site.
- *Hydrogeological Investigation for Well Yield and Wastewater System Design, Bon Echo Provincial Park, Cloyne, Ontario Parks*: undertook a hydrogeological assessment for the design of a new on-site wastewater treatment system for a proposed comfort station servicing thirteen cabin camp sites. This assessment was completed in conjunction with a hydrogeological assessment for a new supply well, a designated substance survey and a geotechnical investigation associated with the development of the site. The study included hydraulic pumping test and well yield assessment of a new water supply well, and the assessment and design of a new wastewater system servicing the comfort station. The wastewater system consisted of a Premier Tech Aqua Ecoflo Biofilter for treatment and an area bed for disposal. The wastewater system was approved by Ministry of the Environment and Climate Change (MOECC) for an Environmental Compliance Approval (ECA).
- *Wastewater System Assessment and Design, Township of Minden Hills***:** Conducted an on-site assessment to determine the number of cabins that could be added at the Kinark Outdoor Centre. Surficial sand soils were present on the site however the presence of shallow bedrock and the proximity to Grey Lake restricted the development to 11 cabins. Cambium's study confirmed that 11 cabins with a capacity of 12,100 L/day could be serviced by a communal subsurface disposal system on the site while ensuring that proper setbacks to the lake were met and no adverse effects from phosphorus loading would impact the water quality of Grey Lake.
- *Replacement On-site Wastewater System, Coffee Time Fowlers Corners:* Conducted a hydrogeological assessment of the existing property and failing septic bed. Provided a new design including an Advanced Treatment System for ECA approval based on current daily sewage flow and existing geological conditions.
- *McFadden Road Development, Apsley:* Conducted a hydrogeological assessment on the supply well for water quantity and quality of a proposed condominium development for use as a communal well. Completed an assessment of the property to determine its adequacy for on-site disposal of wastewater according to D-5-4 guidelines. Determined a 12 unit development could be supported at the site.
- *Wastewater Servicing Expansion, Township of Minden Hills:* Conducted an on-site assessment to determine the number of cabins that could be added at the Kinark Outdoor Centre. Designed a communal subsurface disposal system with a capacity to treat 12,100 L/day to service 11 cabins on the site.
- *Environmental Impact Study, Pickering:* Hydrogeological assessment of infilling of groundwater seep and gully feature for the construction of a medical services complex on an adjacent wetland complex. Assessment included installation and single well hydraulic testing of multilevel piezometers to determine direction and contribution of groundwater flow to adjacent wetland. Assessment also included a water

balance for the site considering groundwater contributions to the wetland under existing conditions and post-development scenarios.

- *Castle Harbour Subdivision, Port Perry:* Conducted hydrogeological assessment (D-5-4) of private wells to determine suitability for servicing a subdivision. Assessment included an aquifer pumping test, calculating well capacity and yield, assessing potential for well interference with on-site and neighbouring wells, and an assessment of water quality for potability from on-site wells.
- *Oshawa Secondary Plan, City of Oshawa:* This study involved the characterization of the geological terrain and identifying groundwater resources for a Secondary Plan in northwest Oshawa, ON. Technical recommendations of the study were to aid in developing policy and zoning for the study area.
- Numerous Private Subsurface Disposal Systems, Muskoka District: Designed replacement subsurface sewage systems for multiple residences located adjacent a lake. Field investigation to identify possible septic bed locations which were limited by existing grade and required setback distances from the water supply wells and the lake. Hydrogeological assessment provided to amend Certificate of Approval for sewage systems for the residences to the MOE for approval.

WATER RESOURCES

- Conducted Hydrogeological Assessments to support Permits-To-Take-Water (PsTTW) for Municipal supply wells, industrial supply wells, pond dewatering, water supply for golf courses, etc. Water quality analysis. Investigation of groundwater/surface water interactions. Wetland hydrological and biogeochemical assessments. Assessment of well performance and aquifer characteristics using various hydrogeological applications (eg. Aquisolv, Aquifer Test 4.0).
- *Hydrogeological Assessment, Gardens Retirement Residence, Haliburton*: Completed a water supply assessment for a proposed 120 unit retirement residence. The study included the installation of a water supply well, 24-hour pumping test and water quality analysis of the groundwater. The study concluded that the test well could sustain the proposed development with no impacts to adjacent water well users.
- *Hydrogeological Investigation for Water Supply, Blue Pigeon Resort, Trent Lakes*: Expansion of a resort to include a multi-use commercial centre and 14 additional cottages. The water supply assessment included a concurrent 24 hr pumping test of 3 on-site supply wells, water characterization, and an assessment of impact from the water taking on adjacent water supply wells.
- *Permit To Take Water, Deer Run Golf Course, City of Kawartha Lakes*: Completed a hydrological and hydrogeological assessment in support of a PTTW for the golf course. Irrigation water is pumped from Mariposa Brook and placed into an on-site pond for storage. Water is then pumped from the pond for irrigation water. The assessment included the inclusion of on-site source wells which supply drinking water to the clubhouse and 26 trailer units.
- *Well Yield Assessment, Whitefish/Pog Lake, Algonquin Park, Ontario Parks*: Completed a hydrogeological assessment of the water supply well at the Whitefish/Pog Lake Campground. The assessment included an inspection and documentation of the construction of the water supply well using a downhole borehole camera, a variable rate pumping test and a 16 hour constant rate pumping test to determine the capacity of the well. Water quality samples were also collected to assess the raw water quality.
- *Well Yield Assessment, Bon Echo Provincial Park, Ontario Parks*: Supervision of the installation of a new water supply well at the Group Campground. An 18 hour constant rate pumping test was completed on the new supply well to determine well yield for the campground. Water quality samples were also collected to assess the raw water quality.
- *Hydrogeological Assessment, Hidden Ridge Subdivision, Zephyr*: Undertook a hydrogeological assessment for a proposed 17 lot residential development, according to MOE D-5-5 regulations. The study included the installation of 3 test wells, 6 hour well yield test and water quality analysis. The study concluded that neither

the adjacent water well users, nor the Provincially Significant Wetland would be impacted from the development.

- *Granite Cove Condominiums, Haliburton*: Completed a hydrogeological assessment for a proposed 30 unit condominium development. The study included an inventory of surrounding residential water wells and a long term (24 hour) constant rate pumping test of the on-site supply well. The supply well is deemed acceptable for supporting the development using a water storage system without interfering with surrounding residential wells.
- *Black River Wilderness Campground, Chippewas of Rama First Nation*: Supervision of the installation of a new water supply well for the campground. A 6 hour constant rate pumping test was completed on the new supply well to determine well yield for the campground. Water quality samples were also collected to assess the raw water quality.
- *Residential Water Well Inspections, Alderville First Nation*: Residential water well inspection of 44 residences to determine if the wells conformed to O.Reg 903 for the installation of point-of-entry drinking water treatment systems. The assessment included an inspection and documentation of the construction of the water supply well using a downhole borehole camera, the collection of water quality samples and recommendations to upgrade the wells for compliance with O.Rog. 903.
- *Residential Water Well Upgrades, Alderville First Nation*: Management and supervision of water well upgrades for compliance of 40 residential and communal wells with O.Reg. 903.
- *Granite View Condominiums, Haliburton*: Completed a hydrogeological assessment for a proposed 24 unit condominium development. The study included an inventory of surrounding residential water wells and a long term (24 hour) constant rate pumping test of the on-site supply well. The supply well is deemed acceptable for supporting the development using a water storage system without interfering with surrounding residential wells.
- *Balmer Road Development, Apsley:* Undertook a hydrogeological assessment of 26 ha parcel of land proposed for residential development, according to MOE D-5-5 regulations. Four test wells were installed on the property and a constant rate pumping test was performed on each well to determine well yield and the hydrogeological properties of the bedrock aquifer. The study determined that up to 64 residential units can be serviced using one of the on-site wells as a communal well.
- *GUDI Assessment, Bobcaygeon:* Cambium was retained to complete a GUDI assessment of the communal supply well for the Alpine Glen Subdivision. The study included the assessment of water quality data from the supply well, assessment of the well log and the inspection of the wellhead and capture area.
- *Communal Water System, Pickering:* Completed hydraulic testing on a new production well near the existing communal Pottery Well #1 (PW-1). The study included the assessment of the hydrogeological regime, installation of a new supply well, installation of monitoring wells into the same unconfined aquifer system, and a hydraulic pumping test on both the new supply well and the original Pottery well. The drawdown from each well was measured during each pumping test and the properties of the aquifer and zone of influence were calculated. Due to the variance of aquifer material between the old and new Pottery supply wells, it was deemed that the original well offered the best yield for use as a supply well.
- *Permit To Take Water, Municipality of Highlands East*: Permit To Take Water (PTTW) amendment to include two reserve supply wells (Cardiff Well #2 and #3) in the existing PTTW. The study included characterizing the hydrogeological setting and identifying that all three supply wells were connected to the same aquifer system. The work also included preparing a drinking water works permit and amendment to their drinking water licence, which included characterizing the raw water source, and preparing the required documentation for the permit and licence amendment.
- *Hydrogeological Assessment, Snowball*: Conducted a hydrogeological assessment for the expansion of the storage building and site plan approval of an aggregate storage yard. The study included the installation of

