CORPORATION OF THE CITY OF
CLARENCE-ROCKLAND
PLANNING COMMITTEE

September 5, 2019, 7:00 pm
Council Chambers
415 rue Lemay Street, Clarence Creek, Ont.

CORPORATION DE LA CITÉ DE CLARENCE-ROCKLAND

COMITÉ DE L'AMÉNAGEMENT

le 5 septembre 2019, 19 h 00
Salle du Conseil
415 rue Lemay Street, Clarence Creek, Ont.

Declaration of pecuniary interest
Déclaration d'intérêt pécuniaire

Date of meeting Date de la réunion:	
Item Number Numéro de l'item:	
Subject of the item: Sujet de l'item :	
Name of Council Member Nom du membre du conseil	

I, _________________________, hereby declare a pecuniary interest in the matter identified above for the following reason :

Je, _________________________, déclare un intérêt pécuniaire en ce qui concerne l'article ci-haut mentionné, pour la raison suivante :

Name (print)	Signature	Date

This declaration is filed in accordance with the *Municipal Conflict of Interest Act* and will be recorded in the meeting minutes and will be made available in a public registry. / Cette déclaration est soumise sous la *Loi sur les conflits d'intérêt municipaux* et sera enregistrée dans le procès-verbal de la réunion et sera disponible dans un registre public.

Excerpt from the Municipal Conflict of Interest Act, R.S.O. 1990, c. M.50

DUTY OF MEMBER

When present at meeting at which matter considered

5 (1) Where a member, either on his or her own behalf or while acting for, by, with or through another, has any pecuniary interest, direct or indirect, in any matter and is present at a meeting of the council or local board at which the matter is the subject of consideration, the member,

(a) shall, prior to any consideration of the matter at the meeting, disclose the interest and the general nature thereof;

(b) shall not take part in the discussion of, or vote on any question in respect of the matter; and

(c) shall not attempt in any way whether before, during or after the meeting to influence the voting on any such question. R.S.O. 1990, c. M.50, s. 5 (1).

Where member to leave closed meeting

(2) Where the meeting referred to in subsection (1) is not open to the public, in addition to complying with the requirements of that subsection, the member shall forthwith leave the meeting or the part of the meeting during which the matter is under consideration. R.S.O. 1990, c. M.50, s. 5 (2).

Extrait de la Loi sur les conflits d'intérêts municipaux, L.R.O. 1990, chap. M.50

OBLIGATIONS DU MEMBRE

Participation à une réunion où l'affaire est discutée

5 (1) Le membre qui, soit pour son propre compte soit pour le compte d'autrui ou par personne interposée, seul ou avec d'autres, a un intérêt pécuniaire direct ou indirect dans une affaire et participe à une réunion du conseil ou du conseil local où l'affaire est discutée, est tenu aux obligations suivantes :

a) avant toute discussion de l'affaire, déclarer son intérêt et en préciser la nature en termes généraux;

b) ne pas prendre part à la discussion ni voter sur une question relative à l'affaire;

c) ne pas tenter, avant, pendant ni après la réunion, d'influencer de quelque façon le vote sur une question relative à l'affaire. L.R.O. 1990, chap. M.50, par. 5 (1).

Exclusion de la réunion à huis clos

(2) Si la réunion visée au paragraphe (1) se tient à huis clos, outre les obligations que lui impose ce paragraphe, le membre est tenu de quitter immédiatement la réunion ou la partie de la réunion où l'affaire est discutée. L.R.O. 1990, chap. M.50, par. 5 (2).

CORPORATION OF THE

CITY OF CLARENCE-ROCKLAND

PLANNING COMMITTEE MEETING MINUTES

August 8, 2019
Council Chambers
415 rue Lemay Street, Clarence Creek, Ont.

PRESENT:	Mario Zanth, Chairperson Guy Desjardins, Mayor (ex-officio) Michel Levert, Councillor Ward 7 Sylvie Lalonde, Member Michel Talbot, Member Maryse St-Pierre, Deputy Clerk
ABSENT:	Carl Grimard, Councillor Ward 3

1. Opening of the meeting

The President opens the meeting at 7:00 pm.

2. Adoption of the agenda

RECOMMENDATION AME2019-14
Moved by Guy Desjardins
Seconded By Sylvie Lalonde

THAT the agenda be adopted as presented.

CARRIED

3. Declaration of pecuniary interests (none)

4. Adoption of the minutes

4.1 Minutes of March 6, 2019

RECOMMENDATION AME2019-15
Moved by Michel Levert
Seconded By Michel Talbot

THAT the minutes of the Planning Committee meeting of March 6, 2019 be adopted.

CARRIED

5. Planner's Statement

The planner's statement is presented.

6. Deferred Items (none)

7. Presentations / Reports

7.1 Zoning By-law Amendment – Monica Séguin, 2919 Old Highway 17, Unit 4 (#15)

a. Presentation

Marc Rivet, planning consultant for the City, presents the request for an amendment to the zoning by-law submitted by Monica Séguin, for 2919 Old Highway 17, Unit 4 (#15).

b. Committee/Public comments

Further to questions, Marc Rivet explains that no other exceptions for a recreational vehicle as a secondary residence have been made in this Zoning by-law.

Further to questions, Marc Rivet explains that requirements for septic tanks are under the South Nation Conservation authority.

Further to questions, Marc Rivet explains that septic tanks should comply with the Building Code and not the Zoning By-Law.

Gilles Séguin, 1319 Maxime Street, Gloucester, explains that his daughter had a discussion with the City staff on the way she shall connect her septic system.

Pierrette Lafrenière, 2919 Old Highway 17, explains that she is not against Mrs. Séguin's project but asks that this authorization be given to this lot only, because she does not want her area to become a campground.

Further to questions, Marc Rivet explains that according to the current By-law a recreational vehicle can be stored on a property, but can't be used for something else.

Jean-François Lemoyne, 2895 Old Highway 17, explains that he is not against the request, but he has concerns that it would create a precedent and that other recreational vehicles will be installed. He adds that he does not want this authorization to allow for recreational vehicle rentals such as Airbnb. Marc Rivet explains that it is possible to indicate a limit of recreational vehicles; however, further investigation is required regarding rentals. Michel Talbot explains that control of tenants belongs to the association.

Pierrette Lafrenière asks how this zoning amendment will impact the property value. Mayor Desjardins suggests contacting MPAC.

c. Recommendation

RECOMMENDATION AME2019-16
Moved by Sylvie Lalonde
Seconded By Michel Talbot

WHEREAS the Provincial Policy Statement and the Official Plan of the United Counties of Prescott and Russell permits limited residential development as well as development and site alteration including minor additions or passive non-structural uses which do not affect flood flows within flood areas; and

WHEREAS the applicant wishes to remove a dwelling damaged during the flooding with a recreational vehicle as a seasonal dwelling;

THAT the Planning Committee recommends to Municipal Council to approve the request for a Zoning by-law Amendment submitted by Mrs. Monica Séguin for the property located at 2919 Old Highway 17, Unit 4 (#15) in Rockland.

CARRIED

7.2 Amendment to Zoning By-Law – 1536 Lacasse Rd

a. Presentation

Nicolas Denis presents the application for Zoning By-law amendment submitted by Jean-Guy Giroux for 1536 Lacasse Road.

b. Committee/Public comments

Further to questions, Nicolas Denis explains that the subdivision process can't be completed at the same time.

c. Recommendation

RECOMMENDATION AME2019-17
Moved by Michel Levert
Seconded By Sylvie Lalonde

THAT the Planning Committee recommends to Council to amend Zoning By-law 2016-10 in order to change the zoning category for a portion of the subject property from, “Rural (RU) Zone” to “Rural – Exception 54 (RU-54) Zone”, as recommended by the Infrastructure and Planning Department.

CARRIED

9. Adjournment

The meeting is adjourned at 7:44 pm.

Mario Zanth, President	Maryse St-Pierre, Deputy Clerk

CORPORATION DE LA

CITÉ DE CLARENCE-ROCKLAND

PROCÈS-VERBAL DU COMITÉ D'AMÉNAGEMENT

le 8 août 2019
Salle du Conseil
415 rue Lemay Street, Clarence Creek, Ont.

PRÉSENT:	Mario Zanth, Président Guy Desjardins, Maire (ex-officio) Michel Levert, Conseiller Quartier 7 Sylvie Lalonde, Membre Michel Talbot, Membre Maryse St-Pierre, Greffière adjointe
ABSENT:	Carl Grimard, Conseiller quartier 3

1. Ouverture de la réunion

Le président ouvre la réunion à 19h.

2. Adoption de l'ordre du jour

RECOMMANDATION AME2019-14
Proposée par Guy Desjardins
Appuyée par Sylvie Lalonde

QUE l'ordre du jour soit adopté tel que présenté.

ADOPTÉE

3. Déclaration d'intérêts pécuniaires (aucune)

4. Adoption des procès-verbaux

4.1 Procès-verbal du 6 mars 2019

RECOMMANDATION AME2019-15
Proposée par Michel Levert
Appuyée par Michel Talbot

QUE le procès-verbal de la réunion du comité d'aménagement du 6 mars 2019 soit adopté.

ADOPTÉE

5. Énoncé de l'urbaniste

L'énoncé de l'urbaniste est présenté.

6. Items différés (aucun)

7. Présentations / Rapports

7.1 Amendement au règlement de zonage – Monica Séguin, 2919 Old Highway 17, Unité 4 (#15)

a. Présentation

Marc Rivet, urbaniste consultant pour la Cité, fait la présentation de la demande d'amendement au règlement de zonage soumise par Monica Séguin, pour le 2919 Vieille Route 17, Unité 4 (#15).

b. Commentaires du comité et du public

Suite aux questions, Marc Rivet explique qu'il n'y a aucune autre exception pour un véhicule récréatif à titre de résidence saisonnière dans le règlement de zonage.

Suite aux questions, Marc Rivet explique que les exigences relatives au système septique sont sous l'autorité de la Conservation de la Nation Sud.

Suite aux questions, Marc Rivet explique que les réservoirs septiques doivent répondre aux exigences du code du bâtiment et non au règlement de zonage.

Gilles Séguin, 1319 rue Maxime, Gloucester, explique que sa fille a eu une discussion avec le personnel de la Cité sur la façon qu'il faut connecter son système septique.

Pierrette Lafrenière, 2919 Vieille Route 17, explique qu'elle n'est pas contre le projet de Mme Séguin, mais demande que cette autorisation soit donnée pour ce lot seulement, car elle ne veut pas que son secteur devienne un terrain de camping.

Suite aux questions, Marc Rivet explique qu'aux termes du règlement actuel, une roulotte peut être entreposée sur une propriété, mais ne peut être utilisée autrement.

Jean-François Lemoyne, 2895 Vieille Route 17, explique qu'il est d'accord avec la demande, mais qu'il est inquiet de la création d'un précédent et que d'autres roulottes s'installent. Il ajoute qu'il ne veut pas que cette autorisation crée la possibilité pour les gens de louer la roulotte comme sur Airbnb. Marc Rivet explique qu'il est possible de limiter le nombre de roulottes, mais qu'il faudra investiguer relativement à la location. Michel Talbot explique que le contrôle des locataires appartient à l'association.

Pierrette Lafrenière demande qu'est-ce qui arrive avec la valeur de la propriété. Le maire Desjardins suggère de contacter la SÉFM.

c. Recommandation

RECOMMANDATION AME2019-16
Proposée par Sylvie Lalonde
Appuyée par Michel Talbot

ATTENDU QUE la Déclaration de principes provinciale et le Plan officiel des Comtés unis permettent un aménagement résidentiel limité et autorisent des utilisations non structurelles qui n'ont pas d'effet sur le débit de crue en zone d'inondation; et

ATTENDU QUE le requérant désire remplacer une maison unifamiliale endommagée par les inondations avec un véhicule récréatif comme résidence saisonnière;

QUE le Comité d'aménagement recommande au Conseil municipal d'approuver la demande de modification au règlement de zonage soumis par Mme Monica Séguin pour la propriété située au 2919 Old Highway 17, Unit 4 (#15), Rockland.

ADOPTÉE

7.2 Amendement au Règlement de Zonage – 1536 chemin Lacasse

a. Présentation

Nicolas Denis fait la présentation de la demande d'amendement au règlement de zonage soumise par Jean-Guy Giroux pour le 1536 chemin Lacasse.

b. Commentaires du comité et du public

Suite aux questions, Nicolas Denis explique que le processus de morcellement ne peut se faire en même temps.

c. Recommandation

RECOMMANDATION AME2019-17
Proposée par Michel Levert
Appuyée par Sylvie Lalonde

QUE le comité d'aménagement recommande au conseil municipal d'approuver le règlement modifiant le Règlement de Zonage no. 2016-10, à l'effet de modifier la catégorie de zonage pour une partie du terrain au 1536 chemin Lacasse de « Zone rurale (RU) » à « Zone rurale – exception 54 (RU-54) », tel que recommandé par le Département d'infrastructure et aménagement.

ADOPTÉE

9. Ajournement

La réunion est ajournée à 19h44.

Mario Zanth, Président	Maryse St-Pierre, Greffière adjointe

Énoncé de l'urbaniste / Planner's Statement

Énoncé de l'urbaniste / Planner's Statement

- Toute personne présente peut soumettre ses observations et ses commentaires sur les présentes propositions d'ébauche de plan de lotissement ou de la modification au plan officiel ou de la modification au règlement de zonage.
- Toute personne peut obtenir des renseignements sur la ou les présentes demandes en s'adressant au Département d'infrastructure et de l'aménagement du territoire de la Cité de Clarence-Rockland, au 1560 rue Laurier à Rockland (édifice de l'Hôtel de ville) aux heures habituelles de bureau, soit de 8h30 à 16h30 du lundi au vendredi.

- Anyone present at the meeting may submit their concerns or comments in respect to the proposed draft plan of subdivision or to the Official Plan amendment or to the Zoning By-Law amendment.
- Anyone may obtain additional information relating to the present requests by contacting the Infrastructure and Planning Department at the City Hall, located at 1560 Laurier Street in Rockland, between 8:30 A.M. and 4:30 P.M., from Monday to Friday.

Énoncé de l'urbaniste / Planner's Statement

- Si une personne ou un organisme public avait par ailleurs la capacité d'interjeter appel de la décision de du conseil de la Corporation de la Cité de Clarence-Rockland devant le Tribunal d'appel de l'aménagement local, mais que la personne ou l'organisme public ne présente pas d'observations orales lors d'une réunion publique ou ne présente pas d'observations écrites à la Corporation de la Cité de Clarence-Rockland avant l'adoption du règlement municipal ou du plan de lotissement, la personne ou l'organisme public n'a pas le droit d'interjeter appel de la décision.

- If a person or public body would otherwise have an ability to appeal the decision of the Council of the Corporation of the City of Clarence-Rockland to the Local Planning Appeal Tribunal but the person or public body does not make oral submissions at a public meeting or make written submissions to Corporation of the City of Clarence-Rockland before the by-law is passed or the approval of a Draft plan of Subdivision, the person or public body is not entitled to appeal the decision.

Énoncé de l'urbaniste / Planner's Statement

- Si une personne ou un organisme public ne présente pas d'observations orales lors d'une réunion publique ou ne présente pas d'observations écrites à la Corporation de la Cité de Clarence-Rockland avant l'adoption du règlement municipal ou du plan de lotissement, la personne ou l'organisme public ne peut pas être joint en tant que partie à l'audition d'un appel dont est saisie le Tribunal d'appel de l'aménagement local à moins qu'il n'existe, de l'avis de ce dernier, des motifs raisonnables de le faire.

- If a person or public body does not make oral submissions at a public meeting, or make written submissions to Corporation of the City of Clarence-Rockland before the by-law is passed or the Draft Plan of Subdivision is approved, the person or public body may not be added as a party to the hearing of an appeal before the Local Planning Appeal Tribunal unless, in the opinion of the Tribunal, there are reasonable grounds to do so.

Énoncé de l’urbaniste / Planner’s Statement

- SI VOUS DÉSIREZ être avisé(e) de la décision de la Corporation de la Cité de Clarence-Rockland relativement au présent plan de lotissement proposé ou de la décision relativement à l’amendement au plan officiel ou au règlement de zonage proposé, vous devez présenter une demande écrite à la: Greffière, Cité de Clarence-Rockland, 1560 rue Laurier, Rockland (Ontario) K4K 1P7.

- IF YOU WISH to be notified of the decision of the Corporation of the City of Clarence-Rockland in respect of the proposed plan of subdivision or of the decision in respect of the proposed Official Plan or Zoning Amendment, you must make a written request addressed to the Clerk, City of Clarence-Rockland, 1560 Laurier Street, Rockland, Ontario K4K 1P7.

Énoncé de l’urbaniste / Planner’s Statement

- Une personne ou un organisme public dispose d’un délai de 20 jours pour interjeter appel devant le Tribunal d’appel de l’aménagement local (TAAL) suite à l’envoie de l’avis d’adoption. Pour ce faire, la personne ou l’organisme public doit déposer à la Cité un avis d’appel qui explique son opposition au règlement municipal, les motifs à l’appui de son appel, en plus de payer les droits prescrits.

- A person or public body may submit an appeal within 20 days of the receipt of the notice of adoption before the Local Planning Appeal Tribunal (LPAT). However, the person or public body has to file an appeal with the City explaining the reasons supporting the objection to the by-law in addition to paying the required fees.

REPORT N° AMÉ-19-80-R

Date	05/09/2019
Submitted by	Marie-Eve Bélanger
Subject	Secondary Plan – OP Amendment No. 13
File N°	D-09-83

1) **NATURE/GOAL :**
The nature of this report is to present the Secondary Plan of the Expansion lands, being Amendment No. 13 to the urban area of the City of Clarence-Rockland.

2) **DIRECTIVE/PREVIOUS POLICY :**
1

3) **DEPARTMENT'S RECOMMENDATION :**
THAT the Planning Committee recommends to Council the approval of By-law 2019-72, being the Amendment No. 13 to the Official Plan of the Urban Area of the City of Clarence-Rockland (Secondary Plan for the Expansion Lands).

QUE le comité d'aménagement recommande au conseil l'approbation du règlement 2019-72, soit l'amendement no. 13 au Plan Officiel de la Cité de Clarence-Rockland (plan secondaire).

4) **BACKGROUND :**
In April 2016, a new Consolidated Official Plan of the United Counties of Prescott and Russell came into effect. The Consolidated Official Plan (OP) sets out the long-term vision to the year 2035. The new Official Plan identified an area for the urban expansion of Rockland, which will accommodate additional new urban development required to meet the projected growth over the planning period. This area is located to the south of Rockland on both sides of Caron Street.

The Zoning by-law of the City of Clarence-Rockland was approved in May 2016 following the approval of the UCPR OP. The lands known as the expansion lands were included in a Special Study Area (SSA) Zone. It is the intent of this Zone that lands so zoned will ultimately be developed or redeveloped in accordance with a Secondary Plan. The Secondary plan is intended to ensure that future growth occurs in an efficient, orderly and sustainable manner.

A contract was issued to Fotenn Consultants for the elaboration of a Secondary plan.

5) **DISCUSSION :**

The Secondary plan applies to the Expansions Lands, an irregularly shaped parcel comprising 133.5 hectares of land southeast of Rockland’s existing Urban Area Boundary. The area is bounded to the north by David Street and to the east by the Clarence Creek. The Lands are situated primarily east of Caron Street, except for an area of 23 hectares on the west side of Caron Street.

The Expansion Lands Secondary Plan promotes sustainable urban development that will accommodate Clarence-Rockland’s projected growth over the next 20 years, while protecting and enhancing the natural character and established woodlots that define the area.

The Secondary Plan was founded on a well-defined grid-network that will promote a strong connectivity throughout the neighbourhood and to adjacent destinations. A mix of Local and Collector roads will provide safe, direct access to neighbourhood amenities, including parks and schools for all users, including pedestrian, cyclists and drivers. A mix of open spaces and amenities, located within close walking distance of all residents, will promote convenient and exciting places to gather and socialize.

The proposed Secondary Plan, included as Document 1 under the Official Plan Amendment No. 13, is divided into 10 Sections. The plans and policies pertaining to land use, built form, servicing and transportation are in Section 4, 5 and 6. Design guidelines are contained in Section 7.

As indicated under Section 4 of the Secondary Plan, specific policies applies to Residential areas, Commercial Areas, Community Facilities, Open space and Environmental protection area. Schedule C of the OP Amendment No. 13 shows the proposed land uses.

Under Section 5 of the Plan, the transportation network is proposed. The intent of this network is to provide an integrated multi-modal transportation network that is safe, convenient and affordable. The proposed collector street network is identified on Schedule C of the OP Amendment. Minor adjustments to the location and alignment of the collector streets will not require and amendment to the Plan.

Under Section 7, there are some design guidelines that are proposed for the Expansion Lands. As such, they are intended to compliment the compulsory policies of Section 4, 5 and 6. They are not mandatory but they provide a tool for evaluation of development applications.

Provincial Policy Statement:

The Provincial Policy Statement (PPS) provides policy direction on matters of provincial interest related to land use planning and development. Municipalities are required to "be consistent with" the PPS with respect to any planning decisions.

Section 1.1.1 states that healthy, liveable and safe communities are sustained by:

a. Promoting efficient development and land use patterns which sustain the financial well-being of the Province and municipalities over the long term;
b. Accommodating an appropriate range and mix of residential (including second units, affordable housing and housing for older persons), employment (including industrial and commercial), institutional (including places of worship, cemeteries and long-term care homes), recreation, park and open space, and other uses to meet long-term needs;

   …

Policy 1.1.2 requires that sufficient land shall be made available to accommodate an appropriate range and mix of land uses to meet projected needs for a time horizon of up to 20 years.

Policy 1.1.3 requires that settlement area shall be the focus of growth and development, and their vitality and regeneration shall be promoted.

Policy 1.6 requires that infrastructure be provided in a coordinated, efficient and cost-effective manner that considers impacts from climate change while accommodating projected needs.

Policy 1.6.6.1 requires that planning for sewage and water services shall:

a. Direct and accommodate expected growth or development in a manner that promotes the efficient use and optimization of existing municipal sewage services and municipal water services.

Policy 1.6.6.7 states that planning for stormwater management shall:

a. Minimize, or, where possible, prevent increases in contaminant loads;
b. Minimize changes in water balance and erosion;
c. Not increase risks to human health and safety and property damage;
d. Maximize the extent and function of vegetative and pervious surfaces; and
e. Promote stormwater management best practices, including stormwater attenuation and re-use and low-impact development.

Policy 1.6.7 stipulates that transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs. Transportation and land use considerations shall be integrated at all stages of the planning process.

Official Plan of the United Counties of Prescott and Russell:

The Official Plan of the United Counties of Prescott and Russell provides guidance for development, while stimulating economic growth and protecting the environment and public health. As the Upper-Tier municipality, all land use planning decisions in the City of Clarence-Rockland are required to be consistent with the County OP.

The expansion lands are identified as Urban Policy Area on Schedule A of the OP. The designation applies to City, Towns and Villages with populations of 1,000 or more and which are developed primarily on the basis of municipal water and sewer systems.

Policy 4 of Section 2.2.6 requires that zoning regulations be designed to provide for a mix of 70% low-density residential development, 20% medium density residential development and 10% high-density residential development in the Urban Policy Area. The Secondary Plan proposes a mix of 69% low-density residential, 21% of medium density residential and 10% of high density residential. Au such, this policy of the Official is respected.

Section 7.6 requires that local Councils provide for affordable housing by enabling a full range of housing types and densities to meet projected demographics and market requirements of current and future residents of the United Counties. Policies include:

- Ensuring a minimum 10-year supply of residential land at all times.
- Consider building small lot singles, linked bungalows, maisonettes, quad/six-plexes, and other affordable housing forms.

Section 7.6.3.2 of the OP clarifies that the County encourages the permission of second residential units within all single detached, semi-detached, and rowhouses dwelling units.

Official plan of the Urban Area of the City of Clarence-Rockland

The Official plan came into full force and effect on September 30, 2014 and it intended to direct the future development of the Urban Area of the City of Clarence-Rockland for a period of approximately 20 years to 2033.

The Expansion Lands are located outside of the urban area of

Clarence-Rockland, as shown on Schedule A of the OP. As the intention of the Secondary Plan is to include the lands inside the urban boundary, this section summarizes the policies for lands under urban designations.

Section 4.20 of the OP contains policies pertaining to servicing requirements. It specifies that looping of the water distribution system shall be a priority of Council in order to ensure sufficient pressure and flow in all areas of Rockland.

Policy 1 of Section 4.20.3 stipulates that future development within Rockland must proceed on the basis of full municipal services.

Section 5.6 contains policies for the Residential land use designations, which are anticipated to apply to the majority of the expansion lands. The designation encourages a mix of housing types and tenures, such as single ownership, cooperatives, condominiums and rental.

Section 7.14 contains policies for active transportation and the pedestrian and bicycle network. The existing pedestrian and bicycle network will be maintained and expanded through the creation of additional pedestrian walkways, trails and bikeways with adequate signage. Sidewalks are encouraged, where feasible, to create pedestrian connections between neighbourhoods and major destinations.

<u>Clarence-Rockland Zoning By-law 2016-10</u>

The study area is currently zoned Special Study Area (SSA) Zone. The intent of the zone is to preserve land for development or redevelopment in accordance with the results and recommendations of a Secondary Plan. The only permitted uses on the SSA Zone are those which were in existence on the date of passing of the By-law and any other uses may be authorized by the Committee of Adjustment or City Council under the provision of the Planning Act.

6) **CONSULTATION:**

The City and the consultants held the following meetings:

March 1, 2018: Meeting with the affected residents only in order to explain the Secondary plan process

August 8, 2018, Open House No. 1: Meeting to introduce the project to the public.

January 8th, 2019, Open House No.2: Meeting to present three concepts in regards to roads and land use.

June 12, 2019, Open House No. 3: Meeting to present the final concept plan based on comments received. The supporting studies (Transportation, Master Servicing, Environmental) were presented as well.

7) **RECOMMENDATIONS OR COMMENTS FROM COMMITTEE/ OTHER DEPARTMENTS :**

The consultant organized a total of five Technical Advisory Committee (TAC) Meeting throughout the project. The TAC was composed of a planner from the South Nation Conservation, a planner from the United Counties, the Manager of Development of the City, the Engineer of the City and the consultant (CIMA and Fotenn).

During those meetings, the technical reports were reviewed as well as the land use maps.

No other comments were received from other departments or agencies.

8) **FINANCIAL IMPACT (expenses/material/etc.) :**

n/a

9) **LEGAL IMPLICATIONS :**

n/a

10) **RISK MANAGEMENT:**

n/a

11) **STRATEGIC IMPLICATIONS:**

The Secondary Plan study was initiated in order to provide the City with a concept plan of the Expansion Lands. This concept plan will remove the "piecemeal" effect that the City has been having over the years. This is a more effective approach to planning as the entire area of the Expansion Lands are considered as a whole.

12) **SUPPORTING DOCUMENTS:**

OP Amendment By-law 2019-72
OP Amendment No.13
Environmental Constraints Report
Existing Conditions Report
Master Servicing Study
Transportation Impact Assessment

AMENDMENT NUMBER 13 TO THE OFFICIAL PLAN OF THE URBAN AREA OF THE CITY OF CLARENCE-ROCKLAND

Prepared by
the Infrastructure and Planning Department
of the City of Clarence-Rockland
1560 Laurier Street
Rockland (Ontario)
K4K 1P7
(613) 446-6022

September 2019

AMENDMENT NO. 13 TO THE OFFICIAL PLAN OF THE URBAN AREA OF THE CITY OF CLARENCE-ROCKLAND

TABLE OF CONTENTS

PART A - THE PREAMBLE

i. Purpose

The purpose of the proposed Official Plan Amendment No. 13 is to implement the Expansion Lands Secondary Plan (ELSP). The ELSP provides a planning framework to ensure that future development within the Expansion Lands occurs in an efficient, orderly and sustainable manner.

ii. Land affected

The lands affected by this Amendment include certain lands bounded to the north by David Street and to the east by the Clarence Creek. The Expansion Lands are situated primarily east of Caron Street with the exception of an area of approximately 23 hectares on the west side of Caron Street in the southwest corner. In total, the Expansion Lands study area comprises approximately 133.5 hectares of land.

iii. Basis

Background

The Expansion Lands were identified for development during the 2015 United Counties Official Plan review. The review identified a localized shortage of residential land supply in the City of Clarence-Rockland and resulted in the addition of approximately 133.5 hectares of development land to the Rockland urban area – known as the Expansion Lands.

The Expansion Lands are currently designated "Urban Policy Area" in the United Counties of Prescott and Russell (UCPR) Official Plan and have not previously been designed in the Official Plan of the Urban Area of the City of Clarence-Rockland. The lands are currently zoned "Special Study Area (SSA)" pursuant to Zoning By-law 2016-10.

The City initiated the Expansion Lands Secondary Plan (ELSP) in 2017 to establish a policy framework for the lands and to provide the basis for future development to ensure the efficient use of the land and infrastructure. The Secondary Plan establishes a connected network of streets and pathways to increase connectivity and guide future development.

Rationale

The Urban Policy Area designation of the UCPR Official Plan applies to cities, towns, and villages with populations of 1,000 or more and which have been developed primarily on the basis of municipal water and sewer systems. The Urban Policy Area is intended to accommodate a significant portion of future growth in the United Counties.

The Expansion Lands Secondary Plan is a new Secondary Plan that will be added to Section 8 of the Official Plan of the Urban Area for the City of Clarence-Rockland. The ELSP will provide area-specific policy direction to guide development within the Expansion Lands Area over the next 20 years and ensuring that future growth occurs in an efficient, orderly, and sustainable manner.

Amendment No. 13 will revise the Official Plan schedules to add the Expansion Lands to the Official Plan of the Urban Area of the City of Clarence-Rockland.

PART B - THE AMENDMENT

1. Introduction

This part of the document in its entirety, entitled **PART B - THE AMENDMENT**, consisting of the following text and schedules, constitute Amendment No. 13 to the Official Plan of the Urban Area of the City of Clarence-Rockland, as amended, and shall be known as the "Expansion Lands Secondary Plan".

2. Details of the Amendment

The Official Plan of the Urban Area of the City of Clarence-Rockland is hereby amended as set out in the table below and in the attached schedules and documents:

Item	Section	Details of Amendment
1	1.3 – The Official Plan	Amend 1.3 – The Official Plan by: • Modifying the first sentence of "Section 1.3" to add "Document 1" after "Schedule B". • Adding the following paragraph at the end of "Section 1.3": "Document 1 – Expansion Lands Secondary Plans is the document that provides policies specific to the Expansion Lands Area."
2	8 – Special Study Area	Amend 8 – Special Study Area by: • Amending the title of Section 8 from "Special Study Area" to "Secondary Plans and Special Study Areas" • Amending the title of Section 8.1 from "Special Study Area 1" to "Special Study Areas" and moving the title to be before the first paragraph of Section 8. • That the current Section 8.1 (titled "Special Study Area 1") be renumbered to Section 8.1.1. • That the current Section 8.1.1 (titled "Development Plan") be renumbered to Section 8.1.1.1.
3	8.2 (new section)	Amend Section 8 of the Official Plan by: • Adding a new section following 8.1.1.1 – Development Plan, as follows: **8.2 Secondary Plans**

		Secondary plans provide specific policies for areas identified within an Official Plan as requiring more detailed direction on topics such as land use, infrastructure, the natural environment, transportation and urban design. Listed below are the secondary plans **8.2.1 Expansion Lands Secondary Plan** The Expansion Lands Secondary Plan provides area-specific policy direction to guide development within the Expansion Lands over the next 20 years. The Plan is intended to ensure that future growth occurs in an efficient, orderly, and sustainable manner. The Expansion Lands Secondary Plan forms part of this Official Plan and is attached as "Document 1" hereto.
4	Schedule A – Land Uses and Constraints (amended schedule)	Schedule A to the Official Plan of the Urban Area of the City of Clarence-Rockland is hereby amended by adding the lands described as the "Expansion Lands" to the Urban Area and including the following notation on the Expansion Lands "See Schedule A1 – Expansion Lands Land Use and Road Network", as shown in Item 3, Schedule A of Part B.
5	Schedule B – Road Network and Community Linkages (amended schedule)	Schedule B to the Official Plan of the Urban Area of the City of Clarence-Rockland is hereby amended by adding the lands described as the "Expansion Lands" to the Urban Area, as shown in Item 3, Schedule B of Part B.
6	Document 1 – Expansion Lands Secondary Plan (new document)	Document 1 – Expansion Lands Secondary Plan, included as Item 3, Document 1 of Part B, is hereby added to the Official Plan of the Urban Area of the City of Clarence-Rockland. The Secondary Plan provides area-specific policy direction to guide development within the Expansion Lands over the next 20 years. The Document is to be inserted following the last Schedule of the Official Plan of the Urban Area of the City of Clarence-Rockland.
7	Schedule A1 – Expansion Lands Land Uses and Road Network (new schedule)	Schedule A1 – Expansion Lands Land Uses and Road Network, included as Item 3, Schedule C of Part B, is hereby added to the Official Plan of the Urban Area of the City of Clarence-Rockland.

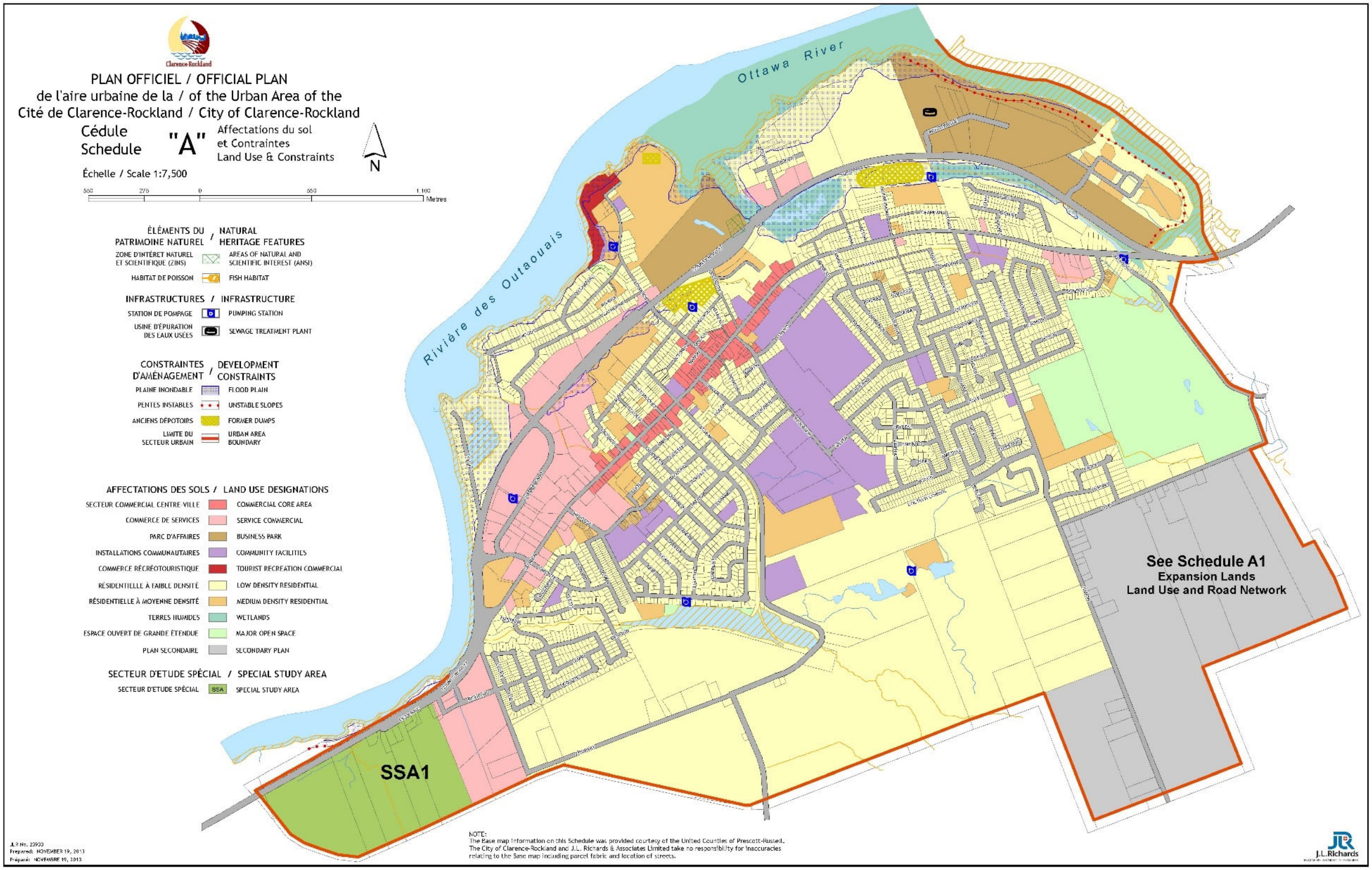
3. Schedules and Document to Amendment No. 13 – Official Plan of the Urban Area of the City of Clarence-Rockland

The following schedules A and B support the amendment to Schedules A and B of the Official Plan of the Urban Area of the City of Clarence-Rockland.

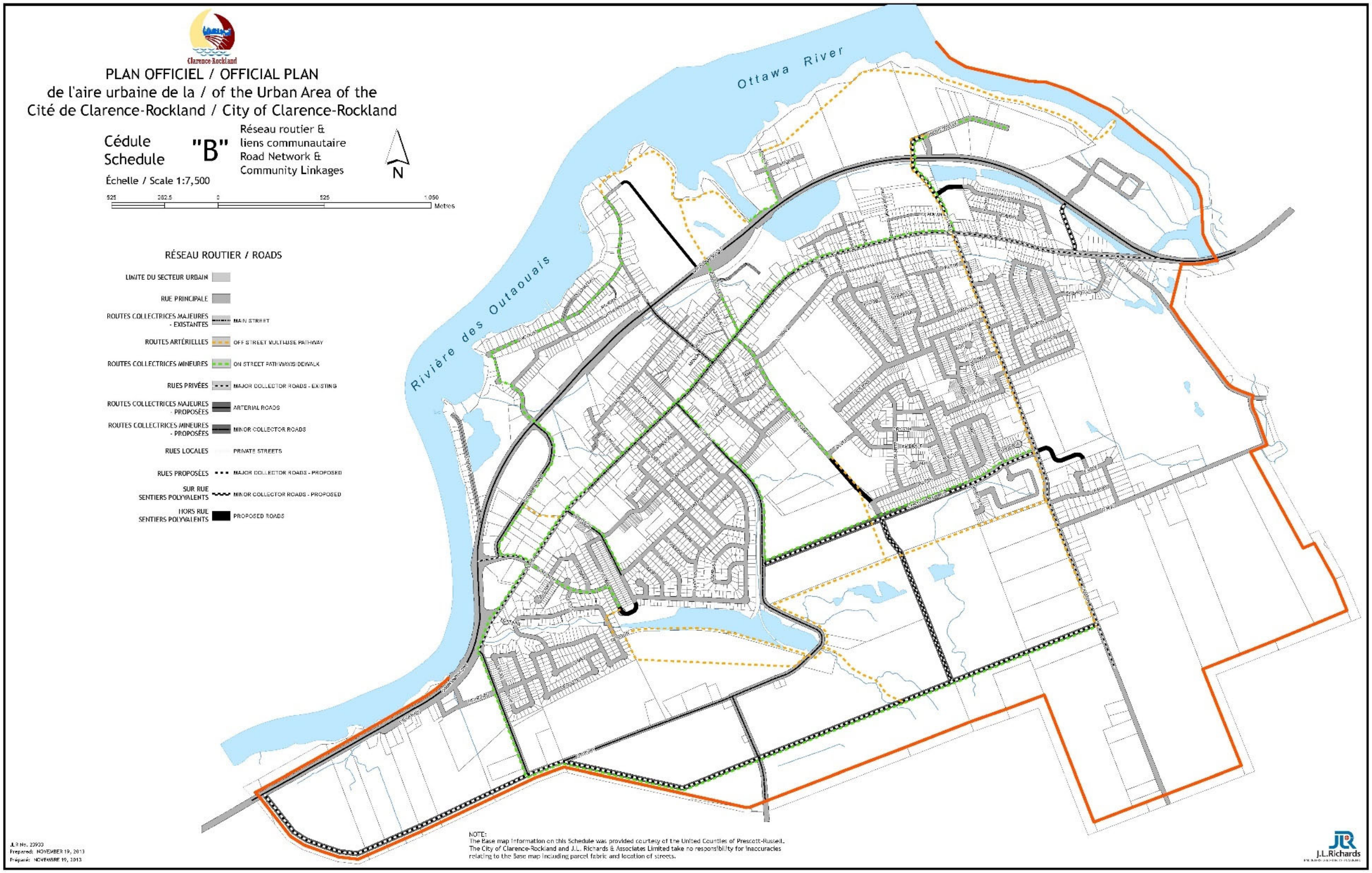
Schedule C is a new schedule to be added to the Official Plan of the Urban Area of the City of Clarence-Rockland as Schedule A1. The new schedule is specific to the Expansion Lands Secondary Plan area and will provide land use and road network information.

Document 1 is the Expansion Lands Secondary Plan and provides an area-specific development framework to guide development within the Expansion Lands. The new Document 1 will be added to the Official Plan of the Urban Area of the City of Clarence-Rockland.

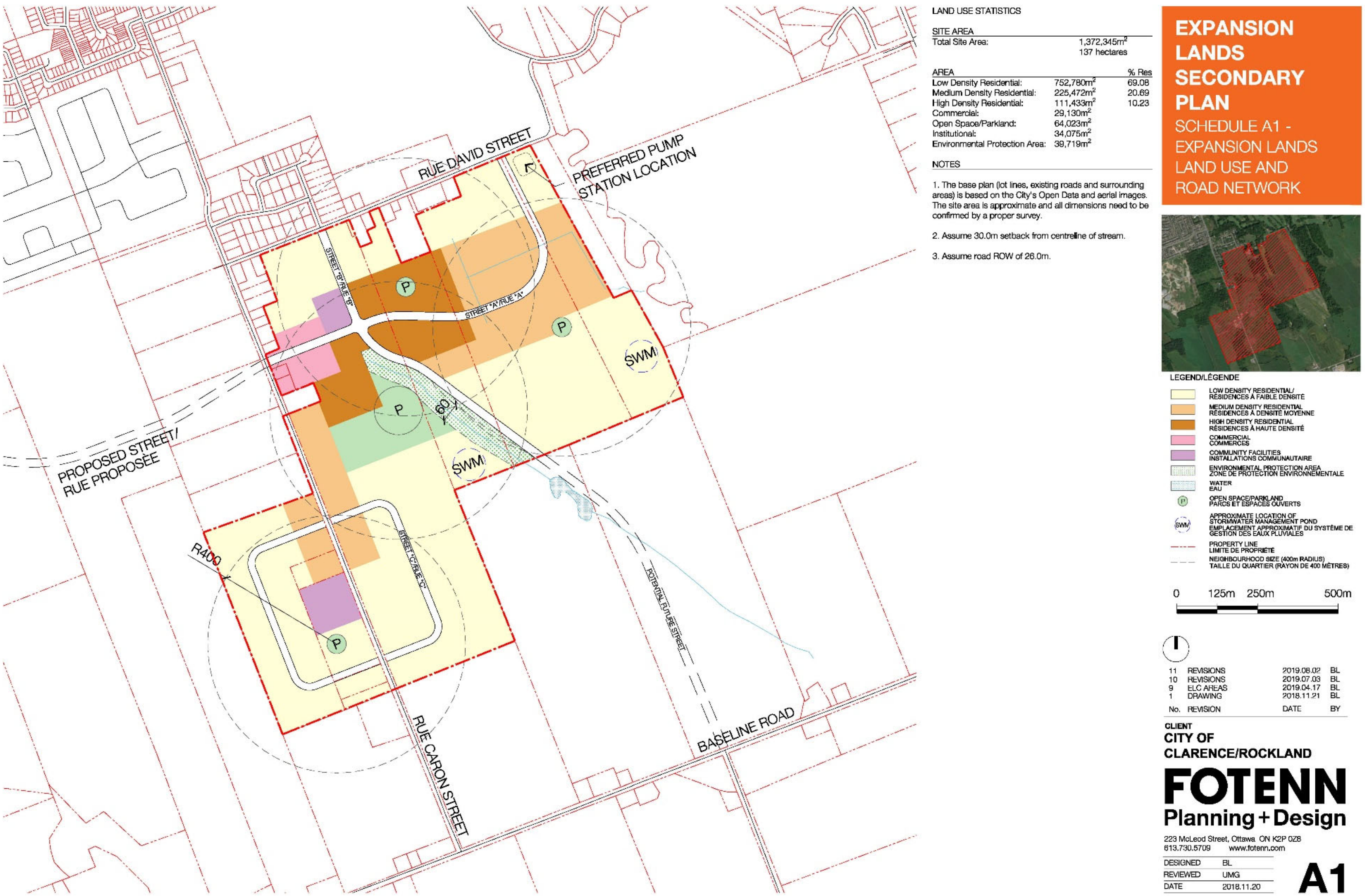
Schedule A of Amendment No. 13 – Amended Official Plan Schedule A – Land Use and Constraints



Schedule B of Amendment No. 13 – Amended Official Plan Schedule B - Updated Road Network and Community Linkages



Schedule C of Amendment No. 13 – New Schedule A1 to the Official Plan - Expansion Lands Land Uses and Road Network



Document 1 of Amendment No. 13 – Expansion Lands Secondary Plan

1.0 Introduction

The City of Clarence-Rockland Expansion Lands Secondary Plan is a land use planning policy document adopted by City Council under authority of Section 16 of the Planning Act. The purpose of this Secondary Plan is to provide area-specific policy direction to guide development within the Expansion Lands Area over the next 20 years.

The Expansion Lands were identified for development during the 2015 United Counties of Prescott and Russell (UCPR) Official Plan. The review identified a localized shortage of residential land supply in the City of Clarence-Rockland and to address the shortage, added approximately 133.5 hectares of land to the Rockland Urban Policy Area. These lands became known as the “Expansion Lands.”

Following the addition of the lands to the Urban Policy Area designation, the City of Clarence-Rockland rezoned the lands to “Special Study Area (SSA)”. The intent of the SSA zone is for lands to be developed in accordance with the results and recommendations of a Secondary Plan. In the interim, existing uses are permitted to continue, but no new uses are permitted.

The Secondary Plan is intended to ensure that future growth occurs in an efficient, orderly, and sustainable manner. Section 2 of this Plan described the Planning Area where these policies will apply. Section 3 outlines the vision and guiding principles for the Expansion Lands area. The plans and policies pertaining to land use, built form, servicing, and transportation are in Section 4, 5, and 6. Design guidelines are contained in Section 7. Finally, the Plan including policies for its interpretation and implementation in Sections 8 and 9.

Key components of the Secondary Plan include goals, objectives, policies and guidelines that provide direction for applying the high-level policies of the Official Plan at a local scale. Development applications in the Expansion Area will be required to conform with the policies of the Secondary Plan, as well as the City of Clarence-Rockland Official Plan and the United Counties of Prescott and Russell (UCPR) Official Plan.

1.1 Integrated Municipal Class Environmental Assessment

A critical element of the Expansion Lands Secondary Plan process was the integration of the planning process under the Official Plan with the Class Environmental Assessment (Class EA) process for proposed infrastructure projects. The objective of an integrated process is to create a set of guiding documents that will shape the development of a healthy, vibrant, and livable community.

Combining the Secondary Plan process with the Class EA creates an opportunity to coordinate the approval requirements of the Environmental Assessment Act and the Planning Act and provides an integrated approach to the planning and development of all aspects of the community.

The integrated process is efficient because background studies and existing conditions reports can be shared between the two processes; stakeholders and advisory committees are able to consider all aspects of planning and servicing; and the public review and approval processes can be consolidated and simplified.

2.0 Planning Area

This Secondary Plan applies to the Expansion Lands, an irregularly shaped parcel comprising 133.5 hectares of land southeast of Rockland’s existing Urban Area Boundary. The area is bounded to the north by David Street and to the east by Clarence Creek. The Expansion Lands are situated primarily east of Caron Street, except for an area of approximately 23 hectares on the west side of Caron Street in the southwest corner.

3.0 Vision & Guiding Principles

Balancing rural charm with urban vitality, the Expansion Lands Secondary Plan promotes sustainable urban development that will accommodate Clarence-Rockland's projected growth over the next 20 years, while protecting and enhancing the natural character and established woodlots that define the area.

As the City evolves, new growth and development will enhance the quality of life for both current and future residents, and will reinforce a vibrant, active community for people of all ages and abilities. A mix of housing options, including single and semi-detached, townhouses and apartment buildings, will promote diversity, increase access to affordable housing, and provide additional density to support local commercial uses and alternative modes of transportation.

Founded on a well-defined grid-network, the Expansion lands Secondary Plan will promote strong connectivity throughout the neighbourhood, and to adjacent destinations via Caron Street and David Road. A mix of Local and Collector Roads will provide safe, direct access to neighbourhood amenities, including parks and schools, for all users, including pedestrian, cyclists and drivers.

A mix of open spaces and amenities, located within close walking distance of all residents, will provide convenient and exciting places to gather and socialize, while supporting and promoting community events and broader City activities.

Through high quality urban design, the Expansion Lands will be a pillar of urban design in the City of Clarence-Rockland, and a place that new residents and visitors will be proud to call home.

3.1 Guiding Principles

1. Promote sustainable and contemporary development that respects and enhances the existing rural and natural fabric of the Expansion Lands.
2. Ensure new development responds to the surrounding context, including streets, development patterns, dwelling styles, topography and natural heritage features.
3. Establish strong connections throughout the community, and to the broader City, through the creation of a strong grid network, and short, permeable blocks.
4. Create a complete community with a mix of residential typologies, community amenities, and parks and open spaces that will provide opportunities to live, work and play.
5. Provide a variety of housing types and tenures to support affordable housing options and promote a diverse and vibrant community.
6. Protect and celebrate the natural setting through careful links to a safe, highly visible and well-connected network of parks, trails and public spaces.
7. Promote active transportation, including walking, cycling and transit, through compact development with a continuous network of sidewalks, cycling facilities and trails.
8. Ensure all elements of the public realm, including streets, parks, trails, and public destinations are welcoming and accessible for people of all ages and abilities.

4.0 Land Use and Built Form

The Land Use Plan for the Expansion Lands, shown in Schedule B, illustrates the approximate location of arterial and collector streets, development areas, environmental protection, and stormwater management infrastructure.

The Land Use Plan is premised on the direction established in the Vision and Guiding Principles, with the goal of creating a balanced, complete community. The Plan reserves land for a range of uses, providing living, shopping, and recreation opportunities within the Expansion Lands Area.

4.1 Land Use Designations

The following land use policies refer to Schedule A1 – Expansion Lands Land Use and Road Network and provide specific directions for various land use character areas. These policies, together with the design guidelines outlined in section 5.0, the Official Plan, and other Council-approved planning documents, will ensure that the final build-out of the Expansion Lands is an attractive, liveable, and healthy community composed of well-designed structuring elements.

The policies of Section 4.0 are specific and should be considered compulsory in future subdivision design. The Design Guidelines of Section 5.0 are less specific and, although every effort should be made to achieve them, there is an understanding that this is not possible in all instances through future subdivision design. Policies are numbered to provide ease of reference, and there is no implied precedence of any policy based on numbering.

4.1.1 Residential Areas

Lands designated residential will permit the development of a wide range of housing types to accommodate the needs of future residents and households.

In all Residential Area designations, the following policies apply:

1. Access from local roads to arterial and collector roads will be restricted.
2. Rear-lotting and associated fencing is discouraged. Residential lots will be permitted to font on collector roads except in proximity to major intersections
3. A variety of housing densities and designs will be encouraged to enhance the streetscapes in the Expansion Lands.
4. Front entrances should generally face and be visible from the street.
5. Building designs shall reduce or avoid projecting garages.
6. Stormwater management facilities may be permitted within the Residential designations.
7. Minimum densities are provided in each designation. The densities should be interpreted as a minimum density, not a target. Higher densities of permitted building types in each designation shall be encouraged, provided that servicing and transportation capacity is confirmed through the Plan of Subdivision process.

4.1.1.1 Low Density Residential

A significant portion of the Expansion Lands are designated Low Density Residential. This designation is intended to act as a transition between the adjacent low-rise neighbourhoods and the core of the Expansion Lands community that features a mix of uses and higher densities.

In the Low-Density Residential designation, the following policies apply:

1. Permitted uses include single detached dwellings, semi-detached dwellings, doubles, and duplex dwellings. Secondary dwelling units are also permitted subject to the provisions of the Zoning By-law.
2. Residential land uses in the Low-Density Residential designation shall be provided at a minimum density of 16 units per net hectare.
3. The Zoning By-law will permit the envisioned land uses and specify the zone provisions through a special exception of the Urban Residential First Density (R1) zone.

4.1.1.2 Medium Density Residential

The Medium Density Residential designation generally abuts collector roads and is intended to provide a transition between the Low-Density Residential Designation and the higher densities within the Expansion lands community.

In the Medium Density Residential designation, the following policies apply:

1. Permitted uses include: semi-detached dwellings, duplex dwellings, linked dwellings, townhouse dwellings, three-unit dwellings, and group homes.
2. Residential land uses in the Medium Density Residential designation shall be provided at a minimum density of 35 units per net hectare.
3. The Zoning By-law will permit the envisioned land uses through a special exception of the Urban Residential Second Density (R2) zone.

4.1.1.3 High Density Residential

The High-Density Residential designation is intended to contribute to the creation of a community core within the Expansion Lands, offering opportunities for people to walk to retail uses and community facilities.

In the High-Density Residential designation, the following policies apply:

1. Permitted uses include townhouse dwellings, back-to-back townhouse dwellings, stacked townhouse dwellings, apartment dwellings, and group homes.
2. Residential land uses in the High-Density Residential designation shall be provided at a minimum density of 75 units per net hectare for apartments and 55 units per hectare for all other permitted uses.
3. High-density residential buildings shall be set back an appropriate distance from the public street to maintain a consistent streetscape and ensure safety for users and motorists.
4. The Zoning By-law will permit the envisioned land uses through application of the Urban Residential Third Density (R3) zone.

4.1.2 Commercial

The Commercial designation is intended to permit small-scale, community-serving commercial land uses and mixed-use development.

The following policies apply to the Commercial designation:

1. Permitted uses generally include retail stores, food stores, restaurants, offices, personal service businesses, and other small-scale commercial land uses.
2. Stand-alone retail buildings are permitted.
3. Mixed-use buildings will be encouraged within the Commercial area. Non-residential uses, including apartments and offices, will be permitted above the ground floor in mixed-use buildings.
4. A maximum building height of four (4) storeys is permitted.
5. The City will encourage buildings to front onto public streets to create more active streetscapes.
6. Entrances will be clearly defined and visible from the street.
7. Where applicable, ground floor spaces of commercial buildings facing the street will have windows and an active door which faces directly onto the street.

4.1.3 Community Facilities

The Community Facilities designation is intended to accommodate community-serving institutional land uses, such as schools, libraries, places of worship, and small-scale office uses.

1. Permitted uses in the Community Facilities designation include a full range of public and/or community non-profit uses such as parks, schools, clubs, religious institutions, places of worship, government offices, arenas, or other indoor recreational facilities, community centres, museums, and other similar uses.
2. Main entrances to buildings will be encouraged to face a public street.
3. Where multiple institutional uses are developed on the same or adjacent lots, co-location and pedestrian linkages will be encouraged to enable better connections for users.
4. The Zoning By-law will permit the envisioned land uses through the application of the Community Facilities Zone.

4.1.4 Environmental Protection Area

The Environmental Protection Area designation is intended to provide a 60-metre protection buffer around the tributary to Clarence Creek. Development within this designation will be restricted to maintain water quality in the creek.

1. No development, except for a low impact trail network shall be permitted within the Environmental Protection Area designation.
2. The environmental protection policies of the Official Plan shall apply to development adjacent to the Environmental Protection Area.
3. Subject to the policies of the Official Plan, an application for Plan of Subdivision, Zoning By-law Amendment, or Site Plan Control may require an Environmental Impact Study (EIS) to confirm that there will be no negative impacts on the creek.
4. Environmental Protection Areas will be acquired by the City through the Plan of Subdivision process and will not be considered as parkland dedication.
5. The Zoning By-law will regulate development within the Environmental Protection Area designation through application of the Conservation (CON) Zone.

4.1.5 Open Space

The Open Space designation is intended to identify areas reserved for active and passive recreation activities within the Expansion Area community. General park locations are indicated on Schedule A1, including three Neighbourhood Parks and one larger Community Park. Parks are strategically located to ensure that the majority of residents in the Expansion Lands community are within a 400-metre walking distance of parks and open space.

1. Permitted uses within the Open Space designation include community parks, neighbourhood parks, open space linkages, sports and recreation facilities, conservation uses, and similar uses supportive of active and passive recreation activities.
2. The Community Park identified on Schedule A1 should have a minimum area of 2.0 hectares while Neighbourhood Parks identified on Schedule A1 should have a minimum area of 0.5 hectares.
3. Open Space/Parkland should include a variety of active recreation facilities, as determined through the Plan of Subdivision process. Examples of facilities include sports fields, public washrooms, picnic facilities, splash pads, and seating areas. All facilities shall be located in safe and functional areas.
4. Development along the Open Space/Parkland designation shall provide a minimum of two (2) public frontages to enhance access, visibility, and safety. Road frontages along the designation shall be landscaped with street trees to provide a natural interface between the open space/park and the urbanized area.
5. Where direct street frontage is not provided, development adjacent to the Open Space/Parkland designation shall provide opportunities for direct pedestrian access to the open space and parkland.
6. The Zoning By-law will regulate development within the Open Space/Parkland designation through application of the Parks and Open Space (OS) Zone.

5.0 Transportation

The intent of the transportation network within the Expansion Lands area is to provide an integrated, multi-modal transportation network that is safe, convenient, and affordable.

5.1 Street Network

1. The proposed Collector Street network within the Expansion Lands area is identified on Schedule A1.

2. The ultimate location of the collector streets and local streets is to be determined through the Plan of Subdivision process. Minor adjustments to the location and alignments of collector streets will not require an amendment to the Secondary Plan.
3. Public streets will be constructed in accordance with City of Clarence-Rockland standards.
4. Collector Streets within the Expansion Lands should have a right-of-way width of 26 metres and include sidewalks on both sides and dedicated cycling facilities.
5. Traffic control at the intersection of Street A and Street B within the Expansion Lands will be encouraged in the form of a single-lane roundabout. A minimum 40 metre wide right-of-way should be protected for single-lane roundabouts at the intersection of collector streets.
6. The cross-section of David Street shall be upgraded to a right-of-way width of 26 metres and include sidewalks and on both sides and dedicated cycling facilities.
7. The cross-section of Caron Street shall be upgraded to a right-of-way width of 26 metres and extend the existing sidewalk and multi-use pathway south from David Street to the edge of the urban boundary.
8. On local streets, sidewalks should be provided to support pedestrian movements within the community (i.e. to/from Commercial areas, parks, etc.)
9. Along Commercial, Open Space/Parkland, and Community Facilities Designation frontages, on-street parking should be considered.

5.2 Cycling and Walking

1. The City of Clarence-Rockland will expand the cycling network in the Expansion Lands community with the extension of cycling and pedestrian facilities along Caron Street.
2. Collector Streets shall include pedestrian sidewalks and dedicated cycling facilities on both sides of the street.
3. Opportunities for pathway connections in the Environmental Protection Area and to existing surrounding communities should be explored.

6.0 Servicing and Infrastructure

A Master Servicing Study has been completed as part of the Secondary Planning process. The study indicates that the major infrastructure in the area is expected to support the projected development build-out of the Expansion Lands community, subject to planned upgrades to the City's Water Treatment Plant. It is expected that servicing requirements can be managed on a property by property basis through the normal development review process.

1. All development in the Expansion Lands community shall be undertaken in accordance with the Expansion Lands Master Servicing Study and shall conform to all other applicable standards of the City of Clarence-Rockland.
2. Where possible, locate stormwater management ponds adjacent to parks and integrate pathways into a common network.
3. Stormwater Management Facilities are permitted in all Residential and Commercial land use designations. Stormwater facilities are not considered as parkland dedication.
4. Low-Impact Development (LID) techniques are encouraged in the Expansion Lands community. Where LIDs are proposed, the City may require development proponents to demonstrate that soil conditions are appropriate to accommodate the alternative stormwater management processes.

7.0 Design Guidelines

The following community design guidelines are intended to complement the compulsory policies by providing design guidance for select elements of the community. While achievement of the guidelines is not mandatory, they provide a tool for evaluation of development applications.

7.1 Guidelines for Residential Development

7.1.1 General

1. Dwellings should be designed to individually and collectively contribute to the character of the various neighbourhoods within the community.
2. Individual dwellings should have appropriate façade detailing, materials and colours consistent with its architectural style.
3. For corner units, both street facing elevations should be given a similar level of architectural treatment. Main entries for these dwellings are encouraged to be oriented to the flanking lot line.
4. Dwelling designs with covered front porches or porticos are encouraged, where appropriate to the architectural style.
5. Attached street-facing garages should be incorporated into the main massing of the building to ensure they do not become a dominant element within the streetscape. Street-facing garage sizes should be in relation to lot size as follows:
    a. Dwellings on lots with frontage less than 10.5 metres should be restricted to a single-car garage or 1-1/2 car garage; and
    b. Dwellings on lots with frontage of 10.5 metres or greater will be permitted to have up to a two-car garage.
6. Variations in the siting of residential dwellings will be encouraged for variety and visual interest.
7. Building facades should provide visual interest through use of materials, colours, ample fenestration, sophisticated wall articulation and style-appropriate architectural detailing.
8. The use of high quality, durable building materials should be selected as the main cladding materials to support the intended architectural character of buildings.
9. Two to three exterior materials per building should be used to introduce texture and visual diversity to building surfaces.
10. Streetscapes should provide a variety of colours in simple and effective ways that will contribute to a vibrant and rich residential neighbourhood. The overuse of similar colours is not permitted.
11. Front building projections such as porches, canopies, and stairs are encouraged as transitional elements that provide access, amenity space, weather protection, and visual interest from the street.
12. Front entries of single storey buildings should be emphasized with gables, dormers, or other roof and entry treatments
13. Front porch dimensions should be large enough to accommodate furnishings, seating areas, and active use (minimum depth of 1.5 metres).
14. Driveways should be designed to avoid conflict with the driveways of adjacent uses, such as schools, parks, and commercial blocks.
15. Separate driveway locations to enable at least one street parking space between private approaches.
16. Where possible, pair driveways to maximize on-street parking capacity and provide ample space for street trees.
17. Where possible, utility elements and equipment should be located away from publicly exposed views and are discouraged from being located in the front yard or flanking yard. Where provided, utilities should be screened with landscaping or similar mechanisms.

7.1.2 Semi-Detached Dwellings

1. Both halves of semi-detached dwellings should be compatible in terms of design expression. Elevations may be symmetrical or asymmetrical.
2. Semi-detached dwellings should have 2 storey massing. Bungalow forms are generally discouraged for this housing type.
3. Semi-detached dwellings should be fully attached above grade.

7.1.3 Townhouse Dwellings

1. Townhouse block sizes may range from 3 to 8 units and should be no longer than 40 metres.
2. Individual Townhouse blocks should be separated by public streets or mid-block connections. A mix of townhouse block sizes along the street helps to provide visual diversity in the streetscape.
3. Townhouse and Semi-detached dwellings should be fully attached above grade.
4. Enliven façades and the roofs of buildings with decks and private outdoor amenity areas for residents to inhabit.
5. Articulate the massing and materiality of Townhouses to express each individual unit.
6. Activate the transition zone between private living spaces and the public realm with stoops, stairs, yards and porches.
7. Locate the main façade parallel to the street and set it in line with adjacent buildings.
8. Dwellings should typically be sited in close relation to the street with minimal setbacks, wherever feasible.
9. Townhouses should have a walkway linking the front door to the public sidewalk.

7.1.4 Apartment Buildings

1. The design of the building should consider the overall form and rhythm of building elements to create a consistent and attractive building street facade that reinforces a human scale environment.
2. Building setbacks should be minimized to maintain a strong relationship with the street and sidewalk while allowing sufficient space for a comfortable pedestrian zone and landscape opportunities
3. All façades exposed to public view should be highly articulated and detailed.
4. Main entrances should be design as a focal point of the building and should face the street. They should be recessed or covered and provide visibility to interior lobbies to allow for safe and convenient arrival and departure from the buildings.
5. The provision of semi-private amenity spaces (i.e. courtyards, plazas, etc.) at ground level is encouraged.
6. Residential apartments are encouraged to include covered private open space (i.e. balconies/terraces) where feasible to enhance the private living environment of residents
7. Parking should be provided in a non-obtrusive manner. Surface parking areas should be screened from street view through the use of landscaping or building location.
8. Avoid straight long frontages that exceed 40 metres. For longer frontages, buildings should be designed to appear as if they are composed of small parts using step backs or vertical breaks.

7.2 Guidelines for Community Facilities and Commercial Uses

1. Buildings should generally be sited to align with streets, parks and accessible open spaces, framing these areas with building mass.
2. For Commercial frontages, 50% of wall surface on the ground floor fronting the public street should be occupied by windows.
3. Ground levels should be free of any significant grade changes to promote barrier-free access and retail activity.
4. The scale of buildings should be compatible with adjacent development.
5. Provide pedestrian and cycling connections to sites and to surrounding sidewalks.
6. Surface parking areas should be located at the side or rear of the buildings. Where located adjacent to public streets, surface parking areas should be screened with landscaping.
7. Surface parking areas should be organized into small bays, rather than large surface lots. Planting strips, landscaped traffic islands and/or paving articulation should be used to define vehicle routes and smaller parking courts that provide pedestrian walkways, improve edge conditions and minimize the aesthetic impact of surface parking.
8. Driveway widths and corner radii should be minimized to reduce vehicle speed, while accommodating expected vehicles.
9. Bicycle parking should be located in convenient and visible locations.

10. Loading, waste facilities and other service functions and utilities should be located away from the street and screened from public view.

7.3 Parks and Open Space Guidelines

1. Community Parks should include a range of passive and recreational uses and may include sports fields, tennis courts, multi-purpose courts, ice rinks, skateboard parks, splash pads, children's play areas, open play spaces, pedestrian walkways, and seating areas.
2. Neighbourhood Parks should include a range of active and passive recreation opportunities which may include shade structures, seating, play equipment, a multi-purpose court, a splash pad, an outdoor rink, mini sports fields or similar facilities.
3. Access points to designated park spaces should be well connected to surrounding transportation networks such as sidewalks, pedestrian pathways and cycling routes.
4. Locate parks facilities such as playing fields and surface parking lots to facilitate the sharing of facilities.
5. Where possible, provide view corridors terminating at the parks in street network design.
6. Incorporate shade trees, greenery, and shade structures into park design.

7.4 Streetscape Guidelines

1. All streets should include enhanced landscape design through tree planting and landscaping in the public and private right-of-way.
2. Collector Roads should ensure a high proportion of tree planting. Closely spaced (6 to 8 metres apart, or double rows) will emphasize the urban tree canopy along these streets and walkways.
3. Street trees should be planted with appropriate soil volume in continuous tree trenches to allow for full growth and to ensure their long-term viability.
4. Street trees should generally be located within the boulevard and should be offset a minimum of 1.5 metres from the curb to accommodate snow storage, large vehicle movements and minimize salt damage. Where this is not possible, street trees should be located between the sidewalk and the public right-of-way.
5. Where possible, the principles of low impact development (LID) shall be implemented to control stormwater on-site and minimize discharge to the sewer system.
6. Parallel on-street parking is permitted on Collector Roads throughout the community.
7. Sidewalks should be at least 1.8 metres wide.
8. Collector Roads will facilitate direct pedestrian, vehicle, and cyclist links between the major parks and natural features in the community.
9. They will be 'green streets' that accommodate the transportation function of the road while also incorporating high-quality landscaping and innovative stormwater management facilities.
10. Local streets will generally have a 20 metre right-of-way and accommodate a wider 4.25 metre shared lane in each direction.
11. Continuous trees along the boulevard of local streets are encouraged to reinforce a strong urban tree canopy and augment front-yard trees on private property.

7.5 Stormwater Management Facilities Guidelines

1. Design the stormwater management ponds with naturalized features, such as slopes and contours.
2. Edges of stormwater management areas may feature hard edges as part of a public realm plan that incorporates stormwater ponds as a water feature in a public space.
3. Stormwater ponds should be designed with native plants materials, where possible.
4. Where possible, provide safe and accessible pathways around the stormwater management pond.

8.0 Interpretation

1. The boundaries of land use designations in this Secondary Plan are flexible and subject to minor variation without amendment to the Official Plan. The location of land uses and rights-of-way are included to represent the facilities and services required and are not intended to represent exact locations.
2. Where lists of examples of permitted uses are provided in this Secondary Plan, they are intended to illustrate the possible range and type of uses that are to be considered. Specific uses that are not listed but are considered by the City to be similar to the listed uses and to conform to the general intent of the applicable land use category, may be recognized as a permitted use in the implementing Zoning By-law.
3. Interpretation of the Expansion Lands Secondary Plan will be made having regard to all applicable policies established in the City of Clarence-Rockland Official Plan.

9.0 Implementation

The policies of this Secondary Plan provide a framework for the future development and transformation of the Expansion Lands community. The success of these policies depends on effective implementation. This section reinforces and augments the implementation policies of the Official Plan and describes the principal tools and actions that the City intends to use to implement the objectives and policies of the plan. The principal mechanisms include:

- An implementing Official Plan Amendment;
- Guidance on the interpretation of the Secondary Plan; and,
- Process to amend the Secondary Plan and Environmental Assessments.

9.1 Official Plan Amendment

The Expansion Lands Secondary Plan will be approved by Council as an Amendment to the City of Clarence-Rockland Official Plan. The Amendment will address the following matters:

- Schedule A – Amend the Schedule to add the Expansion Lands into to the urban boundary and add a notation on the Expansion Lands “See Schedule A1 – Expansion Lands Land Use and Road Network”;
- Schedule B – Amend the Schedule to add the Expansion Lands into to the urban boundary;
- Amend Section 8 to address Special Study Areas and Secondary Plans, and to reference the Expansion Lands Secondary Plan;
- Add the Secondary Plan policies as “Document 1 – Expansion Lands Secondary Plan”;
- Add “Schedule A1 – Expansion Lands Land Use and Road Network” to the Official Plan;

9.2 Development Approvals

While implementation of the Secondary Plan will be multi-faceted in approach, traditional land use planning processes, including zoning, plan of subdivision, and site plan processes, will be the primary method of implementing the policies of this Secondary Plan.

1. The goals, objectives and policies of this Secondary Plan will direct all development applications within the Expansion Lands. The urban design guidelines will be used by the City to inform the development review process and provide specific guidance but are not considered policy.
2. All development applications shall include a description and/or illustration as to how the development proposal meets the policies of this Secondary Plan, Master Plans, and related design guidelines.
3. Development approvals for lands within the Secondary Plan area will generally proceed by Plan of Subdivision to secure the necessary road network, servicing infrastructure and parkland dedication. Development applications shall include all information required under the Official Plan.
4. All development in the Expansion Lands community is subject to site plan control in accordance with the City’s Site Plan Control By-law.

5. The City will impose conditions on the development of the land through the Plan of Subdivision or Site Plan Control process. These conditions will address provision of matters such as, but not necessarily limited to:
    a. Parks, open space and environmental features;
    b. Water, wastewater collection, and stormwater management facilities;
    c. Construction of streets and infrastructure;
    d. Road widenings and the provision of daylight triangles; and
    e. Other utilities.
6. Zoning By-law Amendments will be required to permit the development established by the Land Use Plan in conjunction with Plan of Subdivision and/or Site Plan approval. It is anticipated that Zoning By-laws will amend the zoning to the zones indicated in the policies for each respective land use policy designation. The City may also use Holding Zones to specify the future uses of lands that, at the present time, are considered premature for development due to inadequate road, servicing or community facilities infrastructure being available within a reasonable period.

9.3 Phasing

The overall phasing plan for development will be determined by a number of factors, including:

/ Transportation capacity;
/ Water system capacity;
/ Sanitary sewer capacity;
/ Installation of a new sanitary pump station and upgrades to existing Wastewater Treatment Plant;
/ Installation of the stormwater management facilities required;

It is anticipated that within each individual phase, development will occur incrementally through Plans of Subdivision with associated infrastructure and services being installed.

Where smaller, individual properties are located within a development phase, such properties shall not be required to be developed with the balance of the lands in that phase. However, through the implementation of plans of subdivision within each phase, provision shall be made to accommodate the potential integration of these individual properties at a future date through overall subdivision design, lot patterns, road layouts and infrastructure plans.

All public utilities should be contacted early in the planning process regarding the area servicing of development.

Infrastructure Requirement	**Development Capacity**
Servicing	
Caron Street Booster Station (Water)	To be evaluated on prior to the approval of each phase of development
Expansion Lands Pump Stations (Sanitary)	Prior to the first phase of development
Upgrades to Pump Station 1 (Sanitary)	Prior to the first phase of development
Upgrades to the Wastewater Treatment Plan (Sanitary)	Prior to the first phase of development
Stormwater Management Facilities (Stormwater)	On a sub-watershed basis
Transportation	
Caron/CR17 – Turn movement upgrades	352 residential units
Caron/CR17 – Widen westbound through movement to two lanes	991 residential units

Infrastructure Requirement	Development Capacity
Caron/Françoise – Implement Traffic Signal Control	991 residential units
Caron/Cote/Potvin – Implement Traffic Signal Control	991 residential units

9.4 Parkland and Greenspace Acquisition

The network of community and neighbourhood parks are identified on Schedule A1. The majority of greenspace will ultimately be dedicated to the City for public ownership.

1. Schedule A1 identifies the general location of all proposed public parkland within the Expansion Lands. The City will acquire this parkland through a variety of measures, including:
    a. Parkland and/or open space dedication through the development approvals process;
    b. Conveyance of completed stormwater management facilities; and,
    c. Conveyances of other open spaces through the development approvals process.
2. Lands utilized for stormwater management facilities, designated environmental protection area, or lands within the floodplain will not be taken as part of the parkland dedication requirement as per the Planning Act.
3. Neighbourhood Parks are to be built concurrently with the development of the lands that the parks are intended to serve.
4. Should any subdivision or site plan application result in a decrease in total units anticipated, no compensation will be given for over dedication. Should any subdivision or site plan application result in an increase in the total units from what was anticipated, the corresponding additional parkland will be an obligation of, and is to be dealt with by, the landowner through the dedication of additional parkland or cash-in-lieu contribution to the City.
5. Cash in lieu of parkland collected within the Expansion Lands will be used to develop the parks identified on Schedule A1.

9.5 Amendments

The Secondary Plan and the accompanying Master Plans were prepared through an extensive process involving technical analysis and public consultation. Development should proceed in a manner that is consistent with the policies, plans, guidelines, and recommendations contained in the documents.

However, it is not possible to anticipate every circumstance or issue that may arise over the course of the development of the lands. Accordingly, there must be a mechanism to permit landowners to make amendments, as deemed necessary.

The amending process distinguishes between minor and major changes. A substantive design change will require approval by City Council and external agencies, as necessary, and may necessitate the completion of an amendment to the Environmental Assessment (EA). A minor change would not require these amendments and may be made at the discretion of the Planning Department.

9.5.1 Minor Changes

Minor design changes are changes which do not appreciably change the expected net impacts or outcomes associated with the Secondary Plan.

Minor changes to Schedule A1 such as:

- The location of parkland;
- The location, size, shape and/or area of Community Facilities or Commercial blocks; or
- The location of stormwater management facilities.

These minor modifications will generally be made through Plan of Subdivision or Site Plan Control applications. Affected landowners and appropriate stakeholders will be notified of any proposed modifications through the standard application circulation process established in the Planning Act.

9.5.2 Major Changes

Major changes are those which change the intent of the EAs or appreciably change the expected net impacts or outcomes associated with the project. Major changes to the Land Use Plan or changes requiring amendments to schedules of the Official Plan, such as:

- A major realignment in the network of collector streets;
- A reduction in the extent of overall parkland or open space,
- A change to the location of the proposed sanitary Pumping Stations;
- A change to the number of proposed sanitary Pumping Stations; or
- A change to the number of stormwater management facilities.

Such major modifications will be subject to an Official Plan Amendment process under the Planning Act.

Major modifications may require an addendum to the Master Plans to document the change, identify the associated impacts and mitigation measures to allow related concerns to be addressed and reviewed by the appropriate stakeholders.

Major changes should be supported by a Planning Rationale and any technical documents to provide justification for the proposed change and to assist the City and the public in the review of the proposal.

9.6 Affordable Housing

Affordable housing will be accommodated in accordance with the United Counties of Prescott and Russell Official Plan, and the City of Clarence-Rockland Official Plan. The Expansion Lands Secondary Plan encourages affordable housing through the provision of a range of housing types.

1. Encourage a minimum of 10% of new residential units to be affordable housing units.
2. Where 25 or more single and/or semi-detached dwelling units or 50 or more multi-family dwelling units are proposed, encourage an affordable housing component within the project.
3. Ensure cost-effective development within the Expansion Lands to reduce the costs associated with housing.
4. Alternative housing types including garden suites and secondary (accessory) dwelling units are permitted within all residential designations in the Expansion Lands.

10.0 Schedules

Schedule A1 – Expansion Lands Land Use and Road Network

Part C - Implementation and interpretation

Implementation and interpretation of this Amendment shall be made having regard to all applicable policies set out in the Official Plan of the Urban Area of the City of Clarence-Rockland.

Preliminary Environmental Constraints Report

Expansion Lands, Clarence Rockland, Ontario

CIMA+ file number: C10-A000817
June 4, 2019

City of Clarence Rockland

Preliminary Environmental Constraints Report

Clarence Rockland Expansion Lands

Project # C10-A000817

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Environmental Specialist

Reviewed by: Valérie Bédard, B Sc.
Project Manager - Environment

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CIMA+

240 Catherine St.
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June 4, 2019

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Executive Summary

CIMA+ was retained by FOTENN Planning + Design, on behalf of the City of Clarence-Rockland, to undertake an Environmental Impact Statement (EIS) on the proposed expansion lands to the southeast of the existing Urban Area Boundary of the City of Rockland.

The study area is irregularly shaped, consisting of 137 ha on the south side of David Street and bounded by Clarence Creek to the east. It is situated primarily to the east of Caron street except for an approximately 23 ha area to the southwest of the study area.

The proposed project consists of an expansion of the City of Clarence Rockland's urban boundary. The area currently consists of lands which are undeveloped or are used for agricultural purposes. The preferred zoning for these expansion lands would be a mix of low, medium, and high-density residential areas as well as limited commercial and institutional areas. The plan also includes provisions for site servicing, roadways, drainage, parklands and an environmental protection zone setback along the unnamed tributary at the center of the site.

The preliminary assessment of environmental constraints was completed through a combination of background documentation review and field surveys. General development best practices have been recommended to avoid or mitigate potential environmental impacts to identified valued ecosystem components. A review of applicable legislation has also been completed to inform requirements for future development of the site.

1. Introduction

CIMA+ was retained by FOTENN Planning + Design, on behalf of the City of Clarence-Rockland, to undertake an Environmental Impact Statement (EIS) on the proposed expansion lands to the southeast of the existing Urban Area Boundary of the City of Rockland. The study area is irregularly shaped, consisting of 137 ha on the south side of David Street and bounded by Clarence Creek to the east. It is situated primarily to the east of Caron street except for an approximately 23 ha area to the southwest of the study area.

Figure 1 presents the location of the site with its surroundings.

Figure 1: Site Location Map

This study was undertaken to identify the site's general ecological features and constraints and to assist in future development option analyses. The mandate objectives are to:

- Describe the existing natural conditions of the study site based on consultations, available documentation and field surveys; and
- Identify any potentially significant environmental features and functions present at the site.

Following the completion of field assessments, recommendations for environmental impact avoidance and mitigation measures will be developed for inclusion in the site development plans.

1.1 Existing and Past Land Use

The study area is quite large and currently supports several land uses. Most of the lands are agricultural fields, which at the time of the study are planted with corn and soy. A conifer plantation is also centrally located on the north side of the study area. Remaining lands are undeveloped lands, primarily woodlands and meadows, with a small amount of residential development along David Road to the north and Caron Street to the west.

2. Background Review

The following public sources were consulted as part of our desktop research:

- Google Earth Aerial imagery (current and historic);
- Geographic information from Land Information Ontario;
- Crown Land Use Policy Atlas;
- The Ecosystems of Ontario, Part 1 Ecozones and Ecoregions, Ministry of Natural Resources, 2009;
- Atlas of Breeding Birds of Ontario (ABBO);
- eBird online database;
- Ontario Nature Reptile and Amphibian Atlas; and
- Ontario Geological Survey (OGS Earth – Surficial and Bedrock mapping).

The desktop study also included the consultation of various other sources to identify potential Species at Risk (SAR) that could be encountered on the site.

Information requests were submitted to the Natural Heritage Information Center (NHIC) and the Ministry of Natural Resources and Forestry - Kemptville District (MNRF) to obtain relevant information concerning the property. Correspondence is included in Appendix A.

3. Site Visit

Two site visits were conducted by **CIMA+** staff on July 8th, 2018 and on August 8th, 2018. The first site visit was attended by Nicholas Bertrand, B.Sc. and Kai Markvorsen, B.Sc. The second site visit was attended by Claudia Fortin, B.Sc. and Stéphane Boisvenue, senior technician.

Activities undertaken during the July 8th site visit included:

- Vegetation survey;
- Bird survey;
- Incidental observations of wildlife species.

Activities undertaken during the August 8th site visit included:

- Delineation of vegetation communities;

- Assessment of habitats for potential Species at Risk; and
- Incidental observations of wildlife species.

4. Site Description

4.1 Ecoregion

The Study Area is located within Ecoregion 6E (Lake Simcoe-Rideau), the second most densely populated ecoregion in Ontario. This ecoregion is part of the Mixedwood Plains Ecozone of Southern Ontario, characterized by a relatively diverse vegetation.

4.2 Surficial Geology

Surficial geology mapping from the Ontario Geological Survey indicates that the Study Area is underlain by a combination of till, fine-textured glaciomarine, organic and alluvial deposits as well overlaying Paleozoic bedrock. Typical soils in this units are comprised of clay, sand and silt. Surficial geology of the Study Area is shown in Figure 2.

Figure 2. Surficial Geology

4.3 Provincial Designations

There are no Areas of Natural and Scientific Interest (ANSI) within, or in proximity to, the Study Area.

Rockland Marsh is a Provincially Significant Wetland (PSW) that is located downstream of the project site along Clarence Creek.

Key Site Features and designated areas are identified on Figure 3.

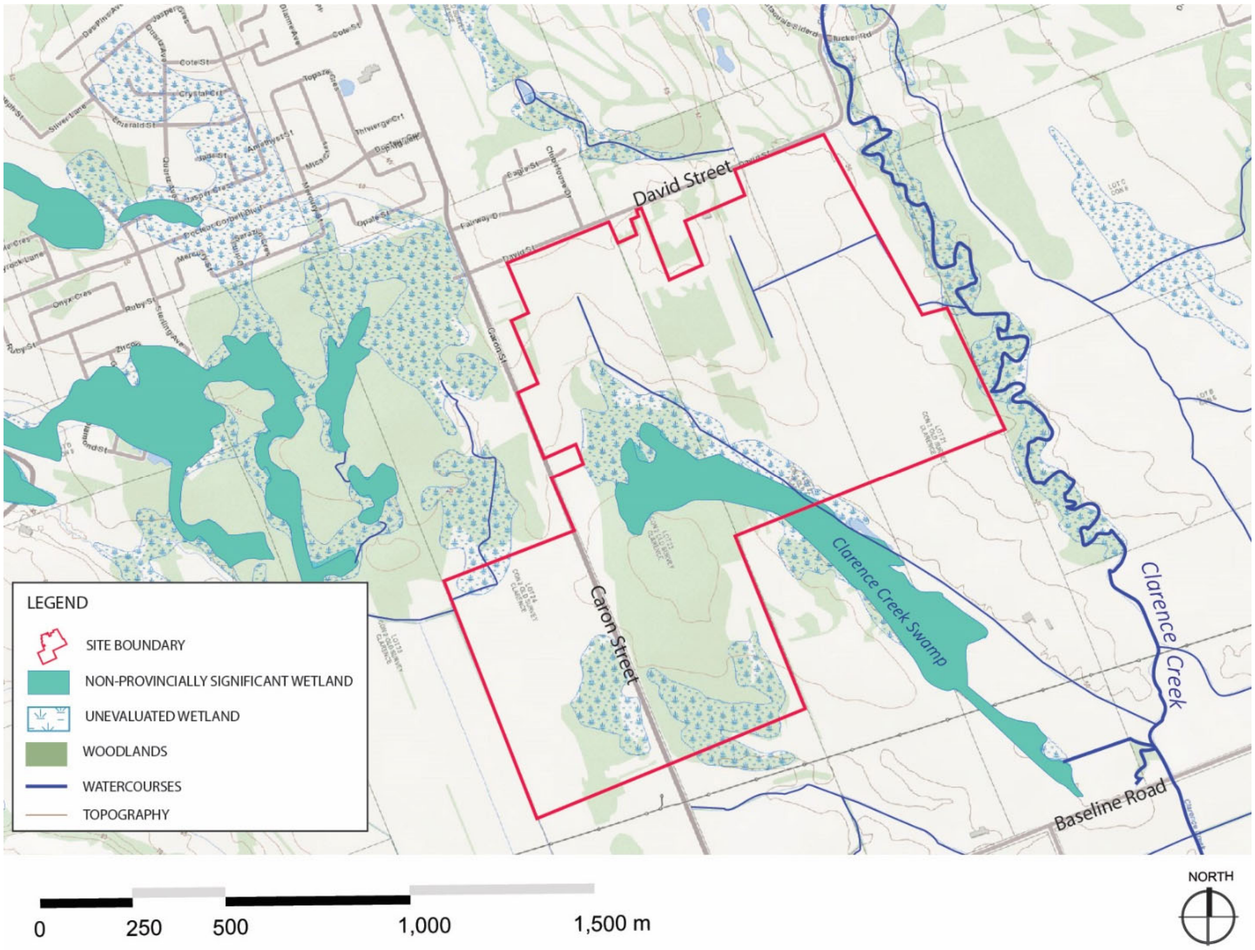

Figure 3. Existing Landscape Features and Designations

4.4 Vegetation Cover

Vegetation cover was examined as part of the site visit and classified according to the Ecological Lands Classification (ELC) for Southern Ontario. Vegetation communities were determined by assessing type and percent vegetative cover, soil type and moisture content, presence of surface water, etc.. Based on this assessment, the vegetation cover on the site consisted of the following vegetation community types:

- Organic Thicket Swamp (SWT3)
- Red Pine Cultural Coniferous Plantation (CUP3)
- Mineral Cultural Meadow (CUM1)
- Coniferous Swamp (SWC)
- Dry-Fresh Pine Coniferous Forest (FOC1)
- Mixed Forest (FOM)
- Sugar Maple Cultural Deciduous Plantation (CUP1-1)
- Cattail Mineral Shallow Marsh (MAS2-1)
- Mineral Thicket Swamp (SWT2)
- Mineral Cultural Meadow (CUM1)
- Dry Fresh Oak Deciduous Forest (FOD-1)
- White Spruce – European Larch Coniferous Plantation (CUP3-8)
- Mineral Cultural Thicket (CUT1)

In addition to these identified vegetation communities, there is a large area of recent clear-cut which covers most of the southern portion of the site along the east side of Carron St. No significant woodlands or valley lands were identified within the study area.

The location and size of the vegetation community types is shown in Figure 4.

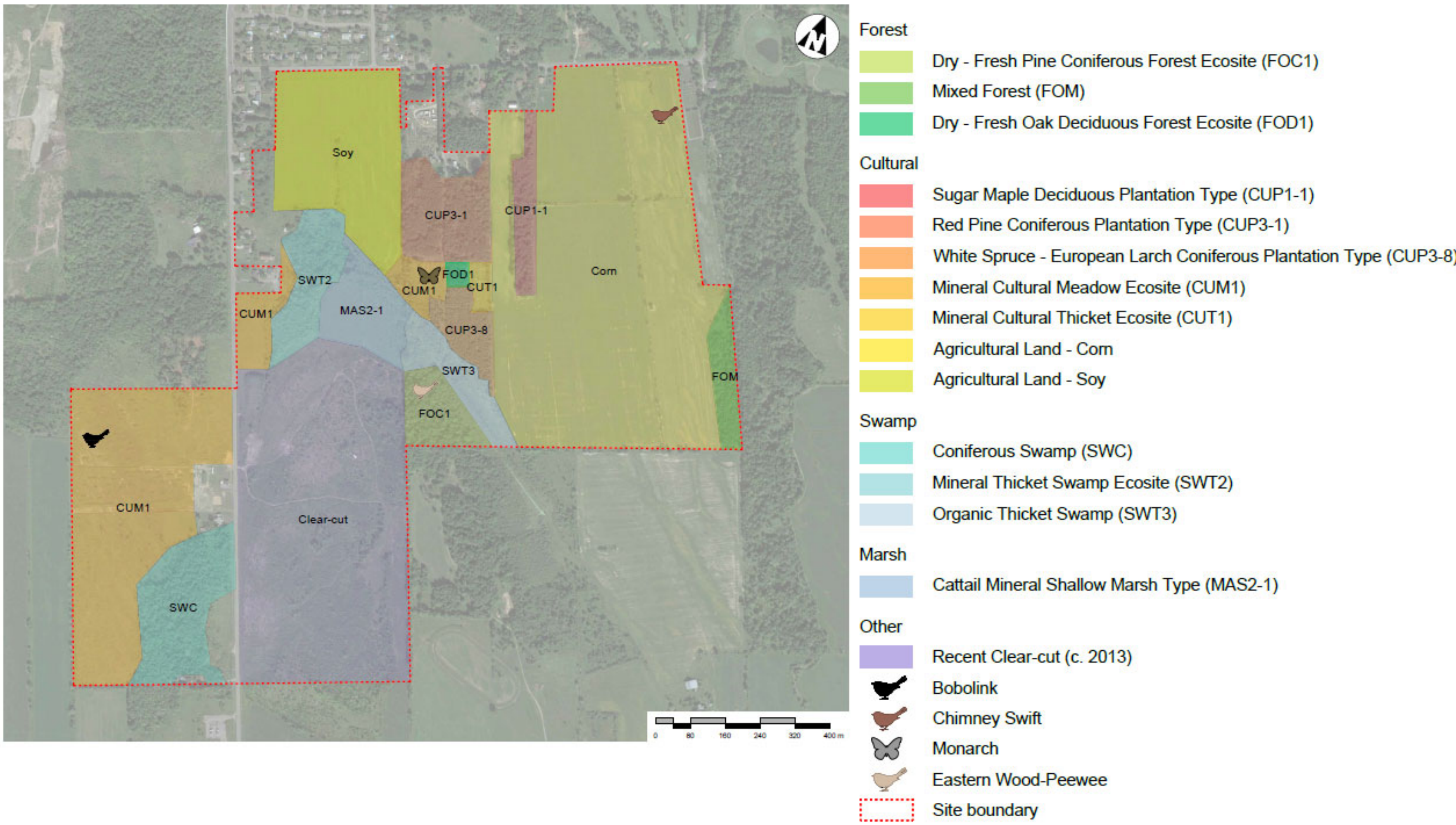

Figure 4:Expansion Lands ELC Mapping

4.5 Wildlife

Characterization of the biological community in the Study Area was completed by compiling data from published resources and local agencies as well as by conducting a visual assessment of natural heritage features, with focus on vegetation composition and the presence of Species at Risk (SAR).

4.5.1 Reptiles and Amphibians

The Ontario Nature Reptile and Amphibian Atlas (Atlas Squares 18VR74 and 18VR84) was consulted to determine which amphibian and reptile species are likely to occur in the general vicinity of the Study Area. The species observed in these two atlas squares are presented in Table 1 below.

Table 1: Amphibian and Reptile Species

Common Name	Scientific Name
American Bullfrog	(*Lithobates catesbeianus)*
American Toad	(*Anaxyrus americanus*)
Eastern Newt	(*Notophthalmus viridescens*)
Eastern Gartersnake	(*Thamnophis sirtalis*)
Eastern Red-backed Salamander	(*Plethodon cinereus*)
Four-toed Salamander	(*Hemidactylium scutatum*)
Green Frog	(*Rana clamitans*)
Jefferson/Blue-spotted Salamander Complex	(*Ambystoma jeffersonianum*)
Midland Painted Turtle	(*Chrysemys picta*)
Mudpuppy	(*Necturus maculosus*)
Northern Leopard Frog	(*Lithobates pipiens*)
Red-bellied Snake	(*Storeria occipitomaculata*)
Snapping Turtle	(*Chelydra serpentine*)
Spotted Salamander	(*Ambystoma maculatum*)
Spring Peeper	(*Pseudacris crucifer*)
Wood Frog	(*Lithobates sylvaticus*)

No reptile or amphibian species were observed during **CIMA+** site visits.

4.5.2 Birds

The Atlas of Breeding Birds of Ontario (square 18VQ49) and eBird identified 218 bird species as potentially occurring within the study area. A complete list of these species is presented in **Appendix B**. During the site visit, 33 bird species were identified by sight and/or sound over the course of both field visits and are presented in Table 2.

Table 2: Bird Species

Common Name	Scientific Name
Chimney swift	*Chaetura pelagica*
Bobolink	*Dolichonyx oryzivorus*
Alder flycatcher	*Empidonax alnorum*
Great Crested Flycatcher	*Myiarchus crinitus*
American Crow	*Corvus brachyrhynchos*
Blue Jay	*Cyanocitta cristata*
Red-breasted Nuthatch	*Sitta canadensis*
White-breasted Nuthatch	*Sitta carolinensis*
House Wren	*Troglodytes aedon*
American Robin	*Turdus migratorius*
Great Catbird	*Dumetella carolinensis*
Cedar Waxwing	*Bombycilla cedrorum*
Black and White Warbler	*Mniotilta varia*
Mourning Warbler	*Geothlypis philadelphia*
Common Yellowthroat	*Geothlypis trichas*
Yellow Warbler	*Setophaga petechia*
White throated Sparrow	*Zonotrichia albicollis*
Song Sparrow	*Melospiza melodia*
Chipping Sparrow	*Spizella passerina*
Swamp Sparrow	*Melospiza georgiana*
Scarlet Tanager	*Piranga olivacea*
Red-breasted Grosbeak	*Pheucticus ludovicianus*
Indigo Bunting	*Passerina cyanea*

Common Name	Scientific Name
Redwinged Blackbird	*Agelaius phoeniceus*
Brownheaded Cowbird	*Molothrus ater*
Common Grackle	*Quiscalus quiscula*
American Goldfinch	*Spinus tristis*
Mourning Dove	*Zenaida macroura*
Tree Swallow	*Tachycineta bicolor*
Puna Yellow Finch	*Sicalis lutea*
Eastern Wood-Peewee	*Contopus virens*

4.5.3 Mammals

Specific mammal surveys were not conduced as part of **CIMA+** site visits. However incidental observations were made. Species include Eastern Chipmunk (*Tamias striatus*) and red squirrel (*Tamiasciurus hudsonicus).* All species observed are common species in the province of Ontario.

4.5.4 Fish and Fish Habitat

Specific critical habitat for aquatic species at risk was not noted as part of the background review and a complete assessment of aquatic habitat was beyond the scope of this assessment. However, aquatic habitat is present within the study area and does constitute potential fish habitat.

4.6 Habitat for Species at Risk

The study area is situated on private lands. As such, the protected Endangered and Threatened Species at Risk (SAR) are those covered by the provincial *Endangered Species Act* (ESA). The federal Species at Risk Act would only be applicable to migratory birds protected under the *Migratory Birds Convention Act* and fish protected under the *Fisheries Act*. Distribution ranges for SAR were determined using a variety of sources including: COSEWIC reports, ABBO and the species at risk Ontario website. In addition, the MNRF identified potential SAR as part of their response to the information request. The list of potential SAR, their status and preferred habitat and whether that habitat is present within the study area is presented in Table 3. SAR observed during site visits are noted and the locations of observation are identified in Figure 4.

Table 3: Potential Species at Risk

Common Name Scientific Name Rarity Rankings	Comments	Habitat Present	Observed
American Eel *Anguilla rostrata* Federal - **Threatened (TH)** Provincial - **Endangered (EN)**	In Ontario, American Eels can be found as far inland as Algonquin Park. Once the eels mature (10-25 years) they return to the Sargasso Sea to spawn.	No	No
Northern Brook Lamprey *Ichthyomyzon fossor* Federal - **Special Concern (SC)** Provincial - **Special Concern (SC)**	The Northern brook lamprey is a small, elongate fish that grows 16 cm. It has an eel-like appearance and a round, jawless mouth with teeth arranged in a circle and seven gill openings and no pectoral or pelvic fins. Adults are dark greyish-brown on the back and sides, with pale grey or silvery white on the belly. It lives in clear, cool water streams.	No	No
Barn Swallow *Hirundo rustica* Federal - **Not Listed** Provincial - **Threatened (TH)**	Barn Swallows forage in open areas throughout most of the continent, including suburban parks and ball fields, agricultural fields, beaches, and over open water such as lakes, ponds and coastal waters. Breeding habitat must include open areas for foraging, structures or cliffs to build nests on, and a source of mud such as a riverbank to provide the material for building nests.	Yes	No
Eastern Meadowlark *Sturnella magna* Federal - **Threatened (TH)** Provincial - **Threatened (TH)**	Eastern Meadowlarks are most common in native grasslands and prairies, but they also occur in pastures, hayfields, agricultural fields, airports, and other grassy areas.	Yes	No
Butternut *Juglans cinereal* Federal - **Endangered (EN)** Provincial - **Endangered (EN)**	Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams	Yes	No
Little Brown Bat *Myotis lucifugus* Federal - **Endangered (EN)** Provincial - **Endangered (EN)**	During the day they roosts in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. They hibernate most often in caves or abandoned mines that are humid and remain above freezing.	Yes	No

Common Name Scientific Name Rarity Rankings	Comments	Habitat Present	Observed
Tri-colored Bat *Perimyotis subflavus* Federal - **Endangered (EN)** Provincial - **Endangered (EN)**	During the summer, the Tri-colored Bat is found in a variety of forested habitats. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. They overwinter in caves where they typically roost by themselves rather than part of a group.	Yes	No
Northern Long-eared Bat *Myotis septentrionalis* Federal - **Endangered (EN)** Provincial - **Endangered (EN)**	Northern long-eared bats are associated with boreal forests, choosing to roost under loose bark and in the cavities of trees.	Yes	No
Chimney Swift *Chaetura pelagica* Federal – **Threatened (TH)** Provincial – **Threatened (TH)**	The Chimney Swift spends most of its time flying and even forages in the air, catching its prey (flying insects) in flight. Primarily found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. They also tend to stay close to water as this is where the flying insects that they eat congregate.	No	Yes - foraging over agricultural (corn) field
Monarch *Danaus plexippus* Federal – **Endangered (EN)** Provincial – **Special Concern (SC)**	Milkweeds (numerous species) are the sole food plant for Monarch caterpillars. These plants grow predominantly in open and periodically disturbed habitats such as roadsides, fields, wetlands, prairies, and open forests. Milkweeds are often planted outside their native range, and sometimes wayward Monarchs are observed at these patches.	Yes	Yes – CUM1
Bobolink *Dolichonyx oryzivorus* Federal - **Threatened (TH)** Provincial - **Threatened (TH)**	The Bobolink is a medium sized songbird found in grasslands and hayfields. Bobolinks often build their small nests on the ground in dense grasses. Bobolinks spend much of their time out of sight on the ground feeding on insects and seeds.	Yes	Yes – foraging/ perching over CUM1

Common Name Scientific Name Rarity Rankings	Comments	Habitat Present	Observed
Eastern Wood- Peewee *Contopus virens* Federal - **Special Concern (SC)** Provincial - **Special Concern (SC)**	The eastern wood-pewee is a small forest bird that grows to about 15 cm long. It lives in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests and feeds on flying insects.	Yes	Yes – calling in FOC1
Jefferson/Blue-spotted Salamander Complex *Ambystoma jeffersonianum* Federal - **Endangered (EN)** Provincial - **Endangered (EN)**	Jefferson salamanders are 12-20 cm long and have a grey or brown-coloured back, with lighter under- parts they may also have blue flecks on the sides and limbs. Adults live in moist, loose soil, under logs or in leaf litter but migrate to woodland ponds to breed in the spring. They lay their eggs in clumps attached to underwater vegetation.	Yes	No
Snapping Turtle *Chelydra serpentina* Federal - **Special Concern (SC)** Provincial - **Special Concern (SC)**	Canada's largest freshwater turtle, Snapping Turtles have large black, olive or brown shells. They typically inhabit shallow waters and hide under the soft mud and leaf litter. From early to mid-summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams but they will also nest in man-made structures including the gravel shoulders of roads, dams and aggregate pits.	Yes	No

All endangered and threatened species receive individual protection under Section 9 of the *Endangered Species Act* (ESA) and receive general habitat protection under Section 10 of the ESA.

Species listed as special concern are not protected under the ESA; however, these species may receive protection under other legislation (e.g. the *Fish and Wildlife Conservation Act*). The habitat of special concern species may also be considered significant wildlife habitat.

5. Description of Proposed Project

The proposed project consists of an expansion of the City of Clarence Rockland's urban boundary. The lands are comprised of 137 ha of lands which are undeveloped or are used for agricultural purposes. The preferred zoning for these expansion lands would be a mix of low, medium, and high-density residential areas as well as limited commercial and institutional areas. The plan also includes provisions for site servicing, roadways, drainage, parklands and an environmental protection zone setback along the unnamed tributary at the center of the site. The final preferred concept plan is shown in **Appendix C**.

6. Environmental Constraints

6.1 Federal Legislation

6.1.1 Fisheries Act

The Fisheries Act is administered by the Department of Fisheries and Oceans Canada (DFO) and is intended to manage threats to the sustainability and ongoing productivity of Canada's fisheries. Section 35 of the Act prohibits the carrying on of a work, undertaking or activity that results in serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Serious harm to fish is defined as the death of fish or the permanent alteration to, or destruction of, fish habitat.

Fish habitat is defined as spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly to carry out their life processes.

If, as part of development, work is proposed within 30 m of Clarence Creek, its tributaries or a hydraulically connected wetland, an environmental professional would have to conduct a fisheries self-assessment to assess if a *Fisheries Act* request for review needs to be submitted to DFO.

6.1.1 Migratory Birds Convention Act

The *Migratory Birds Convention Act* regulates the protection and conservation of migratory birds as populations and individuals and protects their nests. The Act applies to any areas that provide potential for nesting habitat of migratory birds.

Section 6 of the Migratory Bird Regulations made under the Act states that no person shall disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird except under authority of a permit.

As the Study Area provide nesting opportunities for migratory birds, the provisions of this Act apply to any development activities proposed on these expansion lands.

6.2 Provincial Legislation

6.2.1 Endangered Species Act

The *Endangered Species Act* prohibits any person from killing or damaging the habitat of species that are listed on the Species at Risk in Ontario list. Some exemptions exist under O.Reg. 242/08 of the Act, related to particular species and activities, for example the Eastern Meadowlark and the Bobolink. If a proposed undertaking is covered under one of the exemptions, a streamlined notification process applies. If none of the exemptions apply, a permit under section 17(1) of the Act is required.

The SAR screening conducted for this project indicates potential for multiple species at risk and their habitat is present within the study area. Field assessments also identified several SAR. Further assessments will be required to support future development within the boundary expansion area in order to avoid impacts to these species.

6.2.1 Provincial Policy Statement

The Provincial Policy Statement (PPS) was issued under Section 3 of the Planning Act and is applicable province-wide to all planning decisions. The Study Area is in Ecoregion 6E, and there are natural heritage features in the Study Area that are protected by the PPS.

Development and site alteration are not permitted in significant woodlands, significant valleylands, significant wildlife habitat, or fish habitat unless it has been demonstrated that there will be no negative impacts on the natural features or on the ecological functions. It is expected that this assessment will be carried out through a development specific EIS.

6.2.1 Conservation Authorities Act

The Conservation Authorities Act was enacted to provide for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario. Under Section 21 of the Act, Conservation Authorities have the power to study and investigate the watersheds of their jurisdictions and to determine programs whereby the natural resources of the watershed may be conserved, restored, developed and managed.

The project is not located within the jurisdiction of the South Nation Conservation Authority (SNCA). However, the SNCA provide comment and review of projects in this area through a memorandum of understanding with the municipality.

6.3 Municipal Policy

6.3.1 Official Plan of the Urban Area of the City of Clarence Rockland

While the study area is not within the urban area boundary at this time, it is expected that the requirements of the Official Plan will apply once the boundary is expanded. The Official Plan identifies several environmental requirements indented to avoid or mitigate impacts to species and their habitats. These requirements are summarized below:

<u>Habitat of Endangered and Threatened Species (Section 4.13.2)</u>

An Environmental Impact Study (EIS) is required when development and/or site alterations are proposed within 50 metres of significant portions of the habitat of threatened and endangered species. As mentioned above habitat for several SAR was identified within the study area.

<u>Vegetation Cover (Section 4.13.4)</u>

Future development must consider the following criteria for the purposes of the reasonable protection of trees and shrubs:

- The maintenance of as much of the natural vegetation between the development and any existing public roads as possible.
- The protection of significant trees or shrubs.
- For developments which require site plan approval, a tree inventory may be required, and the grading plan and landscaping plan should consider measures for the protection of trees.

- For developments that are proposed by plan of subdivision, a tree preservation plan with recommended measures to protect trees will be required as a condition of the subdivision approval.

Fish Habitat (Section 4.13.5)

The Official Plan establishes a minimum setback from waterbodies at 30 metres. If any development or site alteration is proposed that would reduce that distance or that has the potential to negatively impact fish or fish habitat, an Environmental Impact Study must be submitted to support the development.

Setbacks from Water (Section 4.21)

All buildings and structures, except for electric power transmission lines and other public utilities, marinas and marine facilities, will be set back a minimum of 30 m from the high-water mark of any waterbody or watercourse. Development and site alteration within the setback may be permitted where an EIS has demonstrated there will be no impact on the watercourse. Existing vegetation between buildings or structures and the high-water mark should remain undisturbed where possible.

Wetlands (Section 5.7)

The Official plan designates all identified provincially significant wetlands (PSW as identified by the Ministry of Natural Resources (MNR) using the Ontario Wetland Evaluation System) as wetlands. While there is a PSW located downstream of the Study Area along Clarence Creek there are no PSW located within the study area.

6.3.2 Official Plan – United Counties of Prescott and Russell

The official plan of the United Counties of Prescott and Russell also identify several environmental requirements relevant to development within the expansion lands area.

Surface Water Management Plans (Section 3.4.4)

In order to control flooding, ponding, erosion and sedimentation and to protect, as much as possible, water quality and aquatic habitat or other natural habitat, storm water management plans shall be required for any new development consisting of more than four lots or for commercial or industrial developments with large amounts of impervious area. Stormwater management will be undertaken in accordance with the Ministry of Environment and Climate Change Guideline entitled “Stormwater Management Planning and Design Manual, 2003”. Stormwater management may not be required for small scale developments such as lots created through the consent process or minor developments subject to site plan control where there is no impact on the watershed.

Wetlands Policy Areas (Section 5.5.1)

The Official plan designates all identified provincially significant wetlands (PSW as identified by the Ministry of Natural Resources (MNR) using the Ontario Wetland Evaluation System) as significant wetlands. While the official plan does not identify wetlands within the expansion lands area as significant it requires that:

a) Any development or site alteration proposed on or adjacent to a locally significant wetland shall not be permitted unless it has been demonstrated that there will be no negative impacts through an Environmental Impact Study (EIS).

b) Any development or site alteration proposed on or adjacent to an evaluated, non-provincially significant wetland (i.e. not identified to be important or significant at a provincial, local or municipal level), shall avoid negative impacts to the wetland (e.g. relocate the development); and, where avoidance is not possible, minimize the impacts to the fullest extent possible (as determined through an EIS).

c) Any development or site alteration proposed on or adjacent to an unevaluated wetland not evaluated according to the Ontario Wetland Evaluation System), shall require a scoped Environmental Impact Study.

Endangered or Threatened Species Habitat Species at Risk (Section 5.5.2)

Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

Where a screening identifies the potential habitat of endangered and threatened species, an ecological site assessment (EcoSA) shall be required in support of a planning application. The EcoSA shall assess the potential for significant habitat and delineate the extent of significant habitat of endangered and/or threatened species within or adjacent to an area proposed for development or site alteration. In cases where an environmental impact study (EIS) is triggered by the Official Plan, the above requirements may be addressed as part of the environmental impact study, provided it is undertaken by a qualified individual.

On all sites proposed for development or site alteration, a site inventory for butternut, an endangered tree species, will be required prior to the disturbance or removal of trees. When harm to (cutting of branches, root disturbances, etc.) or removal of butternut is proposed, prior assessment of the health of the species by a qualified Butternut Health Assessor is required.

Fish Habitat (Section 5.5.7)

Rivers, municipal drains and all other watercourses in the United Counties are either direct or indirect fish habitat.

Development and site alterations shall not be permitted in fish habitat except in accordance with provincial and federal requirements. Where development is proposed within 120 metres of an area of fish habitat as identified on Schedule B or adjacent to an area of fish habitat identified through consultation with the South Nation Conservation or the federal Department of Fisheries and Oceans it must be demonstrated through an environmental impact study carried out in accordance with Section 5.6 that there will be no negative impacts on the natural feature or on the ecological functions for which the feature is identified.

7. Recommended Mitigation Measures

As described above, there are no detailed plans to develop properties within the study area as part of the expansion of the urban boundary. As such, the recommendation of site specific mitigative measures is not possible at this time. However, the following work and general recommendation measures are recommended to inform future development:

- The unevaluated part of the centrally located wetland identified through field assessments should be assessed using the Ontario Wetland Evaluation System to determine whether it meets the criteria of being a PSW;
- It is expected that development within the expanded urban area boundary to be planned in accordance with the Official Plan of the Urban Area of the City of Clarence-Rockland will require the preparation of projects specific EIS;
- EIS should consider the potential impacts to SAR and SAR habitat identified in section 4 of this report which may be present within the area to be developed.
- Compliance with the *Endangered Species Act*, *Species at Risk Act* and *Fisheries Act* obligations will need to be confirmed before any modification to a site part of the expansion lands can be carry out.
- Implement Environment and Climate Change Canada *Guidelines to reduce risk to migratory birds*.
- While working within 30 m of a fish habitat, implement DFO *Measures to avoid causing harm to fish and fish habitat*.
- Tree removal and site preparation for construction should occur before April 1st or after September 30th to minimize impacts to habitat of migratory birds during critical life stages and comply with provincial and federal legislation. Following these guidelines will also allow to limit the impacts of the site preparation on bats as most bats should be absent from the site after September 30.
- Minimize the removal of natural vegetation and clearly delineated areas to be removed on the construction drawings.
- Educate workforce on potential wildlife which could occur in the vicinity of the work area and measures to avoid wildlife.
- Ensure that all grassland habitat that needs to be removed is cut prior to April 1 or after August 31. This is important to avoid impacting SAR grassland birds.
- Should any mammal, reptile or amphibian species be encountered during construction, the construction activities will immediately stop until the animal has safely moved out of harm's way. If a non-SAR individual needs to be moved, it can be relocated to its appropriate habitat outside of the work area.
- Should a nest be observed (any species) stop all activity at or near the nest and contact professional biologist for next steps.

- When possible, work should be completed during daylight hours. If nighttime lights are used, they will be installed so as to illuminate the work area only to minimize impacts to nighttime activities of wildlife.
- Vehicles and equipment should have the appropriate mufflers installed.
- Vehicle and equipment engine idling will be minimized
- Construction vehicles will have designated access routes from and to the construction area.
- Temporarily disturbed areas will be revegetated to pre-construction conditions using native trees and shrubs.
- All equipment and vehicles will be equipped with dust collectors and mufflers as appropriate.
- During concrete removal, tarps will be used to contain airborne dust particles.
- Water will be applied, at a minimum, on a daily basis, to all inactive disturbed surface areas. Water will be applied more frequently if required to prevent the visible emissions of fugitive dust.
- Water will be applied to all unpaved roads used for vehicular traffic at a frequency sufficient to prevent the visible emissions of fugitive dust.
- Clean gravel with low fines content will be chosen as material to top unpaved roads. Unpaved roads will be regularly graded and maintained to avoid washboarding and rutting that can increase fugitive dust emissions.
- Speed limits will be posted throughout the project area to control fugitive dust on all unpaved roads.
- All loads on haul trucks will be covered.
- During very windy conditions, material handling/transfer activity that generates fugitive dust will be avoided or reduced. If it is not possible to reschedule the activity, increased application of water for dust suppression may be used.
- Water will be applied to all open stockpiles on a daily basis when there is evidence of wind driven fugitive dust.
- Wetted stockpiles will be surrounded with sediment and erosion control measures (i.e. fencing).
- Materials with the potential to generate dust will be sprayed with water 15 minutes prior to handling and/or at points of transfer.
- Burning of waste materials will be prohibited
- There will be no use of herbicides in clearing of vegetation.
- Refuelling of equipment (e.g., pumps) and maintenance shall be conducted off slopes and away from water bodies on impermeable pads (drip tray) or buried liners to allow full containment of spills.
- The contractor crew will be fully trained on the use of clean-up materials in order to minimize impacts of any accidental spills.

- Ensure that the erosion and sediment control (ESC) measures chosen are appropriate for the site and are functioning as intended.
- Maintain and monitor ESC measures, provide the results of monitoring, and ensure adjustments as needed are made on a continuous basis.
- No work will occur in or within 30 m of the water until the appropriate ESC measures have been properly implemented. These will be designed to prevent the movement of suspended sediments outside of the site preparation and construction work areas.
- Work will stop if sedimentation issues occur outside of work areas until the cause of sedimentation is identified and addressed
- Should dust particles be created during concrete crushing, excavation, stockpiling etc. then they will be suppressed using the appropriate method (i.e. tarps).
- Any removal of riparian vegetation will be minimized and removal will be completed using small machinery.
- Where possible, vehicle traffic will be restricted to access roads
- The sediment fencing will not be removed until the terrestrial vegetation has become re-established.

The measures identified above should be considered in the context of proposed development within the expansion lands and are not necessarily a complete listing.

8. Conclusion

CIMA+ has completed, on behalf of the City of Clarence-Rockland, a preliminary assessment of environmental constraints on the proposed expansion lands to the southeast of the existing Urban Area Boundary of the City of Rockland, Ontario. Based on a combination of background documentation review and field surveys a developable area of the site has been defined and general development best practices have been recommended to avoid or mitigate potential environmental impacts to identified valued ecosystem components. A review of applicable legislation has also been completed to inform requirements for future development of the site

8.1 Study Limitations and Constraints

CIMA+ completed diligent and reasonable research in the conduct of this evaluation, with respect to the recognized laws and standards of practice.

The facts presented in this report are strictly limited to the period of investigation. The conclusions presented in this report are based on the available information and documents, the observations made during the Site visit and also the information obtained from communications with various contacts. The interpretation presented in this report is limited to this data.

CIMA+ is not responsible for erroneous conclusions due to voluntary abstention or the non-availability of pertinent information. Any opinion expressed in relation to legal or regulatory conformity is technical and should not be, in any case, considered as legal advice.

8.2 Signatures

CIMA+

Kai Markvorsen, B.Sc.
Environmental Specialist

Valérie Bédard, B.Sc.
Project Manager - Environment

C10-A000817

9. References

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Ottawa, NTS 31G/SW and part of NTS 31G/NW, data base map, southern Ontario engineering geology terrain study (Map # M5513, 1:100000) - 1990. Accessed through OGS Earth at https://www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth . Ministry of Energy, Northern Development and Mines.

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Ontario Basic Mapping (2018). [Online] Available at: http://www.geographynetwork.ca/website/obm/viewer.htm

Bird Studies Canada, Atlas of Breeding Birds of Ontario. Available at https://www.birdsontario.org/atlas/index.jsp?lang=en

Ontario Reptile and Amphibian Atlas. Available at https://ontarionature.org/programs/citizen-science/reptile-amphibian-atlas/

APPENDIX A

Correspondence

C10-A000817

Kai Markvorsen

From: Kai Markvorsen
Sent: Wednesday, April 11, 2018 1:10 PM
To: 'Inforequest, Kemptville (MNRF)'
Subject: Information Request supporting EIS for Clarence Rockland Urban Boundary Expansion
Attachments: Location Map.pdf; Clarence Rockland MNRF Info Request 2018-04-11.pdf

Hello,

Please find attached an information request, and location map, for available SAR and natural heritage information.

The study area is irregularly shaped, consisting of 133.5 ha on the south side of David Street and bounded by Clarence Creek to the east. It is situated primarily to the east of Caron street with the exception of an approximately 23 ha area to the southwest of the study area.

Please let me know if more information is required to support this request.

Regards,

Kai

Kai Markvorsen
Environment Professional
Environment

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240 Catherine Street, Suite 110
Ottawa, Ontario K2P 2G8
CANADA
Tel: 613-860-2462 ext. 6644 / Fax: 613-860-1870
Cell: 343-996-4951

Kai Markvorsen

From: NHIC-Requests (MNRF) <nhicrequests@ontario.ca>
Sent: Wednesday, April 4, 2018 5:16 PM
To: Kai Markvorsen
Subject: RE: Information Request to Support EIS for Clarence Rockland Urban Expansion

Hello Kai,

EO_ID 111923 represents an element occurrence for Eastern Meadowlark. This is an extant element occurrence. The most recent observations are from 2004.

EO_ID 111919 represents an element occurrence for Eastern Meadowlark. This is an extant element occurrence. The most recent observations are from 2004.

I also queried the Provincially Tracked Species Observations layer (Ontario's provincial record for observations for species of conservation concern) and did not find any newer observations for Eastern Meadowlark for your project site. I did find one observation for Least Bittern (made in 2016) that intersects your project site; the location was reported as the "pond" area in Morris Village, Rockland and we mapped it as a circle with a 1 km radius because we don't know where exactly the species was seen. The observer of the Least Bittern was not a naturalist or birder and reported having some trouble identifying the species. The observer did not have photos to share with us, so we could not confirm the identity of the species.

I queried our natural areas data and could not find reports for:

- Clarence Creek Swamp (Area ID 19089)
- Rockland Marsh (Area ID 19053) – this is a provincially significant wetland (wetland evaluation completed on November 18, 1999, total score: 479)
- South Rockland Swamp (Area ID 19057)

You can download spatial data for these wetlands from https://www.ontario.ca/data/wetlands.

Since your project area falls completely within the jurisdiction of the Ministry of Natural Resources and Forestry Kemptville District Office, I recommend contacting them to see if they have additional information or can offer you any guidance.

If you have any questions, or if there is anything else the Natural Heritage Information Centre can help you with, please let us know.

Best regards,
Martina

MNRF Science

Martina Furrer
Biodiversity Information Biologist
Ontario Natural Heritage Information Centre
Ontario Ministry of Natural Resources and Forestry
300 Water St, Peterborough, ON, K9J 3C7
705.755.2192 | martina.furrer@ontario.ca

http://www.ontario.ca/environment-and-energy/natural-heritage-information-centre

From: Kai Markvorsen [mailto:Kai.Markvorsen@cima.ca]
Sent: April 4, 2018 12:31 PM
To: NHIC-Requests (MNRF) <nhicrequests@ontario.ca>
Subject: Information Request to Support EIS for Clarence Rockland Urban Expansion

Hello,

We're looking for data on the following grid squares (with associated area ID references). Information request is supporting Environmental Impact Statement for the Urban Expansion of Clarrence Rockland.

Grid Square	ID Reference
18VR7843	areaid=19057
18VR7943	areaid=19053
18VR8043	nhic_eo_id=111923
18VR7842	areaid=19057
18VR7942	areaid=19057
18VR8042	areaid=19089
18VR7941	nhic_eo_id=111919
18VR8041	nhic_eo_id=111919

Please let us know if more information is required.

Regards,

Kai

Kai Markvorsen
Environment Professional
Environment

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CANADA
Tel: 613-860-2462 ext. 6644 / Fax: 613-860-1870
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Ministry of Natural Resources and Forestry

Kemptville District

10 Campus Drive
Postal Box 2002
Kemptville ON K0G 1J0
Tel.: 613 258-8204
Fax: 613 258-3920

Ministère des Richesses naturelles et des Forêts

District de Kemptville

10, promenade Campus
Case postale, 2002
Kemptville ON K0G 1J0
Tél.: 613 258-8204
Téléc.: 613 258-3920

Fri. Apr 13, 2018

Kai Markvorsen
CIMA+
240 Catherine Street, Suite 110
Ottawa, Ontario
K2P 2G8
(613) 860-2462
kai.markvorsen@cima.ca

Attention: Kai Markvorsen

Subject: Information Request - Developments
Project Name: EIS for Clarence Rockland Urban Boundary Expansion
Site Address:
Our File No. 2018_CLA-4511

Natural Heritage Values
The Ministry of Natural Resources and Forestry (MNRF) Kemptville District has carried out a preliminary review of the above mentioned area in order to identify any potential natural resource and natural heritage values.
The following Natural Heritage values were identified for the general subject area:

- Evaluated Wetland, Clarence Creek Swamp (Evaluated-Other)
- Evaluated Wetland, Estates Swamp (Evaluated-Other)
- Evaluated Wetland, South Rockland Swamp (Evaluated-Other)
- River, Clarence Creek

Municipal Official Plans contain information related to natural heritage features. Please see the local municipal Official Plan for more information, such as specific policies and direction pertaining to activities which may impact natural heritage features. For planning advice or Official Plan interpretation, please contact the local municipality. Many municipalities require environmental impact studies and other supporting studies be carried out as part of the development application process to allow the municipality to make planning decisions which are consistent with the Provincial Policy Statement (PPS, 2014).

The MNRF strongly encourages all proponents to contact partner agencies and appropriate municipalities early on in the planning process. This provides the proponent with early knowledge regarding agency requirements, authorizations and approval timelines; Ministry of the Environment and Climate Change (MOECC) and the local Conservation Authority may require approvals and permitting where natural values and natural hazards (e.g., floodplains) exist.

As per the Natural Heritage Reference Manual (NHRM, 2010) the MNRF strongly recommends that an ecological site assessment be carried out to determine the presence of natural heritage features and species at risk and their habitat on site. The MNRF can provide survey methodology for particular species at risk and their habitats.

The NHRM also recommends that cumulative effects of development projects on the integrity of natural heritage features and areas be given due consideration. This includes the evaluation of the past, present and possible future impacts of development in the surrounding area that may occur as a result of demand created by the presently proposed project.

Wildland Fire

MNRF woodland data shows that the site contains woodlands. The lands should be assessed for the risk of wildland fire as per PPS 2014, Section 3.1.8 "*Development shall generally be directed to areas outside of lands that are unsafe for development due to the presence of hazardous forest types for wildland fire. Development may however be permitted in lands with hazardous forest types for wildland fire where the risk is mitigated in accordance with wildland fire assessment and mitigation standards".* Further discussion with the local municipality should be carried out to address how the risks associated with wildland fire will be covered for such a development proposal. Please see the Wildland Fire Risk Assessment and Mitigation Guidebook (2016) for more information.

Significant Woodlands

Section 2.1.5 b) of the PPS states: *Development and site alteration shall not be permitted in significant woodlands unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.* The 2014 PPS directs that significant woodlands must be identified following criteria established by the Ontario Ministry of Natural Resources and Forestry, i.e. the Natural Heritage Reference Manual (NHRM), 2010. Where the local or County Official Plan has not yet updated significant woodland mapping to reflect the 2014 PPS, all wooded areas should be reviewed on a site specific basis for significance. The MNRF Kemptville District modelled locations of significant woodlands in 2011 based on NHRM criteria. The presence of significant woodland on site or within 120 metres should trigger an assessment of the impacts to the feature and its function from the proposed development.

Significant Wildlife Habitat

Section 2.1.5 d) of the PPS states: *Development and site alteration shall not be permitted in significant wildlife habitat unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.* It is the responsibility of the approval authority to identify significant wildlife habitat or require its identification. The MNRF has several guiding documents which may be useful in identification of significant wildlife habitat and characterization of impacts and mitigation options:

- Significant Wildlife Habitat Technical Guide, 2000
- The Natural Heritage Reference Manual, 2010
- Significant Wildlife Habitat Mitigation Support Tool, 2014
- Significant Wildlife Habitat Criteria Schedule for Ecoregion 5E and 6E, 2015

The habitat of special concern species (as identified by the Species at Risk in Ontario list) and Natural Heritage Information Centre tracked species with a conservation status rank of S1, S2 and S3 may be significant wildlife habitat and should be assessed accordingly.

Water

The Ministry of Natural Resources and Forestry (MNRF) has established timing window guidelines to restrict in-water work related to an activity during certain periods. These restricted periods are identified in order to protect fish from impacts of works or undertakings in and around water during spawning and other critical life stages. A suite of appropriate measures should be taken for projects involving in-water works to minimize and mitigate impacts to fish, water quality and fish habitat, and include:

- avoiding in-water works during the timing guidelines;
- installation of sediment/erosion control measures;
- avoiding the removal, alteration, or covering of substrates used for fish spawning, feeding, over-wintering or nursery areas; and
- debris control measures to manage falling debris (e.g. spalling).

Timing guidelines are based on species* presence and are therefore subject to change if new information becomes available. Timing guidelines in Kemptville District are:

Waterbody (and applicable geography or Fisheries Management Zone)	Timing Guidelines (no in-water works)
○ St. Lawrence River (FMZ 20)	March 15 – July 15 (Spring spawning species)
○ Ottawa River – Lac Des Chats (FMZ 12)	October 1 to July 15 (Spring and fall spawning species, including Lake Trout and Lake Whitefish)
○ Ottawa River – Lac Deschenes (FMZ 12)	October 15 to July 15 (Spring and fall spawning species, including Cisco)
○ Ottawa River – Lac Dollard des Ormeaux (FMZ 12)	January 1 to July 15 (Winter and spring spawning species, including Burbot)
○ Big Rideau Lake (South Burgess, North Burgess, Bastard and South Elmsley Twps) ○ Charleston Lake (Lansdowne and Escott Twps) ○ Crow Lake (South Crosby Twp)	October 1 to June 30 (Spring and fall spawning species, including Lake Trout)
○ Bass Lake (South Elmsley Twp) ○ Lower Rideau Lake (South Elmsley Twp) ○ Bob's Lake (South Sherbrooke Twp) ○ Christie Lake (South Sherbrooke Twp) ○ Dalhousie Lake (Dalhousie Twp) ○ Davern Lake (South Sherbrooke Twp) ○ Farren Lake (South Sherbrooke Twp) ○ Grippen Lake (Leeds Twp) ○ Indian Lake (South Crosby Twp) ○ Little Long Lake (Lansdowne Twp) ○ Millpond Lake (South Burgess) ○ Otter Lake (South Elmsley, South Burgess and Bastard Twps) ○ Otty Lake (North Burgess and North Elmsley Twps)	October 15 to June 30 (Spring and Fall spawning species, including Lake Whitefish and Cisco)

○ Pike Lake (North Burgess Twp) ○ Silver Lake (South Sherbrooke Twp) ○ Redhorse Lake (Lansdowne Twp) ○ Tay River (South Sherbrooke, Bathurst, Drummond and North Elmsley Twps) ○ Wolfe Lake (North Crosby Twp)	
○ Bennett Lake (Bathurst Twp) ○ Crosby Lake (North Crosby Twp) ○ Gananoque River (Leeds Twp) ○ Lac Georges (Plantagenet and Alfred Twps) ○ Gillies Lake (Lanark Twp) ○ Little Crosby Lake (North Crosby Twp) ○ McLaren Lake (North Burgess Twp) ○ Mississippi Lake (Drummond, Beckwith and Ramsay Twps) ○ Mississippi River (Beckwith, Ramsay, Pakenham and Fitzroy Twps) ○ Raisin River below Martintown dam (Charlottenburgh Twp) ○ Rideau River (Wolford, Oxford, Montague, Marlborough, South Gower, North Gower, Osgood, Nepean and Gloucester Twps) ○ South Lake (Leeds Twp) ○ South Nation River below Plantagenet weir (Plantagenet Twp) ○ Upper Rideau Lake (North Crosby Twp) ○ Westport Sand Lake (North Crosby Twp)	January 1 – June 30 (Winter and spring spawning species, including Burbot)
○ Small rivers and streams (denoted on 1:50,000 National Topographic System maps as being one lined) ○ All other waterbodies in FMZ 18	March 15 to June 30 (Spring spawning species)

Please note: Additional timing restrictions may apply as they relate to endangered and threatened species for works in both water and wetland areas. Timing restrictions are subject to change, depending on species found in a given waterbody.

In addition to adhering to the above timing guidelines, a work permit from the MNRF may be required depending on the nature and scope of work. No encroachment on the bed or banks of a waterbody/watercourse (e.g. abutments, embankments, etc.) is permitted without MNRF approval. Additional information regarding work permits may be found online at https://www.ontario.ca/page/crown-land-work-permits#section-2.

The MNRF does not have any water quality or quantity data available. We recommend that the Ministry of the Environment and Climate Change be contacted for such data along with the local Conservation Authority. For further information regarding fish habitat and protocols, please refer to the following interagency, document, *Fish Habitat Referral Protocol for* Ontario at: http://www.web2.mnr.gov.on.ca/mnr/ebr/fish_hab_referral/protocol_en.pdf.

Additional approvals and permits may be required under the Fisheries Act and the Species at Risk Act; please contact Fisheries and Oceans Canada to determine requirements and next steps. There may also be approvals required by the local Conservation Authority or Transport Canada, and these agencies should be contacted directly to determine requirements. As the MNRF is responsible for the management of provincial fish populations, we request ongoing involvement in such discussions in order to ensure population conservation.

Species at Risk

A review of the Natural Heritage Information Centre (NHIC) and internal records indicate that there is a potential for the following threatened (THR) and/or endangered (END) species on the site or in proximity to it:

- American Eel (END)
- Barn Swallow (THR)
- Butternut (END)
- Eastern Meadowlark (THR)
- Little Brown Bat (END)
- Northern Long-eared Bat (END)
- Tri-Colored Bat (END)

All endangered and threatened species receive individual protection under section 9 of the ESA and receive general habitat protection under Section 10 of the ESA, 2007. Thus any potential works should consider disturbance to the individuals as well as their habitat (e.g. nesting sites). General habitat protection applies to all threatened and endangered species. Note some species in Kemptville District receive regulated habitat protection. The habitat of these listed species is protected from damage and destruction and certain activities may require authorization(s) under the ESA. For more on how species at risk and their habitat is protected, please see: https://www.ontario.ca/page/how-species-risk-are-protected.

If the proposed activity is known to have an impact on any endangered or threatened species at risk (SAR), or their habitat, an authorization under the ESA may be required. It is recommended that MNRF Kemptville be contacted prior to any activities being carried out to discuss potential survey protocols to follow during the early planning stages of a project, as well as mitigation measures to avoid contravention of the ESA. Where there is potential for species at risk or their habitat on the property, an Information Gathering Form should be submitted to Kemptville MNRF at sar.kemptville@ontario.ca.

The Information Gathering Form may be found here:
http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/FormDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=018-0180E

For more information on the ESA authorization process, please see:
https://www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization

One or more special concern species has been documented to occur either on the site or nearby. Species listed as special concern are not protected under the ESA, 2007. However, please note that some of these species may be protected under the Fish and Wildlife Conservation Act and/or Migratory Birds Convention Act. Again, the habitat of special concern species may be significant wildlife habitat and should be assessed accordingly. Species of special concern for consideration:

- Northern Brook Lamprey (SC)

If any of these or any other species at risk are discovered throughout the course of the work, and/or should any species at risk or their habitat be potentially impacted by on site activities, MNRF should be contacted and operations be modified to avoid any negative impacts to species at risk or their habitat until further direction is provided by MNRF.

Please note that information regarding species at risk is based largely on documented occurrences and does not necessarily include an interpretation of potential habitat within or in proximity to the site in question. Although this data represents the MNRF's best current available information, it is important to note that a lack of information for a site does not mean that additional features and values are not present. It is the responsibility of the proponent to ensure that species at risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the activities carried out on the site.

The MNRF continues to strongly encourage ecological site assessments to determine the potential for SAR habitat and occurrences. When a SAR or potential habitat for a SAR does occur on a site, it is recommended that the proponent contact the MNRF for technical advice and to discuss what activities can occur without contravention of the Act. For specific questions regarding the Endangered Species Act (2007) or SAR, please contact MNRF Kemptville District at sar.kemptville@ontario.ca.

The approvals processes for a number of activities that have the potential to impact SAR or their habitat have recently changed. For information regarding regulatory exemptions and associated online registration of certain activities, please refer to the following website: https://www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization.

Please note: The advice in this letter may become invalid if:

- The Committee on the Status of Species at Risk in Ontario (COSSARO) re-assesses the status of the above-named species OR adds a species to the SARO List such that the section 9 and/or 10 protection provisions apply to those species; or
- Additional occurrences of species are discovered on or in proximity to the site.

This letter is valid until: Sat. Apr 13, 2019

The MNRF would like to request that we continue to be circulated on information with regards to this project. If you have any questions or require clarification please do not hesitate to contact me.

Sincerely,

Dom Ferland
Management Biologist
dominique.ferland@ontario.ca

Encl.\
-ESA Infosheet
-NHIC/LIO Infosheet

Endangered Species Act, 2007 & Species At Risk in Ontario

Background

Endangered Species Act: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statues-07e06_e.htm
Species at Risk in Ontario List: www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/246809.html

The Endangered Species Act (ESA) 2007 protects both species and habitat. Section 9 of the ESA "prohibits killing, harming, harassing, capturing, possessing, collecting, buying, selling, trading, leasing or transporting species that are listed as threatened, endangered or extirpated". Section 10 of the ESA, 2007 prohibits damaging or destroying habitat of endangered or threatened species. Protected habitat is either based on general definition in the Act or prescribed through a regulation. The ESA 2007 defines general habitat as an area on which the species depends, directly or indirectly, to carry on its life processes, including reproduction, rearing, hibernation, migration or feeding.

It is important to be aware that changes may occur in both species and habitat protection. The ESA applies to listed species on the Species at Risk in Ontario List (SARO). The Committee on the Status of Species in Ontario (COSSARO) meets regularly to evaluate species for listing and/or re-evaluate species already listed. As a result, species' designations may change that could in turn change the level of protection they receive under the ESA 2007. Also, habitat protection provisions for a species may change e.g. if a species-specific habitat regulation comes into effect. The regulation would establish the area that is protected as habitat for the species.

Information with respect to SAR can be found in the online database at the Natural Heritage Information Centre (NHIC) - http://nhic.mnr.gov.on.ca/nhic.cfm . The NHIC compiles, maintains and distributes information on species at risk and updates its information on a regular basis. We encourage you to routinely check the NHIC database to obtain the most up to date SAR information for proposed work locations. However, while the NHIC database is the best available source of data, even when there are no known occurrences documented at a site, there is a possibility that SAR may occur at a proposed work location.

All data represents the MNR's best current available information, it is important to note that a lack of occurrence at a site does not mean that there are no Species at Risk (SAR) at the location. The MNR continues to encourage ecological site assessments to determine the potential for other SAR occurrences. When a SAR does occur on a proposed site, it is recommended that the proponent contact the MNR for technical advice and to discuss what activities can occur without contravention of the Act. If an activity is proposed that will contravene the Act (such as Section 9 or 10), the proponent must contact the MNR to discuss the potential for application of certain permits (Section 17) or agreement (Regulation 242/08). For specific questions regarding the Endangered Species Act (2007) or species at risk, please contact a district Species at Risk Biologist at sar.kemptville@ontario.ca.

Natural Heritage Information Centre

Land Information Ontario

Natural Heritage Information Centre: http://nhic.mnr.gov.on.ca/
Biodiversity Explorer (mapping): https://www.biodiversityexplorer.mnr.gov.on.ca/nhicWEB/main.jsp

Land Information Ontario: http://www.mnr.gov.on.ca/en/Business/LIO/index.html
Ontario Geospatial Data Exchange: http://www.mnr.gov.on.ca/en/Business/LIO/2ColumnSubPage/STEL02_167959.html
LIO Make-a-Map: http://www.mnr.gov.on.ca/en/Business/LIO/2ColumnSubPage/STDPROD_068999.html
Ontario Maps: http://www.mnr.gov.on.ca/en/Business/LIO/2ColumnSubPage/STDPROD_068512.html

The **Natural Heritage Information Centre** (NHIC) compiles, maintains and distributes information on natural species, plant communities and spaces of conservation concern in Ontario. This information is stored in a spatial database used for tracking this information. The Centre also has a library with conservation-related literature, reports, books, and maps, which are accessible for conservation applications, land use planning, and natural resource management. The NHIC website makes much of this information available through the internet.

Natural Heritage Information Centre
300 Water Street, 2nd Floor, North Tower
P.O. Box 7000, Peterborough, ON, K9J 8M5
Tel.:(705) 755-2159 Fax:(705) 755-2168

Land Information Ontario (LIO) manages key provincial datasets. LIO makes these and hundreds of other data sets available to registered users at no charge. LIO also coordinates public and private sector organizations to collect high resolution satellite imagery for Ontario providing significant cost savings for all partners. Technical bulletins, newsletters and more are available online. More details regarding Ontario imagery and data can be searched, ordered and accessed online.

LIO's Ontario Geospatial Data Exchange (OGDE) allows more than 400 public sector organizations to easily share and use digital geographic information under a single legal agreement. Membership is available to eligible public organizations at no costs.

Through the website, Maps & Map Tools are made available, including online mapping software: LIO Make-a-Map.

Land Information Ontario
lio@ontario.ca
LIO Support Team: (705) 755-1878

Or for specifics, see online at:
http://www.mnr.gov.on.ca/en/Business/LIO/2ColumnSubPage/STDPROD_068510.html

Additional Information pertaining to NHIC, LIO and other Natural Heritage and Data and Information tools is available in the MNR Kemptville Information Request Guide (2012).

APPENDIX B

Species Lists

C10-A000817

Species	Scientific Name
Canada Goose	*Branta canadensis*
Wood Duck	*Aix sponsa*
Gadwall	*Mareca strepera*
American Wigeon	*Anas americana*
American Black Duck	*Anas rubripes*
Mallard	*Anas platyrhynchos*
Blue-winged Teal	*Anas discors*
Northern Shoveler	*Anas clypeata*
Northern Pintail	*Anas acuta*
Green-winged Teal	*Anas carolinensis*
Ring-necked Duck	*Aythya collaris*
Lesser Scaup	*Aythya affinis*
Hooded Merganser	*Lophodytes cucullatus*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Ruddy Duck	*Oxyura jamaicensis*
Gray Partridge	*Perdix perdix*
Ring-necked Pheasant	*Phasianus colchicus*
Ruffed Grouse	*Bonasa umbellus*
Wild Turkey	*Meleagris gallopavo*
Common Loon	*Gavia immer*
Pied-billed Grebe	*Podilymbus podiceps*
American Bittern	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Great Blue Heron	*Ardea herodias*
Green Heron	*Butorides virescens*
Black-crown N.-Heron	*Nycticorax nycticorax*
Turkey Vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
Northern Harrier	*Circus cyaneus*
Sharp-shinned Hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperii*
Northern Goshawk	*Accipiter gentilis*
Red-should Hawk	*Buteo lineatus*
Broad-winged Hawk	*Buteo platypterus*
Red-tailed Hawk	*Buteo jamaicensis*
American Kestrel	*Falco sparverius*
Merlin	*Falco columbarius*

Species	Scientific Name
Peregrine Falcon	*Falco peregrinus*
Virginia Rail	*Rallus limicola*
Sora	*Porzana carolina*
Common Moorhen	*Gallinula chloropus*
American Coot	*Fulica americana*
Coot/Moorhen	*Fulica americana*
Killdeer	*Charadrius vociferus*
Rock Dove	*Columba livia*
Spotted Sandpiper	*Actitis macularius*
Upland Sandpiper	*Bartramia longicauda*
Common Snipe	*Gallinago gallinago*
American Woodcock	*Scolopax minor*
Wilson's Phalarope	*Phalaropus tricolor*
Ring-billed Gull	*Larus delawarensis*
Herring Gull	*Larus argentatus*
Black Tern	*Chlidonias niger*
Common Tern	*Sterna hirundo*
Mourning Dove	*Zenaida macroura*
Yellow-billed Cuckoo	*Coccyzus americanus*
Black-billed Cuckoo	*Coccyzus erythropthalmus*
Eastern Screech-Owl	*Megascops asio*
Great Horned Owl	*Bubo virginianus*
Barred Owl	*Strix varia*
Long-eared Owl	*Asio otus*
Short-eared Owl	*Asio flammeus*
North Saw-whet Owl	*Aegolius acadicus*
Common Nighthawk	*Chordeiles minor*
Whip-poor-will	*Caprimulgus vociferus*
Chimney Swift	*Chaetura pelagica*
Ruby-thr Hummingbird	*Archilochus colubris*
Belted Kingfisher	*Megaceryle alcyon*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Leuconotopicus villosus*
Black-backed Woodpecker	*Picoides arcticus*
Northern Flicker	*Colaptes auratus*
Pileated Woodpecker	*Hylatomus pileatus*

Species	Scientific Name
Olive-sided Flycatcher	*Contopus cooperi*
Eastern Wood-Pewee	*Contopus virens*
Yellow-bellied Flycatcher	*Empidonax flaviventris*
Alder Flycatcher	*Empidonax alnorum*
Willow Flycatcher	*Empidonax traillii*
Least Flycatcher	*Empidonax minimus*
Eastern Phoebe	*Sayornis phoebe*
Gr Crested Flycatcher	*Myiarchus crinitus*
Eastern Kingbird	*Tyrannus tyrannus*
Loggerhead Shrike	*Lanius ludovicianus*
Yellow-throated Vireo	*Vireo flavifrons*
Blue-headed Vireo	*Vireo solitarius*
Warbling Vireo	*Vireo gilvus*
Philadelphia Vireo	*Vireo philadelphicus*
Red-eyed Vireo	*Vireo olivaceus*
Gray Jay	*Perisoreus canadensis*
Blue Jay	*Cyanocitta cristata*
American Crow	*Corvus brachyrhynchos*
Common Raven	*Corvus corax*
Horned Lark	*Eremophila alpestris*
Purple Martin	*Progne subis*
Tree Swallow	*Tachycineta bicolor*
North Rgh-wing Swallow	*Stelgidopteryx serripennis*
Bank Swallow	*Riparia riparia*
Cliff Swallow	*Petrochelidon pyrrhonota*
Barn Swallow	*Hirundo rustica*
Black-capped Chickadee	*Poecile atricapillus*
Red-breast Nuthatch	*Sitta canadensis*
White-breast Nuthatch	*Sitta carolinensis*
Brown Creeper	*Certhia americana*
House Wren	*Troglodytes aedon*
Winter Wren	*Troglodytes hiemalis*
Sedge Wren	*Cistothorus platensis*
Marsh Wren	*Cistothorus palustris*
Golden-crown Kinglet	*Regulus satrapa*
Ruby-crown Kinglet	*Regulus calendula*
Blue-gr Gnatcatcher	*Polioptila caerulea*
Eastern Bluebird	*Sialia sialis*
Veery	*Catharus fuscescens*

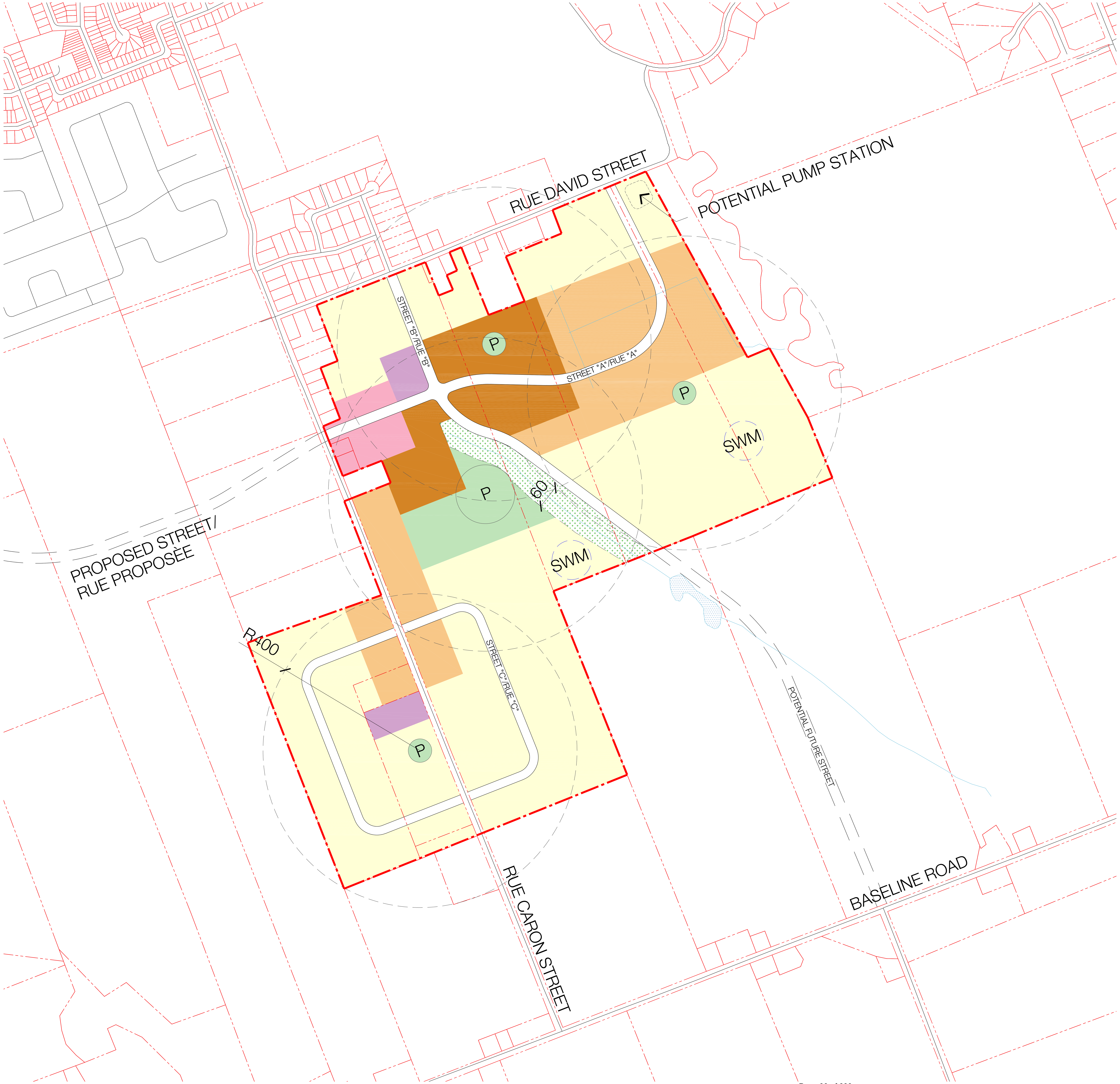
Species	Scientific Name
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
Wood Thrush	*Hylocichla mustelina*
American Robin	*Turdus migratorius*
Gray Catbird	*Dumetella carolinensis*
Northern Mockingbird	*Mimus polyglottos*
Brown Thrasher	*Toxostoma rufum*
European Starling	*Sturnus vulgaris*
Cedar Waxwing	*Bombycilla cedrorum*
Golden-winged Warbler	*Vermivora chrysoptera*
Blue/Gold-wing Warbler	*Vermivora chrysoptera*
Tennessee Warbler	*Leiothlypis peregrina*
Nashville Warbler	*Leiothlypis ruficapilla*
Northern Parula	*Setophaga americana*
Yellow Warbler	*Setophaga petechia*
Chestn-sided Warbler	*Setophaga pensylvanica*
Magnolia Warbler	*Setophaga magnolia*
Cape May Warbler	*Setophaga tigrina*
Black-thr Blue Warbler	*Setophaga caerulescens*
Yellow-rumped Warbler	*Setophaga coronata*
Black-thr Green Warbler	*Setophaga virens*
Blackburnian Warbler	*Setophaga fusca*
Pine Warbler	*Setophaga pinus*
Palm Warbler	*Setophaga palmarum*
Bay-breasted Warbler	*Setophaga castanea*
Cerulean Warbler	*Setophaga cerulea*
Black-white Warbler	*Mniotilta varia*
American Redstart	*Setophaga ruticilla*
Ovenbird	*Seiurus aurocapilla*
North Waterthrush	*Parkesia noveboracensis*
Mourning Warbler	*Geothlypis philadelphia*
Common Yellowthroat	*Geothlypis trichas*
Canada Warbler	*Cardellina canadensis*
Eastern Towhee	*Pipilo erythrophthalmus*
Chipping Sparrow	*Spizella passerina*
Clay-colored Sparrow	*Spizella pallida*
Field Sparrow	*Spizella pusilla*
Vesper Sparrow	*Pooecetes gramineus*
Savannah Sparrow	*Passerculus sandwichensis*

Species	Scientific Name
Grasshopper Sparrow	*Ammodramus savannarum*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
Swamp Sparrow	*Melospiza georgiana*
White-throat Sparrow	*Zonotrichia albicollis*
Dark-eyed Junco	*Junco hyemalis*
Scarlet Tanager	*Piranga olivacea*
Northern Cardinal	*Cardinalis cardinalis*
Rose-breast Grosbeak	*Pheucticus ludovicianus*
Indigo Bunting	*Passerina cyanea*
Bobolink	*Dolichonyx oryzivorus*
Red-wing Blackbird	*Agelaius phoeniceus*
Eastern Meadowlark	*Sturnella magna*
Common Grackle	*Quiscalus quiscula*
Brown-head Cowbird	*Molothrus ater*
Baltimore Oriole	*Icterus galbula*
Purple Finch	*Haemorhous purpureus*
House Finch	*Haemorhous mexicanus*
Red Crossbill	*Loxia curvirostra*
White-winged Crossbill	*Loxia leucoptera*
Pine Siskin	*Spinus pinus*
American Goldfinch	*Spinus tristis*
Evening Grosbeak	*Coccothraustes vespertinus*
House Sparrow	*Passer domesticus*

APPENDIX C

Prefered Concept Plan

C10-A000817



LAND USE STATISTICS

SITE AREA

Total Site Area:	1,372,345m^2 137 hectares

AREA		% Res
Low Density Residential:	764,561m^2	69.41
Medium Density Residential:	225,472m^2	20.47
High Density Residential:	111,433m^2	10.12
Commercial:	29,130m^2	
Open Space/Parkland:	64,023m^2	
Institutional:	22,274m^2	
Environmental Protection Area:	39,719m^2	

NOTES

1. The base plan (lot lines, existing roads and surrounding areas) is based on the City's Open Data and aerial images. The site area is approximate and all dimensions need to be confirmed by a proper survey.

2. Assume 30.0m setback from centreline of stream.

3. Assume road ROW of 26.0m.

EXPANSION LANDS SECONDARY PLAN

PREFERRED CONCEPT LAND USE PLAN

LEGEND/LÉGENDE

- LOW DENSITY RESIDENTIAL/ RÉSIDENCES À FAIBLE DENSITÉ
- MEDIUM DENSITY RESIDENTIAL RÉSIDENCES À DENSITÉ MOYENNE
- HIGH DENSITY RESIDENTIAL RÉSIDENCES À HAUTE DENSITÉ
- COMMERCIAL COMMERCES
- COMMUNITY FACILITIES INSTALLATIONS COMMUNAUTAIRE
- ENVIRONMENTAL PROTECTION AREA ZONE DE PROTECTION ENVIRONNEMENTALE
- WATER EAU
- P OPEN SPACE/PARKLAND PARCS ET ESPACES OUVERTS
- SWM APPROXIMATE LOCATION OF STORMWATER MANAGEMENT POND EMPLACEMENT APPROXIMATIF DU SYSTÈME DE GESTION DES EAUX PLUVIALES
- PROPERTY LINE LIMITE DE PROPRIÉTÉ
- NEIGHBOURHOOD SIZE (400m RADIUS) TAILLE DU QUARTIER (RAYON DE 400 MÈTRES)

0 125m 250m 500m

No.	REVISION	DATE	BY
8	REVISIONS	2019.03.04	BL
7	REVISIONS	2019.02.08	BL
6	PREFERRED CONCEPT	2019.01.17	BL
5	PUBLIC MEETING	2019.01.07	BL
4	DRAWING	2018.12.20	ET
3	DRAWING	2018.12.19	BL
2	CLIENT REVIEW	2018.11.22	BL
1	DRAWING	2018.11.21	BL

CLIENT

CITY OF CLARENCE/ROCKLAND

FOTENN
Planning + Design
223 McLeod Street, Ottawa ON K2P 0Z8
613.730.5709 www.fotenn.com

DESIGNED	BL
REVIEWED	UMG
DATE	2018.11.20

P1

expansion lands SECONDARY PLAN

PLAN SECONDAIRE pour les terrains qui ont été ajouté à l'aire urbaine

EXISTING CONDITIONS & CONSTRAINTS REPORT

August 9, 2018

Clarence-Rockland

FOTENN Planning + Design

CIMA+

SHORE·TANNER & ASSOCIATES
REAL ESTATE APPRAISERS AND CONSULTANTS
148 COLONNADE ROAD SOUTH, SUITE 202, OTTAWA, ONTARIO K2E 7R4

ROCKLAND EXPANSION LANDS SECONDARY PLAN: EXISTING CONDITIONS AND CONSTRAINTS REPORT

Prepared for the City of Clarence-Rockland

Prepared by:	Fotenn Planning + Design 223 McLeod Street Ottawa, ON K2P 0Z8
In conjunction with:	CIMA+
	Shore-Tanner & Associates Inc.

August 9, 2018

QUALITY CONTROL

Document	Existing Conditions and Constraints Report
Date	August 9, 2018
Prepared for	City of Clarence-Rockland
Approved by	Paul Black
Prepared by	Fotenn Consultants Inc.

REVISION HISTORY

No.	QC	Date Issued
1	PB	July 16, 2018
2	PB	August 9, 2018

1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

The United Counties of Prescott and Russell (UCPR) Official Plan Review, completed in 2015 and adopted by the Ministry of Municipal Affairs in 2016, identified a localized shortage of residential land supply in the City of Clarence-Rockland. To address the shortage, the UCPR Official Plan identified approximately 133.5 hectares of lands to be added to the Rockland Urban Policy Area. These lands became known as the “Expansion Lands”.

Following the addition of the lands to the Urban Policy Area designation, the City of Clarence-Rockland rezoned the lands to “Special Study Area (SSA)”. The intent of the SSA zone is that lands will be developed in accordance with the results and recommendations of a Secondary Plan. In the interim, existing uses are permitted to continue, but no new uses are permitted.

In 2017, the City of Clarence-Rockland issued a Request for Proposals for the preparation of a Secondary Plan and Zoning By-law Amendment for the Expansion Lands to guide the future land uses, urban design, and infrastructure in the area. The intent of this Secondary Planning process is to create a vibrant community that features a mix of uses and a range of housing options in an urban village context.

The Secondary Planning exercise will include a land use plan, built form policies, design guidelines and a phasing strategy, and will be supported by studies and plans from relevant disciplines including a Master Servicing Study, a Community Transportation Study, an Environmental Management Plan, and a Commercial Market Research Report.

The Secondary Planning process will be integrated with the Municipal Class Environmental Assessment (EA) process. EA approval is required for municipal infrastructure such as water, sanitary and storm sewers, and roads. The integrated process allows approvals, reviews, and public consultations to be coordinated and to meet the requirements of both the EA Act and the Planning Act.

1.2 PURPOSE OF THE EXISTING CONDITIONS & CONSTRAINTS REPORT

This report is intended to provide an overview of the Expansion Lands that comprise the planning area of the Secondary Plan (the "study area"), including the policy framework, relevant studies completed to-date, and the existing physical and environmental conditions. The document also provides an evaluation of the opportunities and constraints related to transportation and infrastructure, and the local development market.

The report will be used to inform the Secondary Plan, as appropriate. Where the final study recommendations deviate from the information provided within, the report will be used as a basis to identify required updates and amendments to City policies and processes.

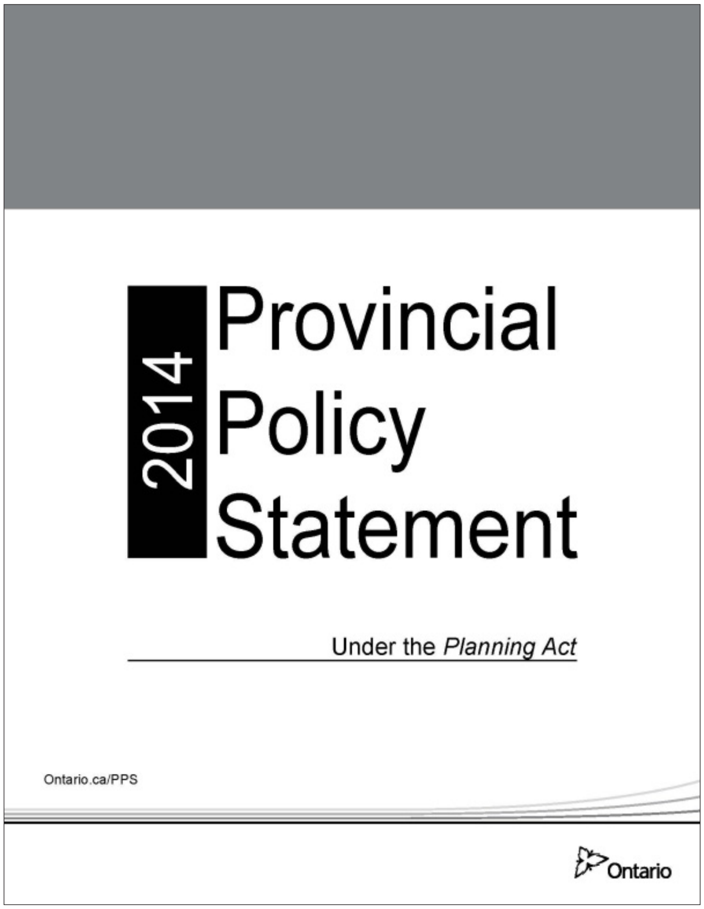
1.3 THE STUDY AREA

The Study Area is irregularly shaped, comprising 133.5 hectares of land southeast of Rockland's existing Urban Area Boundary. The study area includes lands south of David Street and west of Clarence Creek. It is situated mostly to the east of Caron Street, with the exception of an area of approximately 23 hectares on the west side of Caron Street in the southwest of the study area.

North of the study area is the residential neighbourhood of Rockland East and the Rockland Golf Club. Across Caron Street to the west is a future residential neighbourhood. Surrounding lands to the southwest, south, and east are used for agricultural purposes or vacant.


DAVID ST
Clarence Creek
CARON ST
BASELINE RD

2.0 POLICY REVIEW



2.1 PROVINCIAL POLICY STATEMENT (PPS)

The Provincial Policy Statement (PPS) provides policy direction on matters of provincial interest related to land use planning and development. Municipalities are required to "be consistent with" the PPS with respect to any planning decisions.

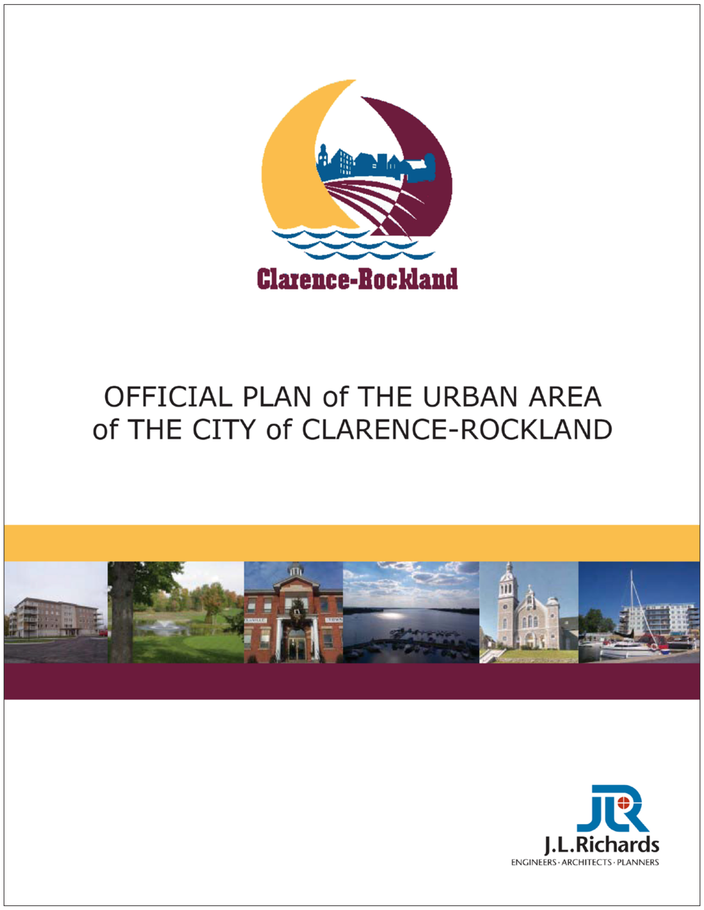
Section 1.1.1 states that healthy, liveable and safe communities are sustained by:

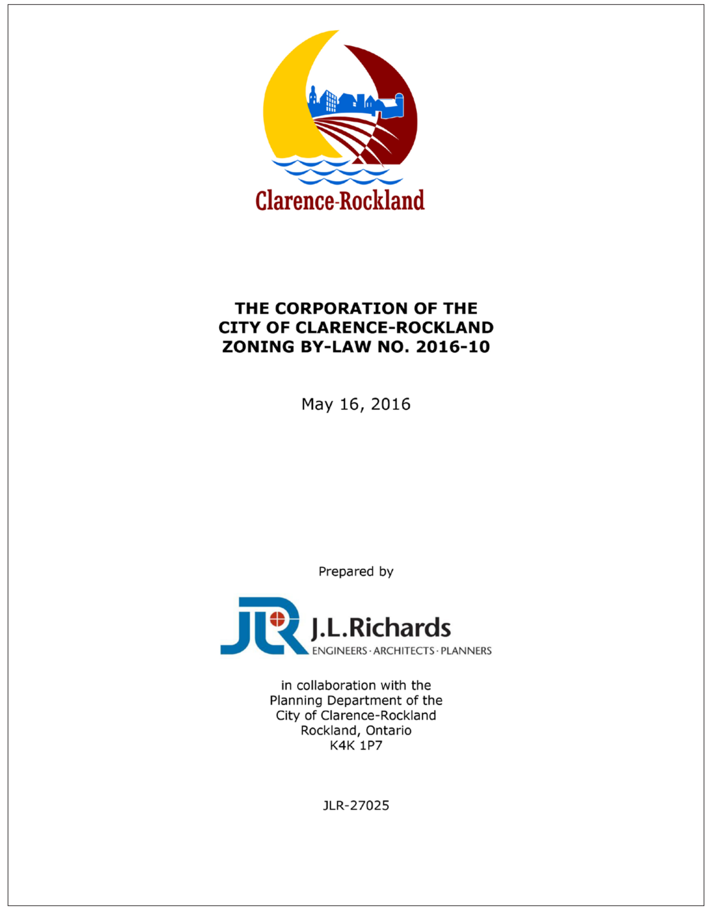
a. Promoting efficient development and land use patterns which sustain the financial well-being of the Province and municipalities over the long term;
b. Accommodating an appropriate range and mix of residential (including second units, affordable housing and housing for older persons), employment (including industrial and commercial), institutional (including places of worship, cemeteries and long-term care homes), recreation, park and open space, and other uses to meet long-term needs;
c. Avoiding development and land use patterns which may cause environmental or public health and safety concerns;
d. Avoiding development and land use patterns that would prevent the efficient expansion of settlement areas in those areas which are adjacent or close to settlement areas;
e. Promoting cost-effective development patterns and standards to minimize land consumption and servicing costs;
f. Improving accessibility for persons with disabilities and older persons by identifying, preventing and removing land use barriers which restrict their full participation in society;
g. Ensuring that necessary infrastructure, electricity generation facilities and transmission and distribution systems, and public service facilities are or will be available to meet current and projected needs; and
h. Promoting development and land use patterns that conserve biodiversity and consider the impact of climate change.

Policy 1.1.2 requires that sufficient land shall be made available to accommodate an appropriate range and mix of land uses to meet projected needs for a time horizon of up to 20 years. Within settlement areas, sufficient land shall be made available through intensification and redevelopment and, if necessary, designated growth areas.

Section 1.1.3 requires that settlement areas shall be the focus of growth and development, and their vitality and regeneration shall be promoted. Land use patterns within settlement areas shall be based on:

a. Densities and a mix of land uses which:
   a) Efficiently use land and resources;
   b) Are appropriate for, and efficiently use, the infrastructure and public service facilities which are





planned or available, and avoid the need for their unjustified and / or uneconomical expansion;

c) Minimize negative impacts to air quality and climate change, and promote energy efficiency;
d) Support active transportation;
e) Are transit-supportive, where transit is planned, exists, or may be developed; and
f) Are freight supportive.

Policy 1.1.3.6 states that new development taking place in designated growth areas should occur adjacent to the existing built-up area and shall have a compact form, mix of uses and densities that allow for the efficient use of land, infrastructure and public service facilities.

Policy 1.1.3.8 stipulates that a planning authority may identify a settlement area or allow the expansion of a settlement area boundary only at the time of a comprehensive review.

Policy 1.4.3 requires that planning authorities provide for an appropriate range and mix of housing types and densities to meet projected requirements of current and future residents of the regional market area by:

a. Establishing and implementing minimum targets for the provision of housing which is affordable to low and moderate income households.
b. Permitting and facilitating:
   a) all forms of housing required to meet the social, health and well-being requirements of current and future residents, including special needs requirements; and
   b) All forms of residential intensification, including second units, and redevelopment in accordance with policy 1.1.3.3.
c. Directing the development of new housing towards locations where appropriate levels of infrastructure and public service facilities are or will be available to support current and projected needs;
d. Promoting densities for new housing which efficiently use land, resources, infrastructure and public service facilities, and support the use of active transportation and transit in areas where it exists or is to be developed; and
e. Establishing development standards for residential intensification, redevelopment and new residential development which minimize the cost of housing and facilitate compact form, while maintaining appropriate levels of public health and safety.

Policy 1.5.1 states that healthy, active communities should be promoted by:

a. Planning public streets, spaces and facilities to be safe, meet the needs of pedestrians, foster social interaction and facilitate active transportation and community connectivity;
b. Planning and providing for a full range and equitable distribution of publicly-accessible built and natural

settings for recreation, including facilities, parklands, public spaces, open space areas, trails and linkages, and, where practical, water-based resources.

Section 1.6 requires that infrastructure be provided in a coordinated, efficient and cost-effective manner that considers impacts from climate change while accommodating projected needs. Planning authorities should promote green infrastructure to complement infrastructure.

Policy 1.6.6.1 requires that planning for sewage and water services shall:

a. Direct and accommodate expected growth or development in a manner that promotes the efficient use and optimization of existing municipal sewage services and municipal water services.

Policy 1.6.6.7 states that planning for stormwater management shall:

a. Minimize, or, where possible, prevent increases in contaminant loads;
b. Minimize changes in water balance and erosion;
c. Not increase risks to human health and safety and property damage;
d. Maximize the extent and function of vegetative and pervious surfaces; and
e. Promote stormwater management best practices, including stormwater attenuation and re-use and low-impact development.

Section 1.6.7 stipulates that transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs. Transportation and land use considerations shall be integrated at all stages of the planning process.

2.2 COUNTY OF PRESCOTT-RUSSELL OFFICIAL PLAN (OCTOBER 2017 OFFICE CONSOLIDATION)

The Official Plan for the United Counties of Prescott and Russell provides guidance for development, while stimulating economic growth and protecting the environment and public health. As the Upper-Tier municipality, all land use planning decisions in the City of Clarence-Rockland are required to be consistent with the County Official Plan.

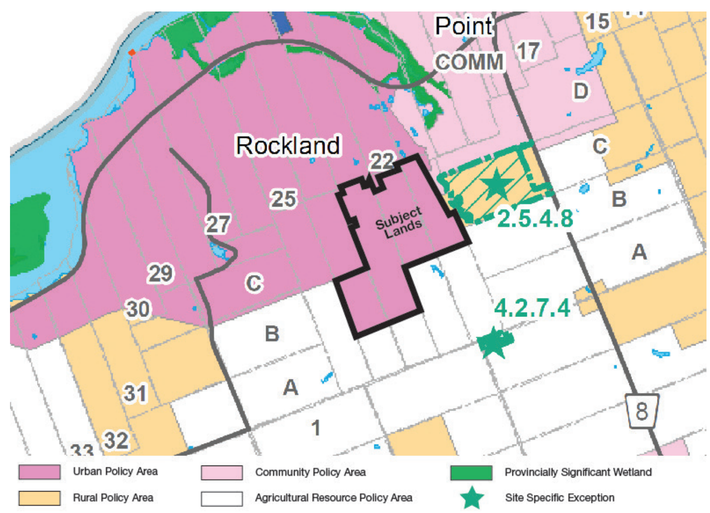
The Plan anticipates a total of 11,893 households in the City of Clarence-Rockland by 2035, representing an increase of 3,253 households from 2011.

Section 2.1.3 contains Sustainable Communities Objectives:

1. We will strengthen our communities by directing growth and development to areas with existing or planned water and sewer infrastructures.
3. A three-year supply of serviced land will be maintained at all times as part of the ten-year supply of land designated for residential development.
4. A broad range of housing types will be permitted in order to meet the requirements of a growing population.
9. The distinct character of our towns, villages, hamlets and rural areas will be maintained.
10. Significant natural heritage sites and areas will be protected from incompatible land uses.

The expansion lands are identified as Urban Policy Area on Schedule A (Land Use Designations). The designation applies to City, Towns, and Villages with populations of 1,000 or more and which have been developed primarily on the basis of municipal water and sewer systems. The Urban Policy Area is intended to absorb a significant part of future growth in the United Counties.

Urban Policy Areas shown on Schedule A reflect the boundaries of settlement areas, as rationalized by local municipalities, to accommodate residential growth pressure focused in the western portion of the County and along the major transportation routes providing access to employment opportunities in the Ottawa area.



Schedule A - County of Prescott-Russell Official Plan

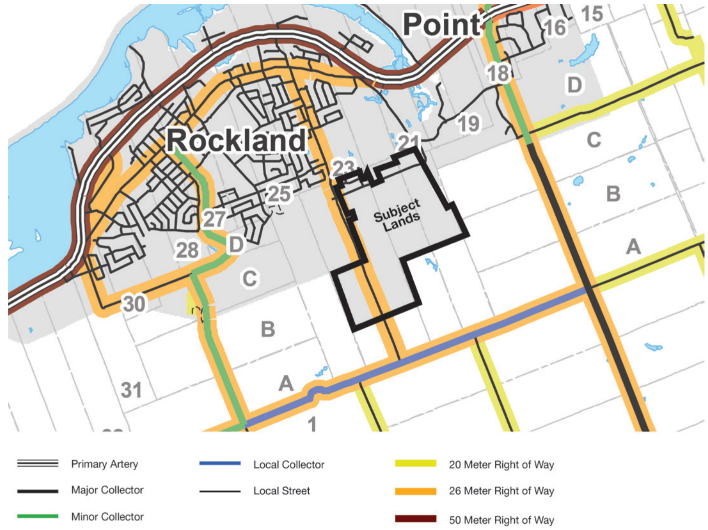
Section 2.2.5 stipulates that lot creation and development will only be permitted if there is confirmation of sufficient reserve sewage system capacity and reserve water system capacity within municipal sewage services and municipal water services, or private communal sewage and water services. Partial services are generally discouraged.

The policies of Section 2.2.6 apply to residential uses in the Urban Policy Area. Policy 1 outlines Council's objectives for residential uses:

a. To ensure the provision of an adequate supply of residential land;
b. To provide for a range and mix of low-, medium- and high-density housing types to satisfy a broad range of residential requirements and ensure that affordable housing is available, but low-rise and low-density housing forms such as single-detached and semi-detached dwellings shall continue to dominate;
c. To provide for neighbourhood facilities and amenities which are appropriate to a residential living environment;
d. To ensure the provision of roads and other municipal services necessary to the development of functional neighbourhood areas;
e. To encourage the addition of housing above commercial uses in and near the downtown, in residential transition areas, and in other main commercial areas;
f. To support the development, at appropriate locations and densities, of residential facilities that meet the housing needs of persons requiring specialized care;
g. To manage the rate of growth and the amount of residential development within the urban centre in order to maintain and enhance the small town character;
h. To encourage residential developments which incorporate innovative and appropriate design principles which contribute to public safety, affordability, energy conservation, and that protect, enhance and properly manage the natural environment;
i. To monitor the housing supply by reviewing new development, demolitions, intensification, and the number of affordable housing units brought on stream.

Policy 4 of Section 2.2.6 requires that zoning regulations be designed to provide for a mix of 70% low-density residential development, 20% medium density residential development and 10% high-density residential development in the Urban Policy Area. Low-density development is defined as up to 35 units per net hectare, medium-density development should not exceed 55 units per net hectare for townhouses, and apartment should represent a density of 75 units per net hectare.

A 26-metre Local Street right-of-way is shown over Caron Street on Schedule D. Local roads consist of local collectors and local streets which are publicly maintained on a year-round basis, seasonal roads, and private roads. Local roads shall generally have a minimum right-of-way width of 20 metres. However, reduced right-of-way widths may be accepted through the subdivision or condominium review process, provided that the right-of-way widths can accommodate all of the required servicing infrastructures for the proposed development and provided that the approval authority is satisfied that the reduced widths will not result in lower quality development. Generally



Schedule D - County of Prescott-Russell Official Plan

Policies in Section 3.4.1 stipulate that development will not be encouraged where such development would result in, or could lead to, unplanned expansions to existing water and wastewater infrastructures. Development shall generally be directed to communities which can reasonably provide or extend full water and wastewater services.

Stormwater management will be required for all new development in the United Counties in accordance with guidelines which may be developed by the Ministry of Environment and Climate Change, the Ministry of Natural Resources and Forestry, the South Nation Conservation, the County, or local municipalities. Careful consideration shall be given to the use of low impact development (LID) practices for stormwater management, including the design of impervious surfaces and other factors that impact on stormwater management. Stormwater management facilities and LID practices shall be designed, where possible, to be linked with the natural heritage and open space system.

Policy 8 of Section 3.4.1 requires that the establishment of new water and wastewater servicing facilities shall be subject to Ministry of Environment and Climate Change guidelines and provincial regulations.

Lands to the immediate west, and to a limited extent the immediate east, are designated Bedrock Resources. Section 4.3.7 of the Official Plan states that the incompatible development within 500 metres of Bedrock Resource Areas shall only be permitted subject to the following criteria:

1. Adjacent to areas intended or utilized for a licensed quarry operation, a hydrogeological investigation is required to demonstrate that the proposed non-extraction development can be adequately serviced by water and sewer services in a manner which will not impede continued existing and proposed extraction operations.
2. Any other investigation as required by the development approval authority such as traffic studies, noise studies, vibration studies, slope stability studies, and air quality impact studies are carried out and demonstrate that the proposed development can proceed without impeding the continued operation of the licensed extraction operation existing licensed operations and future operations on reserves. Such studies are to be carried out by qualified professionals.

Appendix 1 of the Official Plan identifies two forested areas within the expansion lands as High Potential Hazardous Fuel Types for Wildland Fire. Section 6.10 requires that development shall generally be directed to areas outside of lands that are unsafe for development due to the presence of hazardous forest types for wildland fire. Development may be permitted in lands with hazardous forest types for wildland fire where risk is mitigated in accordance with the wildland fire assessment and mitigation standards, as identified by the Ministry of Natural Resources and Forestry.

Section 7.6 requires that local Councils provide for affordable housing by enabling a full range of housing types and densities to meet projected demographic and market requirements of current and future residents of the United Counties. Policies include:

- Ensuring a minimum 10-year supply of residential land at all times.
- Making provision for alternative housing types such as garden suites and accessory dwelling units.
- Within the Urban Policy Area, encouraging cost-effective development standards and densities for new residential development to reduce the cost of housing.
- Support regional targets by developing policies which contribute to an adequate mix of housing, including tenure and type.
- Consider building small lot singles, linked bungalows, maisonettes, quad / six-plexes, and other affordable housing forms.
- Reviewing the affordable housing component in any new development where 25 or more single and / or semi-detached dwelling units or 50 or more multi-family dwelling units are proposed. The County will ensure that new subdivision development will provide a variety of housing types and densities to support the County housing targets.
- Implementing through the local municipality's Comprehensive Zoning By-law accessory apartments as a permitted as-of-right use in new and existing development areas as appropriate.
- Supporting the development, at appropriate locations, or residential facilities that meet the housing needs of persons requiring specialized care.

Section 7.6.3.2 of the Official Plan clarifies that the County encourages the permission of second residential units within all single detached, semi-detached, and townhouses dwelling units.

2.3 CLARENCE-ROCKLAND OFFICIAL PLAN (2014)

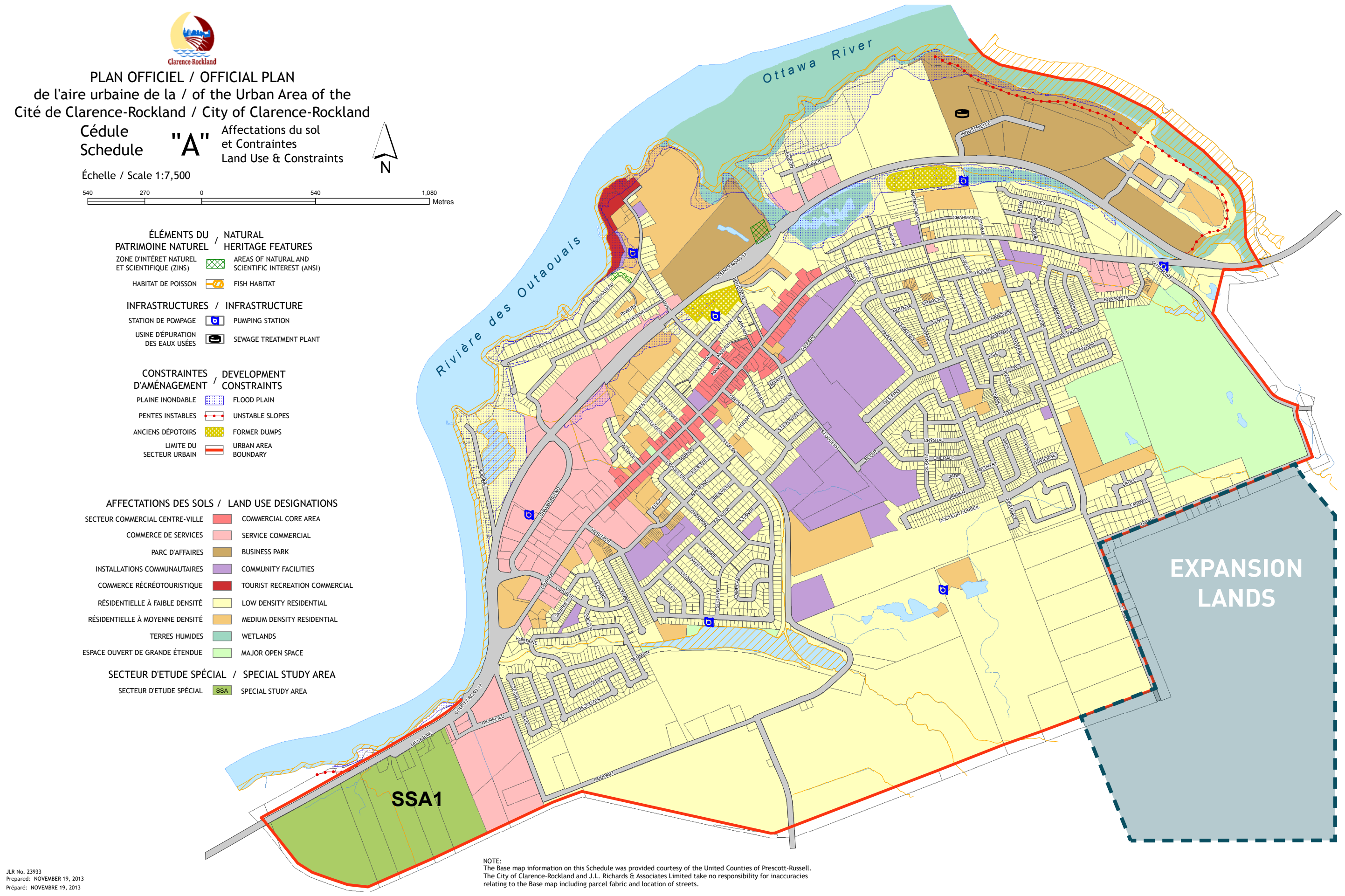
The City of Rockland Official Plan came into full force and effect on September 30, 2014, and is intended to direct the future development of the Urban Area of the City of Clarence-Rockland for a period of approximately 20 years to 2033.

The expansion lands are located outside of the urban area of Clarence-Rockland, as shown on Schedule A (Land Use).Accordingly, rural lands outside of the urban boundary are governed by the policies of the United Counties of Prescott Russell Official Plan. As the intention of the Secondary Plan is to include the lands inside the urban boundary, this section summarizes the policies for lands under urban designations.

Section 4.20 of the Official Plan contains policies pertaining to servicing requirements. It specifies that looping of the water distribution system shall be a priority of Council in order to ensure sufficient pressure and flow in all areas of Rockland.

Policy 1 of Section 4.20.3 stipulates that future development within Rockland must proceed on the basis of full municipal services. Council will only approve applications for development within Rockland when it is satisfied that there is sufficient capacity in both municipal piped systems to service the proposed development. The following additional services shall also be required as a condition to the approval of any development proposal in Rockland, unless otherwise indicated:

- Paved streets
- Storm sewers
- Street lighting
- Underground wiring (electricity, telephone, cablevision)
- Curbs
- Sidewalks (on one side of minor collector roads and on both sides of major collector roads)



Schedule A - Clarence-Rockland Official Plan

- Bicycle paths
- Natural gas
- Bus shelters
- Landscaping

Council will establish and implement the proper phasing policies in order to ensure the timely provision of infrastructure and public service facilities.
Section 4.27 notes that stormwater management plans are required for draft plan approval of subdivision and site plan approvals in the municipality to foster sustainability of urban watersheds and provide opportunities for the enhancement of watercourses.

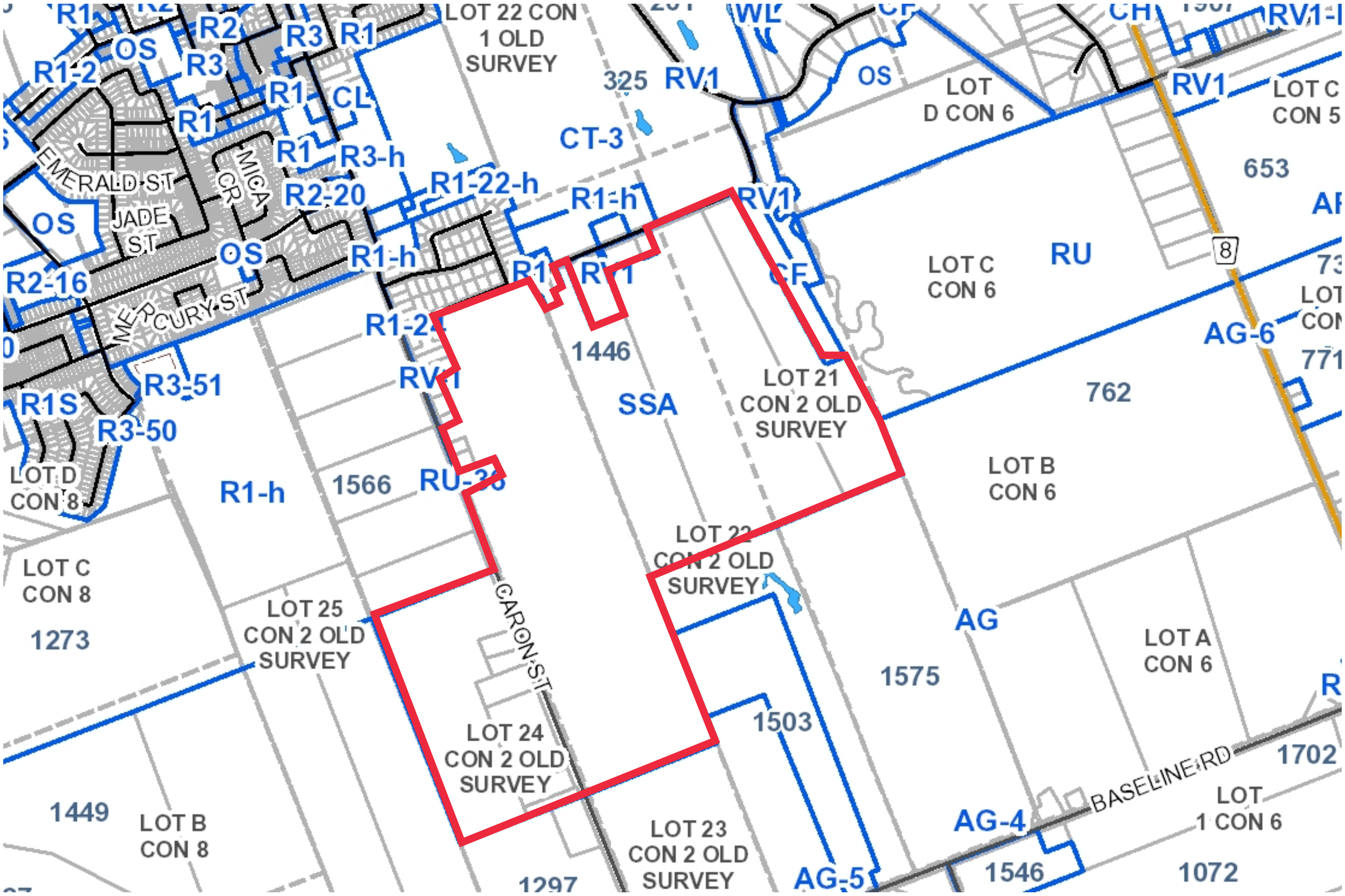
Section 5.6 contains policies for the Residential land use designations, which are anticipated to apply to the majority of the expansion lands. The designation encourages a mix of housing types and tenures, such as single ownership, cooperatives, condominiums and rental. Some complementary non-residential uses are also permitted.

The Plan states that the residential portion of Rockland is planned in neighbourhoods. In each neighbourhood, low density residential is the predominant use, but there could also be medium density residential components, local convenience commercial uses and neighbourhood parks.

The Official Plan requires a range of housing types throughout Rockland. The purpose of the policy is to avoid uniformity of housing types in new development areas. When reviewing development applications that proceed by plans of subdivision, Council shall require a variety of housing types. All major subdivisions are expected to have medium density residential units comprise at least 10 percent of the proposed units.
In order to promote energy conservation, the Plan suggests that new subdivisions should consider solar orientation of streets, lots and buildings.

The Low Density Residential land use policy designation permits single-detached dwellings, semi-detached dwellings, doubles and duplex dwellings to a maximum of 16 units per net hectare. Small-scale commercial, park, school, place of worship and / or community facilities serving a local residential area. A variety of lot sizes are encouraged.

The Medium-Density Residential designation permits multiple-unit residential uses such as townhouses and small apartment buildings no more than five storeys in height, to a maximum of 30 units per net hectare.



Clarence-Rockland Zoning By-law

Section 7.4 contains policies for Local Roads, which are proposed to measure 18 metres in width. Through traffic on local roads is discouraged.

Section 7.14 contains policies for active transportation and the pedestrian and bicycle network. The existing pedestrian and bicycle network will be maintained and expanded through the creation of additional pedestrian walkways, trials, and bikeways with adequate signage. Sidewalks are encouraged, where feasible, to create pedestrian connections between neighbourhoods and major destinations.

2.4 CLARENCE-ROCKLAND ZONING BY-LAW 2016-10

The study area is zoned Special Study Area (SSA) Zone. The intent of the zone is to preserve land for development or redevelopment in accordance with the results and recommendations of a Secondary Plan. In the interim, the use of lands within a SSA Zone should not be changed to the extent that the results of the Secondary Plan and supporting studies could be prejudiced.

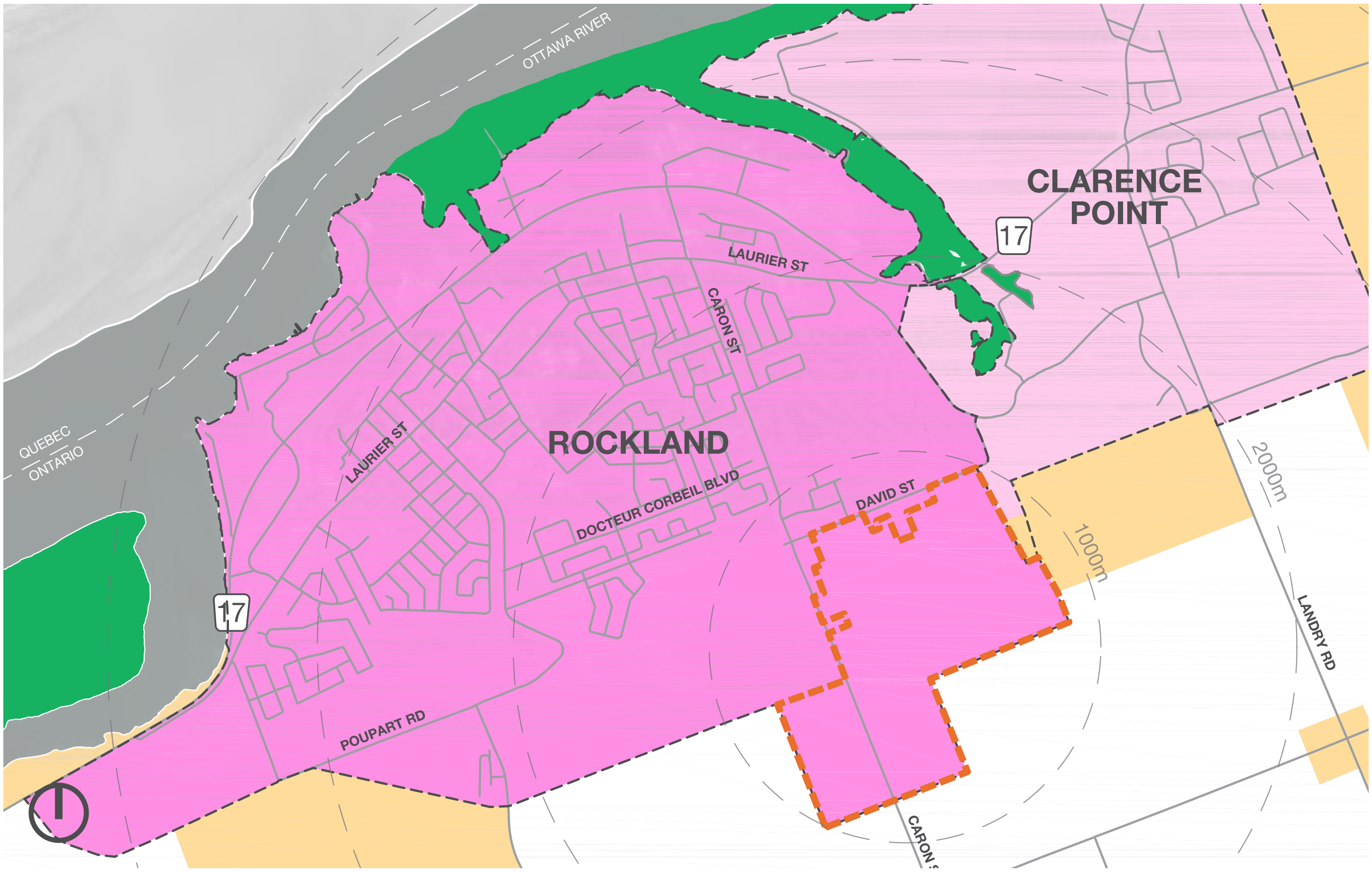
The only permitted uses in the SSA Zone are those which were in existence on the date of passing of the By-law and any other uses may be authorized by Committee of Adjustment or City Council under the provision of the Planning Act.

Adjacent zones to the expansion lands include:

- Urban Residential First Density – General (R1) Zone
- Tourist Commercial (CT) Zone
- Community Facilities (CF) Zone
- Rural (RU) Zone
- Agricultural (AG)


1143

3.0 STUDY AREA ANALYSIS



Land Use

3.1 LAND USE

The majority of the expansion lands are currently used for agricultural activities. These agricultural properties front onto David Street to the north and Caron Street to the west, and are used for the growing of crops.

The smaller properties along the north and west perimeter of the expansion lands are developed with low-density detached residential dwellings. The sizes and configurations of the lots accommodating these residential uses vary, but are generally narrow and rectangular.

Immediately adjacent to the expansion lands across David Street to the north is the Rockland East residential subdivision with approximately 50-60 residential properties. A more extensive residential subdivision is located northwest of the expansion lands on the west side of Caron Street.

North and east of the expansion lands is the Rockland Golf Club. The club features 27 holes and extends from Highway 17 in the north to east of David Street northeast of the expansion lands.

The lands west of the expansion lands are designated for low-density residential development in the Official Plan, and are anticipated to be developed in the future.

3.2 NEIGHBOURHOOD CONTEXT

The expansion lands are located adjacent to a predominantly residential area, but nearby a range of community amenities including:

- Rockland District High School
- Carrefour Jeunesse
- École secondaire catholique L'Escale
- École élémentaire catholique Sainte-Trinité
- St. Patrick Catholic School
- Simon Park

LEGEND

STUDY AREA / ZONE À L'ÉTUDE

URBAN POLICY AREA
SECTEUR DES POLITIQUES URBAINES

COMMUNITY POLICY AREA
SECTEUR DES POLITIQUES COMMUNAUTAIRES

RURAL POLICY AREA
SECTEUR DES POLITIQUES RURALES

PROVINCIALLY SIGNIFICANT WETLAND
TERRE HUMIDE D'IMPORTANCE PROVINCIALE

AGRICULTURAL RESOURCE POLICY AREA
SECTEUR DES POLITIQUES DES RESOURCES AGRICOLES

Nearby Amenities

- Club de Golf Rockland
- Clarence-Rockland YMCA-YWCA
- Jean-Marc Lalonde Arena
- Commercial shopping areas

3.3 TRANSPORTATION

CIMA+ has prepared a Transportation Memo summarizing existing conditions for the expansion lands. The Memo summarizes existing infrastructure for pedestrian, cycling, and vehicular transportation in the community.

The expansion lands are bordered by David Street to the north and Caron Street to the west. David Street is a two-lane road running east from Caron Street and terminating at Tucker Road/Montée Outaouais. Caron Street is a two-lane north-south road connecting to Highway 17 in the north and to Baseline Road in the south. Caron Street has an urban cross-section north of the Expansion Lands before transitioning to a rural cross-section at David Street.

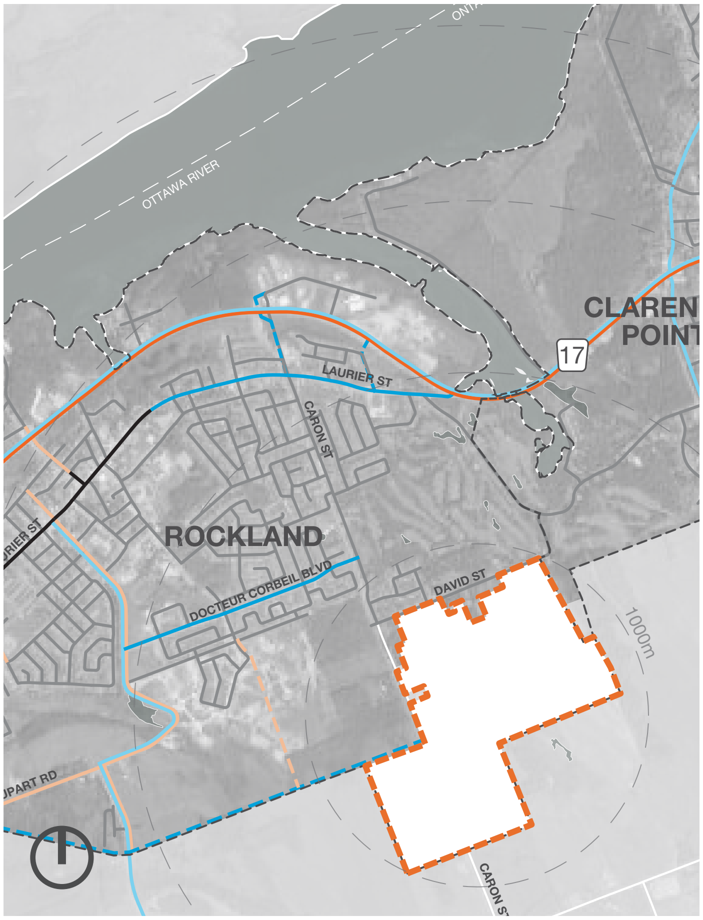
Highway 17 is a County road that provides a major transportation link to both Ottawa and Montreal, as well as other areas of the United Counties of Prescott and Russell. The highway is a two-lane east-west arterial oad however an Environmental Assessment completed in 2016 recommended the widening of this roadway from Highway 417 in the City of Ottawa in the west, to Landry Road, east of Rockland in the east.

Baseline Road, located south of the expansion lands, is a two-lane collector with a rural cross section.

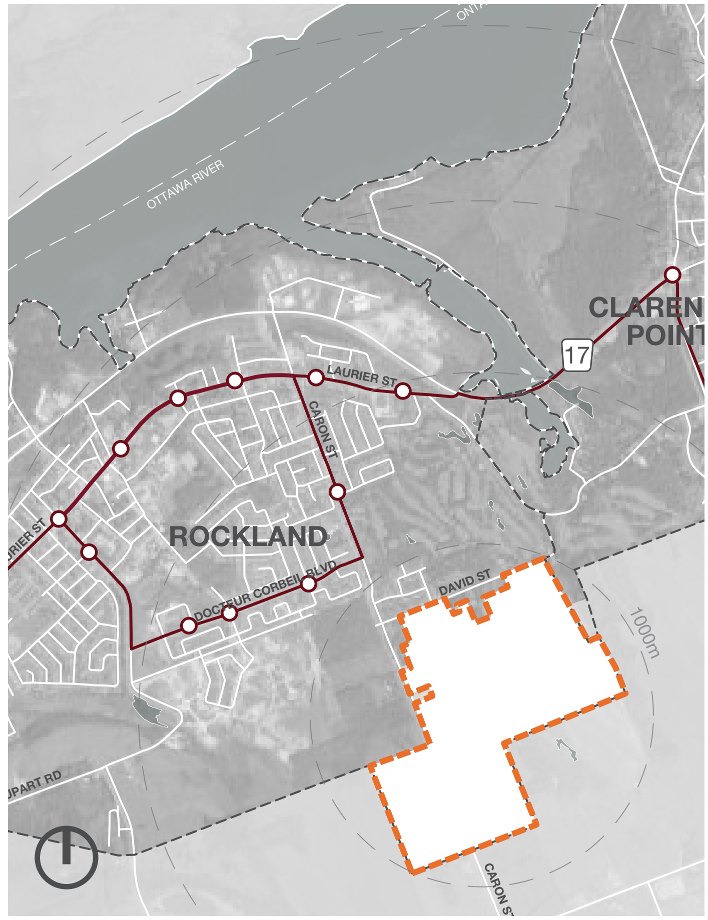
Some local roads within the city are identified as potential candidates for widening in the Official Plan. For example, a right-of-way widening is contemplated for David Street.

LEGEND

SITE
RECREATIONAL SPACE
EDUCATION
MEDICAL
INSTITUTION
SPIRITUAL
COMMUNITY
HOSPITALITY
COMMERCIAL
MUSEUM/GALLERY
GOLF COURSE



Street Hierarchy



Existing Commuter Transit Service

As established in the Official Plan, the incorporation of dedicated pedestrian facilities may be considered at the time of road reconstruction.

While capacity varies with time of day, the majority of intersections in the vicinity of the expansion lands have a Level of Service (LOS) of A or B, signifying "Very Good" or "Good."

Limited public transportation is available in Clarence-Rockland, but is not currently provided in the vicinity of the expansion lands. The bus service links Clarence-Rockland with Ottawa and Gatineau.

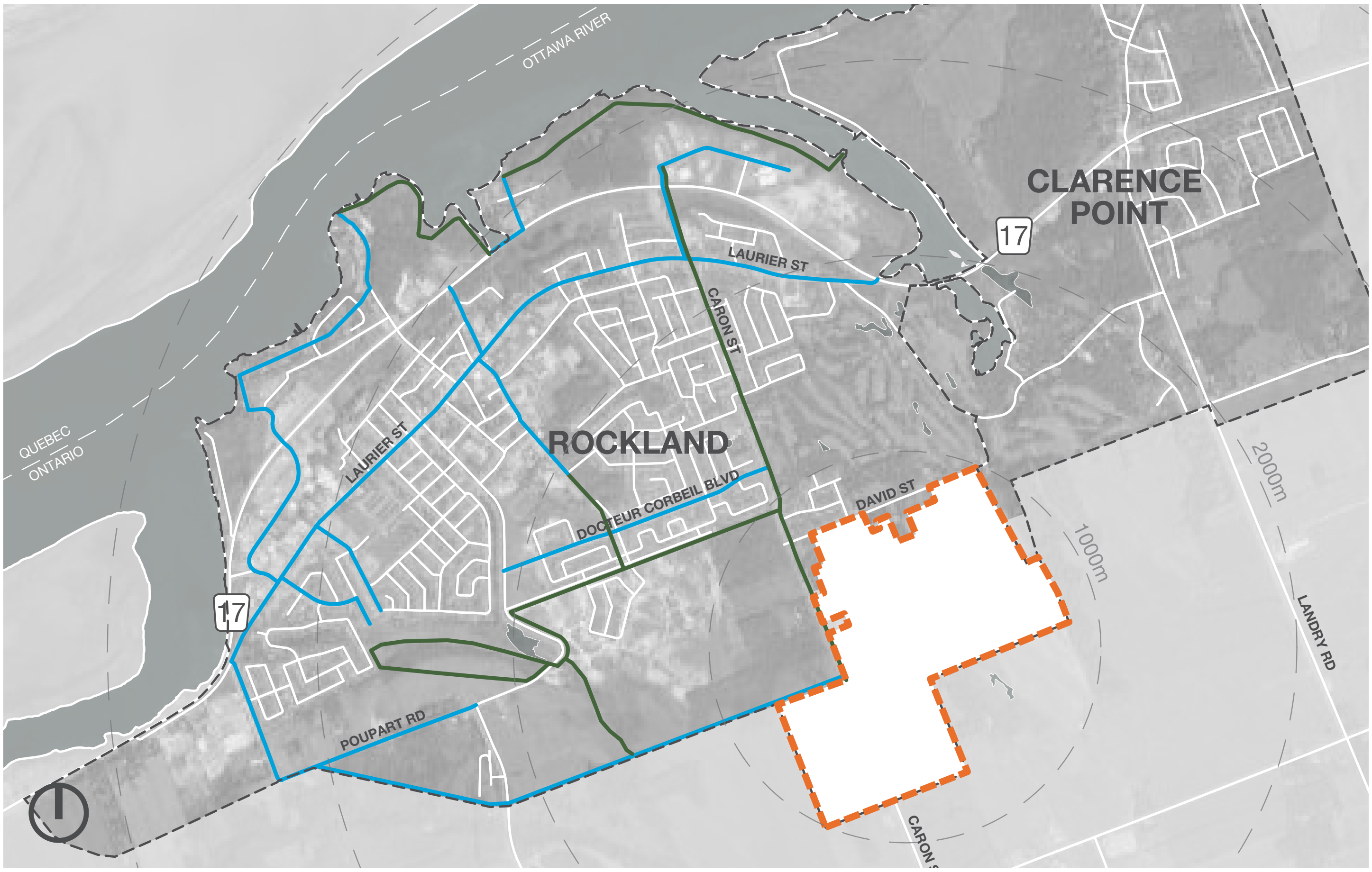
Pedestrian facilities are generally not provided along local streets or roads with rural cross-sections. However, crosswalks are provided at major intersections such as Caron Street at Highway 17, and Caron Street at Laurier Street. Along major arterials, pedestrians and cyclists will be accommodated by multi-use pathways, paved shoulders and service roads along the corridors. Some local streets have midblock crossings and / or pedestrian refuge boulevards.