groundwater monitoring wells, assessment of groundwater quality on the site and in neighbouring wells and an assessment of the potential impact the development will have on the adjacent surface water system and surrounding water wells.

- *Mariposa Creek Estates, City of Kawartha Lakes:* Completed a long term constant rate pumping test on the communal well at a recreational trailer park. The study confirmed that the proposed rate of water taking for the 300 unit trailer park would not impact the adjacent Provincially Significant Wetland nor Mariposa Creek.
- *Permit To Take Water, Big Mountain Lake, Nephton:* Completed a hydrological study for a mine processing facility utilizing measured lake levels to determine if water taking was impacting Big Mountain Lake. Confirmed that there are no long term impacts to lake levels in the lake, and lake drawdown was closely correlated to climatic effects.
- *Hydrogeological Testing of Supply Well for Energy from Waste Facility, Dufferin County:* Site selection and supervision of installation of supply well. Supervised variable and constant rate pumping tests. Analysis of pumping test data to determine feasibility of bedrock aquifer supplying water for Energy from Waste facility. The study included assessment of the aquifer properties and potential impacts to local receptors, both anthropogenic and ecological.
- *Highway 66 Permit To Take Water, New Leaskard:* Hydrologic and hydrogeologic assessment of road resurfacing and multiple culvert replacement for Highway 66 in support a PTTW application.
- *Hydrogeologic and Hydrologic Monitoring Program for Dewatering Operations of Construction of Bathurst Langstaff Trunk Sewer, Toronto:* Extensive groundwater and surface water monitoring program during construction of trunk sewer. PTTW required monthly reports to monitor potential impacts of dewatering on adjacent ecological features, extent of groundwater drawdown in shallow aquifer, and impacts of dewatering discharge to surface water systems.
- *Municipal Well Assessment, Halton Region*: Analysis of long term pumping test to determine feasibility of increased capacity of a Municipal supply well. The study included assessment of other groundwater users in the area and potential impacts to local receptors, both anthropogenic and ecological.
- *Permit To Take Water, Golf Course, Port Severn*: Hydrogeological and hydrological assessment to take water for irrigation from supply pond.
- *Permit To Take Water, Water Bottler, Barrie*: Analysis and permitting of water taking for water bottling facility. Assessment included determining the capacity of the supply well for increased production and assessing potential aquifer interference with nearby Municipal supply wells.

CLASS ENVIRONMENTAL ASSESSMENT

- Gardens of Halliburton, Dysart et all: Commenced a Class C Environmental Assessment for the water supply system for a proposed 120 unit retirement residence. The study included assessing various options for water supply, managing a multi-disciplinary team which addressed hydrogeology and archeology as well as public consultation with adjacent landowners and First Nations.
- McClintock Septage Disposal Site, Township of Algonquin Highlands: Commenced a Class Environmental Assessment for the proposed expansion of a septage disposal site. The study included assessing various options for increasing septage disposal capacity, managing a multi-disciplinary team which addressed hydrogeology, natural environment and archeology as well as public consultation with adjacent landowners.
- *Omemee Municipal Wastewater System, City of Kawartha Lakes:* Undertook a Class Environmental Assessment to assess wastewater servicing options for the expansion of the Omemee water pollution control plant which services the Village. A large subsurface disposal system was selected as the preferred option based on the environmental and socio-economic assessments.

ENVIRONMENTAL SITE ASSESSMENT

- *Phase II Environmental Site Assessment, Douro*: Hydrogeological assessment of an existing automobile recycling yard for possible use as a waste transfer station. Assessment included installation of monitoring wells into the shallow bedrock formations, analysis of groundwater elevations to determine direction of flow and the analysis of water chemistry to characterize possible contaminates in the groundwater system and whether these may migrate off the site.

AGGREGATE ASSESSMENT AND ARA LICENCES

- Conducted numerous hydrogeological assessments for MNR Aggregate Resource Act (ARA) licences (Sand & Gravel Pits and Quarries), and to support PsTTW for quarry dewatering and aggregate wash plants. Water level and water quality monitoring programs for aggregate sites (compliance monitoring). Certificate of Approval (C of A) to discharge wastewater for quarry dewatering.
- *ARA Licence, Below Water Pit, Kemptville:* Completed hydrogeological assessment in support of a licence to extract below the water table. The study focused on assessing potential impacts to both surrounding water well users as well as adjacent and on-site Provincially Significant Wetlands.
- *ARA Site Plans, South Gower Pit*: Preparation of ARA Site Plans for Licence for Below Water Extraction for a sand & gravel pit.
- *Water level Monitoring Program, Turk Valley Pit*: Completed multi-year water level monitoring program of on-site monitoring wells for an above-water extraction sand and gravel pit. Water levels are measured manually monthly and continuously through the installation of Solinst Leveloggers. Stream water levels are also monitored in the adjacent Cold Creek. Preparation of an annual monitoring report to assess the hydrogeological conditions and potential for impacts for compliance with the ARA Site Plans and PTTW.
- *ARA Licence, Below Water Quarry, Dunchurch*: Hydrogeological assessment to characterize groundwater resources on the site and within 500 m of the property. Field testing included a geological drilling program, in-situ hydraulic testing and water levels monitoring through the installation of Solinst Leveloggers. The study focused on assessing potential impacts to surrounding water well users and on-site wetlands and surface water system.
- *Water level Monitoring Program, Godfrey Pit*: Completed multi-year water level monitoring program of on-site monitoring wells for a below-water extraction sand and gravel pit. Water levels are measured manually quarterly and continuously through the installation of Solinst Leveloggers. Stream water levels and temperatures are also monitored in the adjacent Birdeye’s Creek. Preparation of an annual monitoring report to assess the hydrogeological conditions and potential for impacts for compliance with the ARA Site Plans.
- *Water level and Water Quality Monitoring Program, Schrama P*it: Completed multi-year water level and water quality monitoring program of on-site monitoring wells for a below-water extraction sand and gravel pit. Water levels are measured manually bi-annually and continuously through the installation of Solinst Leveloggers. Water quality samples are collected from on-site monitoring wells to assess for potential contamination from the adjacent Smith Waste Disposal Site. Preparation of an annual monitoring report to assess the hydrogeological conditions and potential for impacts for compliance with the ARA Site Plans.
- *Water Level Monitoring Program, Brighton Pit*: Completed multi-year water level monitoring program of on-site monitoring wells for a below-water extraction sand and gravel pit. Water levels are measured manually monthly. Stream water levels are also monitored in the adjacent Matson Lake Wetland. Preparation of an annual monitoring report to assess the hydrogeological conditions and potential for impacts for compliance for the PTTW and ARA Site Plans.
- *Water level and Water Quality Monitoring Program, Hillsburgh Pit*: Completed multi-year water level monitoring program of on-site monitoring wells for a below-water extraction sand and gravel pit. Water levels

are measured manually monthly and continuously through the installation of Solinst Leveloggers. Water quality samples are collected annually from on-site monitoring wells to monitor for potential contamination to the downgradient Hillsburgh Municipal Production wells. Preparation of an annual monitoring report to assess the hydrogeological conditions and potential for impacts for compliance with PTTW and the ARA Site Plans.

- *ARA Licence Amendment for Below Water Extraction and Above Ground Extension, Hillsburgh:* Completed hydrogeological assessment for both an amendment of the existing licence to extract below the water table and in support of above water extraction in new licence expansion areas.
- *Permit To Take Water, Colborne:* Conducted a long term (24 hour) constant rate pumping test on two additional industrial supply wells for an aggregate washing plant. The supply well was sourced from the two different deeper confined aquifer units; adjacent residential wells during the pumping test.
- *Permit To Take Water, Colborne:* Conducted a long term (72 hour) constant rate pumping test on an industrial supply well for an aggregate washing plant. The supply well was sourced from the unconfined aquifer; adjacent shallow residential wells and stream levels and flow in a groundwater fed creek were monitoring during the pumping test.
- *Aggregate Resources Investigation, Brockville:* Completed an aggregate resource inventory of a large property near Brockville. The inventory included numerous test pits to determine the depth of the resource and an assessment of the quantity and quality of the aggregate material.
- *ARA Licence Extension, Quarry Below Water, Wainfleet:* Conducted hydrogeological assessment including identifying groundwater resources in multiple bedrock aquifers, calculating extent of cone of drawdown in multiple aquifers from quarry dewatering and assessing impacts to nearby receptors (eg residential water wells and adjacent Provincially Significant Wetland complex). Hydrogeological assessment included geological investigations (boreholes), packer testing, aquifer pumping test and calculating aquifer properties based on the field testing. Represented client in numerous agency meetings and technical discussions with MOE, MNR, Niagara Peninsula Conservation Authority, Region of Niagara and Township of Wainfleet.
- *ARA Licence, Quarry Below Water, Flamborough:* Hydrogeological assessment to characterize groundwater resources on the site. Field testing included large geological drilling program, packer testing and multiple aquifer pumping tests to determine feasibility of dewatering the site and to monitor the response of aquifer testing in a nearby large Provincially Significant Wetland (PSW).
- *Permit To Take Water and C of A to Discharge for Quarry, Breccin:* Led a multi-disciplinary team of hydrogeologists, ecologists and engineers to conduct studies on whether it was technically feasible to dewater a quarry adjacent a large Provincially Significant Wetland (PSW). Studies included identifying groundwater flow in fractured bedrock, potential for connection of groundwater to adjacent surface water system (lake and PSW complex) and assessment of water quality of dewatering discharge into the lake/PSW. Liaised with the MOE during the field/monitoring program setup to ensure that technical issues and concerns were identified and monitored prior to the field program.
- *ARA Licence, Above Water Pit, Colborne:* Led a geological, hydrogeological, and ecological assessment for ARA Licence of a sand and gravel pit. Provided technical expertise for the geological and hydrogeological assessment. Conducted geological and groundwater investigations to determine aggregate reserves available above and below the water table. Identified nearby groundwater and surface water receptors and assessed potential for impacts. Liaised with numerous agencies and stakeholders regarding technical findings and approvals (MNR, CA, Township, Private Citizen’s Group). Attended and presented hydrogeological findings to the public and Town Council at Open House and Town Council meetings. Provided expert testimony in hydrogeology at Ontario Municipal Board (OMB) hearing regarding site application.
- *ARA Licence, Above Water Pit, Orangeville:* The study involved leading a hydrogeological and ecological assessment to support an ARA Licence for sand and gravel pit. Calculated available aggregate resources

above and below the water table. Identified nearby groundwater (wells) and surface water receptors (wetlands) and assessed potential for impacts. Liaised with numerous agencies and stakeholders regarding technical findings and approvals (MNR, Credit Valley Conservation, Town of Caledon). Attended multiple Open House and Town Council meetings and responded to hydrogeological concerns and issues from the public and Town Council.

- *Two ARA Licences, Below Water Pits, Aberfoyle:* The study involved two concurrent adjacent ARA Licences for sand and gravel pits with below water extraction. Led geological and hydrogeological assessments of both sites, and managed ecological staff on the project. Liaised with approval and review agencies (MOE, Grand River Conservation Authority, MNR) and the Township of Puslinch (including their technical peer-review consultant) for the applications. Conducted a cumulative effects assessment of the two proposed applications with multiple surrounding active sand and gravel pits to assess potential impacts to Mill Creek, a significant cold water fishery. Attended multiple Town Planning Committee and Town Council meetings to respond to hydrogeological questions and issues regarding the two applications.
- *ARA Licence Amendment, Brighton:* Provided the hydrogeological assessment to support an amendment for below water extraction from an existing pit. Issues arose regarding fish habitat in a headwater creek within a Locally Significant Wetland (LSW) adjacent the extraction area. Managed and worked closely with aquatic ecologists to determine the potential for an impact to aquatic habitat as a result of a loss in groundwater discharging to the wetland (groundwater/surface water interaction). Conducted long term monitoring program to determine the extent of groundwater discharge to the surface water system and the resulting implications to aquatic habitat. Held numerous discussions with MNR, Lower Trent Conservation Authority and DFO during the review and approval process.

LANDFILL COMPLIANCE MONITORING

- Compliance monitoring reports for over 40 waste disposal sites for various Municipalities. Water level and quality sampling of groundwater and surface water in and adjacent to landfills. Assessing leachate plume migration and mitigating for off-site impacts of leachate.
- *Municipal Landfill, Town of Georgina:* Long term groundwater and surface water monitoring of a closed landfill. Assessment of changes in leachate concentrations over time and throughout landfill and adjacent Provincially Significant Wetland. Authored annual compliance reports for the landfill to the Town.
- *Municipal (City of Oshawa) Landfill, Durham Region:* Assessed groundwater quality monitoring data obtained from Region staff. Authored monitoring report for compliance with C of A (Waste) for the closed landfill.
- *Municipal (Brock Township) Landfill, Durham Region:* Assessed groundwater quality monitoring data obtained from Region staff. Field investigations to install new monitoring wells at the downgradient edge of the waste and in adjacent wetland complex. Authored monitoring report for compliance with C of A (Waste) for active landfill.
- *Municipal (former Township of Eldon) Landfill, City of Kawartha Lakes:* Assessed groundwater and surface water quality monitoring data for an open, naturally attenuating landfill for compliance with Reasonable Use Concept. Site is situated within a complex site setting of overburden (esker) deposits overlying bedrock formations and surrounding large peat deposits. Natural setting has resulted in a complex water chemistry for the site with natural brine water in some of the bedrock formations and high concentrations of some metal and organic analytical parameters from the surrounding peat deposits mixing with leachate from the waste deposit. On-going studies at the site have included the installation of additional monitoring wells in the overburden for site characterization and mini-piezometers in the peat deposits to assess pore water chemistry from the peatlands.
- *Municipal (former Township of Emily) Landfill, City of Kawartha Lakes:* Assessed groundwater water quality monitoring data for a closed, naturally attenuating landfill for compliance with Reasonable Use Concept. The

site has an active leachate management system consisting of three purge wells to intercept leachate impacted groundwater, where this water is pumping to a wastewater lagoon for attenuation and stray irrigation system for disposal. Assessment at the site includes monitoring leachate propagation from the waste area, downgradient of the site in the overburden and bedrock deposits, and surrounding the leachate lagoon and stray irrigation fields. In addition, the site also hosts a Municipal Works Yard which includes salt storage where a salt plume has been identified in the downgradient groundwater system as a result of historical salt storage and handling operations.