A paved asphalt path is provided along the east side of Caron Street, extending from Highway 17 in the north to David Street in the south. The City has designated this path as a multi-use pathway, and bicycle symbols are indicated on the pavement. An east-west bicycle corridor is located along Docteur Corbeil Boulevard north of the expansion lands. "Sharrow" markings are indicated on the pavement where on-street parking is provided.

The City of Clarence-Rockland is currently undertaking a Transportation Master Plan (TMP) and Active Transportation Plan (ATP) to meet the anticipated growth and demand of the transportation network by all road users, including vehicles, cyclists and pedestrians. Both plans will inform the update to the Strategic Transportation Plan for the Urban Area.

LEGEND

SITE
COUNTY ROAD
URBAN ROAD
MAIN STREET
ARTERIAL
MAJOR COLLECTOR
COLLECTOR
MAJOR COLLECTOR PROPOSED
COLLECTOR PROPOSED
TRANSIT STOPS
CR TRANSPO - ROUTE #530



Pedestrian and Cyclist Connections

3.4 SERVICING AND INFRASTRUCTURE

CIMA+ has prepared an Existing Conditions Analysis for civil servicing for the expansion lands examining water, sanitary sewer, and stormwater management for the expansion lands.

The analysis notes that the capacity of the water treatment plant exceeds current normal usage. Initial information suggests that an additional 4,676.6 cubic metres per day of treated water can be produced by the water treatment plant in support of the expansion area.

It is anticipated that the expansion lands can be serviced by the Caron Street Booster Station and the Bouvier Water Tower according to the Serviceability Study for Morris Village Stage 5 (October 2017). While initial information confirms that the Caron Street Booster Station currently has excess capacity of 3,975 cubic metres per day, further information for existing boundary conditions and the dedicated watermain booster line to the Bouvier Water Tower is required for additional analysis. Capacity for fire flow has not yet been determined.

Sanitary flows from development on the expansion lands will be directed to the wastewater treatment plant for the Clarence-Rockland serviced area. As the existing plant does not allow for adequate retention time for chlorination during peak flow periods, the City will be undertaking appropriate upgrades to the headworks and equalization tank infrastructure.

A total of seven pump stations serve the sanitary system, with an eighth currently being designed. Improvements to Pumping Station No. 1, the largest in the city, are also proposed, which are anticipated to create sufficient capacity to allow for development on the expansion lands. Capacity in the surrounding sanitary system, including along Caron Street, has yet to be confirmed.

A portion of the expansion lands fall within the catchment area of the catch basin and storm sewer system on Caron Street. The balance of the expansion lands drain to Clarence Creek or Lafontaine Creek along the path of least resistance. A dual drainage system will be implemented in the expansion lands, with a minor piped

LEGEND

SITE

MULTI-USE PATH (OFF-STREET)

MULTI-USE PATH (SIDEWALK)

BIKE LANE

Natural Features

system and a major overland flow system. Further analysis and detailed design details will become available as the project progresses.

3.5 ENVIRONMENTAL FEATURES

CIMA+ has prepared an Existing Conditions Analysis for environmental features on the expansion lands. The purpose of the study is to identify the site's general ecological features and constraints and to assist in future analyses of development options.

The study was performed using various public sources as part of a desktop study, as well as direct correspondence with Staff from the Natural Heritage Information Centre (NHIC). Additional requests for information have been submitted to the South Nation Conservation Authority (SNCA) and the Ministry of Natural Resources and Forestry (MNRF). Field investigations by trained environmental technicians and biologists will be undertaken at a time of year appropriate for proper identification of flora and fauna.

The expansion lands are underlain by a combination of till, fine-textured glaciomarine, organic and alluvial deposits, as well as overlaying Paleozoic bedrock. Typical soils in these units are comprised of clay, sand, and silt.

Clarence Creek, a tributary to the Ottawa River, flows north along the eastern edge of the site. Several wetlands are located on and adjacent to the expansion lands, including Clarence Creek Swamp, South Rockland Swamp, Estates Swamp, and Rockland Marsh. Rockland Marsh is a provincially significant wetland land, as evaluated in 1999. There are no Areas of Natural and Scientific Interest (ANSI) within, or in proximity to, the expansion lands.

There is the potential for Species at Risk (SAR) to be present on the expansion lands, to be confirmed during field investigations.

Environmental features will be examined in greater detail as the project progresses.

LEGEND

SITE
WETLAND
WOODLAND
FISH HABITAT

3.6 MARKET OVERVIEW

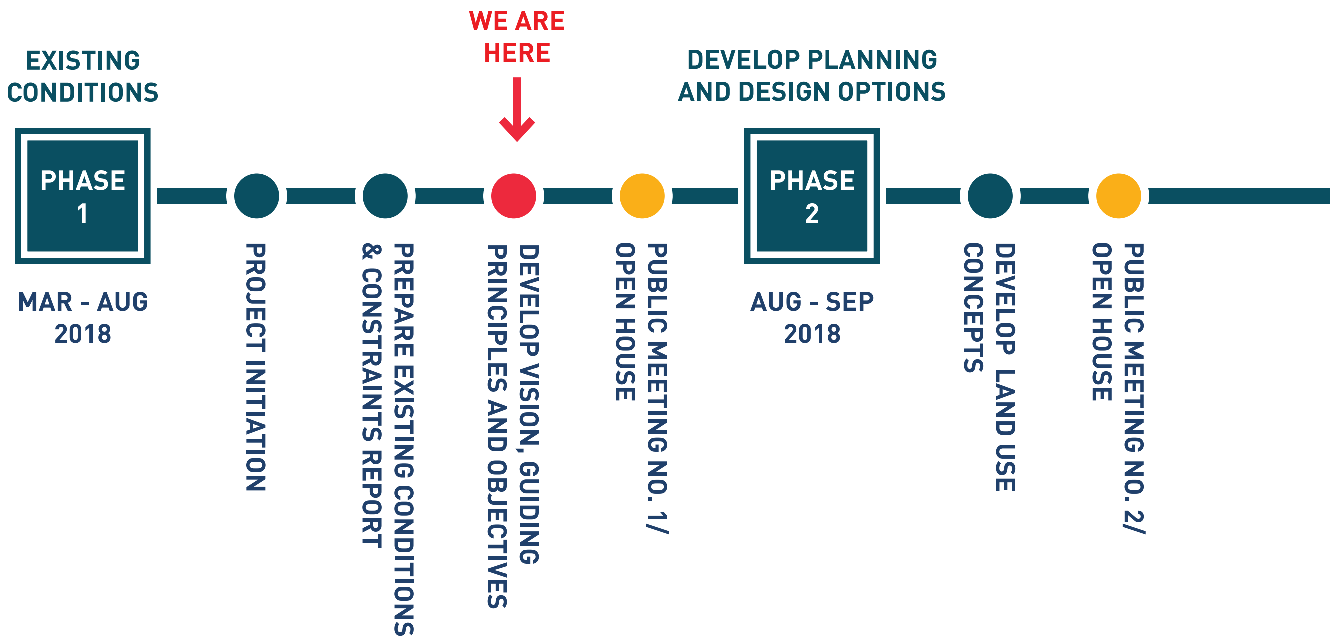
Shore Tanner & Associates ("Shore Tanner") has prepared a Retail Market Demand Study for Clarence-Rockland to determine the scope of market demand for retail, service, and small office businesses within the expansion lands area.

Based on knowledge of the area, Shore Tanner defines the City of Clarence-Rockland as the Primary Trade Area, which typically accounts for 50% of total sales. The United Counties of Prescott and Russell would be considered a Secondary Trade Area, accounting for the balance of sales in a given business.

The study outlines current trends in retail markets, including shopping patterns and store types. It notes that contemplation of retail uses in the expansion lands must consider critical trends, such as: targeted use of social media, online services, a better understanding of the retail market trends, more awareness of competition from shopping centres and districts, and better recognition of the needs, preferences, and desires of the Trade Area residents.

The study suggests that the most market-viable types of office businesses in the expansion lands would be those that serve the residents of the broader area. While government, corporate, or any specialty-type office developments are possible, they are not a reliable market segment for office tenants.

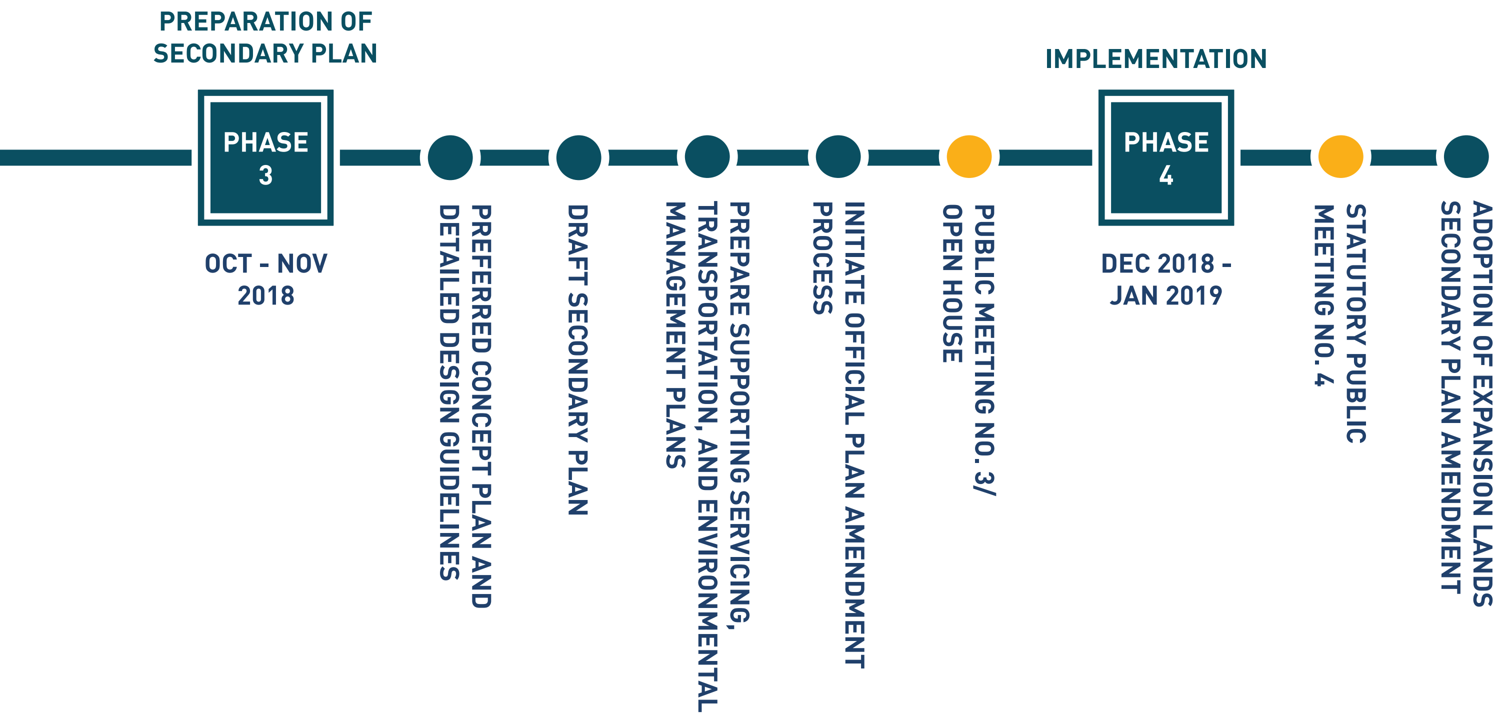
4.0 SUMMARY OF CONSIDERATIONS



The above analysis of existing conditions provides an important baseline for the preparation of the Secondary Plan for the expansion lands. Specific items for consideration going forward include:

- Area land uses;
- UCPR Official Plan target for 70% low-density, 20% medium-density and 10% high-density residential development in the Urban Policy Area designation;
- Rockland Official Plan target of 10% medium density residential within new subdivisions;
- Rockland Official Plan defines low density as up to 16 units per net hectare, and medium density as up to 30 units per net hectare;
- Upgrades potentially required to the potable water service network to support development on the expansion lands;
- Timing of upgrades to the existing wastewater treatment plant;
- Capacity related to the sanitary transmission lines to service the expansion lands development area
- Future widening/modification of Highway 17;
- Limited pedestrian and cycling network connections to the existing urban area and major destinations;
- Potential widening of Caron Street and David Street;
- Adjacency of Clarence Creek and other water courses;
- Potential for species at risk habitat on-site;
- Existing wooded areas; and,
- Anticipated market community-serving retail uses.

These items will remain critical matters for consideration during the development of the Secondary Plan and the preferred land use concept.


PREPARATION OF SECONDARY PLAN
PHASE 3
OCT - NOV 2018
PREFERRED CONCEPT PLAN AND DETAILED DESIGN GUIDELINES
DRAFT SECONDARY PLAN
PREPARE SUPPORTING SERVICING, TRANSPORTATION, AND ENVIRONMENTAL MANAGEMENT PLANS
INITIATE OFFICIAL PLAN AMENDMENT PROCESS
PUBLIC MEETING NO. 3/ OPEN HOUSE
IMPLEMENTATION
PHASE 4
DEC 2018 - JAN 2019
STATUTORY PUBLIC MEETING NO. 4
ADOPTION OF EXPANSION LANDS SECONDARY PLAN AMENDMENT

APPENDIX A: TRANSPORTATION ANALYSIS

MEMO

TO: City of Clarence-Rockland

CC: Paul Black, MCIP RPP - FOTENN

FROM: Matthew Radaelli, Dipl.T. - CIMA+

REVIEWED BY: Gordon Scobie, P.Eng. - CIMA+

DATE: 13 July 2018

SUBJECT: **Expansion Lands Existing Conditions Analysis - Transportation**

1 Background

The purpose of this report is to assess the existing network capacities for vehicles, cyclists, and pedestrians and to highlight the existing transportation and traffic related conditions in the surrounding area of the subject Expansion Lands within the City of Clarence-Rockland.

It is understood that the City is also concurrently undertaking a Transportation Master Plan (TMP), as well as an Activate Transportation Plan (ATP) in order to meet the anticipated growth and demand of the transportation network by all road users, including vehicles, cyclists and pedestrians in the near future. Both plans will serve as an update to the Strategic Transportation Plan for the Urban Area of the City of Clarence-Rockland, which was completed in 2005.

1.1 Study Area

The City of Clarence-Rockland is located within the United Counties of Prescott and Russell, and is situated along Highway 17 (HWY 17), approximately 40 km east of the City of Ottawa's downtown. The Ottawa River is located immediately north while the United Counties of Stormont, Dundas, and Glengarry are located further south. An interprovincial connection between Ontario and Quebec is provided via a seasonal ferry (does not operate during winter months), which provides a link between Thurso, Quebec and Clarence-Rockland. Alternative interprovincial connections are provided via a bridge connection in the east (linking Hawkesbury, Ontario and Grenville, Quebec) or a four season ferry in the west (linking Cumberland, Ontario and Masson-Angers, Quebec), which operates 24 hours a day, 7 days a week.

The location of the Secondary Plan Expansion Lands, in relation to the greater City of Clarence-Rockland is illustrated in **Figure 1**.

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Figure 1: Study Area

As depicted in **Figure 1**, the subject expansion lands include area south of David Street and west of Clarence Creek. It is situated mostly to the east of Caron Street, with the exception of an area of approximately 23 hectares on the west side of Caron Street in the southwest of the study area. The Rockland Golf Club and the residential neighbourhood of Rockland East are located to the north of the study area. A future residential neighbourhood is projected to be developed in the lands located west of the study area, as the lands are designated for low density residential develop as per the Clarence-Rockland Official Plan (OP).

The foregoing further describes the existing transportation network within the City of Clarence-Rockland.

2 Existing Transportation Network

2.1 Study Area Road Network

The roads within the greater study area are under a combination of jurisdictions, including the Counties of Prescott and Russell, and the City of Clarence-Rockland. The following is a summary of the roads within the greater study area of the proposed Secondary Plan boundaries, and the role these roadways play in the greater road network.

HWY 17: is a 2-lane east-west arterial road with a posted speed limit of 70 km/h designated under the Counties of Prescott and Russell's jurisdiction that is continuous between the County limits. HWY17 provides a major transportation link between the Ottawa region and the Greater Montreal area community, as well as providing direct access within the Counties of Prescott and Russell.

Caron Street: is a 2-lane north-south major collector road. A posted speed limit of 50 km/h is present from the north extension of the road at its intersection with HWY 17 to 500 metres south of David Street. South of David Street, Caron Street extends to Baseline Road with a posted speed limit of 80 km/h. A centre two-way-left-turn lane is currently provided along Caron Street between HWY 17 and David Street, which provides refuge for left-turn movements to/from a number of local roads and adjacent land uses.

Docteur Corbeil Boulevard: is a 2-lane east-west major collector road with a posted speed limit of 50 km/h. In the west, Docteur Corbeil Boulevard extends from St. Jean Street (as a 'T' intersection) and terminates at Caron Street in the east (as a 'T' intersection).

Laurier Street: is a 2-lane east-west major collector road with a posted speed limit of 50 km/h. In the west, Laurier Street extends from Popuart Road to HWY 17 in the east (as an unsignalized 'T' intersection). On-street parking is provided on both the north and south sides of Laurier Street where residential housing is provided.

David Street: is a 2-lane east-west local street with a posted speed limit of 50 km. In the west, David Street extends from Caron Street (as a 'T' intersection) to Tucker Road/Montée Outaouais in the east (as a 'T' intersection). David Street primarily serves a small residential and agricultural land uses.

Baseline Road: is a 2-lane local collector with a posted speed limit of 80 km/h and a rural cross section. In the west, Baseline Road extends from Canaan Road to Division Road in the east.

2.2 Study Area Intersections

Caron Street at HWY 17 is a four legged signalized intersection. Auxiliary left-turn lanes are provided in all directions, and auxiliary right-turn lanes are provided in the eastbound and westbound directions. A single lane is provided for through movements in all directions, with northbound and southbound through movements shared with right-turns.

Crosswalks with pedestrian actuated signals are provided for all crossing directions.

Caron Street at Laurier Street is a slightly skewed, four legged signalized intersection. Auxiliary left-turn lanes are provided in all directions. A single shared through/right-turn lane is provided in all directions

Crosswalks with pedestrian actuated signals are provided for all crossing directions.

Caron Street at Hélène Street is a three legged sidestreet stop-controlled intersection. An auxiliary northbound left turn lane is provided as an extension of the continuous left-turn lane along Caron Street.

No pedestrian crosswalks are provided at the intersection. This intersection is similar to most local residential roads intersecting with Caron Street within the study area.

Caron Street at Docteur Corbeil Boulevard is a three legged side street stop-controlled intersection. A continuous centre left-turn lane is provided through the intersection along Caron Street.

A pedestrian crossing is provided on the west side of the intersection. Bicycle lanes are provided along Docteur Corbeil Boulevard.

Caron Street at David Street is a three legged all-way stop controlled intersection. An auxiliary southbound left-turn lane is provided as an extension of the continuous left-turn lane along Caron Street.

No Pedestrian crosswalks are provided at the intersection.

Caron Street at Baseline Road is a three legged side street stop controlled intersection, with southbound vehicles along Caron Street required to stop. No auxiliary lanes are provided at the intersection.

No pedestrian crosswalks are provided at the intersection.

2.3 Planned Network Modifications

An Environmental Study Report was prepared by AECOM in June of 2016 for the proposed widening of HWY 17[1]. Within the City of Clarence-Rockland, the proposed improvements included widening the existing HWY 17 as well as potentially widening/improving Baseline Road outside of the City Urban Boundary.

The recommended plan is to widen the highway from one lane in each direction to two lanes in both directions from east of the Trim Road interchange in the City of Ottawa, for a distance of approximately 21.5 km to Landry Road in the City of Clarence-Rockland. The speed limit within the segment would vary between 60 – 80 km/h. A conceptual design of the cross-section within the urban area of the City is illustrated in **Figure 2**.

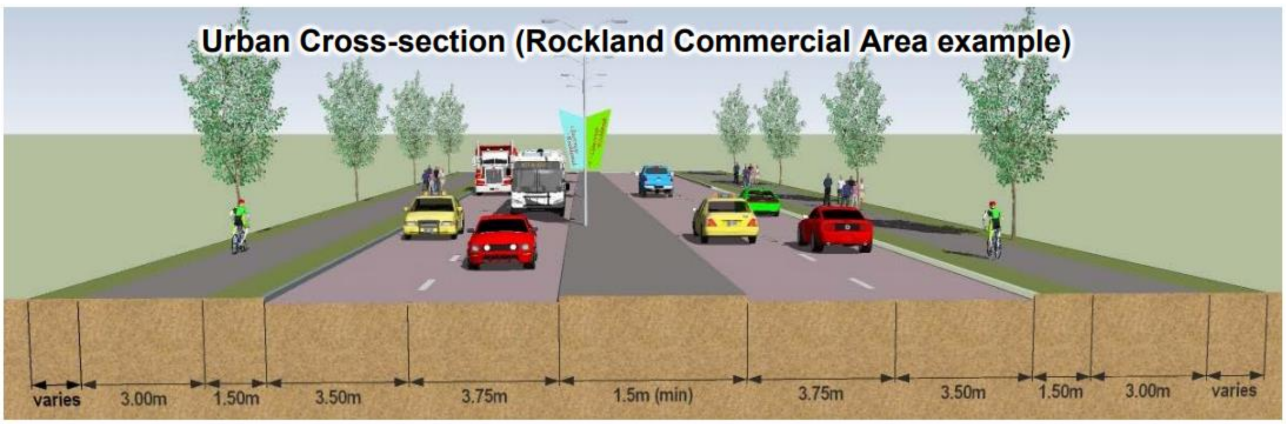


Figure 2: Conceptual Urban Cross-Section within the City of Clarence-Rockland

Pedestrians and cyclists will be accommodated by multi-use pathways, paved shoulders and service roads along the corridor. Pedestrian crossing treatments are proposed to be used within the commercial zone in the City.

2.4 Existing Active Transportation

Active transportation facilities were reviewed to gain an understanding of existing pedestrian and cycling facilities within the greater City area. The City acknowledges that protecting and expanding the existing pedestrian and bicycle network in the City is essential to creating quality of place. Existing policies within the City's Official Plan are anticipated to be expanded with the future TMP and ATP currently being updated.

Pedestrian Facilities

A sidewalk, approximately 2.2 m in width is provided along the west side of Caron Street, while a paved asphalt path approximately 3.0 m in width along the east side of this roadway, both extending from HWY 17 in the north and terminating at David Street in the south. The asphalt path is recognized as an 'off-street multi-use path' according to the Clarence-Rockland Official Plan; however, there is no signage is present along the asphalt path (based on Google Streetview imagery) to indicate its use as a 'multi-use' path which is typically associated with wide paved asphalt pathways.

[1] Environmental Study Report Ottawa Road 174 / County Road 17 Environmental Assessment Study, AECOM, June 2016

Two (2) midblock crossing treatments are present along Caron Street connecting to local trails, as illustrated in **Figure 3**. Midblock crossing treatments have 'zebra' type pavement markings, side-mounted pedestrian crossover signs (Ra-5LR) on both sides of the road facing both directions, and pedestrian refuge islands. These midblock crossing treatments offer the only opportunity for pedestrians to cross Caron Street, with the exception of the east-west crosswalk provided at the signalized HWY 17/Caron and Laurier/Caron intersections.

Figure 3: Midblock Pedestrian Crossing (Caron Street north of Hélène Street)

Sidewalks are primarily located along collector roadways within the City, such as Laurier Street, St. Joseph Street, St. Jean Street, Heritage Drive, etc. Most local residential streets within the City do not have pedestrian facilities. An example of absent sidewalks along local roadways is depicted in **Figure 4**.

Some local roads within the City are identified as potential candidates for road widening as per the Official Plan (e.g. David Road is a candidate for widening). As defined in the City's Official Plan[2], the addition of dedicated pedestrian facilitates should be considered at the time when road reconstruction projects are being undertaken within the City's urban area.

[2] Official Plan of the Urban Area of the City of Calrence-Rockland, Section 7.11 Pedestrian Policies

Figure 4: Absence of sidewalks north of David Rd

Cycling Facilities

As mentioned previously, a paved asphalt path is provided along the east side of Caron Street, extending from HWY 17 in the north and terminating at David Street in the south. The City has designated this path as a 'multi-use' facility; however, the elements attributed to it are more recognizable with a dedicated cycling facility, such as a two-way cycle-track. The width of the asphalt path is approximately 3.0 metres, with a solid yellow centre-line running down the centre. Bicycle lane pavement markings are provided in both directions, as illustrated in **Figure 5**.

Figure 5: Paved Asphalt Pavement Markings – Caron Street South of HWY 17

Cyclist crossing facilities are also provided in multiple locations along Caron Street. Crossing facilities have custom double-sided bicycle crossing signage present on both sides of the road to alert oncoming vehicles. Dashed pavement markings as well as directional arrows are present, which provide positive guidance for crossing cyclists, as illustrated in **Figure 6**.

Figure 6: Cyclist Crossing Facilities – Caron Street

Bicycle lanes are provided in the east and westbound directions along Docteur Corbeil Boulevard. As depicted in **Figure 7**, bicycle lanes are shown to terminate when on-street parking is provided for the adjacent residential units, and 'Sharrow' pavement markings are provided within the centre of the travel lane to guide cyclists as to where they should ride within a travel lane, shared by both motorists and cyclists.

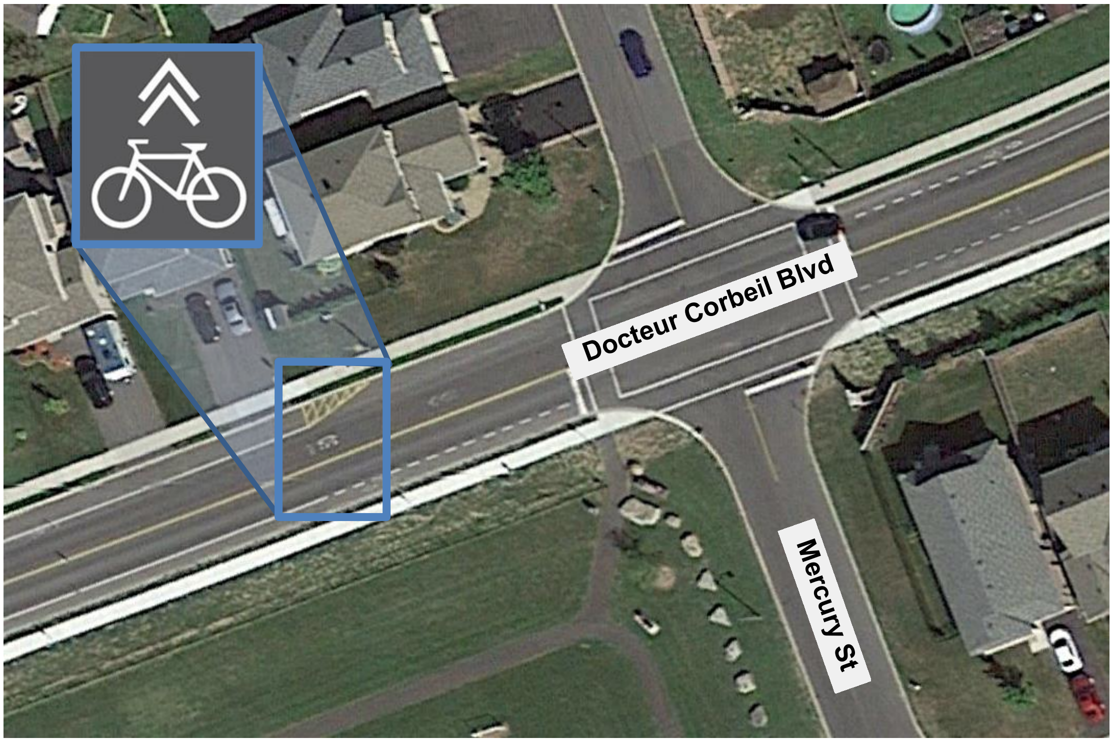


Figure 7: Bicycle Lane & 'Sharrow' Cyclist Pavement Markings (Docteur Corbeil Blvd 350m west of Caron St)

2.5 Existing Transit

Clarence-Rockland Transpo (CRT) operates three bus routes (No. 530, 530A and 535), which connect the City of Clarence-Rockland and downtown Ottawa, with some services continuing on to Gatineau (Hull). Route 530 directly serves the study area, while route 535 provides service to/from Bourget along Russell Road and Highway 417.

Within the City of Clarence-Rockland, route 530 and 530A are understood to be a commuter-oriented express service operating inbound to Ottawa in the morning and outbound to Clarence-Rockland in the afternoon. In 2012, 11 daily trips were provided on Route 530, with an average daily ridership of 355 people using the service (per direction). Within Clarence-Rockland, this route is understood to travel on Laurier Street and Docteur Corbeil Boulevard (to/from Clarence Creek). Both routes and their respective bus stop locations are illustrated in **Figure 8** and **Figure 9**.

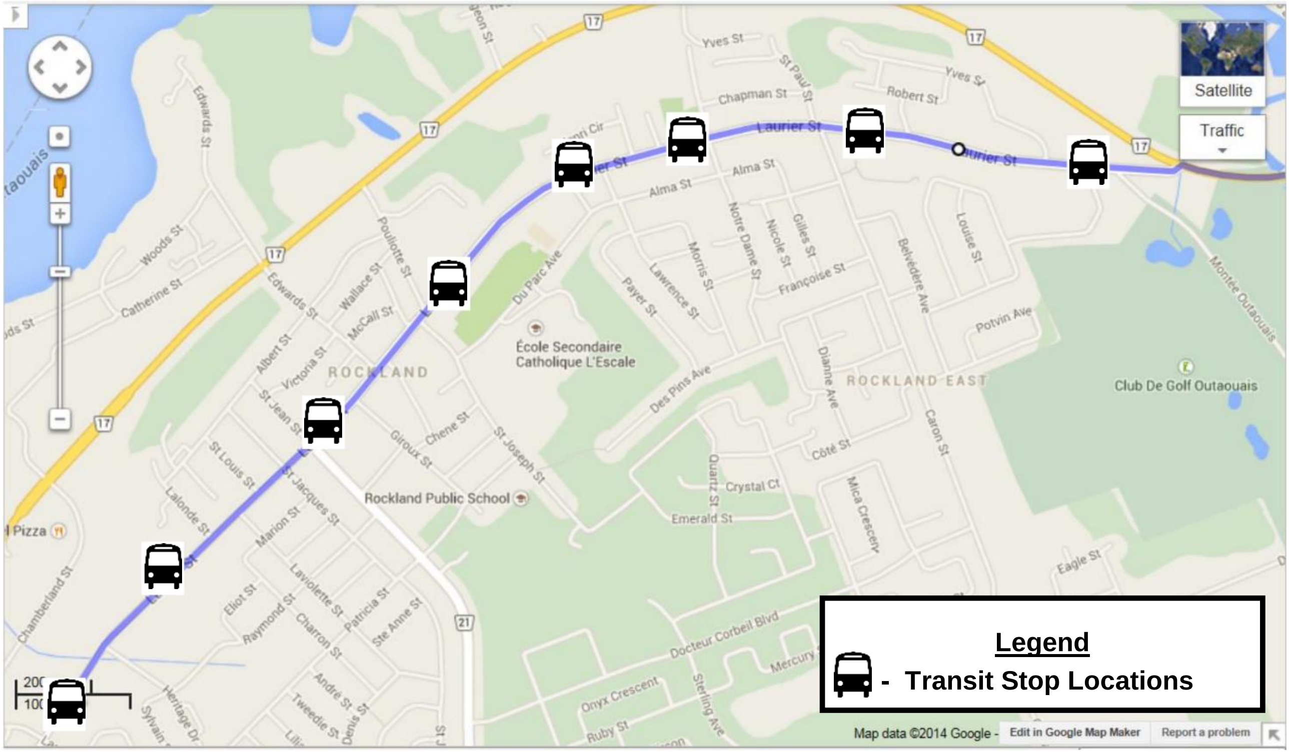


Figure 8: CRT Route 530

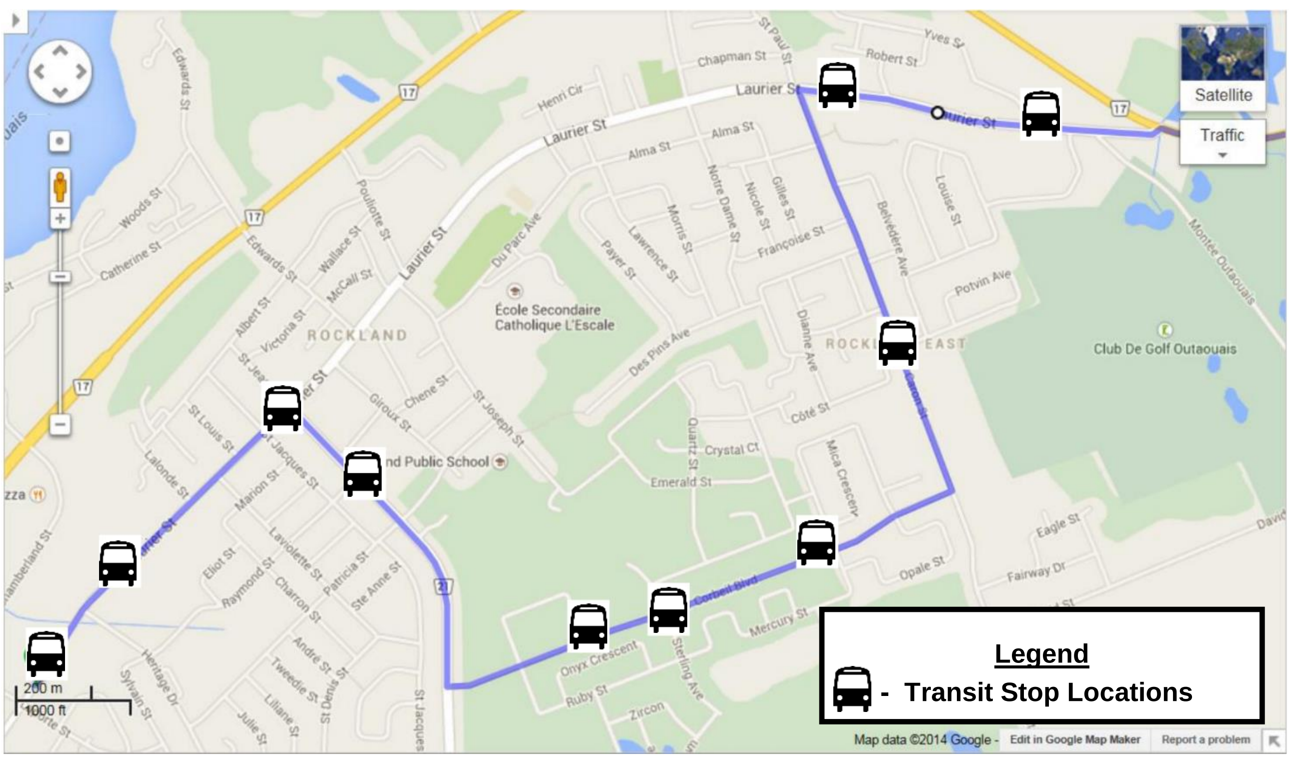


Figure 9: CRT Route 530A

3 Existing Network Operations

3.1 Methodology

Intersection capacity analysis was undertaken using procedures described in the Highway Capacity Manual (HCM). The analysis primarily focuses on performance measures such as level-of-service (LOS), volume to capacity (v/c) ratio, and 95th percentile queues. Additionally, delays reported with HCM methodology were compared to delays reported in SimTraffic simulation in certain cases where simulated results vary from reported results. LOS is a qualitative measure of operational performance and is based on control delay. The LOS criteria for signalized and unsignalized intersections are shown in **Table 1**.

Table 1: LOS Criteria for Signalized and Unsignalized Intersections

LOS	Control Delay (seconds/vehicle)		Traffic Flow Characteristics
	Signalized Intersections	Unsignalized Intersections	
A	0 – 10	0 – 10	Very Good
B	> 10 – 20	> 10 – 15	Good
C	> 20 – 35	> 15 – 25	Typically preferred planning objective
D	> 35 – 55	> 25 – 35	Typically acceptable
E	> 55 – 80	> 35 – 50	Undesirable; potentially unstable traffic flow
F	> 80	> 50	Failing movements may impede traffic flow

The v/c ratio is the ratio between traffic volume and the theoretical capacity of an intersection or movement. A v/c ratio greater than 1.0 indicates that an intersection or movement is operating over capacity. A 95th percentile queue is a queue length that has a 5% probability of being exceeded during the analysis period (i.e. during peak hours). It is common industry practice to use 95th percentile queues for design purposes. Additionally, the review of intersection operations follow industry best practices which indicate that the analysis should identify intersections where:

- v/c ratios for overall intersection operations, through movements or shared through/turning movements are 0.90 or above;
- v/c ratios for exclusive movements are above 1.00; and
- 95th percentile queue lengths for individual movements exceed available lane storage.

The operational performance of signalized and stop-controlled intersections within the study area were reviewed using Synchro/SimTraffic 9 software.

3.2 Traffic Analysis

Turning movement counts (TMCs) were collected during the week of April 5th to April 12th 2018 during both AM and PM peak periods. Some TMCs at unsignalized intersections were estimated based on counts at similar locations throughout the study area. Link volume between intersections was balanced appropriately in the north-south direction along Caron Street, to minimize volume discrepancies between counts conducted on different days. Turning movement counts are illustrated in **Figure 10** and full turning movement counts are provided in **Appendix A**.

Intersection operational analysis was undertaken for the two (2) signalized and seven (7) unsignalized intersections within the study area using Synchro/SimTraffic 9 software to assess existing conditions. A signal timing plan was provided by the City of Clarence-Rockland for the intersection of Caron Street & HWY 17 and used in the existing conditions Synchro model. The signal timing at the intersection of Caron Street & Laurier Street was not provided and was measured in the field on April 10, 2018. The measured signal timing was compared with OTM Book 12 Signal Timing guidelines based on the roadway conditions and modified accordingly. The existing conditions analysis is summarized in **Table 2** and the detailed Synchro/SimTraffic output results are provided in **Appendix B**.

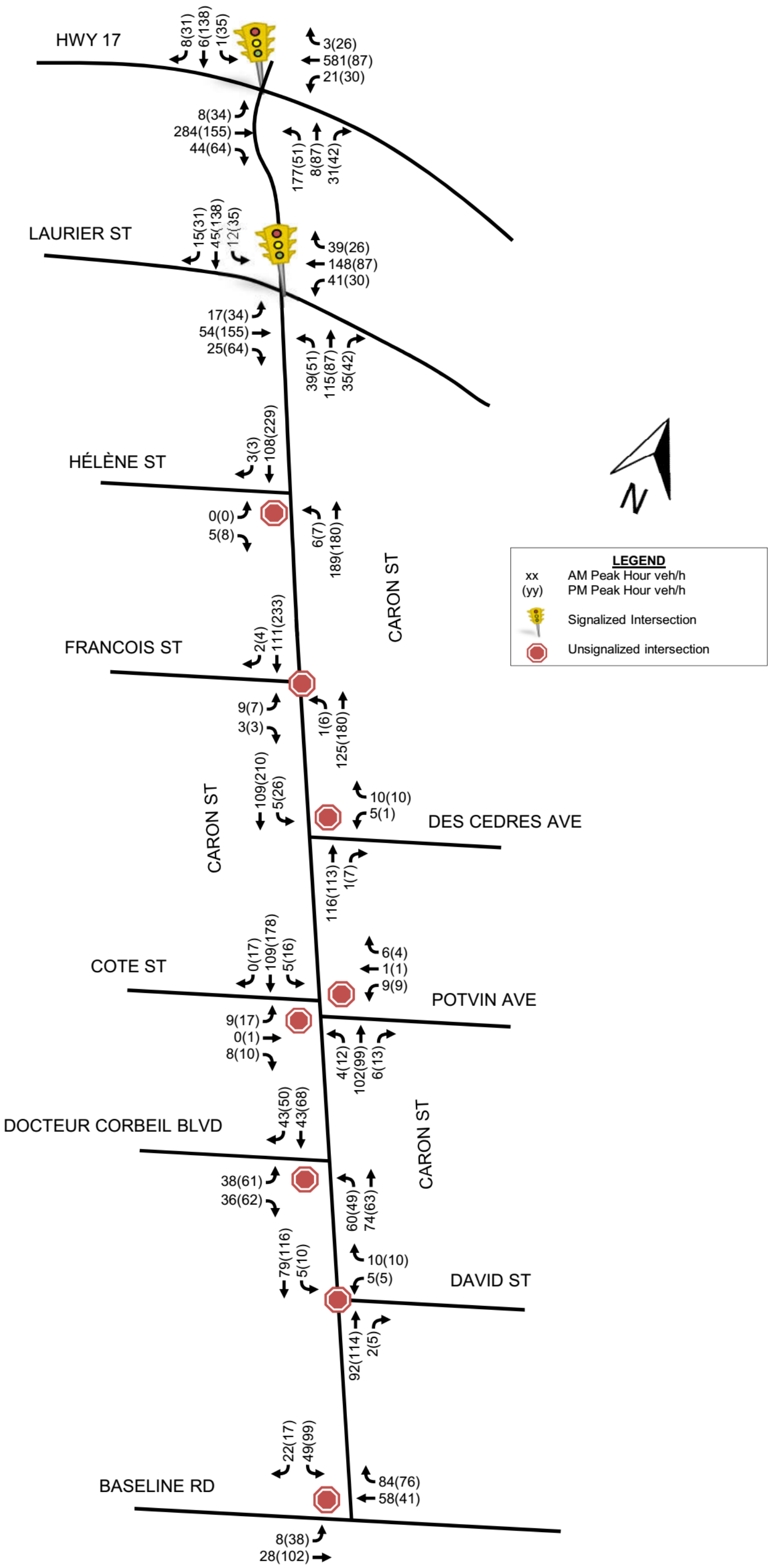


Figure 10: 2018 Existing Turning Movement Volume

Table 2: 2018 Existing Intersection Operations

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at HWY 17 (Signalized)										
EB	L	90	0.03	10	A	7	0.06	12	B	12
	T	-	0.33	12	B	34	0.20	16	B	26
	R	85	0.03	9	A	9	0.05	14	B	14
WB	L	60	0.04	8	A	8	0.05	12	B	12
	T	-	0.65	17	B	51	0.11	15	B	19
	R	56	0.00	9	A	2	0.02	14	B	9
NB	L	60	0.72	41	D	44	0.23	32	C	23
	T/R	-	0.07	35	C	12	0.42	39	D	35
SB	L	40	0.02	43	D	2	0.15	34	C	21
	T/R	-	0.26	48	D	8	0.64	46	D	49
Overall			**0.70**	**20**	**B**	**-**	**0.29**	**27**	**C**	**-**
Caron Street at Laurier Street (Signalized)										
EB	L	35	0.04	13	B	6	0.07	11	B	12
	T/R	-	0.10	14	B	12	0.32	16	B	30
WB	L	60	0.08	11	B	10	0.07	12	B	9
	T/R	-	0.26	14	B	23	0.17	15	B	16
NB	L	55	0.15	23	C	13	0.23	25	C	15
	T/R	-	0.44	28	C	34	0.42	29	C	31
SB	L	50	0.06	26	C	6	0.14	24	C	14
	T/R	-	0.18	28	C	19	0.59	32	C	42
Overall			**0.32**	**20**	**B**	**-**	**0.38**	**22**	**C**	**-**
Caron Street at Hélène Street (Unsignalized)										
EB	L/R	-	0.01	9	A	6	0.01	10	A	8
NB	L	15	0.00	1	A	2	0.01	8	A	4
	T	-	0.12	-	-	-	0.12	-	-	-
SB	T/R	-	0.07	-	-	-	0.15	-	-	-
Overall			**0.21**	**1**	**A**	**-**	**0.23**	**1**	**A**	**-**
Caron Street at Françoise Street (Unsignalized)										
EB	L/R	-	0.02	8	A	10	0.02	8	A	10
NB	L	15	0.00	7	A	2	0.01	8	A	6
	T	-	0.18	8	-	17	0.26	-	-	19
SB	T/R	-	0.15	8	A	17	0.31	8	A	24
Overall			**0.17**	**8**	**A**	**-**	**0.23**	**9**	**A**	**-**
Caron Street at Des Cèdres Avenue (Unsignalized)										
WB	L/R	-	0.02	9	A	10	0.01	9	A	9
NB	T/R	-	0.08	-	-	-	0.08	-	-	-
SB	L	15	0.00	1	A	2	0.02	8	A	6
	T	-	0.07	-	-	-	0.14	-	-	-

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Overall			**0.17**	**1**	**A**	**-**	**0.22**	**1**	**A**	**-**
Caron Street at Cote Street/Potvin Avenue (Unsignalized)										
EB	L/T/R	-	0.02	8	A	11	0.04	8	A	14
WB	L/T/R	-	0.02	8	A	10	0.02	8	A	10
NB	L	15	0.01	7	A	5	0.02	7	A	9
	T/R	-	0.16	-	-	18	0.16	-	-	16
SB	L	15	0.01	7	A	4	0.03	7	A	7
	T/R	-	0.16	-	-	15	0.17	-	-	14
Overall			**0.16**	**7**	**A**	**-**	**0.18**	**7**	**A**	**-**
Caron Street at Docteur Corbeil Boulevard (Unsignalized)										
EB	L/R	-	0.10	10	A	14	0.16	10	B	15
NB	L	15	0.04	8	A	8	0.04	8	A	8
	T	-	0.05	-	-	-	0.04	-	-	-
SB	T/R	-	0.06	-	-	-	0.08	-	-	-
Overall			**0.21**	**4**	**A**	**-**	**0.24**	**5**	**A**	**-**
Caron Street at David Street (Unsignalized)										
WB	L/R	-	0.02	7	A	10	0.02	7	A	10
NB	T/R	-	0.12	8	A	17	0.15	8	A	17
SB	L	40	0.01	7	A	6	0.02	7	A	10
	T	-	0.11	7	-	16	0.17	7	-	15
Overall			**0.15**	**7**	**A**	**-**	**0.17**	**8**	**A**	**-**
Caron Street at Baseline Road (Unsignalized)										
EB	L/T	-	0.01	2	A	3	0.03	2	A	6
WB	T/R	-	0.09	-	-	12	0.08	-	-	16
SB	L/R	-	0.09	10	A	-	0.18	11	B	-
Overall			**0.20**	**3**	**A**	**-**	**0.28**	**4**	**A**	**-**

As shown in **Table 2**, all movements at signalized intersections are operating with a v/c ratio below 0.72 (i.e. with a LOS D or better). With regard to 95th percentile queues, the existing storage at signalized intersections is also noted as being sufficient (i.e. left-turn vehicle queues are not spilling back into and blocking adjacent through lanes). All movements at unsignalized intersections are operating with a v/c ratio below 0.31, (i.e. with a LOS B or better) and 95th percentile queues ranging between 1-3 vehicles in length.

Overall, there are no existing issues from a transportation perspective along Caron Street.

Attachments

Appendix A

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Hwy 17, Rockland, On
GPS Coordinates: Lat=45.432940, Lon=-75.598433
Date: 2018-04-05
Day of week: Thursday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	2	2	7	140	0	41	1	7	1	53	13	267
07:45	1	1	2	4	158	3	52	4	10	2	75	14	326
08:00	0	2	1	1	136	0	46	3	6	3	73	5	276
08:15	0	1	3	9	147	0	38	0	8	2	83	12	303

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	2	2	7	140	0	41	1	7	1	53	13	267
07:45	1	1	2	4	158	3	52	4	10	2	75	14	326
08:00	0	2	1	1	136	0	46	3	6	3	73	5	276
08:15	0	1	3	9	147	0	38	0	8	2	83	12	303

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	1	6	8	21	581	3	177	8	31	8	284	44	1172
Factor	0.25	0.75	0.67	0.58	0.92	0.25	0.85	0.50	0.78	0.67	0.86	0.79	0.90
Approach Factor	0.94			0.92			0.82			0.87			

Peak Hour Vehicle Summary

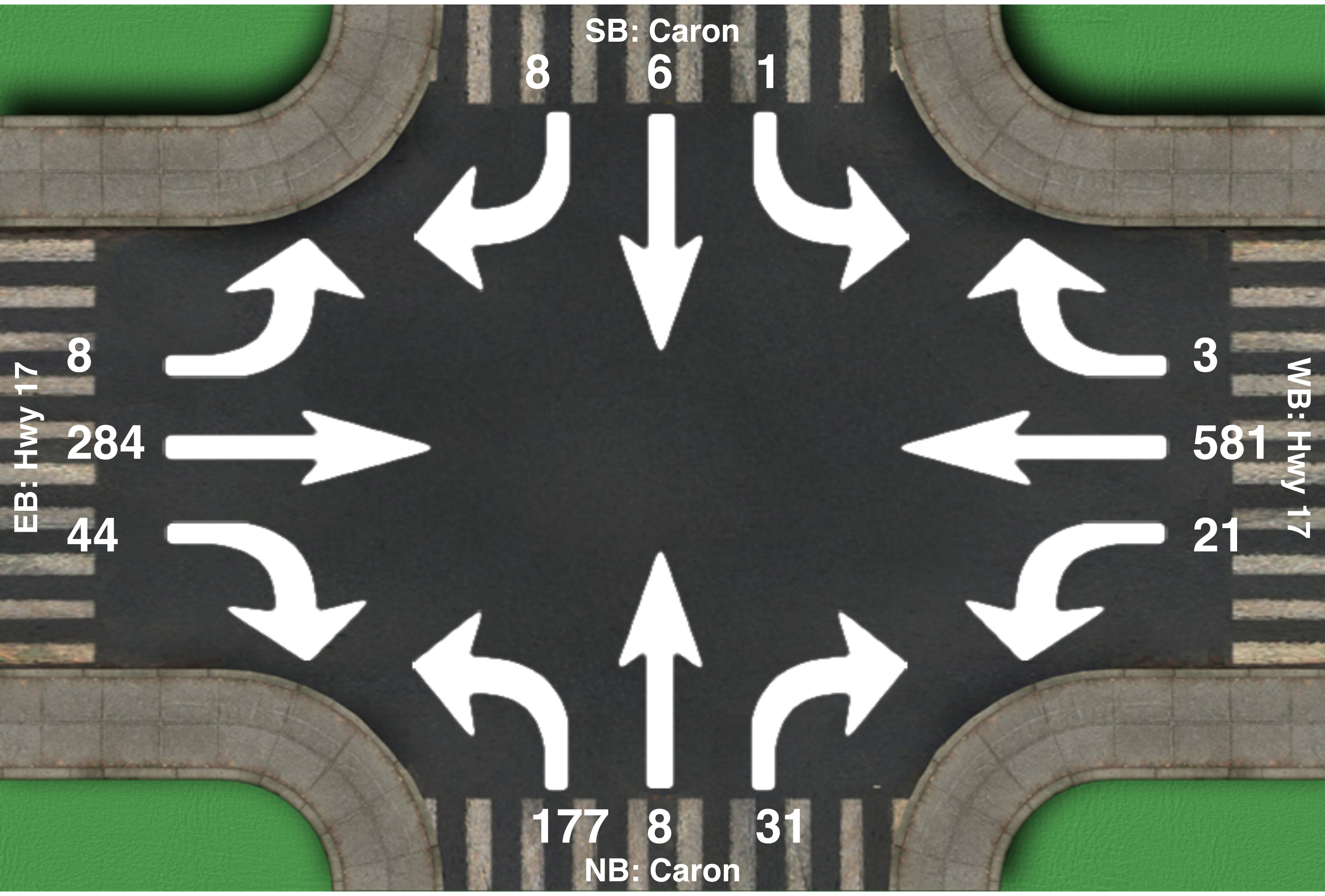
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	1	6	8	21	581	3	177	8	31	8	284	44	1172

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Caron at Hwy 17, Rockland, On
GPS Coordinates: Lat=45.432940, Lon=-75.598433
Date: 2018-04-05
Day of week: Thursday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	1	6	8	21	581	3	177	8	31	8	284	44	1172
Factor	0.25	0.75	0.67	0.58	0.92	0.25	0.85	0.50	0.78	0.67	0.86	0.79	0.90
Approach Factor	0.94			0.92			0.82			0.87			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Hwy 17, Rockland, On
GPS Coordinates: Lat=45.557294, Lon=-75.279173
Date: 2018-04-05
Day of week: Thursday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	1	4	7	3	73	1	19	2	5	3	186	45	349
16:15	0	3	3	1	84	1	33	1	15	3	184	43	371
16:30	1	3	7	2	82	0	26	1	12	6	192	44	376
16:45	2	2	3	6	99	1	29	0	10	3	199	42	396
17:00	0	0	0	0	1	0	0	0	0	0	3	1	5

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	1	4	7	3	73	1	19	2	5	3	186	45	349
16:15	0	3	3	1	84	1	33	1	15	3	184	43	371
16:30	1	3	7	2	82	0	26	1	12	6	192	44	376
16:45	2	2	3	6	99	1	29	0	10	3	199	42	396
17:00	0	0	0	0	1	0	0	0	0	0	3	1	5

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	4	12	20	12	338	3	107	4	42	15	761	174	1492
Factor	0.50	0.75	0.71	0.50	0.85	0.75	0.81	0.50	0.70	0.62	0.96	0.97	0.94
Approach Factor	0.75			0.83			0.78			0.97			

Peak Hour Vehicle Summary

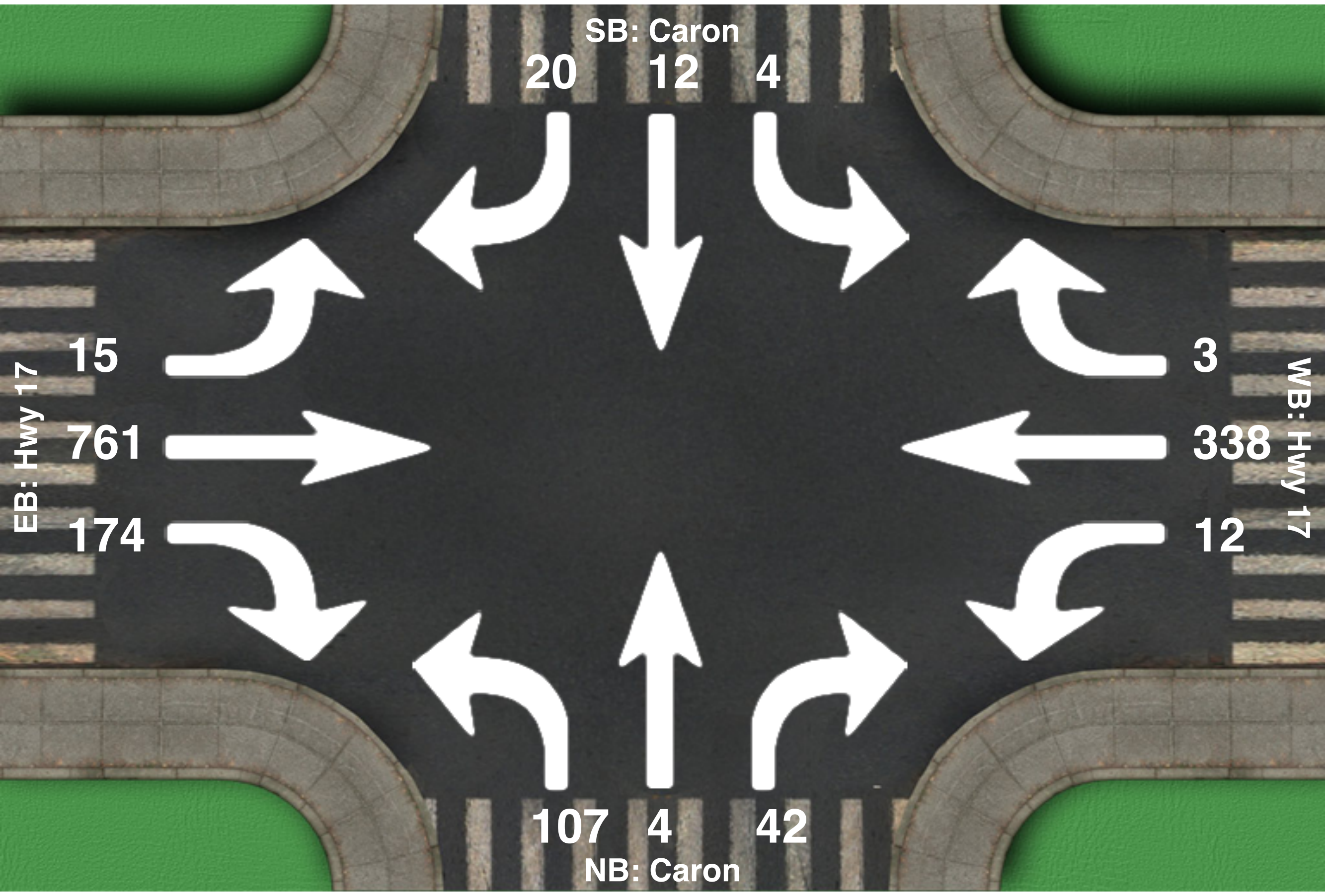
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	4	12	20	12	338	3	107	4	42	15	761	174	1492

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Caron at Hwy 17, Rockland, On
GPS Coordinates: Lat=45.557294, Lon=-75.279173
Date: 2018-04-05
Day of week: Thursday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	4	12	20	12	338	3	107	4	42	15	761	174	1492
Factor	0.50	0.75	0.71	0.50	0.85	0.75	0.81	0.50	0.70	0.62	0.96	0.97	0.94
Approach Factor	0.75			0.83			0.78			0.97			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Laurier, Rockland, On
GPS Coordinates: Lat=45.555171, Lon=-75.276541
Date: 2018-04-09
Day of week: Monday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	1	7	1	11	32	14	9	29	10	1	11	5	131
07:45	4	12	8	11	43	8	12	36	7	6	10	6	163
08:00	2	11	2	14	39	7	7	18	10	6	19	9	144
08:15	5	15	4	5	34	10	11	32	8	4	14	5	147

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	1	7	1	11	32	14	9	29	10	1	11	5	131
07:45	4	12	8	11	43	8	12	36	7	6	10	6	163
08:00	2	11	2	14	39	7	7	18	10	6	19	9	144
08:15	5	15	4	5	34	10	11	32	8	4	14	5	147

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	12	45	15	41	148	39	39	115	35	17	54	25	585
Factor	0.60	0.75	0.47	0.73	0.86	0.70	0.81	0.80	0.88	0.71	0.71	0.69	0.90
Approach Factor	0.75			0.92			0.86			0.71			

Peak Hour Vehicle Summary

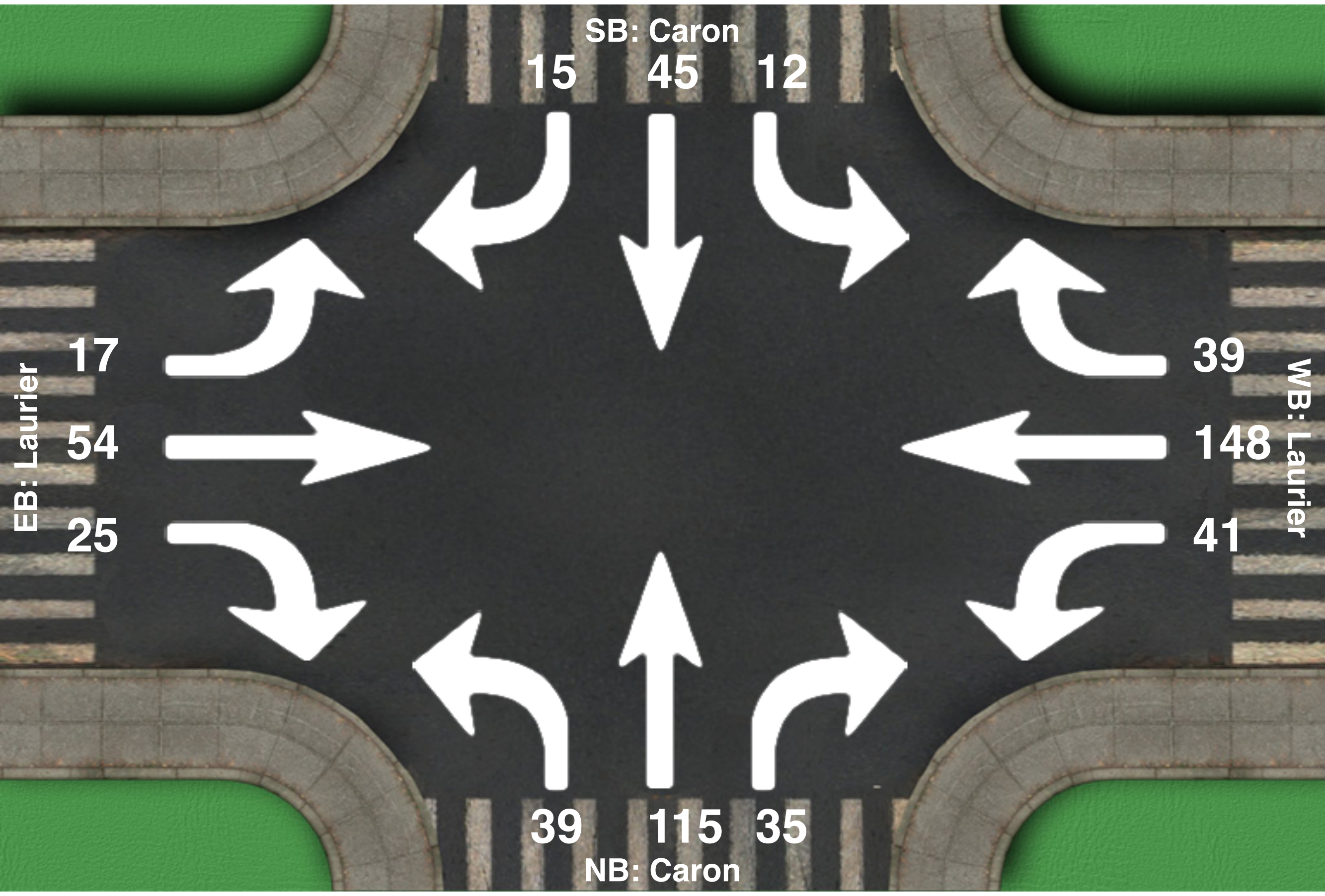
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	12	45	15	41	148	39	39	115	35	17	54	25	585

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Caron at Laurier, Rockland, On
GPS Coordinates: Lat=45.555171, Lon=-75.276541
Date: 2018-04-09
Day of week: Monday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	12	45	15	41	148	39	39	115	35	17	54	25	585
Factor	0.60	0.75	0.47	0.73	0.86	0.70	0.81	0.80	0.88	0.71	0.71	0.69	0.90
Approach Factor	0.75			0.92			0.86			0.71			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Laurier, Rockland, On
GPS Coordinates: Lat=45.554743, Lon=-75.276561
Date: 2018-04-09
Day of week: Monday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	16	34	6	7	20	8	10	18	8	9	40	14	190
16:15	4	41	8	7	23	7	13	18	14	8	42	15	200
16:30	7	32	11	8	24	6	14	24	8	8	34	23	199
16:45	8	31	6	8	20	5	14	27	12	9	39	12	191

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	16	34	6	7	20	8	10	18	8	9	40	14	190
16:15	4	41	8	7	23	7	13	18	14	8	42	15	200
16:30	7	32	11	8	24	6	14	24	8	8	34	23	199
16:45	8	31	6	8	20	5	14	27	12	9	39	12	191

Bicycle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
16:00	2	0	2	0	0	0	0	1	1	0	0	0	3
16:15	0	2	2	0	0	0	0	0	0	0	0	0	2
16:30	0	0	0	2	0	2	0	0	0	2	0	2	4
16:45	1	0	1	0	1	1	0	1	1	1	0	1	4

Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	35	138	31	30	87	26	51	87	42	34	155	64	780
Factor	0.55	0.84	0.70	0.94	0.91	0.81	0.91	0.81	0.75	0.94	0.92	0.70	0.97
Approach Factor	0.91			0.94			0.85			0.97			

Peak Hour Vehicle Summary

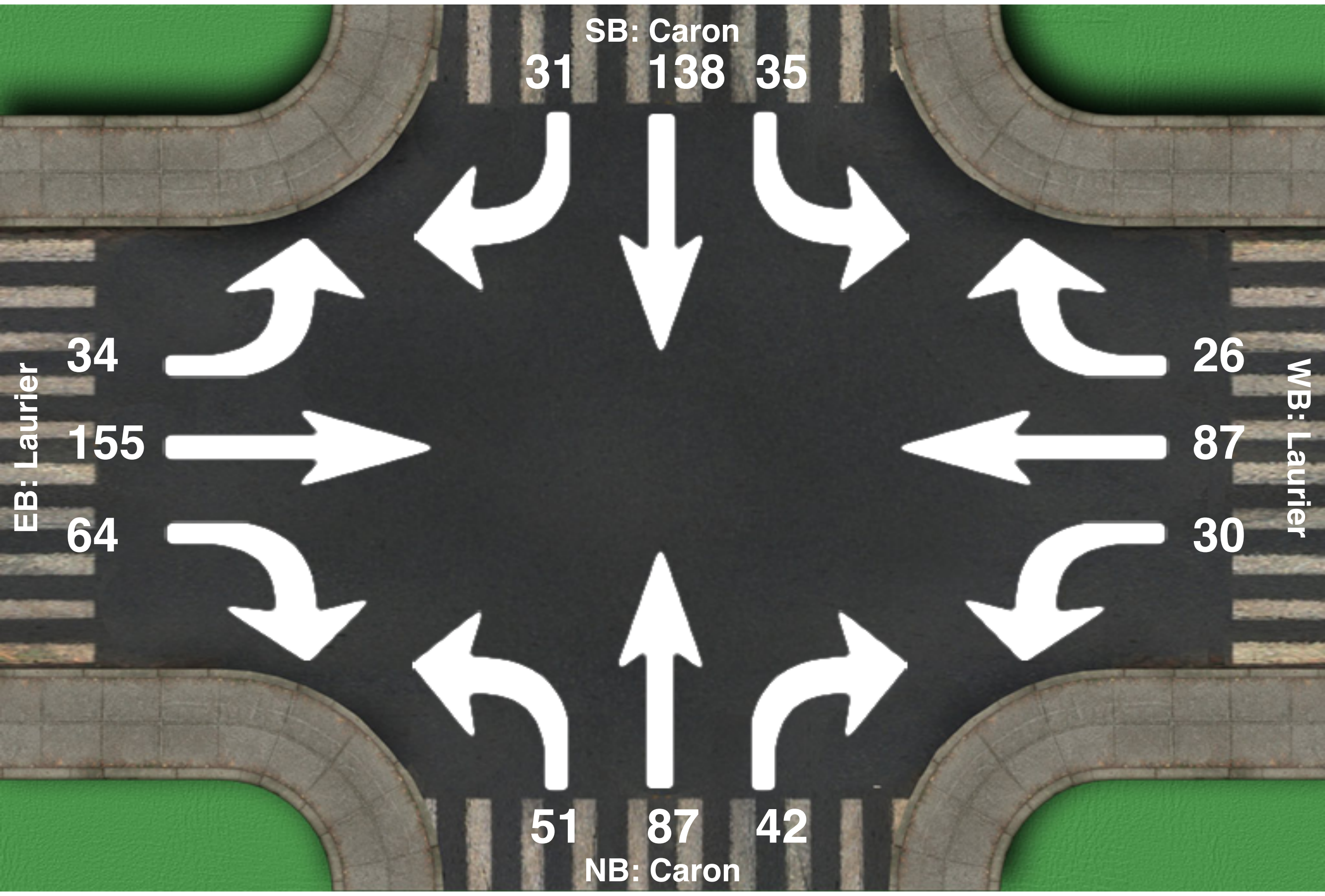
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	35	138	31	30	87	26	51	87	42	34	155	64	780
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	3	2	5	2	1	3	0	2	2	3	0	3	13

Intersection Peak Hour

Location: Caron at Laurier, Rockland, On
GPS Coordinates: Lat=45.554743, Lon=-75.276561
Date: 2018-04-09
Day of week: Monday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	35	138	31	30	87	26	51	87	42	34	155	64	780
Factor	0.55	0.84	0.70	0.94	0.91	0.81	0.91	0.81	0.75	0.94	0.92	0.70	0.97
Approach Factor	0.91			0.94			0.85			0.97			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Baseline , Rockland, On
GPS Coordinates: Lat=45.525226, Lon=-75.259189
Date: 2018-04-10
Day of week: Tuesday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	10	0	6	0	15	26	0	0	0	4	15	0	76
07:45	16	0	5	0	12	20	0	0	0	0	6	0	59
08:00	12	0	8	0	16	13	0	0	0	1	4	0	54
08:15	11	0	3	0	15	25	0	0	0	3	3	0	60

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	10	0	6	0	15	26	0	0	0	4	15	0	76
07:45	16	0	5	0	12	20	0	0	0	0	6	0	59
08:00	12	0	8	0	16	13	0	0	0	1	4	0	54
08:15	11	0	3	0	15	25	0	0	0	3	3	0	60

Bicycle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	49	0	22	0	58	84	0	0	0	8	28	0	249
Factor	0.77	0.00	0.69	0.00	0.91	0.81	0.00	0.00	0.00	0.50	0.47	0.00	0.82
Approach Factor	0.85			0.87			0.00			0.47			

Peak Hour Vehicle Summary

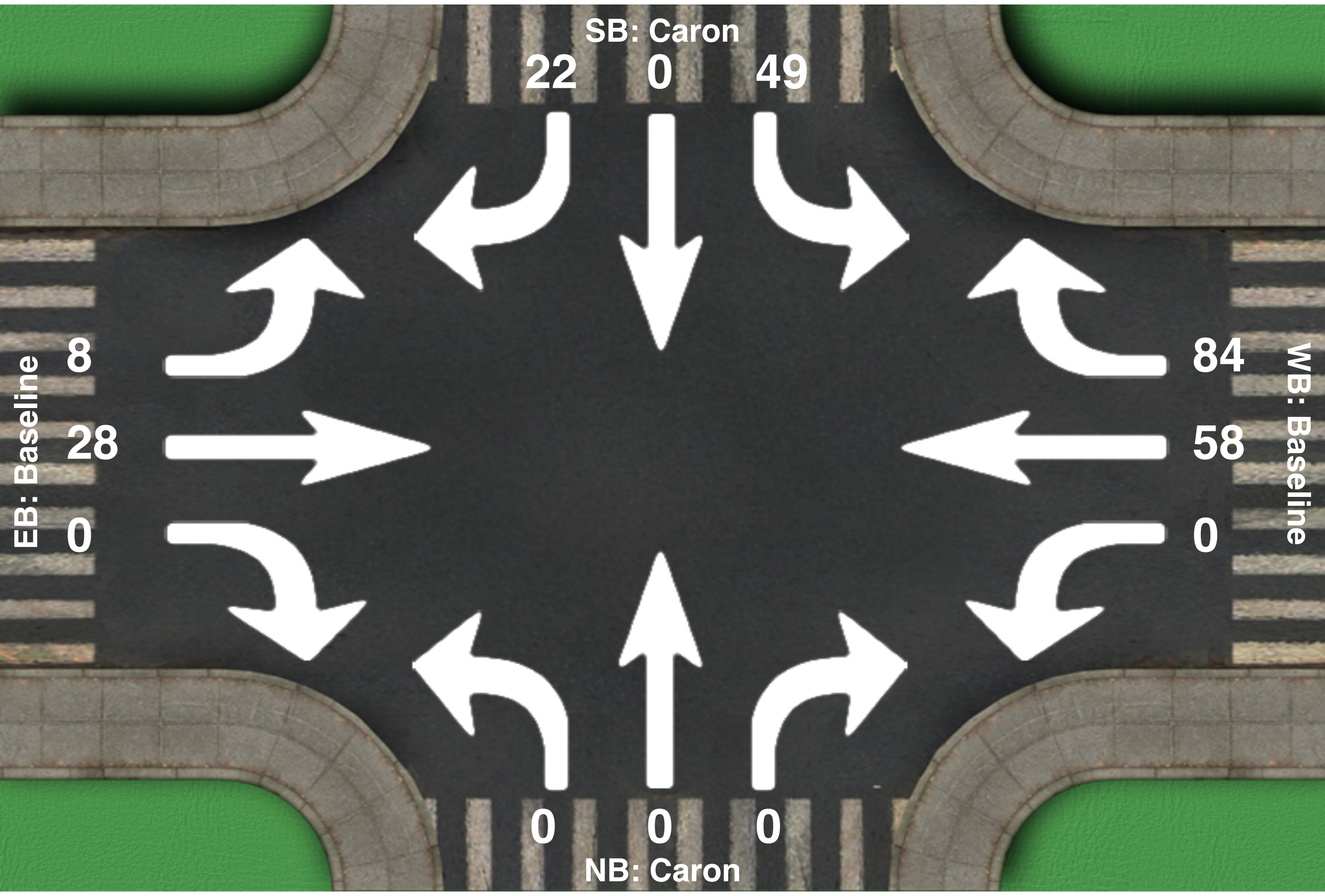
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	49	0	22	0	58	84	0	0	0	8	28	0	249
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Caron at Baseline , Rockland, On
GPS Coordinates: Lat=45.525226, Lon=-75.259189
Date: 2018-04-10
Day of week: Tuesday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	49	0	22	0	58	84	0	0	0	8	28	0	249
Factor	0.77	0.00	0.69	0.00	0.91	0.81	0.00	0.00	0.00	0.50	0.47	0.00	0.82
Approach Factor	0.85			0.87			0.00			0.47			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Baseline , Rockland, On
GPS Coordinates: Lat=45.525226, Lon=-75.259189
Date: 2018-04-10
Day of week: Tuesday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	27	0	2	0	9	25	0	0	0	6	28	0	97
16:15	25	0	4	0	12	23	0	0	0	7	20	0	91
16:30	22	0	3	0	13	17	0	0	0	12	31	0	98
16:45	25	0	8	0	7	11	0	0	0	13	23	0	87

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	27	0	2	0	9	25	0	0	0	6	28	0	97
16:15	25	0	4	0	12	23	0	0	0	7	20	0	91
16:30	22	0	3	0	13	17	0	0	0	12	31	0	98
16:45	25	0	8	0	7	11	0	0	0	13	23	0	87

Bicycle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	99	0	17	0	41	76	0	0	0	38	102	0	373
Factor	0.92	0.00	0.53	0.00	0.79	0.76	0.00	0.00	0.00	0.73	0.82	0.00	0.95
Approach Factor	0.88			0.84			0.00			0.81			

Peak Hour Vehicle Summary

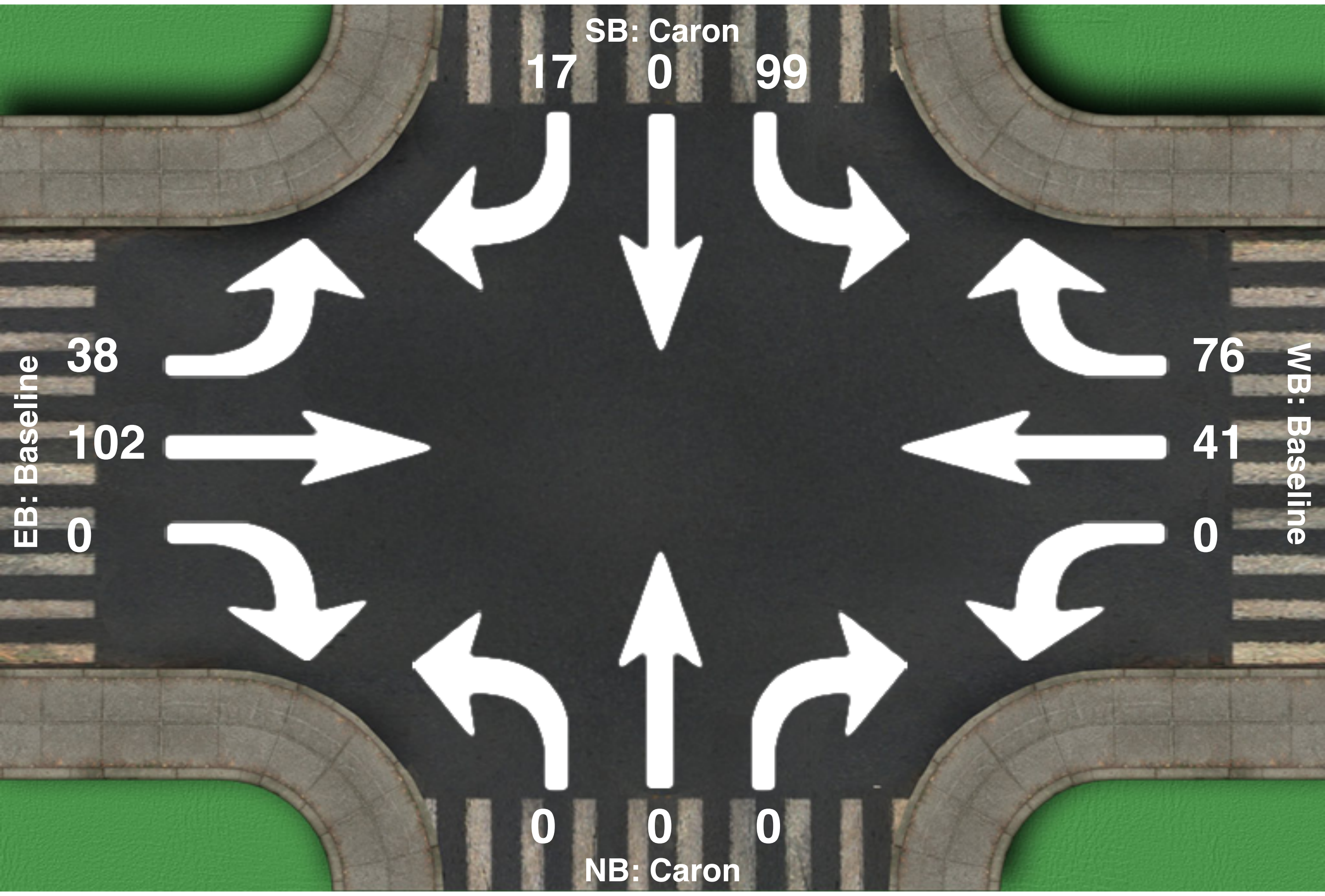
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	99	0	17	0	41	76	0	0	0	38	102	0	373
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Caron at Baseline , Rockland, On
GPS Coordinates: Lat=45.525226, Lon=-75.259189
Date: 2018-04-10
Day of week: Tuesday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	99	0	17	0	41	76	0	0	0	38	102	0	373
Factor	0.92	0.00	0.53	0.00	0.79	0.76	0.00	0.00	0.00	0.73	0.82	0.00	0.95
Approach Factor	0.88			0.84			0.00			0.81			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Docteur Corbeil, Rockland, On
GPS Coordinates: Lat=45.544293, Lon=-75.271567
Date: 2018-04-11
Day of week: Wednesday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	12	9	0	0	0	23	21	0	9	0	9	83
07:45	0	9	18	0	0	0	24	22	0	11	0	14	98
08:00	0	12	9	0	0	0	7	13	0	12	0	8	61
08:15	0	10	7	0	0	0	6	18	0	6	0	5	52
08:30	0	0	0	0	0	0	1	0	0	0	0	0	1

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	12	9	0	0	0	22	21	0	9	0	9	82
07:45	0	9	18	0	0	0	24	22	0	11	0	14	98
08:00	0	12	9	0	0	0	7	13	0	12	0	8	61
08:15	0	10	7	0	0	0	6	18	0	6	0	5	52
08:30	0	0	0	0	0	0	1	0	0	0	0	0	1

Bicycle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	0	0	0	0	0	1	0	0	0	0	0	1
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
07:30	0	0	0	0	0	0	1	0	1	0	0	0	1
07:45	0	2	2	0	1	1	0	0	0	0	0	0	3
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	1	1	0	0	0	0	1	1	0	0	0	2
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	0	43	43	0	0	0	60	74	0	38	0	36	294
Factor	0.00	0.90	0.60	0.00	0.00	0.00	0.62	0.84	0.00	0.79	0.00	0.64	0.75
Approach Factor	0.80			0.00			0.73			0.74			

Peak Hour Vehicle Summary

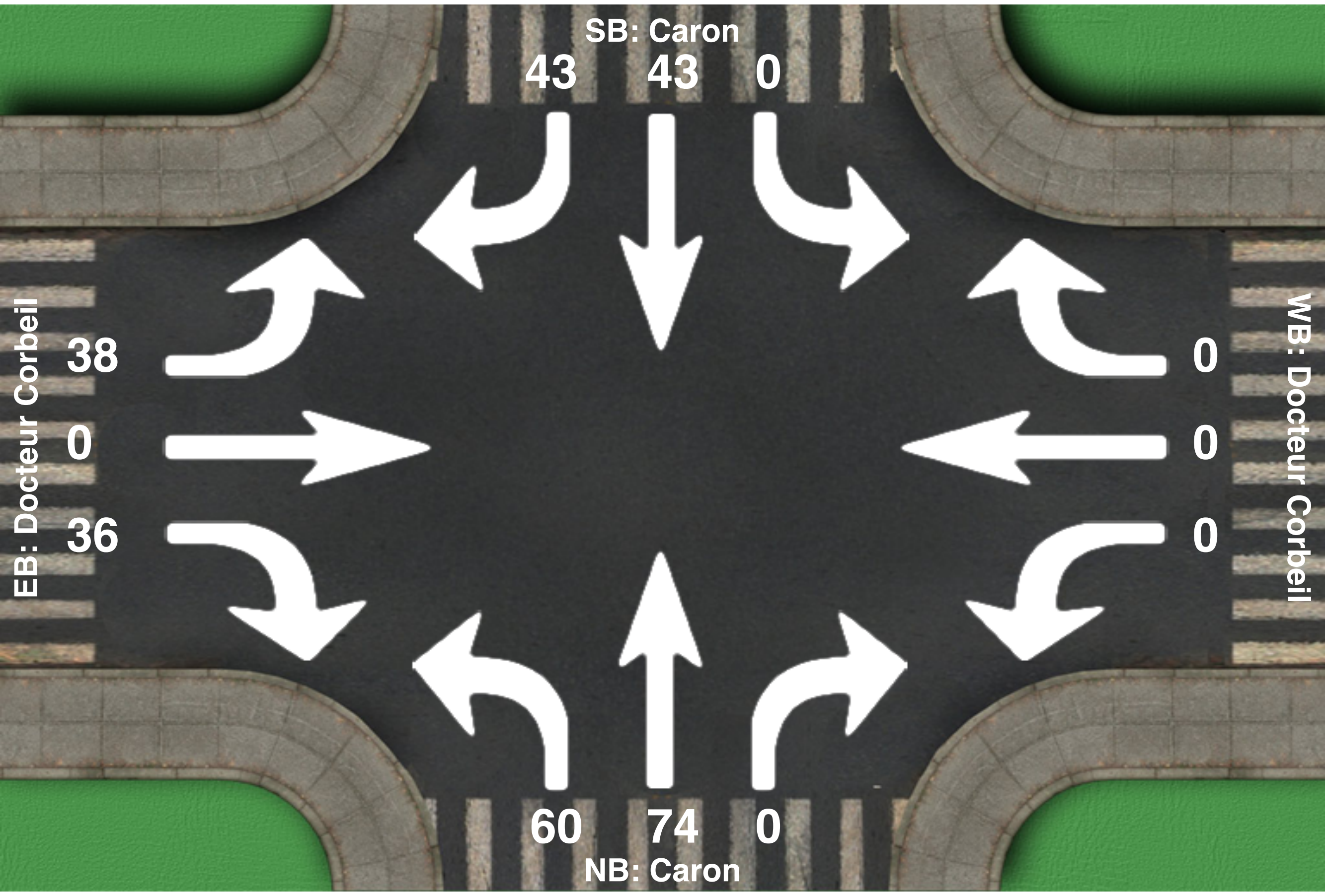
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	0	43	43	0	0	0	59	74	0	38	0	36	293
Bicycle	0	0	0	0	0	0	1	0	0	0	0	0	1

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	3	3	0	1	1	1	1	2	0	0	0	6

Intersection Peak Hour

Location: Caron at Docteur Corbeil, Rockland, On
GPS Coordinates: Lat=45.544293, Lon=-75.271567
Date: 2018-04-11
Day of week: Wednesday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	0	43	43	0	0	0	60	74	0	38	0	36	294
Factor	0.00	0.90	0.60	0.00	0.00	0.00	0.62	0.84	0.00	0.79	0.00	0.64	0.75
Approach Factor	0.80			0.00			0.73			0.74			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Docteur Corbeil, Rockland, On
GPS Coordinates: Lat=45.544176, Lon=-75.271704
Date: 2018-04-11
Day of week: Wednesday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	0	17	10	0	0	1	12	13	0	9	0	21	83
16:15	0	17	16	0	0	0	11	17	0	16	0	11	88
16:30	0	18	14	0	0	0	9	11	0	16	0	13	81
16:45	0	16	10	0	0	0	17	22	0	20	0	17	102

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	0	17	9	0	0	1	12	13	0	9	0	21	82
16:15	0	17	16	0	0	0	11	17	0	16	0	11	88
16:30	0	18	14	0	0	0	9	11	0	15	0	13	80
16:45	0	16	10	0	0	0	17	22	0	20	0	17	102

Bicycle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	0	0	1	0	0	0	0	0	0	0	0	0	1
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	1	0	0	1
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
16:00	0	0	0	3	0	3	0	0	0	0	0	0	3
16:15	0	0	0	0	0	0	1	0	1	0	0	0	1
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	0	68	50	0	0	1	49	63	0	61	0	62	354
Factor	0.00	0.94	0.78	0.00	0.00	0.25	0.72	0.72	0.00	0.76	0.00	0.74	0.87
Approach Factor	0.89			0.25			0.72			0.83			

Peak Hour Vehicle Summary

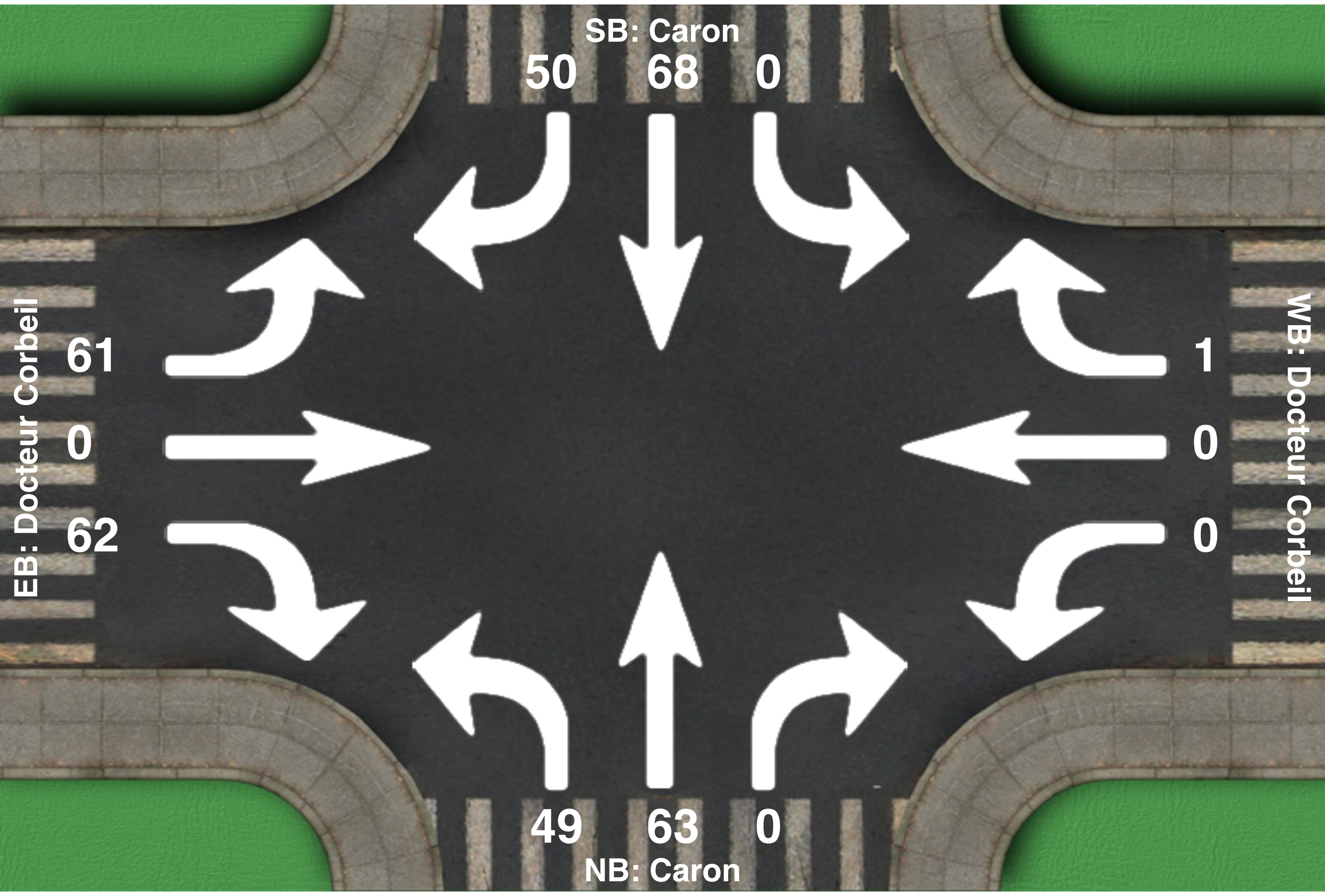
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	0	68	49	0	0	1	49	63	0	60	0	62	352
Bicycle	0	0	1	0	0	0	0	0	0	1	0	0	2

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	3	0	3	1	0	1	0	0	0	4

Intersection Peak Hour

Location: Caron at Docteur Corbeil, Rockland, On
GPS Coordinates: Lat=45.544176, Lon=-75.271704
Date: 2018-04-11
Day of week: Wednesday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	0	68	50	0	0	1	49	63	0	61	0	62	354
Factor	0.00	0.94	0.78	0.00	0.00	0.25	0.72	0.72	0.00	0.76	0.00	0.74	0.87
Approach Factor	0.89			0.25			0.72			0.83			

Appendix B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	284	44	21	581	3	177	8	31	1	6	8
Future Volume (vph)	8	284	44	21	581	3	177	8	31	1	6	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3		5.9	6.3	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	1765	1500	1676	1765	1500	1676	1555		1676	1616	
Flt Permitted	0.30	1.00	1.00	0.54	1.00	1.00	0.53	1.00		1.00	1.00	
Satd. Flow (perm)	536	1765	1500	944	1765	1500	941	1555		1765	1616	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	9	316	49	23	646	3	197	9	34	1	7	9
RTOR Reduction (vph)	0	0	22	0	0	1	0	30	0	0	9	0
Lane Group Flow (vph)	9	316	27	23	646	2	197	13	0	1	7	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	50.5	49.5	49.5	53.1	50.8	50.8	18.0	11.2		2.5	1.6	
Effective Green, g (s)	50.5	49.5	49.5	53.1	50.8	50.8	18.0	11.2		2.5	1.6	
Actuated g/C Ratio	0.56	0.55	0.55	0.59	0.57	0.57	0.20	0.12		0.03	0.02	
Clearance Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3		5.9	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	313	971	825	576	997	847	274	193		48	28	
v/s Ratio Prot	0.00	0.18		c0.00	c0.37		c0.08	0.01		0.00	0.00	
v/s Ratio Perm	0.02		0.02	0.02		0.00	c0.06			0.00		
v/c Ratio	0.03	0.33	0.03	0.04	0.65	0.00	0.72	0.07		0.02	0.26	
Uniform Delay, d1	9.7	11.1	9.2	7.7	13.4	8.5	32.7	34.7		42.5	43.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.9	0.1	0.0	3.3	0.0	8.7	0.2		0.2	4.8	
Delay (s)	9.8	12.0	9.3	7.7	16.7	8.5	41.4	34.9		42.7	48.4	
Level of Service	A	B	A	A	B	A	D	C		D	D	
Approach Delay (s)		11.6			16.3			40.2			48.0	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	89.9	Sum of lost time (s)	26.0
Intersection Capacity Utilization	60.3%	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 (vph)	17	54	25	41	148	39	39	115	35	12	45	15
Future Volume (vph)	17	54	25	41	148	39	39	115	35	12	45	15
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.5	6.5		6.5	6.5		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.97		1.00	0.96		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	1680		1676	1710		1676	1703		1676	1698	
Flt Permitted	0.63	1.00		0.66	1.00		0.62	1.00		0.65	1.00	
Satd. Flow (perm)	1109	1680		1161	1710		1086	1703		1150	1698	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	19	60	28	46	164	43	43	128	39	13	50	17
RTOR Reduction (vph)	0	15	0	0	8	0	0	14	0	0	14	0
Lane Group Flow (vph)	19	73	0	46	199	0	43	153	0	13	53	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	33.7	32.8		37.9	34.9		19.2	16.0		14.8	13.8	
Effective Green, g (s)	33.7	32.8		37.9	34.9		19.2	16.0		14.8	13.8	
Actuated g/C Ratio	0.43	0.42		0.49	0.45		0.25	0.21		0.19	0.18	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	485	706		583	765		291	349		224	300	
v/s Ratio Prot	0.00	0.04		c0.00	c0.12		c0.01	c0.09		0.00	0.03	
v/s Ratio Perm	0.02			0.04			0.03			0.01		
v/c Ratio	0.04	0.10		0.08	0.26		0.15	0.44		0.06	0.18	
Uniform Delay, d1	12.7	13.7		10.6	13.5		22.8	27.1		25.8	27.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.1	0.8		0.2	0.9		0.1	0.3	
Delay (s)	12.8	14.0		10.7	14.3		23.0	28.0		25.9	27.6	
Level of Service	B	B		B	B		C	C		C	C	
Approach Delay (s)		13.8			13.6			27.0			27.3	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	78.0	Sum of lost time (s)	25.2
Intersection Capacity Utilization	35.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	5	6	189	108	3
Future Volume (Veh/h)	0	5	6	189	108	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	6	7	210	120	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked						
vC, conflicting volume	346	122	123			
vC1, stage 1 conf vol	122					
vC2, stage 2 conf vol	224					
vCu, unblocked vol	346	122	123			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	759	930	1464			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	6	7	210	123
Volume Left	0	7	0	0
Volume Right	6	0	0	3
cSH	930	1464	1700	1700
Volume to Capacity	0.01	0.00	0.12	0.07
Queue Length 95th (m)	0.1	0.1	0.0	0.0
Control Delay (s)	8.9	7.5	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	8.9	0.2		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	9	3	1	125	111	2
Future Volume (vph)	9	3	1	125	111	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	3	1	139	123	2

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	13	1	139	125
Volume Left (vph)	10	1	0	0
Volume Right (vph)	3	0	0	2
Hadj (s)	0.05	0.53	0.03	0.02
Departure Headway (s)	4.5	5.1	4.6	4.2
Degree Utilization, x	0.02	0.00	0.18	0.15
Capacity (veh/h)	735	686	762	848
Control Delay (s)	7.6	7.0	7.5	7.9
Approach Delay (s)	7.6	7.5		7.9
Approach LOS	A	A		A

Intersection Summary			
Delay	7.7		
Level of Service	A		
Intersection Capacity Utilization	16.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	10	116	1	5	109
Future Volume (Veh/h)	5	10	116	1	5	109
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	129	1	6	121
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	262	130			130	
vC1, stage 1 conf vol	130					
vC2, stage 2 conf vol	133					
vCu, unblocked vol	262	130			130	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			100	
cM capacity (veh/h)	817	920			1455	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	17	130	6	121
Volume Left	6	0	6	0
Volume Right	11	1	0	0
cSH	881	1700	1455	1700
Volume to Capacity	0.02	0.08	0.00	0.07
Queue Length 95th (m)	0.4	0.0	0.1	0.0
Control Delay (s)	9.2	0.0	7.5	0.0
Lane LOS	A		A	
Approach Delay (s)	9.2	0.0	0.4	
Approach LOS	A			

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	16.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	0	8	9	1	6	4	102	6	5	109	0
Future Volume (vph)	9	0	8	9	1	6	4	102	6	5	109	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	0	9	10	1	7	4	113	7	6	121	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	19	18	4	120	6	121
Volume Left (vph)	10	10	4	0	6	0
Volume Right (vph)	9	7	0	7	0	0
Hadj (s)	-0.14	-0.09	0.53	-0.01	0.53	0.03
Departure Headway (s)	4.4	4.4	5.2	4.7	5.2	4.7
Degree Utilization, x	0.02	0.02	0.01	0.16	0.01	0.16
Capacity (veh/h)	778	759	675	755	673	749
Control Delay (s)	7.5	7.5	7.0	7.3	7.1	7.4
Approach Delay (s)	7.5	7.5	7.3		7.4	
Approach LOS	A	A	A		A	

Intersection Summary			
Delay	7.4		
Level of Service	A		
Intersection Capacity Utilization	16.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	36	60	74	43	43
Future Volume (Veh/h)	38	36	60	74	43	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	42	40	67	82	48	48
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	290	74	98			
vC1, stage 1 conf vol	74					
vC2, stage 2 conf vol	216					
vCu, unblocked vol	290	74	98			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	96	96			
cM capacity (veh/h)	752	986	1493			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	82	67	82	96
Volume Left	42	67	0	0
Volume Right	40	0	0	48
cSH	851	1493	1700	1700
Volume to Capacity	0.10	0.04	0.05	0.06
Queue Length 95th (m)	2.2	1.0	0.0	0.0
Control Delay (s)	9.7	7.5	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.7	3.4		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	10	92	2	5	79
Future Volume (vph)	5	10	92	2	5	79
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	102	2	6	88

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	17	104	6	88
Volume Left (vph)	6	0	6	0
Volume Right (vph)	11	2	0	0
Hadj (s)	-0.28	0.02	0.53	0.03
Departure Headway (s)	4.1	4.2	5.1	4.6
Degree Utilization, x	0.02	0.12	0.01	0.11
Capacity (veh/h)	842	850	684	762
Control Delay (s)	7.1	7.7	7.0	7.0
Approach Delay (s)	7.1	7.7	7.0	
Approach LOS	A	A	A	

Intersection Summary			
Delay	7.4		
Level of Service	A		
Intersection Capacity Utilization	15.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	28	58	84	49	22
Future Volume (Veh/h)	8	28	58	84	49	22
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	31	64	93	54	24
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	157				160	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	157				160	110
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				93	97
cM capacity (veh/h)	1423				826	943

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	40	157	78
Volume Left	9	0	54
Volume Right	0	93	24
cSH	1423	1700	859
Volume to Capacity	0.01	0.09	0.09
Queue Length 95th (m)	0.1	0.0	2.1
Control Delay (s)	1.7	0.0	9.6
Lane LOS	A		A
Approach Delay (s)	1.7	0.0	9.6
Approach LOS			A

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	19.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: Rue Caron/Rue Industrielle & HWY 17

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (m)	8.5	43.7	12.6	8.3	65.3	4.6	53.8	14.3	4.1	11.0
Average Queue (m)	1.9	16.5	2.7	2.4	27.7	0.2	25.0	4.9	0.1	2.5
95th Queue (m)	7.3	33.6	9.2	8.3	51.4	1.9	43.7	11.7	1.7	8.1
Link Distance (m)		833.3			805.3			415.2		113.3
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Storage Blk Time (%)					0		0			
Queuing Penalty (veh)					0		0			

Intersection: 2: Caron St/Rue Caron & Laurier St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	8.3	16.8	15.0	34.4	15.8	44.0	8.2	27.3
Average Queue (m)	1.7	4.4	3.4	9.8	4.9	17.9	1.4	9.6
95th Queue (m)	6.3	12.1	10.4	23.2	12.7	34.0	5.8	19.1
Link Distance (m)		928.0		698.5		142.0		415.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	35.0		60.0		55.0		50.0	
Storage Blk Time (%)						0		
Queuing Penalty (veh)						0		

Intersection: 3: Caron St & Hélène St

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	8.2	5.1
Average Queue (m)	1.2	0.2
95th Queue (m)	5.8	2.1
Link Distance (m)	266.6	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Caron St & Francois St

Movement	EB	NB	NB	SB
Directions Served	LR	L	T	TR
Maximum Queue (m)	10.7	5.2	20.2	18.9
Average Queue (m)	3.1	0.2	11.1	11.2
95th Queue (m)	10.4	2.2	17.2	17.1
Link Distance (m)	343.3		122.7	232.6
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)		15.0		
Storage Blk Time (%)			1	
Queuing Penalty (veh)			0	

Intersection: 5: Caron St & Des Cedres Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (m)	8.7	3.4
Average Queue (m)	3.0	0.1
95th Queue (m)	9.7	1.8
Link Distance (m)	109.3	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Caron St & Cote St/Potvin Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (m)	9.1	8.9	8.7	22.5	5.5	17.6
Average Queue (m)	3.7	3.2	0.9	11.2	0.7	9.2
95th Queue (m)	10.9	10.1	5.3	18.2	3.7	14.6
Link Distance (m)	73.6	115.9		507.4		263.8
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)			30.0		40.0	
Storage Blk Time (%)				0		
Queuing Penalty (veh)				0		

Intersection: 7: Caron St & Docteur Corbeil Blvd

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	15.7	10.1
Average Queue (m)	8.1	1.7
95th Queue (m)	14.4	7.6
Link Distance (m)	486.3	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 8: David St & Caron St

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (m)	9.1	21.9	9.2	19.4
Average Queue (m)	3.2	10.2	1.1	9.5
95th Queue (m)	10.1	17.0	6.1	16.1
Link Distance (m)	509.7	82.9		518.2
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)			40.0	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: Baseline Rd & Caron St

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	7.5	14.2
Average Queue (m)	0.4	7.3
95th Queue (m)	3.2	12.2
Link Distance (m)	763.0	1938.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	155	64	30	87	26	51	87	42	35	138	31
Future Volume (vph)	34	155	64	30	87	26	51	87	42	35	138	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3		5.9	6.3	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	1765	1500	1676	1765	1500	1676	1678		1676	1717	
Flt Permitted	0.69	1.00	1.00	0.65	1.00	1.00	0.44	1.00		0.67	1.00	
Satd. Flow (perm)	1223	1765	1500	1144	1765	1500	774	1678		1174	1717	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	172	71	33	97	29	57	97	47	39	153	34
RTOR Reduction (vph)	0	0	36	0	0	15	0	15	0	0	7	0
Lane Group Flow (vph)	38	172	35	33	97	14	57	129	0	39	180	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	55.8	51.9	51.9	55.6	51.8	51.8	26.1	19.5		21.7	17.3	
Effective Green, g (s)	55.8	51.9	51.9	55.6	51.8	51.8	26.1	19.5		21.7	17.3	
Actuated g/C Ratio	0.53	0.49	0.49	0.53	0.49	0.49	0.25	0.18		0.21	0.16	
Clearance Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3		5.9	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	662	867	737	621	865	735	247	309		262	281	
v/s Ratio Prot	c0.00	c0.10		0.00	0.05		c0.01	0.08		0.01	c0.11	
v/s Ratio Perm	0.03		0.02	0.03		0.01	0.04			0.02		
v/c Ratio	0.06	0.20	0.05	0.05	0.11	0.02	0.23	0.42		0.15	0.64	
Uniform Delay, d1	12.0	15.1	14.0	12.1	14.5	13.8	31.2	38.0		34.1	41.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.5	0.1	0.0	0.3	0.0	0.5	0.9		0.3	4.9	
Delay (s)	12.1	15.6	14.1	12.1	14.8	13.9	31.6	39.0		34.4	46.2	
Level of Service	B	B	B	B	B	B	C	D		C	D	
Approach Delay (s)		14.8			14.1			36.9			44.2	
Approach LOS		B			B			D			D	

Intersection Summary				
HCM 2000 Control Delay	27.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.29			
Actuated Cycle Length (s)	105.6	Sum of lost time (s)	26.0	
Intersection Capacity Utilization	48.3%	ICU Level of Service	A	
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)	34	155	64	30	87	26	51	87	42	35	138	31
Future Volume (vph)	34	155	64	30	87	26	51	87	42	35	138	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.5	6.5		6.5	6.5		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	1675		1672	1694		1674	1665		1673	1709	
Flt Permitted	0.66	1.00		0.61	1.00		0.58	1.00		0.67	1.00	
Satd. Flow (perm)	1153	1675		1070	1694		1030	1665		1172	1709	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	172	71	33	97	29	57	97	47	39	153	34
RTOR Reduction (vph)	0	14	0	0	10	0	0	22	0	0	10	0
Lane Group Flow (vph)	38	229	0	33	116	0	57	122	0	39	177	0
Confl. Peds. (#/hr)	4		4	4		4	2		2	2		2
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	35.3	32.4		33.3	31.4		16.5	13.4		16.5	13.4	
Effective Green, g (s)	35.3	32.4		33.3	31.4		16.5	13.4		16.5	13.4	
Actuated g/C Ratio	0.46	0.43		0.44	0.41		0.22	0.18		0.22	0.18	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	555	714		483	699		249	293		274	301	
v/s Ratio Prot	c0.00	c0.14		0.00	0.07		c0.01	0.07		0.01	c0.10	
v/s Ratio Perm	0.03			0.03			0.04			0.03		
v/c Ratio	0.07	0.32		0.07	0.17		0.23	0.42		0.14	0.59	
Uniform Delay, d1	11.2	14.5		12.2	14.1		24.1	27.8		23.8	28.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.2		0.1	0.5		0.5	1.0		0.2	2.9	
Delay (s)	11.2	15.7		12.3	14.6		24.6	28.8		24.1	31.7	
Level of Service	B	B		B	B		C	C		C	C	
Approach Delay (s)		15.1			14.1			27.6			30.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	25.2
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	8	7	180	229	3
Future Volume (Veh/h)	0	8	7	180	229	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	9	8	200	254	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	472	256	257			
vC1, stage 1 conf vol	256					
vC2, stage 2 conf vol	216					
vCu, unblocked vol	421	195	196			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	707	807	1312			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	9	8	200	257
Volume Left	0	8	0	0
Volume Right	9	0	0	3
cSH	807	1312	1700	1700
Volume to Capacity	0.01	0.01	0.12	0.15
Queue Length 95th (m)	0.2	0.1	0.0	0.0
Control Delay (s)	9.5	7.8	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.5	0.3		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	7	3	6	180	233	4
Future Volume (vph)	7	3	6	180	233	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	3	7	200	259	4

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	11	7	200	263
Volume Left (vph)	8	7	0	0
Volume Right (vph)	3	0	0	4
Hadj (s)	0.02	0.53	0.03	0.02
Departure Headway (s)	5.0	5.2	4.7	4.3
Degree Utilization, x	0.02	0.01	0.26	0.31
Capacity (veh/h)	656	674	748	825
Control Delay (s)	8.0	7.1	8.2	9.2
Approach Delay (s)	8.0	8.2		9.2
Approach LOS	A	A		A

Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	10	113	7	26	210
Future Volume (Veh/h)	1	10	113	7	26	210
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	11	126	8	29	233
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	421	130			134	
vC1, stage 1 conf vol	130					
vC2, stage 2 conf vol	291					
vCu, unblocked vol	421	130			134	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			98	
cM capacity (veh/h)	701	920			1451	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	12	134	29	233
Volume Left	1	0	29	0
Volume Right	11	8	0	0
cSH	896	1700	1451	1700
Volume to Capacity	0.01	0.08	0.02	0.14
Queue Length 95th (m)	0.3	0.0	0.4	0.0
Control Delay (s)	9.1	0.0	7.5	0.0
Lane LOS	A		A	
Approach Delay (s)	9.1	0.0	0.8	
Approach LOS	A			

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	1	10	9	1	4	12	99	13	16	99	17
Future Volume (vph)	17	1	10	9	1	4	12	99	13	16	99	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	19	1	11	10	1	4	13	110	14	18	110	19

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	31	15	13	124	18	129
Volume Left (vph)	19	10	13	0	18	0
Volume Right (vph)	11	4	0	14	0	19
Hadj (s)	-0.06	0.01	0.53	-0.05	0.53	-0.07
Departure Headway (s)	4.5	4.6	5.3	4.7	5.2	4.6
Degree Utilization, x	0.04	0.02	0.02	0.16	0.03	0.17
Capacity (veh/h)	741	727	669	753	667	758
Control Delay (s)	7.7	7.7	7.2	7.4	7.2	7.4
Approach Delay (s)	7.7	7.7	7.3		7.3	
Approach LOS	A	A	A		A	

Intersection Summary			
Delay	7.4		
Level of Service	A		
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	62	49	63	68	50
Future Volume (Veh/h)	61	62	49	63	68	50
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	69	54	70	76	56
Pedestrians	4					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	286	108	136			
vC1, stage 1 conf vol	108					
vC2, stage 2 conf vol	178					
vCu, unblocked vol	286	108	136			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	93	96			
cM capacity (veh/h)	775	943	1443			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	137	54	70	132
Volume Left	68	54	0	0
Volume Right	69	0	0	56
cSH	851	1443	1700	1700
Volume to Capacity	0.16	0.04	0.04	0.08
Queue Length 95th (m)	4.0	0.8	0.0	0.0
Control Delay (s)	10.0	7.6	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.0	3.3		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	10	114	5	10	116
Future Volume (vph)	5	10	114	5	10	116
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	127	6	11	129

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	17	133	11	129
Volume Left (vph)	6	0	11	0
Volume Right (vph)	11	6	0	0
Hadj (s)	-0.28	0.01	0.53	0.03
Departure Headway (s)	4.2	4.2	5.2	4.7
Degree Utilization, x	0.02	0.15	0.02	0.17
Capacity (veh/h)	798	843	681	759
Control Delay (s)	7.3	8.0	7.0	7.4
Approach Delay (s)	7.3	8.0	7.4	
Approach LOS	A	A	A	

Intersection Summary			
Delay	7.6		
Level of Service	A		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	102	41	76	99	17
Future Volume (Veh/h)	38	102	41	76	99	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	42	113	46	84	110	19
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	130				285	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	130				285	88
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				84	98
cM capacity (veh/h)	1455				685	970

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	155	130	129
Volume Left	42	0	110
Volume Right	0	84	19
cSH	1455	1700	716
Volume to Capacity	0.03	0.08	0.18
Queue Length 95th (m)	0.6	0.0	4.6
Control Delay (s)	2.2	0.0	11.1
Lane LOS	A		B
Approach Delay (s)	2.2	0.0	11.1
Approach LOS			B

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	28.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: Rue Caron/Rue Industrielle & HWY 17

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (m)	16.5	31.9	17.1	16.6	27.7	11.2	36.4	46.0	37.0	59.7
Average Queue (m)	3.8	13.3	5.0	3.8	6.5	2.5	9.7	17.9	7.7	26.5
95th Queue (m)	12.3	26.3	13.7	11.8	18.7	8.7	23.2	34.9	21.2	48.5
Link Distance (m)		833.3			805.3			415.2		113.3
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Storage Blk Time (%)								0	0	4
Queuing Penalty (veh)								0	0	1

Intersection: 2: Caron St/Rue Caron & Laurier St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	19.5	38.5	13.3	21.0	18.3	37.4	20.2	50.0
Average Queue (m)	3.9	14.3	2.9	6.4	6.7	17.6	5.3	22.9
95th Queue (m)	12.2	30.4	9.2	16.4	14.9	30.9	13.7	41.8
Link Distance (m)		928.0		698.5		142.0		415.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	35.0		60.0		55.0		50.0	
Storage Blk Time (%)		1						0
Queuing Penalty (veh)		0						0

Intersection: 3: Caron St & Hélène St

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	8.3	7.1
Average Queue (m)	2.4	0.5
95th Queue (m)	8.3	3.7
Link Distance (m)	266.6	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Caron St & Francois St

Movement	EB	NB	NB	SB
Directions Served	LR	L	T	TR
Maximum Queue (m)	9.3	9.1	21.5	27.8
Average Queue (m)	2.7	1.3	12.4	16.0
95th Queue (m)	9.5	6.4	19.2	24.4
Link Distance (m)	343.3		122.7	232.6
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)		15.0		
Storage Blk Time (%)		0	1	
Queuing Penalty (veh)		0	0	

Intersection: 5: Caron St & Des Cedres Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (m)	8.7	9.1
Average Queue (m)	2.4	1.1
95th Queue (m)	8.8	5.8
Link Distance (m)	109.3	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 6: Caron St & Cote St/Potvin Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (m)	16.0	8.9	8.8	18.1	5.6	16.8
Average Queue (m)	5.8	3.1	2.5	10.4	2.2	8.8
95th Queue (m)	13.6	10.0	8.9	16.1	6.6	13.5
Link Distance (m)	73.6	115.9		507.4		263.8
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)			30.0		40.0	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Caron St & Docteur Corbeil Blvd

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	17.9	13.1
Average Queue (m)	10.0	1.7
95th Queue (m)	15.1	8.2
Link Distance (m)	486.3	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 8: David St & Caron St

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (m)	9.1	18.7	9.3	16.7
Average Queue (m)	3.3	10.7	2.7	10.1
95th Queue (m)	10.2	16.6	9.5	14.5
Link Distance (m)	509.7	82.9		518.2
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)			40.0	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: Baseline Rd & Caron St

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	12.2	18.3
Average Queue (m)	1.1	9.7
95th Queue (m)	6.1	15.6
Link Distance (m)	763.0	1938.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 2

APPENDIX B: PRELIMINARY ENVIRONMENTAL ANALYSIS

MEMO

TO: City of Clarence-Rockland

CC: Paul Black, MCIP RPP - FOTENN

FROM: Kai Markvorsen, Environmental Specialist - CIMA+

REVIEWED BY: Nicholas Bertrand, B.Sc. - CIMA+

DATE: 17 April 2018

SUBJECT: **Expansion Lands Existing Conditions Analysis - Environment**

1 Introduction

CIMA+ was mandated by FOTENN Planning + Design, on behalf of the City of Clarence-Rockland, to undertake an Environmental Impact Statement (EIS) on the proposed expansion lands to the southeast of the existing Urban Area Boundary of the City of Rockland. The study area is irregularly shaped, consisting of 133.5 ha on the south side of David Street and bounded by Clarence Creek to the east. It is situated primarily to the east of Caron street with the exception of an approximately 23 ha area to the southwest of the study area.

Figure 1 presents the location of the site with its surroundings.

This study was undertaken to identify the site's general ecological features and constraints and to assist in future development option analyses. The mandate objectives are to:

- Describe the existing natural conditions of the study site based on consultations, available documentation and field surveys;
- Identify any potentially significant environmental features and functions present at the site;

Following the completion of field assessments, recommendations for environmental impact avoidance and mitigation measures will be developed for inclusion in the site development plans.

CIMA Canada Inc.
240 Catherine Street, Suite 110
Ottawa, ON K2P 2G8

T: 613.860.2462
F: 613.860.1870
www.cima.ca

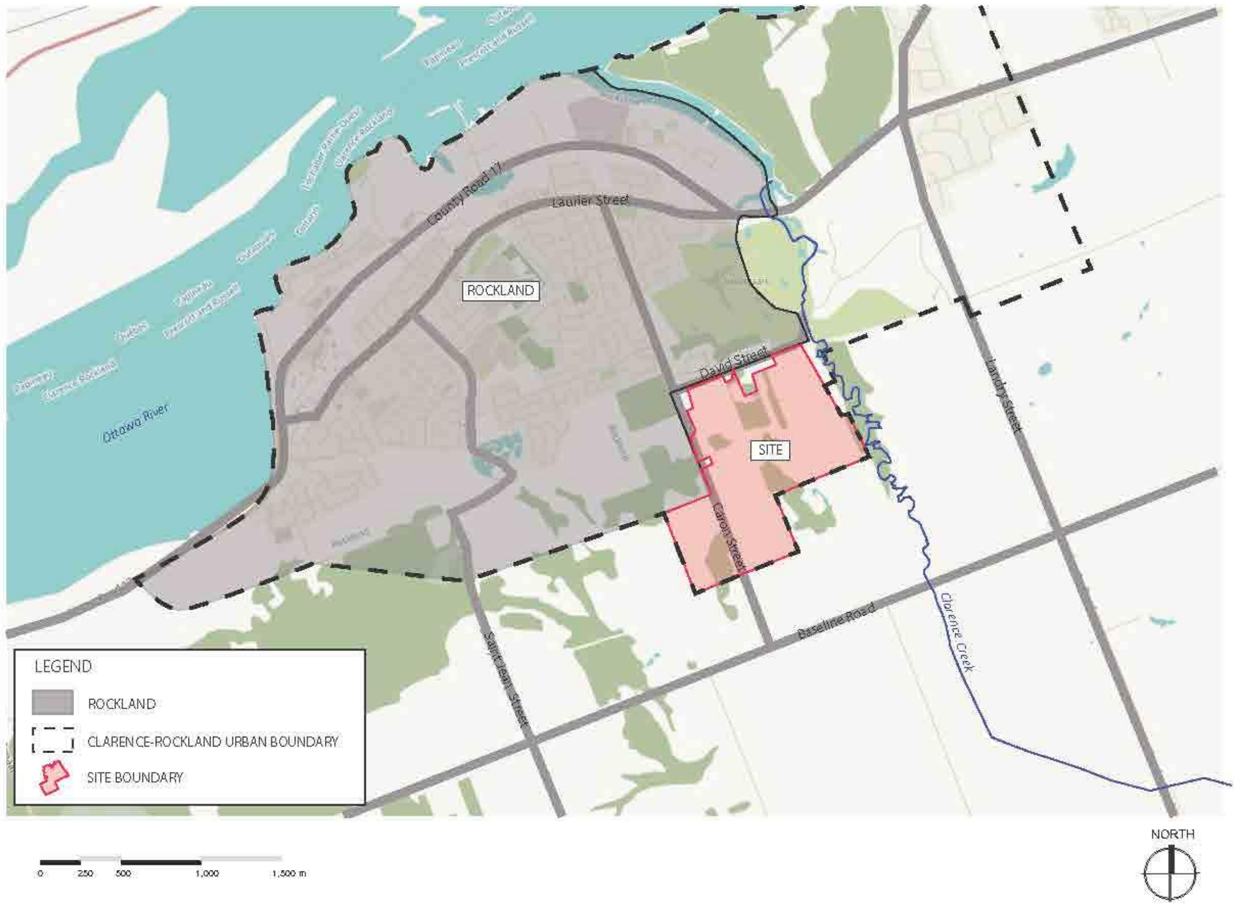


Figure 1. Site Location Map

2 Methodology

2.1 Documentation and Desktop Research

The following public sources were consulted as part of our desktop research:

- Aerial imagery (current and historic) Google Earth;
- Geographic information from Land Information Ontario;
- Crown Land Use Policy Atlas;
- The Ecosystems of Ontario, Part 1 Ecozones and Ecoregions, Ministry of Natural Resources, 2009;
- Atlas of Breeding Birds of Ontario;
- Ontario Nature Reptile and Amphibian Atlas;
- Ontario Geological Survey (OGS Earth – Surficial and Bedrock mapping).

The desktop study also included the consultation of various other sources to identify potential Species at Risk (SAR) that could be encountered on the site.

2.2 Consultations

Information requests were submitted to the Natural Heritage Information Center (NHIC) The South Nation Conservation Authority (SNCA) and the Ministry of Natural Resources and Forestry - Kemptville District (MNRF) to obtain relevant information concerning the property. Correspondence is included in Appendix A. At this time, only information has been received from the NHIC.

2.3 Field Investigations

The field investigations/assessments will be conducted and overseen by a team of trained environmental technicians and biologists from CIMA+ and will include on-site investigation of flora and fauna during a time of year that allowed for identification and observation of all various possible species applicable to the site and during appropriate weather conditions.

3 Landscape Features and Designations

3.1 Ecoregion

The Study Area is located within Ecoregion 6E (Lake Simcoe-Rideau), the second most densely populated ecoregion in Ontario. This ecoregion is part of the Mixedwood Plains Ecozone of Southern Ontario, characterized by relatively diverse vegetation.

3.2 Surficial Geology

Surficial geology mapping from the Ontario Geological Survey indicates that the Study Area is underlain by a combination of till, fine-textured glaciomarine, organic and alluvial deposits as well overlaying Paleozoic bedrock. Typical soils in this units are comprised of clay, sand and silt. Surficial geology of the Study Area is shown in Figure 2.

Figure 2. Surficial Geology

3.3 Watershed and Watercourses

The Study Area is within the middle reaches of the Lower Ottawa – South Nation watershed. The Ottawa River is located approximately 2.5 km north of the property. Clarence Creek, a tributary to the Ottawa River, flows north along the eastern edge of the site. A detailed description of watercourses will be provided following the completion of field assessments. Depending on the species present, in-water work timing restrictions will likely apply to any development work in order to avoid impacts to fish and fish habitat.

3.4 Wetlands

A number of wetlands are located on and adjacent to the site including Clarence Creek Swamp, South Rockland Swamp, Estates Swamp and Rockland Marsh. Rockland Marsh is a provincially significant wetland land (wetland evaluation completed on November 18, 1999). A detailed description of wetlands will be provided following the completion of field assessments.

3.5 Uplands

Uplands in the Study Area consist primarily of agricultural fields and woodlands. Several developed residential properties are located along Caron Street on the west side of the project area as well as two farms within the Study Area limits. In this area, natural cover is punctuated with buildings and maintained green spaces. A detailed description of upland habitats, including the assessment of potentially affected woodlands for significance, will be provided following the completion of field assessments.

3.6 Provincial Designations

There are no Areas of Natural and Scientific Interest (ANSI) within, or in proximity to, the Study Area. Rockland Marsh is a Provincially Significant Wetland that is located downstream of the project site along Clarence Creek.

Key Site Features and designated areas are identified on Figure 3.

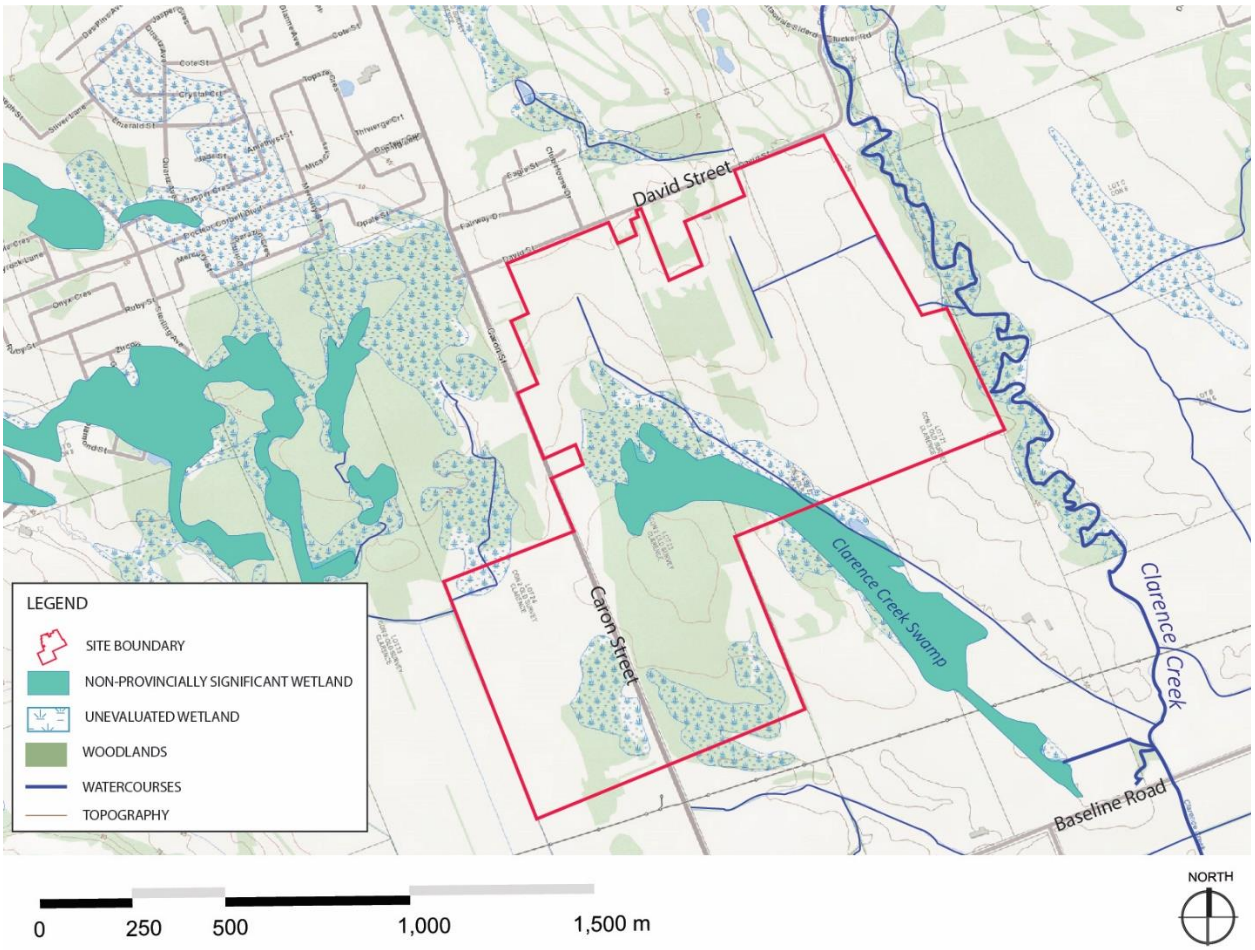


Figure 3. Existing Landscape Features and Designations

3.7 Conservation Authority Designations

At this time, no information has been received from the SNCA.

3.8 Municipal Planning Designations

The Study Area is located within the municipality of Clarence Rockland to the south of the City of Rockland's Urban Area Boundary.

3.9 Existing and Historic Land Uses

Aerial photographs from 2005, 2008, 2013 and 2017 show little change or development of the site over the period. At some point between 2008 and 2013 a significant portion of the woodlands in the central portion of the site were cleared. Significant clearing and subdivision development has also occurred to the west of the site since 2008.

4 Biological Community Characterization

4.1 General Approach

Characterization of the biological community in the Study Area will be completed by compiling data from published resources, data provided by local agencies, and by conducting a visual assessment of natural heritage features, with particular focus on vegetation composition and the presence of Species at Risk (SAR).

4.2 Vegetation

A vegetation survey will be conducted and habitat classified in accordance with the Ecological Land Classification for Southern Ontario (ELC). ELC Polygons will be delineated using aerial photograph interpretation supplemented by field identification of plant species within the Study Area limits.

4.3 Birds

The Atlas of Breeding Birds of Ontario (Atlas Squares 18VR74 and 18VR84) was consulted to determine which bird species are likely to occur in the general vicinity of the Study Area.

The ABBO indicated that had the potential for 180 bird species to be present within approximately 1km of the site. The presence of these species in the Study area and their habitat will be verified through field observations.

4.4 Amphibians and Reptiles

The Ontario Nature Reptile and Amphibian Atlas (Atlas Squares 18VR74 and 18VR84) was consulted to determine which amphibian and reptile species are likely to occur in the general vicinity of the Study Area. These records will be augmented with onsite observations.

Species identified by the Atlas as being potentially present at the site include: American Bullfrog (*Lithobates catesbeianus),* American Toad (*Anaxyrus americanus*), Eastern Newt (*Notophthalmus viridescens*), Eastern Gartersnake (*Thamnophis sirtalis*), Eastern Red-backed Salamander (*Plethodon cinereus*), Four-toed Salamander (*Hemidactylium scutatum*), Green Frog (*Rana clamitans*), Jefferson/Blue-spotted Salamander Complex (*Ambystoma jeffersonianum*), Midland Painted Turtle (*Chrysemys picta*), Mudpuppy (*Necturus maculosus*), Northern Leopard Frog (*Lithobates pipiens*), Red-bellied Snake (*Storeria* *occipitomaculata*), Snapping Turtle (*Chelydra serpentine*), Spotted Salamander (*Ambystoma maculatum*), Spring Peeper (*Pseudacris crucifer*), Wood Frog (*Lithobates sylvaticus*).

4.5 Mammals

The presence of mammals will be noted as part of field surveys. Species will be identified through both direct and indirect (i.e. tracks, droppings, etc.) observation.

4.6 Fish and Fish Habitat

At this time, no fisheries information has been received from the MNRF/SNCA for Clarence Creek. The evaluation and characterization of watercourses for fish and fish habitat will be conducted as part of field assessments.

4.7 Species at Risk

The MNRF and the NHIC identified the following Species at Risk or their habitats as being potentially present within the Study Area.

Table 1. Threatened and/or Endangered Species Potentially Present within the Study Area

Common Name Scientific Name Rarity Rankings	Comments
American Eel *Anguilla rostrata* Federal = **Threatened (TH)** Provincial = **Endangered (EN)**	In Ontario, American Eels can be found as far inland as Algonquin Park. Once the eels mature (10-25 years) they return to the Sargasso Sea to spawn.
Barn Swallow *Hirundo rustica* Federal = **Not Listed** Provincial = **Threatened (TH)**	Open or semi-open lands: farms, field, marshes.
Eastern Meadowlark *Sturnella magna* Federal = **Threatened (TH)** Provincial = **Threatened (TH)**	Meadowlarks require open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches.
Butternut *Juglans cinereal* Federal = **Endangered (EN)** Provincial = **Endangered (EN)**	Variety of sites, grows best on well-drained fertile soils in shallow valleys and on gradual slopes
Little Brown Bat *Myotis lucifugus* Federal = **Endangered (EN)** Provincial = **Endangered (EN)**	During the day they roosts in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. They hibernate most often in caves or abandoned mines that are humid and remain above freezing.

Common Name Scientific Name Rarity Rankings	Comments
Tri-colored Bat *Perimyotis subflavus* Federal = **Endangered (EN)** Provincial = **Endangered (EN)**	During the summer, the Tri-colored Bat is found in a variety of forested habitats. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. They overwinter in caves where they typically roost by themselves rather than part of a group.
Northern Long-eared Bat *Myotis septentrionalis* Federal = **Endangered (EN)** Provincial = **Endangered (EN)**	Northern long-eared bats are associated with boreal forests, choosing to roost under loose bark and in the cavities of trees.

All endangered and threatened species receive individual protection under Section 9 of the *Endangered Species Act* (ESA) and receive general habitat protection under Section 10 of the ESA. Field investigations will be conducted in order to confirm whether these SAR or their habitat are present in the proposed development area.

The MNRF also identified the potential presence of a species of special concern, Brook Lamprey (*Lampetra planeri*). Species listed as special concern are not protected under the ESA; however, these species may receive protection under other legislation (e.g. the *Fish and Wildlife Conservation Act*). The habitat of special concern species may also be considered significant wildlife habitat.

Attachments

Appendix A

Kai Markvorsen

From:	NHIC-Requests (MNRF) <nhicrequests@ontario.ca>
Sent:	Wednesday, April 4, 2018 5:16 PM
To:	Kai Markvorsen
Subject:	RE: Information Request to Support EIS for Clarence Rockland Urban Expansion

Hello Kai,

EO_ID 111923 represents an element occurrence for Eastern Meadowlark. This is an extant element occurrence. The most recent observations are from 2004.

EO_ID 111919 represents an element occurrence for Eastern Meadowlark. This is an extant element occurrence. The most recent observations are from 2004.

I also queried the Provincially Tracked Species Observations layer (Ontario's provincial record for observations for species of conservation concern) and did not find any newer observations for Eastern Meadowlark for your project site. I did find one observation for Least Bittern (made in 2016) that intersects your project site; the location was reported as the "pond" area in Morris Village, Rockland and we mapped it as a circle with a 1 km radius because we don't know where exactly the species was seen. The observer of the Least Bittern was not a naturalist or birder and reported having some trouble identifying the species. The observer did not have photos to share with us, so we could not confirm the identity of the species.

I queried our natural areas data and could not find reports for:

- Clarence Creek Swamp (Area ID 19089)
- Rockland Marsh (Area ID 19053) – this is a provincially significant wetland (wetland evaluation completed on November 18, 1999, total score: 479)
- South Rockland Swamp (Area ID 19057)

You can download spatial data for these wetlands from https://www.ontario.ca/data/wetlands.

Since your project area falls completely within the jurisdiction of the Ministry of Natural Resources and Forestry Kemptville District Office, I recommend contacting them to see if they have additional information or can offer you any guidance.

If you have any questions, or if there is anything else the Natural Heritage Information Centre can help you with, please let us know.

Best regards,
Martina

MNRF Science

Martina Furrer
Biodiversity Information Biologist
Ontario Natural Heritage Information Centre
Ontario Ministry of Natural Resources and Forestry
300 Water St, Peterborough, ON, K9J 3C7
705.755.2192 | martina.furrer@ontario.ca

http://www.ontario.ca/environment-and-energy/natural-heritage-information-centre

From: Kai Markvorsen [mailto:Kai.Markvorsen@cima.ca]
Sent: April 4, 2018 12:31 PM
To: NHIC-Requests (MNRF) <nhicrequests@ontario.ca>
Subject: Information Request to Support EIS for Clarence Rockland Urban Expansion

Hello,

We're looking for data on the following grid squares (with associated area ID references). Information request is supporting Environmental Impact Statement for the Urban Expansion of Clarrence Rockland.

Grid Square	ID Reference
18VR7843	areaid=19057
18VR7943	areaid=19053
18VR8043	nhic_eo_id=111923
18VR7842	areaid=19057
18VR7942	areaid=19057
18VR8042	areaid=19089
18VR7941	nhic_eo_id=111919
18VR8041	nhic_eo_id=111919

Please let us know if more information is required.

Regards,

Kai

Kai Markvorsen
Environment Professional
Environment

CIMA+
Partners in Excellence

240 Catherine Street, Suite 110
Ottawa, Ontario K2P 2G8
CANADA
Tel: 613-860-2462 ext. 6644 / Fax: 613-860-1870
Cell: 343-996-4951

Kai Markvorsen

From: Kai Markvorsen
Sent: Wednesday, April 11, 2018 1:10 PM
To: 'Inforequest, Kemptville (MNRF)'
Subject: Information Request supporting EIS for Clarence Rockland Urban Boundary Expansion
Attachments: Location Map.pdf; Clarence Rockland MNRF Info Request 2018-04-11.pdf

Hello,

Please find attached an information request, and location map, for available SAR and natural heritage information.

The study area is irregularly shaped, consisting of 133.5 ha on the south side of David Street and bounded by Clarence Creek to the east. It is situated primarily to the east of Caron street with the exception of an approximately 23 ha area to the southwest of the study area.

Please let me know if more information is required to support this request.

Regards,

Kai

Kai Markvorsen
Environment Professional
Environment

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Ministry of Natural Resources and Forestry

Kemptville District

10 Campus Drive
Postal Box 2002
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Tel.: 613 258-8204
Fax: 613 258-3920

Ministère des Richesses naturelles et des Forêts

District de Kemptville

10, promenade Campus
Case postale, 2002
Kemptville ON K0G 1J0
Tél.: 613 258-8204
Téléc.: 613 258-3920

Fri. Apr 13, 2018

Kai Markvorsen
CIMA+
240 Catherine Street, Suite 110
Ottawa, Ontario
K2P 2G8
(613) 860-2462
kai.markvorsen@cima.ca

Attention: Kai Markvorsen

Subject: Information Request - Developments
Project Name: EIS for Clarence Rockland Urban Boundary Expansion
Site Address:
Our File No. 2018_CLA-4511

Natural Heritage Values

The Ministry of Natural Resources and Forestry (MNRF) Kemptville District has carried out a preliminary review of the above mentioned area in order to identify any potential natural resource and natural heritage values.

The following Natural Heritage values were identified for the general subject area:

- Evaluated Wetland, Clarence Creek Swamp (Evaluated-Other)
- Evaluated Wetland, Estates Swamp (Evaluated-Other)
- Evaluated Wetland, South Rockland Swamp (Evaluated-Other)
- River, Clarence Creek

Municipal Official Plans contain information related to natural heritage features. Please see the local municipal Official Plan for more information, such as specific policies and direction pertaining to activities which may impact natural heritage features. For planning advice or Official Plan interpretation, please contact the local municipality. Many municipalities require environmental impact studies and other supporting studies be carried out as part of the development application process to allow the municipality to make planning decisions which are consistent with the Provincial Policy Statement (PPS, 2014).

The MNRF strongly encourages all proponents to contact partner agencies and appropriate municipalities early on in the planning process. This provides the proponent with early knowledge regarding agency requirements, authorizations and approval timelines; Ministry of the Environment and Climate Change (MOECC) and the local Conservation Authority may require approvals and permitting where natural values and natural hazards (e.g., floodplains) exist.

As per the Natural Heritage Reference Manual (NHRM, 2010) the MNRF strongly recommends that an ecological site assessment be carried out to determine the presence of natural heritage features and species at risk and their habitat on site. The MNRF can provide survey methodology for particular species at risk and their habitats.

The NHRM also recommends that cumulative effects of development projects on the integrity of natural heritage features and areas be given due consideration. This includes the evaluation of the past, present and possible future impacts of development in the surrounding area that may occur as a result of demand created by the presently proposed project.

Wildland Fire

MNRF woodland data shows that the site contains woodlands. The lands should be assessed for the risk of wildland fire as per PPS 2014, Section 3.1.8 "*Development shall generally be directed to areas outside of lands that are unsafe for development due to the presence of hazardous forest types for wildland fire. Development may however be permitted in lands with hazardous forest types for wildland fire where the risk is mitigated in accordance with wildland fire assessment and mitigation standards".* Further discussion with the local municipality should be carried out to address how the risks associated with wildland fire will be covered for such a development proposal. Please see the Wildland Fire Risk Assessment and Mitigation Guidebook (2016) for more information.

Significant Woodlands

Section 2.1.5 b) of the PPS states: *Development and site alteration shall not be permitted in significant woodlands unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.* The 2014 PPS directs that significant woodlands must be identified following criteria established by the Ontario Ministry of Natural Resources and Forestry, i.e. the Natural Heritage Reference Manual (NHRM), 2010. Where the local or County Official Plan has not yet updated significant woodland mapping to reflect the 2014 PPS, all wooded areas should be reviewed on a site specific basis for significance. The MNRF Kemptville District modelled locations of significant woodlands in 2011 based on NHRM criteria. The presence of significant woodland on site or within 120 metres should trigger an assessment of the impacts to the feature and its function from the proposed development.

Significant Wildlife Habitat

Section 2.1.5 d) of the PPS states: *Development and site alteration shall not be permitted in significant wildlife habitat unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.* It is the responsibility of the approval authority to identify significant wildlife habitat or require its identification. The MNRF has several guiding documents which may be useful in identification of significant wildlife habitat and characterization of impacts and mitigation options:

- Significant Wildlife Habitat Technical Guide, 2000
- The Natural Heritage Reference Manual, 2010
- Significant Wildlife Habitat Mitigation Support Tool, 2014
- Significant Wildlife Habitat Criteria Schedule for Ecoregion 5E and 6E, 2015

The habitat of special concern species (as identified by the Species at Risk in Ontario list) and Natural Heritage Information Centre tracked species with a conservation status rank of S1, S2 and S3 may be significant wildlife habitat and should be assessed accordingly.

Water

The Ministry of Natural Resources and Forestry (MNRF) has established timing window guidelines to restrict in-water work related to an activity during certain periods. These restricted periods are identified in order to protect fish from impacts of works or undertakings in and around water during spawning and other critical life stages. A suite of appropriate measures should be taken for projects involving in-water works to minimize and mitigate impacts to fish, water quality and fish habitat, and include:

- avoiding in-water works during the timing guidelines;
- installation of sediment/erosion control measures;
- avoiding the removal, alteration, or covering of substrates used for fish spawning, feeding, over-wintering or nursery areas; and
- debris control measures to manage falling debris (e.g. spalling).

Timing guidelines are based on species* presence and are therefore subject to change if new information becomes available. Timing guidelines in Kemptville District are:

Waterbody (and applicable geography or Fisheries Management Zone)	Timing Guidelines (no in-water works)
○ St. Lawrence River (FMZ 20)	March 15 – July 15 (Spring spawning species)
○ Ottawa River – Lac Des Chats (FMZ 12)	October 1 to July 15 (Spring and fall spawning species, including Lake Trout and Lake Whitefish)
○ Ottawa River – Lac Deschenes (FMZ 12)	October 15 to July 15 (Spring and fall spawning species, including Cisco)
○ Ottawa River – Lac Dollard des Ormeaux (FMZ 12)	January 1 to July 15 (Winter and spring spawning species, including Burbot)
○ Big Rideau Lake (South Burgess, North Burgess, Bastard and South Elmsley Twps) ○ Charleston Lake (Lansdowne and Escott Twps) ○ Crow Lake (South Crosby Twp)	October 1 to June 30 (Spring and fall spawning species, including Lake Trout)
○ Bass Lake (South Elmsley Twp) ○ Lower Rideau Lake (South Elmsley Twp) ○ Bob's Lake (South Sherbrooke Twp) ○ Christie Lake (South Sherbrooke Twp) ○ Dalhousie Lake (Dalhousie Twp) ○ Davern Lake (South Sherbrooke Twp) ○ Farren Lake (South Sherbrooke Twp) ○ Grippen Lake (Leeds Twp) ○ Indian Lake (South Crosby Twp) ○ Little Long Lake (Lansdowne Twp) ○ Millpond Lake (South Burgess) ○ Otter Lake (South Elmsley, South Burgess and Bastard Twps) ○ Otty Lake (North Burgess and North Elmsley Twps)	October 15 to June 30 (Spring and Fall spawning species, including Lake Whitefish and Cisco)

○ Pike Lake (North Burgess Twp) ○ Silver Lake (South Sherbrooke Twp) ○ Redhorse Lake (Lansdowne Twp) ○ Tay River (South Sherbrooke, Bathurst, Drummond and North Elmsley Twps) ○ Wolfe Lake (North Crosby Twp)	
○ Bennett Lake (Bathurst Twp) ○ Crosby Lake (North Crosby Twp) ○ Gananoque River (Leeds Twp) ○ Lac Georges (Plantagenet and Alfred Twps) ○ Gillies Lake (Lanark Twp) ○ Little Crosby Lake (North Crosby Twp) ○ McLaren Lake (North Burgess Twp) ○ Mississippi Lake (Drummond, Beckwith and Ramsay Twps) ○ Mississippi River (Beckwith, Ramsay, Pakenham and Fitzroy Twps) ○ Raisin River below Martintown dam (Charlottenburgh Twp) ○ Rideau River (Wolford, Oxford, Montague, Marlborough, South Gower, North Gower, Osgood, Nepean and Gloucester Twps) ○ South Lake (Leeds Twp) ○ South Nation River below Plantagenet weir (Plantagenet Twp) ○ Upper Rideau Lake (North Crosby Twp) ○ Westport Sand Lake (North Crosby Twp)	January 1 – June 30 (Winter and spring spawning species, including Burbot)
○ Small rivers and streams (denoted on 1:50,000 National Topographic System maps as being one lined) ○ All other waterbodies in FMZ 18	March 15 to June 30 (Spring spawning species)

**Please note: Additional timing restrictions may apply as they relate to endangered and threatened species for works in both water and wetland areas. Timing restrictions are subject to change, depending on species found in a given waterbody.*

In addition to adhering to the above timing guidelines, a work permit from the MNRF may be required depending on the nature and scope of work. No encroachment on the bed or banks of a waterbody/watercourse (e.g. abutments, embankments, etc.) is permitted without MNRF approval. Additional information regarding work permits may be found online at https://www.ontario.ca/page/crown-land-work-permits#section-2.

The MNRF does not have any water quality or quantity data available. We recommend that the Ministry of the Environment and Climate Change be contacted for such data along with the local Conservation Authority. For further information regarding fish habitat and protocols, please refer to the following interagency, document, *Fish Habitat Referral Protocol for* Ontario at: http://www.web2.mnr.gov.on.ca/mnr/ebr/fish_hab_referral/protocol_en.pdf.

Additional approvals and permits may be required under the Fisheries Act and the Species at Risk Act; please contact Fisheries and Oceans Canada to determine requirements and next steps. There may also be approvals required by the local Conservation Authority or Transport Canada, and these agencies should be contacted directly to determine requirements. As the MNRF is responsible for the management of provincial fish populations, we request ongoing involvement in such discussions in order to ensure population conservation.

Species at Risk

A review of the Natural Heritage Information Centre (NHIC) and internal records indicate that there is a potential for the following threatened (THR) and/or endangered (END) species on the site or in proximity to it:

- American Eel (END)
- Barn Swallow (THR)
- Butternut (END)
- Eastern Meadowlark (THR)
- Little Brown Bat (END)
- Northern Long-eared Bat (END)
- Tri-Colored Bat (END)

All endangered and threatened species receive individual protection under section 9 of the ESA and receive general habitat protection under Section 10 of the ESA, 2007. Thus any potential works should consider disturbance to the individuals as well as their habitat (e.g. nesting sites). General habitat protection applies to all threatened and endangered species. Note some species in Kemptville District receive regulated habitat protection. The habitat of these listed species is protected from damage and destruction and certain activities may require authorization(s) under the ESA. For more on how species at risk and their habitat is protected, please see: https://www.ontario.ca/page/how-species-risk-are-protected.

If the proposed activity is known to have an impact on any endangered or threatened species at risk (SAR), or their habitat, an authorization under the ESA may be required. It is recommended that MNRF Kemptville be contacted prior to any activities being carried out to discuss potential survey protocols to follow during the early planning stages of a project, as well as mitigation measures to avoid contravention of the ESA. Where there is potential for species at risk or their habitat on the property, an Information Gathering Form should be submitted to Kemptville MNRF at sar.kemptville@ontario.ca.

The Information Gathering Form may be found here:
http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/FormDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=018-0180E

For more information on the ESA authorization process, please see:
https://www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization

One or more special concern species has been documented to occur either on the site or nearby. Species listed as special concern are not protected under the ESA, 2007. However, please note that some of these species may be protected under the Fish and Wildlife Conservation Act and/or Migratory Birds Convention Act. Again, the habitat of special concern species may be significant wildlife habitat and should be assessed accordingly. Species of special concern for consideration:

- Northern Brook Lamprey (SC)

If any of these or any other species at risk are discovered throughout the course of the work, and/or should any species at risk or their habitat be potentially impacted by on site activities, MNRF should be contacted and operations be modified to avoid any negative impacts to species at risk or their habitat until further direction is provided by MNRF.

Please note that information regarding species at risk is based largely on documented occurrences and does not necessarily include an interpretation of potential habitat within or in proximity to the site in question. Although this data represents the MNRF's best current available information, it is important to note that a lack of information for a site does not mean that additional features and values are not present. It is the responsibility of the proponent to ensure that species at risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the activities carried out on the site.

The MNRF continues to strongly encourage ecological site assessments to determine the potential for SAR habitat and occurrences. When a SAR or potential habitat for a SAR does occur on a site, it is recommended that the proponent contact the MNRF for technical advice and to discuss what activities can occur without contravention of the Act. For specific questions regarding the Endangered Species Act (2007) or SAR, please contact MNRF Kemptville District at sar.kemptville@ontario.ca.

The approvals processes for a number of activities that have the potential to impact SAR or their habitat have recently changed. For information regarding regulatory exemptions and associated online registration of certain activities, please refer to the following website: https://www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization.

Please note: The advice in this letter may become invalid if:

- The Committee on the Status of Species at Risk in Ontario (COSSARO) re-assesses the status of the above-named species OR adds a species to the SARO List such that the section 9 and/or 10 protection provisions apply to those species; or
- Additional occurrences of species are discovered on or in proximity to the site.

This letter is valid until: Sat. Apr 13, 2019

The MNRF would like to request that we continue to be circulated on information with regards to this project. If you have any questions or require clarification please do not hesitate to contact me.

Sincerely,

Dom Ferland
Management Biologist
dominique.ferland@ontario.ca

Encl.\
-ESA Infosheet
-NHIC/LIO Infosheet

Endangered Species Act, 2007 & Species At Risk in Ontario

Background

Endangered Species Act: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statues-07e06_e.htm
Species at Risk in Ontario List: www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/246809.html

The Endangered Species Act (ESA) 2007 protects both species and habitat. Section 9 of the ESA "prohibits killing, harming, harassing, capturing, possessing, collecting, buying, selling, trading, leasing or transporting species that are listed as threatened, endangered or extirpated". Section 10 of the ESA, 2007 prohibits damaging or destroying habitat of endangered or threatened species. Protected habitat is either based on general definition in the Act or prescribed through a regulation. The ESA 2007 defines general habitat as an area on which the species depends, directly or indirectly, to carry on its life processes, including reproduction, rearing, hibernation, migration or feeding.

It is important to be aware that changes may occur in both species and habitat protection. The ESA applies to listed species on the Species at Risk in Ontario List (SARO). The Committee on the Status of Species in Ontario (COSSARO) meets regularly to evaluate species for listing and/or re-evaluate species already listed. As a result, species' designations may change that could in turn change the level of protection they receive under the ESA 2007. Also, habitat protection provisions for a species may change e.g. if a species-specific habitat regulation comes into effect. The regulation would establish the area that is protected as habitat for the species.

Information with respect to SAR can be found in the online database at the Natural Heritage Information Centre (NHIC) - http://nhic.mnr.gov.on.ca/nhic.cfm . The NHIC compiles, maintains and distributes information on species at risk and updates its information on a regular basis. We encourage you to routinely check the NHIC database to obtain the most up to date SAR information for proposed work locations. However, while the NHIC database is the best available source of data, even when there are no known occurrences documented at a site, there is a possibility that SAR may occur at a proposed work location.

All data represents the MNR's best current available information, it is important to note that a lack of occurrence at a site does not mean that there are no Species at Risk (SAR) at the location. The MNR continues to encourage ecological site assessments to determine the potential for other SAR occurrences. When a SAR does occur on a proposed site, it is recommended that the proponent contact the MNR for technical advice and to discuss what activities can occur without contravention of the Act. If an activity is proposed that will contravene the Act (such as Section 9 or 10), the proponent must contact the MNR to discuss the potential for application of certain permits (Section 17) or agreement (Regulation 242/08). For specific questions regarding the Endangered Species Act (2007) or species at risk, please contact a district Species at Risk Biologist at sar.kemptville@ontario.ca.

Natural Heritage Information Centre

Land Information Ontario

Natural Heritage Information Centre: http://nhic.mnr.gov.on.ca/
Biodiversity Explorer (mapping): https://www.biodiversityexplorer.mnr.gov.on.ca/nhicWEB/main.jsp

Land Information Ontario: http://www.mnr.gov.on.ca/en/Business/LIO/index.html
Ontario Geospatial Data Exchange: http://www.mnr.gov.on.ca/en/Business/LIO/2ColumnSubPage/STEL02_167959.html
LIO Make-a-Map: http://www.mnr.gov.on.ca/en/Business/LIO/2ColumnSubPage/STDPROD_068999.html
Ontario Maps: http://www.mnr.gov.on.ca/en/Business/LIO/2ColumnSubPage/STDPROD_068512.html

The **Natural Heritage Information Centre** (NHIC) compiles, maintains and distributes information on natural species, plant communities and spaces of conservation concern in Ontario. This information is stored in a spatial database used for tracking this information. The Centre also has a library with conservation-related literature, reports, books, and maps, which are accessible for conservation applications, land use planning, and natural resource management. The NHIC website makes much of this information available through the internet.

Natural Heritage Information Centre
300 Water Street, 2nd Floor, North Tower
P.O. Box 7000, Peterborough, ON, K9J 8M5
Tel.:(705) 755-2159 Fax:(705) 755-2168

Land Information Ontario (LIO) manages key provincial datasets. LIO makes these and hundreds of other data sets available to registered users at no charge. LIO also coordinates public and private sector organizations to collect high resolution satellite imagery for Ontario providing significant cost savings for all partners. Technical bulletins, newsletters and more are available online. More details regarding Ontario imagery and data can be searched, ordered and accessed online.

LIO's Ontario Geospatial Data Exchange (OGDE) allows more than 400 public sector organizations to easily share and use digital geographic information under a single legal agreement. Membership is available to eligible public organizations at no costs.

Through the website, Maps & Map Tools are made available, including online mapping software: LIO Make-a-Map.

Land Information Ontario
lio@ontario.ca
LIO Support Team: (705) 755-1878

Or for specifics, see online at:
http://www.mnr.gov.on.ca/en/Business/LIO/2ColumnSubPage/STDPROD_068510.html

Additional Information pertaining to NHIC, LIO and other Natural Heritage and Data and Information tools is available in the MNR Kemptville Information Request Guide (2012).

APPENDIX C: CIVIL SERVICING ANALYSIS

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MEMO

TO:	City of Clarence-Rockland
CC:	Paul Black, MCIP RPP - FOTENN
FROM:	Brian O'Dell, EIT - CIMA+
PEER REVIEWED AND APPROVED BY:	Christopher Lyon, M.Eng., P.Eng - CIMA+
DATE:	11 May 2018
SUBJECT:	**Expansion Lands Existing Conditions Analysis - Civil Servicing**

1 Existing Conditions

The proposed growth area of the urbanized area for the City of Clarence-Rockland is located southeast of the urban area, immediately adjacent to Caron Street as illustrated on **Figure 1**. The area is comprised of approximately 133.5 hecatares (ha) of land held under multiple ownerships in blocks of land that are currently undeveloped or in use for agricultural purposes.

Figure 1 - Study Area provided in Request For Proposal Number F18-INF-2017-019.

1.1 Potable Water Supply and Major Transmission

Water Treatment and Potable Water Capacity

Based on the information provided to CIMA+ for the Clarence-Rockland Water Treatment Plant (WTP), the following current capacities have been identified:

- Existing Clarence-Rockland WTP capacity is 13,500 m^3/day; and the
- Existing Clarence-Rockland WTP high lift pumping capacity is 13,500 m^3/day.

These values represent the largest (maximum) sustained amount of treated (filtered and Chlorinated water) that the municipal water treatment plant can produce using existing equipment and processes. Water exiting the plant is also known as potable water. Once produced, potable water is piped to reservoir systems that are designed to ensure that a minumum amount of potable water is stored and available for regular daily uses (washing, drinking, toilet flushing, etc.) and also for fire protection.

To estimate the maximum flow of water that is required to support fully developed lands in the urban growth area (Expansion Lands), we will utilize water usage data that is collected by the City's SCADA system. Standard consumption rates are compiled into an annual Summary Report by Ontario Clean Water Agency (OCWA). OCWA is a quasi-private sector corporation that operates the urban water system under contract with the City of Clarence-Rockland. The 2016 Summary Report of water consuption is provided in Appendix A. Key items drawn from this report include:

- The highest value of the Daily Flow Maximums for 2016 was 8,823.4 m^3/day. This represents the highest water demand day during the year
- The value of the Daily Flow Averages for 2016 was 6,170.51 m^3/day. This represents an average day of water consumption over the year.

Based on this information, it is evident that water treatment plant capacity (13,500 cmpd) exceeds current average usage usage (6,170 cmpd). It also exceeds peak water consumption as recorded in 2016 (8,823 cmpd). Information available suggests that an additional 4,676.6 m^3/day of treated water can be produced by the WTP in support of Expansion Lands development.

Once the preferred land use scenario has been established for the Expansion Lands, CIMA+ will calculate the required flow of water needed to to support this urban growth, and will detremine whether or not the water treatment plant can currently meet this new projected supply or whether it requirements modifications to meet higher water flows that cannot be support by current plant infrastructure. It should be noted, that we will work with City officials and OCWA to verify 2018 baseline consumption maximums, and will assess future demand growth based on both Expansion Lands development and the additional town-wide infill development during similar timelines.

Finally, in regard to existing capacities restrictions associated with muicipal water treatment supply, that the Draft Report for the Clarence-Rockland and Limoges Water Servicing Study, confirmed that no capacity updateds are requred for the existing system to meet current service area demands (to 2017). The report also confirms that as the City experiences growth it will have to take the following actions to support future demands:

- Acquire land adjacent to the existing WTP to expand the WTP;
- Increase the WTP treatment capacity;
- Increase the WTP high lift pumping capacity;
- Increase the clearwell storage volume at the WTP; and
- Increase Caron Booster Station capacity.

CIMA+ analysis of the water requirements of the Expansion Lands, is expected to clarify which, if any, of these improvemenst must be in effect to support partial or full development of the Expansion Lands.

Potable Water Transmission Mains and Reservoir Systems

The proposed Expansion Lands area is currently not served by the municipal potable water system. As indicated by **Figure 2** below, the proposed Expansion Lands are identified as being supported in the future by the municipal services sub-area known as 'Pressure Zone 2', see the green highlighted area. To ensure a good supply of potable water to this growth area, the City of Clarence-Rockland must ensure that adequate water transmission lines and reservior systems are in place to move large quantities of water under pressure, such that containment systems are filled daily.

Two types of potable water resevoir systems are regularly used in Eastern Ontario. These include 'elevated storage' in what is commonly called a water tower. The Water pressure in the local watermain distribution pipes around a water tower is directly associated with the fact that the water is storage well above-grade. The higher the water storage area – the higher the potetial water pressure in the watermains.

The second type is below-ground or at-grade reservoirs. These reservoirs offer little water pressure to the adjacent watermain systems, and so they are paired with electric motors that boost the pressure of water leaving the reservoirs. These 'booster stations' offer a similar service to a water tower, as each of these systems increase water pressure and flow capacity in the watermain distribution system.

The Municipality of Clarence-Rockland uses both water towers and booster stations to supply good water flow and pressure to the urban service area. Based on earlier engineering studies, at this time it is expected that the Expansion Lands can be serviced by the Caron Street Booster Station (BS) and the Bouvier Water Tower (Serviceability Study for Morris Village – Stage 5 (October 2017)). To confirm this preliminary assessment, additional information on the current water transmission lines (water pressure and flow capacity), and engineering analysis is required to determine the water distribution system current capacity from the Clarence-Rockland WTP to the Expansion Lands.

As the development plans for the Expansion Lands are developed during this study, it is expected that localized water modelling will be used inconjunction with available data on water (pressure and flow capacities) to develop an engineered approach to supply water to the proposed developent area.

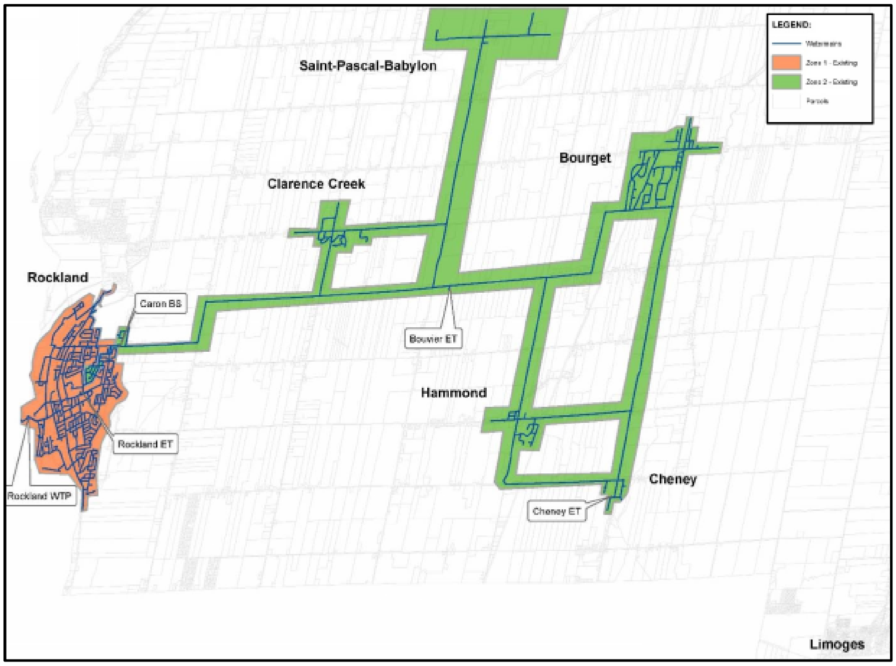


Figure 2 - Existing Drinking Water System Layout provided in Report for Clarence-Rockland and Limoges Water Servicing Study (Draft, January 19, 2018).

<u>Potable Water Reservoir Storage Systems</u>

The Expansion Lands require engieered volumes of potable water to be held in reservoirs to ensure that adequate water is on-hand to meet consumption and fire-fighting needs. The amount of water to be held in reservoirs is guided by standards published by the Ontario Ministry of the Environment and Climate Change.

Based on current City studies[1], it is understood that the City has adequate reservoir capacity to support growth needs until the year 2027. This analysis assumes that City growth will continue in a manner that is keeping with approved growth rates provided under the City Official Plan.

To clarify the impacts of this finding on the development of the Expansion Lands, additional analysis on reservoir capacity will be conducted when preferred development plans are finalized for the Expansion Lands area.

1.2 Expansion Lands Water Distribution Network

The distribution of treated water from reservoirs and booster stations to the planned new development in the Expansion Lands is supported by a system of watermains that are looped around and through the

[1] Draft Report for the Clarence-Rockland and Limoges Water Servicing Study dated January 19, 2017

Expansion Lands. Earlier engineering studies, confirm a number of specialized watermain systems that are expected to be instrumental in serving the growth area are expected to include:

- Existing 150 mm diameter watermain on David Street;
- High pressure 300 mm diameter watermain on Caron Street;
- Caron Street Booster Station Improvements; and
- Dedicated watermain booster line to the Bouvier Water Tower.

The above information has been drawn from as-built drawings and the Draft Report for the Clarence-Rockland and Limoges Water Servicing Study dated January 19, 2017. Based on the initial information received, the existing capacity of the Caron Street Booster Station (3,975 m^3/day) exceeds the normal usage (2,563 m^3/day). It is estimated that the available capacity is the Caron Street Booster Station is 1,412 m^3/day. Our analysis of servicing the Expansion Lands will assess whether future maximum demand will exceed capacity. This analysis will use additional information on existing watermain conditions (e.g.: boundary conditions) to determine whether the proposed dedicated watermain booster line to the Bouvier Water Tower is required to meet projected maximum demand.

1.3 Fire Protection and Resevoir Capacity

The amount of potable water needed for human consuption is small by contrast to the flow and pressure of potable water needed to fight fires. In general, municipalties generally adopt minimum volumetric flow rates (litres per seond or gallons per minute) that will be available to fight fires in their community. The availability of water to fight fires has a direct impact on the insurance rates paid by local building owners.

The existing fire flow targets adoted in the City of Clarence-Rockland for the new development area are 125 L/s in pressure zone PZ-1 (Rockland), with lower supply rates have been adopted for outlying village areas (67 L/s for PZ-2 (Villages)).

The detailed engineering analysis to be performed for the proposed development area will confirm available and required water supply (pressure, flow and reservoir capacity) for the preferred development scenario. These modelled fire flow capabilities will be confirmed against the municipal standard and will be verified against the findings of the Fire Underwriters Survey.

1.4 Sanitary Sewers System and Wastewater Treatment

The City of Clarence-Rockland is served by a comprehensive sanitary sewer system. This system is designed to support sanitary sewerage flows from all lands within the urban service area. It is proposed that the Expansion Lands area under review in this study, will be fully supported by sanitary sewer system, and that localized septic systems will not be permitted in this growth area.

Wastewater Treatment Plant

This system of sanitary sewers and pumping stations collectively direct sewage flows to a single wastewater treatment plant (WWTP) that supports the Clarence-Rockland serviced area. Under relevant Provincial regulations, municipalities must have pumping stations and WWTP systems rated and given a maximum capacity in Cubic Meters/Day or Liters/Second.

The Clarence-Rockland WWTP is a secondary treatment facility based on sequencing batch reactor technology. Disinfection is provided by chlorination prior to discharge to the Ottawa River. Sludge is stabilized through an aerobic digestion process prior to storage on site and land application.

The current rated capacity of the Clarence-Rockland WWTP is as follows:

- Rated Average Daily Flow Capacity of 6,800 m^3/day;
- Rated Maximum Daily Flow Capacity of 17,340 m^3/day; and a
- Rated Peak Flow Capacity of 20,400 m^3/day.

Under existing peak flow conditions, the WWTP does not provide sufficient retention time for chlorination prior to discharging to the Ottawa River.

As of 2018, to address the capacity issues and provide for future growth, the City of Clarence-Rockland is undertaking upgrades to the WWTP, including:

- Construction of a new headworks facility, complete with fine screening and grit removal system to improve both pre-treatment and secondary treatment effectiveness; and,
- Design and construction of an equalization tank, as previously identified within the long-term plan for the WWTP, to normalize peak flows from inflow and infiltration.

It is anticipated that these changes will address several WWTP deficiencies.

Sanitary Pump Stations

While the City's sanitary sewer system has been designed to rely on gravity to support natural flows toward a centralized Waste Water Treatment Plant, it has not been feasible to use gravity alone in all situations. Therefore, the City has constructed a number of sewage pumping stations in the existing urban area to pump sewage flows towards the WWTP. At this time, a total of seven (7) existing sewage pumping stations are in operation which use pumps to pressurize and 'lift' sewage to higher gravity-fed sewers. An eighth sewage pumping station is under design.

Pumping Station No. 1 is the City's largest pumping station, as it transfers collected sewage from the full urban service area to the Clarence-Rockland WWTP. It is located south of Highway 17, next to Caron Street. In regard to known critical sanitary sewer infrastructure at this stage of our review, below is key planning information with respect to Pumping Station No. 1, which will be used to pump sewage flows from the Expansion Lands:

- Existing average daily flow is 44.14 L/s (estimated 2013 flows from 2005 data);
- Existing maximum daily flow is 82.19 L/s (estimated 2013 flows from 2005 data);
- Existing firm rated capacity is 200 L/s;
- Existing peak instantaneous sewage flow is 203.91 L/s (estimated 2013 flows from 2005 data); and
- Flows in excess of 200L/s from Pumping Station No. 1 have been reported by O.W.C.A. in the past 5 years (Pumping Station No. 1 Technical Memorandum dated December 18, 2013).

MOECC design guidelines require that all pumping stations be able to pump peak instantaneous sewage flows based on its firm capacity. Firm capacity is defined as the station capacity with the largest pump out of commission. For Pumping Station No. 1, this is 200 L/s. Based on the current status of Pumping Station

No. 1 and the MOECC design guidelines, it would suggest that Pumping Station No. 1 is currently operating at or even beyond its firm capacity.

The City of Clarence-Rockland has identified possible future improvements to Pumping Station No. 1, including:

- Increase the pumping capacity and conveyance capacity of Pumping Station No. 1 to 400 L/s; and
- Twinning the forcemain to convey an ultimate peak flow capacity of 850 L/s and for operation redundancy.

It is anticipated that the above modifications to Pumping Station No. 1 will address the existing capacity issues and provide available capacity for future growth.

As part of this study mandate the system of sewers and pump station from the Expansion Lands to the WWTP, will be reviewed and capacities / deficiencies assessed. In the event that additional pump stations are required, this requirement will be identified.

Sanitary Sewers

As noted above, the planned Expansion Lands development will rely on an existing system of urban area sanitary sewers and pumping stations to convey flows from the Expansion Lands to the Wastewater Treatment Plant. Our review of existing conditions is focused on ensuring that there is adequate additional capacity in the downstream sanitary sewer system to meet the added growth of the Expansion Lands plus approved development elsewhere in the urban service area.

Key issues under investigation, include:

- Existing use and capacity of a constructed 450 mm diameter forcemain on Caron St from David St to 100 m south of Corbel Blvd;
- Existing use and capacity of a 250 mm diameter sanitary sewer from Caron St, heading east on David St (until capped);
- Existing use and capacity of a 300 mm diameter sanitary sewer from intersection of Caron St and David St, southbound on Caron St (terminating at an existing maintenance hole);
- The Ultimate Servicing Map, SK1.1 in Appendix B, shows a sub-area of the Expansion Lands which is on the west side of Caron Street. This area is expected to be serviced by Pumping Station No. 8 (located in Morris Village Stage 5, Pumping Station No. 9, in the Serviceability Study for Morris Village – Stage 5);
    - Pumping Station No. 8 has a total area of 103.08 ha and a population of 6,786 capita allocated for future sites. The new pumping station will service a total of 219.53 ha and a total population of 14,665 capita for a total peak flow of 227.10 L/s;
    - Sewage from Pumping Station No. 8 will be pumped to the deep sanitary sewer on Caron Street and then gravity flow to Pumping Station No. 1;
    - Existing use and capacity of this pumping station and downstream receiving sewers is to be confirmed.
- The Ultimate Servicing Map, SK1.1 in Appendix B, shows the sub-area of the Expansion Lands which is on the east side of Caron Street, that will be serviced by Pumping Station South of David

St (as identified in Table 3-7 from the Sewage Pumping Station Capacity and Condition Assessment & Sanitary Treatment Facility Capacity and Capital Investment Report dated June 9, 2014).

- It is assumed this pumping station will pump sewage through the existing 450 mm diameter forcemain to a maintenance hole upstream of Pumping Station No. 1, at which point it will transition to gravity flow to Pumping Station No. 1.
- Existing use and capacity of this pump station and downstream receiving sewers is to be confirmed.

- In 2015, Caron Street was reconstructed and new underground infrastructure was installed. The Sanitary Sewer Calculation Sheet in Appendix B, and associated Sketch SK1.23, indicate that the new sanitary sewers have approximately 13% available capacity when taking into account existing and proposed contributing sanitary areas.

1.5 Storm Sewer and Storm Water Management

The pre-development condition of the proposed Expansion Lands is rolling cultivated fields which drain to low areas and eventually to adjacent ditches and creeks. The major creeks adjacent to the Expansion Lands are Clarence Creek and Lafontaine Creek, both creeks are tributaries to the Ottawa River. The Expansion Lands are approximately 3 to 3.5 km upstream from the confluence of the creeks with the Ottawa River.

Caron Street (north of David Street) has an urban cross section and handles runoff from the roadway by catch basins and storm sewers. Appendix C shows the catchment areas for the storm sewers, along with the associated storm sewer calculation sheet for sizing the piping network. Some of the catchment areas identified in Appendix C fall within the proposed Expansion Lands.

Currently Caron Street (south of David Street) and David Street have a rural cross section and handle runoff from the roadway by roadside ditches and culverts until a stormwater outfall is reached. Runoff from the culvtivated lands follows the path of least resistance until Clarence Creek or Lafontaine Creek is reached.

It is assumed that as the Expansion Lands develop, a dual drainage system will be adopted. This dual drainage system will consist of a minor piped storm sewer system and a major overland flow system. Basedon consultation with the municipality and the South Nation Conservation Authority, the stormwater system for quality and quantity sizing will be designed to address the following:

- Pre-to-Post development control;
- Storm sewers will be designed using the rational formula for the 5 year design storm using an inlet time of 10 minutes for roads and 15 minutes for rear yards;
- The March 2003 Ministry of the Environment Stormwater Management Planning and Design Manual will be used for any studies and required design;
- Where feasibel, rear yard and roadway catchbasins will be equipped with inlet control devices restricting flows to appropriate limits;
- The hydraulic grade line (HGL) in the storm sewer will be designed to allow a clearance of at least 0.3 m between the underside of footing and the 100 year HGL;

- Maximum ponding in road sags will be 0.3 m;
- Minor system and Major system flow will be directed to an appropriately sized stormwater management facility which will be designed to meet quality and quantity requirements.

Further analysis is required and design details will be available as the project progresses. The proposed Expansion Lands are outside the boundaris for the South Nation Conservation Authority (SNCA) and the Rideau Valley Conservation Authority. From previous project experience, it is anticipated consultation with SNCA and the Ministry of Natural Resources and Forestry will be required to validate quantity and quality requirements as the design progresses.

Attachments

Appendix A – 2016 Summary Report for Water Consumption

Appendix B – Sanitary Sewer Calculation Sheet for Caron Street by WSP, Sanitary Servicing Areas and Pump Station Catchment Areas by Genivar

Appendix C – Storm Sewer Calculation Sheet and Storm Catchment Areas by WSP/Genivar

Appendix A

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

February 27th 2017

Mr. Denis Longpré
The City of Clarence-Rockland
1560, Laurier Street
Rockland, ON
K4K 1P7

Dear Mr. Longpré,

Attached is the 2016 Summary Report for the Rockland Water System. This report is completed in accordance with Schedule 22 of O. Reg. 170/03, under the Safe Drinking Water Act, which requires a Summary Report to be prepared not later than March 31st of each year for the preceding calendar year.

This Summary Report is to be provided to the members of the municipal council. Please ensure this distribution.

Furthermore we recently forwarded you a copy of the 2016 Section 11 Annual Report for the Rockland Water System. Section 12 of O. Reg. 170/03, requires that both the Summary Report and the Annual Report be made available for inspection by any member of the public during normal business hours, without charge. The reports should be made available for inspection at the office of the municipality, or at a location that is reasonably convenient to the users of the water system.

Sincerely

Patrick Lalonde
(A) Process Compliance Technician
OCWA, Alfred Hub

SUMMARY REPORTS FOR MUNICIPALITIES

Introduction:

Schedule 22 of O. Reg. 170/03 requires the preparation by the water system owner of a "Summary Report for Municipalities". This requirement is applicable only to large and small municipal residential water systems.

The Summary Report for the preceding year is to be issued by March 31st of the following year.

Distribution of the Summary Report is a function of ownership. If the water supply is owned by a municipality then all members of council are to receive the report. If owned by a municipal service board established under Section 195 of the Municipal Act, 2001 then all members of that board are to receive the report. Where a corporation owns the water supply, then the board of directors is to receive the report. And finally, where the water supply provides water to another municipality under a contract then the water supply owner shall give by March 31st 2017 a copy of the Summary Report to the municipality being supplied

The contents of the Summary Report for Municipalities must include the following:

1. A list of the requirements of the Safe Drinking Water Act and it's Regulations that the water system failed to meet during the report's time frame including the duration of the failure
2. A list of the requirements of the water system's Certificate of Approval that the water system failed to meet during the report's time frame including the duration of the failure
3. A list of any Orders that the water system failed to meet during the report's time frame including the duration of the failure
4. For each of the above failures, a description of the measures taken to correct the failures
5. A summary of the quantities and flow rates of the water supplied "including monthly average and maximum daily flows and daily instantaneous peak flow rates." (Information is to enable the owner to assess the capability of the water system to meet existing and future uses.)
6. A statement that captures the comparison of the flow information above to the rated capacity and flow rates approved in the water supply's approval.

SUMMARY REPORTS FOR MUNICIPALITIES

Report

This report is a summary of water quality information for the Rockland WTP, published in accordance with Schedule 22 of Ontario's Drinking-Water Systems Regulation for the reporting period of January 1st, 2016 to December 31st, 2016. The Rockland WTP is categorized as a Large Municipal Residential Drinking Water System.

This report was prepared by The Ontario Clean Water Agency on behalf of the Corporation of the City of Clarence-Rockland.

Who gets a copy of the Report:

- in the case of a drinking-water system owned by a municipality, the members of the municipal council;
- in the case of a drinking-water system owned by a municipal service board established under section 195 of the *Municipal Act, 2001*, the members of the municipal service board; or
- in the case of a drinking-water system owned by a corporation, the board of directors of the corporation.

What must the Report contain?

The report must,

(a) list the requirements of the Act, the regulations, the system's approval and any order that the system **failed to meet** at any time during the period covered by the report and specify the duration of the failure; and

(b) for each failure referred to in clause (a), describe the measures that were taken to correct the failure.

The following table lists the requirements that the system failed to meet and the measures taken to correct the failure:

Drinking Water Legislation	List the requirement(s) the system failed to meet	Specify the duration of the failure (i.e. date(s))	Describe the measures taken to correct the failure	Status (complete or outstanding)
Safe Drinking Water Act	N/A			
Ontario Regulations (eg. O.Reg 170/03, O.Reg 128/04, O.Reg 903	N/A			
Municipal Drinking Water Licence#175-101 System Drinking Water Works Permit #175-201 PTTW#2563-7H9QE8	Section 1.4 of the MDWL. Failed to meet the Suspended Solids Criteria listed in table 3 for residue management	Month of December 2016	Backwash supernatant tank valve to storm sewer has been shut off and diverted to sanitary, Tank will be scheduled for cleaning and inspection in 2017	Complete
Provincial Officer's Order #	N/A			

What else must the Report contain?

The report must also include the following information for the purpose of enabling the owner of the system to assess the capability of the system to meet existing and planned uses of the system:

1. A summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average and maximum daily flows and daily instantaneous peak flow rates.
2. A comparison of the summary referred to in paragraph 1 to the rated capacity and flow rates approved in the system's approval.

Attached please find a copy of the Annual Record of Water Taking for the Rockland WTP, which contains all required flow information.

When Does the Report Get Submitted?

If a report is prepared for a system that supplies water to a municipality under the terms of a contract, the owner of the system shall give a copy of the report to the municipality by March 31 2017.

End

ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

Annual Record Of Surface Water Taking
Relevé annuel des prises d'eau de surface

Personal information contained on this form is collected under the authority of the Ontario Water Resources Act, Section 20. The Purpose of the form is to record details and information about the taking of water annually. Questions should be directed to the respective hub office in your area.

Les renseignements personnels qui figurent dans le présent formulaire sont recueillis en vertu de l'article 20 de la Loi sur les ressources en eau de l'Ontario. Ce formulaire sert à dossiers les détails et les renseignements concernant la prise d'eau annuelle. Prière d'adresser toutes questions au personnel du bureau régional de votre secteur.

Year(Année): **2016** Permit No.(N° de permis):**2563-7H9QE8** Source: **Ottawa River**

Name of Permittee: **Corporation of the City of Clarence**
Nom du titulaire du permis

Mailing Address: **1560 rue Laurier, Rockland ,Ontario,K4P 1P7**
Adresse postale

Concession: I
Concession:

Lot: 27
Lot:

Location Of Taking: **Rockland WTP**
Lieu de la prise d'eau

Twp. or Municipality: **City of Clarence-Rockland**
Canton ou municipalité

Month	Monthly Flow Total (m3/month)	Daily Flow Average (m3/day)	Daily Flow Maximum (m3/day)	Daily Flow Peak Flow Rate (L/min)	Daily Flow Peak Flow Rate (L/sec)	Number of Days of Water Taking	Maximum Daily Run Time (hr)
Jan	143,884.2	4,641.43	5,477.8	4,798.8	69.24	31	24.0
Feb	133,453.5	4,601.84	5,407.7	4,611.3	69.23	29	22.0
Mar	142,111.8	4,584.25	5,439.7	8,481.3	70.28	31	22.7
Apr	136,936.1	4,564.54	5,537.0	8,695.0	69.9	30	23.0
May	170,584.9	5,502.74	8,823.4	9,211.3	106.18	31	23.9
Jun	185,115.2	6,170.51	7,810.6	9,166.3	112.17	30	23.3
Jul	166,299.4	5,364.50	7,171.8	9,217.5	114.09	31	21.9
Aug	176,702.5	5,700.08	8,246.5	9,313.8	111.67	31	21.2
Sep	156,914.0	5,230.47	6,972.3	9,263.8	112.63	30	18.6
Oct	153,298.2	4,945.10	6,151.3	9,232.5	112.71	31	16.7
Nov	141,775.3	4,725.84	5,391.9	9,192.5	113.27	30	14.2
Dec	147,531.3	4,759.07	6,727.2	9,933.8	116.07	31	16.1
Total	1,854,606.4					366	
Avg	154,550.5	5,067.23			98.12		
Max	185,115.2	6,170.51	8,823.4	9,933.8	116.07		24.0
Criteria			**14,500**	**10,089**		366	24.0

Appendix B

Sanitary Sewer Calculation Sheet

	DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA						
	MANHOLE				CONTRIBUTING	POPULATION			Σ	q	M	Peak Flow	Σ	IA	Q (INCOMMING FROM SIDE STREET)	Q	SIZE	Slope	CAP	Q/Qfull	VEL	LENGTH	FALL
LOCATION	FROM	TO	No.	Ha	AREAS	Ppha	P	P(1000)	P(1000)	l/cap/d)		(l/s)	AREA (ha)	(l/s)	(l/s)	(l/s)	(mm)	(%)	(l/s)		(m/s)	(m)	(m)
Caron St	SAM250	SAM251	26	2.40		67.50	162	0.162	0.162	400	4.00	3.00	2.4	0.67	-	3.83	200	2.10%	47.53	0.08	1.51	22.8	0.479
Caron St	SAM251	SAM252	32	24.20	26,32	67.50	1633.5	1.6335	1.7955	400	3.62	30.11	26.6	7.45	-	38.97	250	1.16%	64.05	0.61	1.30	55.5	0.644
Caron St	SAM252	SAM253			26,32				1.7955	400	3.62	30.11	26.6	7.45	-	38.97	250	1.29%	67.54	0.58	1.38	33.8	0.436
Caron St	SAM253	SAM254			26,32				1.7955	400	3.62	30.11	26.6	7.45	-	38.97	250	0.60%	46.06	0.85	0.94	62.5	0.375
Caron St	SAM254	SAM255			26,32				1.7955	400	3.62	30.11	26.6	7.45	-	38.97	300	0.40%	61.16	0.64	0.87	96.7	0.387
Caron St	SAMH201	SAMH202	26,32,33,33b,34,35	312.10		67.50	21066.8	21.0668	21.06675	400	2.63	256.49	312.1	87.39	-	343.88	750	0.15%	431.17	0.80	0.98	95.1	0.143
Caron St	SAMH202	SAMH203													241.00	584.88	750	0.40%	704.10	0.83	1.59	100.2	0.401
Caron St	SAMH203	SAMH204													0.00	584.88	750	0.40%	704.10	0.83	1.59	100.2	0.401
Caron St	SAMH204	SAMH205													0.00	584.88	750	0.40%	704.10	0.83	1.59	99.9	0.400
Caron St	SAMH205	SAMH206													0.00	584.88	750	0.40%	704.10	0.83	1.59	99.8	0.399
Caron St	SAMH206	SAMH207													0.00	584.88	750	0.50%	787.20	0.74	1.78	100.1	0.501
Caron St	SAMH207	SAMH208													0.00	584.88	750	0.50%	787.20	0.74	1.78	100.1	0.501
Caron St	SAMH208	SAMH209	Refer to CH2MHILL Master Sanitary Servicing Plan for the South Development Area for respective calculations												16.00	600.88	750	0.50%	787.20	0.76	1.78	100.2	0.501
Caron St	SAMH209	SAMH210													1.00	601.88	750	0.50%	787.20	0.76	1.78	75.8	0.379
Caron St	SAMH210	SAMH211													8.00	609.88	750	0.50%	787.20	0.77	1.78	105.0	0.525
Caron St	SAMH211	SAMH212													1.00	610.88	750	0.50%	787.20	0.78	1.78	99.8	0.499
Caron St	SAMH212	SAMH213													0.00	610.88	900	0.20%	809.59	0.75	1.27	102.3	0.205
Caron St	SAMH213	SAMH214													92.00	702.88	900	0.20%	809.59	0.87	1.27	70.7	0.141
Caron St	SAMH214	SAMH215													21.00	723.88	675	1.00%	840.59	0.86	2.35	93.3	0.933
EXISTING PIPE	SAMH215	EX SAMH216																					
EXISTING PIPE	EX SAMH216	EX SAMH217	Existing Pipes (Covered Under Seperate ECA)																				
EXISTING PIPE	EX SAMH217	MH608																					
Caron St	MH608	PS1														732.80	675	1.00%	840.59	0.87	2.35	94.9	0.949

DESIGN PARAMETER

Mannings n = 0.0130
Average Daily Flow (q)= 400 l/cap/d
Infiltration Rate (I) = 0.28 l/s/ha

Designed By: Matt Scanlan, EIT

Checked By: Matt Morkem, P.Eng

Dwg. Reference: SK1-23rev1 -Sanitary Area

PROJECT: Caron St. Reconstruction

LOCATION: Rockland, Ontario

Project Number: 65038

Date: 29-Apr-13

GENIVAR
1224 GARDINERS ROAD, SUITE 201
KINGSTON, ONTARIO
CANADA K7P 0G2
PHONE: 613-634-7373 FAX: 613-634-3523
WWW.GENIVAR.COM

CLIENT:

CITY OF CLARENCE-ROCKLAND

CLIENT REF. #:

PROJECT:

CARON STREET RECONSTRUCTION

ISSUED FOR – REVISION:

IS	RE	DATE	DESCRIPTION
1		2013/01/23	ISSUED FOR ECA

PROJECT NO: 065038

DATE: MAY, 2010

ORIGINAL SCALE: 1:20000

DESIGNED BY: MS

DRAWN BY: MF/MS

CHECKED BY: MM

IF THIS BAR IS NOT 1" LONG, ADJUST YOUR PLOTTING SCALE.

1"

DISCIPLINE: CIVIL

TITLE:

PROPOSED SANITARY SERVICING AREAS

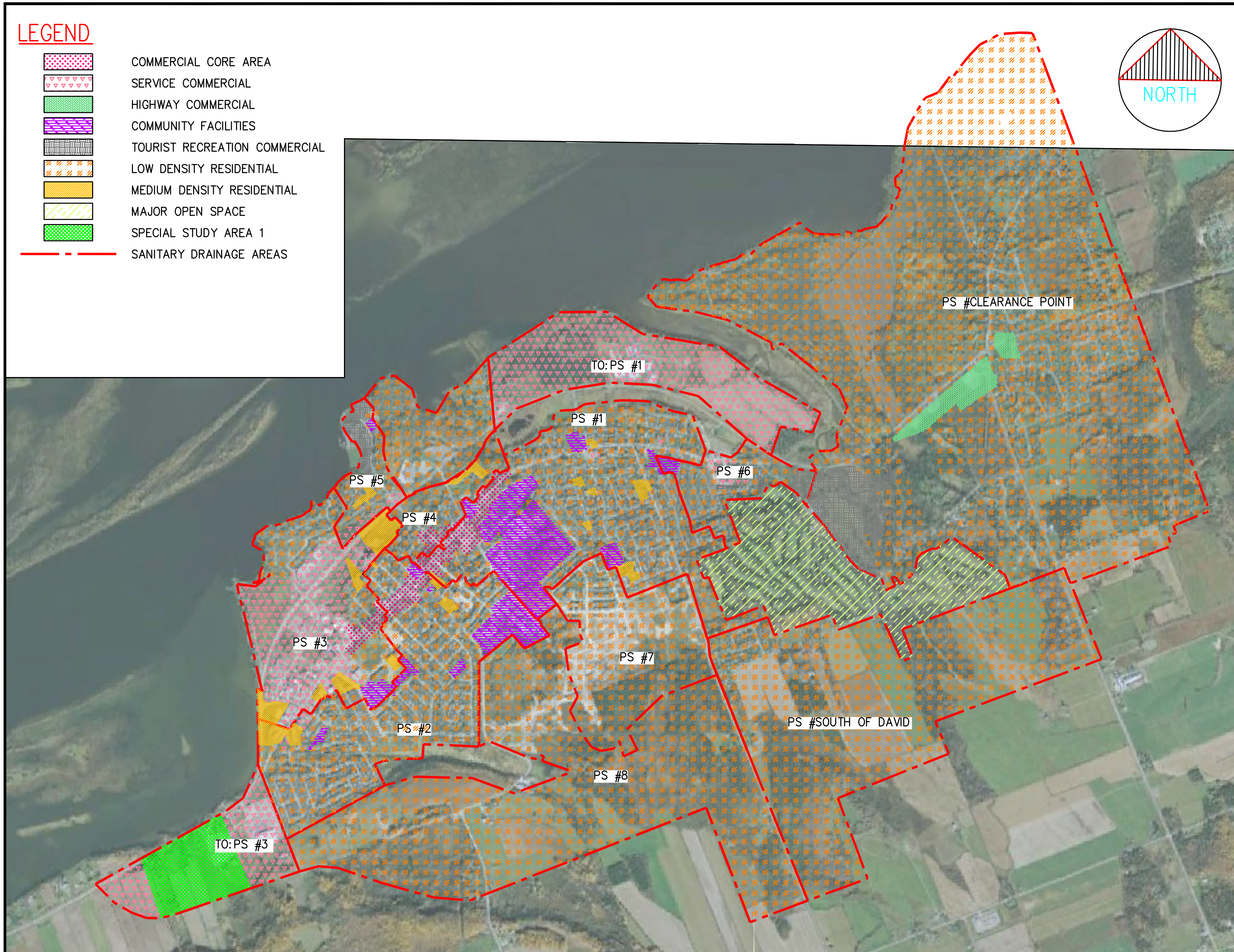
SHEET NUMBER: SK1.23

SHEET #: -- OF --

ISSUE: ISSUED FOR ECA

DATE OF: JANUARY 23, 2013

REV # 0



GENIVAR
1224 GARDINERS ROAD, SUITE 201
KINGSTON, ONTARIO
CANADA K7P 0G2
PHONE: 613-634-7373 FAX: 613-634-3523
WWW.GENIVAR.COM

CLIENT: CITY OF CLARENCE-ROCKLAND

CLIENT REF. #:

PROJECT: CLARENCE-ROCKLAND PUMPING STATION EVALUATION

ISSUED FOR - REVISION:

IS	RE	DATE	DESCRIPTION

PROJECT NO: 121-20569-00

DATE: MAY 2013

ORIGINAL SCALE: 1:25000

IF THIS BAR IS NOT 1" LONG, ADJUST YOUR PLOTTING SCALE.

1"

DESIGNED BY: MS

DRAWN BY: STR

CHECKED BY: MM/MS

DISCIPLINE: CIVIL

TITLE: PUMP STATION CATCHMENT AREA PLAN

SHEET NUMBER: SK1.1

SHEET #: OF

ISSUE: ISSUED FOR REVIEW

DATE OF: MAY 22, 2013

REV #: 0

M:\2012\121-20569-00 – Rockland PS Evaluation\121-20569-00_SK1_CatchmentAreas.dwg – 22.05.13 4:48pm

Appendix C

Storm Sewer Calculation Sheet

Caron Street Reconstruction

STREET	MANHOLE From	MANHOLE To	AREA No	AREA Ha	CONTRIBUTING AREAS	RUNOFF DATA C	AC	Σ AC	Tc (min.)	I (mm/hr)	Q (L/s)	PIPE DATA Size (mm)	Slope (%)	Capacity (L/s)	Q/Q_{full}	Velocity (m/s)	Length (m)	FALL (m)
CARON ST	STM300	STM304	S1	0.220	S1	0.75	0.165	0.165	15.000	83.56	38.33	300	0.50%	68.4	0.56	0.97	65.92	0.330
CHAPMAN ST	-	STM304	Existing Pipes															
CARON ST	STM304	STM305																
ATREL ST CUL DE SAC EAST	-	STM305																
CARON ST	STM305	STM306																
ATREL ST	STM103	STM306																
CARON ST	STM306	STM307																
CARON ST	STM307	STM309																
CARON ST	STM308	STM309	S6	0.240	S6	0.75	0.180	0.180	15.000	83.56	41.81	300	0.50%	68.4	0.61	0.97	44.04	0.220
CARON ST	STM307	STM309	-	-	A1,A2,A3,S1,S2,S3,S4,S5	-	-	4.041	18.228	74.40	835.67	900	0.40%	1144.9	0.73	1.80	41.59	0.166
CARON ST	STM309	OUTLET	-	-	A1,A2,A3,S1,S2,S3,S4,S5,S6	-	-	4.221	18.613	73.45	861.80	900	0.35%	1071.0	0.80	1.68	20.00	0.070
CARON ST	MH101	MH102	G	1.308	G	0.40	0.523	0.523	15.0	84	122.45	375	0.70%	146.7	0.83	1.33	82.53	0.578
CARON ST	MH102	MH103	F	0.915	F,G	0.40	0.366	0.889	15.8	81	201.86	450	0.70%	238.5	0.85	1.50	72.3	0.506
CARON ST	MH103	MH104	F		F,G		0.000	0.889	16.5	79	196.77	450	0.70%	238.5	0.82	1.50	62.7	0.439
CARON ST	MH104	MH105	E	1.039	E,F,G	0.40	0.416	1.305	17.0	78	283.44	525	0.60%	333.1	0.85	1.54	47.5	0.285
	MH105	MH106					0.000	1.305	17.5	76	278.40	525	0.60%	333.1	0.84	1.54	47.5	0.285
	MH106	MH107					0.000	1.305	18.0	75	274.08	525	0.60%	333.1	0.82	1.54	42.2	0.253
CARON ST	MH107	MH108			E,F,G		0.000	1.305	18.5	74	269.73	525	0.55%	318.9	0.85	1.47	42.2	0.232
CARON ST	MH108	MH109	C+D	20.296	C,D,E,F,G	0.40	8.118	9.423	19.1	72	1906.36	1200	0.35%	2306.5	0.83	2.04	80	0.280
CARON ST	MH109	MH110	B	1.671	B,C,D,E,F	0.40	0.668	10.092	20.2	70	1974.94	1200	0.35%	2306.5	0.86	2.04	128.1	0.448
CARON ST	MH110	MH111	A	0.979	A,B,C,D,E,F,G	0.40	0.392	10.483	21.1	68	1991.48	1200	0.35%	2306.5	0.86	2.04	119.32	0.418
CARON ST	MH111	MH112			A,B,C,D,E,F,G		0.000	10.483	21.2	68	1989.28	1050	1.00%	2730.7	0.73	3.15	7	0.070
CARON ST	MH150	MH151	H	4.038	H	0.40	1.615	1.615	15.0	84	377.94	750	0.40%	704.1	0.54	1.59	70.96	0.284
CARON ST	MH151	MH152	I	1.553	H,I	0.40	0.621	2.237	16.0	80	503.21	750	0.45%	746.8	0.67	1.69	105.0	0.473
CARON ST	MH152	MH153	J	1.460	H,I,J	0.40	0.584	2.821	16.9	78	615.60	750	0.50%	787.2	0.78	1.78	90.0	0.450
CARON ST	MH153	MH155	K	1.843	H,I,J,K	0.40	0.737	3.558	17.8	75	751.44	825	0.40%	907.8	0.83	1.70	96.1	0.384
CARON ST	MH155	MH156			H,I,J,K		0.000	3.558	18.7	73	728.86	825	0.39%	896.4	0.81	1.68	91.7	0.358
CARON ST	MH156	MH157	L	2.905	H,I,J,K,L	0.40	1.162	4.720	19.5	71	944.59	825	0.60%	1111.9	0.85	2.08	89.8	0.539
CARON ST	MH158	MH157	M	4.338	M	0.40	1.735	1.735	15.0	84	406.00	750	0.20%	497.9	0.82	1.13	54	0.108
	MH157	HEADWALL			H,I,J,K,L,M						1350.59	1200	0.20%	1743.6	0.77	1.54	14	0.028

DESIGN PARAMETER

Mannings n = 0.013

Infiltration Rate (I) = 0.28 l/s/ha

Designed By:
Matt Scanlan

Checked By:
Matt Morkem

Dwg. Reference:
SK1-6rev1 - Storm Area North Caron
SK.32rev1 - Storm Areas South Caron

PROJECT:
Caron St. Reconstruction

LOCATION:
Rockland, Ontario

Project Number: 65038

Date: 20-Jun-13

GENIVAR
1224 GARDINERS ROAD, SUITE 201
KINGSTON, ONTARIO
CANADA K7P 0G2
PHONE: 613-634-7373 FAX: 613-634-3523
WWW.GENIVAR.COM

CLIENT:

CITY OF CLARENCE-ROCKLAND

CLIENT REF. #:

PROJECT:

CARON STREET RECONSTRUCTION

ISSUED FOR - REVISION:

IS	RE	DATE	DESCRIPTION
1		2013/01/22	ISSUED FOR ECA

PROJECT NO: 065038

DATE: MAY, 2013

ORIGINAL SCALE: 1:7500

IF THIS BAR IS NOT 1" LONG, ADJUST YOUR PLOTTING SCALE.

1"

DESIGNED BY: MS

DRAWN BY: MF/MS

CHECKED BY: MM

DISCIPLINE: CIVIL

TITLE:

PROPOSED STORM CATCHMENT AREAS

SHEET NUMBER: SK1.32

SHEET #: -- OF --

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APPENDIX D: RETAIL MARKET DEMAND STUDY

RETAIL MARKET DEMAND STUDY: CLARENCE-ROCKLAND ONTARIO

FINAL REPORT

Prepared for:

City of Clarence-Rockland

Prepared by:

Shore-Tanner & Associates

October 17, 2018

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I. Executive Summary

On behalf of the City of Clarence-Rockland, and as a member of a multi-disciplinary team of consultants under the direction of Fotenn Planning & Design, this study has been carried out by Shore-Tanner & Associates. Its purpose is to determine the scope of market demand for retail, service, and small office businesses in a new part of Rockland. The main findings of the study are summarized below, followed by more detailed substantiation in the main body of the report.

A. Subject Site

The Subject Site is approximately 133.5 hectares (320 acres) in size, located southeast of Rockland's existing Urban Area Boundary. It is proposed to be added to the City of Rockland through an Expansion Lands Secondary Plan.

For the purposes of this study, we estimated a total of approximately 3,200 housing units, and associated population of 8,000 on the Subject Site when fully developed.

B. Major Socio-Demographic Findings

1. Rockland is a major commercial hub in the United Counties of Prescott and Russell (UCPR) and its businesses attract customers from within this area and beyond.
2. The total population of Clarence-Rockland increased by an average of 372 or 1.8%, and in UCPR by 915 or 1.1% per year from 2006 to 2016 (Table 3.1).
3. The 2018 population of Clarence-Rockland is estimated at 26,746 and that of UCPR at 91,500. Their estimated average annual growth to the year 2028 is 598 or 2.4% and 1,620 or 1.8% respectively (Table 3.3).
4. Considering that an overall average annual population growth of 1% represents a growing and balanced economy, the past and future growth of both of these areas have exceeded this generally accepted growth standard.
5. Due to the development of many housing units over $300,000 and attracting affluent families, including from Ottawa, incomes in both areas have significantly increased recently. As shown in Table 3.4, the 2016 **median** household incomes were:

    - Clarence-Rockland $88,823
    - UCPR $78,748
    - City of Ottawa $85,981

This is particularly important since the City of Ottawa's household incomes are often among the top three to five cities in Canada.

C. Retail Spending

1. On average, each resident of Clarence-Rockland is estimated to spend $18,110, and those of UCPR as a whole, $17,380 in 2018 at all retail and service businesses within and outside these areas (Table 5.1).
2. The total spending of UCPR residents is estimated at $1.590 **billion** in 2018, and expected to increase by $28.1 million or 1.8% annually by the year 2028, to $1.871 **billion** (Table 5.2).
3. The estimated spending portion of the residents of Clarence-Rockland from UCPR's total is $484.4 million in 2018, and $592.6 million in 2028 (i.e., average annual growth in spending of $10.82 million or 2.2% (Table 5.3).
4. At present, some of the spending of UCPR residents takes place at businesses in Ottawa and elsewhere. This leakage-out is due to the following factors:
    a) Some of the UCPR residents work in Ottawa and spend some of their retail dollars there.
    b) There are no senior department stores (i.e., Simons, The Bay, Nordstrom) or other new and popular/trendy stores (e.g., J. Crew, Michael Kors) within UCPR. These stores exist in Ottawa, and attract customers from UCPR and other cities and towns within 1-2 hours drive.
5. There are, as well, customers from outside UCPR who shop at businesses there, especially at those in Rockland (i.e., leakage-in).

As more, especially new, businesses are attracted to Rockland, the leakages of UCPR's shopping dollars to Ottawa will decrease, and the leakages into UCPR will increase.

D. Demand Estimation

1. The spending of the residents of Clarence-Rockland is estimated to support a minimum total of 967,000 sq. ft. of floor space in 2018, increasing by an average of 21,700 sq. ft. annually, to 1.184 million sq. ft. by 2028 (Table 6.1).

2. The supportable increase by time frame is (Table 6.1):
   - 2018-2020 45,000 sq. ft.
   - 2020-2023 64,000 sq. ft.
   - 2023-2028 108,000 sq. ft.
   - 2018-2028 217,000 sq. ft.
3. At present, some of the total supportable space is outside Clarence-Rockland since its residents do not spend 100% of their shopping dollars at Rockland businesses.

E. Inventory of Existing Businesses

As of May 2018, there were 146 retail and service businesses in Rockland, and they occupied an estimated total of 538,000 sq. ft. of floor space.

Including the limited number of such businesses in the Clarence part, the overall average floor space per capita in Clarence-Rockland is estimated to be 22 sq. ft.

Based on the industry standard of 30 to 40 sq. ft. of floor space per capita, **the City of Clarence-Rockland is under-stored for retail and service businesses.**

Of the 146 existing stores, a total of 14 with a combined size of 29,200 sq. ft. or **5.4% were vacant, and this rate is within the industry range of 4% to 8%.**

F. Recommendations For the Expansion Lands

An overall average of up to 40 sq. ft. of retail and service floor space is generally supportable on a per capita basis.[1] Due to leakages in and out, however, it is not always possible to accurately calculate the actual floor space supported by each resident by location of shopping.