TECHNICAL PEER REVIEW

- *Hydrogeological Peer Review, County of Renfrew:* Provided peer review services for numerous hydrogeological assessments including privately serviced subdivisions following Ministry D-5-4 and D-5-5 guidelines.
- *Hydrogeological Peer Review, Curve Lake First Nation:* Provided peer review for hydrogeological study of the Rockridge Quarry, Buckhorn, ON, on behalf of the Curve Lake First Nation.
- *Hydrogeological Peer Review, Pine Ridge Municipal Planning Association:* Provided peer review for hydrogeological study following the MOE D-5-4 and D-5-5 regulations for a privately serviced subdivision.
- *Hydrogeological Peer Review, County of Hastings:* Provided numerous technical reviews of hydrogeological studies for privately serviced subdivisions on behalf of the County.

EXPERT WITNESS

- Retained as an expert witness in hydrogeology at an LPAT hearing for a proposed sand and gravel pit in Hillsburgh, ON.
- Appeared as an expert witness in hydrogeology at an Ontario Municipal Board hearing for a proposed commercial expansion in the Township of King (Snowball).
- Appeared as an expert witness in wetland soils at a Provincial Court hearing in regard to the alleged filling of a wetland, Town of Milton, Halton Region.
- Appeared as an expert witness in hydrogeology at an Ontario Municipal Board hearing for a proposed sand and gravel pit in Colborne, ON.
- Represented adjacent quarry operator as an expert witness in hydrogeology at an Ontario Municipal Board hearing for a proposed quarry site in Wainfleet, ON.

Ontario

Bulletin

Ministry of Northern Development, Mines, Natural Resources and Forestry

Watershed Conditions Statement - Flood Outlook

Parry Sound District

Including Muskoka River, Magnetawan River and Pickerel River Watersheds

Friday, September 24, 2021
3:00 pm

The Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF) – Parry Sound District is advising area residents that a Watershed Conditions Statement - Flood Outlook is in effect until Tuesday September 28, 2021. This message will affect residents within the NDMNRF Parry Sound District which includes the District Municipality of Muskoka, the Territorial District of Parry Sound and a north-west portion in the County of Haliburton.

With recent rainfall the banks and shorelines adjacent to water bodies can become extremely slippery and unstable. Residents and visitors should exercise caution while around waterbodies and maintain close supervision of children and pets.

Minor flooding within flood prone areas is possible.

NDMNRF also advises extreme caution when using forest access roads for outdoor activities as they may become inundated with water, are prone to washouts and may become impassible due to localized flooding.

Residents are reminded to keep a close watch on conditions and regularly check for updated messages.

TECHNICAL INFORMATION

Description of Weather System

The Muskoka and Parry Sound area has received widespread significant rainfall since September 21st, 2021. Another 10mm to 20mm of rain is forecasted through the weekend.

Description of Current Conditions.

Water levels and river flows are currently higher than normal for this time of year.

Water levels and river flows are expected to remain high through the weekend and into next week.

Minor flooding within flood prone areas is possible. Residents within flood prone areas are encouraged to monitor conditions and prepare accordingly.

The ministry is closely monitoring the weather and developing watershed conditions. Further updates will be issued as appropriate.

DEFINITIONS

- **WATERSHED CONDITIONS STATEMENT – WATER SAFETY:** indicates that high flows, melting ice or other factors could be dangerous for such users as boaters, anglers and swimmers but flooding is not expected.
- **WATERSHED CONDITIONS STATEMENT – FLOOD OUTLOOK:** gives early notice of the potential for flooding based on weather forecasts calling for heavy rain, snow melt, high winds or other conditions
- **FLOOD WATCH**: potential for flooding exists within specific watercourses and municipalities
- **FLOOD WARNING:** flooding is imminent or occurring within specific watercourses and municipalities.

LEARN MORE

- Surface Water Monitoring Centre public webpage www.ontario.ca/flooding
- Environment Canada bulletins: www. weather.gc.ca
- A close watch on local conditions and weather forecasts from Environment Canada is recommended.

Water Management Department, Parry Sound District Office
705-646-5531 or watermanagement.psdistrict@ontario.ca

THE CORPORATION OF THE MUNICIPALITY OF MCDOUGALL

2022 COMMITTEE/COUNCIL SCHEDULE

JANUARY 12, 2022

FEBRUARY 16, 2022

MARCH 2, 2022 - BUDGET

MARCH 16, 2022

APRIL 6, 2022

APRIL 20, 2022

MAY 4, 2022

MAY 18, 2022

JUNE 1, 2022

JUNE 15, 2022

JULY 13, 2022

AUGUST 17, 2022

SEPTEMBER 7, 2022

SEPTEMBER 21, 2022

OCTOBER 5, 2022

OCTOBER 19, 2022

NOVEMBER 16, 2022

DECEMBER 7, 2022

DECEMBER 21, 2022

Place: Municipal Council Chambers, 5 Barager Boulevard, McDougall, Ontario, P2A 2W9. (Unless otherwise stated)

Time: Seven O’clock in the evening (7:00 p.m.) (unless otherwise stated).

The Municipality of McDougall EST. 1872

2022 MUNICIPAL HOLIDAY SCHEDULE

	HOLIDAY	MUNICIPAL OFFICE	TRANSFER STATION	LANDFILL	PUBLIC WORKS	WATER WORKS
	New Years Day Saturday, January 1	Closed	Closed	Closed	Closed	Closed
	Family Day Monday February 21	Closed	Closed	Closed	Closed	Closed
EASTER WEEKEND	**Good Friday** April 15	Closed	Closed	Closed	Closed	Closed
	Easter Saturday April 16	Closed	Open	Closed	Closed	Closed
	Easter Sunday April 17	Closed	Closed	Closed	Closed	Closed
	Easter Monday April 18	Closed	Open	Open	Closed	Closed
	Victoria Day Monday May 23	Closed	Open	Closed	Closed	Closed
	Canada Day Friday July 1	Closed	Closed	Closed	Closed	Closed
	Civic Holiday Monday August 1	Closed	Open	Closed	Closed	Closed
	Labour Day Monday September 5	Closed	Open	Closed	Closed	Closed
	Thanksgiving Day Monday October 10	Closed	Closed	Closed	Closed	Closed
	Remembrance Day Friday November 11	Closed	Closed	Closed	Closed	Closed
CHRISTMAS SHUTDOWN	**Christmas Eve** Saturday December 24	Closed	Open	Closed	Closed	Closed
	Christmas Day Sunday December 25	Closed	Closed	Closed	Closed	Closed
	Boxing Day Monday December 26	Closed	Closed	Closed	Closed	Closed
	Tuesday December 27	Closed	Open	Open	Closed	Closed
	Wednesday December 28	Closed	Closed	Open	Open	Open
	Thursday December 29	Closed	Closed	Open	Open	Open
	Friday December 30	Closed	Open	Open	Open	Open
	Saturday December 31	Closed	Open	Closed	Closed	Closed
	New Year's Day Sunday January 1, 2023	Closed	Closed	Closed	Closed	Closed

FONOM
Federation of Northern Ontario Municipalities

September 23, 2021

Minister Peter Bethlenfalvy
Ministry of Finance
7 Queen's Park Crescent, 7th floor
Toronto, Ontario M7A 1Y7
SENT BY EMAIL: peter.bethlenfalvy@pc.ola.org

Dear Minister Bethlenfalvy:

On behalf of the Board of the Federation of Northern Ontario Municipalities (FONOM), I would like to thank you for meeting with us during the AMO Conference. Someday soon, it will be nice to sit across the table from you.

FONOM's mission is to improve the quality of life for all Northeastern Ontario citizens and ensure the future of our youth. As the unified voice for the people of Northeastern Ontario municipalities. We believe that having access to new revenue tools will help us with our mission. As we do not think with the challenges on the horizon, our reliance on property tax is sustainable for communities in the Northeast.

Below is a Resolution passed at the most recent FONOM Board meeting, and we would ask you and your colleagues to consider our request in your Party's Campaign Platform.