At full development, the Subject Expansion Land is estimated to have approximately 8,000 residents. What would be most needed in this community of 8,000 residents are

[1] At a total population of 26,746 in Clarence-Rockland, the total supportable floor space of 967,000 in 2018 represents 36 sq. ft. per capita at businesses within, but also outside this city.

locally-oriented food, convenience, and service businesses in the first few years. Other businesses will also be in demand, but the risk of over-storing should be avoided. Based on these considerations, we recommend the businesses and sizes identified in Table 1.1 for the Subject Expansion Lands. Briefly, they include:

1. **Total of approximately 100,000 sq. ft. of floor space.**
2. **Food, convenience, personal services: approximately 60,000 sq. ft. of above.**
3. **Specialty retail, fashion, gifts, others: approximately 40,000 sq. ft. of above.**
4. **No businesses offering durable or semi-durable products which already exist in Rockland.**
5. **Review of the supply-demand dynamics in the entire expanded Rocklands once every five years in order to revise 1-4 above based on market forces.**

Table 1.1 Recommended Businesses To Select For the Expansion Lands		
Business Type	**No.**	**Approximate Size (sq. ft.)**
Supermarket	1	40,000-50,000
Convenience Stores	3	5,000-6,000
Specialty Food Stores	3	4,000-6,000
Pharmacies	2	8,000-12,000
Computer Supply & Services	1	1,000-2,000
Hardware Store	1	3,000-8,000
Fashion Stores	2	3,000-8,000
Specialty Retail	3	3,000-7,000
Table Service Restaurants	3	5,000-7,000
Coffee Shops	2	3,000-4,000
Fast Food Eateries	3	5,000-8,000
Banks & Other Financial	3	6,000-10,000
Beauty Salons, Barber, Spa	3	4,000-6,000
Miscellaneous	5	5,000-8,000
Office	5	5,000-8,000
Total: Up to 40 Businesses		**100,000-150,000**

II. Subject Site and Environs

A. Subject Site

The Subject Site is approximately 133.5 hectares (320 acres) in size, located southeast of Rockland's existing Urban Area Boundary. It is proposed to be added to the City of Rockland through an Expansion Lands Secondary Plan.

For the purposes of this study, we estimated total approximately 3,200 housing units, and associated population of 8,000 on the Subject Site when fully developed.

The expansion land is currently vacant and is owned by six private-sector individuals and companies. Its boundary at present is:

> ***David Street to the north, Clarence-Creek to the east, close to Baseline Road to the south, and Carson Street to the west.***

North of David Street is the residential neighbourhood of Rockland East and Rockland Golf Club. Along all other sides of the Subject Site are vacant lands, farms, and open spaces.

B. Development Potential

At present, the Subject Site is being considered for low-density residential development, and locally-oriented commercial businesses. Based on discussions with the study's Project Manager at Fotenn Planning and Design, the likely development densities on the Subject Site would be in the order of 10 to 12 units per acres, or an overall average of 11 units per acre. The estimated total number of units on the Subject 320 acres is thus approximately 3,200 units at full development. At the 2016 average household size of

2.63 persons (Table 3.2), the total number of residents associated with 3,200 housing units would be 8,416.

Some of the future residents on the expansion lands would be first-time buyers/renters, or otherwise consist of two persons. As well, the average household size has been on a declining trend and this trend is expected to continue. Therefore, to avoid over-estimation of population, we assume that the overall household size on the Subject Site would be 2.5 persons, or a total of 8,000. **For the purposes of this study, therefore, we have used a total population of 8,000 (rounded) on the Subject Expansion Lands when fully developed.**

III. SOCIO-DEMOGRAPHIC ANALYSIS

A. Trade Area

Based on the retail industry standards and practices, capture, market or trade area is one from which customers can be attracted for the purchase of the goods and services offered by the area's businesses. Primary Trade Area (PTA) typically provides at least 50% of the total sales of the businesses within. The rest of the area(s) which provide the balance of the total sales is called Secondary Trade Area (STA). There can also be Tertiary Trade Areas (TTA) for businesses which attract/capture at least 10% of their total sales from outside the PTA and STA combined.

Based on field research, our knowledge of the area, and past studies, we have defined the following as the effective Trade Area for the recommended businesses on the Subject Site:

> ***The City of Clarence-Rockland as the Primary, and the rest of the United Counties of Prescott & Russell (UCPR) as the Secondary Trade Area.***

Trade areas are not rigid, and change over time based on growth, transportation, competitive facilities, lifestyle, and other such changes and trends. A somewhat larger or smaller Trade Area would also be valid for the purposes of this study. However, we believe what we have defined is quite reasonable for the objectives of this study.

B. Total Population: 2006-2016

1. The City of Clarence-Rockland and the rest the UCPR have continued to grow. For the 10-year period 2006-2016, their average annual growth was (Table 3.1):

   - Clarence-Rockland 372 or 1.8%
   - UCPR 915 or 1.1%

2. As of mid-2016, Statistics Canada's Census data show total populations of:

   - Clarence-Rockland 24,512
   - UCPR 89,333

C. Households

1. The City of Clarence-Rockland has continued to experience higher growth rates and be more family-dominated than the rest of the UCPR.
2. In 2016, the median age of the residents of Clarence-Rockland was 42.2 years (44.3 in UCPR), its overall average household size was 2.63 (2.52 in UCPR), and 5.8 in 10 of its households (6.2 in UCPR) consisted of only one ro two persons (Table 3.2).

D. Growth Forecasts

Since 2014-2015, residential and thus population growth have significantly accelerated in Clarence-Rockland, and to a lesser ex tent, in the rest of UCPR. Based on the actual growth since 2014, under construction, planned, and proposed housing developments, the City of Clarence-Rockland, and Hemson Consulting Ltd. Have provided population forecasts for both areas. Based on these forecasts, we have prepared **Table 3.3, which demonstrates the following average annual population increases for the period 2018-2028:**

1. Clarence-Rockland	**598 or 2.4%**
2. UCPR	**1,620 or 1.8%**

Compared to the actual annual growth from 2006 to 2016, the figures in Table 3.3 appear to be too optimistic. However, for infrastructure planning purposes, it is prudent to use somewhat generous forecasts. As well, the actual 2016 population of UCPR was 89,333 (Table 3.3), whereas Hemson report's estimate was 88,700 (i.e., 633 or 0.7% lower than actual). Above all, as the City of Ottawa continues to expand eastward, and its housing costs continue to be much lower than in Rockland, growth in Rockland/UCPR will only further intensify. From this perspective, the forecasts in Table 3.3 seem quite reasonable, and may even be somewhat too low for the period 2023-2028.

Table 3.1 Historical Population Data		
Year	**Clarence-Rockland**	**Prescott and Russell United Counties (UCPR)**
2006	20,790	80,184
2011	23,185	85,381
2016	24,512	89,333
Average Annual Change: 2006-2016:		
Numeric	372	915
%	1.8	1.1

Notes:

[1] In 2016, the median age of the residents was 42.2 in Clarence-Rockland, and 44.3 in UCPR.

[2] Generally, economists and planners consider an average annual population growth of 1.0% to represent an economically growing area.

Source: Shore-Tanner & Associates based on Statistics Canada's census data.

Table 3.2 Households By Size: 2016				
Household Size	**Clarence-Rockland**		**Prescott and Russell United Counties (UCPR)**	
	No.	**%**	**No.**	**%**
Single Person	1,810	19.4	8,125	23.0
Two Persons	3,635	40.0	13,880	39.2
Three Persons	1,590	17.0	5,665	16.0
Four or More Persons	2,295	24.6	7,720	21.8
Total	**9,330**	**100.0**	**35,390**	**100.0**
Average Size	2.63	–	2.52	–
Single and Two Persons Combined	5,445	58.4	22,005	62.2

Source: Shore-Tanner & Associates based on Statistics Canada's census data.

Table 3.3
Population Forecasts

Year	Clarence-Rockland	Prescott and Russell United Counties (UCPR)
2016	24,512	89,333
2018	26,746	91,500
2020	27,955	96,500
2021	28,524	99,000
2023	29,746	101,500
2028	32,723	107,700
Average Annual Change: 2018-2028:		
Numeric	598	1,620
%	2.4	1.8

Sources:

1. City of Clarence-Rockland for Clarence-Rockland
2. Shore-Tanner & Associates for UCPR based on the mid-estimates of population growth in ***Growth Forecast and Land Needs Analysis***, by Hemson Consulting Ltd., December 2015. Population growth from about 2023 and thereafter is expected to be higher than 598 per years.

Table 3.4
Household Income Distribution: 2016

Income Class ($)	Clarence-Rockland		Prescott and Russell United Counties (UCPR)	
	No.	%	No.	%
Under 40,000	1,460	15.6	7,825	22.1
40,000-59,999	1,315	14.1	5,250	14.8
60,000-79,999	1,355	14.5	4,925	13.9
80,000-99,999	1,200	12.9	4,445	12.6
100,000-124,999	1,375	14.7	4,550	12.9
125,000-149,999	1,025	11.0	3,210	9.1
150,000 & over	1,600	17.1	5,185	14.6
Total	**9,330**	**100.0**	**35,390**	**100.0**
Median Household	88,823	–	78,748	–
Median Per Capita	33,773	–	31,249	–

Note: The 2016 median income for the City of Ottawa was $85,981 and for the Province of Ontario it was $74,287.

Source: Shore-Tanner & Associates based on Statistics Canada's census data.

IV. RETAIL MARKET TRENDS

This section presents a number of major trends and changes in shopping habits, patterns, and new retail facilities. While our recommended businesses for the Subject Site are mostly for the day to day local and convenience shopping, the knowledge of the retail industry trends provides additional understanding for this ever-changing and highly competitive industry.

A. Retail Stores

A number of new types of shopping facilities, most of which have their origins in the U.S., were introduced into the Canadian market in the late 1990s. The major new shopping facilities in this regard are:

1. **Box Stores:** Costco, Walmart, and The Home Depot fall into this category. These are often referred to as big-box stores, since they are typically larger than 100,000 sq. ft. There are also medium-sized box stores, such as Winner's (clothing), Staples (office products), and Globo shoes, which are typically between 20,000 to 50,000 sq. ft.;
2. **Large Format Stores** such as Canadian Tire and the Great Canadian Super Stores. These are mostly new versions of the same stores, but significantly larger (often between 70,000 to 150,000 sq. ft.), offering a much wider assortment of products and services;
3. **Dollar Stores** which are typically between 1,000 to 5,000 sq. ft., specializing in mostly low-cost imports priced at up to $5.00 per item (e.g., Dollarama, A Buck or Two, The Dollar Store);
4. **Power Centres** are typically between 200,000 to 1,000,000 sq. ft., consist of a variety of box and traditional stores in open malls, with each store having its own pad and parking in front to the extent possible;
5. **Specialty Stores** such as Starbucks (coffee shop), Mountain Equipment Coop (outdoors store), Lululemon (Yoga wear), Sassy Beads (jewellery, craft), and Brio (shoes, clothing, accessories);

6. De-Malling

Another recent trend in the retail industry is the conversion of old and small enclosed shopping malls into open, uncovered shopping centres (referred to as de-malling). Malls which are over 20 years old and up to about 300,000 sq. ft. in size are usually targets for being de-malled. A de-malled shopping centre is less costly to operate since there are no indoor areas to be heated, cooled, cleaned or supervised. As well, the corridors and other public spaces are converted to leasable floor space.

7. Store Enlargements

Another significant trend in the retail industry is the enlargement of existing stores at the same or a new location. Large stores are in a much better position than small and medium-sized stores to offer one-stop-shopping opportunities. Many supermarkets, hardware, furniture, electronics, department, and home improvement stores have in recent years expanded their size in the same or a new location within the National Capital Region and elsewhere. In some cases, new stores from the same chain are built much larger.

8. Walmart Supercentres

In the early 2000s, the Walmart chain stores finally won the right to offer food products at their stores. Called Supercentres, these new Walmart stores have the equivalent of a 50,000 sq. ft. supermarket within them, including produce, fresh meat, deli, dairy, as well as general merchandise (i.e., canned and boxed food products). The food section is usually on one side of these huge stores, and clothing, furniture, and other non-food products on the other side.

At these stores, the cost of food and other products are generally lower, but more importantly, perceived to be lower due to effective advertising, than at competitive stores.

9. Recent Entries Into the Ottawa Market

Since many residents of the Trade Area shop at businesses in Ottawa, it is helpful to identify significant recent changes in the Ottawa market.

In September 2013, several (American) Target stores were opened in Ottawa in previously Zellers stores, and more were planned. Soon after, however, they were all closed down and to this date, some of them are still vacant. An H&M store was opened in Bayshore Shopping Centre in October 2013 and more since then elsewhere in Ottawa.

In February 2012, a Marshall's department store was opened in the Train Yards Shopping Centre, there are four of them now in Ottawa, and more are planned to open. In November 2011, the new and expanded IKEA store at approximately 410,000 sq. ft. was opened in Pinecrest Centre. In early 2011, a Forever 21 store was opened at the Rideau Centre. Since then, it has expanded and attracted a large number of luxury stores such as Michael Kors, Tiffany &Co., and Kate Spade.

A Whole Foods Supermarket and a large number of other retail and restaurants have opened at Lansdowne Park as part of its major redevelopment plan since 2014. Nordstrom, Topman, Simons and a few other American and European stores have also come to Ottawa in the last five years.

In addition to these new facilities, new methods of conducting business have been created. Purchasing through the Internet is one example. Twinning is another example which makes it possible for two businesses to complement each other, while saving on insurance, utilities, taxes, staff, and other costs. Examples in this regard include Chapter's book stores and Starbucks, Walmart and McDonald's restaurants, The Home Depot and Harvey's restaurants. **Online shopping has been growing very rapidly in the last five years, and is expected to grow further from its estimated total market share of approximately 4% of total spending in Ottawa.**

B. Reasons For Success of the New Store Types

There are many reasons for the introduction and successful operation of these new stores, as well as the new merchandising formats. Chief among these are:

1. Population growth, affluence, and especially ethnic and economic diversity, create demand for new products, services, and methods of buying and selling.
2. Many retail markets in Canada including in Ottawa are considered to be still offering a limited variety of shopping facilities with primarily average quality products at or above average prices. Choices at discount/value, as well as at upscale/high-quality ends of the shopping spectrum in particular, are still limited.
3. Power centres and stand-alone box stores have lower operating costs (e.g., little or no common-area charges compared to enclosed malls), provide ample parking situated very close to their entrances, offer one-stop-shopping opportunities, their prices are and/or are perceived to be lower than conventional stores, and they are very successful at selling large quantities of products.

4. For a wide variety of economic, demographic, and lifestyle reasons, many people seem to prefer shopping at these large, new-format and specialty stores.

C. Present Shopping Patterns and Habits

Based on knowledge, experience, observations, and **hundreds** of consumer research surveys, we believe that shopping patterns and habits are solidifying, as follows:

1. Power centres, big-box and other discount-oriented shopping facilities are here to stay. Their main advantages are real and/or perceived value, choice, and large quantities of products. Shoppers tend to go to these stores about once a month, and for the specific and pre-determined purpose of actual shopping (for household and/or office products), rather than for browsing, window shopping, socializing or just passing time. Typically, they prepare a list of what they want to buy ahead of time, follow it through, buy and bring home large quantities of products.

   This type of shopping is rather arduous, especially for older people, those who do not have or wish to spend lots of time for shopping, and those who are affluent enough for whom discount/value is not that important. The amount of time, planning, and the energy required are the main reasons why shopping at these facilities is generally infrequent (although there are customers from all socio-economic classes who only or mostly shop at these stores).

2. **Shopping at regional, community shopping centres, and especially in downtown and on other pedestrian-friendly streets, is often for fashion, specialty products and services, meeting, dining, socializing, entertainment and cultural activities.** There is frequently comparison-shopping, browsing, and cross-shopping at these facilities, especially during holidays and for special occasions (birthdays, anniversaries, etc.). Trips to these facilities do not necessarily always result in purchases due to the entertainment/socializing/dining factors, and also for purposes of comparison shopping. **Thus, the fun and multi-purpose functions of these trips, combined with the far more diverse, attractive, and comfortable atmospheres of these facilities, attract shoppers there more frequently than power centres and big-box stores do.**

3. Shopping at **highway commercial** facilities is also destination oriented and closer in function to shopping at power centres and big-box stores, than to shopping at regional and community shopping centres, or on main streets. Furniture,

electronics, appliances, automotive, box stores, restaurants, and other services often dominate highway commercial strips. Shoppers typically go to these establishments for specific products and/or services, based on pre-determined shopping plan. While there may be comparison shopping, there is usually no window-shopping, socializing, browsing, or cross-shopping. Other than for restaurants, banks, gasoline, and other services, shopping at highway commercial stores is infrequent (furniture, electronics, appliances, and major auto repairs are normally needed less than once a year by most households).

4. The retail industry is dynamic and rapidly evolving. Shoppers demand choice, variety, convenience, value, and fun. In a healthy market, there is a balance between the traditional main street retail stores, suburban shopping centres, and the new and emerging retail facilities as described above.

5. **In the competitive environment of today, maintaining market share, and especially increasing it, is a major challenge for all shopping facilities and districts, requiring new thinking and approaches to merchandising and customer relationship. Targeted use of social media, online services, better understanding of the retail market trends, more awareness of competition from shopping centres and districts, and better recognition of the needs, preferences, and desires of the Trade Area residents are among the key elements of new thinking and approaches, which have to be considered for the planned retail market on the Subject Site in Rockland.**

V. EXPENDITURE ANALYSIS

Spending at retail and service businesses depends on numerous socio-demographic, lifestyle, and locational factors. Based on hundreds of retail market studies by our firm and other research organizations, income is the most influential factor. Often, the higher their income, the more people shop, spend, and thus support the continuation and/or expansion of businesses.

The estimation of demand for supportable floor space is highly analytical and therefore numerically oriented. The detailed results of the analytical part of the demand estimation are presented in the next chapter, after the estimation of expenditure potentials below.

A. Per Capita Expenditures

Statistics Canada is the primary source for expenditure data at retail and service stores across Canada. For this study's Trade Area, the data are estimated based on income comparisons, since they are not available for Clarence-Rockland.

The overall median per capita income in 2016 of Trade Area residents was $33,773 and this was higher than Ontario's which was $28,572 in 2016. Incomes in both areas are higher now.

In Table 5.1, we have provided estimates of per capita expenditures by the residents of the Trade Area for a number of trade groups which are standard in the retail industry. As noted, **we estimate the overall average per capita spending of the TA residents to be $17,386 in 2018**. Of course, due to mortgages, family size and other factors, some individuals and families spend less, and others more than these averages, depending on their disposable income.

B. Total Retail and Service Expenditures

The estimated total expenditures of the residents of UCPR and Clarence-Rockland are provided in Tables 5.2 and 5.3.

Table 5.1
Estimated Per Capita Retail and Service Spending: 2018

Trade Group	UCPR Spending ($)	Clarence-Rockland Spending ($)
A. Retail Product Stores		
Supermarkets	2,290	2,400
Convenience Stores	220	235
Specialty Food	195	205
Beer, Wine & Liquor	670	700
Drugs & Patent Medicine*	1,105	1,160
Clothing	820	860
Shoes, Jewellery & Accessories	235	250
Home Furnishings	125	130
Electronics & Appliances	495	520
Furniture	285	300
Building Materials, Hardware & Garden Supplies	850	890
Sporting Goods, Hobbies, Music & Books	300	315
Used, Recreation & Other Vehicles	470	490
New Car Sales	2,800	2,900
Auto Parts & Accessories	190	200
Gasoline & Service Stations	1,410	1,400
General Merchandise	960	980
Department Stores	720	750
Other Retail Stores	350	370
Subtotal: Retail Products	**14,490**	**15,055**
B. Retail Service Businesses		
Restaurants, Bars & Other Eateries*	1,220	1,300
Personal Care Businesses*	215	225
Sports, Recreation & Entertainment*	1,455	1,530
Subtotal: Service Businesses	**2,890**	**3,055**
Grand Total: All Stores & Businesses	**17,380**	**18,110**

* Estimated
1. Online spending is **not** included.

Source: Shore-Tanner & Associates based on CANSIM Tables 080-0030 and other relevant Statistics Canada data.

Table 5.2
Estimates of Total Spending By UCPR Residents

Trade Group	2018 ($M)	2020 ($M)	2021 ($M)	2023 ($M)	2028 ($M)	Average Annual Change: 18-28	
Population	**91,500**	**96,500**	**99,000**	**101,500**	**107,700**	**Numeric**	**%**
A. Retail Product Stores							
Supermarkets	209.5	221.0	226.7	232.4	246.6	3.7	1.8
Convenience Stores	20.1	21.2	21.8	22.3	23.7	0.36	1.8
Specialty Food	17.8	18.8	19.3	19.8	21.0	0.32	1.8
Beer, Wine & Liquor	61.3	64.6	66.3	68.0	72.1	1.1	1.8
Drugs & Patent Medicine*	101.1	106.6	109.4	112.1	119.0	1.8	1.8
Clothing	75.0	79.1	81.2	83.2	88.3	1.3	1.8
Shoes, Jewellery & Accessories	21.5	22.7	23.3	23.8	25.3	0.4	1.8
Home Furnishings	11.4	12.1	12.4	12.7	13.5	0.2	1.8
Electronics & Appliances	45.3	47.8	49.0	50.2	53.3	0.8	1.8
Furniture	26.1	27.5	28.2	28.9	30.7	0.5	1.8
Building Materials, Hardware & Garden Supplies	77.8	82.0	84.1	86.3	91.5	0.8	1.8
Sporting Goods, Hobbies, Music & Books	27.4	29.0	29.7	30.4	32.3	1.4	1.8
Used, Recreation & Other Vehicles	43.0	45.3	46.5	47.7	50.6	0.5	1.8
New Car Sales	256.2	270.2	277.2	284.2	301.6	0.8	1.8
Auto Parts & Accessories	17.4	18.3	18.8	19.3	20.5	4.5	1.8
Gasoline & Service Stations	129.0	136.1	139.6	143.1	151.8	2.3	1.8
General Merchandise	87.8	92.6	95.0	97.4	103.4	1.6	1.8
Department Stores	65.9	69.5	71.3	73.1	77.5	1.2	1.8
Other Retail Stores	32.0	33.8	34.6	35.5	37.7	0.57	1.8
Subtotal: Retail Products	**1,325.8**	**1,398.3**	**1,434.5**	**1,470.7**	**1,560.6**	**23.5**	**1.8**

* Estimated
1. Online spending is **not** included.

Table 5.2, continued
Estimates of Total Spending By UCPR Residents

Trade Group	2018 ($M)	2020 ($M)	2021 ($M)	2023 ($M)	2028 ($M)	Average Annual Change: 18-28	
						Numeric	%
B. Retail Service Businesses							
Restaurants, Bars & Other Eateries*	111.6	117.7	120.8	123.8	131.4	2.0	1.8
Personal Care Businesses*	19.7	20.7	21.3	21.8	23.1	0.3	1.8
Sports, Recreation & Entertainment*	133.1	140.4	144.0	147.7	156.7	2.4	1.8
Subtotal: Service Businesses	**264.4**	**278.9**	**286.1**	**293.3**	**311.2**	**4.7**	**1.8**
Grand Total: All Stores & Businesses	**1,590.3**	**1,677.2**	**1,720.6**	**1,764.1**	**1,871.8**	**28.1**	**1.8**

* Estimated
1. Online spending is **not** included.

Note: The average annual percentage increases in spending are identical to the estimated population growth of 1.8% in Table 3.3. The dollar figures above are all in the constant value of the Canadian dollar in 2018. In other words, neither inflation, nor actual growth are included in order to avoid possible over-estimation.

Source: Shore-Tanner & Associates.

Table 5.3
Estimates of Total Spending By Clarence-Rockland Residents

Trade Group	2018 ($M)	2020 ($M)	2021 ($M)	2023 ($M)	2028 ($M)	Average Annual Change: 18-28	
Population	**26,746**	**27,955**	**27,524**	**29,746**	**32,723**	**Numeric**	**%**
A. Retail Product Stores							
Supermarkets	64.2	67.1	68.4	71.4	78.5	1.4	2.2
Convenience Stores	6.3	6.6	6.7	7.0	7.7	0.14	2.2
Specialty Food	5.5	5.7	5.8	5.9	6.7	0.12	2.2
Beer, Wine & Liquor	18.7	19.6	20.0	20.8	22.9	0.42	2.2
Drugs & Patent Medicine*	31.0	32.4	33.1	34.5	38.0	0.70	2.2
Clothing	23.0	24.0	24.5	25.6	28.1	0.51	2.2
Shoes, Jewellery & Accessories	6.7	7.0	7.1	7.4	8.2	0.15	2.2
Home Furnishings	3.5	3.6	3.7	3.9	4.2	0.07	2.2
Electronics & Appliances	13.9	14.5	14.8	15.5	17.0	0.31	2.2
Furniture	8.0	8.4	8.6	8.9	9.8	0.18	2.2
Building Materials, Hardware & Garden Supplies	23.3	24.9	25.4	26.5	29.1	0.53	2.2
Sporting Goods, Hobbies, Music & Books	8.4	8.8	9.0	9.4	10.3	0.19	2.2
Used, Recreation & Other Vehicles	13.1	13.7	14.0	14.6	16.0	0.29	2.2
New Car Sales	77.6	81.1	82.7	86.3	94.9	1.73	2.2
Auto Parts & Accessories	5.3	5.6	5.7	5.9	6.5	0.13	2.2
Gasoline & Service Stations	37.4	39.1	40.0	41.6	45.8	0.84	2.2
General Merchandise	26.2	27.4	27.9	29.1	32.1	0.59	2.2
Department Stores	20.0	21.0	21.4	22.3	24.5	0.45	2.2
Other Retail Stores	9.9	10.3	10.6	11.0	12.1	0.22	2.2
Subtotal: Retail Products	**402.3**	**420.9**	**429.4**	**447.8**	**492.6**	**9.03**	**2.2**

* Estimated
1. Online spending is **not** included.

Table 5.3, continued
Estimates of Total Spending By Clarence-Rockland Residents

Trade Group	2018 ($M)	2020 ($M)	2021 ($M)	2023 ($M)	2028 ($M)	Average Annual Change: 18-28	
						Numeric	%
B. Retail Service Businesses							
Restaurants, Bars & Other Eateries*	34.8	36.3	37.1	38.7	42.5	0.77	2.2
Personal Care Businesses*	6.0	6.3	6.4	6.7	7.4	0.14	2.2
Sports, Recreation & Entertainment*	40.9	42.8	43.6	45.5	50.1	0.92	2.2
Subtotal: Service Businesses	**81.7**	**85.4**	**87.1**	**90.9**	**100.0**	**1.83**	**2.2**
Grand Total: All Stores & Businesses	**484.4**	**506.3**	**516.6**	**538.7**	**592.6**	**10.82**	**2.2**

* Estimated
1. Online spending is **not** included.

Note: The average annual percentage increases in spending are identical to the estimated population growth of 1.8% in Table 3.3. The dollar figures above are all in the **constant** value of the Canadian dollar in 2018. In other words, neither inflation, nor actual growth are included in order to avoid possible over-estimation of demand for additional floor space.

Source: Shore-Tanner & Associates.

VI. Demand Estimation

A. Productivity Rates

In Tables 5.1-5.3, we have provided estimates of the available spending by Trade Area residents and employees. The next steps involve the estimation of how much floor space these expenditures can support. For these steps, productivity rates or sales per sq. ft. are needed.

Based on over 100 retail studies in the last 15 years, including in-person confidential meetings and surveys of at least 2,000 business managers and/or owners, we have obtained actual and closely estimated sales data. Many of these studies have included presentations at the Ontario Municipal Board hearings where actual sales data were presented by opposing parties and analyzed. Based on these studies, ongoing research, and review of retail trends, we have provided realistic ranges of annual sales per sq. ft. for the types of retail and service businesses most likely to be viable on the Subject Site. As shown in Table 6.1, the average annual sales per sq. ft. at food stores, for example, is estimated to be between $500 and $700.

B. Total Supportable Floor Space

Table 6.1 presents the total supportable floor space for each business for the years 2018-2028. As demonstrated, **Clarence-Rockland's spending is estimated to be supporting a total of 967,000 to 1.277 million sq. ft. of retail and service business floor space in 2018, at businesses within, but also outside this area.** The total supportable space will, of course, increase each year, based on population growth and affluence.

In Table 6.2, we have identified the increase in supportable demand for each business. As demonstrated, **the supportable increase in the total floor space is as follows by time periods by the residents of Clarence-Rockland:**

1. **2018-2020 45,000-81,000 sq. ft.**
2. **2020-2023 64,000- 87,000 sq. ft.**
3. **2023-2028 108,000-144,000 sq. ft.**
4. **2018-2028 217,000-312,000 sq. ft.**

In other words, the available spending potential of Clarence-Rockland is estimated to generate demand for 217,000 to 312,000 sq. ft. of additional retail and floor space by the year 2028.

The demand generated from the residents of UCPR is, of course, much larger. As in the past, many residents of UCPR outside the City of Clarence-Rockland are expected to do much of their shopping at businesses in Rockland. It is therefore necessary to address their spending, in addition to the spending of the Clarence-Rockland residents.

As demonstrated in Table 5.1, the overall average spending of each resident of UCPR is estimated to be $17,380 in 2018. At this rate, the total spending of UCPR is estimated at $1.59 **billion** in 2018, increasing by an average of $28.1 million annually, to a total of 1.817 **billion** in 2028 (Table 5.2).

In view of the relative abundance of retail and service businesses in Rockland, and also in the City of Ottawa, much of the total spending of UCPR residents happens in these two cities. Regardless of where their spending takes place, it is necessary to first determine how much floor space can their spending support. Table 6.1 provides this answer by individual retail and service groups. As demonstrated in Table 6.1, the total spending of residents of Clarence-Rockland is estimated to support a total of at least 967,000 sq. ft. or 36 sq. ft. per capita within and outside this city (the spending of UCPR residents of course supports much more than 967,000 sq. ft.).

Table 6.1
Estimates of Total Supportable Floor Space in Clarence-Rockland: Square Feet

Trade Group	2018	2020	2021	2023	2028	Average Annual Change: 18-28
A. Retail Product Stores						
Supermarkets						
• At $700/sq. ft.	91,700	95,900	97,700	102,200	112,100	2,140
• At $500/sq. ft.	128,400	134,200	136,800	142,800	157,000	2,860
Convenience Stores						
• At $300/sq. ft.	21,000	22,000	22,300	23,300	25,700	470
• At $250/sq. ft.	25,200	26,400	26,800	28,000	30,800	560
Specialty Food						
• At $450/sq. ft.	12,200	12,700	12,900	13,100	14,900	270
• At $350/sq. ft.	15,700	16,300	16,600	16,900	19,100	340
Beer, Wine & Liquor						
• At $700/sq. ft.	26,700	28,000	28,600	29,700	32,700	600
• At $500/sq. ft.	37,400	39,200	40,000	41,600	45,800	840
Drugs & Patent Medicine*						
• At $1,000/sq. ft.	31,000	32,400	33,100	34,500	38,000	700
• At $700/sq. ft.	44,300	46,300	47,300	49,300	54,300	1,000
Clothing						
• At $350/sq. ft.	65,000	68,600	70,000	73,100	80,300	1,530
• At $250/sq. ft.	92,000	96,000	98,000	102,400	112,400	2,040
Shoes, Jewellery & Accessories						
• At $400/sq. ft.	16,700	17,500	17,700	18,500	20,500	380
• At $300/sq. ft.	22,300	23,300	23,700	24,700	27,300	500

Table 6.1, continued Estimates of Total Supportable Floor Space In Clarence Rockland: Square Feet						
Trade Group	**2018**	**2020**	**2021**	**2023**	**2028**	**Average Annual Change: 18-28**
Home Furnishings						
• At $350/sq. ft.	10,000	10,300	10,600	11,100	12,000	200
• At $250/sq. ft.	14,000	14,400	14,800	15,600	16,800	280
Electronics & Appliances						
• At $700/sq. ft.	19,900	20,700	21,100	22,100	24,300	440
• At $500/sq. ft.	27,800	29,000	29,600	31,000	34,000	620
Furniture						
• At $300/sq. ft.	26,700	28,000	28,700	29,700	32,700	600
• At $250/sq. ft.	32,000	33,600	34,400	35,600	39,200	720
Building Materials, Hardware & Garden Supplies						
• At $250/sq. ft.	95,200	99,600	101,600	106,000	116,400	2,120
• At $175/sq. ft.	136,000	142,300	145,100	151,400	166,300	3,030
Sporting Goods, Hobbies, Music & Books						
• At $300/sq. ft.	28,000	29,300	30,000	31,300	34,300	630
• At $225/sq. ft.	37,300	39,100	40,000	41,800	45,800	850
Used, Recreation & Other Vehicles						
• At $1,000/sq. ft.	13,100	13,700	14,000	14,600	16,000	290
• At $700/sq. ft.	18,700	19,600	20,000	20,900	22,900	420
New Car Sales						
• At $2,000/sq. ft.	38,800	40,000	41,300	43,200	47,500	870
• At $1,400/sq. ft.	55,400	57,900	59,100	61,600	67,800	1,240

Table 6.1, continued Estimates of Total Supportable Floor Space In Clarence-Rockland: Square Feet						
Trade Group	**2018**	**2020**	**2021**	**2023**	**2028**	**Average Annual Change: 18-28**
Auto Parts & Accessories						
• At $1,500/sq. ft.	3,500	3,600	3,800	3,900	4,300	80
• At $1,000/sq. ft.	5,300	5,600	5,700	5,900	6,500	120
Gasoline & Service Stations						
• At $1,200/sq. ft.	31,200	32,600	33,300	34,700	38,200	700
• At $800/sq. ft.	46,700	48,900	50,000	52,000	57,200	1,050
General Merchandise						
• At $350/sq. ft.	74,900	78,300	79,700	83,100	91,700	1,680
• At $250/sq. ft.	104,800	109,600	111,600	116,400	128,000	2,320
Department Stores						
• At $250/sq. ft.	80,000	84,000	85,600	89,200	98,000	1,800
• At $200/sq. ft.	100,000	105,000	107,000	111,500	122,500	2,250
Other Retail Stores						
• At $300/sq. ft.	33,000	34,300	35,300	36,700	40,300	730
• At $250/sq. ft.	39,600	41,200	42,400	44,000	48,400	880
Subtotal: Retail Products	719,000	752,000	767,000	800,000	880,000	16,100
(rounded)	961,000	1,027,000	1,049,000	1,093,000	1,202,000	24,100

Table 6.1, continued
Estimates of Total Supportable Floor Space In Clarence-Rockland: Square Feet

Trade Group	2018	2020	2021	2023	2028	Average Annual Change: 18-28
B. Retail Service Businesses						
Restaurants, Bars & Other Eateries						
• At $600/sq. ft.	58,000	60,500	61,800	64,500	70,800	1,280
• At $450/sq. ft.	77,300	80,700	82,400	86,000	94,400	1,710
Personal Care Businesses						
• At $225/sq. ft.	26,700	28,000	28,400	29,800	32,900	620
• At $175/sq. ft.	34,300	36,000	36,600	38,300	42,300	800
Sports, Recreation & Entertainment[1]						
• At $250/sq. ft.	163,600	171,200	174,400	182,000	200,400	3,680
• At $200/sq. ft.	204,500	214,000	218,000	227,500	250,500	4,600
Subtotal: Retail Services	248,000	260,000	265,000	276,000	304,000	5,600
(rounded)	316,000	331,000	337,000	352,000	387,000	7,100
Grand Total:	967,000	1,012,000	1,032,000	1,076,000	1,184,000	21,700
All Stores & Businesses	1,277,000	1,358,000	1,386,000	1,445,000	1,589,000	31,200

[1] Includes cinemas, theatres, arenas and sports fields.

Source: Shore-Tanner & Associates.

Table 6.2
Estimated Demand For Additional Floor Space By the Spending of Clarence-Rockland Residents

Time Period	Floor Space (sq. ft.)
2018-2020	45,000-81,000
2020-2021	20,000-28,000
2021-2023	44,000-59,000
2023-2028	108,000-144,000
2018-2028	**217,000-312,000**

Source: Table 6.1.

VII. Summary of Existing Businesses

A. Scope of Research

Several days in May 2018 we carried out extensive field research in Rockland. Every retail and service business was visited, its name and type identified, and its size visually estimated.

The field research was started at the Smart Centre, then continued on Laurier Street in the eastern direction to Highway 17. From there, all businesses in the western direction to Laurier Street were visited. There are a few scattered businesses on the intersecting roadways which were also visited and their names, types, and estimated sizes recorded. The details of this research are presented in Appendix A.

B. Major Findings

As of May 2018, there was a total of 146 retail and service businesses in Rockland occupying an estimated 538,000 sq. ft. of floor space.

With the 2018 population of 26,746 in Clarence-Rockland, the overall average floor space per resident is 20.1 sq. ft. However, some of this space is supported by the spending of the other residents of the UCPR. Therefore, the effective floor space per resident is lower than 20.1 sq. ft. There are as well, a number of retail and service businesses in the Clarence part of the City of Clarence-Rockland and they may increase the per capita floor space to 21 or 22 sq. ft.

Based on the industry standard of 30 to 40 sq. ft. of floor space per capita, it is evident that the City of Clarence-Rockland is currently under-stored for retail and service businesses.

If the residents of Clarence-Rockland spend 100% of their shopping dollars at businesses within the City, at least 802,000 sq.ft. or 262,000 sq. ft. more floor space could be supported in 2018, and more in future years. Due to the proximity of Ottawa and its variety of businesses, there will always be some shopping there by the residents of Clarence-Rockland. However, as its population grows, more retail and service businesses can be supported and will be attracted to Clarence-Rockland (as it has been the case in the 10-15 years).

At present, a total of 14 stores with a combined floor space of 29,200 sq. ft. or 5.4% of the total space of 538,000 sq. ft., are vacant in Rockland (industry standard vacancy rate is within 4% and 8%). .

VIII. OFFICE MARKET AND DEMAND

A. Overview of Office Market

In Clarence-Rockland, as in similar cities in size close to a major urban area, there is little office space, and not much data available. The existing space is almost entirely for local needs such as medical, insurance, and financial. To better address the supportable office space on the Subject Site, we have first analyzed Ottawa's rich office market.

Due to the presence of the Federal Government, the City of Ottawa's office market is unique. The various Federal Departments, Crown Corporations, and other government agencies own and occupy approximately 30 million sq. ft. of office space.

The privately-owned office space in the City of Ottawa is approximately 40 million sq. ft., most of which is also rented to and occupied by different Federal Government organizations. There are, as well, some 300 associations, major legal, accounting, auditing and consulting firms, most of whose work is government related.

At a total population of almost one million, the City of Ottawa is the fourth largest in Canada, but its total office floor space of approximately 70 million sq. ft. is the third largest after Toronto and Montreal.

The Ottawa office market has historically been strong and stable. In the last five years, a number of new, large office towers have been developed, pushing its overall total vacancy rate close to 11%.

B. Types of Office Space

Generally speaking, office spaces fall into the following categories:

- Government/Public Sector
- Corporate
- Professional
- Business

There is some overlap in the bottom three types.

A **Corporate** office is usually large, high quality, located in a Class A building in a prime location, and occupied by banks, insurance companies, other major and often national and/or international corporations. Prestige, visibility, luxury, access, status, and image are important for corporate occupants of this type of office space.

A **Professional** office can be of various sizes and locations, and mostly in a Class B or C building. Legal, accounting, medical, high technology, artificial intelligence, associations, and consultancies are typical occupants of this type of space. In terms of prestige, status, visibility, and access, this type of office is often between the corporate and the business types.

A **Business** office is typically small, occupied by locally-oriented companies, located in affordable areas, including business parks, and in Class B, C or lower buildings. Engineering, architectural, accounting, development, construction, transportation, retail, and other such businesses, mostly with up to about 10 employees, are typical occupants of this type of office space.

C. Most Viable Office Space on the Subject Site

Government, and to some extent, Corporate offices, are not dependent on the economy or population of a city. Most professional and business office enterprises, however, serve the residents and local economy of a given area. **We believe that for the Subject Site, the most market viable types of office businesses would be those that serve the larger area residents.** While government, corporate, or any specialty type office developments are also possible, they cannot be counted on.[2]

[2] The need for them is not locally or even city-wide generated. However, elected officials, business leaders, and/or connections may be able to influence the locational decisions of government and corporate officials.

D. Demand Analysis

Of the approximately 40 million sq. ft. of privately-owned office space in the City of Ottawa, we estimate that up to 8 million sq. ft. or 20.0% are used by professional and business tenants who primarily serve the residents and the local economy.[3] These tenants, furthermore, are in Class B, C or lower buildings. The rest are occupied by various levels of governments, corporate, and prestigious professional/high technology tenants.

At 8 million sq. ft. of office space and a total City of Ottawa population of almost one million, the overall average office space associated per resident is about 8 sq. ft. Of course, parts of Ottawa have much higher, and others much lower averages.

In Clarence-Rockland, the total inventory of office space is now almost 0.3 million sq. ft., or approximately 12 sq. ft. per resident, based on a total population of over 26,000 (Table 3.1). Due to the mostly rural and agricultural characteristics of UCPR, its need for office space per capita is much less, and office businesses in Rockland tend to be used by its residents and employees. We have, therefore, used an estimate of 6 sq. ft. for UCPR. **The Trade Area is, therefore, concluded to generate average annual demand for total additional office space of 7,170 sq. ft. in Clarence-Rockland, and 9,700 sq. ft. in UCPR, including the 7,170 sq. ft. for Clarence-Rockland** (Table 7.1).

[3] In other words, the combination of population and economic factors generate demand for 8 million sq. ft. of locally-oriented office floor space.

Table 7.1
Estimates of Total Supportable Office Space

Year	Population		Office Space (sq. ft.)	
	Clarence-Rockland	UCPR	Clarence-Rockland (12 per resident)	UCPR (4 per resident)
2016	24,512	89,333	294,000	536,000
2018	26,746	91,500	321,000	549,000
2020	27,955	96,500	335,500	579,000
2021	28,524	99,000	342,300	594,000
2023	29,746	101,500	357,000	609,000
2028	32,723	107,700	392,700	646,200
Average Annual Increase: 2018-2028:				
Numeric	598	1,620	7,170	9,700
%	2.4	1.8	2.2	1.8

Note: UCPR's figures include the figures for Clarence-Rockland.

Source: Shore-Tanner & Associates

APPENDIX A

List of Retail and Service Businesses In Rockland		
Business Name	**Type**	**Approximate Size (sq. ft.)**
Smart Centre[1]		
Rona	Hardware	40,000
Walmart	Department Store	110,000
• Quizno Subs		
• Hair Salon		
• Pharmacy		
• Garden Supplies		
• Grocery		
• Fashion		
Source	Electronics	2,000
Bulk Barn	Specialty Food	3,000
Boston Pizza	Table Service Restaurant	4,000
Dollarama	General Merchandise	6,000
LBCO	Liquor Store	3,000
Laurier Street		
Ford Dealership	Automotive	6,000
Snap Fitness	Fitness	3,000
Tim Horton's	Coffee Shop	1,800
Royal Plaza (on Laurier St.)		
Vapeking	Smoke Shop	2,000
Aqua Life	Sporting Goods	2,000
Rosalynn's	Table Service Restaurant	2,000
New Wave (pool accessories)	Sporting Goods	2,500
RBC	Financial	3,000
Vacant (2)	Vacant	4,000

[1] Started from this shopping centre, walked and/or drove eastward on Laurier Street to Highway 17, then westward on Laurier Street

List of Retail and Service Businesses In Rockland, continued		
Business Name	**Type**	**Approximate Size (sq. ft.)**
Laurier Street, continued		
First Choice	Barber	1,000
Rockland Sports	Sporting Goods	3,000
M&M Foods Market	Specialty Foods	1,500
Shawarma Rockland	Table Service Restaurant	1,500
Youngster Salon	Beauty Salon	1,500
Hitices	Clothing	1,500
La Bella Salon	Beauty Salon	1,500
Accent	Furniture	8,000
Touch of Distinction	Flooring Supplies	2,000
Rising Sun	Martial Arts	2,000
Vitrerie Glass & Mirror	Furnishings	2,000
Derma Skin Care	Beauty Salon	1,500
Vacant	Vacant	1,500
Domino's Pizza	Pizza Shop	1,500
Mortgage Intelligence	Financial	1,500
Chiro Fashion	Specialty Retail	1,500
Rockland Pharmacy	Pharmacy	3,000
Pronature Sporting	Sporting Goods	2,000
Tiny Hopper	Daycare	2,500
Salon Tete O Pieds	Beauty Salon	1,500
Shoppers Drug Mart	Pharmacy	4,000
Ultramar	Gas Station & Car Wash	2,000
Your Independent Grocer	Supermarket	50,000
Spartas	Mediterranean Restaurant	1,500
Scotiabank	Financial	3,000
Beer Store	Beer Store	3,000
Napa Auto	Automotive	2,500
McDonald's	Fast Food	2,200
Sullyteck	Phone Repair	600
Bytown Lumber	Building Supplies	10,000
The Thimble	Tailor	800
Envy	Spa	2,000
Vacant	Vacant	3,000
Jumbo Pizza	Pizza Shop	2,000

List of Retail and Service Businesses In Rockland, continued		
Business Name	**Type**	**Approximate Size (sq. ft.)**
Laurier Street, continued		
Dunn's Deli	Table Service Restaurant	2,500
Rama	Martial Arts	1,200
Royal Photo	Photo Shop	1,500
Rockland Music	Specialty Retail	1,500
Anne Travel	Travel Agency	1,500
Martel Mortgage	Financial	1,000
Sublime Salon	Beauty Salon	1,000
Christine Raymond Salon	Beauty Salon	1,000
Auto Morin	Automotive	3,000
Sienna Faming	Specialty Retail	2,000
Sacred Art	Tattoo Shop	1,000
The Brunet Funeral	Funeral Services	3,000
L'Atelier Salon	Beauty Salon	2,000
Vacant (several stores)	Vacant	5,000
Rockland Pizza	Pizza Shop	1,200
H & R Block	Financial	1,200
Rockland Variety	Convenience Store	1,500
Vacant	Vacant	1,500
Jean Coutu	Pharmacy	4,500
Post Office	Specialty Retail	2,000
Vacant	Vacant	1,500
Rockland Marine	Boating Supplies	3,000
Giant Tiger	General Merchandise	11,000
Fashion Sports	Clothing	2,000
New Ruby	Chinese Restaurant	3,000
Second Hand Centre	Clothing	1,500
Modelo Salon	Beauty Salon	1,500
Dalrymple Salon	Beauty Salon	1,500
Subway	Fast Food	1,500
Marie-Jo	Table Service Restaurant	2,000
RDS Laundromat	Laundromat	1,200
Chamberland Garage	Automotive	5,000
Rockland Optometry	Specialty Retail	2,000

List of Retail and Service Businesses In Rockland, continued		
Business Name	**Type**	**Approximate Size (sq. ft.)**
Laurier Street, continued		
Rockland Barber	Beauty Salon	600
Bourbonnais Electric	Electronic Shop	1,500
Vacant	Vacant	1,200
Friendly Restaurant	Table Service Restaurant	2,000
Big Boss Burgers	Table Service Restaurant	1,600
Vacant	Vacant	1,500
Sonx Plus	Electronics	1,500
National Bank	Financial	3,000
QV Spa	Beauty Salon	1,500
DCV Heating/Cooling	Heating/Cooling Supplies	2,000
Lavolette	Flower Shop	1,500
Café Joyeux	Table Service Restaurant	1,500
Desjardins	Financial	4,000
Maison de Xin	Table Service Restaurant	4,000
Spa Mauve	Beauty Salon	1,500
Extravadance	Specialty Fashion	2,000
Chez L'Bonlanger	Bakery	2,000
Studio Aqua (bronzage)	Beauty Salon	1,500
Main Street Pizza	Pizza Shop	1,500
Vacant	Vacant	1,500
Le Mieux	Convenience Store	1,500
GAB Sports Bar	Table Service Restaurant	2,000
Beautiful Clinic	Beauty Salon	1,500
QV Spa, Nails	Beauty Salon	1,000
Café La Roche	Table Service Restaurant	2,000
Espada	Tattoo Shop	500
Ryan's Auto	Automotive	2,000
SS Chip Wagon	Eatery	200
Vacant	Vacant	2,000
Vacant	Vacant	2,000
Belanger Dodge Dealer	Automotive	2,000
Vacant	Vacant	3,000
Harmony Hyundai	Automotive	2,000
Mr. Gas	Gas Station	100
Tim Horton's	Coffee Shop	1,000
Canadian Tire Station	Gas Station	100
TD	Financial	2,000
Shell Station	Gas Station	100
Circle K	Convenience Store	2,000

List of Retail and Service Businesses In Rockland, continued		
Business Name	**Type**	**Approximate Size (sq. ft.)**
Plaza Rockland		
Top Mode Depot	Fashion	11,000
A & W	Fast Food	1,800
Pet Valu	Specialty Retail	2,500
Brown Cleaner	Dry Cleaning	1,200
Super Cut	Barber Shop	1,200
Pop Shoes	Shoe Store	2,500
Gabriel Pizza	Pizza Shop	1,200
Broadway Bar & Grill	Table Service Restaurant	2,500
Subway	Fast Food	1,500
Vacant	Vacant	1,500
Dollar Tree	General Merchandise	5,000
TSC	General Merchandise	25,000
Mark's	Clothing	10,000
St. Hubert	Table Service Restaurant	3,000
Oil Changer	Automotive	4,000
Speedy Glass	Automotive	4,000
Benson Auto Parts	Automotive	3,000
Grand Total	**146**	**538,000**

Source: Shore-Tanner & Associates based on field research and visual estimates in late May 2018.

expansion
lands SECONDARY PLAN

PLAN SECONDAIRE pour les
terrains qui ont
été ajouté à
l'aire urbaine

Clarence-Rockland

FOTENN Planning + Design

CIMA+

SHORE·TANNER & ASSOCIATES
REAL ESTATE APPRAISERS AND CONSULTANTS
148 COLONNADE ROAD SOUTH, SUITE 202, OTTAWA, ONTARIO K2E 7R4

CITY OF CLARENCE-ROCKLAND

EXPANSION LANDS SECONDARY PLAN – MASTER SERVICING STUDY

July 2019

CIMA+ File No. A000817

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1. Introduction

The City of Clarence-Rockland is part of the counties of Prescott and Russell. As part of the Official Plan of the United Counties of Prescott and Russell, the urban area of Clarence-Rockland was identified for expansion. This expanded urban area will accommodate new urban development to meet Clarence-Rockland's projected growth over the planning period to 2035. Fotenn, CIMA+ and Shore Tanner were retained by the City of Clarence-Rockland (City) to complete a Secondary Plan for the Expansion Lands. Once complete, this Secondary Plan will be appended to the Official Plan for the City's Urban Area as an amendment.

1.1 Study Area

The proposed growth area is located southeast of the existing urban area, immediately adjacent to Caron Street as illustrated in **Figure 1**. The area is comprised of approximately 137.23 hectares (ha) of land held under multiple ownerships in blocks of land that are currently undeveloped or in use for agricultural purposes.

Figure 1: Expansion Lands

As depicted in **Figure 1**, the study area (Expansion Lands) includes the area south of David Street and west of Clarence Creek. It is situated mostly to the east of Caron Street, except for an area of approximately 23 hectares on the west side of Caron Street in the southwest of the Expansion Lands. The Rockland Golf Club and the residential neighbourhood of Rockland East are located to the north of the Expansion Lands.

1.2 Background Documents

The following background drawings, studies and guidance documents were obtained as part of the Master Servicing Study:

- City of Clarence-Rockland Design Guidelines for Subdivisions and Site Plans, dated June 2018;
- City of Clarence-Rockland existing infrastructure model plan views in PDF form for the sanitary network, storm sewer network and water distribution network;
- City of Clarence Rockland existing infrastructure GIS files and LiDAR surface;
- City of Clarence-Rockland fire hydrant flow test data for Hydrant numbers: 351, 213, 212, 208 and 179;
- Sanitary Master Plan Update – Final Report by CH2M Hill, dated November 2009;
- Sanitary Sewer Calculation Sheet for Caron St. Reconstruction by WSP, dated April 29, 2013;
- Proposed Sanitary Servicing Areas sheet number SK1.23 by GENIVAR, Issued for ECA, dated January 23, 2013;
- Sewage Pumping Station Capacity and Condition Assessment and Sanitary Treatment Facility Capacity and Capital Investment Report by WSP, dated June 9, 2014;
- Clarence-Rockland Sewage Treatment Plant Upgrades – Equalization Tank Conceptual Design Report (FINAL) by RVA, dated May 29, 2017;
- OCWA Quarterly Operations Report Card for the City of Clarence-Rockland Water and Wastewater Facilities, 4th Quarter 2016;
- Plan and Profile of Caron Street As-Built Drawings by GENIVAR, dated November 25, 2015;
- Clarence-Rockland and Limoges Water Servicing Study by CH2MHill, dated April 24, 2018;
- Design Brief for Sewage Pumping Station No. 9, Revision 1 by Atrel Engineering Ltd., dated November 2018;

- Pumping Station No. 9 Issued for Approval Drawings by Atrel Engineering Ltd., dated November 16, 2018;
- Stormwater Management Pond Design Brief for Morris Village Subdivision by JFSA Water Resources and Environmental Consultants, dated May 2009 and updated October 2017;
- Topographical Survey for Lot 23 Concession 2 by Arpentages SCHULTZ BARRETTE Surveying, Ref. No. CON. 2(O.S.)-28;
- Final Preferred Concept Plan and Final Densities by Fotenn Planning and Design, dated March 4, 2019

1.3 Design Criteria

This section provides an overview of the design criteria for the Expansion Lands based on the City of Clarence Rockland, South Nation Conservation (SNC), and Ministry of the Environment, Conservation and Parks (MECP) guidelines.

1.3.1 City of Clarence-Rockland Design Guidelines

Generally, Part 4 – Design Requirements, of the City of Clarence-Rockland's Design Guidelines for Subdivisions and Site Plans was utilized for this study and should be followed in development of the proposed Expansion Lands. A brief summary of the key design criteria is provided below:

Watermains:

- Fire protection demand is to be per the requirements of the Fire Underwriters Survey;
- An average flow of 350 L/person/day and the per unit population provided in Table 4-12 of the design guidelines was used to develop flows for residential land use areas;
- An average flow of 28 m^3/ha per day was used to develop flows for commercial and community facility land use areas;
- Domestic peaking factors used for minimum hour, maximum day and peak hour were obtained from Table 4-14 of the design guidelines; and
- The watermain system must be designed to meet the pressure requirements outlined in Table 4-15 in the design guidelines.

Sanitary Sewers:

- An average flow of 350 L/person/day and the per unit population provided in Table 4-1 of the design guidelines was used to develop flows for the residential land use areas;
- An average flow of 28 m^3/ha per day was used to develop flows for commercial and community facility land use areas;
- Extraneous flows of 0.28 L/s/ha and 0.14 L/s/ha were used for residential and commercial areas, respectively;

- The peaking factor for residential areas was determined using the Harmon formula and a peaking factor of 1.5 was used for commercial areas;
- Full flow velocity in sanitary sewers is to be a minimum of 0.6 m/s and a maximum of 3.0 m/s; and
- Actual velocities have been considered to ensure self-cleansing velocities are achieved.

Storm Sewers and Stormwater Management:

- Storm sewers were designed to convey a 5-year return frequency storm and sized using the Rational Method;
- An inlet time of 15 minutes was utilized;
- Runoff coefficients used for sewer sizing were obtained from Table 4-5 of the design guidelines;
- IDF curves based on Ottawa rainfall intensities and the Ottawa Sewer Design Guidelines were used;
- Depth of rainfall data was obtained from MTO’s IDF Curve Lookup tool for the project site;
- The 100-year post-development peak flow shall not exceed the 100-year pre-development peak flow, and the 5-year post-development peak flow shall not exceed the 5-year pre-development peak flow;
- A minimum of 80% total suspended solids (TSS) removal is to be provided;
- The SCS Type II storm event distribution for both the 24-hour storm event duration was used to size the SWM ponds; and
- Full flow velocity is storm sewers is to be a minimum of 0.8 m/s and a maximum of 3.0 m/s.

1.3.2 Ministry of Environment, Conservation and Parks (MECP)

Additional stormwater runoff from new pavement can impact receiving watercourse and flood conditions. Quality and quantity control measures to treat stormwater runoff should be considered for all new impervious areas and, where possible, existing surfaces. A Stormwater Management Plan should be prepared in accordance with the MOECC “Stormwater Management Planning and Design Manual” dated May 2003.

The MOECC Design Guidelines for Sewage Works and Design Guidelines for Drinking Water Systems should be referenced where applicable.

1.3.3 South Nation Conservation Authority (SNCA)

No specific design criteria were identified by SNCA at the time of this study. However, the following two documents should be considered at the detailed design stage:

- Clarence Creek Floodplain Mapping Report DRAFT prepared by SNCA, dated April 2019; and
- UCPR Stormwater Facilities Planning and Maintenance Guide DRAFT 2 prepared by SNCA, dated May 27, 2019.

2. Existing Conditions

This section is provided to summarize key components of the City's existing infrastructure which will be utilized to support the Expansion Lands. The following observations are based on a review of as-built drawings as well as background reports and documents supplied by the City.

This is a preliminary review of existing water, sanitary and stormwater servicing. Prior to development, the exact location and capacity of relevant services should be determined.

2.1 Water Distribution System

The City's water distribution system consists of a water treatment plant, transmission mains, distribution mains, reservoirs and pump stations. The sections below provide further details regarding existing capacities and any significant constraints.

2.1.1 Water Treatment Plant Capacity and Demand

Based on the information presented in the Final Report for the Clarence-Rockland and Limoges Water Servicing Study by CH2MHILL, provided by the City to CIMA+, the following existing capacities have been identified for the Clarence-Rockland Water Treatment Plant (WTP):

- Existing WTP capacity is 13,500 m^3/day; and the
- Existing WTP high lift pumping capacity is 13,500 m^3/day.

These values represent the maximum amount of treated water that the WTP can produce using existing equipment and processes. An excerpt from the report is provided in **Appendix C1**.

Consumption rates are compiled into an annual Summary Report by Ontario Clean Water Agency (OCWA). OCWA is a quasi-private sector corporation that operates the urban water system under contract with the City. The 2016 Summary Report of water consumption is provided in **Appendix C2**. Key items drawn from this report include:

- The highest value of the Daily Flow Maximums for 2016 was 8,823.4 m^3/day. This represents the highest water demand day during the year;
- The average of the Daily Flow Averages for 2016 was 6,170.51 m^3/day. This represents an average day of water consumption over the year.

Based on this information, it is evident that water treatment plant capacity (13,500 m^3/day) exceeds 2016 average day usage (6,170 m^3/day). It also exceeds peak water consumption as recorded in 2016 (8,823 m^3/day). Not considering any on-going or other future development within the City, the available information suggests that an additional 4,677 m^3/day of treated water can be produced by the WTP in support of Expansion Lands development.

Although the WTP appears to have capacity, the Final Report for the Clarence-Rockland and Limoges Water Servicing Study recommended that around the year 2027, to be able to meet future water demand based on growth estimated in the report, the existing WTP will have to undertake capacity upgrades. The capacity upgrades identified in the report are listed below:

- Acquire land adjacent to the existing WTP to expand the WTP;
- Increase the WTP treatment capacity;
- Increase the WTP high lift pumping capacity;
- Increase the clear well storage volume at the WTP;
- Replace existing 300 mm diameter Edwards St. watermain with a new 500 mm diameter watermain; and
- Increase Caron Booster Station capacity.

2.1.2 Water Distribution Mains and Transmission Mains

Based on water distribution system model information provided by the City, the proposed Expansion Lands area is currently not serviced by the City's water distribution system. Figure 4-1 from the CH2MHILL report found in **Appendix C1,** shows existing pressure zones for the City. Based on this information, the proposed Expansion Lands will be located within existing Pressure Zone 2 (green highlighted area) and have the following water infrastructure nearby which are expected to be instrumental in servicing the Expansion Lands area:

- Existing 200 mm diameter watermain on David Street;
- Existing high pressure 300 mm diameter transmission main on Caron Street; and the
- Caron Street Booster Station.

It is expected that the Expansion Lands can be serviced by the Caron Street Booster Station. Based on the CH2MHILL report in **Appendix C1**, the existing capacity of the Caron Street Booster Station is 3,975 m^3/day. Currently, the existing capacity exceeds the monthly maximum usage which was measured at 2,563 m^3/day in 2016. Based on this information, it is estimated that the available capacity in the Caron Street Booster Station is 1,412 m^3/day. See the Quarterly Operations Report Card by the OCWA in **Appendix C3**.

Although the Caron Street Booster Station appears to have capacity, the Final Report for the Clarence-Rockland and Limoges Water Servicing Study recommended that around the year 2027, to be able to meet future water demand based on growth estimated in the report, the existing Caron Street Booster Station will have to undertake capacity upgrades.

2.2 Sanitary Sewer System

The City's sanitary sewer system consists of sewers, numerous pumping stations and a wastewater treatment plant (WWTP). The sections below provide further details regarding existing capacities and any significant constraints.

2.2.1 Sanitary Sewers

Based on City provided as-built drawings from the Caron Street Reconstruction project dated November 25, 2015 (**Appendix C4**), existing sanitary sewers adjacent to the proposed Expansion Lands development consist of the following:

- A 300 mm diameter sanitary sewer on Caron Street flowing to the south, which starts as a 200 mm diameter sewer north of Fairway Drive. This sewer terminates in a manhole approximately 35 m south of David Street;
- A 450 mm diameter forcemain on Caron Street, capped south of David Street and connected to the deep sanitary sewer near the intersection of Caron Street and Docteur Corbeil Boulevard; and
- A 250 mm diameter sanitary sewer on David Street, from Caron Street to the capped location approximately 20 m east of the sanitary sewer in Caron Street.

It should be noted that the above identified sewers and forcemain are currently not in service.

As part of the Caron Street Reconstruction project, the deep sanitary trunk sewer near the intersection of Caron Street and Docteur Corbeil Boulevard was upgraded to accommodate future flows from on-going and identified development areas. The sanitary sewer calculation sheet for the deep sanitary trunk sewer along with a sketch showing the sanitary servicing areas can be found in **Appendix C4**. The Expansion Lands are identified as Area 33 and Area 34 in the Sanitary Servicing Areas sketch, SK1.23. Based on this information, the deep sanitary trunk sewer along Caron Street considers future development in the proposed Expansion Lands area as well as other development areas. In ultimate build out conditions the deep sanitary trunk sewer along Caron Street will be operating with a theoretical 13% reserve capacity. Further investigation should be conducted to measure the actual sanitary flow to determine actual sanitary sewer capacity.

2.2.2 Sanitary Pumping Stations

The City has constructed several sewage pumping stations in the existing urban area to pump sewage flows towards the WWTP. Currently, a total of eight existing sanitary pumping stations are in operation and one is being designed.

Pumping Station No. 1 is the City's largest pumping station, as it transfers collected sewage from the full urban service area to the Clarence-Rockland WWTP. It is located south of Highway 17, next to Caron Street, and would collect flow from the proposed Expansion Lands. A review of the

Sewage Pumping Station Capacity and Condition Assessment and Sanitary Treatment Facility Capacity and Capital Investment Report by WSP, dated June 9, 2014, found in **Appendix C5**, was conducted and the following list of information for Pumping Station No. 1 was identified:

- Existing average daily flow is 44.14 L/s (estimated 2013 flows from 2005 data);
- Existing maximum daily flow is 82.19 L/s (estimated 2013 flows from 2005 data);
- Existing peak instantaneous sewage flow is 203.91 L/s (estimated 2013 flows from 2005 data);
- Existing firm rated capacity is 200 L/s; and
- Flows more than 200L/s from Pumping Station No. 1 have been reported by O.W.C.A. in the past 5 years.

Based on this information, it appears that Pumping Station No. 1 is currently operating at or even beyond its firm capacity and requires upgrades to accommodate any additional flows from future developments. The WSP report went further into options for increasing the capacity of Pumping Station No. 1 and associated cost estimates. An excerpt from the WSP report has been provided in **Appendix C5**. Further investigation into the capacity of Pumping Station No. 1 is required before development of the Expansion Lands.

Pumping Station No. 9 will be located within the Morris Village development and is currently under review by the City. When constructed, Pumping Station No. 9 will have a capacity to accommodate the flows for a proposed development of 260 L/s. The flows from Pumping Station No. 9 will be discharged to the deep sanitary trunk sewer near the intersection of Docteur Corbeil Boulevard and Caron Street.

The sanitary drainage area for Pumping Station No. 9 accounts for a portion of the proposed Expansion Lands development, located on the west side of Caron Street. This portion of the proposed Expansion Lands development falls within area External 3 as shown on the Issued for Approval drawings. An excerpt from the Design Brief dated November 2018 as well as the Issued for Approval Sanitary Drainage Area Master Plan (Drawing No. 110704-PSSANMI) dated November 16, 2018, have been provided in **Appendix C6**.

Although the portion of the Expansion Lands on the west side of Caron Street was accounted for in the design of Pumping Station No. 9, it is assumed all areas within the Expansion Lands will be serviced by a pumping station located within the Expansion Lands.

2.2.3 Wastewater Treatment Plant

The system of sanitary sewers and pumping stations collectively direct sanitary flows to a single WWTP that supports the Clarence-Rockland serviced area. The City's WWTP is a secondary treatment facility based on sequencing batch reactor technology. Disinfection is provided by chlorination prior to discharge to the Ottawa River. Sludge is stabilized through an aerobic digestion process prior to storage on site and land application.

According to the Amended Certificate of Approval Number 3-0466-93-967, dated February 14, 1996, found in **Appendix C5,** the current rated capacity of the WWTP is as follows:

- Rated Average Daily Flow Capacity of 6,800 m^3/day;
- Rated Maximum Daily Flow Capacity of 17,340 m^3/day; and a
- Rated Peak Flow Capacity of 20,400 m^3/day.

Under existing peak flow conditions, the WWTP does not provide enough retention time for chlorination prior to discharging to the Ottawa River.

Based on the Equalization Tank Conceptual Design Report by RVA, the City is undertaking the following upgrades to the WWTP to address capacity issues and provide for future growth:

- Increase the pumping capacity and conveyance capacity of Pumping Station No. 1 to 400 L/s; and
- Twinning the forcemain to convey an ultimate peak flow capacity of 850 L/s and for operation redundancy.
- Construction of a new headworks facility, complete with fine screening and grit removal system to improve both pre-treatment and secondary treatment effectiveness; and,
- Design and construction of an equalization tank, as previously identified within the long-term plan for the WWTP, to normalize peak flows from inflow and infiltration.

It is anticipated that these modifications will improve the WWTP's ability to accommodate future growth within the City. An excerpt of the RVA report has been provided in **Appendix C7**. Further investigation into the capacity of the WWTP is required before development of the Expansion Lands.

2.3 Drainage and Storm Sewer System

The pre-development condition of the proposed Expansion Lands is rolling cultivated fields which drain to low areas and eventually to adjacent ditches and creeks. The major creeks adjacent to the Expansion Lands are Clarence Creek and Lafontaine Creek, both creeks are tributaries to the Ottawa River. The proposed Expansion Lands are approximately 3 to 3.5 km upstream from the confluence of the creeks with the Ottawa River.

Caron Street (north of David Street) has an urban cross section and handles runoff from the roadway by catch basins and storm sewers. **Appendix C8** shows the catchment areas for the storm sewers, along with the associated storm sewer calculation sheet for sizing the piping network. The portion of Area M on David Street and south of David Street identified in

Appendix C8 fall within the proposed Expansion Lands. It has been assumed for this study, that drainage within this catchment will be serviced by the Expansion Lands.

Currently Caron Street (south of David Street) and David Street have a rural cross section and handle runoff from the roadway by roadside ditches and culverts until a stormwater outfall is reached. Runoff from the cultivated lands follows the path of least resistance until Clarence Creek or Lafontaine Creek is reached. No existing stormwater management (SWM) facilities were identified in the review of infrastructure servicing the Expansion Lands.

Two sources of topographical were reviewed as part of this study. One source was a topographical survey for Lot 23 Concession 2 by Arpentages SCHULTZ BARRETTE Surveying and the other source was LiDAR data provided by the City. A copy of both sources of topographical information have been attached in **Appendix C10.**

A pre-development catchment analysis was performed on LiDAR data, provided by the City, for the proposed Expansion Lands. It is estimated the study area consists of four subcatchments. Three of the subcatchments discharge to Clarence Creek in the East and one subcatchment discharges to Lafontaine Creek in the West. See **Figure 2** below and the Conceptual SWM Facility Locations Sketch **in Appendix C13**.

Preliminary stormwater runoff calculations were completed for the Expansion Lands under pre-development conditions using parameters listed in **Section 1.3.1** and taken from the City of Ottawa Sewer Design Guidelines. It was estimated that pre-development lands ranged from approximately 0.36% to 3.5% impervious surfaces. Percent impervious parameters were estimated by measuring impervious areas (i.e. roofs, driveways and roadways) and comparing them to the total subcatchment area. **Figure 2** below is a screenshot from the PCSWMM model used to estimate peak runoff. The figure is not to scale and the subcatchments as well as the outlets are shown schematically. The subcatchments are labeled as S1 through S4. Each subcatchment drains to an outlet which is identified by a red triangle. The number below the subcatchment ID is the estimated area in hectares.

Figure 2: Screenshot of Pre-Development Model Sub-Catchments

Information from **Figure 2** above is presented in **Table 1** below. The peak runoff shown in **Figure 2** and **Table 1** was estimated using the 24 hour 100-year SCS Type II design storm.

Table 1: Pre-Development Model - 24hr 100yr Design Storm

Sub-Catchment	Area (ha)	Peak Runoff (m^3/s)
S1	25	1.62
S2	26.4	3.05
S3	54.7	**4.13**
S4	45.5	**3.83**

The numbers in bold in **Table 1** above indicate the release rate used to control post-development flows to pre-development flows.

3. Proposed Conditions

From a servicing perspective, the Study will address how the Expansion Lands will increase water and wastewater demands, and how these demands will be accommodated by the municipal system. From a stormwater management perspective, the Study will address how increased impervious surfaces and runoff will be conveyed and controlled in order to meet quantity, quality and erosion control criteria for the City.

This section is provided to identify critical infrastructure required to service the study area as it relates to the Preferred Concept Plan as shown in **Appendix B**. The following estimates are based on a high-level analysis of projected land use areas and densities as well as background reports and documents supplied by the City.

At this time, the future population and demands for the proposed Expansion Lands are not certain, but they have been estimated for the purposes of this Study. Further analysis will be required during the design development and approvals stage that will quantify water, sanitary and stormwater demands based on proposed phasing. These demands will be used to determine how new developments can be serviced through the existing infrastructure.

3.1 Population Estimate

Table 2 below shows the estimated population for the Expansion Lands which were used to develop water demands and sanitary flows.

Table 2: Population Density Estimate

Land Use Designation	Gross Area (ha)	Medium Scenario		Employment	
		Projected Units	Projected Population	Projected Floor Area (m^2)	Projected Employment
Low Density Residential	76.46	688	2,339	N/A	N/A
Medium Density Residential	22.55	203	548	N/A	N/A
High Density Residential	11.14	100	180	N/A	N/A
Commercial	2.91	N/A	N/A	7,283	182
Other (parks, etc.)	24.17	N/A	N/A	N/A	N/A
Total	**137.23**	**991**	**3,067**	**7,283**	**182**

The population project above is based on projected units for specific land use areas provided by Fotenn and person per unit ratios as identified in the City's design guidelines.

3.2 Water Servicing

Future water demands for the ultimate build out of the Expansion Lands were estimated using the design criteria for watermains listed in **Section 1.3.1**, the Preferred Concept Layout and the population density estimate. **Table 3** below shows the person per unit type that was used for each land use type.

Table 3: City of Clarence-Rockland Design Guidelines Table 4-12 Average Persons per Unit (Residential Uses)

Land Use Type	Unit Type	Persons Per Unit
Low Density	Residential, single family	3.4
Medium Density	Residential, townhouse (row)	2.7
High Density	Apartment, average	1.8

Based on the population density estimate in **Section 3.1**, the ultimate build out population of the proposed Expansion Lands is approximately 3,067 people. Using this estimated population along with Table 4-14 from the City design guidelines, the following peaking factors were used to estimate water demand for residential land use areas:

- Minimum Hour Factor of 0.50;
- Maximum Day Factor of 2.00; and
- Peak Hour Factor of 3.00.

Peaking Factors for Commercial/Community Center land use areas were obtained from City of Ottawa Water Design Guidelines and are 1.5 for Maximum Day and 1.8 for Maximum Hour. The estimated water demand for the ultimate build out of the Expansion Lands are shown in **Table 4** below and supporting calculations can be found in **Appendix C11**.

Table 4: Water demand for the ultimate build out

Land Use Type	Average Daily Consumption (L/s)	Daily Peak Flow (L/s)	Hourly Peak Flow (L/s)
Low Density	9.48	18.95	28.43
Medium Density	2.22	4.44	6.66
High Density	0.73	1.46	2.19
Commercial/Community Center	16.60	24.90	29.88
Total	29.03	49.75	67.16

As indicated in **Section 2.1.2** above, it is estimated that the available capacity of the Caron Street Booster Station is 1,412 m^3/day. When comparing the estimated Average Daily Consumption of the proposed Expansion Lands, 29.03 L/s (2,508.19 m^3/day), to the available capacity of the Caron Street Booster Station, 1,412 m^3/day, it appears there is insufficient capacity of the Caron Street Booster Station to meet the estimated water demand of the ultimate build out. Further investigation and analysis prior to development of the Expansion Lands is recommended to determine the appropriate capacity improvements and timing of the capacity improvements to support the proposed Expansion Lands.

At the time of detailed design, the water system should be looped through the Expansion Lands. The specific connections and extensions of the water infrastructure to create a looped system are to be determined at the detailed design stage. Furthermore, this development will be serviced by a high pressure watermain. Individual services to each unit will likely require pressure reducing valves (PRVs) or PRVs will likely be required on the watermain within the right-of-way. A detailed watermain analysis will assist in determining requirements and appropriate locations of the PRVs. See the Proposed Water Servicing Sketch in **Appendix A** for a conceptual layout.

Fire flow requirements were not evaluated as a result of specific development information not being known at the time of this study (i.e. building size, location, use, setbacks, etc.). A fire flow analysis will need to be conducted at the time of detailed design.

Further analysis and hydrant flow tests will be required to determine capacities and servicing opportunities for individual developments and the reserve pressure within the municipal system. These calculations are dependent on individual site plans and the results of surrounding hydrant flow tests and cannot be accurately estimated at this stage.

3.3 Sanitary Servicing

Preliminary sanitary demand calculations were completed for the Expansion Lands assuming ultimate build out. A demand was calculated by using the design criteria for sanitary sewers listed in **Section 1.3.1**, **Table 5** below, the Preferred Concept Layout and the estimated population density. Assuming a standard infiltration rate of 0.28 L/ha/s for residential land use areas, 0.14 L/s/ha for commercial/community center land use areas and using the Harmon Peaking Factor Formula for residential land use areas only, the estimated peak sanitary flows for the proposed Expansion Lands were calculated as **77.45 L/s**. An infiltration rate of 0.14 L/s/ha for commercial/community center land use areas was used to fall in line with the sanitary model used in the Sanitary Master Plan Update. An excerpt of the Sanitary Master Plan Update has been provided in **Appendix C9.**

Table 5: City of Clarence-Rockland Design Guidelines Table 4-1 Average Persons per Unit (Residential Uses)

Land Use Type	Unity Type	Person Per Unit
Low Density	Residential, single family	3.4
Medium Density	Residential, townhouse (row)	2.7
High Density	Apartment, average	1.8

Sanitary design calculations can be found in **Appendix C12**. During the preliminary sanitary sewer design, catchment areas 34_5 and 34_4 were only able to meet the cleansing velocity requirement with relatively steep slopes when compared to the rest of the system. If the steep slopes were implemented, it would cause the need for deep trunk sewers downstream. Therefore, to reduce the risk of these complications, we recommend maintaining minimum slopes in the upstream sewer network and to implement a flushing program. Further analysis will be required at the detailed design stage to assess the capacity of individual sewer connections as well as the requirement of flushing programs.

Due to the topography of the proposed Expansion Lands, a sanitary pumping station will be required for servicing. As part of the Caron Street Reconstruction project, a 450 mm diameter forcemain was installed in Caron Street. The existing forcemain is capped south of David Street and connected to the deep sanitary sewer near the intersection of Caron Street and Docteur Corbeil Boulevard. Currently, the forcemain is not in use and studies supporting its size have not been provided. Further analysis will be required at the detailed design stage to assess the capacity of the forcemain.

The pumping station location is recommended to be placed in the northeast corner of the proposed Expansion Lands, south of David Street and west of Clarence Creek. This location is the lowest point within the proposed Expansion Lands which is closest to an existing City road. Having the pumping station located near the low spot on site reduces the risk of having long deep sanitary sewers and a deep sanitary pumping station. CIMA+ recommends the location of the sanitary pumping station be revisited at the time of development when more accurate information is available on the phasing of development. Depending on the desired phasing of the Expansion Lands, a second sanitary pumping station or a temporary sanitary pumping station may be required. See the Proposed Sanitary Servicing Sketch in **Appendix A** for a conceptual layout of the sanitary network.

As indicated in **Section 2.2** above, it is estimated that both the WWTP and Pumping Station No. 1 will require capacity improvements to support the proposed Expansion Lands. Further investigation into the capacity of the WWTP and Pumping Station No. 1 is required before development of the Expansion Lands.

3.4 Storm Servicing and Stormwater Management

To direct drainage from future developed lots and roadways, a storm sewer system will need to be designed and constructed. The Rational Method was used to conduct a preliminary analysis for storm sewer sizing of the trunk sewers. Future runoff for the ultimate build out of the Expansion Lands was estimated using the design criteria for storm sewers and stormwater management listed in **Section 1.3.1** and the Preferred Concept Layout. Runoff coefficients used in this analysis are shown below in **Table 6** below:

Table 6: Runoff Coefficients Used in Storm Sewer Sizing Calculations

Land Use Type	Source	Runoff Coefficient (C)
Low Density	Single Family (urban)	0.40
Medium Density	Row housing, townhouses	0.60
High Density	Apartments	0.70
Commercial/Community Center	Commercial	0.80

The results of the preliminary analysis can be found in **Appendix C13** and are shown on the Proposed Storm Servicing Sketches (SK-01 and SK-02) in **Appendix A**. Although the storm sewers were designed to convey a 5-year return frequency storm, it should be noted that the high density and commercial/community center land use areas are restricted to releasing the quality event volume as defined in Table 3.2 from the Stormwater Management Planning and Design Manual from the MOECC (currently MECP). Further discussion of the SWM facilities is provided below.

SWM facilities will be required within the Expansion Lands in order to meet quantity, quality, and erosion control criteria defined in the City's design guidelines. Such end of pipe facilities as wetlands, wet ponds and dry ponds need to be correctly implemented to meet stormwater objectives. As identified in **Section 2.3**, four possible outlets were identified from existing topographical information during a pre-development catchment analysis. Generally, the four outlets are located near the low spots within the proposed Expansion Lands and were considered as potential locations for future SWM facilities.

Through consultation with the City, it was decided to limit the number of stormwater management facilities servicing the proposed Expansion Lands to two facilities in order to reduce the future operation and maintenance costs. Furthermore, each pond will provide quality control for the entire catchment area serviced by it, but only quantity control for the low and medium density land use areas serviced by it. Therefore, on-site quantity controls for the high density and commercial/community land use areas will be required at detailed design. As a result of reducing the potential number of SWM facilities from four to two, there is an increased risk of significant grading requirements to ensure positive drainage to the SWM facilities.

Preliminary stormwater runoff calculations were completed for the Expansion Lands under pre and post-development conditions. It was assumed that post-development lands will increase to approximately 55% impervious surfaces. A post-development approximation of 55% was assumed as this would generally represent a low to medium density development. A post-development approximation of 90% was assumed for high density and commercial development. There are opportunities to reduce the impervious area, but this value provides a fair and conservative estimate for the purpose of this study. CIMA+ recommends that this value be revisited at the time of development when more accurate information is available on the form of development.

The computer software PCSWMM was used to estimate runoff and approximate storage volumes, using the parameters listed in **Section 1.3.1** and taken from the City of Ottawa Sewer Design Guidelines. **Figure 3** below is a screenshot from the PCSWMM model used to estimate peak runoff for the post-development scenario. The figure is not to scale and the subcatchments as well as the outlets are shown schematically. The subcatchments are labeled as S3 and S4 as well as H1 through H3. Each subcatchment drains to an outlet which is identified by a red triangle. The number below the subcatchment ID is the estimated area in hectares.

Figure 3: Screenshot of Post-Development Model Sub-Catchments

When comparing the pre-development subcatchments shown in **Figure 2** to the post-development subcatchments shown in **Figure 3**, it should be noted that the post-development subcatchment S3 incorporates the pre-development subcatchment areas S1 and S2. Furthermore, high density land use areas as well as commercial/community centers, identified as H1 and H2, have been subtracted from the overall subcatchment area for S3 due to these areas proposed requirements for on-site quantity control. The same approach was used for the post-development subcatchment area S4. As a rough estimate, **Table 7 and 8** below provide a quick summary of estimated pre-development peak runoff (allowable release rate), post-development peak runoff and associated storage volumes for the 24 hour 100-year SCS Type II design storm.

Table 7: Post-Development Model - 24hr 100yr Design Storm, Catchment S3

Sub-Catchment	Area (ha)	Pre-Development Peak Runoff (m^3/s)	Post-Development Peak Runoff (m^3/s)	Quantity Storage (m^3)	Quality Plus Permanent Storage (m^3)
S3	93.6	4.13	33.17	37,000	17,784
H1	11.4	N/A	N/A	N/A	2,850
H2	1.1	N/A	N/A	N/A	275

The total estimated storage requirement for Subcatchment S3, which would service the west side of the site, is approximately 58,000 m^3. This reflects the sum of the quantity storage and quality plus permanent storage volumes identified in **Table 7** above rounded up to the nearest thousand.

Table 8: Post-Development Model - 24hr 100yr Design Storm, Catchment S4

Sub-Catchment	Area (ha)	Pre-Development Peak Runoff (m^3/s)	Post-Development Peak Runoff (m^3/s)	Quantity Storage (m^3)	Quality Plus Permanent Storage (m^3)
S4	41.5	3.83	15.04	13000	7885
H3	4	N/A	N/A	N/A	1000

The total estimated storage requirement for Subcatchment S4, which would service the east side of the site, is approximately 22,000 m^3. This reflects the sum of the quantity storage and quality plus permanent storage volumes identified in **Table 8** above rounded up to the nearest thousand.

It should be noted that the total catchment area is larger than the proposed Expansion Lands area due to adjacent lands and roadways that are anticipated to contribute runoff to the proposed Expansion Lands.

The Quantity Storage column reflects the quantity storage required to control the post-development peak runoff rate to the pre-development peak runoff rate. The Quality Plus Permanent Storage column reflects the quality storage required per Table 3.2 from the Stormwater Management Planning and Design Manual from the MOECC (currently MECP). The criteria used for Table 3.2 from the Stormwater Management Planning and Design Manual is as follows:

- 80% long term S.S. removal level;
- SWMP Type is a Wet Pond;
- 55% impervious level for low and medium density residential areas; and
- 85% impervious level for high density and commercial/community center areas.

The total storage requirements are rough estimates and they should be confirmed/further optimized during the detailed design stage. Hydrographs produced by the PCSWMM model which show the estimated storage volumes and respective release rates can be found in **Appendix C13.**

The proposed locations of the SWM facilities, as shown in **Appendix A**, are based on LiDAR information and discussions with the City. A preliminary analysis was conducted to verify cover requirements are met and the SWM facility can have a gravity outlet to adjacent watercourses. This preliminary analysis identified that fill will likely be required around the upstream storm sewer located on Street C. The storm sewer in the southern end of Street B has roughly 1 meter of cover when taking into consideration the existing ground elevation. During detailed design when more accurate information becomes available, the exact location of the SWM facilities should be reviewed to ensure gravity discharge to their identified outlets.

4. Dry Utilities

The term dry utilities commonly refer to hydro, gas and communication infrastructure. Currently, there has been no correspondence with Owners of dry utility infrastructure that service the City. A draft of this report should be circulated to known utility companies in the area prior to any development of the Expansion Lands to identify constraints or specific requirements associated with the development.

5. Implementation, Phasing and Costing

Based on the previously mentioned engineering studies and estimated demands for water and sanitary services, the ultimate build out scenario for proposed Expansion Lands requires the City to implement capacity upgrades to the following critical City infrastructure:

- Water Treatment Plant;
- Caron Street Booster Station;
- Wastewater Treatment Plant; and
- Pumping Station No. 1.

The phasing of the proposed Expansion Lands poses implications on the cost of developing the lands. Development considerations such as stormwater management facility locations, significant grading (cut and/or fill), the sanitary pumping station and deep trunk sewers have been identified for planning purposes on the Civil Infrastructure Figures in **Appendix A** and should be optimized during detailed design.

Depending on the desired phasing of the Expansion Lands, a second sanitary pumping station or a temporary sanitary pumping station may be required. The location of any sanitary pumping station should be reviewed when further information is known about the phasing of the development.

Currently, phasing for the proposed Expansion Lands is unknown. It is recommended that the City conduct a Master Phasing Study to assess which area of the proposed Expansion Lands should be developed first and the timing of capacity upgrades to critical City infrastructure.

6. Conclusions and Recommendations

The report has described the existing conditions with respect to municipal infrastructure and the proposed municipal infrastructure for implementation of the expansion lands. The findings of this study are summarized as follows:

1. The Expansion Lands projected population used to estimate water and sanitary demand was estimated at 3,067 people.
2. Based on the Final CH2MHILL report for the servicing Clarence-Rockland and Limoges, around the year 2027 the City's WTP will be required to undertake capacity upgrades to meet further demand. This is for the scenario in the report which discusses only servicing the City.
3. It appears there is insufficient capacity of the Caron Street Booster Station to meet the estimated water demand of the ultimate build out. Further investigation and analysis prior to development of the Expansion Lands is recommended to determine the appropriate capacity improvements and timing of the capacity improvements to support the proposed Expansion Lands.
4. At the time of detailed design, the water system should be looped through the Expansion Lands. The specific connections and extensions of the water infrastructure to create a looped system are to be determined at the detailed design stage. Further analysis will be required to calculate individual fire flow rates and confirm that minimum and maximum pressure requirements are maintained under the various demand scenarios (i.e. maximum day + fire flow).
5. In ultimate build out conditions the deep sanitary trunk sewer along Caron Street will be operating with a theoretical reserve capacity of 13%. Further investigation should be conducted to measure the actual sanitary flow to determine actual sanitary sewer capacity.
6. Further investigation into the capacity of Pumping Station No. 1 is required before development of the Expansion Lands.
7. A new sanitary pumping station will be required to provide sanitary servicing for the proposed Expansion Lands. This pumping station will connect to an existing 450 mm diameter forcemain in Caron Street. The pumping station is recommended to be in the northeast corner of the development. CIMA+ recommends that the number of sanitary pumping stations and their location be revisited at the time of development when more accurate information is available on the phasing of development. Further analysis will be required at the detailed design stage to assess the capacity of the forcemain.

8. A flushing program for the proposed upstream sewers in the sanitary network may be required as a result of the sewers not achieving self cleansing velocity.
9. The City is undertaking upgrades to the WWTP. It is anticipated that these modifications will improve the WWTP's ability to accommodate future growth within the City. Further investigation into the capacity of the WWTP is required before development of the Expansion Lands.
10. At a minimum, two SWM facilities will be required to meet quality, quantity and erosion control criteria to comply with the City's design guidelines. Significant grading (cut and fill) will be required to have the proposed Expansion Lands drain to two SWM facilities.
11. From a preliminary cover analysis for the proposed storm sewers, it was identified that fill will likely be required for the upstream sewers on Street C and the southern sewer on Street B to met minimum fill requirements.

Prepared by:

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July 2, 2019
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Brian O'Dell, P.Eng.
Engineer, Infrastructure

Verified by:

LICENSED PROFESSIONAL ENGINEER
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July 2, 2019
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Tim Kennedy, P.Eng.
Project Engineer, Infrastructure

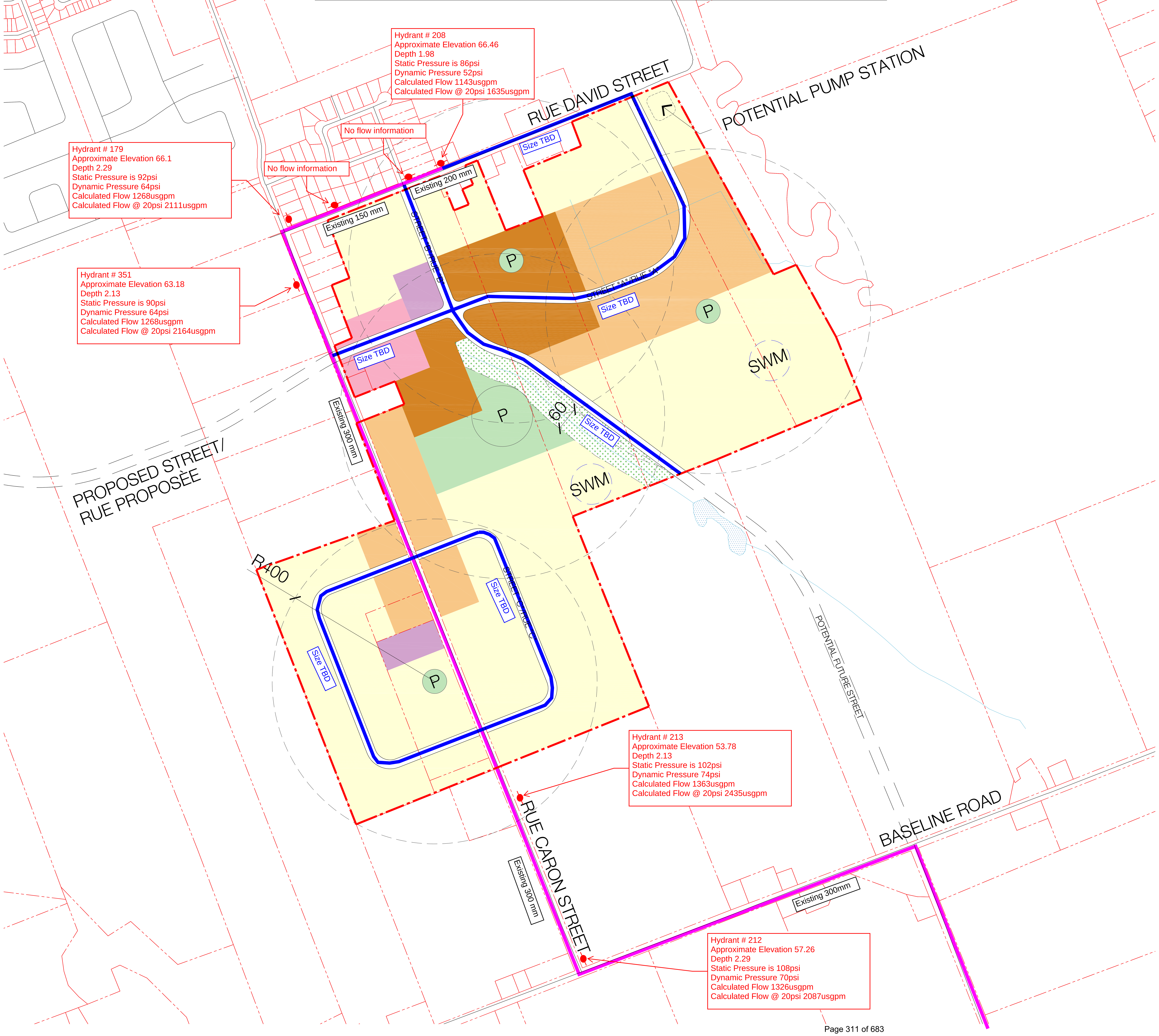
A

Appendix A

Civil Infrastructure Figures

CIMA+

PROPOSED WATER SERVICING SKETCH



LAND USE STATISTICS

SITE AREA

Total Site Area:	1,372,345m^2 137 hectares

AREA		% Res
Low Density Residential:	764,561m^2	69.41
Medium Density Residential:	225,472m^2	20.47
High Density Residential:	111,433m^2	10.12
Commercial:	29,130m^2	
Open Space/Parkland:	64,023m^2	
Institutional:	22,274m^2	
Environmental Protection Area:	39,719m^2	

NOTES

1. The base plan (lot lines, existing roads and surrounding areas) is based on the City's Open Data and aerial images. The site area is approximate and all dimensions need to be confirmed by a proper survey.

2. Assume 30.0m setback from centreline of stream.

3. Assume road ROW of 26.0m.

EXPANSION LANDS SECONDARY PLAN

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- LOW DENSITY RESIDENTIAL/ RÉSIDENCES À FAIBLE DENSITÉ
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- WATER EAU
- P OPEN SPACE/PARKLAND PARCS ET ESPACES OUVERTS
- SWM APPROXIMATE LOCATION OF STORMWATER MANAGEMENT POND EMPLACEMENT APPROXIMATIF DU SYSTÈME DE GESTION DES EAUX PLUVIALES
- PROPERTY LINE LIMITE DE PROPRIÉTÉ
- NEIGHBOURHOOD SIZE (400m RADIUS) TAILLE DU QUARTIER (RAYON DE 400 MÈTRES)

0 125m 250m 500m

No.	REVISION	DATE	BY
8	REVISIONS	2019.03.04	BL
7	REVISIONS	2019.02.08	BL
6	PREFERRED CONCEPT	2019.01.17	BL
5	PUBLIC MEETING	2019.01.07	BL
4	DRAWING	2018.12.20	ET
3	DRAWING	2018.12.19	BL
2	CLIENT REVIEW	2018.11.22	BL
1	DRAWING	2018.11.21	BL

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DATE	2018.11.20

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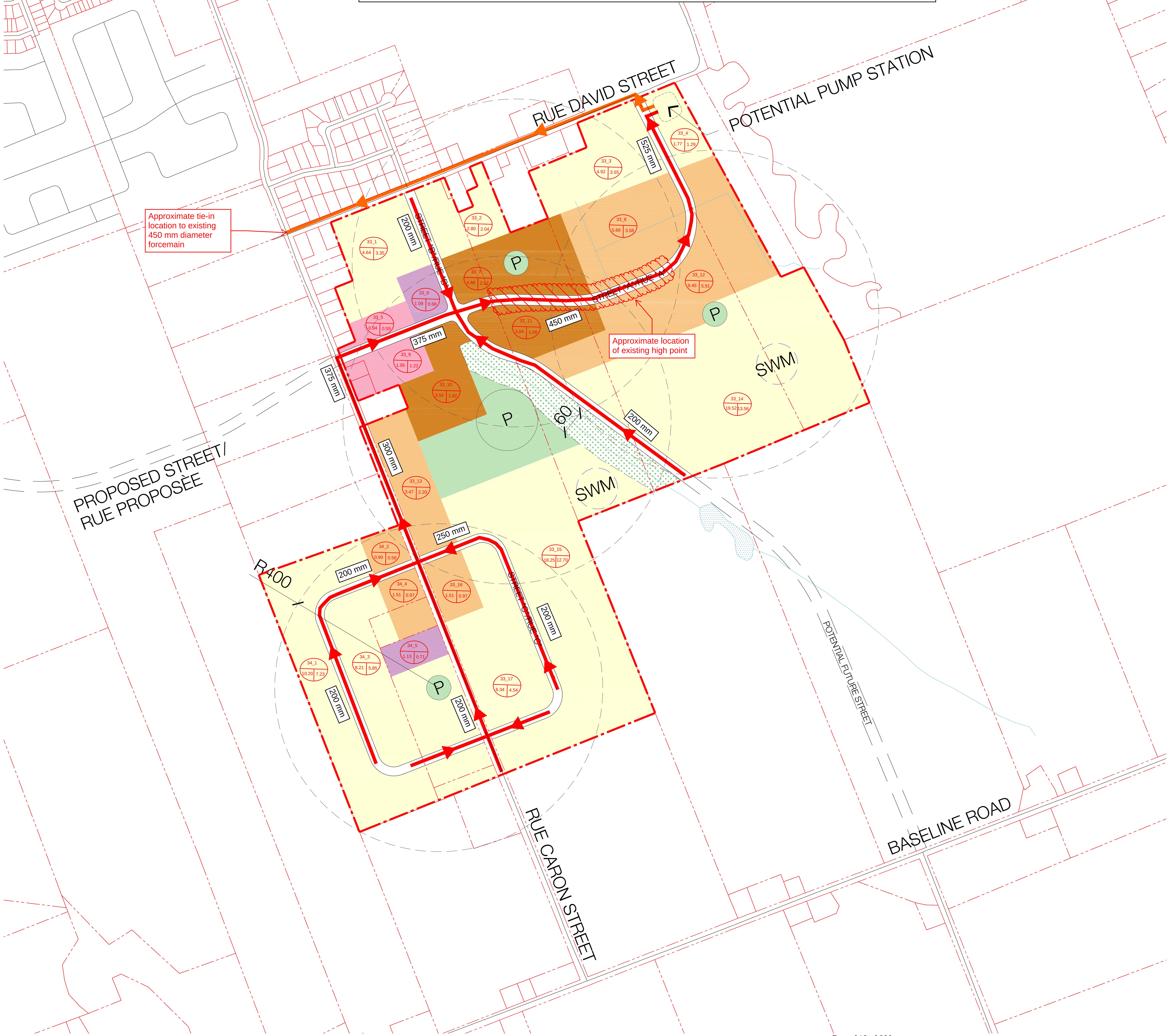
PROPOSED SANITARY SERVICING SKETCH



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3. Assume road ROW of 26.0m.

LEGEND:
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY FORCEMAIN
- FLOW DIRECTION
- SANITARY CATCHMENT ID
- ESTIMATED SANITARY FLOW (L/s)
- SANITARY CATCHMENT AREA (ha)

CIMA+ Project No.: A000846
Prepared By: Brian O'Dell, P.Eng.
Date: 2019-05-03

Note:
1) See Appendix C12 for sanitary flow calculations and sewer sizing.

EXPANSION LANDS SECONDARY PLAN

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0 125m 250m 500m

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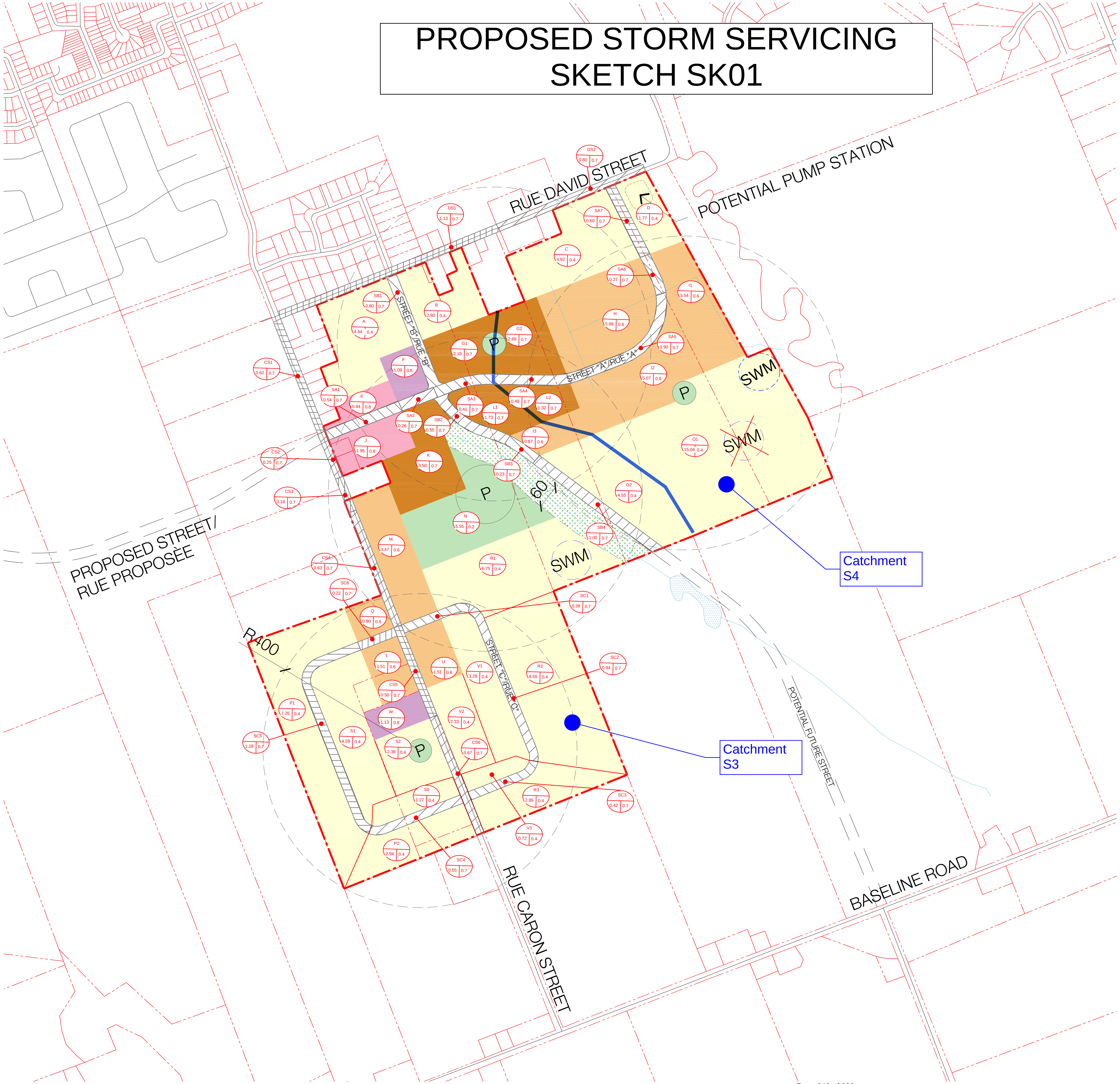
PROPOSED STORM SERVICING SKETCH SK01



LEGEND:
- PROPOSED STORM SEWER
- APPROXIMATE LOCATION OF CATCHMENT SPLIT
- FLOW DIRECTION
- SUBCATCHMENT ID
- RUNOFF COEFFICIENT
- STORM CATCHMENT AREA (ha)

CIMA+ Project No.: A000846
Prepared By: Brian O'Dell, P.Eng.
Date: 2019-05-03

Note:
1) See Appendix C13 for storm flow calculations and sewer sizing.

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0 125m 250m 500m

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PROPOSED STORM SERVICING SKETCH 02

LEGEND:

- PROPOSED STORM SEWER
- APPROXIMATE LOCATION OF CATCHMENT SPLIT
- FLOW DIRECTION
- SUBCATCHMENT ID
- RUNOFF COEFFICIENT
- STORM CATCHMENT AREA (ha)

CIMA+ Project No.: A000846
Prepared By: Brian O'Dell, P.Eng.
Date: 2019-05-03

Note:
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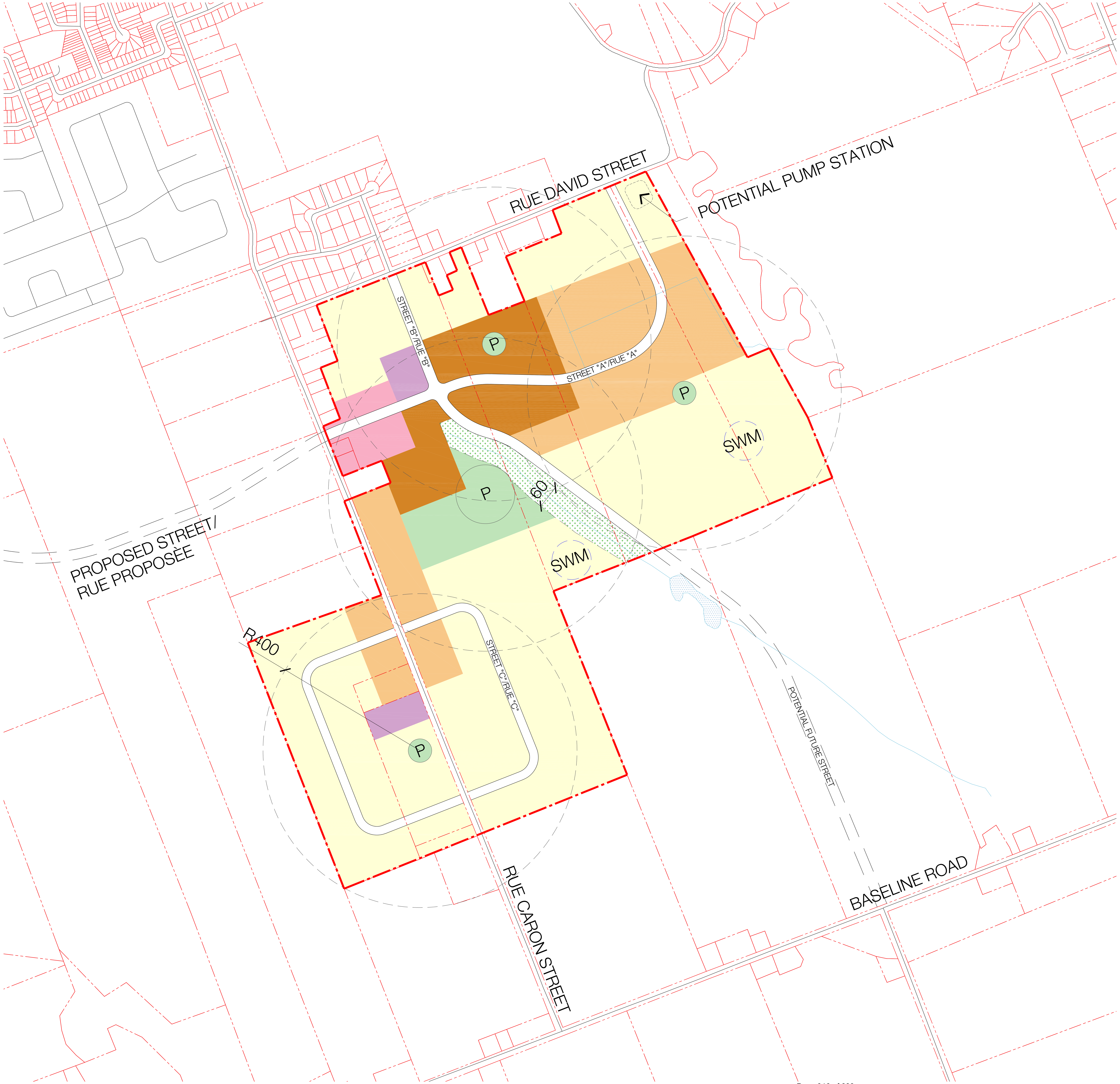
Appendix B

Population Estimate Documents



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- WATER EAU
- P OPEN SPACE/PARKLAND PARCS ET ESPACES OUVERTS
- SWM APPROXIMATE LOCATION OF STORMWATER MANAGEMENT POND EMPLACEMENT APPROXIMATIF DU SYSTÈME DE GESTION DES EAUX PLUVIALES
- PROPERTY LINE LIMITE DE PROPRIÉTÉ
- NEIGHBOURHOOD SIZE (400m RADIUS) TAILLE DU QUARTIER (RAYON DE 400 MÈTRES)

0 125m 250m 500m

No.	REVISION	DATE	BY
8	REVISIONS	2019.03.04	BL
7	REVISIONS	2019.02.08	BL
6	PREFERRED CONCEPT	2019.01.17	BL
5	PUBLIC MEETING	2019.01.07	BL
4	DRAWING	2018.12.20	ET
3	DRAWING	2018.12.19	BL
2	CLIENT REVIEW	2018.11.22	BL
1	DRAWING	2018.11.21	BL

CLIENT

CITY OF CLARENCE/ROCKLAND

FOTENN Planning + Design

223 McLeod Street, Ottawa ON K2P 0Z8
613.730.5709 www.fotenn.com

DESIGNED	BL
REVIEWED	UMG
DATE	2018.11.20

P1

CLARENCE-ROCKLAND EXPANSION LANDS SECONDARY PLAN

PROJECTED DENSITIES AND POPULATION

This projection uses the methodology described in the 2012 Hemson report.

Land Use Designation	Gross Area (ha)	Medium Scenario		Employment	
		Projected Units	Projected Population	Projected Floor Area (m2)	Projected Employment (jobs)
Low Density Residential	76.46	688	1,789		
Medium Density Residential	22.55	203	528		
High Density Residential	11.14	100	261		
Commercial	2.91			7,283	182
Other (parks, etc.)	24.17				
TOTAL	**137.23**	**991**	**2,577**	**7,283**	**182**

Projected Density (Medium Scenario): 17 people and jobs/gross hectare

Assumptions

Density scenarios are based on the 2012 Hemson Growth Study	Low	7
	Med	9
	High	12
Employment Density	25% of land area at 1 job per 40 square metres	

Land Use Distribution

Designation	Area (square metres)	Area (hectares)	Percentage of Total Area
Low Density Residential	764,561	76.46	56%
Medium Density Residential	225,472	22.55	16%
High Density Residential	111,433	11.14	8%
Commercial (Retail)	29,130	2.91	2%
Parks and Open Space	64,023	6.40	5%
Institutional/Community Facility	22,274	2.23	2%
Environmental Protection Area	39,719	3.97	3%
Roads	115,733	11.57	8%
TOTAL	**1,372,345**	**137.23**	**100%**

C

Appendix C

Supporting Civil Figures

CIMA+

C1

Appendix C

Clarence-Rockland and Limoges Water Servicing Study Excerpt

2 Model Parameters and Assumptions

2.1 Water Demands

2.1.1 Historical Clarence-Rockland Water Demands

Existing SCADA daily flow data was examined to determine existing demands and peaking factors (see Figure 2-1 for graphical, and Table 2-1 for tabular representation of the data). From the Rockland WTP and the Caron BS flows, the PZ-1 and PZ-2 flows were calculated. The total system flow was taken from the Rockland WTP flow meter. The PZ-1 flow was calculated by subtracting the Caron BS flow from the Rockland WTP flow. The PZ-2 flow was taken from the Caron BS flow meter.

Figure 2-1. Daily SCADA Flow Records – January 2012 to May 2017

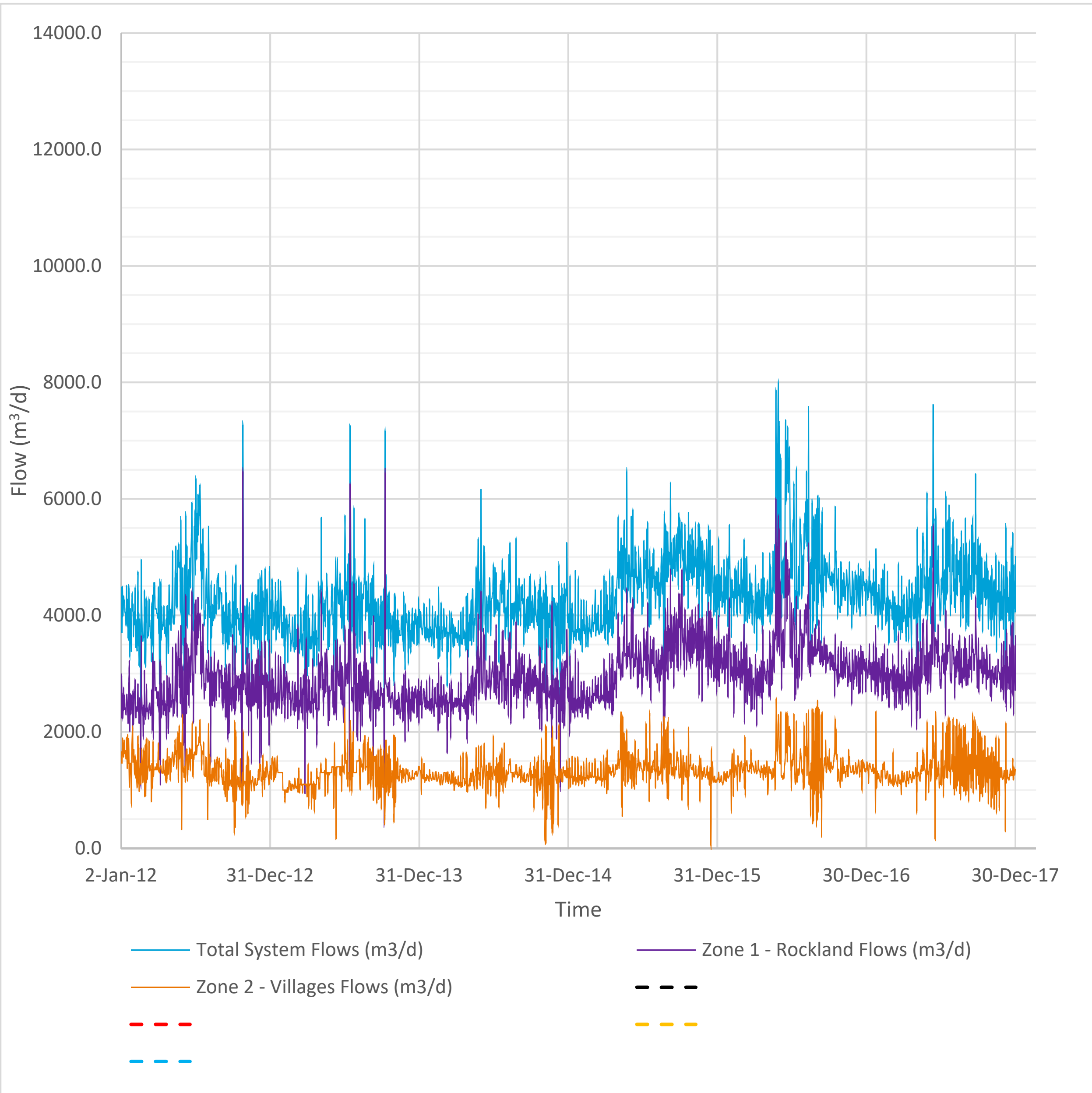


Table 2-1. Daily SCADA Flow Records – Annual Average – 2012 to 2017

Year	Total System	Zone 1 – Rockland	Zone 2 – Villages
2012	4,128.5	2,752.3	1,376.1
2013	3,960.1	2,698.6	1,261.5
2014	3,985.4	2,748.4	1,237.0
2015	4,508.5	3,156.8	1,351.7
2016	4,573.5	3,197.0	1,376.5
2017	4,427.3	3,092.8	1,334.5

Table 2-2. Daily SCADA Flow Records – Total System Average Day, Maximum Day, and 99th Percentile Maximum Day Demands – 2012 to 2017

Year	Average Day	Maximum Day	Maximum Day 99th Percentile
2012	4,128.5	7,260.1	5,981.8
2013	3,960.1	7,182.1	5,751.7
2014	3,985.4	6,161.1	5,242.7
2015	4,508.5	6,461.7	5,749.3
2016	4,573.5	7,942.6	6,938.0
2017	4,427.3	7,619.2	5,946.4

2.1.2 Future Clarence-Rockland Water Demands

The future City water demand projections are based on the following sources:

- Table: Province of Ontario *Residential Population by Age Groups (2016-2041)* (Province of Ontario)
- Report: *United Counties of Prescott and Russell Official Plan (2016-2035)*, Planning Department of the United Counties of Prescott and Russell (April, 2017) (Planning Department of the United Counties of Prescott and Russell, 2017)
- Report: *Official Plan of the Urban Area of the City of Clarence-Rockland (2016-2035)*, Planning Department of the City of Clarence-Rockland, (November 19, 2013) (Planning Department of the City of Clarence-Rockland, 2013)
- Table: *Development Charges Study – Growth Forecast – Residential Units* (April 7, 2017) (Planning Department of the City of Clarence-Rockland, 2017)
- Report: *Urban Area Statistiques – Lots approuvés (2015)*, City of Clarence-Rockland Planning Department, 2016 (Planning Department of the City of Clarence-Rockland, 2016)
- Table: Daily SCADA flow records for the WTP and the Caron BS (2012-2017) (City of Clarence-Rockland, 2017)
- GIS shapefile: UCPR Zoning layer (United Counties of Prescott and Russell, 2017)
- Map: The City of Clarence-Rockland – Future Development (Planning Department of the City of Clarence-Rockland)

Using the 99th percentile maximum and average flows, a maximum day multiplier was calculated. The design maximum day multiplier was rounded up for each.

Hourly flow data from the pumping facilities and the elevated tower would be required to calculate a peak hour multiplier, however this data was not available. Therefore, the peak hour multiplier was assumed to be 1.5 times the maximum day multiplier as indicated in the Ministry of Environment (MOE) *Design Guidelines for Drinking-Water Systems, 2008* (Ministry of the Environment, 2008).

Table 2-5. Clarence-Rockland Residential and Employment Demand Multipliers

Description	PZ-2 – Villages	PZ-1 – Rockland	Total[3]
Minimum (m^3/d)	50.4	436.5	1,349.2
Average (m^3/d)	1,328.7	2,955.9	4,284.6
Maximum (m^3/d)	2,563.0	6,470.0	7,942.6
Maximum (percentile)[1] (m^3/d)	2,289.6	4,458.8	6,383.3
Maximum Day Multiplier (percentile) (times Average Day)	1.72	1.51	1.49
Peak Hour Multiplier (times Maximum Day)	1.5	1.5	1.5
Design Maximum Day Multiplier (times Average Day)	1.8	1.6	1.66[2]
Design Peak Hour Multiplier (times Maximum Day)	1.5	1.5	1.5

Notes:
1. Max (percentile) is used for 99th percentile of the observed data to exclude the outliers or erroneous data point
2. Calculated based on total maximum day demand divided by total average day demand with PZ specific demand multipliers
3. The Totals are the combined PZ-1 + PZ-2 flows. The minimum and maximum total flows do not occur concurrently with the PZ-1 or PZ-2 minimum or maximum flows and therefore are not additive.

2.1.2.4 Projected Future Clarence-Rockland Water Demands

With the total connected residential and employment populations from Section 2.1.2.1, and the unit residential and employment demand factors from Section 2.1.2.2, the total projected future City average day water demands were calculated. Using the maximum day and peak hour multipliers from Section 2.1.2.3, the maximum day and peak hour demands were also calculated. A summary of the average day, maximum day, and peak hour demands are presented in Table 2-6 for each design year.

Table 2-6. Clarence-Rockland Total Water Demands (2016-2047)

Year	ADD (m^3/d)	MDD (m^3/d)	PHD (m^3/d)
2016	4,575.7	7,610.9	11,416.3
2017	4,793.4	8,008.0	12,012.0
2022	5,631.4	10,247.0	15,370.5
2027	6,518.2	11,929.6	17,894.4
2032	7,259.2	13,413.6	20,120.4
2037	8,044.7	15,202.9	22,804.3
2042	8,760.5	16,866.6	25,300.0
Beyond 2042	10,695.2	19,912.8	29,869.3

Notes:
1. Definitions: ADD – Average Day Demands, MDD – Maximum Day Demands, PHD – Peak Hour Demands

2.1.2.5 Clarence-Rockland Diurnal Curve

The diurnal curve is a theoretical maximum day pattern with the peak hour multiplier of 1.5 times maximum day demand. This pattern is applied to both the average day, and maximum day EPS scenarios.

5 Recommendations

5.1 Scenario 1 – Clarence-Rockland Only

5.1.1 Scenario 1-1 – 2017 Recommendations

This scenario represents the existing conditions in the system. No capacity upgrades are required for this scenario. However, the following operational upgrades are recommended:

- New 300 mm diameter watermain on St. Jean St. from Patricia St. to Docteur Corbeil Blvd. Note that this watermain is not required to meet the design criteria for Scenario 1-1, but is needed for redundancy and to improve pressures in future scenarios. However, it will be built in the short-term due to the timing of work on the Morris development.
- New 350 mm watermain from the Caron BS to the intersection of Bouvier Rd. and Labonte St. totaling approximately 6.2 km including pressure reducing valves to create sub-PZ-2A.

5.1.2 Scenario 1-2 – 2022 Recommendations

This scenario is an incremental increase in water demands compared to the 2017 scenario. No additional upgrades are required beyond what has been indicated in previous scenarios.

5.1.3 Scenario 1-3 – 2027 Recommendations

This scenario is an incremental increase in water demands compared to the 2022 scenario. The following capacity upgrades are recommended:

- Acquire land adjacent to the existing WTP to expand the WTP.
- Increase the Rockland WTP treatment capacity from 13,500 m^3/d to 23,000 m^3/d to meet the Beyond 2042 scenario maximum day demand (assuming an extra 10% for filter backwashes).
- Increase the Rockland WTP high lift pumping capacity from 13,500 m^3/d to 25,500 m^3/d to meet the Beyond 2042 scenario maximum day demand plus additional capacity to compensate for PZ-1 storage deficiency.
- Expand the Rockland WTP clearwell storage volume to meet the Beyond 2042 scenario storage requirements for PZ-1.
- Replace existing 300 mm Edwards St. watermain (east side of road) with new 500 mm watermain. Extent of replacement from the WTP to the south side of Highway 17.
- Expand the Caron BS capacity from 3,975 m^3/d to 8,000 m^3/d.

5.1.4 Scenario 1-4 – 2032 Recommendations

This scenario is an incremental increase in water demands compared to the 2027 scenario. No additional upgrades are required beyond what has been indicated in previous scenarios.

5.1.5 Scenario 1-5 – 2037 Recommendations

This scenario is an incremental increase in water demands compared to the 2032 scenario. No additional upgrades are required beyond what has been indicated in previous scenarios.

5.1.6 Scenario 1-6 – 2042 Recommendations

This scenario is an incremental increase in water demands compared to the 2037 scenario. No additional upgrades are required beyond what has been indicated in previous scenarios.

5.1.7 Scenario 1-7 – Beyond 2042 Recommendations

This scenario includes all water demands that are anticipated beyond the year 2042 and is not an incremental increase from the 2042 scenario. The timing of these future developments and water demands is currently unknown. This scenario is included in the analysis so that the recommended infrastructure is sized to account for these future known water demands. No additional upgrades are required beyond what has been indicated in previous scenarios.

5.2 Scenario 2 – Clarence-Rockland Plus Limoges

5.2.1 Scenario 2-1 – 2017 Recommendations

This scenario represents the existing conditions in the system with the addition of the 2017 Limoges demands. The following capacity and operational upgrades are recommended:

- New 400 mm watermain main from the Cheney ET to the existing Limoges WTP totaling approximately 9.8 km to connect Limoges to the Clarence-Rockland water system.
- New 300 mm diameter watermain on St. Jean St. from Patricia St. to Docteur Corbeil Blvd. Note that this watermain is not required to meet the design criteria for Scenario 2-1, but is needed for redundancy and to improve pressures in future scenarios. However, it will be built in the short-term due to the timing of work on the Morris development.
- New 450 mm watermain from the Caron BS to the Bouvier ET totaling approximately 9.3 km including pressure reducing valves to create sub-PZ-2A.
- New 450 mm watermain on Caron St. from Docteur Corbeil Blvd. to the Caron BS totaling approximately 0.2 km.
- Expand the Caron BS capacity from 3,975 m^3/d to 15,000 m^3/d.

5.2.2 Scenario 2-2 – 2022 Recommendations

This scenario is an incremental increase in water demands compared to the 2017 scenario. The following capacity upgrades are recommended:

- Increase the Rockland WTP treatment capacity from 13,500 m^3/d to 30,500 m^3/d to meet the Beyond 2042 scenario maximum day demand (assuming an extra 10% for filter backwashes). This includes land acquisition adjacent to the existing WTP for the expansion.
- Increase the Rockland WTP high lift pumping capacity from 13,500 m^3/d to 32,700 m^3/d to meet the Beyond 2042 scenario maximum day demand plus additional capacity to compensate for PZ-1 storage deficiency.
- Expand the Rockland WTP clearwell storage volume to meet the Beyond 2042 scenario storage requirements for PZ-1.
- Replace existing 300 mm Edwards St. watermain (east side of road) with new 500 mm watermain. Extent of replacement from the WTP to the south side of Highway 17.
- New 350 mm watermain from the Bouvier ET to the intersection of Bouvier and Lacroix totaling approximately 2.6 km.

5.2.3 Scenario 2-3 – 2027 Recommendations

This scenario is an incremental increase in water demands compared to the 2022 scenario. The following capacity upgrades are recommended:

- New watermain from the Bouvier and Lacroix to the Cheney ET totaling approximately 8.3 km. This includes approximately 3.0 km of 350 mm diameter watermain and 5.3 km of 300 mm diameter watermain.

SECTION 6

6 Capital Works Plan

6.1 Infrastructure Costs

6.1.1 Recommended Infrastructure Upgrades – Scenario 1 – Clarence-Rockland Only

A Class D estimate was prepared for each recommended infrastructure upgrade for Scenario 1 from Section 5.1 and the estimated costs are shown in Table 6-3 and Table 6-2. The cost estimates in Table 6-3 and Table 6-2 are estimated using the two watermain unit price calculations shown in Section 6.1.4 (Conservative, and Aggressive unit cost estimates).

Table 6-1. Summary of Recommended Infrastructure Upgrade Costs – Scenario 1 – Conservative Cost Estimate

Infrastructure Recommendation Description	Estimated Base Cost ($ M)	Base Cost Markups[1] ($ M)	Subtotal ($ M)	Subtotal Markups[2] ($ M)	Total[3] ($ M)
Zone 1 - Rockland					
Rockland WTP Upgrades[4]	8.10	4.46	12.56	1.88	14.44
Replace Watermain – Edwards St: Rockland WTP to Highway 17 (east side pipe)	0.40	0.16	0.56	0.08	0.65
New Watermain – Caron St: Docteur Corbeil Blvd. to the Caron BS	0.14	0.06	0.20	0.03	0.23
New Watermain – St. Jean St: Patricia St. to Docteur Corbeil Blvd.	0.28	0.11	0.39	0.06	0.45
Zone 2 – Villages					
Caron BS Upgrades	1.23	0.67	1.90	0.28	2.18
New Watermain – Caron BS to Bouvier Rd. and Labonte St.	4.37	1.75	6.11	0.92	7.03
New Watermain – Bouvier Rd. and Labonte St. to Bouvier ET	2.52	1.01	3.52	0.53	4.05
Total	**17.04**	**8.22**	**25.24**	**3.78**	**29.03**

Notes:

1. Contractor’s overhead, profit, mobilization, bonds, and insurance (15%), and design contingency (40% for facility upgrades, and 25% for watermain upgrades).
2. Construction contingency (5%), and average price escalation (10%).
3. Excludes HST.
4. The Rockland WTP Upgrades cost estimate includes low lift and high lift pumping and treatment capacity. It assumes that a new intake in the Ottawa River is not required.

Table 6-2. Summary of Recommended Infrastructure Upgrade Costs – Scenario 1 – Aggressive Cost Estimate

Infrastructure Recommendation Description	Estimated Base Cost ($ M)	Base Cost Markups[1] ($ M)	Subtotal ($ M)	Subtotal Markups[2] ($ M)	Total[3] ($ M)
Zone 1 - Rockland					
Rockland WTP Upgrades[4]	8.10	4.46	12.56	1.88	14.44
Replace Watermain – Edwards St: Rockland WTP to Highway 17 (east side pipe)	0.28	0.11	0.39	0.06	0.45
New Watermain – Caron St: Docteur Corbeil Blvd. to the Caron BS	0.10	0.04	0.15	0.02	0.17
New Watermain – St. Jean St: Patricia St. to Docteur Corbeil Blvd.	0.25	0.10	0.34	0.05	0.40
Zone 2 – Villages					
Caron BS Upgrades	1.23	0.67	1.90	0.28	2.18
New Watermain – Caron BS to Bouvier Rd. and Labonte St.	3.21	1.28	4.49	0.67	5.16
New Watermain – Bouvier Rd. and Labonte St. to Bouvier ET	1.85	0.74	2.59	0.39	2.97
Total	**15.02**	**7.40**	**22.42**	**3.35**	**25.77**

Notes:

1. Contractor's overhead, profit, mobilization, bonds, and insurance (15%), and design contingency (40% for facility upgrades, and 25% for watermain upgrades).
2. Construction contingency (5%), and average price escalation (10%).
3. Excludes HST.
4. The Rockland WTP Upgrades cost estimate includes low lift and high lift pumping and treatment capacity. It assumes that a new intake in the Ottawa River is not required.

6.1.4 Unit Cost Assumptions

The cost estimates for the watermain upgrade recommendations, and for compensation costs discussed in previous sections are based on the watermain unit costs indicated in Table 6-6, and **Error! Reference source not found.**.

The conservative unit price calculations were derived using the cost data in the City of Ottawa June 20, 2016 Unit Spec Code List document. The following unit items were referenced: G030.03 (200 mm), G030.04 (250 mm), G030.05 (300 mm), and G030.06 (400 mm). The 350 mm diameter cost was interpolated between the 300 mm and 400 mm costs. The 450 mm, and 500 mm diameter costs were extrapolated from the costs for the other sizes.

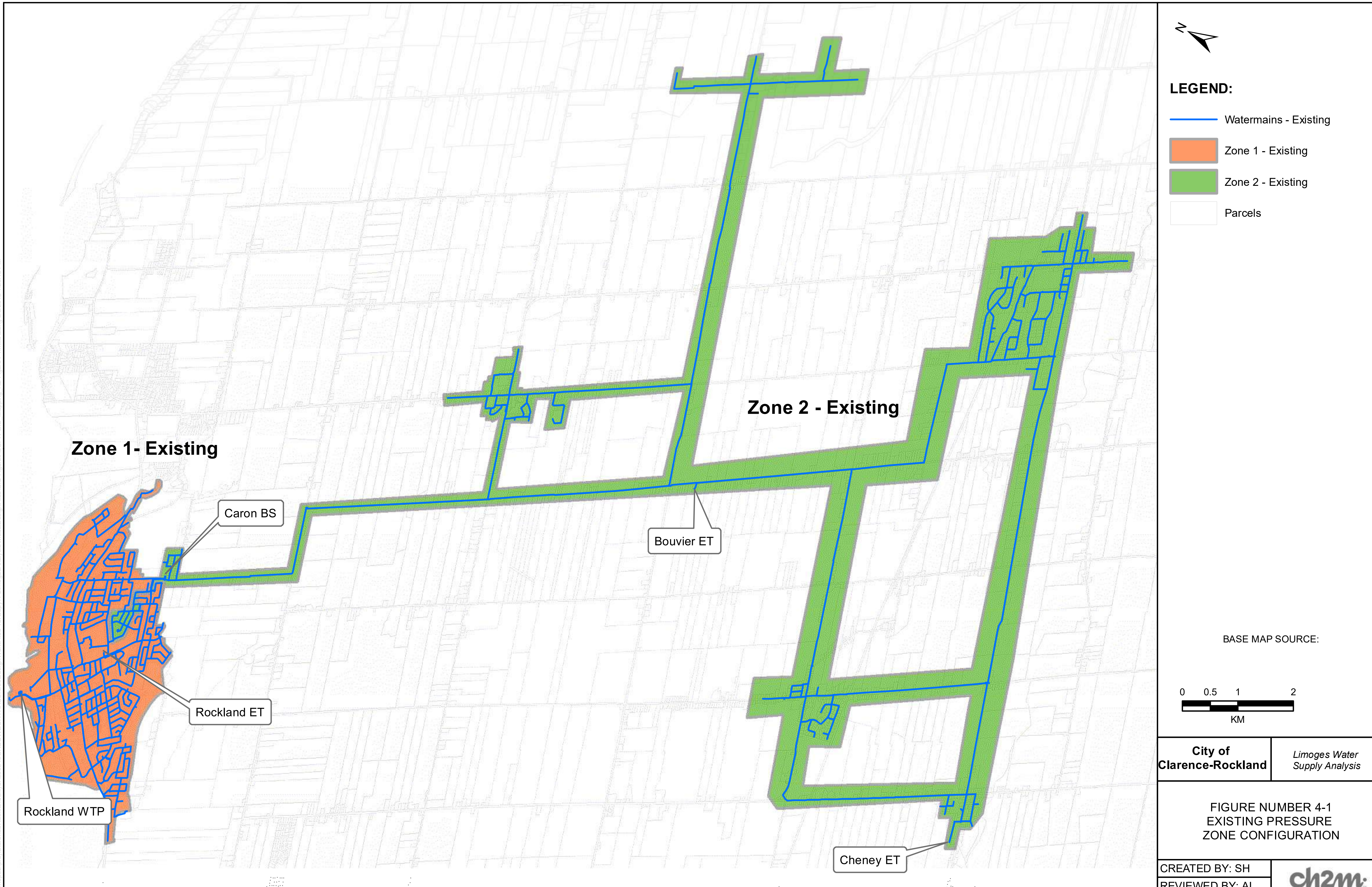
Table 6-6. Unit Costs for Watermains – Conservative Calculations

Diameter (mm)	Base Cost[1]	Subtotal[2]	Total[3]
200	$ 443.15	$ 620.41	$ 713.47
250	$ 504.19	$ 705.87	$ 811.75
300	$ 571.12	$ 799.57	$ 919.50
350	$ 595.65	$ 833.91	$ 959.00
400	$ 620.18	$ 868.25	$ 998.49
450	$ 680.50	$ 952.70	$1,095.61
500	$ 725.05	$ 1,015.07	$1,167.33

Notes:

1. The base cost includes the pipe material and installation cost, trench reinstatement, and valves.
2. The subtotal includes a 40% markup on the base cost for contractor's overhead, profit, mobilization, bonds, and insurance (15%), and design contingency (25%).
3. The total includes a 15% markup on the subtotal for construction contingency (5%) and average price escalation (10%). Excludes HST.

The aggressive cost estimates were calculated using a base unit price of $500/m provided by EXP, for the installation of new transmission watermains.


Zone 1- Existing
Zone 2 - Existing
Caron BS
Bouvier ET
Rockland ET
Rockland WTP
Cheney ET
N
LEGEND:
Watermains - Existing
Zone 1 - Existing
Zone 2 - Existing
Parcels
BASE MAP SOURCE:
0 0.5 1 2
KM
City of Clarence-Rockland
Limoges Water Supply Analysis
FIGURE NUMBER 4-1
EXISTING PRESSURE
ZONE CONFIGURATION
CREATED BY: SH
REVIEWED BY: AL
ch2m

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Appendix C

2016 Annual Record of Surface Water Taking

ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

Annual Record Of Surface Water Taking
Relevé annuel des prises d'eau de surface

Personal information contained on this form is collected under the authority of the Ontario Water Resources Act, Section 20. The Purpose of the form is to record details and information about the taking of water annually. Questions should be directed to the respective hub office in your area.

Les renseignements personnels qui figurent dans le présent formulaire sont recueillis en vertu de l'article 20 de la Loi sur les ressources en eau de l'Ontario. Ce formulaire sert à dossiers les détails et les renseignements concernant la prise d'eau annuelle. Prière d'adresser toutes questions au personnel du bureau régional de votre secteur.

Year(Année): **2016** Permit No.(N° de permis):**2563-7H9QE8** Source: **Ottawa River**

Name of Permittee: **Corporation of the City of Clarence**
Nom du titulaire du permis

Mailing Address: **1560 rue Laurier, Rockland ,Ontario,K4P 1P7**
Adresse postale

Concession: I
Concession:

Lot: 27
Lot:

Location Of Taking: **Rockland WTP**
Lieu de la prise d'eau

Twp. or Municipality: **City of Clarence-Rockland**
Canton ou municipalité

Month	Monthly Flow Total (m3/month)	Daily Flow Average (m3/day)	Daily Flow Maximum (m3/day)	Daily Flow Peak Flow Rate (L/min)	Daily Flow Peak Flow Rate (L/sec)	Number of Days of Water Taking	Maximum Daily Run Time (hr)
Jan	143,884.2	4,641.43	5,477.8	4,798.8	69.24	31	24.0
Feb	133,453.5	4,601.84	5,407.7	4,611.3	69.23	29	22.0
Mar	142,111.8	4,584.25	5,439.7	8,481.3	70.28	31	22.7
Apr	136,936.1	4,564.54	5,537.0	8,695.0	69.9	30	23.0
May	170,584.9	5,502.74	8,823.4	9,211.3	106.18	31	23.9
Jun	185,115.2	6,170.51	7,810.6	9,166.3	112.17	30	23.3
Jul	166,299.4	5,364.50	7,171.8	9,217.5	114.09	31	21.9
Aug	176,702.5	5,700.08	8,246.5	9,313.8	111.67	31	21.2
Sep	156,914.0	5,230.47	6,972.3	9,263.8	112.63	30	18.6
Oct	153,298.2	4,945.10	6,151.3	9,232.5	112.71	31	16.7
Nov	141,775.3	4,725.84	5,391.9	9,192.5	113.27	30	14.2
Dec	147,531.3	4,759.07	6,727.2	9,933.8	116.07	31	16.1
Total	1,854,606.4					366	
Avg	154,550.5	5,067.23			98.12		
Max	185,115.2	6,170.51	8,823.4	9,933.8	116.07		24.0
Criteria			**14,500**	**10,089**		366	24.0

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Appendix C

OCWA Quarterly Operations Report Card, 4th Quarter of 2016

OCWA
Quarterly Operations Report Card

For the City of Clarence-Rockland Water and Wastewater Facilities

Alfred Hub Operations
4th Quarter 2016

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Table of Contents

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Quarterly Operations Report - 2016

1.0 FACILITY LISTINGS

1.1 Water Treatment & Distribution

Facility	Appurtenances
6847W Rockland Water Treatment Plant	1 Raw Water Low Lift Station 1 WTP (Actiflo Process)
6847D Clarence-Rockland Water Distribution System	3 Water Storage Towers 1Water Booster Station An Area Water Distribution System supplying Rockland, Clarence Creek, St. Pascal, Bourget, Hammond and Cheney

1.2 Wastewater Treatment & Collection

Facility	Appurtenances
6816S Rockland Wastewater Treatment System	1 Sequential Batch Reactor Treatment system 2 Biosolids Storage and Drying Lagoons
6816C Rockland Wastewater Collection System	7 Sewage Pumping Stations in Rockland 11 Low Pressure Residential pumping stations in Rockland 1 Communal Sewage System In Clarence-Creek

2.0 COMPLIANCE

2.1 Water Treatment and Distribution

Most Recent MOE Compliance Inspection Report - Rating

ORG	Facility	Inspection Date	Report Period	Inspector Name	MOE CIR Rating	Inspection Report Received	Inspection Report Reply Submitted
6847D	Rockland WTP and WD	02/09/2016	2015	Jean Veilleux	100%	13/04/16	N/A

Annual Reports (Water)

All 2015 Annual Reports required under the Drinking Water Systems Regulation (O. Reg. 170/03) of the Safe Drinking Water Act: Water Taking, Section 10 and Schedule 22 Reports, were completed and submitted by February 27th, 2016.

Adverse Water Quality Incidents (AWQI's)

Date	Facility	AWQI#	ISSUE	Date Resolved
N/A		N/A		

2.2 Wastewater Treatment & Collection

Most recent MOE Inspections

ORG	Facility	Inspection Date	Report Period	Inspector Name	Inspection Report Received	Inspection Report Reply Submitted
6816S	Rockland WWT	Oct.31st 2014	Odor issue	Jean Veilleux	N/A	N/A
6816S	Rockland WWT	March 13th 2015	Acute Lethality non compliance	Ian Rumbolt Environment Canada	N/A	N/A
6816S	Rockland biosolids	October 20th 2015	2015	Brent Winters	Jan. 5th 2016	Jan.14th 2016
6816S	Rockland WPCP and collection	May 10th 2016	2016	Jean Veilleux	Aug. 22nd	N/A
6816S	Rockland biosolids Roy Farm	October 5th 2016	2016	Brent Winters		

Non Compliance, Reportable Spills and Bypasses

Facility	Event	Date Reported
Rockland Sewage	Raw sewage spill due to forcemain break at Pumping Station #1 SAC Report # 7083-AF5TWL	October 27th 2016
Rockland Sewage	Contained raw sewage spill in the Greenbelt trench when connecting new forcemain on Laurier St. SAC Report # 5765-AFYNS5	November 23rd 2016
Rockland WTP	Monthly Total Suspended Solids collected in the backwash supernatant tank above 25mg/l	December 23rd 2016

Annual Reports (Wastewater)

The 2015 Annual Report required under the Certificate of Approval No. 3-0466-93-967 and ECA No. 1990-9P3PRG was completed and issued on March 29th, 2016.

3.0 FACILTY PERFORMANCE

3.1 Water Treatment and Distribution System

Facility	Reporting Period	Attachments
Rockland WTP & Distribution	Jan 1st – Dec 31st 2016	Attachment I; Performance Assessment Report

3.2 Wastewater Treatment and Collection System

Facility	Reporting Period	Attachments
Rockland WPCP & WWC	Jan 1st – Dec 31st 2016	Attachment II: Performance Assessment Report

4.0 DRINKING WATER QUALITY MANAGEMENT STANDARD (DWQMS)

An internal audit of the Operational Plan was conducted February 10th by OCWA staff. The operational plan and reviews were then sent to SAI Global (external auditors) for review and they were an on-site for an audit March 7th and no **non-compliances were identified**. The municipality received their new Drinking Water Permit and License March 14th 2016 and OCWA received their Certificate of Accreditation April 14th 2016.

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5.0 MAINTENANCE / CAPITAL / VALUE ADDED

5.1 Water Treatment and Distribution

Facility	Date	Description
Rockland WTP	Oct.12th	Water intake crib inspection by ODS
Clarence Rockland dist.	Oct 12th	PRV inspection in Hamlets
Cheney distribution	Oct.14th	Fused service repair at 3262 Drouin rd.
Cheney distribution	Oct.19th	Fused service repair at Corner store
Clarence-Creek dist.	Oct. 25th	Inspected new water connection at 1591 Bouvier
Clarence Rockland dist.	November	Completed all hydrant winterizing and inspections
Rockland distribution	Nov.24th	New water main for Greenbelt project on line
Clarence-Rockland dist.	Nov.29th	Repaired hydrants: R-099AD (Marble) R-214AD (David)

		R-285 (Giroux) CC-016 (Landry) H-252AD (Gagnée). And one on St-Jean
Rockland distribution	Dec.7th	2" water service repair at 220 Laurier, Poupart
Rockland distribution	Dec.16th	Water main leak on Baseline rd. near Caron, ordered parts to repair, work done Jan.25th, Martin Normand

5.2 Wastewater Treatment and Collection

Facility	Date	Description
Rockland collection	On-going	Cleaned inlet basket at sta.#1 bi-weekly
Rockland WPCP	Oct.12th	Sewage outfall inspection by ODS
Rockland collection	Oct.27th	Sewage forcemain failure due to core drilling at sta.#1, repaired temporarily, spill reported to SAC
Rockland collection	Nov.10th	Pump failures at sta.#3 due to faulty wiring, rebuilt both motors and replaced control wiring and components
Rockland collection	Nov.21st	Cleaned all pumping station wet wells
Rockland WPCP	Oct.-Nov.	Hauled 3,482m3 biosolids to farmland

5.3 Preventive Maintenance Plan (PMP) Quarterly Work Order Summary

Please refer to attachment III and IV outlining the work order status for the water and wastewater facilities

6.0 COMMUNICATIONS

6.1 Water Treatment & Distribution

Facility	Date	Complaint/Incident	Actions Taken
Rockland distribution	Oct.20th	Odour complaint at 1447 Laurier	Called home owner, seems to be plumbing issue
Hammond distribution	Nov.9th	Car hit hydrant at 3115 Gendron	Repaired
Clarence-Creek dist.	Nov.29th	Water quality complaint at 2804 Bouvier	Visted home, wrong anode in hot water tank

6.2 Wastewater Treatment and Collection

Facility	Date	Complaint/Incident	Actions Taken
Rockland collection	Nov.1st	Slow flowing drain at 835 St-Jacques	Inspected municipal sewers all OK service lateral issue
Rockland collection	Dec. 19th	Sewer back up at 278 Hélène st.	Municipal sewer cleaned on Hélène and Caron in that area, Aqua Drain

7.0 RECOMMENDATIONS / GENERAL COMMENTS

7.1 Water Treatment and Distribution

- ASPEC Automation was at the water treatment plant several times in the past months to perform various repairs and PLC maintenance

7.2 Wastewater Treatment and Collection

- Hauled 3,482 m3 of biosolids from lagoons to three NASM approved farms this fall (Pascal Roy, Serge Ethier and André-Jean Pilon). These volumes are increasing due to the heavier flows in 2016. Extra cost are possible in 2017 due to this increase and extra removal of biosolids (one lagoon holds 1800 m^3)

Ontario Clean Water Agency
Performance Assessment Report Water

January 1st to December 31st 2016

Facility: [6847] ROCKLAND DRINKING WATER SYSTEM

Works: [6847] ROCKLAND DRINKING WATER SYSTEM

	01/2016	02/2016	03/2016	04/2016	05/2016	06/2016	07/2016	08/2016	09/2016	10/2016	11/2016	12/2016	<--Total-->	<--Avg.-->	<--Max.-->	<--Min.-->	<--Criteria-->
Flows:																	
Raw Flow: Monthly Total - Raw Water (m³)	143884.2	133453.5	142111.8	136936.1	170584.9	185115.2	166299.4	176702.5	156914	153298.2	141775.3	147531.3	1854606.4				
Raw Flow: Monthly Avg - Raw Water (m³/d)	4641.43	4601.84	4584.25	4564.54	5502.74	6170.51	5364.5	5700.08	5230.47	4945.1	4725.84	4759.07		5065.86			
Raw Flow: Monthly Max - Raw Water (m³/d)	5477.8	5407.7	5439.7	5537	8823.4	7810.6	7171.8	8246.5	6972.3	6151.3	5391.9	5364.5			8823.4		
Treated Flow: Monthly Total - Treated Water WTP (m³)	139389.9	127700.4	133083.8	126195.9	157818.9	168595	149890.3	158898.5	143813.6	142323.9	133116.6	138429.7	1719256.5				
Treated Flow: Monthly Total - Treated Water Booster Station (m³)	37588	38516	42829	40090	45945	48646	44571	46530	43360	44825	40925	42530	516355				
Treated Flow: Monthly Avg - Treated Water WTP (m³/d)	4496.45	4403.46	4293.03	4206.53	5090.93	5619.83	4835.17	5125.76	4793.79	4591.09	4437.22	4465.47		4696.56			
Treated Flow: Monthly Avg - Treated Water Booster Station (m³/d)	1212.52	1328.14	1381.58	1336.33	1482.1	1621.53	1437.77	1500.97	1445.33	1445.97	1364.17	1371.94		1410.7			
Treated Flow: Monthly Max - Treated Water WTP (m³/d)	5543.3	4955.9	5254.3	5073.8	7942.6	7333.4	6492.3	7511.7	6040.9	5853.9	4910	4863.6			7942.6		
Treated Flow: Monthly Max - Treated Water Booster Station (m³/d)	1320	1680	1909	1510	2563	2337	2303	2408	2535	2216	1678	1512			2563		
Turbidity:																	
Raw: Max Turbidity - Raw Water (NTU)	20.08	16.82	48.87	68	34.04	32.67	27	50	24.11	16.71	21.34	50			68		
Treated: Min Turbidity - Treated Water WTP (NTU)	0.06	0.09	0.12	0.1	0.09	0.08	0.1	0.06	0.09	0.1	0.08	0.08				0.06	
Treated: Max Turbidity - Treated Water WTP (NTU)	0.49	0.26	0.2	0.43	0.12	0.55	0.21	0.15	0.14	0.2	0.63	0.14			0.63		
Filter Eff: Min Turbidity - Actiflo Filter #1 (NTU)	0.05	0.08	0.16	0.12	0.02	0.08	0.12	0.14	0.12	0.11	0.08	0.09				0.02	
Filter Eff: Min Turbidity - Actiflo Filter #2 (NTU)				0.07	0.04	0.06	0.06	0.08	0.09	0.09	0.06	0.13					
Filter Eff: Max Turbidity - Actiflo Filter #1 (NTU)	0.37	0.28	0.3	0.45	0.44	0.38	0.27	0.29	0.27	0.31	0.25	0.43			0.45		1.0 NTU
Filter Eff: Max Turbidity - Actiflo Filter #2 (NTU)				0.39	0.29	0.74	0.55	0.42	0.32	0.38	0.34	0.55			0.74		1.0 NTU
Chemical Parameters:																	
Treated: Max Nitrite - Treated Water WTP (mg/L)	< 0.1			< 0.1			< 0.1								< 0.1		
Treated: Max Nitrate - Treated Water WTP (mg/L)	0.4			0.4			0.2								0.4		
Distribution: Max THM - Distribution Water (µg/l)	46.7			41.5			72.5			45.5					72.5		100 µg/l
Chlorine Residuals:																	
Treated: Min Free Cl2 Resid - Treated Water WTP (mg/L)	0.56	1.15	0.75	0.56	0.86	1.3	0.86	0.56	0.8	0.45	0.45	0.65				0.45	0.05mg/l
Treated: Max Free Cl2 Resid - Treated Water WTP (mg/L)	2.66	2.71	2.46	2.71	2.46	2.4	2.18	2.56	2.47	2.56	2.84	2.61			2.84		4.0mg/l
Treated: Min Combined Cl2 Resid - Treated Water WTP (mg/L)	0.55	0.7	0.51	0.56	0.6	1.48	0.81	0.56	0.92	0.67	0.44	0.73				0.44	.30mg/l
Treated: Max Combined Cl2 Resid - Treated Water WTP (mg/L)	2.94	2.95	2.88	2.93	2.88	2.52	2.91	2.96	2.79	2.83	2.86	2.71			2.96		3.0mg/l
Dist: Min Combined Cl2 Resid - Distribution Water (mg/L)	1.52	1.37	1.17	1.19	1.3	1.16	0.76	0.8	1.64	1.25	1.51	1.2				0.76	.30mg/l
Dist: Max Combined Cl2 Resid - Distribution Water (mg/L)	1.9	1.95	2.17	2.22	2.41	1.74	1.33	1.73	2.29	1.81	2.18	2.05			2.41		3.0mg/l
Bacti Samples Collected:																	
Raw Bacti: # of samples - Raw Water	4	4	5	4	5	4	4	5	4	5	5	4	53				
Treated Bacti: # of samples - Treated Water WTP	4	4	5	4	5	4	4	5	4	4	5	4	52				
Dist Bacti: # of samples - Distribution Water	30	32	38	32	39	32	32	38	28	32	40	30	403				
Treated Bacti: # of TC exceedances - Treated Water WTP	0	0	0	0	0	0	0	0	0	0	0	0	0				
Treated Bacti: # of EC exceedances - Treated Water WTP	0	0	0	0	0	0	0	0	0	0	0	0	0				
Dist Bacti: # of TC exceedances - Distribution Water	0	0	0	0	0	0	0	0	0	0	0	0	0				
Dist Bacti: # of EC exceedances - Distribution Water	0	0	0	0	0	0	0	0	0	0	0	0	0				

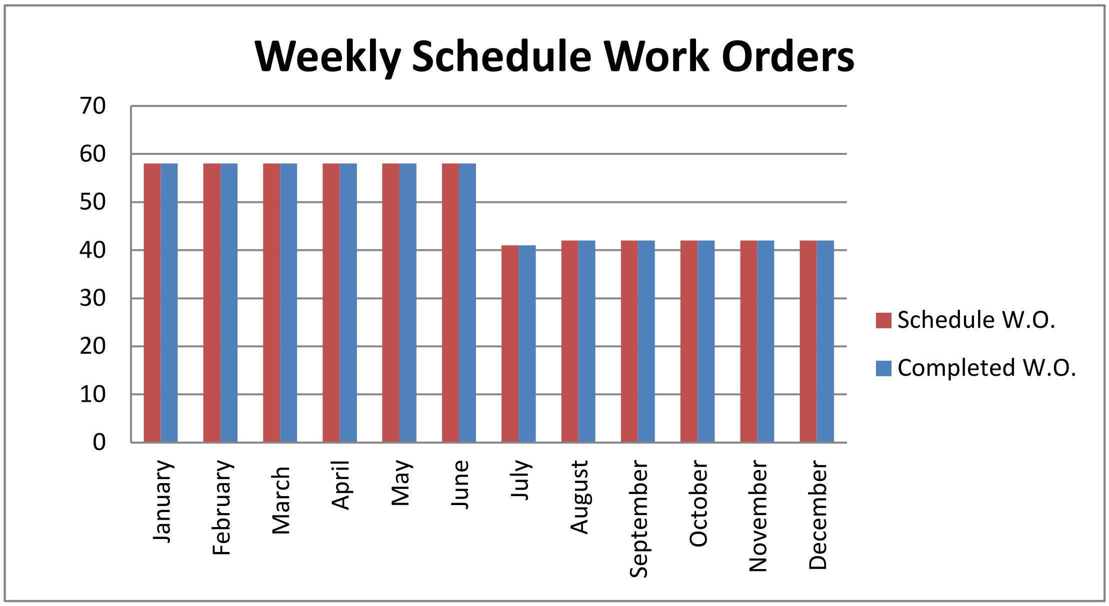
Ontario Clean Water Agency
Performance Assessment Report Wastewater/Lagoon

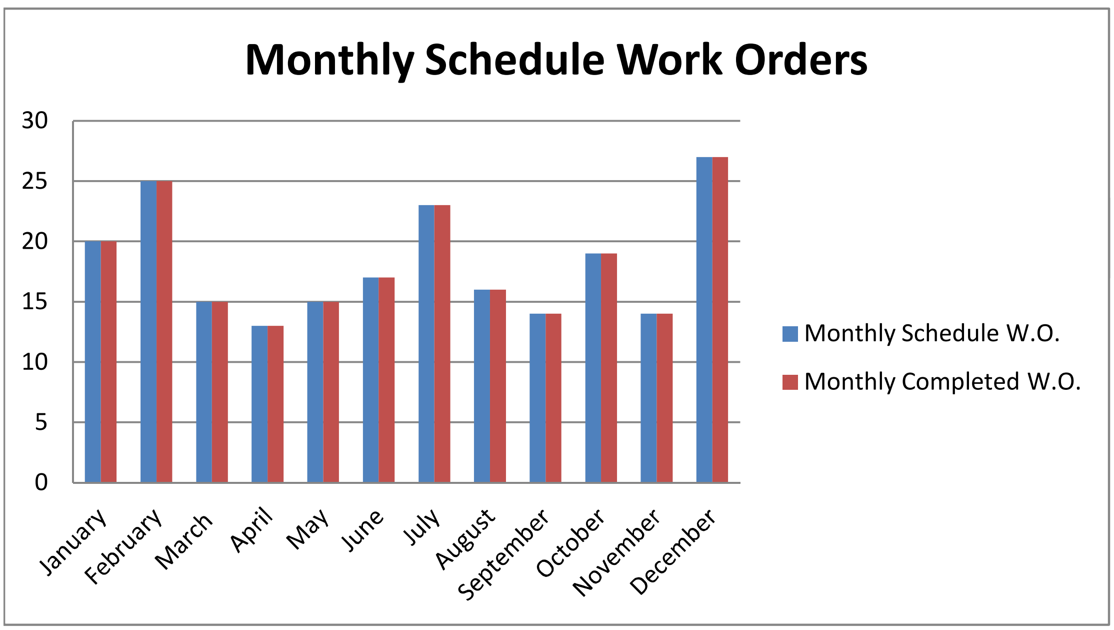
January 1st to cember 31st 2016

Facility: [6816] ROCKLAND WASTEWATER TREATMENT FACILITY
Works: [6816] ROCKLAND WASTEWATER TREATMENT FACILITY

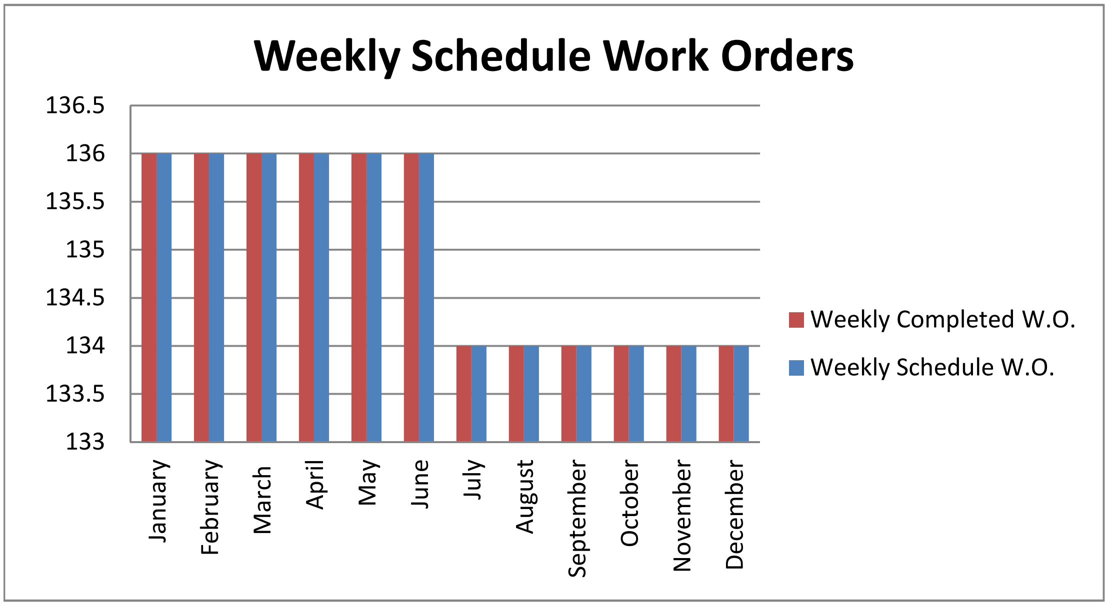
	01/2016	02/2016	03/2016	04/2016	05/2016	06/2016	07/2016	08/2016	09/2016	10/2016	11/2016	12/2016	<--Total-->	<--Avg.-->	<--Max.-->	<--Criteria-->
Flows:																
Raw Flow: Total - Raw Sewage (m³)	131237	124983	200134	188478	123931	109661	107221	123332	108678	122218	115956	131635	1587464			
Raw Flow: Avg - Raw Sewage (m³/d)	4233.45	4309.76	6455.94	6282.6	3997.77	3655.37	3458.74	3978.45	3622.6	3942.52	3865.2	4246.29		4337.39		Rated Capacity 6800m3
Raw Flow: Max - Raw Sewage (m³/d)	5842	6680	11442	9690	4303	4316	3753	5811	4184	5858	4666	6299			11442	
Eff. Flow: Total - WPCP Effluent (m³)	131237	124983	200134	188478	123931	109661	107221	123332	108678	122218	115956	131635	1587464			
Eff. Flow: Avg - WPCP Effluent (m³/d)	4233.45	4309.76	6455.94	6282.6	3997.77	3655.37	3458.74	3978.45	3622.6	3942.52	3865.2	4246.29		4337.39		
Eff. Flow: Max - WPCP Effluent (m³/d)	5842	6680	11442	9690	4303	4316	3753	5811	4184	5858	4666	6299			11442	
Carbonaceous Biochemical Oxygen Demand: CBOD:																
Eff: Avg cBOD5 - WPCP Effluent (mg/L)	< 4	< 15.25	< 3	< 3.25	< 11	< 6.5	< 8.25	< 7.6	< 12.5	< 3	< 3	< 3.25		< 6.717	< 15.25	Annual Avg. 25mg/l
Loading: cBOD5 - WPCP Effluent (kg/d)	< 16.934	< 65.724	< 19.368	< 20.418	< 43.976	< 23.76	< 28.535	< 30.236	< 45.283	< 11.828	< 11.596	< 13.8		< 27.621	< 65.724	170 kg/d
Biochemical Oxygen Demand: BOD5:																
Raw: Avg BOD5 - Raw Sewage (mg/L)	291.75	177.5	113.2	143	250.4	213.75	203.75	228.6	146.75	191.6	169.25	183.5		192.754	291.75	
Raw: # of samples of BOD5 - Raw Sewage (mg/L)	4	4	5	4	5	4	4	5	4	5	4	4	52			
Total Suspended Solids: TSS:																
Raw: Avg TSS - Raw Sewage (mg/L)	1565	324	474	493.5	342.4	276	339	422.4	210	282.857	239	895		488.596	1565	
Raw: # of samples of TSS - Raw Sewage (mg/L)	4	4	5	4	5	4	4	5	4	7	4	4	54			
Eff: Avg TSS - WPCP Effluent (mg/L)	7.5	< 9	14.4	8.5	28.2	12.25	28.25	16.444	23.143	21.4	8.5	21.5		< 16.591	28.25	Annual Avg. 25 mg/l
Eff: # of samples of TSS - WPCP Effluent (mg/L)	4	4	5	4	5	4	4	9	7	5	4	4	59			
Loading: TSS - WPCP Effluent (kg/d)	31.751	< 38.788	92.965	53.402	112.737	44.778	97.709	65.423	83.837	84.37	32.854	91.295		< 69.159	112.737	170 kg/d
Percent Removal: TSS - Raw Sewage (mg/L)	99.521	97.222	96.962	98.278	91.764	95.562	91.667	96.107	88.98	92.434	96.444	97.598			99.521	
Total Phosphorus: TP:																
Raw: Avg TP - Raw Sewage (mg/L)	17.365	5.94	4.42	4.86	7.716	6.68	7.125	7.434	6.273	6.467	6.313	6.6		7.266	17.365	
Raw: # of samples of TP - Raw Sewage (mg/L)	4	4	5	4	5	4	4	5	4	7	4	4	54			
Eff: Avg TP - WPCP Effluent (mg/L)	0.267	0.345	0.418	0.308	0.842	0.493	0.762	0.548	0.731	0.636	0.215	0.415		0.498	0.842	Monthly Avg. 1.0 mg/l
Eff: # of samples of TP - WPCP Effluent (mg/L)	4	4	5	4	5	4	6	9	7	5	4	4	61			
Loading: TP - WPCP Effluent (kg/d)	1.132	1.487	2.699	1.932	3.366	1.8	2.634	2.179	2.65	2.507	0.831	1.762		2.082	3.366	6.8 kg/d
Percent Removal: TP - Raw Sewage (mg/L)	98.46	94.192	90.543	93.673	89.088	92.627	89.31	92.631	88.339	90.166	96.594	93.712			98.46	
Nitrogen Series:																
Raw: Avg TKN - Raw Sewage (mg/L)	72.7	49.55	38.04	37.975	53.86	53.775	55.725	53.34	55.025	50.7	52.275	55.6		52.38	72.7	
Raw: # of samples of TKN - Raw Sewage (mg/L)	4	4	5	4	5	4	4	5	4	7	4	4	54			
Eff: Avg TAN - WPCP Effluent (mg/L)	16.3	17.025	10.836	10.155	18.72	23.025	19.725	19.02	21.5	20.26	19.05	18.425		17.837	23.025	
Eff: # of samples of TAN - WPCP Effluent (mg/L)	4	4	5	4	5	4	4	5	4	5	4	4	52			
Loading: TAN - WPCP Effluent (kg/d)	69.005	73.374	69.957	63.8	74.838	84.165	68.224	75.67	77.886	79.875	73.632	78.238		74.055	84.165	
Eff: Avg NO3-N - WPCP Effluent (mg/L)	0.6	0.5	1.06	0.875	< 0.2	0.15	0.15	0.12	< 0.65	0.2	0.15	0.25		< 0.409	1.06	
Eff: # of samples of NO3-N - WPCP Effluent (mg/L)	4	4	5	4	5	4	4	5	4	5	4	4	52			
Eff: Avg NO2-N - WPCP Effluent (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.15	< 0.15	< 0.1	< 0.1	< 0.1	< 0.1	< 0.2		< 0.117	< 0.2	
Eff: # of samples of NO2-N - WPCP Effluent (mg/L)	4	4	5	4	5	4	4	5	4	5	4	4	52			
Disinfection:																
Eff: GMD E. Coli - WPCP Effluent (cfu/100mL)	1.682	2	8.025	2	2.993	2	9	9.236	6.535	2	2	2		4.122	9.236	200cfu/100ml
Eff: # of samples of E. Coli - WPCP Effluent (cfu/100mL)	4	4	5	4	5	4	4	5	4	5	4	4	52			

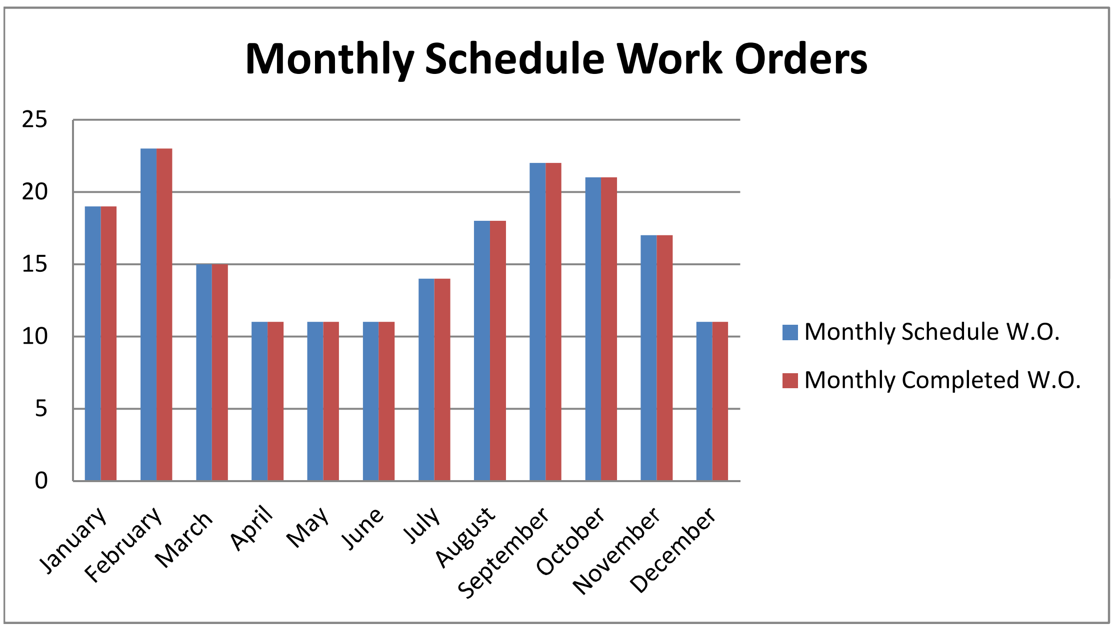
Rockland Water Treament Plant Work Order Status Report





Rockland Wastewater Treament Plant Work Order Status Report





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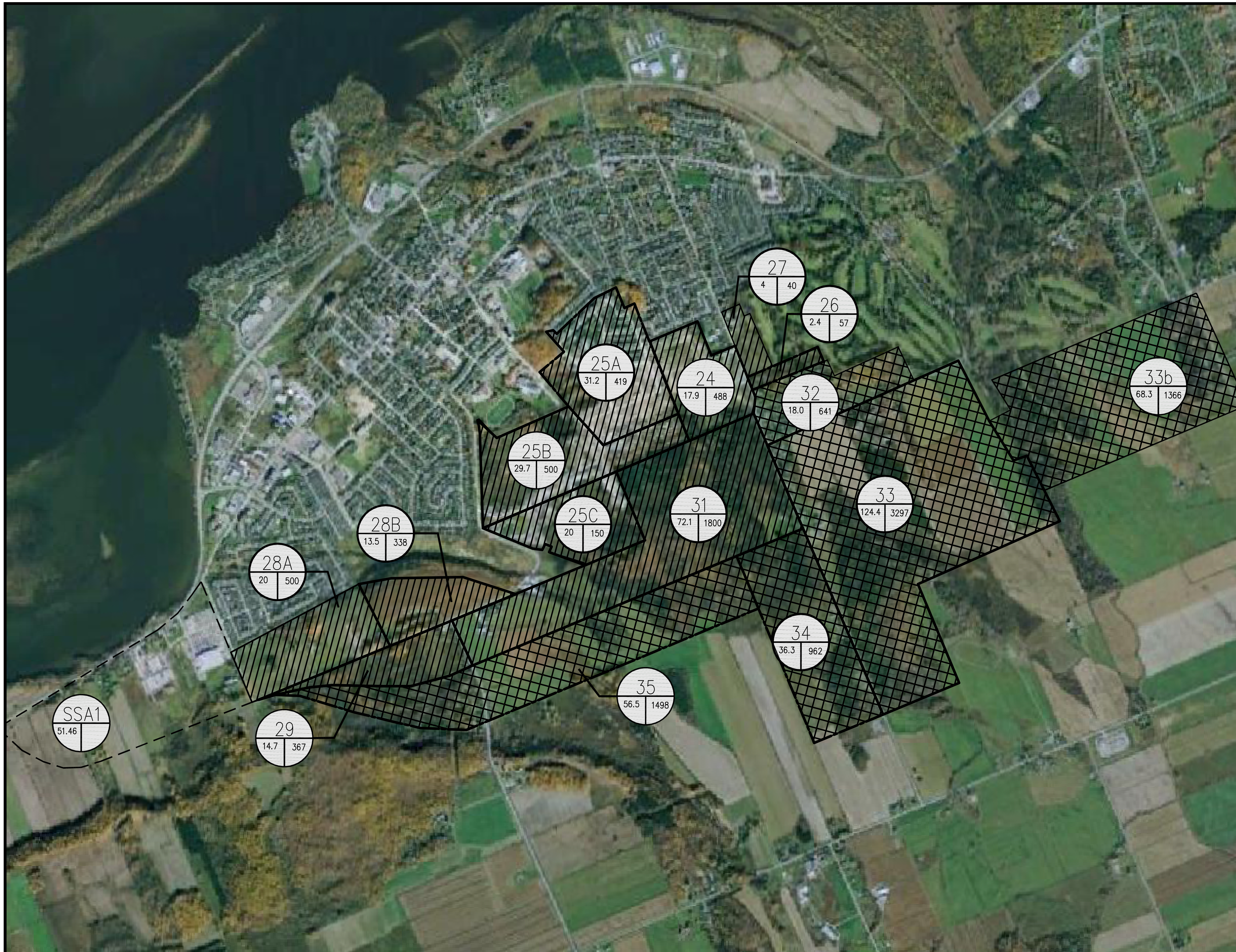
Appendix C

Caron Street Sanitary Sewer Catchment Area, Sewer Calculation Sheet and As-Built Drawings



GENIVAR

1224 GARDINERS ROAD, SUITE 201
KINGSTON, ONTARIO
CANADA K7P 0G2
PHONE: 613-634-7373 FAX: 613-634-3523
WWW.GENIVAR.COM

CLIENT:

CITY OF CLARENCE-ROCKLAND

CLIENT REF. #:

PROJECT:

CARON STREET RECONSTRUCTION

ISSUED FOR – REVISION:

IS	RE	DATE	DESCRIPTION
1		2013/01/23	ISSUED FOR ECA

PROJECT NO: 065038

DATE: MAY, 2010

ORIGINAL SCALE: 1:20000

IF THIS BAR IS NOT 1" LONG, ADJUST YOUR PLOTTING SCALE.

1"

DESIGNED BY: MS

DRAWN BY: MF/MS

CHECKED BY: MM

DISCIPLINE: CIVIL

TITLE:

PROPOSED SANITARY SERVICING AREAS

SHEET NUMBER: SK1.23

SHEET #: -- OF --

ISSUE: ISSUED FOR ECA

DATE OF: JANUARY 23, 2013

REV # 0

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Sanitary Sewer Calculation Sheet

DRAINAGE AREA DESCRIPTION																OUTLET PIPE DATA							
LOCATION	MANHOLE FROM	TO	No.	Ha	CONTRIBUTING AREAS	POPULATION Ppha	P	P(1000)	Σ P(1000)	q l/cap/d)	M	Peak Flow (l/s)	Σ AREA (ha)	IA (l/s)	Q (INCOMMING FROM SIDE STREET) (l/s)	Q (l/s)	SIZE (mm)	Slope (%)	CAP (l/s)	Q/Qfull	VEL (m/s)	LENGTH (m)	FALL (m)
Caron St	SAM250	SAM251	26	2.40		67.50	162	0.162	0.162	400	4.00	3.00	2.4	0.67	-	3.83	200	2.10%	47.53	0.08	1.51	22.8	0.479
Caron St	SAM251	SAM252	32	24.20	26,32	67.50	1633.5	1.6335	1.7955	400	3.62	30.11	26.6	7.45	-	38.97	250	1.16%	64.05	0.61	1.30	55.5	0.644
Caron St	SAM252	SAM253			26,32				1.7955	400	3.62	30.11	26.6	7.45	-	38.97	250	1.29%	67.54	0.58	1.38	33.8	0.436
Caron St	SAM253	SAM254			26,32				1.7955	400	3.62	30.11	26.6	7.45	-	38.97	250	0.60%	46.06	0.85	0.94	62.5	0.375
Caron St	SAM254	SAM255			26,32				1.7955	400	3.62	30.11	26.6	7.45	-	38.97	300	0.40%	61.16	0.64	0.87	96.7	0.387
Caron St	SAMH201	SAMH202	26,32,33,33b,34,35	312.10		67.50	21066.8	21.0668	21.06675	400	2.63	256.49	312.1	87.39	-	343.88	750	0.15%	431.17	0.80	0.98	95.1	0.143
Caron St	SAMH202	SAMH203													241.00	584.88	750	0.40%	704.10	0.83	1.59	100.2	0.401
Caron St	SAMH203	SAMH204													0.00	584.88	750	0.40%	704.10	0.83	1.59	100.2	0.401
Caron St	SAMH204	SAMH205													0.00	584.88	750	0.40%	704.10	0.83	1.59	99.9	0.400
Caron St	SAMH205	SAMH206													0.00	584.88	750	0.40%	704.10	0.83	1.59	99.8	0.399
Caron St	SAMH206	SAMH207													0.00	584.88	750	0.50%	787.20	0.74	1.78	100.1	0.501
Caron St	SAMH207	SAMH208													0.00	584.88	750	0.50%	787.20	0.74	1.78	100.1	0.501
Caron St	SAMH208	SAMH209	Refer to CH2MHILL Master Sanitary Servicing Plan for the South Development Area for respective calculations												16.00	600.88	750	0.50%	787.20	0.76	1.78	100.2	0.501
Caron St	SAMH209	SAMH210													1.00	601.88	750	0.50%	787.20	0.76	1.78	75.8	0.379
Caron St	SAMH210	SAMH211													8.00	609.88	750	0.50%	787.20	0.77	1.78	105.0	0.525
Caron St	SAMH211	SAMH212													1.00	610.88	750	0.50%	787.20	0.78	1.78	99.8	0.499
Caron St	SAMH212	SAMH213													0.00	610.88	900	0.20%	809.59	0.75	1.27	102.3	0.205
Caron St	SAMH213	SAMH214													92.00	702.88	900	0.20%	809.59	0.87	1.27	70.7	0.141
Caron St	SAMH214	SAMH215													21.00	723.88	675	1.00%	840.59	0.86	2.35	93.3	0.933
EXISTING PIPE	SAMH215	EX SAMH216																					
EXISTING PIPE	EX SAMH216	EX SAMH217	Existing Pipes (Covered Under Seperate ECA)																				
EXISTING PIPE	EX SAMH217	MH608																					
Caron St	MH608	PS1														732.80	675	1.00%	840.59	0.87	2.35	94.9	0.949

DESIGN PARAMETER

Mannings n = 0.0130
Average Daily Flow (q)= 400 l/cap/d
Infiltration Rate (I) = 0.28 l/s/ha

Designed By: Matt Scanlan, EIT

Checked By: Matt Morkem, P.Eng

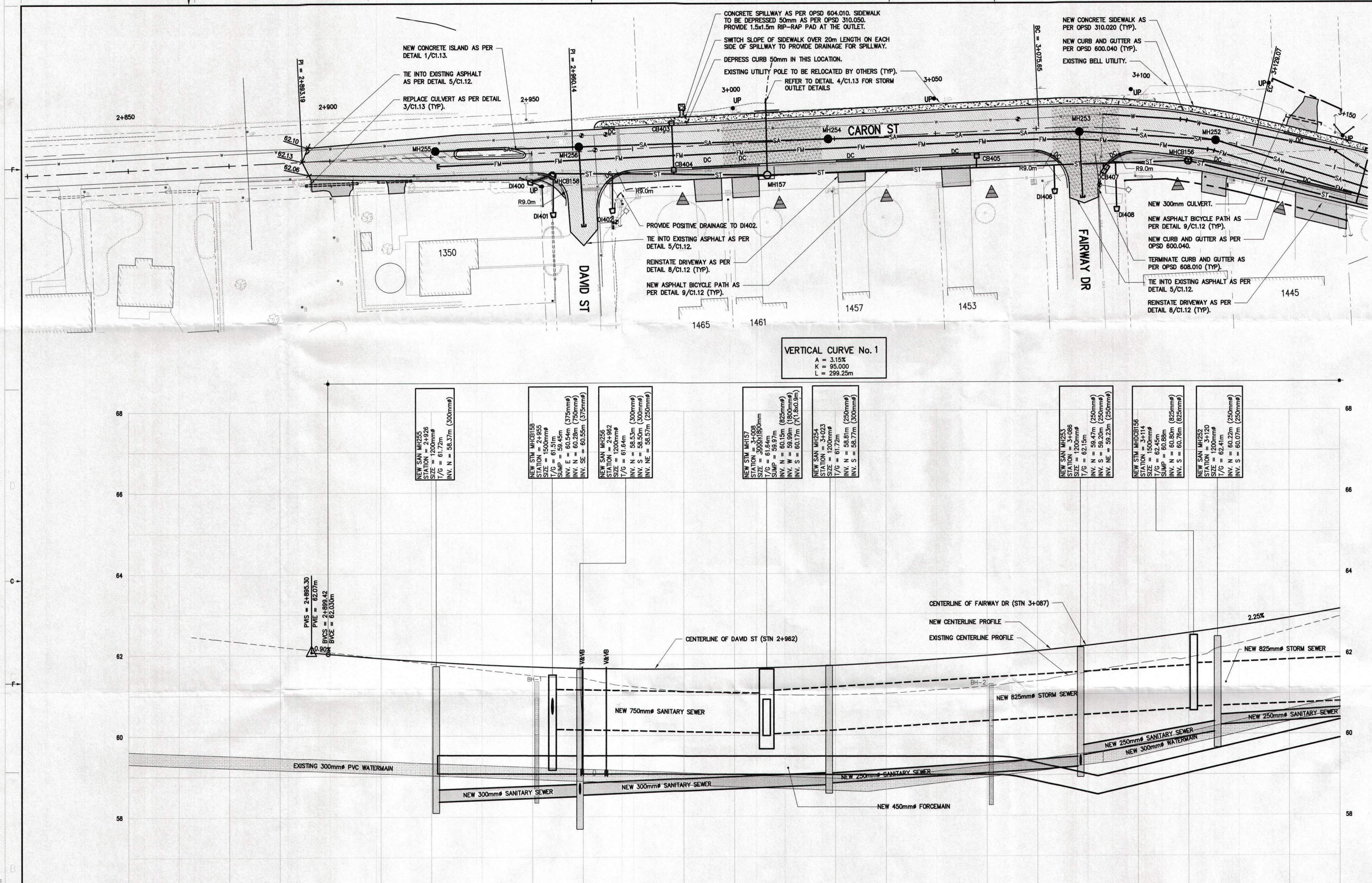
Dwg. Reference: SK1-23rev1 -Sanitary Area

PROJECT: Caron St. Reconstruction

LOCATION: Rockland, Ontario

Project Number: 65038

Date: 29-Apr-13



NOTES:

1. CONTRACTOR TO VERIFY LOCATION OF ALL BURIED SERVICES PRIOR TO START OF CONSTRUCTION.
2. TOPOGRAPHIC INFORMATION PROVIDED BY ARPENTAGE DUTRISAC SURVEYING INC.
3. ALL DISTURBED AREAS TO BE REINSTATED USING 100mm OF TOP SOIL AND SOD (UNLESS OTHERWISE NOTED).
4. SEE DRAWINGS C1.11 TO C1.15 FOR LINE PAINTING AND SIGNAGE DETAILS.

LEGEND:

- EXISTING PROPERTY LINE
- NEW CENTERLINE OF ROAD
- NEW EDGE OF PAVEMENT
- EXISTING EDGE OF PAVEMENT
- NEW CURB
- NEW DEPRESSED CURB
- EXISTING CURB
- NEW EDGE OF SHOULDER
- EXISTING EDGE OF SHOULDER
- NEW DITCH
- EXISTING DITCH
- NEW BOTTOM OF SLOPE
- EXISTING BOTTOM OF SLOPE
- EXISTING TOP OF SLOPE
- EXISTING FENCE
- NEW SANITARY FORCEMAIN
- NEW SANITARY SEWER
- EXISTING SANITARY SEWER
- NEW STORM SEWER
- EXISTING STORM SEWER
- NEW WATERMAIN
- EXISTING WATERMAIN
- EXISTING COMBINED SEWER
- EXISTING GAS LINE
- EXISTING BELL LINE
- NEW GUIDERAIL
- EXISTING GUIDERAIL
- NEW SANITARY MANHOLE
- EXISTING SANITARY MANHOLE
- NEW STORM MANHOLE
- EXISTING STORM MANHOLE
- NEW CATCHBASIN
- NEW DOUBLE CATCHBASIN
- NEW CATCHBASIN DITCH INLET
- EXISTING CATCHBASIN
- NEW HYDRANT
- EXISTING HYDRANT
- NEW VALVE
- EXISTING VALVE
- EXISTING REDUCER
- EXISTING UTILITY POLE
- NEW UTILITY POLE
- UTILITY POLE TO BE RELOCATED
- NEW LIGHT STANDARD
- EXISTING LIGHT STANDARD
- NEW HAND HOLE
- EXISTING HAND HOLE
- EXISTING GAS VALVE
- EXISTING BELL MANHOLE
- EXISTING BELL/CABLE PEDESTAL
- BELL PEDESTAL TO BE MOVED (BY OTHERS)
- EXISTING TREES/HEDGES
- NEW TREES/HEDGES
- NEW BACKFLOW PREVENTOR ON STORM SERVICE @ ℞
- EXISTING BORE HOLE
- SANITARY & WATER SERVICE
- STORM, SANITARY & WATER SERVICE
- NEW TOP OF WALL GRADE
- NEW BOTTOM OF WALL GRADE
- NEW CULVERT
- EXISTING CULVERT
- NEW SIDEWALK
- EXISTING SIDEWALK
- NEW ASPHALT ROADWAY
- NEW ASPHALT DRIVEWAY / PATH
- NEW GRANULAR DRIVEWAY
- NEW FROST TAPER

STATION		2+875	2+900	2+925	2+950	2+975	3+000	3+025	3+050	3+075	3+100	3+125	3+150
CENTERLINE GRADE	FINISHED		62.02	61.83	61.71	61.65	61.66	61.73	61.87	62.07	62.34	62.68	63.08
	EXISTING	62.36	62.07	61.78	61.49	61.21	61.03	60.99	61.11	61.33	61.75	62.24	62.90
TOP OF FORCEMAIN					59.51	59.50	59.49	59.48	59.47	59.30	59.19	59.77	60.35

SANITARY SEWER INVERT: 58.37 — NEW 35.55m 300mmø SANITARY SEWER @ 0.37% — 58.50 / 58.53 — NEW 61.71m 300mmø SANITARY SEWER @ 0.39% — 58.77 / 58.81 — NEW 62.27m 250mmø SANITARY SEWER @ 0.63% — 59.20 / 59.47 — NEW 33.86m 250mmø SANITARY SEWER @ 1.77% — 60.07 / 60.22 — NEW 55.56m 250mmø SANITARY SEWER @ 0.61% — 60.56

STORM SEWER INVERT: 60.28 — NEW 53.00m 750mmø STORM SEWER @ 0.21% — 60.17 / 60.15 — NEW 51.76m 825mmø STORM SEWER @ 0.58% — 60.45 / 60.45 — NEW 52.57m 825mmø STORM SEWER @ 0.58% — 60.76 / 60.80 — NEW 78.96m 825mmø STORM SEWER @ 0.38% — 61.10

SUPERELEVATION:

CURVE 1	CURVE 1	CURVE 1	CURVE 1
-3.00% -3.00%	0.00% -3.00%	3.00% -3.00%	3.00% -3.00%
3+021.25	3+055.25	3+089.25	3+115.46

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CONSULTANT:

SEAL:

CLIENT:

CITY OF CLARENCE-ROCKLAND

CLIENT REF. #:

PROJECT:

RECONSTRUCTION OF CARON STREET

KEY PLAN:

NORTH

ISSUED FOR – REVISION:

IS	RE	DATE	DESCRIPTION
2		NOV 25, 2015	AS-BUILTS
1		AUG 22, 2013	ISSUED FOR CONSTRUCTION

PROJECT NO: 065038/111-55504-00
DATE: NOVEMBER 2015
ORIGINAL SCALE: H: 1:500 V: 1:50
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm
DESIGNED BY: MM/MS
DRAWN BY: MS/STR
CHECKED BY: MM
DISCIPLINE: MUNICIPAL
TITLE:

PLAN & PROFILE OF CARON STREET FROM STA. 2+850 TO STA. 3+150

SHEET NUMBER: C1.1
SHEET #: 1 OF 13
ISSUE: AS-BUILTS
DATE OF: 11/25/2015
REV #: 0

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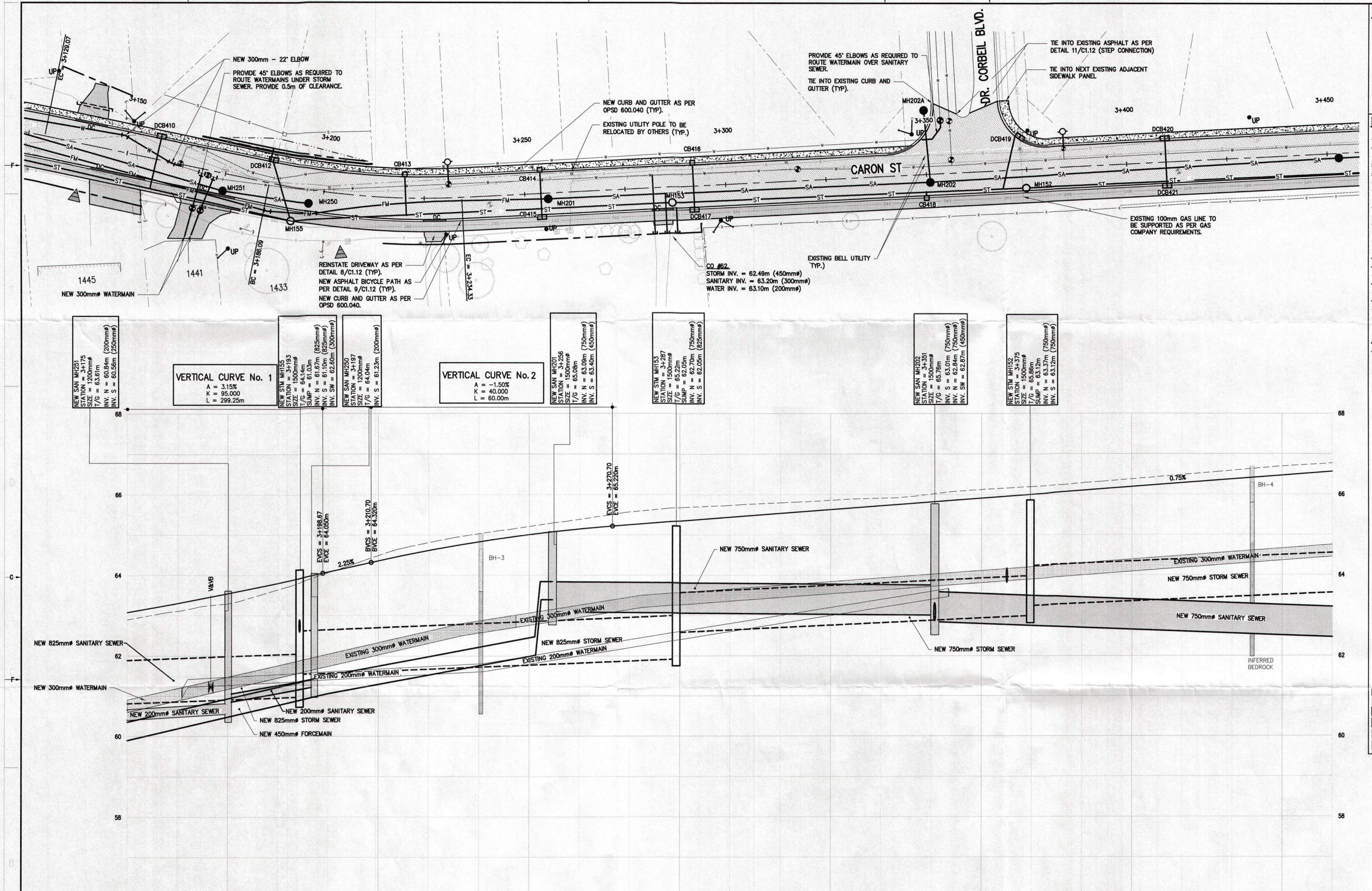
@ DAVID ST.



NOTES:

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2. TOPOGRAPHIC INFORMATION PROVIDED BY ARPENTAGE DUTRISAC SURVEYING INC.
3. ALL DISTURBED AREAS TO BE REINSTATED USING 100mm OF TOP SOIL AND SOD (UNLESS OTHERWISE NOTED).
4. SEE DRAWINGS C1.11 TO C1.15 FOR LINE PAINTING AND SIGNAGE DETAILS.

LEGEND:

EXISTING PROPERTY LINE
NEW CENTERLINE OF ROAD
NEW EDGE OF PAVEMENT
EXISTING EDGE OF PAVEMENT
NEW CURB
NEW DEPRESSED CURB
EXISTING CURB
NEW EDGE OF SHOULDER
EXISTING EDGE OF SHOULDER
NEW DITCH
EXISTING DITCH
NEW BOTTOM OF SLOPE
EXISTING BOTTOM OF SLOPE
EXISTING TOP OF SLOPE
EXISTING FENCE
NEW SANITARY FORCEMAIN
NEW SANITARY SEWER
EXISTING SANITARY SEWER
NEW STORM SEWER
EXISTING STORM SEWER
NEW WATERMAIN
EXISTING WATERMAIN
EXISTING COMBINED SEWER
EXISTING GAS LINE
EXISTING BELL LINE
NEW GUIDERAIL
EXISTING GUIDERAIL
NEW SANITARY MANHOLE
EXISTING SANITARY MANHOLE
NEW STORM MANHOLE
EXISTING STORM MANHOLE
NEW CATCHBASIN
NEW DOUBLE CATCHBASIN
NEW CATCHBASIN DITCH INLET
EXISTING CATCHBASIN
NEW HYDRANT
EXISTING HYDRANT
NEW VALVE
EXISTING VALVE
EXISTING REDUCER
EXISTING UTILITY POLE
NEW UTILITY POLE
UTILITY POLE TO BE RELOCATED
NEW LIGHT STANDARD
EXISTING LIGHT STANDARD
NEW HAND HOLE
EXISTING HAND HOLE
EXISTING GAS VALVE
EXISTING BELL MANHOLE
EXISTING BELL/CABLE PEDESTAL
BELL PEDESTAL TO BE MOVED (BY OTHERS)
EXISTING TREES/HEDGES
NEW TREES/HEDGES
NEW BACKFLOW PREVENTOR ON STORM SERVICE @ ℞
EXISTING BORE HOLE
SANITARY & WATER SERVICE
STORM, SANITARY & WATER SERVICE
NEW TOP OF WALL GRADE
NEW BOTTOM OF WALL GRADE
NEW CULVERT
EXISTING CULVERT
NEW SIDEWALK
EXISTING SIDEWALK
NEW ASPHALT ROADWAY
NEW ASPHALT DRIVEWAY / PATH
NEW GRANULAR DRIVEWAY
NEW FROST TAPER

STATION		3+175	3+200	3+225	3+250	3+275	3+300	3+325	3+350	3+375	3+400	3+425	3+450
CENTERLINE GRADE – FINISHED	63.08	63.55	64.08	64.62	65.01	65.25	65.44	65.63	65.82	66.00	66.19	66.38	66.57
CENTERLINE GRADE – EXISTING	62.90	63.30	64.06	64.81	65.21	65.57	65.73	65.86	66.01	66.19	66.38	66.59	66.77

SANITARY SEWER INVERT	60.22 – NEW 55.56m 250mmø SANITARY SEWER @ 0.61% – 60.56 / 60.84 – NEW 21.68m 200mmø SANITARY SEWER @ 1.80% – 61.23 – 63.09 – NEW 95.09m 750mmø SANITARY SEWER @ 0.08% – 63.01 / 62.84 – NEW 102.03m 750mmø SANITARY SEWER @ 0.39% – 62.45
STORM SEWER INVERT	60.80 – NEW 78.96m 825mmø STORM SEWER @ 0.38% – 61.10 / 61.67 – NEW 95.14m 825mmø STORM SEWER @ 0.40% – 62.05 / 62.70 – NEW 88.06m 750mmø STORM SEWER @ 0.48% – 63.12 / 63.37 – NEW 108.57m 750mmø STORM SEWER @ 0.41% – 63.82
TOP OF FORCEMAIN	61.68 – 62.24 – 62.80 – 63.36 – 63.79 – 63.84
SUPERELEVATION	CURVE 1/2 0.00% 0.00% 3+157.58 – CURVE 2 –3.00% 3.00% 3+199.69 – CURVE 2 –3.00% 3.00% 3+220.72 – CURVE 2 –3.00% 0.00% 3+254.72 – CURVE 2 –3.00% –3.00% 3+288.72

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CONSULTANT:

SEAL:

CLIENT: CITY OF CLARENCE–ROCKLAND

CLIENT REF. #:

PROJECT: RECONSTRUCTION OF CARON STREET

KEY PLAN: NORTH

ISSUED FOR – REVISION:

IS	RE	DATE	DESCRIPTION
2		NOV 25, 2015	AS–BUILTS
1		AUG 22, 2013	ISSUED FOR CONSTRUCTION

PROJECT NO: 065038/111-55504-00
DATE: NOVEMBER 2015
ORIGINAL SCALE: H: 1:500 V: 1:50
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm
DESIGNED BY: MM/MS
DRAWN BY: MS/STR
CHECKED BY: MM
DISCIPLINE: MUNICIPAL
TITLE: PLAN & PROFILE OF CARON STREET FROM STA. 3+150 TO STA. 3+450
SHEET NUMBER: C1.2
SHEET #: 2 OF 13
ISSUE: AS–BUILTS REV # 0
DATE OF: 11/25/2015

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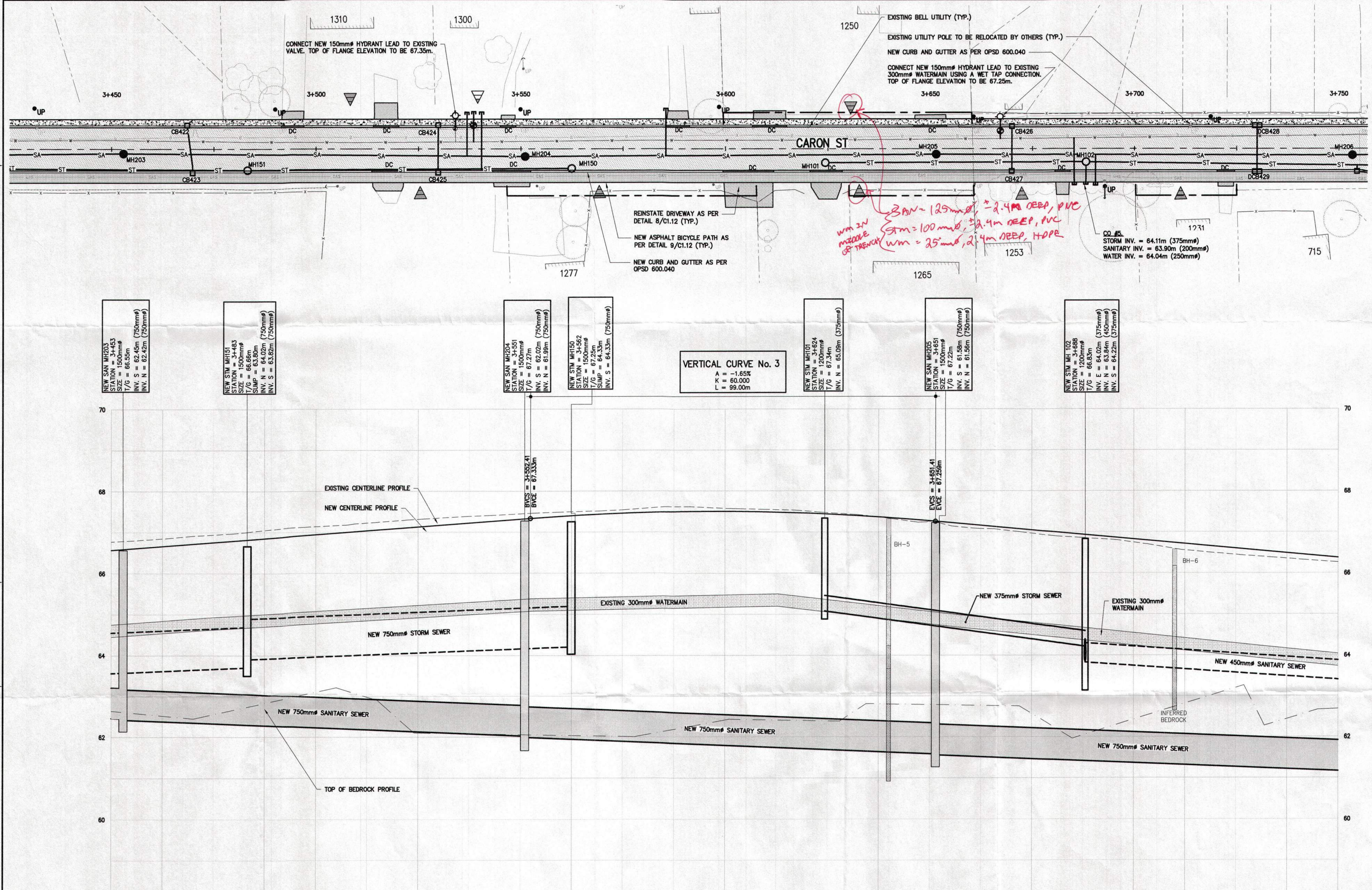
@ DR. CORBEIL BLVD



STATION	3+450	3+475	3+500	3+525	3+550	3+575	3+600	3+625	3+650	3+675	3+700	3+725	3+750
CENTERLINE GRADE – FINISHED	66.57	66.75	66.94	67.13	67.32	67.46	67.50	67.44	67.27	67.05	66.82	66.60	66.37
CENTERLINE GRADE – EXISTING	66.77	66.94	67.14	67.31	67.44	67.54	67.58	67.47	67.26	66.97	66.74	66.44	66.26

SANITARY SEWER INVERT	
62.45 / 62.42	
NEW 98.15m 750mmø SANITARY SEWER @ 0.41%	
62.02 / 61.99	
NEW 100.42m 750mmø SANITARY SEWER @ 0.40%	
61.58 / 61.56	
NEW 101.86m 750mmø SANITARY SEWER @ 0.40%	
61.15	

STORM SEWER INVERT	
63.37	
NEW 108.57m 750mmø STORM SEWER @ 0.41%	
63.82 / 64.02	
NEW 79.18m 750mmø STORM SEWER @ 0.39%	
64.33	
65.09	
NEW 63.75m 375mmø STORM SEWER @ 1.36%	
64.22	

SUPERELEVATION

NOTES:

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LEGEND:

EXISTING PROPERTY LINE
NEW CENTERLINE OF ROAD
NEW EDGE OF PAVEMENT
EXISTING EDGE OF PAVEMENT
NEW CURB
NEW DEPRESSED CURB
EXISTING CURB
NEW EDGE OF SHOULDER
EXISTING EDGE OF SHOULDER
NEW DITCH
EXISTING DITCH
NEW BOTTOM OF SLOPE
EXISTING BOTTOM OF SLOPE
EXISTING TOP OF SLOPE
EXISTING FENCE
NEW SANITARY FORCEMAIN
NEW SANITARY SEWER
EXISTING SANITARY SEWER
NEW STORM SEWER
EXISTING STORM SEWER
NEW WATERMAIN
EXISTING WATERMAIN
EXISTING COMBINED SEWER
EXISTING GAS LINE
EXISTING BELL LINE
NEW GUIDERAIL
EXISTING GUIDERAIL
NEW SANITARY MANHOLE
EXISTING SANITARY MANHOLE
NEW STORM MANHOLE
EXISTING STORM MANHOLE
NEW CATCHBASIN
NEW DOUBLE CATCHBASIN
NEW CATCHBASIN DITCH INLET
EXISTING CATCHBASIN
NEW HYDRANT
EXISTING HYDRANT
NEW VALVE
EXISTING VALVE
EXISTING REDUCER
EXISTING UTILITY POLE
NEW UTILITY POLE
UTILITY POLE TO BE RELOCATED
NEW LIGHT STANDARD
EXISTING LIGHT STANDARD
NEW HAND HOLE
EXISTING HAND HOLE
EXISTING GAS VALVE
EXISTING BELL MANHOLE
EXISTING BELL/CABLE PEDESTAL
BELL PEDESTAL TO BE MOVED (BY OTHERS)
EXISTING TREES/HEDGES
NEW TREES/HEDGES
NEW BACKFLOW PREVENTOR ON STORM SERVICE @ PL
EXISTING BORE HOLE
SANITARY & WATER SERVICE
STORM, SANITARY & WATER SERVICE
TW=54.35 NEW TOP OF WALL GRADE
BW=53.35 NEW BOTTOM OF WALL GRADE
NEW CULVERT
EXISTING CULVERT
NEW SIDEWALK
EXISTING SIDEWALK
NEW ASPHALT ROADWAY
NEW ASPHALT DRIVEWAY / PATH
NEW GRANULAR DRIVEWAY
NEW FROST TAPER

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CONSULTANT:

SEAL:

CLIENT:

CITY OF CLARENCE-ROCKLAND

CLIENT REF. #:

PROJECT:

RECONSTRUCTION OF CARON STREET

KEY PLAN:

NORTH

ISSUED FOR – REVISION:

IS	RE	DATE	DESCRIPTION
2		NOV 25, 2015	AS-BUILTS
1		AUG 22, 2013	ISSUED FOR CONSTRUCTION

PROJECT NO: 065038/111-55504-00
DATE: NOVEMBER 2015
ORIGINAL SCALE: H: 1:500 V: 1:50
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm
DESIGNED BY: MM/MS
DRAWN BY: MS/STR
CHECKED BY: MM
DISCIPLINE: MUNICIPAL
TITLE:

PLAN & PROFILE OF CARON STREET FROM STA. 3+450 TO STA. 3+750

SHEET NUMBER: C1.3
SHEET #: 3 OF 13
ISSUE: AS-BUILTS
DATE OF: 11/25/2015
REV #: 0

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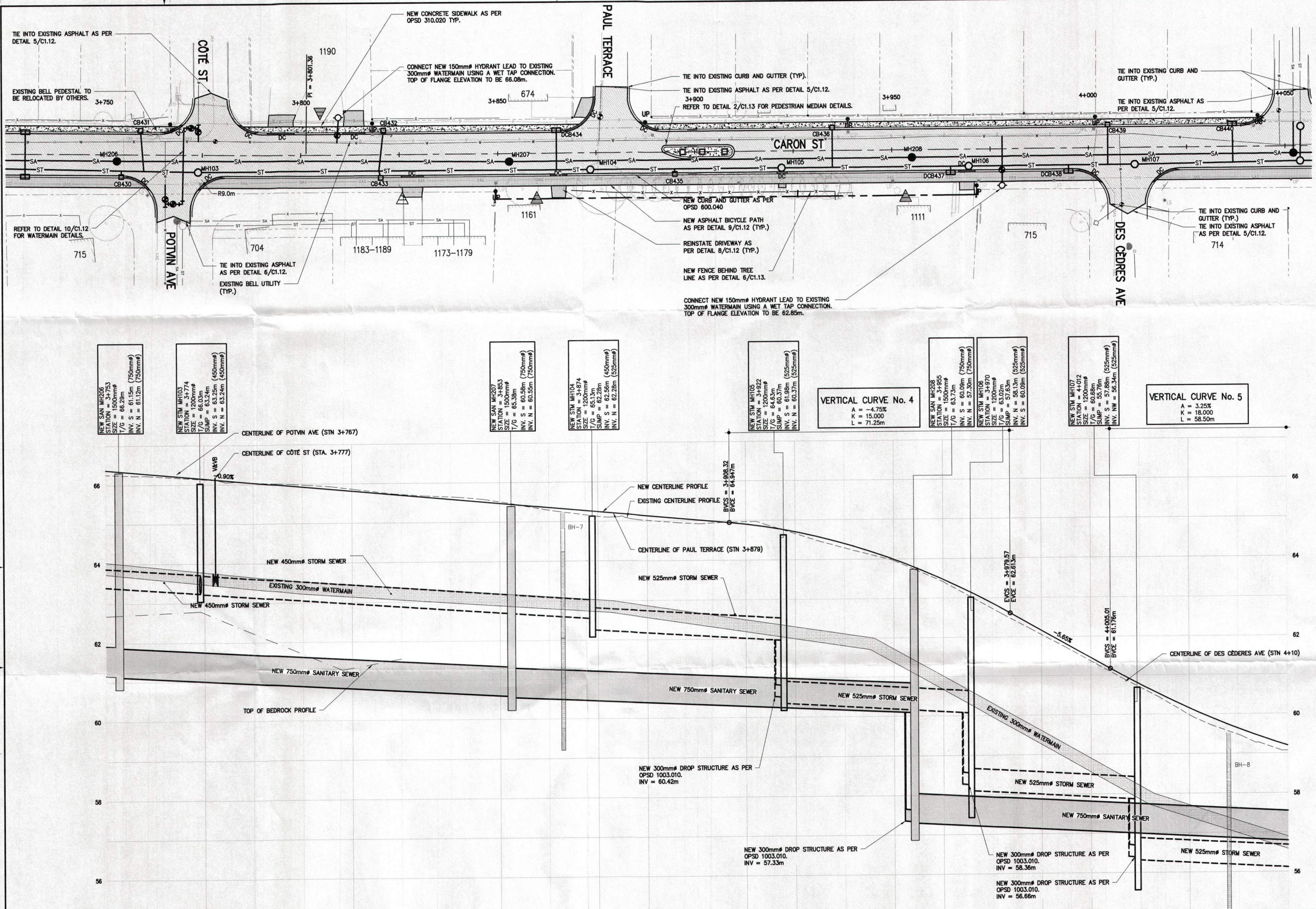

STATION	3+775	3+800	3+825	3+850	3+875	3+900	3+925	3+950	3+975	4+000	4+025	4+050
CENTERLINE GRADE — FINISHED (66.37 at start)	66.15	65.92	65.70	65.47	65.25	65.02	64.70	63.99	62.86	61.46	60.16	59.20
CENTERLINE GRADE — EXISTING (66.26 at start)	66.13	65.97	65.72	65.51	65.13	64.92	64.66	63.96	62.73	61.37	59.98	59.06

SANITARY SEWER INVERT: 61.15 / 61.12 — NEW 99.60m 750mmø SANITARY SEWER @ 0.55% — 60.58 / 60.55 — NEW 102.23m 750mmø SANITARY SEWER @ 0.45% — 60.09 / 57.30 — NEW 97.01m 750mmø SANITARY SEWER @ 0.53% — 56.78

STORM SEWER INVERT: 63.24 — NEW 99.64m 450mmø STORM SEWER @ 0.68% — 62.56 / 62.28 — NEW 48.51m 525mmø STORM SEWER @ 0.62% — 61.98 / 60.37 — NEW 47.51m 525mmø STORM SEWER @ 0.59% — 60.09 / 58.13 — NEW 42.21m 525mmø STORM SEWER @ 0.59% — 57.88 / 56.34 — NEW 42.08m 525mmø STORM SEWER @ 0.52% — 56.12

SUPERELEVATION

NOTES:

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3. ALL DISTURBED AREAS TO BE REINSTATED USING 100mm OF TOP SOIL AND SOD (UNLESS OTHERWISE NOTED).
4. SEE DRAWINGS C1.11 TO C1.15 FOR LINE PAINTING AND SIGNAGE DETAILS.