FONOM is an association of some 110 districts/municipalities/cities/towns in northeastern Ontario mandated to work for the betterment of municipal government in Northern Ontario and to strive for improved legislation respecting local government in the north. It is a membership-based association that draws its members from northeastern Ontario and is governed by an 11-member board.

Sincerely,

Danny Whalen
President

Cc: Andrea Horwath
Steven Del Duca
Graydon Smith (AMO)
Wendy Landry (NOMA)
Lynn Dollin (OSUM)
Jeff Lehman (OBCM)

FONOM
Federation of Northern Ontario Municipalities

September 23, 2021

Whereas the Association of Municipalities of Ontario (AMO) estimates the annual province-wide municipal infrastructure deficit to be $6 billion dollars;

And Whereas the City of Toronto Act, 2006 granted Toronto broader municipal revenue tools than the other 443 municipalities;

And Whereas the AMO has long lobbied for its members the right to access the same revenue tools permitted by the City of Toronto Act;

And Whereas one of the revenue tools the City of Toronto charges and collects is a Municipal Land Transfer Tax (MLTT) in parallel with the Province of Ontario for all property sales, except for first-time homebuyers;

And Whereas in 2020 the City of Toronto received $800 million from the Municipal Land Transfer Tax; this offset represents 15% of their annual revenue (page 28 of the 2021 Budget) and this revenue tool would generate nearly $2.68 billion dollars for the other Ontario Municipalities, which would help municipalities' growing infrastructure deficit;

And Whereas Federation of Northern Ontario Municipalities believes MLTT be renamed **Land Transfer Infrastructure Support (LTIS);**

Therefore Be It Resolved that the Federation of Northern Ontario Municipalities ask the Association of Municipalities of Ontario (AMO) to lobby the Premier of Ontario to grant Ontario Municipalities the same Municipal Revenue Tools as the City of Toronto.

Further Be It Resolved that an electronic copy of this Resolution be shared with the Provincial Minister of Finance Peter Bethlenfalvy, the Leaders of the Provincial Oppositions, the Ontario's Big City Mayors, ROMA, OSUM, and NOMA

615 Hardy Street North Bay, ON P1B 8S2 Tel: (705) 478-7672
Email: fonom.info@gmail.com Website: www.fonom.org

From: FONOM Office/ Bureau de FONOM
Subject: Consolidation of Agencies to address the Opioid, Mental Health and Addiction Crisis
Date: Wednesday, September 29, 2021 6:41:03 AM
Attachments: Resolution - Consolidation of Agencies to address the Opioid, Mental Health and Addiction Crisis.docx

Good day

During the AMO Conference, FONOM/NOMA/NOSDA participated together in a Multi Minister Delegation on the issue of Mental Health, Homelessness, and the Opioid Crisis. The attached Resolution comes from that Delegation. We would ask that you share this Resolution with your Council and Senior Management Team. In addition, we would ask your Council to consider personalizing the Resolution and supporting it at a future meeting.

A FONOM Board member, a member of your local DSSAB Board, or the FONOM Office would clarify any questions you may have.

Talk soon, Mac

Mac Bain
Executive Director
The Federation of Northern Ontario Municipalities
615 Hardy Street North Bay, ON, P1B 8S2
Ph. 705-498-9510

P.S. FONOM GoNorth Promotional Videos

https://www.youtube.com/watch?v=C3FQKMBzS6E **NEW**

https://www.youtube.com/watch?v=1_q0PBPCPZQ&authuser=0
https://www.youtube.com/watch?v=X81-vtsgs0w

https://www.youtube.com/watch?v=LUeGyXL2AXk

www.youtube.com/watch?v=qkEeQSnLHnA

https://www.youtube.com/watch?v=DLV-SUC1J9c

https://www.youtube.com/watch?v=7rIrqgxng-0

WHEREAS Communities across the province are addressing an intensified social crisis and Northern Ontario is no different. We recognize that creating solutions will require a multi-ministry approach but if there are lessons to be learned from this pandemic, what were once cracks in the health care foundation, there are now large gaps forming especially around mental health, addictions, and homelessness;

WHEREAS Northern Ontario has significant challenges when it comes to accessing mental health and addictions services for our people in our communities;

WHEREAS over 300 Child care staff who provide services to over 21,000 licenced child care spaces in over 340 locations across the North and they see the effects of Mental Health and Addictions every day in the children they care for and the parents they support;

WHEREAS, the defined area of Northern Ontario is over 800,000 square kilometres. Also, annually over 500 Social Services staff provide financial and employment assistance to over 15,000 families in 37 delivery sites across the North. Over 300 Community Housing staff provide safe and affordable housing to over 17,000 families in the North. In addition, there are many Police Officers and over 900 paramedics who responded to 200,000 medical emergency 911 calls. Paramedics have seen the direct results of the Mental Health and Addictions crisis in the North and some cases becoming ill themselves trying to cope with what they have seen;

WHEREAS FONOM appreciates the efforts of all the agencies that are working to help and support those addicted to opioids. In some districts, over 30 agencies are providing some assistance. But we would like to see consolidation of these agencies with the input of Municipalities/DSSAB's and local stakeholders. As we believe, a streamlined agency would be able to put the combined funds to better use;

THEREFORE BE IT RESOLVED that FONOM ask that our Northern Ontario Health Teams, in consultation with Municipalities/DSSAB's and local stakeholders, support a province-wide strategy that supports such consolidation;

FUTHER BE IT RESOLVED that a copy of this Resolution to be shared with Premier Ford, Christine Elliott the Minister of Health, Michael Tibollo the Associate Minister of Mental Health and Addictions, the Leaders of the Provincial Oppositions, and the Association of Municipalities of Ontario (AMO).

THE CORPORATION OF THE CITY OF SARNIA
City Clerk's Department
255 Christina Street N. PO Box 3018
Sarnia ON Canada N7T 7N2
519-332-0330 (phone) 519-332-3995 (fax)
519-332-2664 (TTY)
www.sarnia.ca clerks@sarnia.ca

September 17, 2021

Honourable Doug Ford
Premier of Ontario
Legislative Building
Queen's Park
Toronto ON M7A 1A1

Dear Premier,

RE: Renovictions

At its meeting held on September 13, 2021, Sarnia City Council adopted the following resolution with respect to "Renovictions":

That Sarnia City Council request that the Government of Ontario take additional and meaningful steps to address the ever increasing problem of ***"Renovictions" in The Province of Ontario. Citizens and communities are*** *hurt by these unscrupulous practices which can and does directly impact the affordable housing crisis, as well as inflict damage (both financially and mentally) particularly on our most vulnerable citizens; and*

That this correspondence also be sent to other Municipalities in Ontario for their consideration and possible endorsement.

Your consideration of this matter is respectfully requested.

Yours sincerely,

Amy Burkhart
City Clerk

Cc: The Honourable Doug Downey, Attorney General
Bob Bailey, MPP
All Ontario Municipalities

North Bay Parry Sound District Health Unit
Bureau de santé du district de North Bay-Parry Sound

NEWS RELEASE

For immediate release: September 21, 2021

Protect Yourself from West Nile Virus and Eastern Equine Encephalitis

NIPISSING & PARRY SOUND, ON – Although it is almost fall, the North Bay Parry Sound District Health Unit (Health Unit) is advising residents to continue to protect themselves from mosquito bites.

Health Unit staff have been routinely monitoring mosquito pools in various locations across our district and within the month of September, two mosquito pools have tested positive with a virus, one with West Nile Virus (WNV), and another with Eastern Equine Encephalitis Virus (EEE). In both cases, the mosquitoes were from pools located within the District of Parry Sound. No human cases have been reported in the Health Unit district.

It has been approximately seven years since a mosquito tested positive for WNV in the Health Unit district, and ten years since a mosquito tested positive for the EEE virus. Mosquitoes acquire viruses such as WNV and EEE by feeding on infected birds. The virus is spread to humans and other mammals through the bite of an infected mosquito. It is not spread from other animals.