LEGEND:

EXISTING PROPERTY LINE
NEW CENTERLINE OF ROAD
NEW EDGE OF PAVEMENT
EXISTING EDGE OF PAVEMENT
NEW CURB
DC NEW DEPRESSED CURB
EXISTING CURB
NEW EDGE OF SHOULDER
EXISTING EDGE OF SHOULDER
NEW DITCH
EXISTING DITCH
NEW BOTTOM OF SLOPE
EXISTING BOTTOM OF SLOPE
EXISTING TOP OF SLOPE
EXISTING FENCE
FM NEW SANITARY FORCEMAIN
SA NEW SANITARY SEWER
SA EXISTING SANITARY SEWER
ST NEW STORM SEWER
ST EXISTING STORM SEWER
W NEW WATERMAIN
W EXISTING WATERMAIN
COMB EXISTING COMBINED SEWER
GAS EXISTING GAS LINE
B EXISTING BELL LINE
NEW GUIDERAIL
EXISTING GUIDERAIL
NEW SANITARY MANHOLE
EXISTING SANITARY MANHOLE
NEW STORM MANHOLE
EXISTING STORM MANHOLE
NEW CATCHBASIN
NEW DOUBLE CATCHBASIN
NEW CATCHBASIN DITCH INLET
EXISTING CATCHBASIN
NEW HYDRANT
EXISTING HYDRANT
NEW VALVE
EXISTING VALVE
EXISTING REDUCER
UP EXISTING UTILITY POLE
UP NEW UTILITY POLE
UP UTILITY POLE TO BE RELOCATED
LS NEW LIGHT STANDARD
LS EXISTING LIGHT STANDARD
NEW HAND HOLE
EXISTING HAND HOLE
GV EXISTING GAS VALVE
B EXISTING BELL MANHOLE
B C EXISTING BELL/CABLE PEDESTAL
BELL PEDESTAL TO BE MOVED (BY OTHERS)
EXISTING TREES/HEDGES
NEW TREES/HEDGES
BFP NEW BACKFLOW PREVENTOR ON STORM SERVICE @ PL
BH 1 EXISTING BORE HOLE
SANITARY & WATER SERVICE
STORM, SANITARY & WATER SERVICE
TW-54.35 NEW TOP OF WALL GRADE
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NEW CULVERT
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CONSULTANT:

SEAL:

CLIENT:

CITY OF CLARENCE-ROCKLAND

CLIENT REF. #:

PROJECT:

RECONSTRUCTION OF CARON STREET

KEY PLAN:

NORTH

ISSUED FOR – REVISION:

IS	RE	DATE	DESCRIPTION
2		NOV 25, 2015	AS-BUILTS
1		AUG 22, 2013	ISSUED FOR CONSTRUCTION

PROJECT NO: 065038/111-55504-00
DATE: NOVEMBER 2015
ORIGINAL SCALE: H: 1:500 V: 1:50
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm
DESIGNED BY: MM/MS
DRAWN BY: MS/STR
CHECKED BY: MM
DISCIPLINE: MUNICIPAL
TITLE: PLAN & PROFILE OF CARON STREET FROM STA. 3+750 TO STA. 4+050
SHEET NUMBER: C1.4
SHEET #: 4 OF 13
ISSUE: AS-BUILTS
DATE OF: 11/25/2015
REV #: 0

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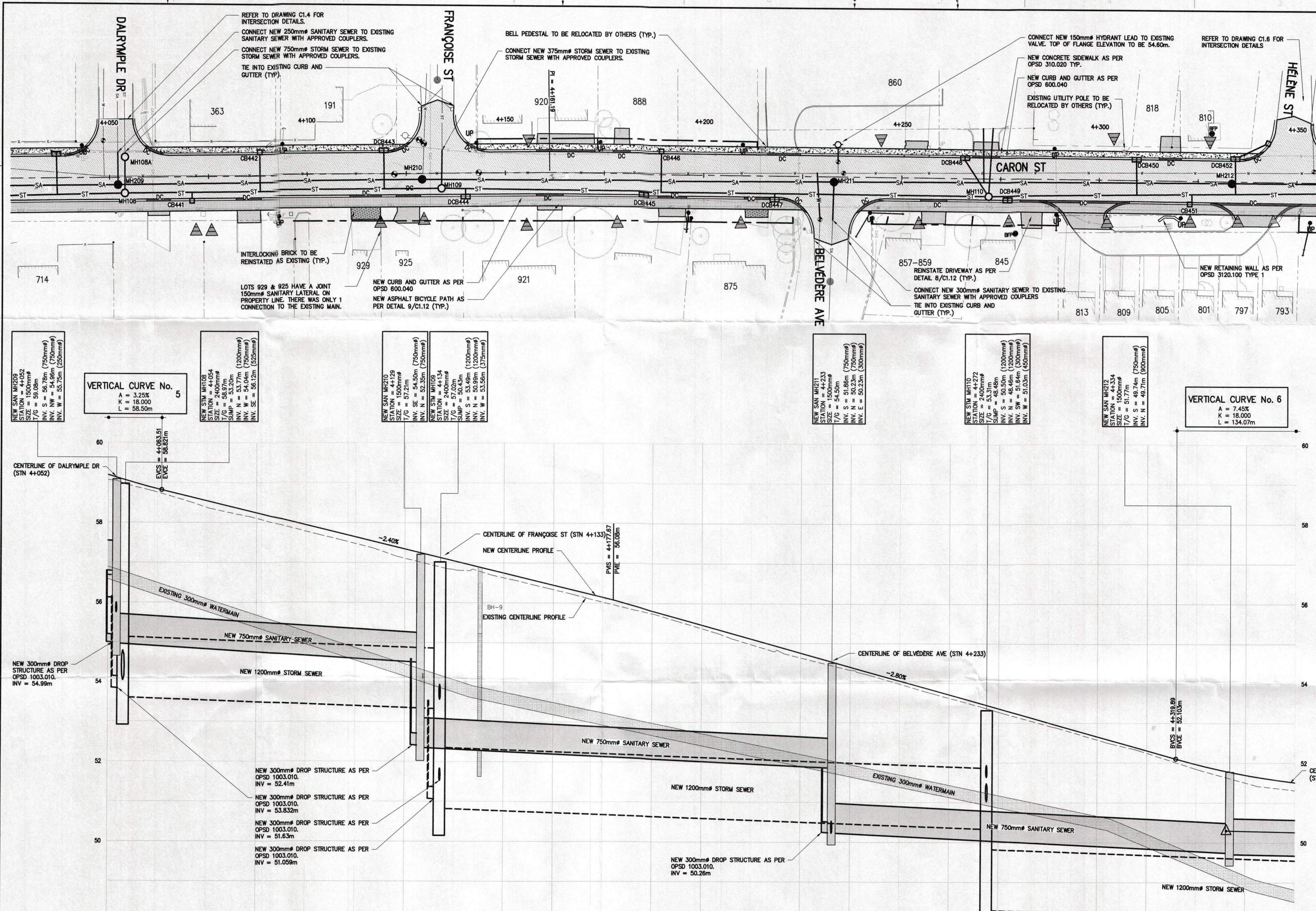

STATION	4+052	4+075	4+100	4+125	4+150	4+175	4+200	4+225	4+250	4+275	4+300	4+325	4+350
CENTERLINE GRADE – FINISHED	59.20	58.55	57.95	57.35	56.75	56.15	55.46	54.76	54.06	53.36	52.66	51.97	51.51
CENTERLINE GRADE – EXISTING	59.06	58.37	57.78	57.11	56.62	56.02	55.37	54.64	53.98	53.27	52.58	51.85	51.32

SANITARY SEWER INVERT: 56.78 / 54.96 — NEW 76.88m 750mmø SANITARY SEWER @ 0.60% — 54.50 / 52.35 — NEW 103.88m 750mmø SANITARY SEWER @ 0.47% — 51.86 / 50.23 — NEW 100.65m 750mmø SANITARY SEWER @ 0.49% — NEW 100.01m 900mmø SANITARY SEWER @ 0.21% — 49.74 / 49.71 — 49.50

STORM SEWER INVERT: 56.34 / 55.12 / 53.77 — NEW 80.07m 1200mmø STORM SEWER @ 0.35% — 53.49 / 50.99 — NEW 138.03m 1200mmø STORM SEWER @ 0.35% — 50.50 / 48.46 — NEW 110.05m 1200mmø STORM SEWER @ 0.35% — 48.07

SUPERELEVATION: NEW 42.08m 525mmø STORM SEWER @ 0.52%

NOTES:

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3. ALL DISTURBED AREAS TO BE REINSTATED USING 100mm OF TOP SOIL AND SOD (UNLESS OTHERWISE NOTED).
4. SEE DRAWINGS C1.11 TO C1.15 FOR LINE PAINTING AND SIGNAGE DETAILS.

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NEW CENTERLINE OF ROAD
NEW EDGE OF PAVEMENT
EXISTING EDGE OF PAVEMENT
NEW CURB
NEW DEPRESSED CURB
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NEW EDGE OF SHOULDER
EXISTING EDGE OF SHOULDER
NEW DITCH
EXISTING DITCH
NEW BOTTOM OF SLOPE
EXISTING BOTTOM OF SLOPE
EXISTING TOP OF SLOPE
EXISTING FENCE
NEW SANITARY FORCEMAIN
NEW SANITARY SEWER
EXISTING SANITARY SEWER
NEW STORM SEWER
EXISTING STORM SEWER
NEW WATERMAIN
EXISTING WATERMAIN
EXISTING COMBINED SEWER
EXISTING GAS LINE
EXISTING BELL LINE
NEW GUIDERAIL
EXISTING GUIDERAIL
NEW SANITARY MANHOLE
EXISTING SANITARY MANHOLE
NEW STORM MANHOLE
EXISTING STORM MANHOLE
NEW CATCHBASIN
NEW DOUBLE CATCHBASIN
NEW CATCHBASIN DITCH INLET
EXISTING CATCHBASIN
NEW HYDRANT
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NEW VALVE
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EXISTING REDUCER
EXISTING UTILITY POLE
NEW UTILITY POLE
UTILITY POLE TO BE RELOCATED
NEW LIGHT STANDARD
EXISTING LIGHT STANDARD
NEW HAND HOLE
EXISTING HAND HOLE
EXISTING GAS VALVE
EXISTING BELL MANHOLE
EXISTING BELL/CABLE PEDESTAL
BELL PEDESTAL TO BE MOVED (BY OTHERS)
EXISTING TREES/HEDGES
NEW TREES/HEDGES
NEW BACKFLOW PREVENTOR ON STORM SERVICE @ ℄
EXISTING BORE HOLE
SANITARY & WATER SERVICE
STORM, SANITARY & WATER SERVICE
NEW TOP OF WALL GRADE
NEW BOTTOM OF WALL GRADE
NEW CULVERT
EXISTING CULVERT
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EXISTING SIDEWALK
NEW ASPHALT ROADWAY
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CONSULTANT:

SEAL:

CLIENT: CITY OF CLARENCE-ROCKLAND

CLIENT REF. #:

PROJECT: RECONSTRUCTION OF CARON STREET

KEY PLAN: NORTH

ISSUED FOR – REVISION:

IS	RE	DATE	DESCRIPTION
2		NOV 25, 2015	AS-BUILTS
1		AUG 22, 2013	ISSUED FOR CONSTRUCTION

PROJECT NO.: 065038/111-55504-00
DATE: NOVEMBER 2015
ORIGINAL SCALE: H: 1:500 V: 1:50
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DESIGNED BY: MM/MS
DRAWN BY: MS/STR
CHECKED BY: MM
DISCIPLINE: MUNICIPAL
TITLE: PLAN & PROFILE OF CARON STREET FROM STA. 4+050 TO STA. 4+350
SHEET NUMBER: C1.5
SHEET #: 5 OF 13
ISSUE: AS-BUILTS
DATE OF: 11/25/2015
REV #: 0

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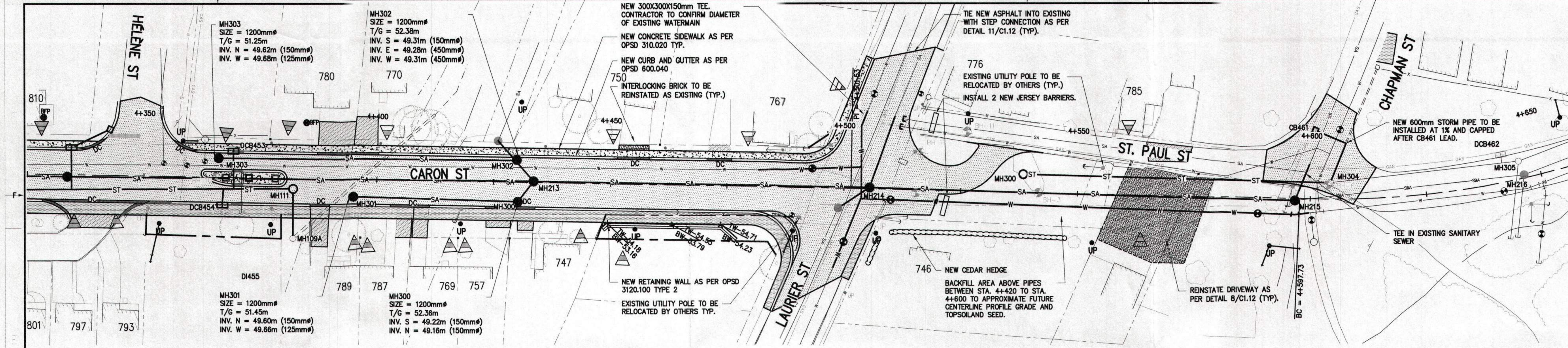

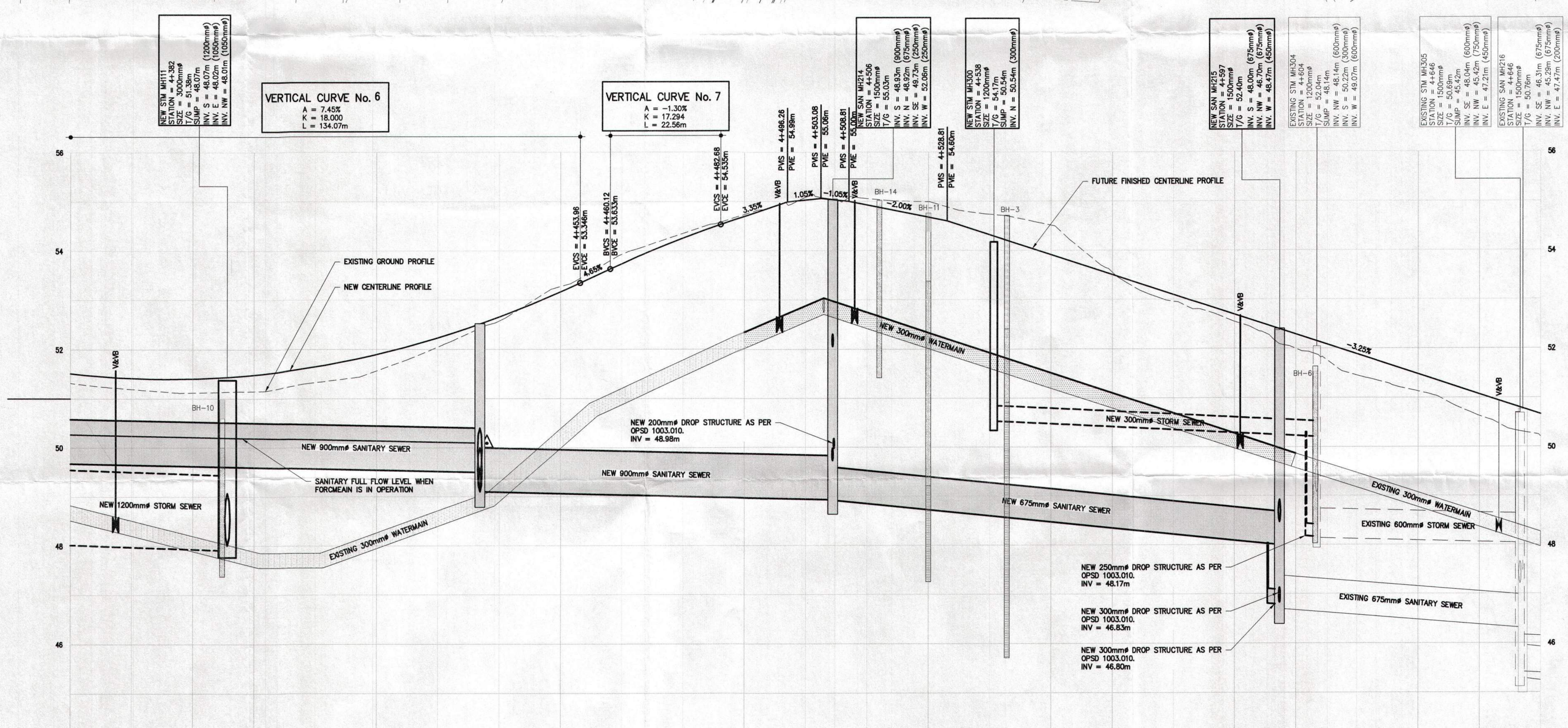

STATION		4+375	4+400	4+425	4+450	4+475	4+500	4+525	4+550	4+575	4+600	4+625	4+650
CENTERLINE GRADE FINISHED	51.51	51.41	51.65	52.23	53.17	54.26	55.03	54.68	53.91	53.10	52.29	51.47	50.66
CENTERLINE GRADE EXISTING	51.32	51.12	51.32	52.05	53.27	54.35	55.09	54.99	54.51	52.96	51.99	51.13	50.21
TOP OF WATERMAIN	48.82	48.20	47.85	48.72	50.39	51.78	52.88	52.33	51.51	50.69			

SANITARY SEWER INVERT	49.71 — NEW 100.01m 900mmø SANITARY SEWER @ 0.21% — 49.50 / 49.10 — NEW 71.94m 900mmø SANITARY SEWER @ 0.24% — 48.93 / 48.92 — NEW 91.19m 675mmø SANITARY SEWER @ 1.01% — 48.00 / 46.70 — EX. 49.51m 675mmø SANITARY SEWER @ 0.79% — 46.31 / 45.29 / 44.23
STORM SEWER INVERT	48.46 — NEW 110.05m 1200mmø STORM SEWER @ 0.35% — 48.07 ; 50.54 — NEW 65.92m 300mmø STORM SEWER @ 0.49% — 50.22 / 48.14 — EX. 40.59m 600mmø STORM SEWER @ 0.25% — 48.04 / 45.42 / 44.98
SUPERELEVATION	CURVE 3: −3.00% −3.00% 4+543.33; CURVE 3: −3.00% −0.00% 4+577.33; CURVE 3: −3.00% 3.00% 4+611.33

NOTES:

1. CONTRACTOR TO VERIFY LOCATION OF ALL BURIED SERVICES PRIOR TO START OF CONSTRUCTION.
2. TOPOGRAPHIC INFORMATION PROVIDED BY ARPENTAGE DUTRISAC SURVEYING INC.
3. ALL DISTURBED AREAS TO BE REINSTATED USING 100mm OF TOP SOIL AND SOD (UNLESS OTHERWISE NOTED).
4. SEE DRAWINGS C1.11 TO C1.15 FOR LINE PAINTING AND SIGNAGE DETAILS.

LEGEND:

EXISTING PROPERTY LINE
NEW CENTERLINE OF ROAD
NEW EDGE OF PAVEMENT
EXISTING EDGE OF PAVEMENT
NEW CURB
NEW DEPRESSED CURB
EXISTING CURB
NEW EDGE OF SHOULDER
EXISTING EDGE OF SHOULDER
NEW DITCH
EXISTING DITCH
NEW BOTTOM OF SLOPE
EXISTING BOTTOM OF SLOPE
EXISTING TOP OF SLOPE
EXISTING FENCE
NEW SANITARY FORCEMAIN
NEW SANITARY SEWER
EXISTING SANITARY SEWER
NEW STORM SEWER
EXISTING STORM SEWER
NEW WATERMAIN
EXISTING WATERMAIN
EXISTING COMBINED SEWER
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SEAL:

CLIENT:

CITY OF CLARENCE-ROCKLAND

CLIENT REF. #:

PROJECT:

RECONSTRUCTION OF CARON STREET

KEY PLAN:

NORTH

ISSUED FOR – REVISION:

IS	RE	DATE	DESCRIPTION
2		NOV 25, 2015	AS-BUILTS
1		AUG 22, 2013	ISSUED FOR CONSTRUCTION

PROJECT NO: 065038/111-55504-00
DATE: NOVEMBER 2015
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TITLE:

PLAN & PROFILE OF CARON STREET FROM STA. 4+350 TO STA. 4+650

SHEET NUMBER: C1.6
SHEET #: 6 OF 13
ISSUE: AS-BUILTS
DATE OF: 11/25/2015
REV #: 0

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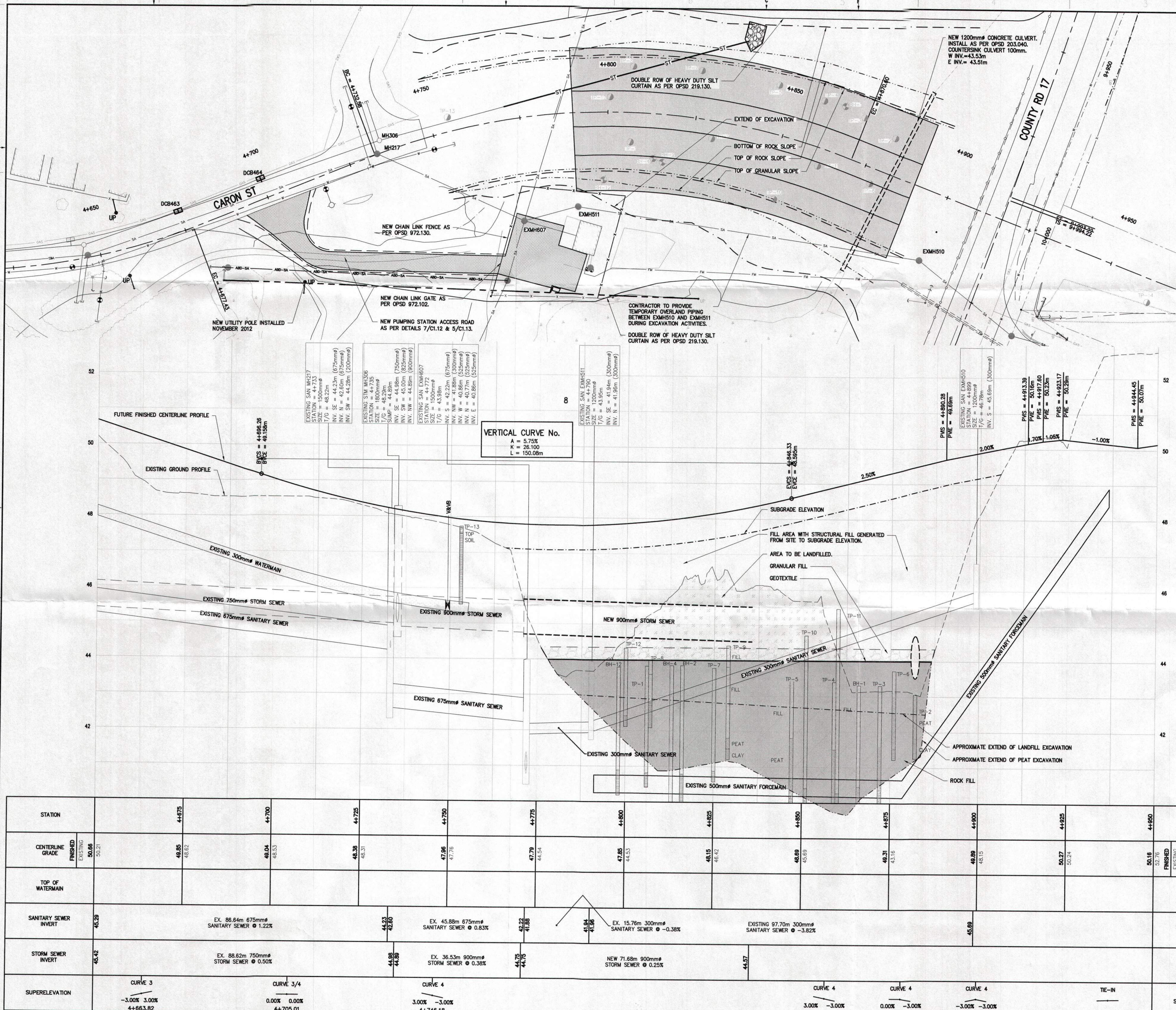

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NEW EDGE OF PAVEMENT
EXISTING EDGE OF PAVEMENT
NEW CURB
DC NEW DEPRESSED CURB
EXISTING CURB
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EXISTING EDGE OF SHOULDER
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EXISTING DITCH
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EXISTING BOTTOM OF SLOPE
EXISTING TOP OF SLOPE
EXISTING FENCE
FM NEW SANITARY FORCEMAIN
SA NEW SANITARY SEWER
SA EXISTING SANITARY SEWER
ST NEW STORM SEWER
ST EXISTING STORM SEWER
W NEW WATERMAIN
W EXISTING WATERMAIN
COMB EXISTING COMBINED SEWER
GAS EXISTING GAS LINE
B EXISTING BELL LINE
NEW GUIDERAIL
EXISTING GUIDERAIL
NEW SANITARY MANHOLE
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UP UTILITY POLE TO BE RELOCATED
LS NEW LIGHT STANDARD
LS EXISTING LIGHT STANDARD
HH NEW HAND HOLE
HH EXISTING HAND HOLE
GV EXISTING GAS VALVE
B EXISTING BELL MANHOLE
B C EXISTING BELL/CABLE PEDESTAL
BELL PEDESTAL TO BE MOVED (BY OTHERS)
EXISTING TREES/HEDGES
NEW TREES/HEDGES
BFP NEW BACKFLOW PREVENTOR ON STORM SERVICE @ PL
BH 1 EXISTING BORE HOLE
SANITARY & WATER SERVICE
STORM, SANITARY & WATER SERVICE
TW-54.35 NEW TOP OF WALL GRADE
BW-53.35 NEW BOTTOM OF WALL GRADE
NEW CULVERT
EXISTING CULVERT
NEW SIDEWALK
EXISTING SIDEWALK
NEW ASPHALT ROADWAY
NEW ASPHALT DRIVEWAY / PATH
NEW GRANULAR DRIVEWAY
NEW FROST TAPER

VERTICAL CURVE #8

STA.	ELEVATION
4+694.89	49.221
4+700	49.06
4+710	48.77
4+720	48.53
4+730	48.32
4+740	48.15
4+750	48.01
4+760	47.92
4+770	47.86
4+780	47.84
4+790	47.86
4+800	47.92
4+810	48.02
4+820	48.16
4+830	48.33
4+840	48.54
4+844.89	48.658

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CLIENT REF. #:

PROJECT:

RECONSTRUCTION OF CARON STREET

KEY PLAN:

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DISCIPLINE: MUNICIPAL
TITLE:

PLAN & PROFILE OF CARON STREET
FROM STA. 4+650 TO STA. 4+950

SHEET NUMBER: C1.7
SHEET #: 7 OF 13
ISSUE: AS-BUILTS
DATE OF: 11/25/2015
REV #: 0

C5

Appendix C

Sewage Pumping Station Capacity and Condition Assessment and Sanitary Treatment Facility Capacity and

Capital Investment

Report Excerpt

3. Pumping Station Capacity Assessment

3.1 Capacity

The detailed pump test data and flow calculation are included in Appendix G. A summary of the station capacities, average flows & firm capacity are presented below. In cases where data was inconclusive and inconsistent, SCADA information was gathered to supplement the pump tests.

Pump capacities were determined by running the pumps and measuring the drop in the wet well level over a measured time period. The volume pumped was calculated using the difference in level and the area of the wet well. This was divided by the elapsed time to determine the pump capacity. The inflow immediately before and/or after the pump test was also recorded, averaged and added to the pump capacity to determine the total pump capacity.

Pump test that appear to have inaccurate and inconsistent results due to unavailability of pumps, level sensor inaccuracies and other issues were reviewed against SCADA level and time data provided by the OCWA to correlate pump capacities.

Table 3-1 presents the results from the recent pump tests as well as the previous test completed in 2005 (CH2MHILL)

Table 3-1: Pump Station Capacities

Pumping Station	Pump Number	Rated Capacity	2005 Pump Test (L/s)	2005 Average for all Pumps (L/s)	2013 Pump Test (L/s)	2013 Average for all Pumps	Firm Capacity (L/s)
1	1	170.5	130.1	104.1	143.8	124.2	200[5]
	2	170.5	110.4		139.7		
	3	94.7	71.9		89.1		
2	1	63.0	81.0	79.1	50.09[1]	73.9[2]	70.7[4]
	2	63.0	77.1		73.93		
3	1	28.4	23.1	31.5	N/A[3]	33.9[2]	31.8[4]
	2	28.4	26.6		39.8		
4	1	49.0	25.7	31.5	22.0[1]	31.2[2]	28.1[4]
	2	49.0	37.2		37.4		
5	1	31.0	29.8	31.7	26.9	25.6	24.3
	2	31.0	33.6		24.3		
6	1	19.5	24.8	24.5	9.5[1]	21.7[2]	18.6[4]
	2	19.5	24.1		N/A[3]		
7	1	65.4	New PS - No flow sources connected to PS				
	2	65.4					

Inflow and infiltration for the ultimate build out was reviewed and varied to account for the actually flows, topography and age of infrastructure to ensure that projected flows are accurate. The Peak Instantaneous Flows values are compared to the current firm capacities to indicate the short, intermediate and ultimate effects on the pumping stations.

Table 3-8 presents the firm capacity of each pumping station in relation to the projected Peak Instantaneous flow data and the required Increase to meet the project time period.

Table 3-8: 2018 Flow Data Summary

Pump Station	Firm Capacity	2018		2023		Ultimate	
		Peak Inst. Flow (L/s)	Required Increase (L/s)	Peak Inst. Flow (L/s)	Required Increase (L/s)	Peak Inst. Flow (L/s)	Required Increase (L/s)
1	200±	233.65	33.65	267.72	67.72	837.2	637.2
2	70.7	111.84	41.14	128.15	57.45	121.6	50.9
3	31.8	85.48	53.68	97.95	66.15	107.5	75.7
4	28.1	87.33	59.23	100.07	71.97	98.1	70.0
5	24.3	39.18	14.88	44.89[1]	20.59	74.1	49.8
6	18.6	49.86	31.26	57.13	38.53	50.0	31.4
7	59.0[2]	N/A	N/A	N/A	N/A	74.3	15.3

1. Max. Daily Flow shown for minimum required increase. Flow monitoring should be conducted to determine Peak Instantaneous Flow
2. Design value from CofA permit

The current size of the forcemain's would allow upgrades to the pumping station equipment alone without increasing the size of the forcemain's (i.e. velocities <3m/s), except pumping station No. 1. Pumping station No.1 would be able to be upgraded to the intermediate date and beyond but the forcemain would need further upgrades to handle to ultimate flows.

3.4 Recommended Upgrades

In general, the stations typically operate effectively; however the majority of the pumping station have reached or exceeded their anticipated design flows and life expectancy. Below are some recommendations with regards to capacity issues but does not relate to the maintenance and repair items identified in the above section

Pumping Station #1

It appears that some maintenance and repairs have been completed to the pumping station and have increased the firm capacity from 170L/s (2005) to approximately 200L/s (2013). These modifications bring the firm capacity in conformance with the MOE guidelines for 2013; however there is no further room for growth at this pumping station. It appears that the station will require an upgrade to continue to services this catchment area and provide room for growth. Modifications to the pumps and piping could be accommodated to increase firm capacity at an approximate cost ranging from $350K to 2 million. Refer to the Appendix C for a detailed review of the pumping station and recommended.

6. Capital Investment Plan

6.1 Pumping Stations

During the condition assessment items were identified that required maintenance and repairs. These items were prioritized and the summary of the combined costs for each level of maintenance and repair costs for each pumping station is provided in Table 6.1.

Table 6.1 – Summary of Maintenance and Repair Costs

Maintenance/Repair		PS#1	PS#2	PS#3	PS#4	PS#5	PS#6	PS#7	Total
LEVEL 1 ITEMS	1	$40,000	$39,750	$20,500	$21,300	$28,500	$19,500	$50,000	$219,550
LEVEL 2 ITEMS	2	$49,150	$29,750	$23,250	$26,800	$15,250	$27,000	$12,250	$183,650
LEVEL 3 ITEMS	3	$80,850	$8,500	$18,500	$2,050	$5,150	$7,500	$13,500	$136,050
LEVEL 4 ITEMS	4	$7,000	$600	$10,200	$0	$1,500	$0	$0	$19,300
TOTAL		$135,000	$78,600	$72,950	$50,150	$50,400	$54,000	$75,750	$516,850

Additionally, capacity upgrades are required to meet the current and future growth.

Table 6.2 – Capital Upgrades at Pumping Stations

Pumping Station	Cost
No.1	$350,000 – $2,000,000
No. 2	$600,00 – $800,000
No. 3	$600,000 – $800,000
TOTAL	$1,550,000 – $3,600,000

6.2 SCADA Upgrades

It order to monitor and control the pumping stations from one central location, the Township can upgrade all of the sewage pumping stations with PLC based control panels. An estimate for this cost is presented in Table 6.2.

Table 5.2 – SCADA Upgrade

Component	# Units	Unit Price	Total Cost
PS PLC Control Panels	7	$20,000	$140,000
HUB Computer, Software, and Printer	1	$20,000	$20,000
Integration of Hub Computer with WTP or WWTP SCADA System	1	$20,000	$20,000
	Total Construction SCADA Upgrade		$180,000
Engineering	LS	%15	$27,000
		Total SCADA Cost	$207,000

Ministry of Environment and Energy

Ministère de l'Environnement et de l'Énergie

Ontario

AMENDED CERTIFICATE OF APPROVAL
SEWAGE
NUMBER 3-0466-93-967

Town of Rockland
1560 Laurier Street
Rockland, Ontario
K4K 1L5

RECEIVED
FEB 14 1996
ONTARIO CLEAN WATER AGENCY

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

Expansion of the existing sewage treatment plant (consisting of an aerated lagoon system) having a rated capacity of 3,340 m^3/d to a new modified plant consisting of a Sequential Batch Reactor (SBR) treatment process and associated appurtenances having a rated capacity of 6,800 m^3/d, located on part of Lots 21, 22, and 23 in the Town of Rockland (formerly Township of Clarence) as follows:

DESIGN CRITERIA

Average daily flow	= 6,800 m^3/d
Maximum day flow rate	= 17,340 m^3/d
Peak flow rate	= 20,400 m^3/d

ARON STREET SEWAGE PUMPING STATION

Upgrading of the existing instrumentation system to incorporate the station controls with a new plant wide Supervisory Control and Data Acquisition (SCADA) system;

TREATMENT PLANT

construction of a below grade concrete structure having overall dimensions 76.15 m x 28.65 m x 6.1 m depth, located north of the existing sludge storage lagoon area, divided into five (5) equal cells consisting of Sequential Batch Reactors (3 cells), an effluent decant/equalization tank (1 cell) and an aerobic digestion tank (1 cell) as follows:

Sequential Batch Reactor

Three (3) parallel SBR tanks each 28.6 m x 14.6 m with a side water depth (SWD) of 5.49 m to provide a complete mix batch treatment with an automatic control of cyclic sequence to operate each reactor in a six hour cycle, with each cycle consisting of "Fill", "Aeration", "Settle" and "Decant" modes and equipped with:

- a jet aeration system consisting of a single jet header with 22 jets per tank (total of three) to provide a total Standard Oxygen Requirement of 2,621 Kg oxygen per day, GENIVAR

TECHNICAL MEMORANDUM

To: Yves Rousselle, CET, Director of Physical Services, City of Clarence-Rockland
Date: December 18, 2013
From: Matt Morkem, P.Eng.
Project: Rockland PS Evaluation
Subject: **Pumping Station 1** GENIVAR Project #:121-20569

The purpose of this technical memorandum is to provide a comprehensive analysis of Pumping Station #1 (PS#1) with regards to capacity, upgrade for the future to optimize its capacity, phasing of the proposed future upgrade and associated costs to accommodate the proposed flows from the new proposed Rockland urban expansion area.

1. Pumping Station Capacity

Based on a review of the current Pumping Station #1 equipment, data provided by the City of Clarence-Rockland, and discussion with Ontario Clean Water Agency (O.C.W.A) the pumping station control logic operates with a small pump (middle) as lead pump until the lag pump level is reached, at which time the lead pump is shut off and one of the lag pumps (east or west) is started. If the next set point is reached while there is one lag pump in operation, then the other lag pump will activate. If this second lag pump is out of commission, then the lead pump will start again to help the first lag pump.

The theoretical capacity of the pumps based on the pumps currently installed in PS#1 are as follows:

Table 1.1

Pump Number	Rated Capacity (L/s)
West	170
East	170
Middle	95

The current pump capacities were determined by running the pumps and measuring the drop in the wet well level over a measured time period. The volume pumped was calculated using the difference in level and the area of the wet well. This was divided by the elapsed time to determine the pump capacity. The inflow immediately before and/or after the pump test was also recorded, averaged and added to the pump capacity to determine the total pump capacity. The current pump capacities are as follows:

Table 1.2

Pump Number	Rated Capacity (L/s)
West	145
East	140
Middle	90

Table 2.1

2005			Stats Canada Annual Growth Rate (%)	2013		
Avg. Daily Flow (L/s)	Max. Daily Flow (L/s)	Peak Inst. Flow (L/s)		Avg. Daily Flow (L/s)	Max. Daily Flow (L/s)	Peak Inst. Flow (L/s)
35.5	66.1	164	2.76	44.14	82.19	203.91

It should be noted that flows in excess of 200L/s from PS#1 have been reported by O.W.C.A. in the past 5 years.

Based on the current status of PS#1 and a review of the MOE guidelines indicated in the previous section, it would suggest that the Pumping Station #1 is currently operating at or even beyond its firm capacity.

3. Future Pumping Station Flows

For the purpose of projecting flows for the total build out of the Clarence Rockland area, a detailed analysis of each pumping station land use and estimated flows was completed. The following assumptions were made for growth component that are serviced by the collection system:

- Assumed Population Per Unit: 2.7
- Rural Density (units/ha): 2
- Low Density (units/ha): 20
- Medium Density (units/ha): 35
- High Density (units/ha): 55
- Residential low generation (l/cap/day): 350
- Commercial flow generation (l/ha/day): 15000
- Inflow and Infiltration (l/s/ha): 0.28,0.56,1.12

The table below summarizes the total build out flows for PS#1 of the Clarence Rockland area based on updates to the 2003 Master Plan in conjunction with the official plan and discussions with the City of Clarence Rockland Planner. Refer to Appendix 1 for ultimate servicing map.

Table 3.1

Pump Station	Land Use	Area (ha)	Residential Average Daily Flow (m^3/day)	Commercial Average Daily Flow (m^3/day)	Peak Daily Flow (l/s)
PS 1	Commercial Core	9.46	-	141.92	6.8
	Service Commercial	77.16	-	1157.46	55.1
	Business Park	0.00	-	0.00	0.0
	Community Facilities	30.42	-	456.26	21.7
	Tourist Recreational	0.00	-	0.00	0.0
	Low Density Residential	106.55	2013.86		104.14
	Medium Density Residential	3.15	104.12		5.70
	High Density Residential	0.00	0.00		0.00
	Contributing PS: 2,3,4,5,6,7,8,South of David				643.8
	Total				**837.2**
PS 2	Commercial Core	3.95	-	59.19	2.8
	Service Commercial	1.24	-	18.65	0.9
	Business Park	0.00	-	0.00	0.0
	Community Facilities	12.32	-	184.75	8.8
	Tourist Recreational	0.00	-	0.00	0.0
	Low Density Residential	103.45	1955.13		101.38
	Medium Density Residential	4.28	141.66		7.76
	High Density Residential	0.00	0.00		0.00
	Contributing PS:	None			0.0
	Total				**121.6**
PS 3	Commercial Core	3.20	-	48.01	2.3
	Service Commercial	79.87	-	1198.02	57.0
	Business Park	0.00	-	0.00	0.0
	Community Facilities	2.27	-	34.11	1.6
	Tourist Recreational	0.00	-	0.00	0.0
	Low Density Residential	27.07	511.64		29.42
	Medium Density Residential	9.83	325.17		17.13
	High Density Residential	0.00	0.00		0.00
	Contributing PS:	None			0.0
	Total				**107.5**
PS 4	Commercial Core	2.16	-	32.36	1.5
	Service Commercial	0.00	-	0.00	0.0
	Business Park	0.00	-	0.00	0.0
	Community Facilities	0.00	-	0.00	0.0
	Tourist Recreational	0.00	-	0.00	0.0
	Low Density Residential	18.35	346.79		20.40
	Medium Density Residential	1.15	38.06		2.08
	High Density Residential	0.00	0.00		0.00
	Contributing PS:	5			74.1
	Total				**98.1**
PS 5	Commercial Core	0.00	-	0.00	0.0
	Service Commercial	2.72	-	40.79	2.7
	Business Park	0.00	-	0.00	0.0
	Community Facilities	0.31	-	4.62	0.3
	Tourist Recreational	4.82	-	72.34	4.0
	Special Study Area #1	25.53	-		0.0
	Low Density Residential	49.48	935.13		65.42
	Medium Density Residential	0.81	26.63		1.68
	High Density Residential	0.00	0.00		0.00
	Contributing PS:	None			0.0
	Total				**74.1**

Pump Station	Land Use	Area (ha)	Residential Average Daily Flow (m^3/day)	Commercial Average Daily Flow (m^3/day)	Peak Daily Flow (l/s)
PS 6	Commercial Core	0.00			0.0
	Service Commercial	3.48	-	52.17	5.4
	Business Park	0.00	-	0.00	0.0
	Community Facilities	1.14	-	17.12	1.8
	Tourist Recreational	2.57	-	38.48	4.0
	Low Density Residential	19.92	376.58	-	38.79
	Medium Density Residential	0.00	0.00	-	0.00
	High Density Residential	0.00	0.00	-	0.00
	Contributing PS:	None			0.0
	Total				**50.0**
PS 7	Commercial Core	0.00	-	0.00	0.0
	Service Commercial	0.00	-	0.00	0.0
	Business Park	0.00	-	0.00	0.0
	Community Facilities	0.00	-	0.00	0.0
	Tourist Recreational	0.00	-	0.00	0.0
	Low Density Residential	73.59	1390.91		74.31
	Medium Density Residential	0.00	0.00		0.00
	High Density Residential	0.00	0.00		0.00
	Contributing PS:	None			0.0
	Total				**74.3**
PS 8	Commercial Core	0.00	-	0.00	0.0
	Service Commercial	0.00	-	0.00	0.0
	Business Park	0.00	-	0.00	0.0
	Community Facilities	0.00	-	0.00	0.0
	Tourist Recreational	0.00	-	0.00	0.0
	Low Density Residential	245.09	4632.12		220.51
	Medium Density Residential	0.00	0.00		0.00
	High Density Residential	0.00	0.00		0.00
	Contributing PS:	None			0.0
	Total				**220.5**
PS Clearance Point	Commercial Core	0.00	-	0.00	0.0
	Service Commercial	0.00	-	0.00	0.0
	Highway Commercial	10.99	-	164.84	9.8
	Business Park	0.00	-	0.00	0.0
	Community Facilities	0.00	-	0.00	0.0
	Tourist Recreational	20.91	-	313.70	14.9
	Low Density Residential	540.96	10224.08		445.96
	Medium Density Residential	0.00	0.00		0.00
	High Density Residential	0.00	0.00		0.00
	Contributing PS:	None			0.0
	Total				**470.6**
PS South of David	Commercial Core	0.00	-	0.00	0.0
	Service Commercial	0.00	-	0.00	0.0
	Business Park	0.00	-	0.00	0.0
	Community Facilities	0.00	-	0.00	0.0
	Tourist Recreational	0.00	-	0.00	0.0
	Rural	0.00	0.00		0.00
	Low Density Residential	210.34	3975.47		192.31
	Medium Density Residential	0.00	0.00		0.00
	High Density Residential	0.00	0.00		0.00
	Contributing PS:	None			0.0
	Total				**192.3**

Based on a similar method that was used to project the flows from 2005 to 2013, the current flows were projected to the ultimate scenario to provide a timeline for reaching the ultimate build out. These results are indicated in the table below:

Table 3.2

Year	Avg. Daily Flow (L/s)	Max. Daily Flow (L/s)	Peak Inst. Flow (L/s)	Stats Canada Annual Growth Rate (%)
2013	44.14	82.19	203.91	2.76
2018	50.58	94.17	233.65	
2023	57.95	107.90	267.72	
2033	89.59	166.81	413.87	
2043	117.62	219.01	543.38	
2053	154.43	287.54	713.42	
2059	181.83	338.57	840.02	

4. Pumping Station Upgrades

1. Modifications

The following section reviews potential modifications that could be made to the existing pumping station to gain additional capacity. Refer to Appendix 2 for preliminary pumping station capacity analysis

a) Replace existing middle pump with an equivalent to the west and east pumps.
The existing smaller (40hp - 90L/s) pump could be replaced with a pump of similar capacity to the other pumps. This would increase the firm capacity to approximately 275L/s as it would mean that it would be based on 2 -145l/s pumps (less allowance for losses with two pumps running). Variable Frequency Drives (VFD's) should also be installed to ensure that with the removal of the smaller pump average day or low flow conditions can still be pumped while minimizing the start/stops of the pumps. MOE guidelines also indicated that if a pumping station discharges into a WWTP they should be equipped with VFD's to minimize flow surges and provide flow pacing. Additionally, due to the increase flow from the new pump, the grinder and grit removal capacity will need to be increased. A third grinder (120L/s) and second grit removal system (236L/S) is recommended to be installed. It should be noted that if screening is install at PS#1 then the third grinder would not be required.

b) Installed a 4th pump using the current pump intakes locations
The current pumping station configuration could be modified to allow for a forth pump to be installed of equal capacity to the other 3 pumps. This would increase the firm capacity

to approximately 400L/s. A VFD should also be installed as indicated above. Additionally, a fourth grinder (120L/s) would need to be installed to handle the increase flow. It should be noted that if screening is install at PS#1 then the forth grinder would not be required.

c) Install four (4) new pumps with increase capacity

Remove and replace all four (4) pumps (approximately 90HP – 290L/s@21m TDH) with larger pumps to increase the capacity and maximize the velocity in the forcemain (i.e. ≈3m/s). This would increase the firm capacity to approximately 600L/s. A VFD should also be installed as indicated above. The flow meter would also need to be replaced as this flow rate exceeds the maximum capacity. As indicated above additional grit removal would be required to accommodate this upgrade; however further plant upgrades would also be required to treat this flow and therefore these aspect have not been included in the upgrades.

d) Increase and/or Twin Forcemain to Sewage Plant

Replace and/or twin the existing forcemain with a 900mm (or equivalent) to provide additional capacity. The pumps and flow meter from the previous expansion could be reused to provide the additional capacity to meet the ultimate building. This would increase the firm capacity to approximately 850L/s. As indicated above additional grit removal would be required to accommodate this upgrade; however further plant upgrades would also be required to treat this flow and therefore these aspect have not been included in the upgrades.

2. Forcemain

Based on the above modifications, the velocity in the forcemain would be 1.4m/s, 2m/s, 3m/s and 1.3m/s, respectively. Although maintaining a velocity above 1.1m/s is not an ideal operating condition, such a velocity would be a result of peak instantaneous flows and would not be maintained for long periods of time. These velocities would still be below the maximum velocity of 3m/s stipulated by the MOE guidelines for a forcemain.

3. Modification Phasing

Based on the current firm capacity as defined by the MOE, PS#1 has reached its capacity. The projected flows anticipated at PS#1 indicate that the following timelines for upgrades are required:

Table 4.1

Year	Peak Inst. Flow (L/s)	Required Upgrade	Firm Capacity (L/s)	Expansion
2013	203.91	none	200	N/A
2018	233.65	a	275	2014/2015
2023	267.72	none	275	N/A
2033	413.87	b	400	2024/2025
2043	543.38	c	600	2034/2035

2053	713.42	d	840	2045/2046
2059	840.02	none	840	N/A

It should also be noted that the plant capacity of ADF = 6800m3/d (79L/s) and MDF = 17,340m3/d (200L/s) would be reached around 2030 that will require further upgrades not discussed in this report. Some upgrades to the Peak Flow Rate have been incorporated into this report (i.e. grit removal system). A detail flow analysis should be completed on a regular basis to verify the projected flows

4. Upgraded Servicing

As it is difficult to determine the exact type of growth that will occur in the City of Clarence-Rockland, it is difficult to state the number of units that the above indicated upgrades will provide. However, as it is anticipated that the majority of growth will be low density the following table provides the additional number (beyond current levels) of units for each upgrade based on low density residential growth using the design parameters indicated in section 3:

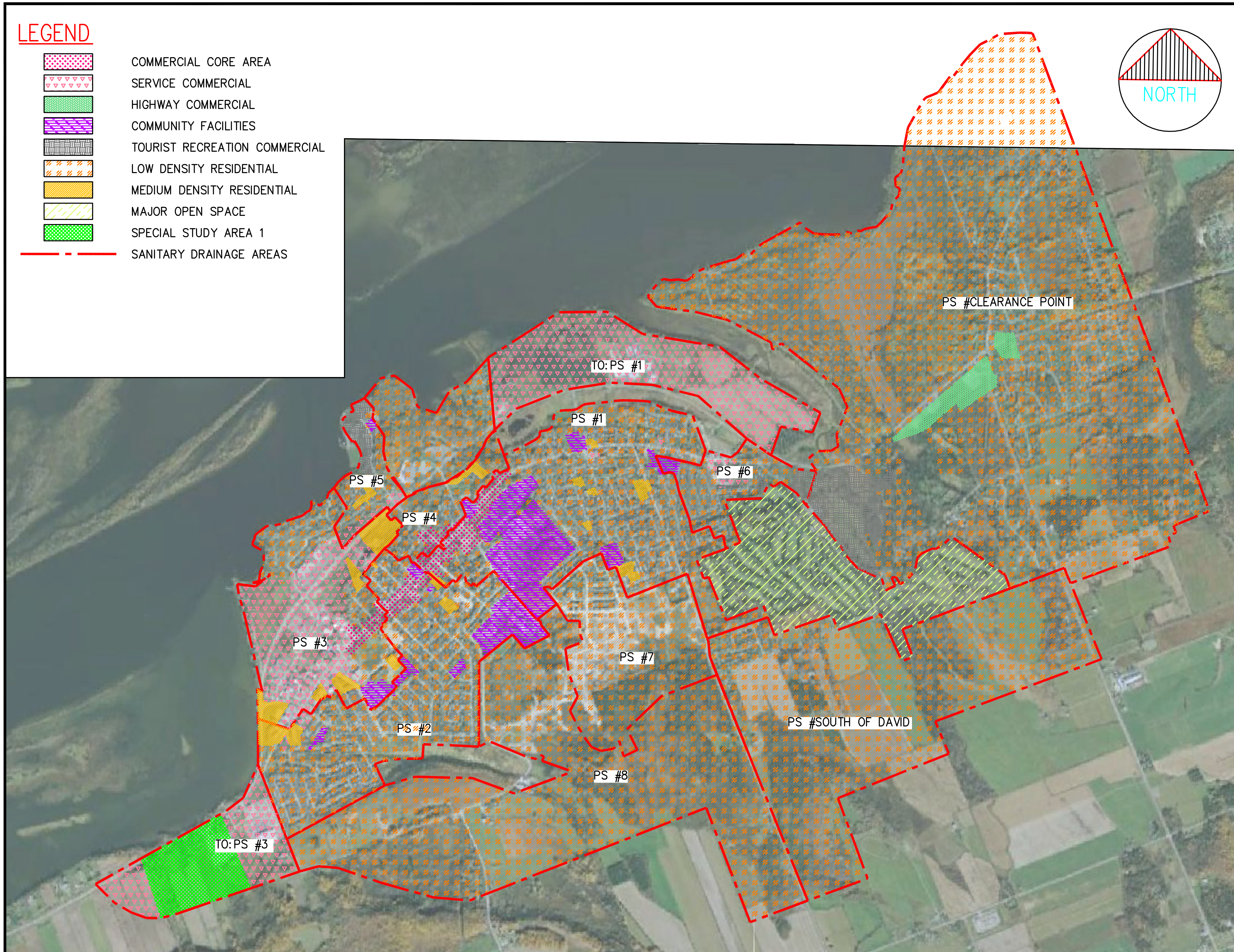
Table 4.2

Expansion	No. of Units	Population Increase	Additional Peak Flow (L/S)
a	2100	5,670	75
b	6600	17,820	215
c	16000	43,200	400
d	28500	76,950	650

It should be noted that not all growth in the City of Clarence Rockland will be low density residential and the total number of units will vary based on the variety of growth type that is experienced.

5. Modifications Cost

The following section provides cost estimates for the modifications indicated in section one (1):



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CLIENT: CITY OF CLARENCE-ROCKLAND

CLIENT REF. #:

PROJECT: CLARENCE-ROCKLAND PUMPING STATION EVALUATION

ISSUED FOR - REVISION:

IS	RE	DATE	DESCRIPTION

PROJECT NO: 121-20569-00

DATE: MAY 2013

ORIGINAL SCALE: 1:25000

IF THIS BAR IS NOT 1" LONG, ADJUST YOUR PLOTTING SCALE.

1"

DESIGNED BY: MS

DRAWN BY: STR

CHECKED BY: MM/MS

DISCIPLINE: CIVIL

TITLE: PUMP STATION CATCHMENT AREA PLAN

SHEET NUMBER: SK1.1

SHEET #: OF

ISSUE: ISSUED FOR REVIEW

DATE OF: MAY 22, 2013

REV #: 0

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Appendix C

Morris Village Pumping Station No. 9 Design Brief Excerpt

DESIGN BRIEF

1.0 INTRODUCTION

1.1 General

The residential development associated with this new pumping station consists of approximately 219.87 ha and is located along St-Jean Street, mid-way between Poupart Road and Docteur Corbeil Boulevard in the City of Clarence-Rockland (see location map SK-1, in Appendix "A"). The proposed sanitary drainage area serviced by pumping station No. 9 includes over 5600 residential units.

The first four stages of the Morris Village development are currently serviced by gravity sewers and directed to the pumping station No.7 located at the intersection of Sterling Avenue and Platinum Drive. As was previously planned, the western parts of Stage 4 will be redirected to the pumping station No. 9 and allow for the northern part of Stage 5 as well as an external area located between Caron Street and Stage 5 to be directed to the existing pumping Station No.7 (see sketch 110704-SANPS in Appendix 'B'). Pumping Station No.7 was approved under MOECC Certificate #0402-78NQJ9.

2.0 SANITARY FLOWS AND HYDRAULICS

2.1 Sanitary Sewer

2.1.1 Proposed Site

The portion of the proposed subdivision that is directed by gravity towards pumping station No.7 is then pumped to the sanitary sewers at the intersection of Crystal Crescent and Quartz Street and directed by gravity towards Avenue des Pins.

On the other hand, the majority of the proposed Morris Village Stage 5 along with external areas located east and future lands located west of St-Jean Street will drain towards pumping station No. 9. The sewage shall then be pumped via a twin 400mm diameter forcemain through the Hydro Corridor, Sterling Avenue, Docteur Corbeil Boulevard before reaching the existing gravity sanitary sewers on Caron Street (see sketch 110704-SANPS in Appendix 'B').

2.1.2 Tributary Area Characteristics

The sanitary drainage area as shown on plan 110704-PSSANM1, is divided into several sub-catchments area. The plan shows the total areas, populations to be directed to each pumping station.

6.0 ELECTRICAL SPECIFICATIONS

The pumping station has been designed to allow for a communication space on the wall in order to communicate to the City of Clarence-Rockland information centre. In summary, a system will be installed by OCWA to properly communicate with the City's information center. The proposed system will control and provide information on such equipment as the pumps, water levels, the security system and system failures. The power supply for this site will be provided by a proposed transformer adjacent to the pumping station; a 600 volts, 3 phase service line will be provided for this pumping station. The electrical design specifications can be found on plan E1 to E9 separate from this report. A backup power system (UPS) will be installed to allow continuous communication in case of failure.

7.0 CONCLUSION

The proposed pumping station has the capacity to accommodate the flows for a proposed development up to 260 l/s. In case of failure, the following events could occur.

i. The standby generator will start to allow the pumps to run as usual, and a signal will be sent to a city representative.

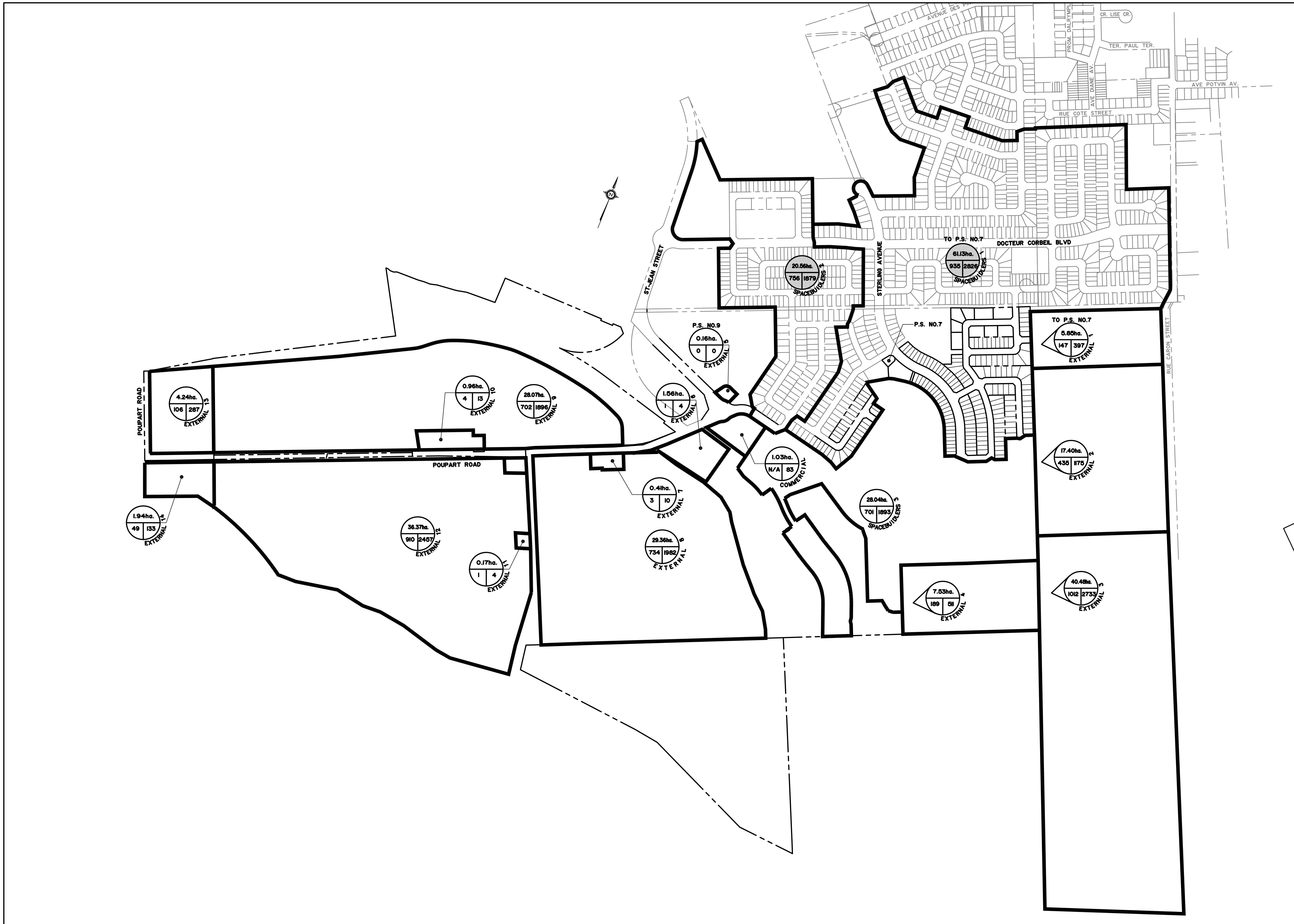
ii. A sewage pump could be used with the by-pass forcemain.

iii. The overflow pipe would carry the sewage towards the closeby storm water management pond and would keep the hydraulic grade line of the sanitary system below the basement levels of the proposed Stage 5.

Prepared by:

ATREL ENGINEERING LTD

Jean M. Décoeur, P.Eng.
President



LEGEND

- 7.53ha. / 189 / 511 — SANITARY DRAINAGE SUB AREA; POPULATION EQUIVALENT; NUMBER OF UNITS IN SUB AREA
- 7.53ha. / 189 / 511 (shaded) — DATA BASED ON ACTUAL COUNTS
- DRAINAGE AREA BOUNDARY

SUMMARY

	TO P.S. No. 7	TO P.S. No. 9
RESIDENTIAL AREA (ha)	66.98	217.25
UNITS (25 UNITS/ha)	1082	5613
POPULATION (2.7 persons/unit)	3223	14967
COMMERCIAL AREA (ha)	N/A	1.03
EQUIVALENT COMMERCIAL POPULATION	N/A	83
OUTLET TO	PAYER ST.	CARON ST.
PUMPED FLOW	64 L/s	260 L/s (Design)

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION △-APPLIES WHEN DRAWING MODIFIED	DATE	BY
△	AS PER CITY COMMENTS	NOV. 16/18	JMD

SCALE 1 : 5 000 (50m 0 150m)

DESIGN JMD
CHECKED
DRAWN PNC
CHECKED
APPROVED JMD

LICENSED PROFESSIONAL ENGINEER J.M. DECOEUR Nov 16/2018 PROVINCE OF ONTARIO

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

CITY OF ROCKLAND
MORRIS VILLAGE PUMPING STATION No. 9

SPACE BUILDERS

PLAN
SANITARY DRAINAGE AREA MASTER PLAN

CLIENT No. 168
PROJECT No. 110704
DATE OCTOBER 2017
DRAWING No. 110704-PSSANM1

C7

Appendix C

RVA Equalization Tank

Conceptual Design Report Excerpt

1.0 INTRODUCTION

Municipal wastewater from the City of Clarence-Rockland (City) is treated at the Clarence Rockland Sewage Treatment Sewage Treatment Plant (CRSTP), located at 700 Industrial Road, in Clarence-Rockland, Ontario. Currently, all wastewater from the urbanized areas of the City of Clarence-Rockland is pumped directly from Pumping Station No. 1 into the treatment plant. The plant has pre-treatment (grit removal only) and operates as a sequencing batch reactor (SBR) activated sludge plant followed by chlorine disinfection, prior to undergoing dechlorination and discharging into the Ottawa River.

The facility has a Rated Capacity of 6,800 m^3/day under Environmental Compliance Approval Number 1990-3P3PRG. The rated peak flow capacity is currently 20,400 m^3/day.

The City of Clarence Rockland is undertaking upgrades to the wastewater treatment plant to include:

- Increase the pumping capacity and conveyance capacity of PS#1 to 400 L/s;
- Twinning the force main to convey an ultimate peak flow capacity of 850 L/s and for operational redundancy;
- Construction of a new headworks facility, complete with fine screening and grit removal system to improve both pre-treatment and secondary treatment effectiveness; and,
- Concrete repairs to the suspended floor slab in the main treatment building.

As part of the preliminary design investigation, it was noted that the City may achieve some long-term advantages and potential cost savings by combining the design and construction of a proposed equalization tank with the headworks facility. The concept would be to have the equalization tank constructed directly underneath the headworks facility and be combined with the tender package for the upgrades to the plant. Construction of a new equalization tank has been previously identified within the long-term plan for the Rockland Sewage Treatment plant (within the next 2-3 years) to normalize peak flows from inflow and infiltration.

This proposed approach of including the equalization tank underneath the headworks facility would offer the following benefits:

- Provides the best use of existing land at the STP to free up space for future additional plant upgrades;

2.0 EQUALIZATION STORAGE BELOW HEADWORKS BUILDING

The *Rockland Wastewater Treatment Plant Review* (OCWA, 2015) noted that equalization storage constructed in the next few years would alleviate peak flows to the STP and delay plant wide capacity expansion until average daily flows reach 90% flow capacity (6,120m^3/d). This finding was echoed based on the hydraulic modeling described in the Hydraulic Flow Technical Memorandum (RVA August 2016), which noted that some form of bypass, modifications or equalization storage is required to convey the new proposed peak pumping flows from PS#1.

An overview of the proposed storage scenario is shown below in **Figure 2-1** through **Figure 2-3** below.

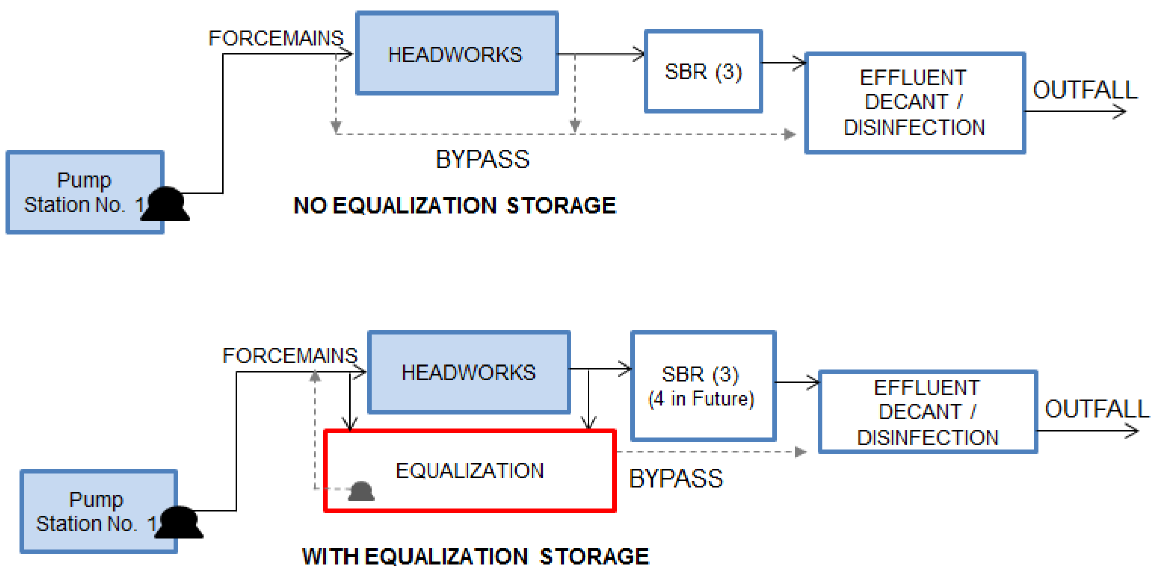


Figure 2-1: Potential Equalization Storage Below Headworks Building

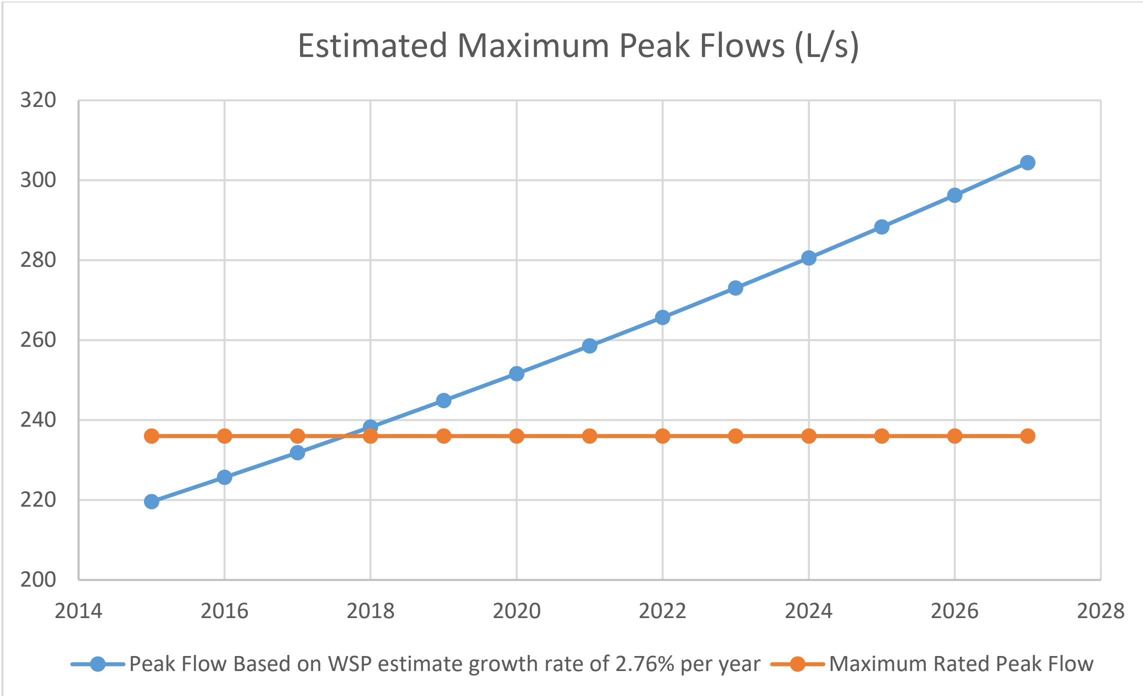


Figure 2-5: Estimated Maximum Peak Flows at Plant Over Time

3.0 GEOTECHNICAL AND STRUCTURAL CONSIDERATIONS

A Geotechnical Investigation Report has been prepared by DST Consulting Engineers, which discusses the ground conditions in the vicinity of the proposed headworks facility, and makes recommendations related to founding the building, both with and without the equalization tank. Refer to Appendix A for the full report.

In summary, the soils at the proposed location of the headworks facility is generally silty clay, Rock was not reached in any boreholes, but local well records indicate it is in the order of 60m below grade in the area.

Based on the Report and discussions with the geotechnical engineer, it has been determined that the soils do not have enough bearing capacity to support the headworks facility and equalization tank using conventional strip or spread footings, or a raft foundation. The increase in stress imposed on the soil by the foundations and slab of the structure, and by placement of backfill around the structure, will result in large compression of the clay, which leads to significant consolidation settlements and damage to the structure.

5.0 ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Adding the equalization tank to the project will mean the works will be classified as a Schedule 'B' activity. From the Municipal Class EA document prepared by the Municipal Engineers Association:

> **"Schedule B:**
>
> Establish sewage flow equalization tankage in existing sewer system or at an existing sewage treatment plants, or at existing pumping stations for influent and/or effluent control."

As such the project would be subject to the requirements of a Schedule B EA process. This will require documentation of the planning process (assess alternative solutions and their impacts) followed by a Notice of Completion, and allowing 30 days for public input.

The schedule impacts will include the allowance for public input for 30 calendar days. During this time, it would be expected that other design elements of the project would continue.

6.0 COST ESTIMATE

The intention of combining the equalization tank below the headworks facility is to offer operational and space savings, with the potential to offer cost savings over installing the tank at a later date as part of a separate contract. The tables below serve to provide a cost estimate for the two options: 1) the equalization tank constructed below the headworks facility, or 2) headworks facility constructed as per the original scope of work, with the tank constructed at a later date as a separate contract.

Table 6-1: Cost Estimate: Equalization Tank Below Headworks Facility

	Structure	Equipment	Electrical	Yard Works	Capital Cost
Pump Station	$200,000	$574,500	$373,500	$19,500	$1,167,500
Equalization Tank	$94,000	$190,000	$123,000	$2,500	$410,000
Headworks	$3,943,500	$1,107,000	$719,500	$30,500	$5,800,500
Forcemain	-	-	-	$400,000	$400,000
Slab Repairs	$125,000	-	-	-	$125,000
SUB TOTAL	$4,362,500	$1,872,000	$1,216,000	$452,500	**$7,903,000**
				Bonding and Insurance	$158,000
				Mobilization and Demobilization	$118,500
				Contractor Markup	$1,185,500
				Scope and Construction Contingency	$2,371,000
				Engineering (Equalization Tank)	$200,000
				TOTAL CAPITAL COST	**$11,936,000**

Table 6-2: Cost Estimate: Separate Contracts

	Structure	Equipment	Electrical	Yard Works	Capital Cost
Pump Station	$200,000	$574,500	$373,500	$19,500	$1,167,500
Headworks	$1,904,000	$1,079,000	$701,500	$30,500	$3,715,000
Forcemain	-	-	-	$400,000	$400,000
Slab Repairs	$125,000	-	-	-	$125,000
SUB TOTAL	$2,229,000	$1,653,500	$1,075,000	$450,000	**$5,407,500**
				Bonding and Insurance	$108,000
				Mobilization and Demobilization	$81,000
				Contractor Markup	$810,000
				Scope and Construction Contingency	$1,622,000
				TOTAL CAPITAL COST	**$8,028,500**
Equalization Tank	$1,970,000	$190,000	$150,000	$40,000	$2,350,000
				Bonding and Insurance	$57,000
				Mobilization and Demobilization	$42,000
				Contractor Markup	$420,000
				Scope and Construction Contingency	$703,000
				Engineering Design	$250,000
				Separate Contract Administration	$150,000
				TOTAL CAPITAL COST	**$3,972,000**

C8

Appendix C

Caron Street Storm Sewer Catchment Areas and Sewer Calculation Sheet

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1224 GARDINERS ROAD, SUITE 201
KINGSTON, ONTARIO
CANADA K7P 0G2
PHONE: 613-634-7373 FAX: 613-634-3523
WWW.GENIVAR.COM

CLIENT:
CITY OF CLARENCE-ROCKLAND

CLIENT REF. #:

PROJECT:
CARON STREET RECONSTRUCTION

ISSUED FOR – REVISION:

IS	RE	DATE	DESCRIPTION
1		2013/01/22	ISSUED FOR ECA

PROJECT NO: 065038

DATE: MAY, 2013

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DESIGNED BY: MS

DRAWN BY: MF/MS

CHECKED BY: MM

IF THIS BAR IS NOT 1" LONG, ADJUST YOUR PLOTTING SCALE.

1"

DISCIPLINE: CIVIL

TITLE:
PROPOSED STORM CATCHMENT AREAS

SHEET NUMBER: SK1.32

SHEET #: -- OF --

ISSUE: ISSUED FOR ECA
DATE OF: JANUARY 22, 2013

REV #: 0

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Storm Sewer Calculation Sheet

Caron Street Reconstruction

STREET	MANHOLE		AREA		CONTRIBUTING	RUNOFF DATA						PIPE DATA						
	From	To	No	Ha	AREAS	C	AC	Σ AC	Tc (min.)	I (mm/hr)	Q (L/s)	Size (mm)	Slope (%)	Capacity (L/s)	Q/Q_{full}	Velocity (m/s)	Length (m)	FALL (m)
CARON ST	STM300	STM304	S1	0.220	S1	0.75	0.165	0.165	15.000	83.56	38.33	300	0.50%	68.4	0.56	0.97	65.92	0.330
CHAPMAN ST	-	STM304																
CARON ST	STM304	STM305																
ATREL ST CUL DE SAC EAST	-	STM305																
CARON ST	STM305	STM306							Existing Pipes									
ATREL ST	STM103	STM306																
CARON ST	STM306	STM307																
CARON ST	STM307	STM309																
CARON ST	STM308	STM309	S6	0.240	S6	0.75	0.180	0.180	15.000	83.56	41.81	300	0.50%	68.4	0.61	0.97	44.04	0.220
CARON ST	STM307	STM309	-	-	A1,A2,A3,S1,S2,S3,S4,S5	-	-	4.041	18.228	74.40	835.67	900	0.40%	1144.9	0.73	1.80	41.59	0.166
CARON ST	STM309	OUTLET	-	-	A1,A2,A3,S1,S2,S3,S4,S5,S6	-	-	4.221	18.613	73.45	861.80	900	0.35%	1071.0	0.80	1.68	20.00	0.070
CARON ST	MH101	MH102	G	1.308	G	0.40	0.523	0.523	15.0	84	122.45	375	0.70%	146.7	0.83	1.33	82.53	0.578
CARON ST	MH102	MH103	F	0.915	F,G	0.40	0.366	0.889	15.8	81	201.86	450	0.70%	238.5	0.85	1.50	72.3	0.506
CARON ST	MH103	MH104	F		F,G		0.000	0.889	16.5	79	196.77	450	0.70%	238.5	0.82	1.50	62.7	0.439
CARON ST	MH104	MH105	E	1.039	E,F,G	0.40	0.416	1.305	17.0	78	283.44	525	0.60%	333.1	0.85	1.54	47.5	0.285
	MH105	MH106					0.000	1.305	17.5	76	278.40	525	0.60%	333.1	0.84	1.54	47.5	0.285
	MH106	MH107					0.000	1.305	18.0	75	274.08	525	0.60%	333.1	0.82	1.54	42.2	0.253
CARON ST	MH107	MH108			E,F,G		0.000	1.305	18.5	74	269.73	525	0.55%	318.9	0.85	1.47	42.2	0.232
CARON ST	MH108	MH109	C+D	20.296	C,D,E,F,G	0.40	8.118	9.423	19.1	72	1906.36	1200	0.35%	2306.5	0.83	2.04	80	0.280
CARON ST	MH109	MH110	B	1.671	B,C,D,E,F	0.40	0.668	10.092	20.2	70	1974.94	1200	0.35%	2306.5	0.86	2.04	128.1	0.448
CARON ST	MH110	MH111	A	0.979	A,B,C,D,E,F,G	0.40	0.392	10.483	21.1	68	1991.48	1200	0.35%	2306.5	0.86	2.04	119.32	0.418
CARON ST	MH111	MH112			A,B,C,D,E,F,G		0.000	10.483	21.2	68	1989.28	1050	1.00%	2730.7	0.73	3.15	7	0.070
CARON ST	MH150	MH151	H	4.038	H	0.40	1.615	1.615	15.0	84	377.94	750	0.40%	704.1	0.54	1.59	70.96	0.284
CARON ST	MH151	MH152	I	1.553	H,I	0.40	0.621	2.237	16.0	80	503.21	750	0.45%	746.8	0.67	1.69	105.0	0.473
CARON ST	MH152	MH153	J	1.460	H,I,J	0.40	0.584	2.821	16.9	78	615.60	750	0.50%	787.2	0.78	1.78	90.0	0.450
CARON ST	MH153	MH155	K	1.843	H,I,J,K	0.40	0.737	3.558	17.8	75	751.44	825	0.40%	907.8	0.83	1.70	96.1	0.384
CARON ST	MH155	MH156			H,I,J,K		0.000	3.558	18.7	73	728.86	825	0.39%	896.4	0.81	1.68	91.7	0.358
CARON ST	MH156	MH157	L	2.905	H,I,J,K,L	0.40	1.162	4.720	19.5	71	944.59	825	0.60%	1111.9	0.85	2.08	89.8	0.539
CARON ST	MH158	MH157	M	4.338	M	0.40	1.735	1.735	15.0	84	406.00	750	0.20%	497.9	0.82	1.13	54	0.108
	MH157	HEADWALL			H,I,J,K,L,M						1350.59	1200	0.20%	1743.6	0.77	1.54	14	0.028

DESIGN PARAMETER

Mannings n = 0.013

Infiltration Rate (I) = 0.28 l/s/ha

Designed By: Matt Scanlan	**PROJECT:** Caron St. Reconstruction
Checked By: Matt Morkem	**LOCATION:** Rockland, Ontario
Dwg. Reference: SK1-6rev1 - Storm Area North Caron; SK.32rev1 - Storm Areas South Caron	**Project Number:** 65038 — **Date:** 20-Jun-13

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Appendix C

Sanitary Master Plan 2009 Update Excerpt

2. Sanitary Sewer System

2.1 Sanitary Sewer Model Update

In the context of this report, "existing sanitary sewer system" refers to the system as of October 2008. The City's wastewater collection system has seven (7) pump stations and a trunk sewer system network that convey sewage to the wastewater treatment plant in the north end of the City via PS #1.

Sewer flows, including sanitary dry-weather flow plus I/I (Inflow/Infiltration), have been estimated using the Harmon Formula for residential flows based on:

- 350 litres per capita per day (Lpcd)
- extraneous residential flows of 0.28 L/s/ha

Industrial, commercial, and industrial flows have been estimated based on the following:

- extraneous ICI flows of 0.14 l/s/ha
- industrial/commercial/institutional sanitary flows of 15,000 L/ha/d
- a peaking factor of 2.5

Sewers identified as being near, at, or beyond capacity based on current development and estimates of current flows are shown in Table 2-1 and use the current system including new sewers with sanitary pump station flows as measured in the 2005 Sanitary Pump Station Assessment Report. For modeling purposes the pump station capacity was taken to be the highest flowrate pump from each of the pump stations. The use of the higher capacity pump was used as it was assumed to represent the serviced condition of both pumps. This scenario seeks to identify existing issues given the 2005 status of the pump stations and the existing development condition and does not rely on future upgrades to pump stations. Pipe capacity has been calculated based on Manning's equation assuming full pipe flow.

As noted in Table 2-1 some gravity sewers upstream of PS #2 have a condition of marginal to poor, meaning they are operating above their theoretical capacity limit. Close being defined as 90-100% of capacity, marginal as 100-110% of capacity and poor as being greater than 110% of capacity. Additional areas with capacity issues are located on the central portion of Laurier Street, near the discharge of the forcemains from PS #2 and 3, as well as locations on the eastern portion of Laurier at the discharge of PS #6. Critical north-south sewer segments at Caron Street and Laurier Street and at Simoneau Street and Laurier Street also indicate operation beyond capacity.

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Appendix C

Topographic Mapping


LOT 23
CONCESSION 2
(OLD SURVEY)
PART 1
PLAN 50R-9754
RUE CARON STREET
LOT 24
CONCESSION 2
(OLD SURVEY)
PART 1
PLAN 50R-770
KEY PLAN
SCALE 1 : 750
20m 0 20 40 60m
Distances shown on this plan are in metres and
can be converted to feet by dividing by 0.3048.
Arpentages SCHULTZ BARRETTE Surveying
Ontario Land Surveyors
Hawkesbury, Ontario
Tel: 613-632-7611 Fax: 613-632-2897
Job No. 16227(5)
Ref. No. CON. 2(O.S.)-28

1M CONTOUR DATA AND AERIAL IMAGE OF PROPOSED EXPANSION LANDS

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Appendix C

Water Demand

City of Clarence Rockland
Expansion Lands - Seconday Plan
A000817 (360)
DESIGN FLOWS - WATER DEMAND

Low Density Residential Design Parameters:

Base flow:	350	L/pers/d
Ratio pers/residence	3.4	pers/residence
Daily peak flow factor	2	
Hourly peak flow factor	3	
Hourly minimum factor	0.5	

Institutional / Commercial Design Parameters:

Base flow:	28000	L/(1000m^2-d)
Gross hectares	5.1223	ha
Daily peak flow factor	1.5	
Hourly peak flow factor	1.8	
Hourly minimum factor	0.5	

Medium Density Residential Design Parameters:

Base flow:	350	L/pers/d
Ratio pers/residence	2.7	pers/residence
Daily peak flow factor	2	
Hourly peak flow factor	3	
Hourly minimum factor	0.5	

High Density Residential Design Parameters:

Base flow:	350	L/pers/d
Ratio pers/residence	1.8	pers/residence
Daily peak flow factor	2	
Hourly peak flow factor	3	
Hourly minimum factor	0.5	

Water Demand - Ultimate Build Out

Phase	Number of Residences units	Average Daily Consumption		Daily Peak Flow		Hourly Peak Flow		Hourly Minimum Flow	
Low Density Residential	688	9.48	l/s	18.95	l/s	28.43	l/s	4.74	l/s
		150.20	galUS/min	300.39	galUS/min	450.59	galUS/min	75.10	galUS/min
Medium Density Residential	203	2.22	l/s	4.44	l/s	6.66	l/s	1.11	l/s
		35.19	galUS/min	70.39	galUS/min	105.58	galUS/min	17.60	galUS/min
High Density Residential	100	0.73	l/s	1.46	l/s	2.19	l/s	0.36	l/s
		11.56	galUS/min	23.12	galUS/min	34.67	galUS/min	5.78	galUS/min
Institutional / Commercial	1	16.60	l/s	24.90	l/s	29.88	l/s	8.30	l/s
		263.12	galUS/min	394.67	galUS/min	473.61	galUS/min	131.56	galUS/min
Total		29.03	l/s	49.75	l/s	67.16	l/s	14.51	l/s
		460.06	galUS/min	788.57	galUS/min	1064.45	galUS/min	230.03	galUS/min

Prepare by: Brian O'Dell, P.Eng. PEO No.: 100529918 Date: 2019-05-02

Verified by: Brian O'Dell, P.Eng. PEO No.: 100529918 Date: 2019-05-02

* Design parameters from City of Clarence-Rockland Design Guidelines 2018

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Appendix C

Sanitary Calculations

CITY OF CLARENCE-ROCKLAND EXPANSION LANDS - SECONDARY PLAN
A000817 (360)

SANITARY SEWER FLOWS - COMMERCIAL & INSTITUTIONAL SECTORS

Table 4-2 Commercial & Industrial Flow Allowances

Development Type	Average Flow
Commercial, average	28 m^3/ha per day
Industrial, light	35 m^3/ha per day
Industrial, heavy	55 m^3/ha per day

Source: City of Ottawa Design Guidelines - Water Distribution

Base Flow: 28000 L/ha/d
Peaking factor: 1.5
Infiltration: 0.14 L/s/ha — See Section 1.4 of the Sanitary Master Plan Update, dated November 2009

Sewershed Area	Proportional Area ha	Average Daily Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Extraneous Flow (L/s)	Maximum Flow (L/s)
33_5	0.94	0.31	1.50	0.46	0.13	0.59
33_6	1.09	0.35	1.50	0.53	0.15	0.68
33_9	1.95	0.63	1.50	0.95	0.27	1.22
34_5	1.13	0.37	1.50	0.55	0.16	0.71
				Qmax - Total (L/s) =		**3.20**

NOTES:

1. Base sanitary flow is based on City of Clarence-Rockland design guidelines and shown in Table 4-2 above.
2. Peaking factor is based on City of Clarence-Rockland design guidelines Section 4.1.3.
3. Infiltration rate is based on Section 1.4 of the Sanitary Master Plan Update, dated November 2009.
4. See Proposed Sanitary Servicing Sketch in Appendix A for identification of sewershed area.

Prepared by: Brian O'Dell, P.Eng. Date: 2019-05-29
PEO # 100529918

Verified by: Brian O'Dell, P.Eng. Date: 2019-05-29
PEO # 100529918

Z:\Cima-C10\Ott_Projects\A\A000817_Clarence-Rockland – Expansion Lands Secondary Plan\300_CALCULATIONS\360\sanitary\spreadsheets\[190321_C10-05 360 CIMA+ Sanitary Sewer Flow - Commercial.xlsx]SANITARY FLOWS

CITY OF CLARENCE-ROCKLAND EXPANSION LANDS - SECONDARY PLAN
A000817 (360)

Harmon Equation:

$$P.F. = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000} \right)^{\frac{1}{2}}} \right) * K$$

where:
P=Population
K=Correction Factor =0.8

SANITARY SEWER FLOWS - RESIDENTIAL SECTOR

Base Flow: 350 L/cap/day
Ratio pers/dwelling: See Table 4-1
Infiltration: 0.28 L/s/ha

Land Use Designation	Gross Area (ha)	Projected Units (ea)
Low Density	76.46	688
Medium Density	22.55	203
High Density	11.14	100

Table 4-1 Average Persons per Unit (Residential Uses)

Unit Type	Persons per unit
Residential, single family	3.4
Residential, semi-detached	2.7
Residential, duplex	2.3
Residential, townhouse (row)	2.7
Apartment, bachelor	1.4
Apartment, 1 bedroom	1.4
Apartment, 2 bedroom	2.1
Apartment, 3 bedroom	3.1
Apartment, average	1.8

Source: City of Ottawa Design Guidelines - Water Distribution

Sewershed Area	Number of dwellings units	Proportional Area ha	Ratio pers/dwelling	Equivalent Population pers	Peaking Factor	Average Daily Flow (L/s)	Peak Flow (L/s)	Extraneous Flow (L/s)	Maximum Flow (L/s)
33_1	42	4.64	3.4	142	3.56	0.58	2.05	1.30	3.35
33_2	25	2.80	3.4	86	3.61	0.35	1.26	0.78	2.04
33_3	44	4.92	3.4	151	3.55	0.61	2.17	1.38	3.55
33_4	16	1.77	3.4	54	3.65	0.22	0.80	0.50	1.29
33_7	44	4.88	1.8	79	3.62	0.32	1.16	1.37	2.52
33_8	51	5.69	2.7	138	3.56	0.56	1.99	1.59	3.58
33_10	31	3.50	1.8	57	3.64	0.23	0.84	0.98	1.82
33_11	27	3.04	1.8	49	3.65	0.20	0.73	0.85	1.58
33_12	85	9.45	2.7	230	3.50	0.93	3.26	2.65	5.91
33_13	31	3.47	2.7	84	3.61	0.34	1.23	0.97	2.20
33_14	176	19.52	3.4	597	3.35	2.42	8.09	5.47	13.56
33_15	164	18.25	3.4	558	3.36	2.26	7.59	5.11	12.70
33_16	14	1.51	2.7	37	3.67	0.15	0.55	0.42	0.97
33_17	57	6.34	3.4	194	3.52	0.79	2.77	1.78	4.54
34_1	92	10.20	3.4	312	3.46	1.26	4.37	2.86	7.23
34_2	8	0.90	2.7	22	3.70	0.09	0.33	0.25	0.58
34_3	74	8.21	3.4	251	3.49	1.02	3.55	2.30	5.85
34_4	14	1.51	2.7	37	3.67	0.15	0.55	0.42	0.97
							Qmax - Total (L/s) =		**74.25**

NOTES:
1. Base sanitary flow, population densities and infiltration rate are based on City of Clarence-Rockland design guidelines.
2. Harmon Equation has been used to calculate the residential peak factor for sanitary flows (see above) - Maximum 4.0.
3. Population densities specified by the City of Clarence-Rockland are shown in Table 4-1 above.
4. See Proposed Sanitary Servicing Sketch in Appendix A for identification of sewershed area.

Prepared by: Brian O'Dell, P.Eng. Date: 2019-05-29
PEO # 100529918

Verified by: Brian O'Dell, P.Eng. Date: 2019-05-29
PEO # 1000529918

May 29, 2019

CLARENCE-ROCKLAND EXPANSION LANDS
A000817 (360)
HYDRAULIC CALCULATIONS FOR SANITARY SEWERS

Manning's 'n' :	**0.013**
Maximum permitted velocity :	**3.00**
Minimum permitted velocity :	**0.60**

Section	Dia.	Slope	Capacity (full)	Velocity (full)	Flow	Velocity (actual)	Error Message Flow Velocity		Error Message	% Full
	mm	%	m³/s	m/s	m³/s	m/s	maximum	minimum	Pipe Capacity	
34_5	200	0.32%	0.019	0.59	0.00071	0.28	O.K.	increase velocity	O.K.	4%
34_4	200	0.32%	0.019	0.59	0.00168	0.36	O.K.	increase velocity	O.K.	9%
34_3	200	0.50%	0.023	0.74	0.00585	0.61	O.K.	O.K.	O.K.	25%
34_1	200	0.32%	0.019	0.59	0.01308	0.63	O.K.	O.K.	O.K.	69%
34_2	200	0.32%	0.019	0.59	0.01366	0.64	O.K.	O.K.	O.K.	72%
33_17	200	0.60%	0.025	0.81	0.00454	0.60	O.K.	O.K.	O.K.	18%
33_15	250	0.24%	0.029	0.59	0.01728	0.61	O.K.	O.K.	O.K.	60%
33_16	250	0.24%	0.029	0.59	0.01825	0.62	O.K.	O.K.	O.K.	63%
33_13	300	0.19%	0.042	0.59	0.03579	0.66	O.K.	O.K.	O.K.	85%
33_10	375	0.14%	0.065	0.59	0.03761	0.61	O.K.	O.K.	O.K.	58%
33_9	375	0.14%	0.065	0.59	0.03883	0.61	O.K.	O.K.	O.K.	60%
33_5	375	0.14%	0.065	0.59	0.03942	0.62	O.K.	O.K.	O.K.	61%
33_6	375	0.14%	0.065	0.59	0.04010	0.62	O.K.	O.K.	O.K.	62%
33_1	200	0.75%	0.028	0.90	0.00335	0.60	O.K.	O.K.	O.K.	12%
33_2	200	0.55%	0.024	0.77	0.00539	0.62	O.K.	O.K.	O.K.	22%
33_14	200	0.32%	0.019	0.59	0.01356	0.64	O.K.	O.K.	O.K.	71%
33_7	450	0.11%	0.094	0.59	0.06157	0.63	O.K.	O.K.	O.K.	66%
33_11	450	0.11%	0.094	0.59	0.06315	0.63	O.K.	O.K.	O.K.	67%
33_12	450	0.11%	0.094	0.59	0.06906	0.64	O.K.	O.K.	O.K.	73%
33_8	450	0.11%	0.094	0.59	0.07264	0.65	O.K.	O.K.	O.K.	77%

CLARENCE-ROCKLAND EXPANSION LANDS
A000817 (360)
HYDRAULIC CALCULATIONS FOR SANITARY SEWERS

Manning's 'n' :	**0.013**
Maximum permitted velocity :	**3.00**
Minimum permitted velocity :	**0.60**

Section	Dia.	Slope	Capacity (full)	Velocity (full)	Flow	Velocity (actual)	Error Message: Flow Velocity maximum	Error Message: Flow Velocity minimum	Error Message: Pipe Capacity	% Full
	mm	%	m³/s	m/s	m³/s	m/s				
33_3	525	0.10%	0.136	0.63	0.07619	0.65	O.K.	O.K.	O.K.	56%
33_4	525	0.10%	0.136	0.63	0.07748	0.65	O.K.	O.K.	O.K.	57%

Remarks :

1. Minimum pipe sizes and slopes were obtained from Table 4-3 of the City of Clarence-Rockland Design Guidelines.
2. Sections 34_5 and 34_4 utilized the minimum slope as an effort to mitigate the need for deep sanitary sewers. These sections will require a flushing program for maintenance. For all other sewers, if the minimum velocity requirement was not met, the pipe slope was increased incrementally by 0.05% until the minimum velocity requirement was met.
3. See Proposed Sanitary Servicing Sketch in Appendix A for identification of sewershed area (Section).