The Health Unit recommends that people use simple personal protective measures to reduce the risk of illness due to bites from infected mosquitoes:

- Take extra care when spending time outdoors between dusk and dawn, when mosquitoes are most active.
- Eliminate any standing water so mosquitoes cannot breed.
- Wear light-coloured clothing, including long-sleeves, pants, socks and shoes.
- Apply insect repellent containing DEET sparingly to clothing and exposed skin areas, following recommendations by Health Canada and the Canadian Paediatric Society.
- Install or repair window and door screens so that mosquitoes cannot get indoors.

Symptoms of WNV usually appear within 2 to 15 days after infection. Most individuals (70% to 80%) infected with WNV have no symptoms. Mild symptoms of WNV can include fever, headache, body aches, a mild rash, and swollen lymph nodes. Serious symptoms can include rapid onset of a severe headache, high fever, stiff neck, nausea or vomiting, confusion and paralysis. Some severe cases can be fatal.

Symptoms of the EEE virus usually appear 4 to 10 days after infection, and some individuals may not develop symptoms. Mild symptoms include flu-like illness with fever, headache, a stiff neck, muscle aches and confusion. Severe cases include swelling of the brain (encephalitis) and can lead to coma, convulsions and death.

If you experience a sudden onset of any symptoms, seek medical attention. While there is no treatment or vaccine for WNV or EEE, symptoms can be treated.

Visit myhealthunit.ca for more information on how to protect yourself from a mosquito bite.

-30-

Media Inquiries:
Catherine Levac-Lafond, Bilingual Media Relations Coordinator
P: 705-474-1400, ext. 5221 or 1-800-563-2808
E: communications@healthunit.ca

North Bay Parry Sound District
Health Unit
Bureau de santé
du district de North Bay-Parry Sound

NEWS RELEASE

For immediate release: September 29, 2021

Public Health Officials across Northern Ontario increase COVID-19 protection for all users of indoor sporting facilities

NORTHERN ONTARIO, ON – Northern Ontario Medical Officers of Health continue to put the health and safety of residents first. Effective October 14, operators of facilities in Northern Ontario where indoor sports are played or practiced will ensure additional groups provide proof of vaccination against COVID-19. Northern Ontario's seven Medical Officers of Health have issued instructions to facility operators under the Reopening Ontario Act requiring anyone aged 12 and older coaching, officiating, or volunteering at indoor organized sports to provide proof of vaccination unless a medical exemption applies.

Activities related to organized sports have the potential to increase COVID-19 transmission. Specifically, close contact, heavy breathing, long exposure times, crowded indoor spaces, and masks removed during physical activity, all contribute to increased risk of COVID-19 transmission. Requiring more groups to be protected with COVID-19 vaccinations will help reduce this risk while maintaining opportunities for sport.

Currently, the Province of Ontario requires proof of vaccination for all those 12 and older entering indoor sport and recreational fitness facilities but exempts those under 18 who enter only to participate in an organized sport. As per the provincial guidance, the requirements do not apply to workers or volunteers, including coaches and officials.

Under the letters sent today, northern Medical Officers of Health are instructing facility operators to require those aged 12 and older who coach, officiate, or volunteer at indoor organized sports to show proof of vaccination.

Northern Ontario Medical Officers of Health advise that we are currently in the fourth wave of the COVID-19 pandemic, with the highly transmissible Delta variant the dominant strain causing COVID-19 cases. The benefits of physical activity and socializing are critical to residents' well-being. Requiring proof of vaccination for those who support organized sport will help to keep sports running and protect all those participating.

Many local organized sports groups and teams participate in travel across Northern Ontario. As all seven Northern Ontario public health units are implementing the same requirement, there will be a consistent approach to vaccine requirements to help reduce the risk of spread and keep communities safe.

Proof of vaccination is not currently required for those aged 12 to 17 who actively participate in organized sports. However, the Northern Ontario Medical Officers of Health will continue to monitor the local COVID-19 situation and adjust instructions as needed. Everyone aged 12 and over is strongly encouraged to get vaccinated against COVID-19 as soon as possible. Municipalities, businesses, and organizations across the region are strongly recommended to develop and implement COVID-19 vaccination policies.

For more information or if you have questions, please call your local public health unit or visit their website.

-30-

Medical Officers of Health from Northern Ontario

Dr. Penny Sutcliffe, Medical Officer of Health, Public Health Sudbury & Districts

Dr. Jennifer Loo, Medical Officer of Health, Algoma Public Health Unit

Dr. Jim Chirico, Medical Officer of Health, North Bay Parry Sound District Health Unit

Dr. Glenn Corneil, Acting Medical Officer of Health, Timiskaming Health Unit

Dr. Lianne Catton, Medical Officer of Health, Porcupine Health Unit

Dr. Kit Young-Hoon, Medical Officer of Health, Northwestern Health Unit

Dr. Janet DeMille, Medical Officer of Health, Thunder Bay District Health Unit

Media Inquiries:

Alex McDermid, Public Relations Specialist
P: 705-474-1400, ext. 5221 or 1-800-563-2808
E: communications@healthunit.ca

North Bay Parry Sound District
Health Unit
Bureau de santé
du district de North Bay-Parry Sound

PUBLIC SERVICE ANNOUNCEMENT

For immediate release: September 20, 2021

Mobile and Walk-in COVID-19 Vaccine Clinics to be Held September 20 to 25

NIPISSING & PARRY SOUND, ON – The North Bay Parry Sound District Health Unit (Health Unit) will be holding COVID-19 vaccine clinics this week throughout the Health Unit district. Individuals who wish to receive a first or second dose are invited to walk in without an appointment and should bring a health card or other form of identification, if possible. Individuals eligible for a third dose can also attend clinics if they have the required documentation, as well as identification. Clinics will offer both Pfizer and Moderna vaccines.

Clinics this week include:

Parry Sound

- Monday, Sept. 20 at Georgian Bay Travel Centre (1 Horseshoe Lake Rd., Parry Sound) from 1 p.m. to 5 p.m.

North Bay

- Tuesday, Sept. 21 at Canadian Tire (890 McKeown Ave., North Bay) from 4 p.m. to 7 p.m.
- Wednesday, Sept. 22 at North Bay Mall (300 Lakeshore Dr., North Bay) from 3 p.m. to 6 p.m.
- Thursday, Sept. 23 at Elks Lodge (325 Elks Ln., North Bay) from 4 p.m. to 8 p.m.

Emsdale

- Friday, Sept. 24 at Emsdale Community Centre (20 Joseph St., Emsdale) from 10 a.m. to 11 a.m.

Burk's Falls

- Friday, Sept. 24 at Burk's Falls Municipal Office (172 Ontario St., Burk's Falls) from 1 p.m. to 2:30 p.m.

Carling

- Saturday, Sept. 25 at Carling Township Office (2 Carling Bay Rd., Carling) from 10 a.m. to 11:30 a.m.

-30-

Media Inquiries:

Catherine Levac-Lafond, Bilingual Media Relations Coordinator
P: 705-474-1400, ext. 5221 or 1-800-563-2808
E: communications@healthunit.ca

North Bay Parry Sound District Health Unit
Bureau de santé du district de North Bay-Parry Sound

PUBLIC SERVICE ANNOUNCEMENT

For immediate release: September 27, 2021

Mobile and Walk-in COVID-19 Vaccine Clinics to be Held September 27 to October 3

NIPISSING & PARRY SOUND, ON – The North Bay Parry Sound District Health Unit (Health Unit) will be holding COVID-19 vaccine clinics this week throughout the Health Unit district. Individuals who wish to receive a first or second dose are invited to walk in without an appointment and should bring a health card or other form of identification, if possible. Individuals eligible for a third dose can also attend clinics if they have the required documentation, as well as identification. Clinics will offer both Pfizer and Moderna vaccines.

Clinics this week include:

Parry Sound:

- Tuesday, Sept. 28 at Bobby Orr Community Centre (7 Mary St., Parry Sound) from 4 p.m. to 7 p.m.

North Bay:

- Sunday, Oct. 3 at Elks Lodge (325 Elks Ln., North Bay) from 1 p.m. to 5 p.m.

Sturgeon Falls:

- Wednesday, Sept. 29 at Marcel Noel Hall (219 O'Hara St., Sturgeon Falls) from 4 p.m. to 7 p.m.
- Friday, Oct. 1 at Caisse Alliance (241 King St., Sturgeon Falls) from 9:30 a.m. to noon

Redbridge:

- Friday, Oct. 1 at Phelps Community Centre (9321 Hwy 63, Redbridge) from 4 p.m. to 6 p.m.

Kearney:

- Saturday, Oct. 2 at Royal Canadian Legion (58 Park Rd., Kearney) from 1 p.m. to 3 p.m.

The mobile clinic planned for September 30 at the Metro and Value Village parking lot in North Bay has been cancelled.

To stay up to date with upcoming clinics, visit myhealthunit.ca/GetVaccinated.

-30-

Media Inquiries:

Catherine Levac-Lafond, Bilingual Media Relations Coordinator
P: 705-474-1400, ext. 5221 or 1-800-563-2808
E: communications@healthunit.ca

North Bay Parry Sound District
Health Unit
Bureau de santé
du district de North Bay-Parry Sound

NEWS RELEASE

For immediate release: September 23, 2021

Vaccine Certificate Questions? Call the Health Unit.

NIPISSING & PARRY SOUND, ON - Effective September 22, 2021, Ontario has implemented a COVID-19 Vaccine Certificate program for many non-essential businesses. Individuals can access their certificate online by going to Ontario.ca/ProofOfVaccination, or by visiting the Health Unit's website. Individuals who require assistance downloading or printing their vaccine certificate, also referred to as a vaccine receipt, can call the Health Unit's call centre at 1-844-478-1400. We ask that you do not walk-in without calling to have your receipt printed, as front reception cannot accommodate the request due to work capacity.

Businesses requiring proof of vaccination include:

- Indoor areas of restaurants, bars, and other food and drink establishments without dance facilities.
- Indoor and outdoor areas of food or drink establishments with dance facilities, including nightclubs, restoclubs, and other similar establishments.
- Indoor areas of meeting and event spaces with limited exceptions.
- Indoor areas of facilities used for sports and recreational fitness activities, including waterparks, and personal physical fitness training with limited exemptions;
    - Includes gyms, fitness/sporting/recreational facilities, pools, leagues, sporting events, waterparks, and indoor areas of facilities where spectators watch events.
- Indoor areas of casinos, bingo halls, and other gaming establishments.
- Indoor areas of concert venues, theatres, and cinemas.
- Indoor areas of bathhouses, sex clubs and strip clubs.
- Indoor areas of horse racing tracks, car racing tracks and other similar venues.
- Indoor areas where commercial film and TV productions take place with studio audiences.

Although some of the receipts do have watermarks, watermark is not required. Businesses must verify if the receipt is either:

- An Ontario receipt issued at the time of vaccination or downloaded after.
- A receipt signed by an Indigenous Health Provider OR
- A receipt from another jurisdiction that shows the holder is fully vaccinated against COVID-19.

For more information on the COVID-19 Vaccine Certificate program visit www.myhealthunit.ca.

-30-

Media Inquiries:
Alex McDermid, Public Relations Specialist
P: 705-474-1400, ext. 5221 or 1-800-563-2808
E: communications@healthunit.ca

North Bay Parry Sound District Health Unit
Bureau de santé du district de North Bay-Parry Sound

PUBLIC SERVICE ANNOUNCEMENT

For immediate release: September 10, 2021

Health Unit Warns of Potential Exposure to COVID-19 at The Boat in North Bay

NORTH BAY, ON – The North Bay Parry Sound District Health Unit (Health Unit) is advising the public of a potential exposure to COVID-19 at the restaurant and bar The Boat located at 225 Memorial Drive in North Bay between 11 p.m. on Friday, September 3, and 1:30 a.m. on Saturday, September 4, 2021.

If you have attended The Boat during that timeframe, you should self-monitor for symptoms for at least ten days following the time of exposure (until after September 14, 2021). If you develop COVID-19 symptoms, self-isolate immediately and arrange to get tested at an assessment centre. It is also recommended that you avoid visiting very elderly or immune-compromised individuals until after September 14, 2021.

The Health Unit reminds the public that vaccination against COVID-19 is a safe, effective way to protect yourself and your loved ones against the virus. Individuals wishing to get vaccinated can visit one of the Health Unit's mobile clinics. No appointments are required.

For more information, visit www.myhealthunit.ca.

-30-

Media Inquiries:

Catherine Levac-Lafond, Bilingual Media Relations Coordinator
P: 705-474-1400, ext. 5221 or 1-800-563-2808
E: communications@healthunit.ca

THE CORPORATION OF THE MUNICIPALITY OF MCDOUGALL BY-LAW NO. 2021-44

Being a By-law to appoint a Fire Chief for the Municipality of McDougall and to rescind By-law 2003-11.

WHEREAS Section 6(1) of the Fire Prevention Act S.O. 1997 as amended, requires the Council of a Municipality to pass a by-law appointing a Fire Chief.

THEREFORE THE COUNCIL OF THE CORPORATION OF THE MUNICIPALITY OF MCDOUGALL ENACTS AS FOLLOWS:

1. That Patrick Shoebottom is hereby appointed as Fire Chief for the Municipality of McDougall

2. That By-law 2003-11 is hereby rescinded.

3. This by-law shall come into force and take effect on the day of the final passing thereof.

READ a **FIRST** and **SECOND** time, this day of , 2021.

Mayor Clerk

READ a **THIRD** time, **PASSED**, **SIGNED** and **SEALED** this this day of , 2021.

Mayor Clerk

CORPORATION OF THE MUNICIPALITY OF McDOUGALL

BY-LAW NO. 2021-45

A By-law to deem certain lots in the Municipality of McDougall not to be a part of a registered Plan of Subdivision (Plan M-215) (Parejo)

WHEREAS Section 50(4) of the Planning Act, R.S.O. 1990, C.P. 13, as amended, authorizes Councils of local municipalities to pass By-laws designating any part of a Plan of Subdivision that has been registered for eight years or more to be deemed not to be a registered Plan of Subdivision for the purposes of Section 50 (3) of the Planning Act:

AND WHEREAS Plan M-215 fronting Squirrel Avenue has been registered for more than eight years;

AND WHEREAS the owner of Lot 128 and Lot 130 of Plan M-215 would like to merge these two lots.

AND WHEREAS there is no objection to the merging of the subject lots;

NOW THEREFORE, the Council of the Corporation of the Municipality of McDougall,

ENACTS AS A BY-LAW OF THE CORPORATION AS FOLLOWS:

1. That Lots 128 and Lot 130 of Plan M-215, in the Municipality of McDougall, formerly the Township of McDougall, District of Parry Sound are deemed not to be lots within a registered Plan of Subdivision for the purposes of Section 50 (3) of the Planning Act.

2. The Clerk is hereby authorized and directed to lodge a copy of this by-law with the Minister of Municipal Affairs and Housing.

3. This By-law shall take effect and come into force upon the registration of a certified copy of the by-law in the Parry Sound Land Registry Office.

READ a **FIRST** and **SECOND** time this ____ day of _________, 2019.

MAYOR CLERK

READ a **THIRD** time, **PASSED, SIGNED** and **SEALED**, this ____ day of ___________, 2019.

MAYOR CLERK

THE CORPORATION OF THE MUNICIPALITY OF MCDOUGALL

BY-LAW NO 2021-46

Being a by-law to enter into an agreement with Stephen Harrison as a condition of approval of Consent No. B44/2020 (McD) *Harrison*

WHEREAS pursuant to Section 224, of the Municipal Act S.O.2001, as amended, it is the role of Council to represent the public and to consider the well-being and interests of the municipality, and to develop and evaluate the policies and programs of the municipality, to determine which services the municipality provides;

AND WHEREAS Section 51(26) of the Planning Act authorizes municipalities to enter into agreements as a condition of approval of a consent;

AND WHEREAS Council deems it appropriate to enter into the attached agreement with Stephen Harrison as a condition of approval of consent No. B44/2020 (McD);

NOW THEREFORE the Council of the Corporation of the Municipality of McDougall enacts as follows:

1. The terms of the attached agreement between the Corporation of the Municipality of McDougall and Stephen Harrison are hereby approved and that the Mayor and the Clerk are authorized to execute the said agreement on behalf of the Municipality.

2. This By-law shall come into effect on the day of final passing.

READ a **FIRST** and **SECOND** time this day of 2021.

Mayor

Clerk

READ a **THIRD** time, **PASSED**, **SIGNED** and **SEALED** this day of 2021.

Mayor

Clerk

CONSENT AGREEMENT

THIS AGREEMENT made in triplicate this _______ day of _______________, 2021.

BETWEEN: STEPHEN HARRISON

hereinafter called the "Owner" of the First Part

-and-

THE CORPORATION OF THE MUNICIPALITY OF McDOUGALL
hereinafter called the "Municipality" of the Second Part

WHEREAS Section 51(26) of the Planning Act authorizes municipalities to enter agreements as a condition of approval of a consent;

AND WHEREAS the Parry Sound Area Planning Board approved a consent for one (1) new waterfront lots on Manitouwabing Lake in Application No. B44/2020(McD);

AND WHEREAS the application was approved with a number of conditions including the requirement that the applicant enter into an agreement to fulfil the conditions;

NOWTHEREFORE, THIS AGREEMENT WITNESS THAT, in the consideration of other good and valuable consideration and the sum of One Dollar ($1.00) of lawful money of Canada now paid by the Municipality to the Owner, the receipt whereof is hereby acknowledged, the Owner and the Municipality, covenant, declare and agree as follows:

PART A – GENERAL

1. The lands to be bound by the terms and conditions of this Agreement referred to as "the subject lands" are located in the Municipality and more particularly described in Schedule 'A' hereto.

2. The Consent Development Plan is described on Schedule 'B' attached hereto and forms part of this Agreement.

3. The survey plan describing the severed land is plan 42R-21689.

4. This agreement shall be registered on title to the subject lands as provided for by Section 51(26) of the Planning Act, R.S.O. 1990, as amended, at the expense of the Owner.

5. This agreement will not be amended or removed from the title of the subject lands except where agreed upon by the Municipality and the Owner.

PART B – PURPOSE OF THE DEVELOPMENT

6. The Owner has applied for and received approval by the Parry Sound Area Planning Board under File No. B44/2020(McD) for a consent for one (1) new waterfront lot on Manitouwabing Lake.

PART C – ACCESS

7. The Owner hereby acknowledges and recognizes that the right-of-way being Parts 1 and 2 of Reference Plan No. 42R-21689 and providing access to the subject lands is a privately owned and maintained road.

8. That the private right-of-way is built to the Municipality's private right-of-way standards.

9. The Owner hereby covenants and agrees that the road is a private road.

10. The Owner hereby recognizes and agrees that the Municipality is not responsible or liable for the non-repair of the private roads identified in paragraph 7 above.

11. The Owner hereby understands that the Municipality may not be able to provide emergency services to the subject lands accessed by the private rights-of-way.

PART D – SEPTIC SYSTEM DESIGN REQUIREMENTS

12. Sewage disposal beds (either conventional septic tank tile field or Ontario Building Code approved filter beds, or tertiary treatment systems) be located at least 30 metres from the shoreline.

13. To the greatest extent possible, the lot owners and/or their contractors make use of onsite B horizon soils in constructing their leaching beds, owing to the high and beneficial capabilities of such soils to irreversibly complex phosphorus.

14. If more imported soil is required for the construction of the tile field, soil with a minimum phosphorus retaining capability of 500 mg/kg should be incorporated.

PART E – EROSION CONTROL

15. Any silt fence should be constructed of heavy material and solid posts to ensure its integrity and should be properly trenched in to maintain its integrity during weather events.

16. Straw bales and silt fence should be stock piled on site to be prepared for potential breaches in the silt and erosion control works

17. If they are installed, these works are to be maintained in good working order until the exposed soils have been greened up.

18. The Owner install effective sediment and erosion control measures prior to the exposure of any soil to prevent the entry of sediment into the lake, and inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

PART F - EXPENSES TO BE PAID BY THE OWNER

19. Every provision of this Agreement by which the Owner is obligated in any way shall be deemed to include the words "at the expense of the Owner" unless the context otherwise requires.

20. The Owner shall pay such reasonable fees as may be invoiced to the Municipality by its Solicitor, its Planner, and its Municipal Engineer in connection with all work to be performed as a result of the provisions of this Agreement.

PART G – INDEMNIFICATION FROM LIABILITY AND RELEASE

21. The Owner covenants and agrees with the Municipality, on behalf of itself, its successors and assigns, to indemnify and save harmless the Municipality, its servants and agents from and against any and all actions, suits, claims and demands whatsoever which may arise either directly or indirectly by reason of the negligent or unlawful performance of or failure to perform any work by the Owner or on his behalf in connection with the carrying out of the provisions of this Agreement provided that such default, failure or neglect was not caused as a result of negligence or breach of this Agreement on the part of the Municipality its servants or agents.

22. The Owner further covenants and agrees to release and forever discharge the Municipality from and against all claims, demands, causes of actions, of every nature and type whatsoever that may arise either as a result of the failure of the Municipality to carry out any of its obligations under this Agreement, or, as a result of the Municipality performing any municipal work on the said lands or the adjacent properties which may damage or interfere with the works of the Owner, provided that such default, failure or neglect was not caused as a result of negligence or breach of this Agreement on the part of the Municipality, its servants or agents.

PART H – ADMINISTRATION

23. The Owner acknowledges that this agreement is entered into under the provisions of Section 51(26) of the Planning Act, R.S.O. 1990, as amended and that any expense of the Municipality arising out of the administration and enforcement of this agreement may be recovered as taxes under Section 326 of the Municipal Act, 1990 as amended and further that the terms and conditions of this agreement may be enforced under conditional building permits under the Building Code Act and regulations thereunder.

24. The Owner and the Municipality acknowledge that the provisions of Section 67 of the Planning Act, R.S.O. 1990, as amended that provides that persons who contravene Section 51 and 52 of the Planning Act are liable on a first conviction to a fine of not more than twenty-five thousand dollars and on a subsequent conviction of not more than ten thousand dollars for each day or part thereof upon which the contravention has continued after the day in which the person was first convicted.

25. This agreement shall ensure to the benefit of and be binding upon the respective successors and assigns of each of the parties hereto.

26. This agreement shall come into effect on the date of execution by the Municipality and the Owner.

IN WITNESSETH WHEREOF the Municipality has caused their Corporate seal to be affixed over the signature of the respecting signing officers.

THE CORPORATION OF THE
MUNICIPALITY OF McDOUGALL

Date: ______________________

____
Mayor – Dale Robinson

____
Clerk- Lori West

Steve Harrison
____
Stephen Harrison

____
Witness - Pamela White
September 29 2021
as to signature of
Stephen Harrison

THIS IS SCHEDULE 'A' TO A CONSENT AGREEMENT BETWEEN STEVEN HARRISON AND THE CORPORATION OF THE MUNICIPALITY OF McDOUGALL

Part of PIN 52121-0335 being Part of Lot 1, Concession 11, Parts 1 & 2 of Reference Plan No. 42R-21689, geographic Township of McDougall now in the Municipality of McDougall

THIS IS SCHEDULE 'B' TO A CONSENT AGREEMENT BETWEEN STEPHEN HARRISON AND THE CORPORATION OF THE MUNICIPALITY OF McDOUGALL