Prepared by: Brian O'Dell, P.Eng.
PEO # 100529918

Date: 2019-05-29

Verified by: Brian O'Dell, P.Eng.
PEO # 100529918

Date: 2019-05-29

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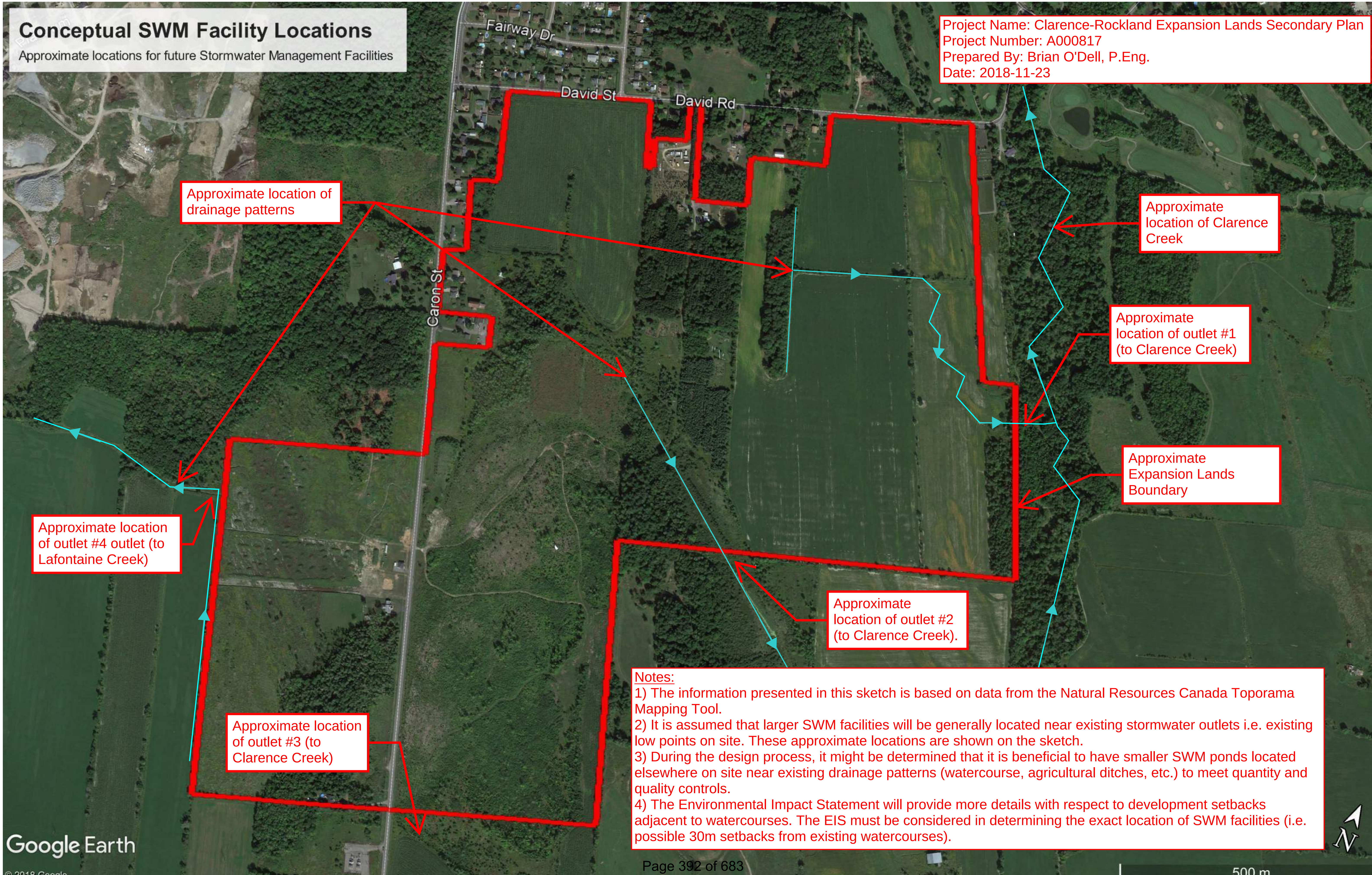
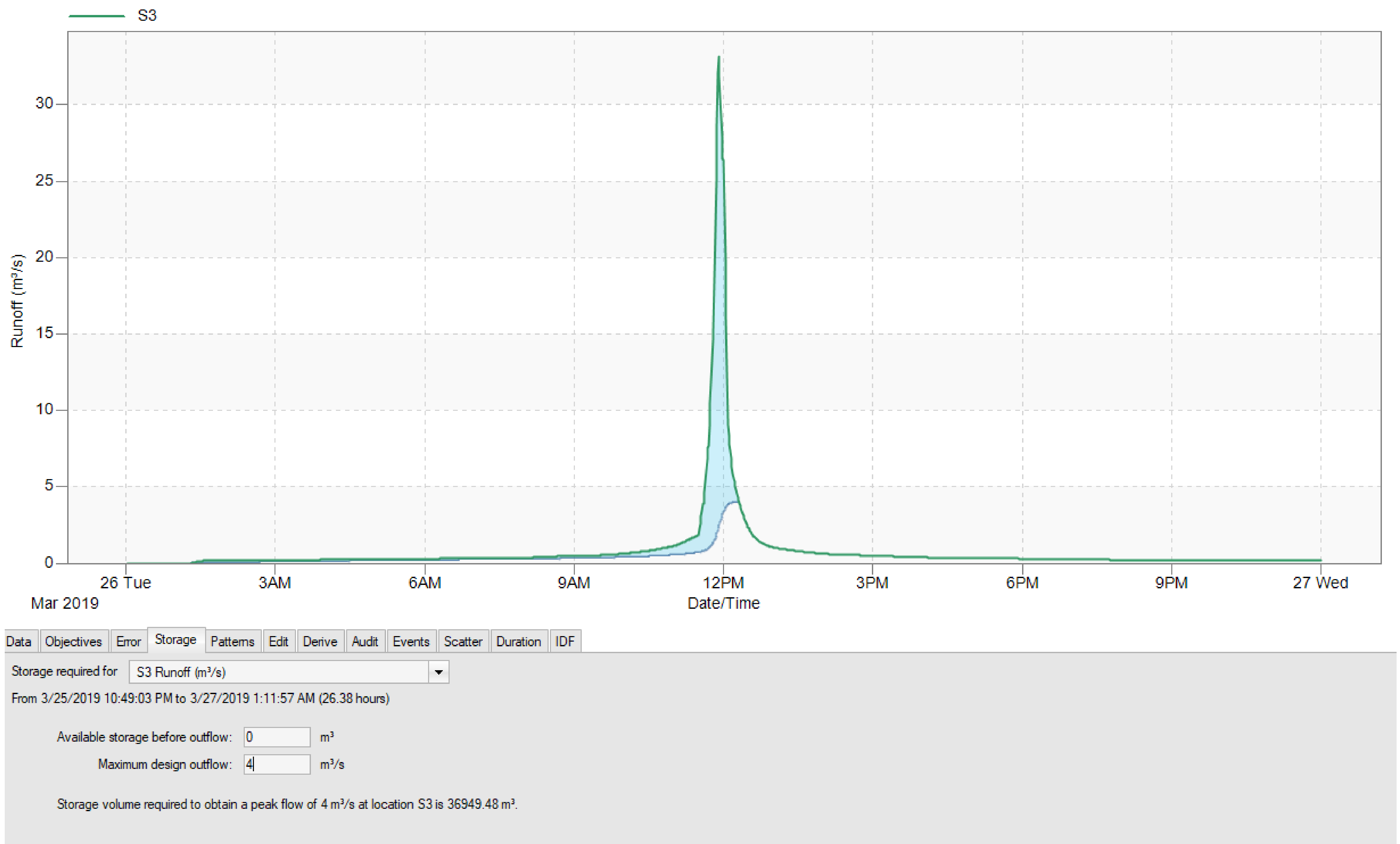
Appendix C

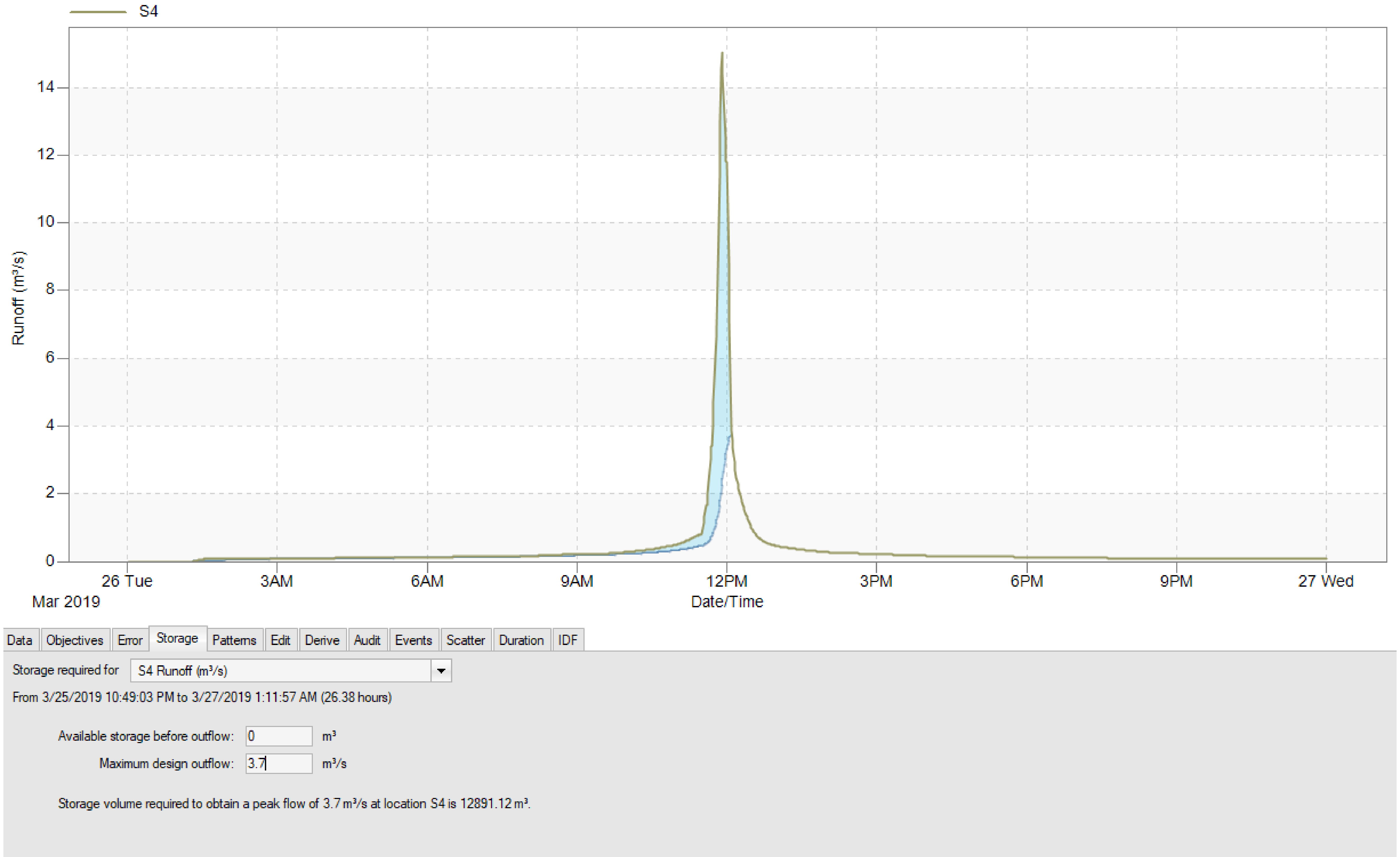
Stormwater Calculations


Conceptual SWM Facility Locations
Approximate locations for future Stormwater Management Facilities
Project Name: Clarence-Rockland Expansion Lands Secondary Plan
Project Number: A000817
Prepared By: Brian O'Dell, P.Eng.
Date: 2018-11-23
Fairway Dr
David St
David Rd
Caron St
Approximate location of drainage patterns
Approximate location of Clarence Creek
Approximate location of outlet #1 (to Clarence Creek)
Approximate Expansion Lands Boundary
Approximate location of outlet #4 outlet (to Lafontaine Creek)
Approximate location of outlet #2 (to Clarence Creek).
Approximate location of outlet #3 (to Clarence Creek)
Notes:
1) The information presented in this sketch is based on data from the Natural Resources Canada Toporama Mapping Tool.
2) It is assumed that larger SWM facilities will be generally located near existing stormwater outlets i.e. existing low points on site. These approximate locations are shown on the sketch.
3) During the design process, it might be determined that it is beneficial to have smaller SWM ponds located elsewhere on site near existing drainage patterns (watercourse, agricultural ditches, etc.) to meet quantity and quality controls.
4) The Environmental Impact Statement will provide more details with respect to development setbacks adjacent to watercourses. The EIS must be considered in determining the exact location of SWM facilities (i.e. possible 30m setbacks from existing watercourses).
Google Earth
© 2018 Google
N
500 m

455,175.4 sq m
547,030.3 sq m
250,288.9 sq m
264,271.5 sq m
PRE-DEVELOPMENT AREAS
B. Tardioli
2019-04-04



Hydrograph curve generated from the computer software PCSWMM approximating storage volume requirements for Subcatchment S3 during a 24 hour 100-year SCS Type II design storm.



Hydrograph curve generated from the computer software PCSWMM approximating storage volume requirements for Subcatchment S4 during a 24 hour 100-year SCS Type II design storm.

STORM SEWER HYDRAULIC DESIGN SHEET (SSDS) - RATIONAL METHOD

Client: City of Clarence-Rockland
Project: Expansion Lands
Location: City of Clarence-Rockland
Project #: A000817

Manning Coefficient: 0.013
Maximum Permitted Velocity: 3.00 m/s
Minimum Permitted Velocity: 0.80 m/s
Return Frequency: 5 years

LOCATION			AREA		FLOW					SEWER DATA								
Street/Catchment Name	From MH/CB	To MH/CB	Area (ha)	C =	Section 2.78*AC (ha)	Accum 2.78*AC (ha)	Time of Conc (min)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Diameter (mm)	Material Type	Slope (%)	Length (m)	Capacity (full) (L/s)	Velocity (full) (m/s)	Velocity (actual) (m/s)	Time of Flow (min)	Ratio (%)
To SWM #1 (Catchment S3)																		
P2			2.94	0.400	3.27	3.27	15.00	83.557	273.17									
S0			1.27	0.400	1.41	1.41	15.00	83.557	118.00									
SC4	340	330	0.55	0.700	1.07	5.75	15.00	83.557	480.61	975	CONC	0.10%	235.00	708.68	0.95	1.02	3.85	68%
V3			0.72	0.400	0.80	0.80	15.00	83.557	66.90									
R3			2.95	0.400	3.28	3.28	15.00	83.557	274.10									
SC3	350	330	0.42	0.700	0.82	4.90	15.00	83.557	409.29	900	CONC	0.10%	170.00	572.47	0.90	0.98	2.90	71%
S2			2.36	0.400	2.62	2.62	15.00	83.557	219.28									
V2			2.33	0.400	2.59	2.62	15.00	83.557	219.28									
CS6	330	331	0.67	0.700	1.30	6.55	18.85	72.891	1367.52	1350	CONC	0.10%	230.00	1687.83	1.18	1.31	2.93	81%
W			1.13	0.800	2.51	2.51	15.00	83.557	209.99									
CS5	331	306	0.50	0.700	0.97	3.49	21.77	66.584	1599.64	1500	CONC	0.10%	240.00	2235.37	1.26	1.37	2.92	72%
P1			7.26	0.400	8.07	8.07	15.00	83.557	674.57									
S1			4.59	0.400	5.10	5.10	15.00	83.557	426.48									
SC5	320	321	1.28	0.700	2.49	15.67	15.00	83.557	1309.18	1500	CONC	0.10%	540.00	2235.37	1.26	1.32	6.83	59%
T			1.51	0.600	2.52	2.52	15.00	83.557	210.45									
Q			0.90	0.600	1.50	1.50	15.00	83.557	125.44									
SC6	321	306	0.22	0.700	0.43	4.45	21.83	66.478	1604.87	1650	CONC	0.10%	120.00	2882.24	1.35	1.38	1.44	56%
G1			2.19	0.700	4.26	4.26	15.00	83.557	356.10									
SA3	310	301	0.41	0.700	0.80	5.06	15.00	83.557	422.77	900	CONC	0.10%	75.00	572.47	0.90	0.98	1.28	74%

LOCATION			AREA		FLOW					SEWER DATA								
Street/Catchment Name	From MH/CB	To MH/CB	Area	C =	Section 2.78*AC	Accum 2.78*AC	Time of Conc	Rainfall Intensity	Peak Flow	Diameter	Material Type	Slope	Length	Capacity (full)	Velocity (full)	Velocity (actual)	Time of Flow	Ratio
DS1	David	300	1.13	0.700	2.20	2.20	15.00	83.557	183.74									
A			4.64	0.400	5.16	5.16	15.00	83.557	431.13									
B			2.80	0.400	3.11	3.11	15.00	83.557	260.16									
SB1	300	301	0.80	0.700	1.56	9.83	15.00	83.557	1005.11	1350	CONC	0.10%	315.00	1687.83	1.18	1.23	4.27	60%
F			1.09	0.800	2.42	2.42	15.00	83.557	202.56									
SA2	301	302	0.26	0.700	0.51	2.93	19.27	71.888	1638.52	1500	CONC	0.10%	95.00	2235.37	1.26	1.38	1.15	73%
E			0.94	0.800	2.09	2.09	15.00	83.557	174.68									
SA1	302	303	0.54	0.700	1.05	3.14	20.42	69.338	1856.34	1500	CONC	0.10%	210.00	2235.37	1.26	1.41	2.48	83%
CS1	Caron	303	0.62	0.700	1.21	1.21	15.00	83.557	100.81									
J			1.95	0.800	4.34	4.34	15.00	83.557	362.37									
CS2	303	304	0.25	0.700	0.49	4.82	22.91	64.457	2268.05	1650	CONC	0.10%	115.00	2882.24	1.35	1.49	1.29	79%
K			3.50	0.700	6.81	6.81	15.00	83.557	569.11									
CS3	304	305	0.18	0.700	0.35	7.16	24.20	62.211	2713.55	1800	CONC	0.10%	90.00	3634.96	1.43	1.56	0.96	75%
M			3.47	0.600	5.79	5.79	15.00	83.557	483.63									
CS4	305	306	0.63	0.700	1.23	7.01	25.16	60.648	3138.94	1950	CONC	0.10%	325.00	4499.86	1.51	1.63	3.33	70%
U			1.51	0.600	2.52	2.52	15.00	83.557	210.45									
SC1	306	307	0.39	0.700	0.76	3.28	28.49	55.842	4921.60	2250	CONC	0.10%	200.00	6590.62	1.66	1.81	1.84	75%
V1			3.29	0.400	3.66	3.66	15.00	83.557	305.69									
R2			8.55	0.400	9.51	9.51	15.00	83.557	794.43									
SC2	360	307	0.94	0.700	1.83	15.00	15.00	83.557	1252.97	1350	CONC	0.10%	415.00	1687.83	1.18	1.29	5.36	74%
R1			6.75	0.400	7.51	7.51	15.00	83.557	627.18									
N	307	SWM#1	5.55	0.200	3.09	10.59	30.33	53.534	6741.59	2550	CONC	0.10%	225.00	9201.96	1.80	1.96	1.91	73%
To SWM#2 (Catchment S4)																		
DS2	David	400	0.80	0.700	1.56	1.56	15.00	83.557	130.08									
C			4.92	0.400	5.47	5.47	15.00	83.557	457.14									
D			1.77	0.400	1.97	1.97	15.00	83.557	164.46									
SA7	400	401	0.50	0.700	0.97	8.41	15.00	83.557	832.99	1200		0.10%	155.00	1232.89	1.09	1.17	2.21	68%
H			5.69	0.600	9.49	9.49	15.00	83.557	793.03									
SA6	401	402	0.27	0.700	0.53	10.02	17.21	77.040	1604.65	1500		0.10%	110.00	2235.37	1.26	1.37	1.34	72%
G2			2.69	0.700	5.23	5.23	15.00	83.557	437.40									
L2			1.32	0.700	2.57	2.57	15.00	83.557	214.64									
SA4	410	411	0.49	0.700	0.95	8.76	15.00	83.557	731.71	1200		0.10%	175.00	1232.89	1.09	1.14	2.57	59%
SA5	411	402	0.90	0.700	1.75	1.75	17.57	76.085	864.97	1350		0.10%	350.00	1687.83	1.18	1.18	4.95	51%
I1	402	403	3.54	0.600	5.90	5.90	22.51	65.174	1249.80	1500		0.10%	270.00	2235.37	1.26	1.30	3.46	56%

LOCATION			AREA		FLOW					SEWER DATA								
Street/Catchment Name	From MH/CB	To MH/CB	Area	C =	Section 2.78*AC	Accum 2.78*AC	Time of Conc	Rainfall Intensity	Peak Flow	Diameter	Material Type	Slope	Length	Capacity (full)	Velocity (full)	Velocity (actual)	Time of Flow	Ratio
L1			1.73	0.700	3.37	3.37	15.00	83.557	281.30									
SB2	420	421	0.55	0.700	1.07	4.44	15.00	83.557	370.73	900		0.10%	200.00	572.47	0.90	0.96	3.49	65%
I3			0.87	0.600	1.45	1.45	15.00	83.557	121.25									
SB3	421	422	0.23	0.700	0.45	1.90	18.49	73.753	510.77	975		0.10%	90.00	708.68	0.95	1.03	1.46	72%
O2			4.55	0.400	5.06	5.06	15.00	83.557	422.77									
SB4	430	422	1.00	0.700	1.95	7.01	15.00	83.557	585.37	1050		0.10%	370.00	863.53	1.00	1.07	5.76	68%
I2	422	403	5.07	0.600	8.46	8.46	20.76	68.620	1676.44	1500		0.10%	490.00	2235.37	1.26	1.38	5.90	75%
O1	403	SWM#2	15.04	0.400	16.72	16.72	26.67	58.361	3902.30	2100		0.10%	75.00	5483.08	1.58	1.72	0.73	71%

Design Parameters:

Rational Formula: $Q_{peak} = 2.78*CIA$

Where:
- Q = Peak Flow (L/s)
- C = Runoff Coefficient
- I = Rainfall Intensity (mm/hr) = $A/(Td + C)^B$
- (City of Ottawa MacDonald Cartier Airport - See Table Below)
- A = Area (ha)
- T = Time of Concentration (min)

Time of Concentration: Tc = Ti + Tf (minutes)

Where:
- Ti = inlet time before pipe (minutes)
- Tf = time of flow in pipe (minutes)

Where:
- Tf = L/(60V)
- L = Pipe Length (m)
- V = Actual Velocity (m/s)

Manning Equation: $Q_{cap} = 1/n*A*R^{2/3}*S^{1/2}$

Where:
- n = Manning Roughness Coefficient
- A = Area of Flow (m^2)
- R = Hydraulic Radius (defined as area of flow (m^2) divided by wetted perimeter (m))
- S = Slope of Pipe (%)

Notes:

1. Runoff coefficients used were obatined from Table 4-5 of the City of Clarence-Rockland Design Guidelines.

2. City of Ottawa IDF parameters were used to calculate rainfall intensities.

3. An initial time of concentration of 15 minutes was used as per Section 4.2.3 of the City of Clarence-Rockland Design Guidelines.

4. See Proposed Storm Servicing Sketch SK-01 in Appendix A for identification of Catchment Name.

Prepared by: Benjamin Tardioli, EIT
PEO No.:
Date: 2019-05-29

Verified by: Brian O'Dell, P.Eng.
PEO No.: 100529918
Date: 2019-05-29

CITY OF CLARENCE-ROCKLAND

EXPANSION LANDS SECONDARY PLAN
TRANSPORTATION IMPACT ASSESSMENT

Report No. 01-2019
June 2019

A000817

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1. Introduction

The Town of Clarence-Rockland is part of the counties of Prescott and Russell. As part of the Official Plan of the United Counties of Prescott and Russell, the urban area of Clarence-Rockland was identified to be expanded to accommodate the long-term growth 2035 vision. This expanded urban area will accommodate additional new urban development to meet Clarence-Rockland's projected growth over the projected planning period. The expansion lands are located south of Clarence-Rockland on the west and east side of Caron Street. Fotenn, CIMA+ and Shore Tanner were retained by the Town of Clarence-Rockland to complete a Secondary Plan for the Expansion Lands. Once complete this Secondary Plan will be appended to the Official Plan for the Urban Area for the city of Clarence-Rockland as an amendment.

This report will assess the existing and proposed transportation network capacities for vehicles, cyclists and pedestrians and to highlight the existing transportation and traffic related conditions in the surrounding area of Clarence-Rockland. It is understood that the City is also concurrently undertaking a Transportation Master Plan (TMP), as well as a Multi-Modal Transportation Master Plan (MMTMP) in order to meet the anticipated growth and demand of the transportation network by all road users, including vehicles, cyclists and pedestrians in the near future. Both plans will serve as an update to the Strategic Transportation Plan for the Urban Area of the City of Clarence-Rockland, which was completed in 2005.

1.1 Planning Context

The following studies, planning policy and plans were consulted to understand the context of this transportation study from the perspective of each of the province, the county and the city of Clarence-Rockland's objectives for planning in this area.

- #CycleOn Strategy, 2013
- Prescott-Russell Recreational Trail Strategic Plan, 2014
- Prescott-Russell Recreational Trail Assessment and Improvement Plan, 2015
- Prescott-Russell Official Plan, 2018
- Strategic Transportation Plan for the Urban Area of the City of Clarence-Rockland, 2005
- Official Plan of the Urban Area of the City of Clarence-Rockland, 2014
- Development Charges Background Study, 2014
- Clarence-Rockland Transit Feasibility Study, 2014
- Clarence-Rockland Community Improvement Plan Background Study, 2016
- Clarence-Rockland Parks & Recreation Master Plan, 2016
- City of Clarence-Rockland Strategic Plan, 2018
- City of Clarence-Rockland Multi-Modal Transportation Master Plan Draft Memo, 2018

1.1.1 Provincial Planning

The province of Ontario is looking to have cycling recognized as a respected and valued mode of transportation in Ontario by the year 2033. The guiding principles of this strategy are:

- Safety
- Partnership
- Accessibility
- Connectivity

The strategic plans that apply to the City of Clarence-Rockland for the purpose of this report to meet this goal includes:

- Design healthy, active and prosperous communities;
- Improve cycling structure; and
- Make streets safer.

1.1.2 County Planning

The land that Clarence-Rockland is looking to make part of their urban area is currently under rural policy area with the County of Prescott-Russell. Their Official Plan provides guidance on the distribution of residential types and density. It is seeking to ensure that 70% of all new housing will be low density (up to 16 units per net ha), 20% medium density (up to 30 units per net ha) and 10% high density (more than 30 units per net ha). Caron Street and Baseline Road are identified as having a right-of-way of 26 meters. Baseline Road is identified as a local collector road and Caron Road is identified as a major collector.

The County of Prescott-Russell has a focus on improving recreational active transportation modes across the county. This includes the paving of road shoulders within the cycling network and integrating it into Public Works, improving active transportation uptake in municipal official plans, and including sidewalk and cycling facility requirements in municipal by-laws for new developments.

1.1.3 Municipal Planning Context

A future residential neighbourhood is projected to be developed in the lands located west of the study area, as the lands are designated for low density residential develop as per the Clarence-Rockland Official Plan (OP).

Key Issues

- Planned pathway system – integration of existing and proposed on/off-street pathway facilities (MMLOS considerations)
- Medium to Long term effects on Caron Street – Primary north-south roadway link to County Road 17 (HWY17), looking at a potentially expansion.

- New East-West Arterial Corridor – Proposed development lands may trigger this need as County Road 17 and Caron Street begin to reach capacity, as previously discussed in the 2005 strategic plan.

1.2 Study Area

The City of Clarence-Rockland is located within the United Counties of Prescott and Russell and is situated along County Road 17 (HWY 17), approximately 40 km east of the City of Ottawa's downtown. The Ottawa River is located immediately north while the United Counties of Stormont, Dundas, and Glengarry are located further south. An interprovincial connection between Ontario and Quebec is provided via a seasonal ferry (does not operate during winter months), which provides a link between Thurso, Quebec and Clarence-Rockland. Alternative interprovincial connections are provided via a bridge connection in the east (linking Hawkesbury, Ontario and Grenville, Quebec) or a four-season ferry in the west (linking Cumberland, Ontario and Masson-Angers, Quebec), which operates 24 hours a day, 7 days a week.

The location of the Secondary Plan Expansion Lands, in relation to the greater City of Clarence-Rockland is illustrated in **Figure 1**.

Figure 1: Expansion Lands

As depicted in **Figure 1**, the subject expansion lands include area south of David Street and west of Clarence Creek. It is situated mostly to the east of Caron Street, with the exception of an area of approximately 23 hectares on the west side of Caron Street in the southwest of the study area. The Rockland Golf Club and the residential neighbourhood of Rockland East are located to the north of the study area.

2. Existing Conditions

2.1 Study Area Road Network

The roads within the greater study area are under a combination of jurisdictions, including the Counties of Prescott and Russell, and the City of Clarence-Rockland. The following is a summary of the roads within the greater study area of the proposed Secondary Plan boundaries, and the role these roadways play in the greater road network.

HWY 17: is a 2-lane east-west arterial road with a posted speed limit of 70 km/h designated under the Counties of Prescott and Russell's jurisdiction that is continuous between the County limits. HWY17 provides a major transportation link between the Ottawa region and the Greater Montreal area community, as well as providing direct access within the Counties of Prescott and Russell.

Caron Street: is a 2-lane north-south major collector road. A posted speed limit of 50 km/h is present from the north extension of the road at its intersection with HWY 17 to 500 metres south of David Street. South of David Street, Caron Street extends to Baseline Road with a posted speed limit of 80 km/h. A centre two-way-left-turn lane is currently provided along Caron Street between HWY 17 and David Street, which provides refuge for left-turn movements to/from a number of local roads and adjacent land uses.

Docteur Corbeil Boulevard: is a 2-lane east-west major collector road with a posted speed limit of 50 km/h. In the west, Docteur Corbeil Boulevard extends from St. Jean Street (as a 'T' intersection) and terminates at Caron Street in the east (as a 'T' intersection). Laurier Street: is a 2-lane east-west major collector road with a posted speed limit of 50 km/h. In the west, Laurier Street extends from Popuart Road to HWY 17 in the east (as an unsignalized 'T' intersection). On-street parking is provided on both the north and south sides of Laurier Street where residential housing is provided.

David Street: is a 2-lane east-west local street with a posted speed limit of 50 km. In the west, David Street extends from Caron Street (as a 'T' intersection) to Tucker Road/Montée Outaouais in the east (as a 'T' intersection). David Street primarily serves a small residential and agricultural land uses.

Baseline Road: is a 2-lane local collector with a posted speed limit of 80 km/h and a rural cross section. In the west, Baseline Road extends from Canaan Road to Division Road in the east.

2.2 Study Area Intersections

Caron Street at HWY 17 is a four-legged signalized intersection. Auxiliary left-turn lanes are provided in all directions, and auxiliary right-turn lanes are provided in the eastbound and westbound directions. A single lane is provided for through movements in all directions, with northbound and southbound through movements shared with right-turns.

Crosswalks with pedestrian actuated signals are provided for all crossing directions.

Caron Street at Laurier Street is a slightly skewed, four-legged signalized intersection. Auxiliary left-turn lanes are provided in all directions. A single shared through/right-turn lane is provided in all directions

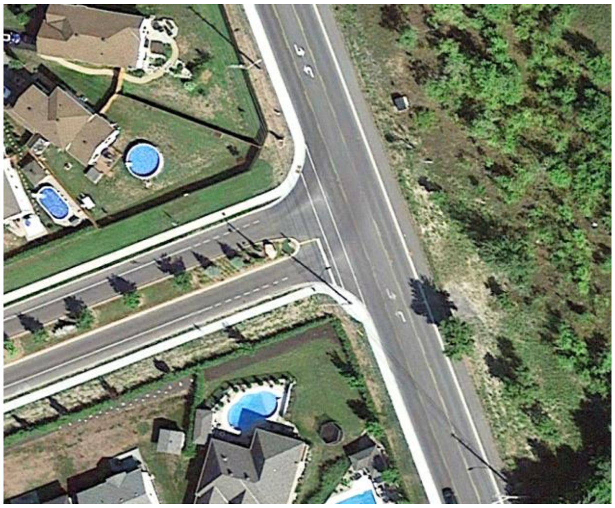
Crosswalks with pedestrian actuated signals are provided for all crossing directions.

Caron Street at Hélène Street is a three-legged side street stop-controlled intersection. An auxiliary northbound left turn lane is provided as an extension of the continuous left-turn lane along Caron Street.

No pedestrian crosswalks are provided at the intersection. This intersection is similar to most local residential roads intersecting with Caron Street within the study area.

Caron Street at Docteur Corbeil Boulevard is a three-legged side street stop-controlled intersection. A continuous centre left-turn lane is provided through the intersection along Caron Street.

A pedestrian crossing is provided on the west side of the intersection. Bicycle lanes are provided along Docteur Corbeil Boulevard.



Caron Street at David Street is a three legged all-way stop controlled intersection. An auxiliary southbound left-turn lane is provided as an extension of the continuous left-turn lane along Caron Street.

No Pedestrian crosswalks are provided at the intersection.

Caron Street at Baseline Road is a three-legged side street stop-controlled intersection, with southbound vehicles along Caron Street required to stop. No auxiliary lanes are provided at the intersection.

No pedestrian crosswalks are provided at the intersection.

2.3 Existing Active Transportation

Active transportation facilities were reviewed to gain an understanding of existing pedestrian and cycling facilities within the greater City area. The City acknowledges that protecting and expanding the existing pedestrian and bicycle network in the City is essential to creating quality of place. Existing policies within the City's Official Plan are anticipated to be expanded with the future TMP and ATP currently being updated.

2.3.1 Pedestrian Facilities

A sidewalk, approximately 2.2 m in width is provided along the west side of Caron Street, while a paved asphalt path approximately 3.0 m in width is provided along the east side of this roadway, both extending from HWY 17 in the north and terminating at David Street in the south. The asphalt path is recognized as an 'off-street multi-use path' according to the Clarence-Rockland Official Plan; however, there is no signage present along the asphalt path (based on Google Street view imagery) to indicate its use as a 'multi-use' path.

Two (2) midblock crossing treatments are present along Caron Street connecting to local trails, as illustrated in **Figure 2**. Midblock crossing treatments have 'zebra' type pavement markings, side-mounted pedestrian crossover signs (Ra-5LR) on both sides of the road facing both directions, and pedestrian refuge islands. These midblock crossing treatments offer the only opportunity for pedestrians to cross Caron Street, with the exception of the east-west crosswalk provided at the signalized HWY 17/Caron and Laurier/Caron intersections.

Figure 2: Midblock Pedestrian Crossing (Caron Street north of Hélène Street)

Sidewalks are primarily located along collector roadways within the City, such as Laurier Street, St. Joseph Street, St. Jean Street, Heritage Drive, etc. Most local residential streets within the City do not have pedestrian facilities. An example of absent sidewalks along local roadways is depicted in **Figure 3**.

Some local roads within the City are identified as potential candidates for road widening as per the Official Plan (e.g. David Road is a candidate for widening). As defined in the City's Official Plan[1], the addition of dedicated pedestrian facilitates should be considered at the time when road reconstruction projects are being undertaken within the City's urban area.

Figure 3: Absence of sidewalks north of David Rd

2.3.2 Cycling Facilities

As mentioned previously, a paved asphalt path is provided along the east side of Caron Street, extending from HWY 17 in the north and terminating at David Street in the south. The City has designated this path as a 'multi-use' facility; however, the elements attributed to it are more recognizable with a dedicated cycling facility, such as a two-way cycle-track. The width of the asphalt path is approximately 3.0 metres, with a solid yellow centre-line running down the centre. Bicycle lane pavement markings are provided in both directions, as illustrated in **Figure 4.**

[1] Official Plan of the Urban Area of the City of Calrence-Rockland, Section 7.11 Pedestrian Policies

Figure 4: Paved Asphalt Pavement Markings – Caron Street South of HWY 17

Cyclist crossing facilities are also provided in multiple locations along Caron Street. Crossing facilities have custom double-sided bicycle crossing signage present on both sides of the road to alert oncoming vehicles. Dashed pavement markings as well as directional arrows are present, which provide positive guidance for crossing cyclists, as illustrated in **Figure 5**.

Figure 5: Cyclist Crossing Facilities – Caron Street

Bicycle lanes are provided in the east and westbound directions along Docteur Corbeil Boulevard. As depicted in **Figure 6** bicycle lanes are shown to terminate when on-street parking is provided for the adjacent residential units, and 'Sharrow' pavement markings are provided within the centre of the travel lane to guide cyclists as to where they should ride within a travel lane, shared by both motorists and cyclists.

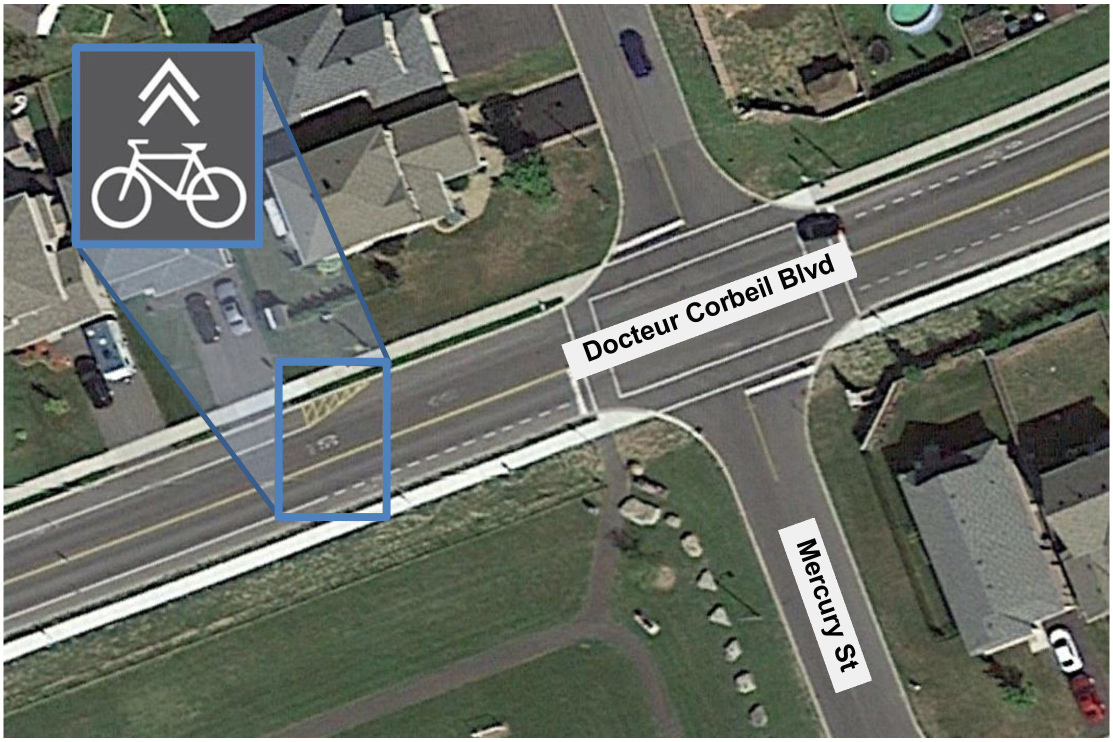


Figure 6: Bicycle Lane & 'Sharrow' Cyclist Pavement Markings (Docteur Corbeil Blvd 350m west of Caron St)

2.4 Existing Transit

Clarence-Rockland Transport (CRT) operates three bus routes (No. 530, 530A and 535), which connect the City of Clarence-Rockland and downtown Ottawa, with some services continuing to Gatineau (Hull). Route 530 directly serves the study area, while route 535 provides service to/from Bourget along Russell Road and Highway 417.

Within the City of Clarence-Rockland, route 530 and 530A are understood to be a commuter-oriented express service operating inbound to Ottawa in the morning and outbound to Clarence-Rockland in the afternoon. In 2012, 11 daily trips were provided on Route 530, with an average daily ridership of 355 people using the service (per direction). Within Clarence-Rockland, this route is understood to travel on Laurier Street and Docteur Corbeil Boulevard (to/from Clarence Creek). Both routes and their respective bus stop locations are illustrated in **Figure 7** and **Figure 8.**

Based on information provided, it should be noted that the contract between Clarence-Rockland and the Leduc Bus Lines will expire on August 31st, 2019. However, Leduc Bus lines has indicated that buses will continue to operate on September 1st, although there could be an increase in fares without municipal funding.[2] This may have an impact on future transit ridership.

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[2] CBC. (2019). *Clarence-Rockland hands public transit system to private sector* | *CBC News*. [online].

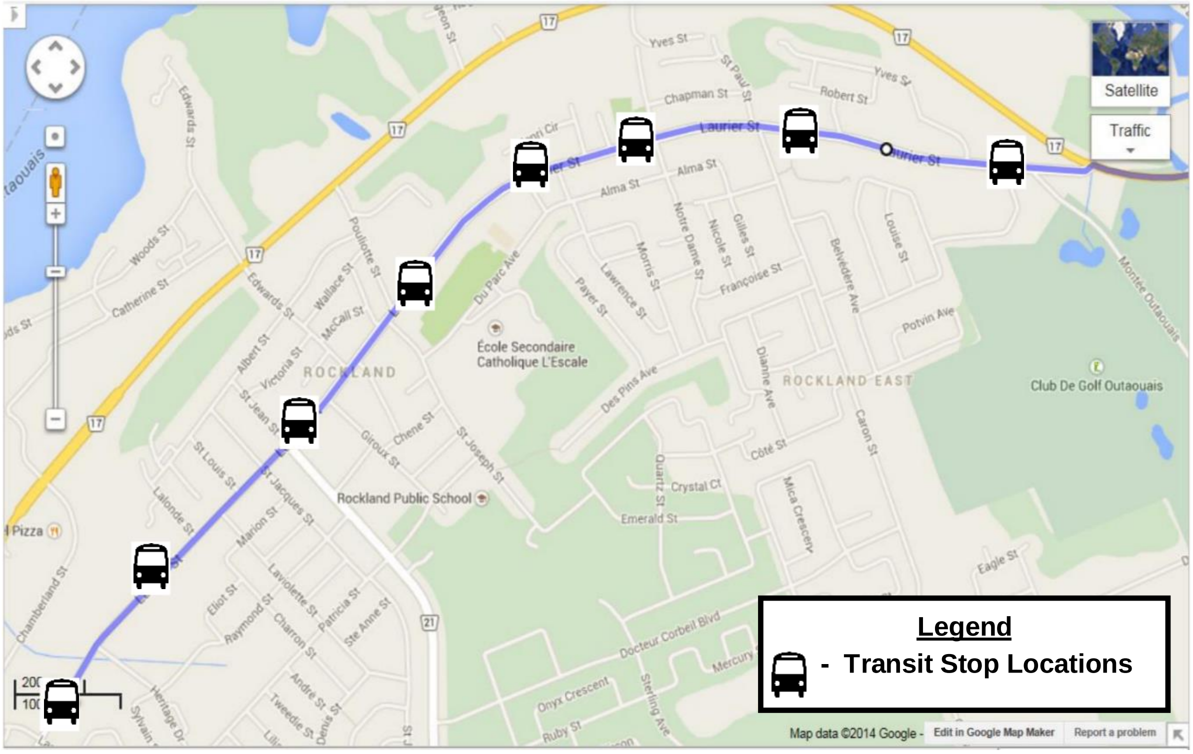


Figure 7: CRT Route 530

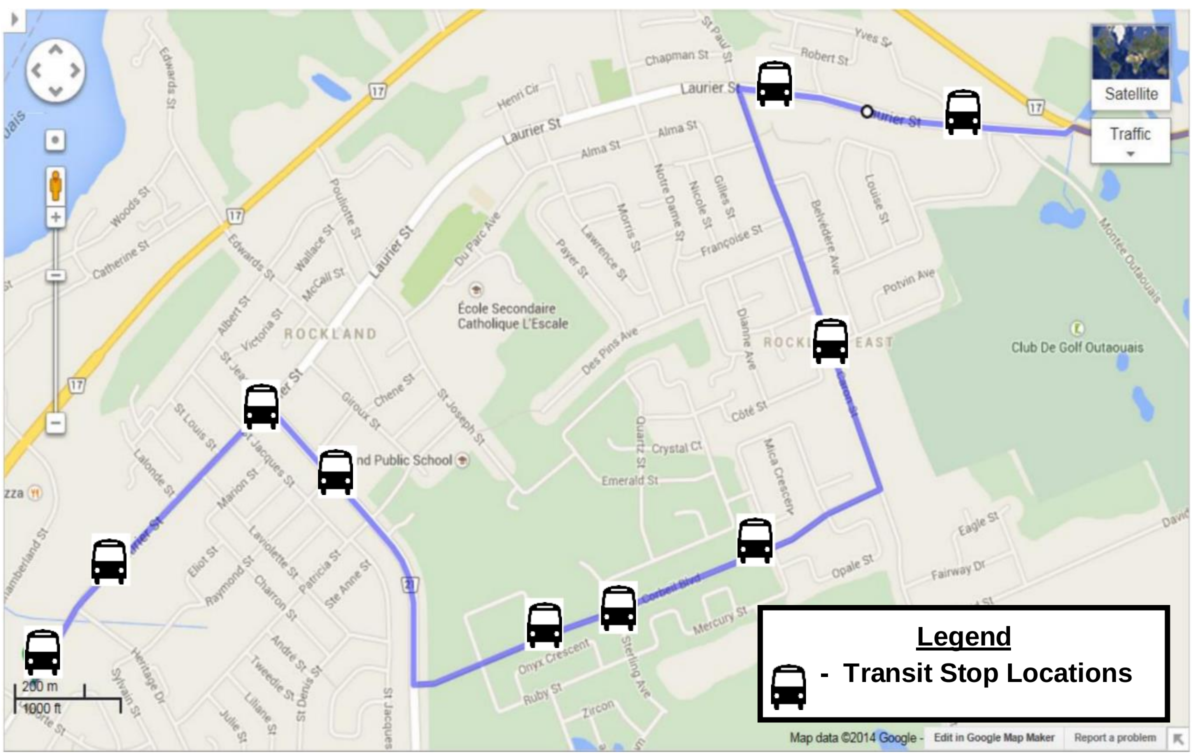


Figure 8: CRT Route 530A

2.5 Existing Network Operations

2.5.1 Methodology

Intersection capacity analysis was undertaken using procedures described in the Highway Capacity Manual (HCM). The analysis primarily focuses on performance measures such as level-of-service (LOS), volume to capacity (v/c) ratio, and 95th percentile queues. Additionally, delays reported with HCM methodology were compared to delays reported in SimTraffic simulation in certain cases where simulated results vary from reported results. LOS is a qualitative measure of operational performance and is based on control delay. The LOS criteria for signalized and unsignalized intersections are shown in **Table 1.**

Table 1: LOS Criteria for Signalized and Unsignalized Intersections

LOS	Control Delay (seconds/vehicle)		Traffic Flow Characteristics
	Signalized Intersections	Unsignalized Intersections	
A	0 – 10	0 – 10	Very Good
B	> 10 – 20	> 10 – 15	Good
C	> 20 – 35	> 15 – 25	Typically preferred planning objective
D	> 35 – 55	> 25 – 35	Typically acceptable
E	> 55 – 80	> 35 – 50	Undesirable; potentially unstable traffic flow
F	> 80	> 50	Failing movements may impede traffic flow

A v/c Ratio is the ratio between traffic volume and the theoretical capacity of an intersection or movement. A v/c Ratio greater than 1.0 indicates that an intersection or movement is operating over capacity. A 95th percentile queue is a queue length that has a 5% probability of being exceeded during the analysis period (i.e. during peak hours). It is common industry practice to use 95th percentile queues for design purposes.

Additionally, the review of intersection operations follows industry best practices which indicate that the analysis should identify intersections where:

- v/c ratios for overall intersection operations, through movements or shared through/turning movements are 0.90 or above;
- v/c ratios for exclusive movements are above 1.00; and
- 95th percentile queue lengths for individual movements exceed available lane storage.

The operational performance of signalized and stop-controlled intersections within the study area were reviewed using Synchro/SimTraffic (v9) software.

2.5.2 Traffic Analysis

Turning movement counts (TMCs) were collected during the week of April 5th to April 12th, 2018 during both AM and PM peak periods. Some TMCs at unsignalized intersections were estimated based on counts at similar locations throughout the study area. Link volume between intersections was balanced appropriately in the north-south direction along Caron Street, to minimize volume discrepancies between counts conducted on different days. Turning movement counts are illustrated in **Figure 9** and full turning movement counts are provided in **Appendix A**.

Intersection operational analysis was undertaken for the two (2) signalized and seven (7) unsignalized intersections within the study area using Synchro/SimTraffic 9 software to assess existing conditions. A signal timing plan was provided by the City of Clarence-Rockland for the intersection of Caron Street & HWY 17 and used in the existing conditions Synchro model. The signal timing at the intersection of Caron Street & Laurier Street was not provided and was measured in the field on April 10, 2018. The measured signal timing was compared with OTM Book 12 Signal Timing guidelines based on the roadway conditions and modified accordingly.

The existing conditions analysis is summarized in **Table 2** and the detailed Synchro/SimTraffic output results are provided in **Appendix B**.

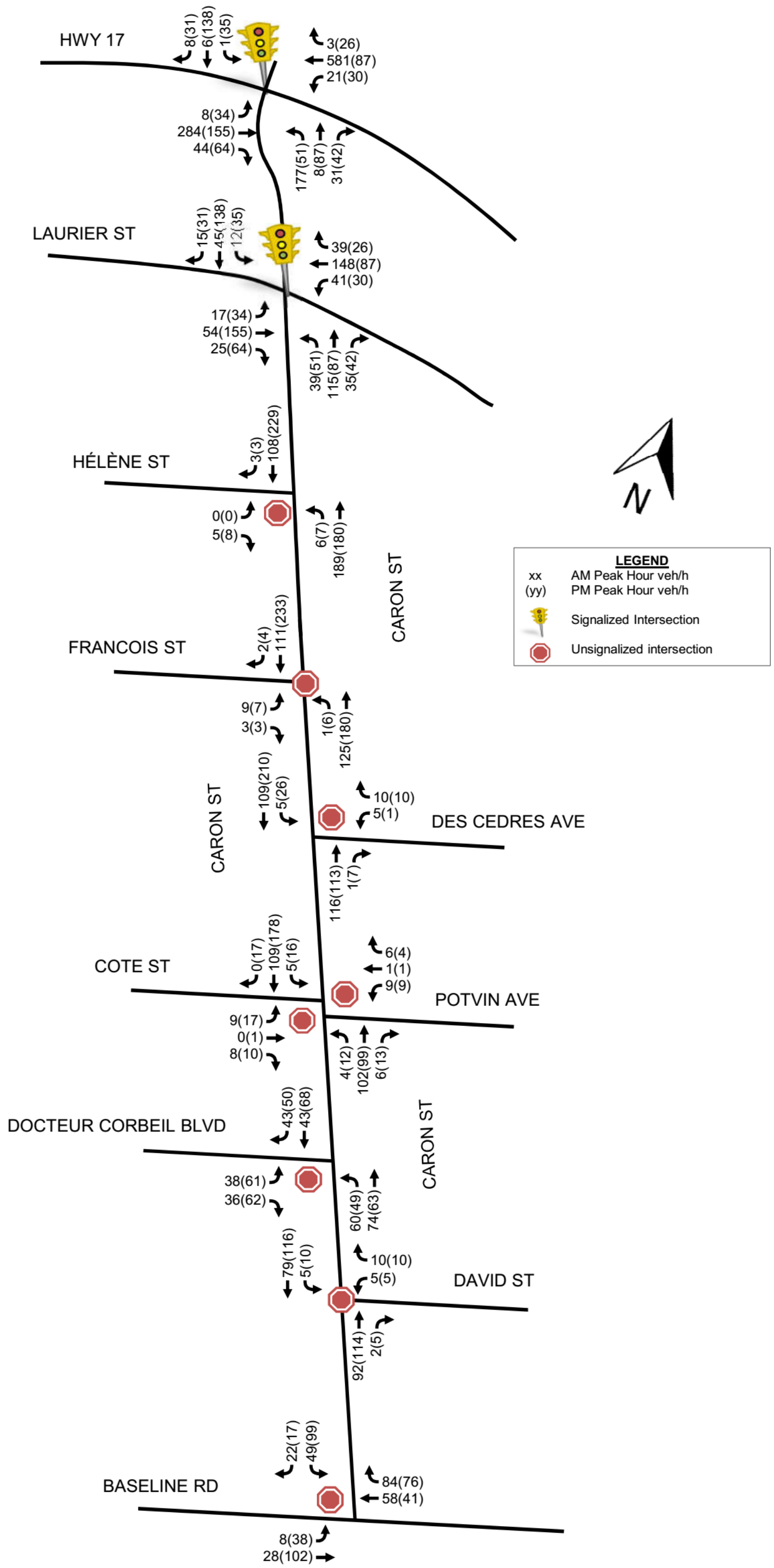


Figure 9: 2018 Existing Turning Movement Volumes

Table 2: 2018 Existing Intersection Operations

Direction	Mov	Storage Length (m)	AM Peak Hour v/c	AM Delay (s)	AM LOS	AM Queue (m)	PM Peak Hour v/c	PM Delay (s)	PM LOS	PM Queue (m)
Caron Street at HWY 17 (Signalized)										
EB	L	90	0.03	10	A	7	0.06	12	B	12
	T	-	0.33	12	B	34	0.20	16	B	26
	R	85	0.03	9	A	9	0.05	14	B	14
WB	L	60	0.04	8	A	8	0.05	12	B	12
	T	-	0.65	17	B	51	0.11	15	B	19
	R	56	0.00	9	A	2	0.02	14	B	9
NB	L	60	0.72	41	D	44	0.23	32	C	23
	T/R	-	0.07	35	C	12	0.42	39	D	35
SB	L	40	0.02	43	D	2	0.15	34	C	21
	T/R	-	0.26	48	D	8	0.64	46	D	49
Overall			**0.70**	**20**	**B**	**-**	**0.29**	**27**	**C**	**-**
Caron Street at Laurier Street (Signalized)										
EB	L	35	0.04	13	B	6	0.07	11	B	12
	T/R	-	0.10	14	B	12	0.32	16	B	30
WB	L	60	0.08	11	B	10	0.07	12	B	9
	T/R	-	0.26	14	B	23	0.17	15	B	16
NB	L	55	0.15	23	C	13	0.23	25	C	15
	T/R	-	0.44	28	C	34	0.42	29	C	31
SB	L	50	0.06	26	C	6	0.14	24	C	14
	T/R	-	0.18	28	C	19	0.59	32	C	42
Overall			**0.32**	**20**	**B**	**-**	**0.38**	**22**	**C**	**-**
Caron Street at Hélène Street (Unsignalized)										
EB	L/R	-	0.01	9	A	6	0.01	10	A	8
NB	L	15	0.00	1	A	2	0.01	8	A	4
	T	-	0.12	-	-	-	0.12	-	-	-
SB	T/R	-	0.07	-	-	-	0.15	-	-	-
Overall			**0.21**	**1**	**A**	**-**	**0.23**	**1**	**A**	**-**
Caron Street at Françoise Street (Unsignalized)										
EB	L/R	-	0.02	8	A	10	0.02	8	A	10
NB	L	15	0.00	7	A	2	0.01	8	A	6
	T	-	0.18	8	-	17	0.26	-	-	19
SB	T/R	-	0.15	8	A	17	0.31	8	A	24
Overall			**0.17**	**8**	**A**	**-**	**0.23**	**9**	**A**	**-**
Caron Street at Des Cèdres Avenue (Unsignalized)										
WB	L/R	-	0.02	9	A	10	0.01	9	A	9
NB	T/R	-	0.08	-	-	-	0.08	-	-	-
SB	L	15	0.00	1	A	2	0.02	8	A	6
	T	-	0.07	-	-	-	0.14	-	-	-
Overall			**0.17**	**1**	**A**	**-**	**0.22**	**1**	**A**	**-**
Caron Street at Cote Street/Potvin Avenue (Unsignalized)										
EB	L/T/R	-	0.02	8	A	11	0.04	8	A	14
WB	L/T/R	-	0.02	8	A	10	0.02	8	A	10
NB	L	15	0.01	7	A	5	0.02	7	A	9
	T/R	-	0.16	-	-	18	0.16	-	-	16
SB	L	15	0.01	7	A	4	0.03	7	A	7
	T/R	-	0.16	-	-	15	0.17	-	-	14
Overall			**0.16**	**7**	**A**	**-**	**0.18**	**7**	**A**	**-**
Caron Street at Docteur Corbeil Boulevard (Unsignalized)										

Direction	Mov	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
EB	L/R	-	0.10	10	A	14	0.16	10	B	15
NB	L	15	0.04	8	A	8	0.04	8	A	8
	T	-	0.05	-	-	-	0.04	-	-	-
SB	T/R	-	0.06	-	-	-	0.08	-	-	-
Overall			**0.21**	**4**	**A**	**-**	**0.24**	**5**	**A**	**-**
Caron Street at David Street (Unsignalized)										
WB	L/R	-	0.02	7	A	10	0.02	7	A	10
NB	T/R	-	0.12	8	A	17	0.15	8	A	17
SB	L	40	0.01	7	A	6	0.02	7	A	10
	T	-	0.11	7	-	16	0.17	7	-	15
Overall			**0.15**	**7**	**A**	**-**	**0.17**	**8**	**A**	**-**
Caron Street at Baseline Road (Unsignalized)										
EB	L/T	-	0.01	2	A	3	0.03	2	A	6
WB	T/R	-	0.09	-	-	12	0.08	-	-	16
SB	L/R	-	0.09	10	A	-	0.18	11	B	-
Overall			**0.20**	**3**	**A**	**-**	**0.28**	**4**	**A**	**-**

As shown in **Table 2**, all movements at signalized intersections are operating with a v/c ratio below 0.72 (i.e. with a LOS D or better). Regarding 95th percentile queues, the existing storage at signalized intersections is also noted as being sufficient (i.e. left-turn vehicle queues are not spilling back into and blocking adjacent through lanes). All movements at unsignalized intersections are operating with a v/c ratio below 0.31, (i.e. with a LOS B or better) and 95th percentile queues ranging between 1-3 vehicles in length.

Overall, there are no existing issues from a transportation perspective along Caron Street.

3. Transportation Master Plan

As part of the subject Secondary Plan and for the purpose of the following Transportation Master Planning exercise, future land use statistics were developed for the planned urban expansion area. Three residential scenarios were considered (e.g. a low, medium and high density scenario), and following public consultation and consultation with technical City Staff, a "medium" density scenario was selected as the preferred option. The following **Table 3** summarizes the estimated land use statistics for the subject expansion area.

Table 3: Medium Scenario Land Use Projected Densities

Land Use Designation	Area (ha)	Residential		Employment	
		Units	Population	Floor Area (m^2)	Employment
Low Density Residential	76.46	688	1,789	-	-
Medium Density Residential	22.55	203	528	-	-
High Density Residential	11.14	100	261	-	-
Commercial	2.91	-	-	7,283	182
Institutional/Community	24.17	-	-	-	-
Total	**137.23**	**911**	**2,577**	**7,283**	**182**

As a result of this projected increase in population and employment, new roads and multi-modal links should be considered, which the following sections outline potential future transportation needs.

It should be noted that as development applications come online, additional and more detailed analysis from a transportation perspective will be required to better develop future network needs (e.g. traffic signal control, auxiliary turns lanes, etc.). The estimated timing of full build-out is 25-years.

3.1 Planned Area Network Changes

An Environmental Study Report was prepared by AECOM in June of 2016 for the proposed widening of HWY 17[3]. Within the City of Clarence-Rockland, the proposed improvements included widening the existing HWY 17 as well as potentially widening/improving Baseline Road outside of the City Urban Boundary. The recommended plan is to widen both roadways from one lane in each direction to two lanes in both directions from east of the Trim Road interchange in the City of Ottawa, for a distance of approximately 21.5 km to Landry Road in the City of Clarence-Rockland.

A conceptual design of the future cross-section within the urban area of the Clarence-Rockland is illustrated in **Figure 10.**

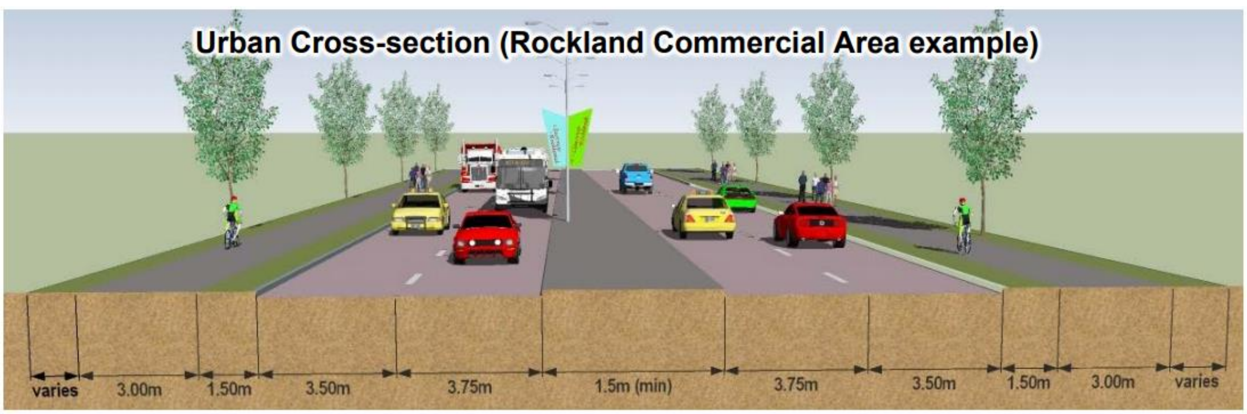


Figure 10: Conceptual Urban Cross-Section within the City of Clarence-Rockland

It should also be noted that it was identified in the Environmental Study Report that pedestrians and cyclists should be accommodated by multi-use pathways, paved shoulders and service roads along the HWY 17, with select pedestrian crossing treatments proposed within commercial zones where there will be desire lines.

[3] Environmental Study Report Ottawa Road 174 / County Road 17 Environmental Assessment Study, AECOM, June 2016

Based on the article provided by *CBC News,* MTO confirmed in 2016 that it would provide funding to widen HWY 17 in Clarence-Rockland. The planned construction is expected to commence in 2019[4].

With respect to the 2005 Strategic Planning report, prepared by *McCormick Rankin Corporation*, it was proposed that David Street will eventually extend to Poupart Road, which would be extended to HWY 17 to bolster the east-west network for the southern part of the city. Given the recent residential development west of Caron Street, this new east-west link is more likely to occur further south; however, the construction of the new east-west link is still uncertain and therefore, its timing is assumed to be beyond the scope of this assessment.

Without a new east-west link, more traffic will have to travel north or south in order to head east or west of the City. As a result, neighbourhoods may experience cut-through traffic once north-south become more congested.

3.2 Preferred Secondary Plan Concept

Following public consultation and consultation with technical City Staff, a preferred concept plan, outlining where certain land use types should be considered and where future collector roadways should be provided by the 2044 planning horizon year. This preferred concept plan is shown below in **Figure 11** and it should be noted that local roadways are not depicted, as future development will dictate where local roadways will be constructed. It should also be noted that there is currently no timeline for the extension of Street 'A' and Street 'B' beyond the study area, (i.e. a connection to the adjacent community to the west and Baseline Road to the south will ultimately be provided; however, this will likely occur beyond the 25-year planning horizon).

For the purpose of this assessment, the preferred concept plan was broken down into three phases. Phase 1 is assumed to be built-out within a 10-year time horizon (i.e. by the year 2029), Phase 2 is assumed to be built-out within a 20-year horizon (i.e. by the year 2039), and full build-out of the preferred concept plan is assumed to be built-out within a 25-year horizon (i.e. by the year 2044).

[4] CBC. (2016). *Ontario gives $40M to widen Rockland's County Road 17 | CBC News*. [online] Available at: https://www.cbc.ca/news/canada/ottawa/country-road-17-widen-1.3638456 [Accessed 2 May 2019].

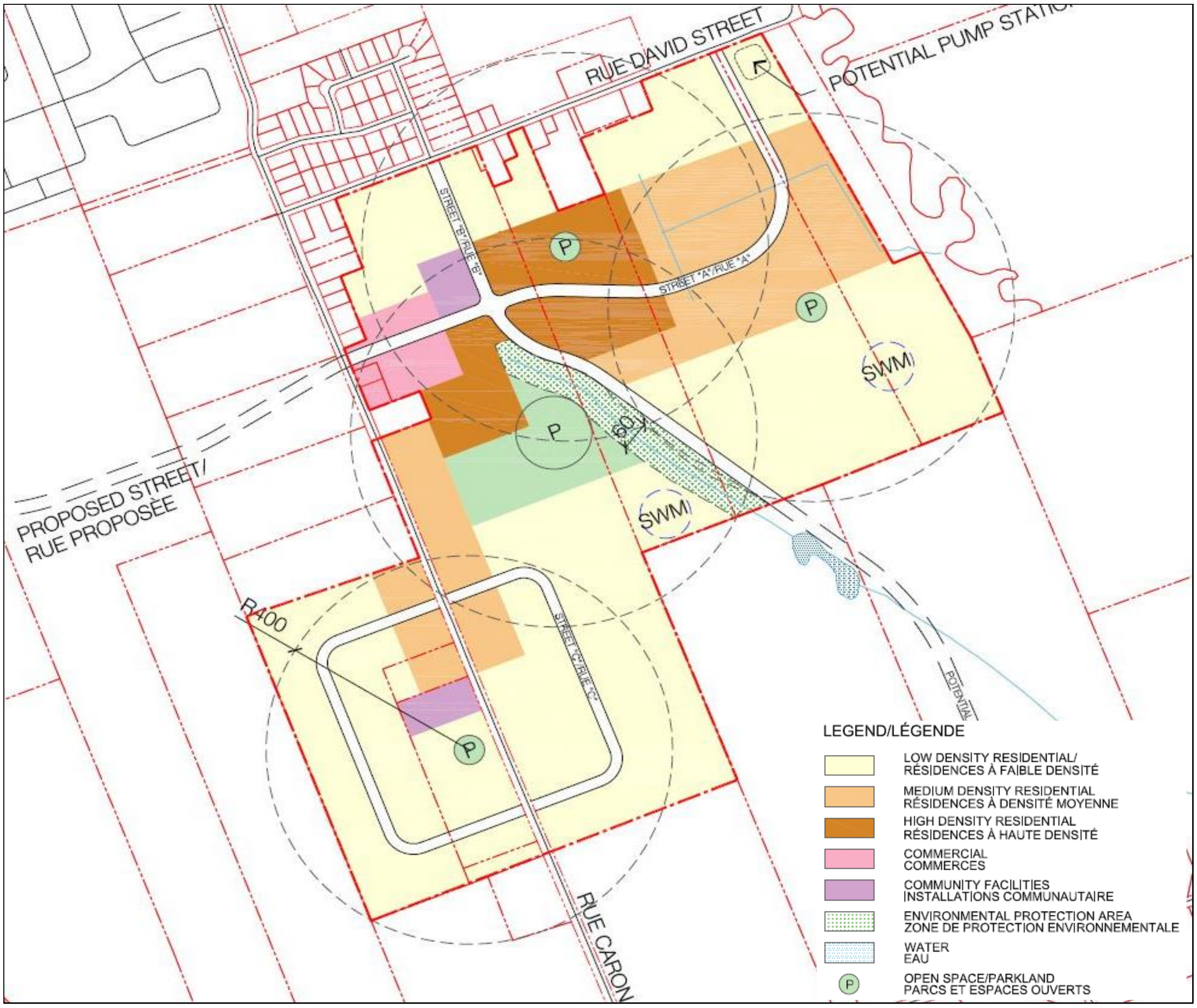


Figure 11: Preferred Concept Plan (prepared by FOTENN Consulting)

For analysis purposes, the following **Table 4** summarizes an assumed build-out and timing of the land uses depicted in **Figure 11**.

Table 4: Projected Build-Out Phasing

Land Use	Units or Gross Floor Area (GFA)		
	Phase 1 (year 2029)	Phase 2 (year 2039)	Full Build-out (year 2044)
Low Density Residential	273	480	688
Medium Density Residential	48	126	203
High Density Residential	31	65	100
Total Residential Units	**352**	**671**	**991**
Total Commercial GFA (m^2)	**7,283**	**7,283**	**7,283**

As shown in **Table 4**, it is anticipated that the planned commercial component of the expansion lands will be fully built-out by the 2029 horizon year and by the 2044 horizon year, an approximate total of 990 residential units will be constructed.

3.3 Future Transit

As mentioned previously in Section 2.4 of this report, the immediate future of transit service and ridership is somewhat unknown for Clarence-Rockland. However, as the subject expansion lands is built-out and as Clarence-Rockland continues to grow, it is assumed there will be an increase in transit demand. Therefore and for the purpose of this assessment, a transit modal share has been assumed when analyzing the total projected person trips generated by the subject expansion lands.

3.4 Future Cycling, Pedestrian & On-Street Parking

As previously mentioned, an approximate 2.2 m wide sidewalk is provided along the west side of Caron Street and a paved asphalt pathway, approximately 3.0 m in width, is provided along the east side of this roadway. Currently, these active transportation facilities are provided between HWY 17 in the north to David Street in the south. With the expansion of the urban boundary, these active transportation facilities should be extended south to the proposed new urban boundary (i.e. the existing sidewalk and pathway along Caron Street should be extended south, beyond the proposed Street 'C').

The cross-section of David Street currently consists of a relatively narrow travel lane in each direction for general purpose traffic, unpaved shoulders and rural ditches for drainage. Given David Street will be included in the expansion of the urban boundary, its cross-section should be upgraded to include sidewalks and dedicated cycling facilities (e.g. paved shoulders as a minimum or more preferably, a segregated bike facility should be provided along its length, such as cycle-tracks), which is considered to be a typical cross-section for urban collector roadways.

With respect to the City of Ottawa's *Road Corridor Planning & Design Guidelines*, the recommended right-of-way (ROW) width for David Street is 26 m, which is considered typical for new roads with segments that include on-road cycling routes. Typical cross-sections can be found in Appendix A of the City of Ottawa's *Road Corridor Planning & Design Guidelines.*

With regard to the new collector roadways (i.e. Street 'A', Street 'B' and Street 'C'), their cross-sections should also include sidewalks and dedicated cycling facilities, and along commercial, community and parkland frontages, on-street parking should also be considered.

By providing safe and efficient links for all modes of transportation, and ensuring sufficient on-street parking is provided for commercial/community spaces, the subject expansion lands will have the means to be a rich and sustainable community.

3.5 Background Growth

With respect to background traffic growth, as a result of new development outside the study area, a general 2% per annum growth rate was assumed as a way to capture the projected impacts of new traffic travelling through the study area. Based on recent Census data[5], this is considered to be a conservative approach, as Clarence-Rockland has experienced a historical growth rate of 1.7% per annum.

Based on the surrounding network and area development potential, an annual background traffic growth rate was applied to the HWY 17 eastbound and westbound through movements only. It should be noted that background traffic volumes for all other movements at study area intersections will remain constant (i.e. with the exception of the eastbound and westbound through movements at the Caron/HWY 17 intersection, observed volumes depicted in **Figure 9** are not anticipated increase because of new development outside the study area).

The following **Table 5** summarizes the projected background traffic volumes on HWY 17 for each build-out horizon year.

Table 5: Projected Background Traffic Growth

Direction	Mov.	Background Traffic Volumes (veh/h)					
		Phase 1 (year 2029)		Phase 2 (year 2039)		Full Build-out (year 2044)	
		AM	PM	AM	PM	AM	PM
Caron Street at HWY 17 (Signalized)							
EB	**T**	346	189	422	230	466	254
WB	**T**	708	106	863	129	953	143

3.6 Projected Site Trip Generation

For the purpose of this assessment, projected site-generated traffic was estimated using the appropriate average vehicle trip generation rates (or fitted curve equation, if available) from the 10th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual. The following **Table 6** summarizes a number of appropriate ITE trip generation rates for estimating projected site-generated traffic.

Table 6: ITE Vehicle Trip Generation Rates

Land Use	Data Source	AM Peak	PM Peak
Single-Family Detached Housing	ITE 210	T = 0.74(X); T= 0.71(X) + 4.80	T = 0.99(X); Ln(T)= 0.96(X) + 0.20
Multifamily Housing	ITE 220	T = 0.46(X); Ln(T) = 0.95(X) - 0.51	T = 0.56(X); Ln(T) = 0.89(X) - 0.02

[5] Statistics Canada. 2017. *Clarence-Rockland, C [Census subdivision], Ontario and Ontario [Province]* (table). *Census Profile*. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed May 1, 2019).

Land Use	Data Source	AM Peak	PM Peak
Single Tenant Office Building	ITE 715	T = 1.78 (X); T= 1.68(X) + 17.26	T = 1.71(X); T= 1.54(X) + 27.59
Convenience Market	ITE 851	T = 62.54(X); n/a	T = 49.11(X); n/a
Fast Food Restaurant Without Drive Thru Window	ITE 933	T = 25.10(X); T= 89.03(X) - 157.40	T = 28.34(X); n/a
Mid-Rise Residential with 1st Floor Commercial	ITE 231	T = 0.45(X); n/a	T = 0.37(X); n/a
Drive in Bank	ITE 912	T = 9.50(X); n/a	T = 20.45(X); n/a
Coffee/Donut Shop with Drive-thru	ITE 937	T = 88.99(X); n/a	T = 43.38(X); n/a
Pharmacy Without Drive-thru	ITE 880	T = 2.94(X); n/a	T = 8.51(X); n/a
Medical Dental Clinic	ITE 720	T = 2.78(X); Ln(T) = 0.89(X) + 1.31	T = 3.46(X); T= 3.43(X) + 2.57
Fast Casual Restaurant	ITE 930	T = 2.07(X); n/a	T = 14.13(X); n/a
Day Care Centre	ITE 565	T = 11.0(X); n/a	T = 11.12(X); n/a
Clinic	ITE 630	T = 3.69(X); n/a	T = 3.28(X); Ln(T) = 0.72(X) + 1.97
Notes: T = Average Vehicle Trip Ends; and X = Number of residential units or 1,000 ft² GFA			

With respect to ITE trip generation rates, the data used to develop these rates only include vehicle trips (i.e. walking, cycling or transit trips are not captured), and the data collection surveys are typically conducted in highly-suburban locations with limited access to transit and dedicated non-motorized facilities (e.g. sidewalks, bike lanes, etc. are limited). To properly consider the multi-modal trips generated by new development, projected site-generated traffic (estimated using ITE trip generation rates) is converted to projected site-generated *persons* trips.

To convert projected ITE vehicle trips to *person* trips, an auto occupancy factor and non-auto trip factor is applied to the ITE trip generation rates. With respect to available American Census data, the typical modal share of non-auto person trips is approximately 10% and the typical auto occupancy is 1.15. Therefore, when combined, a factor of 1.28 is used to convert vehicle trips to person trips.

Based on the foregoing, the projected weekday morning and afternoon peak hour person trip generation for the subject expansions lands is summarized in **Table 7, Table 8** and **Table 9**, for the planned 2029, 2039 and 2044 build-out years, respectively.

It should be noted, for the commercial component of the expansion lands, multiple trip generation rates were combined to estimate an overall commercial projected trip generation (i.e. trip generation rates for convenience market, drive-in bank, coffee shop, etc. were combined).

Table 7: Phase 1 Modified Person Trip Generation (Year 2029)

Land Use	Area	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing	273 Units	63	191	254	214	127	341
Multifamily Housing	48 Units	6	24	30	24	15	39
Mid-Rise Residential with 1st Floor Commercial	31 Units	4	14	18	10	5	15
Commercial	78,394 ft²	681	525	1,026	527	612	1,139
Total Person Trips/hr		**754**	**754**	**1,508**	**775**	**759**	**1,534**

As summarized in **Table 7**, the build-out of Phase 1 is projected to generate approximately 1,508 and 1,534 person trips per hour during weekday morning and afternoon peak hours, respectively.

Table 8: Phase 2 Modified Person Trip Generation (Year 2039)

Land Use	Area	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing	480 Units	110	332	442	369	217	586
Multifamily Housing	126 Units	17	59	76	58	35	93
Mid-Rise Residential with 1st Floor Commercial	65 Units	8	29	37	22	9	31
Commercial	78,394 ft²	681	525	1,206	527	612	1,139
Total Person Trips/hr		**816**	**945**	**1,761**	**976**	**873**	**1,849**

As summarized in **Table 8**, the build-out of Phase 2 is projected to generate approximately 1,761 and 1,849 person trips per hour during weekday morning and afternoon peak hours, respectively.

Table 9: Full Build-Out Modified Person Trip Generation (Year 2044)

Land Use	Area	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing	688 Units	157	474	631	521	307	828
Multifamily Housing	203 Units	27	93	120	89	53	142
Mid-Rise Residential with 1st Floor Commercial	100 Units	13	45	58	33	14	47
Commercial	78,394 ft²	681	525	1,206	527	612	1,139
Total Person Trips/hr		**878**	**1,137**	**2,015**	**1,170**	**986**	**2,156**

As summarized in **Table 9**, the full build-out of the expansion lands is projected to generate approximately 2,015 and 2,156 person trips per hour during weekday morning and afternoon peak hours, respectively.

3.6.1 Travel Mode Shares

Estimating the number of person trips arriving/departing by different travel modes, total projected person trips are subdivided by mode share values that take into consideration proximity and quality of transit, pedestrian and cycling facilities, and the main purpose of trips.

With respect to the Transportation Impact Study (TIS), prepared by *Castleglenn Consultants Inc*., for the Morris Village development, which is located directly adjacent to and west of the subject expansion lands, modal share values for Morris Village were assumed to be 85% auto drivers, 5% auto passenger, and 10% transit.

For the purpose of this assessment, similar modal share values were assumed, to be consistent with the previous analysis conducted for the Morris Village development. It should be noted that a non-motorized travel mode was not included in the Morris Village TIS and for the purpose this assessment, it was assumed that there will be a 5% mode share for non-motorized trips, resulting in the following modal splits for the proposed expansion lands:

- 80% Auto Driver
- 5% Auto Passenger
- 10% Transit
- 5% Non-motorized

100% Total Person Trips

It should also be noted, given the majority of the planned commercial will serve the community within the subject expansion lands, it is reasonable to conclude that a number of trips will be shared (e.g. a single person can visit a drive-in bank on their way home). As such, a 30% reduction in total projected site-generated traffic was assumed.

The following **Table 10, Table 11,** and **Table 12** summarize the weekday morning and afternoon peak hour trip generation, by mode, for the planned 2029, 2039 and 2044 build-out years, respectively.

Table 10: Phase 1 Site Trip Generation (Year 2029)

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	80%	604	604	1,208	620	608	1,228
Auto Passenger	5%	38	38	76	39	38	77
Transit	10%	75	75	150	78	76	154
Non-motorized	5%	37	37	74	38	37	75
Total Person Trips	100%	754	754	1,508	775	759	1,534
Total Auto Trips		**604**	**604**	**1,208**	**620**	**608**	**1,228**
Less Multi-Purpose Trips		**-181**	**-181**	**-362**	**-186**	**-182**	**-368**
Total 'New' Auto Trips		**423**	**423**	**846**	**434**	**426**	**860**

As summarized in **Table 10**, the build-out of Phase 1 is projected to generate approximately 846 and 860 veh/h during weekday morning and afternoon peak hours, respectively.

Table 11: Phase 2 Site Trip Generation (Year 2039)

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	80%	653	756	1,409	781	699	1,480
Auto Passenger	5%	41	48	89	49	44	93
Transit	10%	82	94	176	98	87	185
Non-motorized	5%	40	47	87	48	43	91
Total Person Trips	100%	816	945	1,761	976	873	1,849
Total Auto Trips		**653**	**756**	**1,409**	**781**	**699**	**1,480**
Less Multi-Purpose Trips		**-196**	**-227**	**-423**	**-234**	**-210**	**-444**
Total 'New' Auto Trips		**457**	**529**	**986**	**547**	**489**	**1,036**

As summarized in **Table 11**, the build-out Phase 2 is projected to generate approximately 986 and 1,036 veh/h during weekday morning and afternoon peak hours, respectively.

Table 12: Full Build-out Site Trip Generation (Year 2044)

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	80%	703	910	1,613	936	789	1,725
Auto Passenger	5%	44	57	101	59	50	109
Transit	10%	88	114	202	117	98	215
Non-motorized	5%	43	56	99	58	49	107
Total Person Trips	100%	878	1,137	2,015	1,170	986	2,156
Total Auto Trips		**703**	**910**	**1,613**	**936**	**789**	**1,725**
Less Multi-Purpose Trips		**-211**	**-273**	**-484**	**-281**	**-237**	**-518**
Total 'New' Auto Trips		**492**	**637**	**1,129**	**655**	**552**	**1,207**

As summarized in **Table 12**, the full build-out of the expansion lands is projected to generate approximately 1,129 and 1,207 veh/h during weekday morning and afternoon peak hours, respectively.

3.7 Vehicle Traffic Distribution and Assignment

The projected distribution of site-generated traffic was based on volume splits at existing study area intersections and the assumptions found in the Morris Village TIS, prepared by *Castleglenn Consultants Inc*. As such, the assumed distribution is outlined as follows:

- 65% to/from the west (Ottawa) via HWY 17;
- 10% to/from the east (Hawkesbury) via HWY 17;
- 15% to/from the south via Baseline Road; and
- 10% to/from the City of Clarence Rockland.

100%

3.8 Projected Conditions

3.8.1 Phase 1 Conditions

Based on the assumed distribution outlined in section 3.7, 'new' auto trips were assigned to the study area network (depicted as **Figure 12**) for the 2029 build-out year, and were layered onto projected background traffic volumes (i.e. background traffic volumes are essentially existing volumes, taking into consideration volume increases on HWY 17, as summarized in **Table 5**). As a result, the total projected traffic volumes for the 2029 build-out year is depicted as **Figure 13**.

Using the Synchro (v9) intersection capacity analysis software, **Appendix C** contains a projected performance summary for study area intersections and the detail output data from Synchro. It should be noted, a TWLTL (i.e. Two-way Left Turn Lane) median on Caron Street was extended from David Street to Street 'A'. It should also be noted that no additional modifications to network geometry or signal timing were assumed for the analysis contained in **Appendix C**.

As a result of increased traffic volumes for the 2029 build-out year, the northbound left-turn movement at the Caron/HWY 17 intersection is projected to operate with a LoS 'F' during both weekday morning and afternoon peak hours. All other study area intersections are projected to perform with an acceptable Level of Service.

The following **Table 13** summarizes the failing northbound left-turn movement at the Caron/HWY 17 intersection.

Table 13: Critical Movements Phase 1 (Year 2029)

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at HWY 17 (Signalized)										
NB	L	60	1.95	463	F	155	1.17	136	F	110

Improving the projected performance of the Caron/HWY 17 intersection, the following measures are recommended to support the additional traffic generated by the subject expansion lands.

Caron/HWY 17

- Implement dual northbound left-turns lanes;
- Provide dual westbound receiving lanes (i.e. two lanes are needed to receive northbound left-turning traffic);
- Implement a fully protected northbound left-turn signal phase; and
- Optimize Signal Phasing[6].

With the implementation of the above recommendations, the northbound left-turn movement at the Caron/HWY 17 intersection is projected to operate with a LoS of 'D', during both morning and afternoon peak hours.

A projected performance summary for study area intersections with improvements and the detail output data from Synchro is contained in **Appendix D**.

With regarding to the new study area intersections, All-Way STOP control is recommended at the Caron/Street 'A' intersection and at the Street 'A'/Street 'B' intersection. At the new David/Street 'B' intersection, STOP control on the minor approach will be sufficient.

Despite the extension of Street 'A' westward will not occur within the foreseeable future (i.e. extending Street 'A' west of Caron Street), the City may wish to protect sufficient right-of-way for a single lane roundabout at the intersection of Street 'A'/Street 'B'. A roundabout at this location will be consistent with the intersection treatments within the Morris Village development. However, for analysis purposes, All-Way STOP control will be assumed in the subsequent analysis and it should be noted that a single lane roundabout has more vehicle throughput capacity than an All-Way STOP controlled intersection.

[6] Optimization of the signalized intersection operations was based on modifications of operation parameters as part of the Synchro analysis. The minimum initial and total split parameters in Synchro were modified to optimize the operation of the actuated traffic signal system.

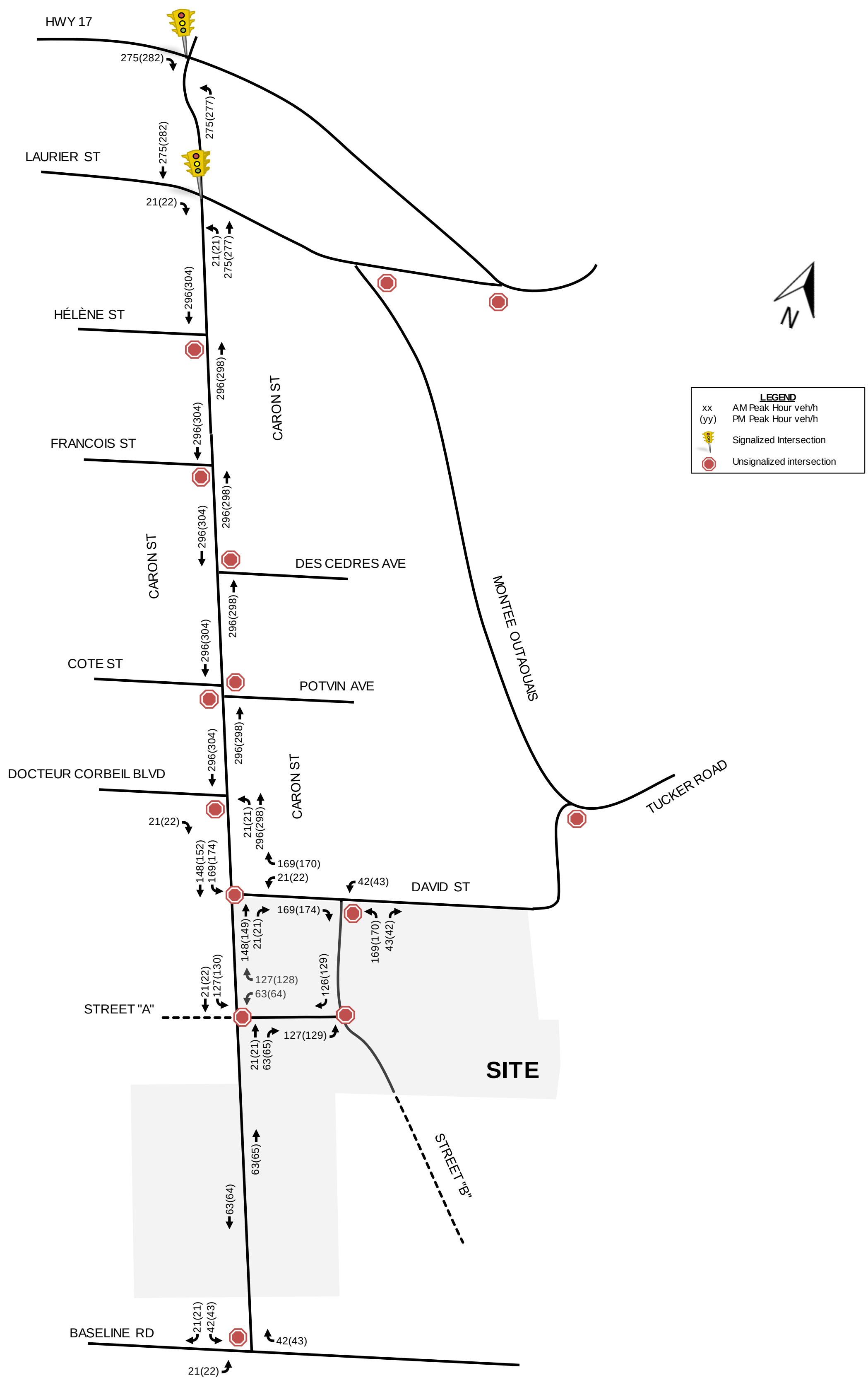


Figure 12: Phase 1 Total New Site-Generated Trips (Year 2029)

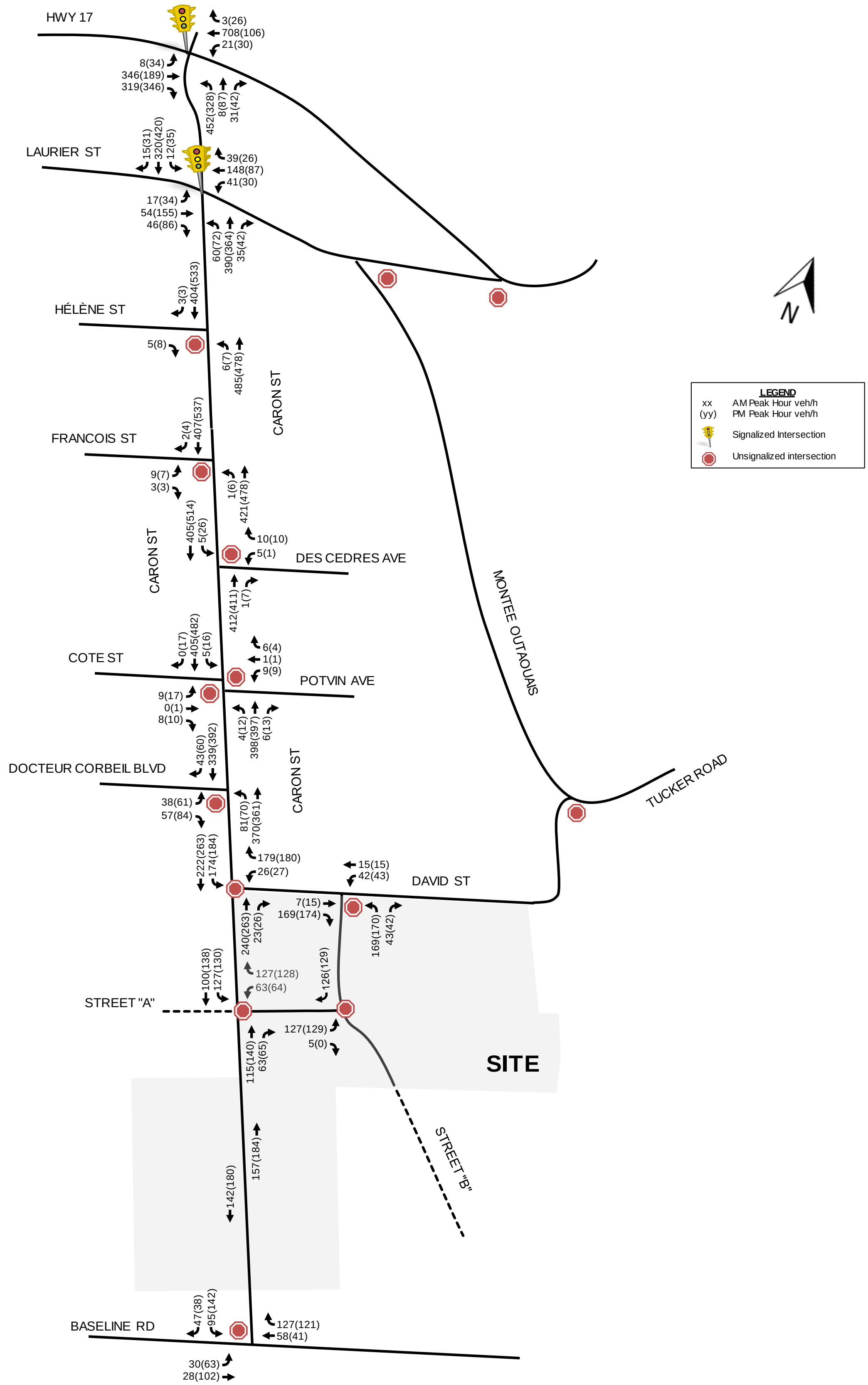


Figure 13: Phase 1 Total Projected Volume (Year 2029)

3.8.2 Phase 2 Conditions

Based on the assumed distribution outlined in section 3.7, 'new' auto trips were assigned to the study area network (depicted as **Figure 14**) for the 2033 build-out year, and were layered onto projected background traffic volumes (i.e. background traffic volumes are essentially existing volumes, taking into consideration volume increases on HWY 17, as summarized in **Table 5**). As a result, the total projected traffic volumes for the 2039 build-out year is depicted as **Figure 15**.

Using the Synchro (v9) intersection capacity analysis software, **Appendix E** contains a projected performance summary for study area intersections and the detail output data from Synchro. It should be noted, a TWLTL (i.e. Two-way Left Turn Lane) median on Caron Street was extended from David Street to Street 'A'. It should also be noted that the previously recommended modifications to the network geometry and signal timing adjustments to the Caron/HWY 17 intersection for Phase 1, are also assumed to be in place by the 2039 build-out year, which is reflected in the analysis contained in **Appendix E**.

As a result of increased traffic volumes for the 2039 build-out year, the northbound left-turn movement at the Caron/HWY 17 intersection, is projected to operate with a LoS 'F' during weekday morning peak hour. In addition, the southbound through/right-turn movement at the Caron/Laurier intersection, is projected to operate with a poorly performing LoS 'E' during the weekday afternoon peak hour. All other study area intersections are projected to perform with an acceptable Level of Service.

The following **Table 14** summarizes the failing northbound left-turn movement at the Caron/HWY 17 intersection, and the southbound through/right-turn movement at the Caron/Laurier intersection.

Table 14: Critical Movements Phase 2 (Year 2039)

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at HWY 17 (Signalized)										
NB	L	80	1.05	90	F	100	0.69	44	D	53
Caron Street at Laurier Street (Signalized)										
SB	T/R	-	0.73	36	D	94	1.01	71	E	165

Improving the projected performance of the Caron/HWY 17 and Caron/Laurier intersections, the following measures are recommended to support the additional traffic generated by the subject expansion lands.

Caron/HWY 17

- Optimize Signal Phasing

Caron/Laurier

- Optimize Signal Phasing

With the implementation of the above recommendations, the northbound left-turn movement at the Caron/HWY 17 intersection is projected to operate with a LoS 'E', during the weekday morning peak hour. With regard to the southbound through/right movement at Caron/Laurier intersection, it is projected to operate with a LoS 'D' during the afternoon peak hour.

A projected performance summary for study area intersections with improvements and the detail output data from Synchro is contained in **Appendix F**.

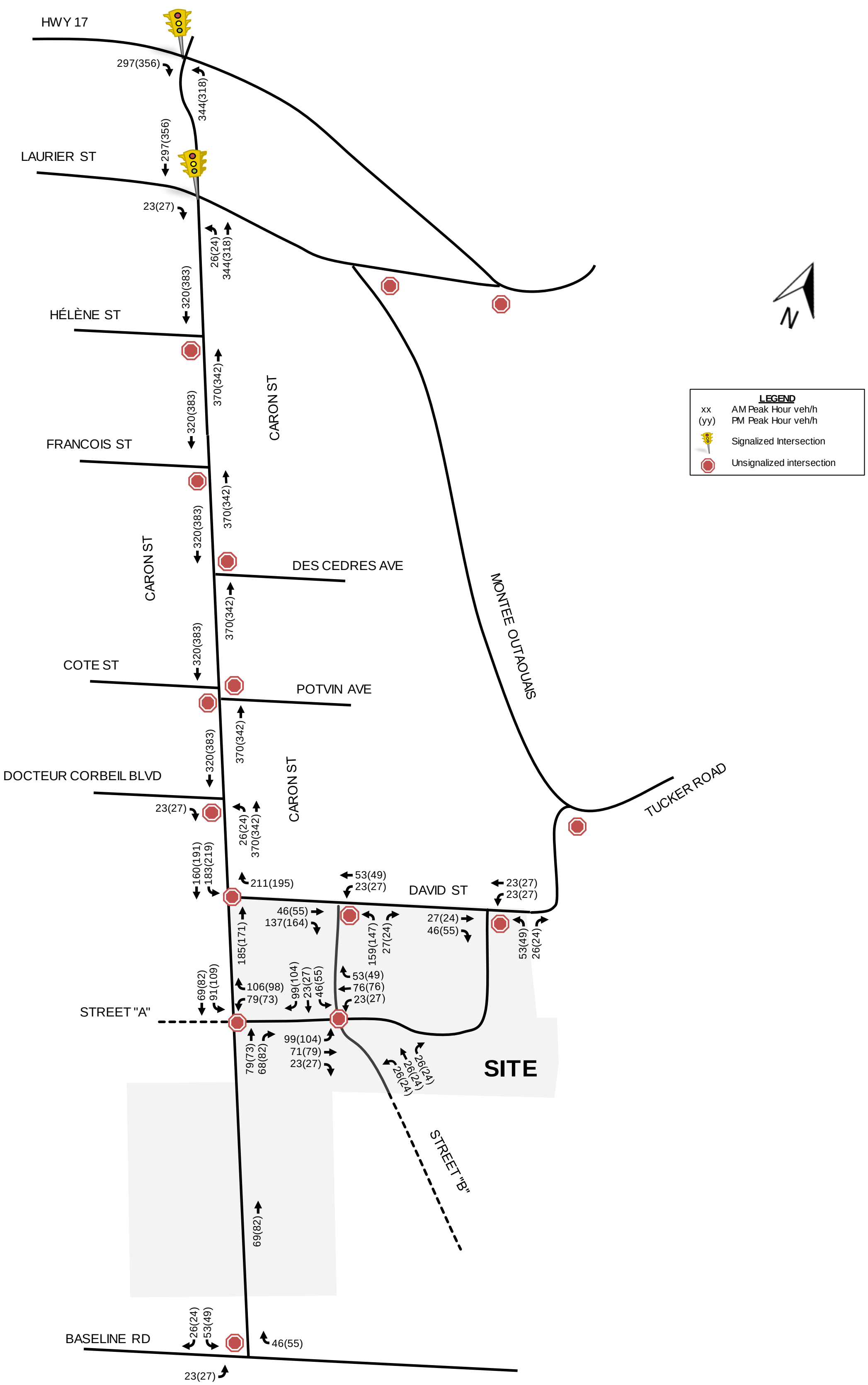


Figure 14: Phase 2 Total New Site-Generated Trips (Year 2039)

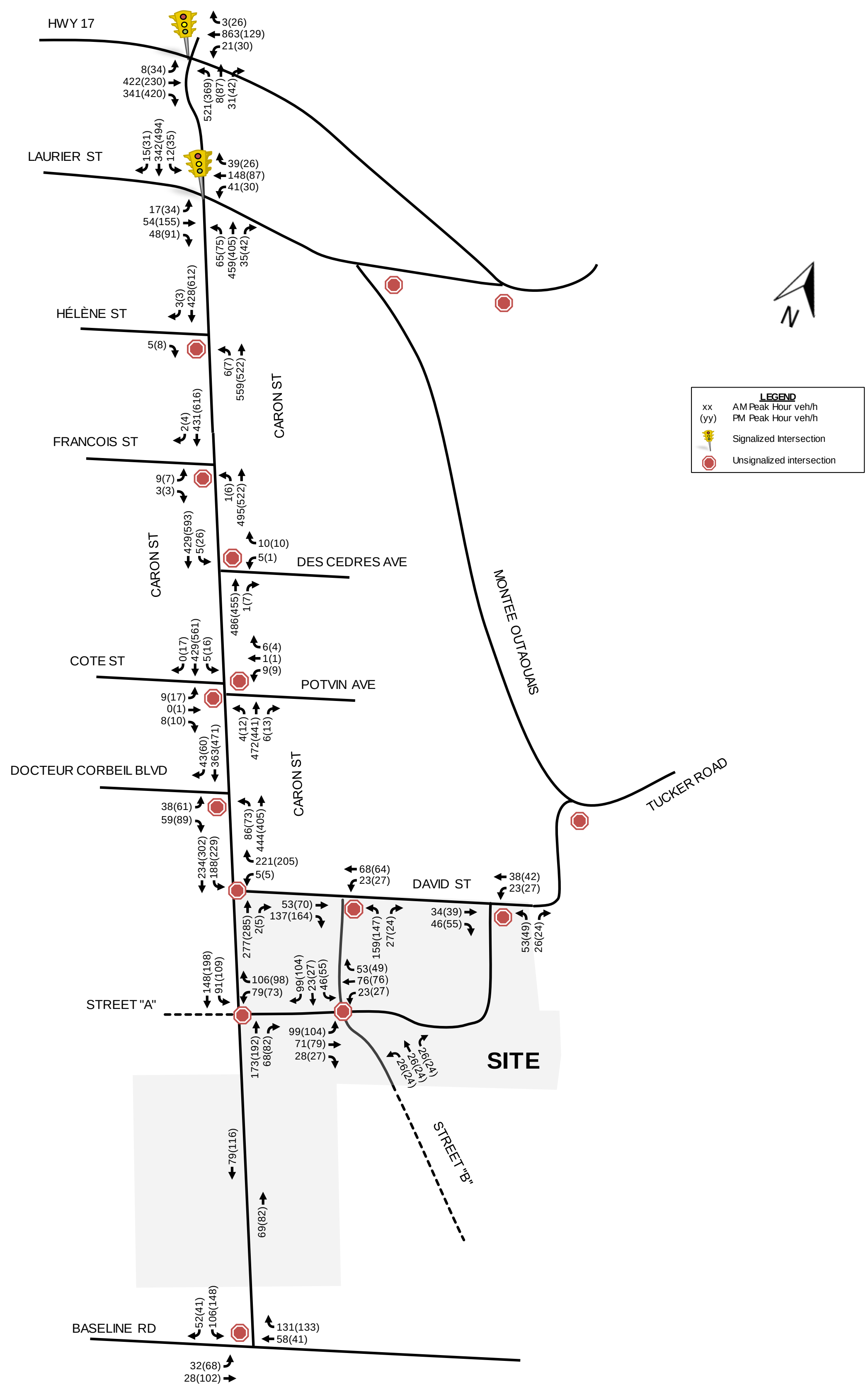


Figure 15: Phase 2 Total Projected Volume (Year 2039)

3.8.3 Full Build Out Conditions

Based on the assumed distribution outlined in section 3.7, 'new' auto trips were assigned to the study area network (depicted as **Figure 16**) for the full build-out 2044 horizon year, and were layered onto projected background traffic volumes (i.e. background traffic volumes are essentially existing volumes, taking into consideration volume increases on HWY 17, as summarized in **Table 5**). As a result, the total projected traffic volumes for the 2044 build-out year is depicted as **Figure 17**.

Using the Synchro (v9) intersection capacity analysis software, **Appendix G** contains a projected performance summary for study area intersections and the detail output data from Synchro. It should be noted, a TWLTL (i.e. Two-way Left Turn Lane) median on Caron Street was extended from Street 'A' to Street 'C'. It should also be noted that the previously recommended modifications to the network geometry and signal timing adjustments for Phase 2, are also assumed to be in place by the 2044 build-out year, which is reflected in the analysis contained in **Appendix G**.

As a result of increased traffic volumes for the 2044 build-out year, the northbound left-turn movement at the Caron/HWY 17, is projected to operate with a LoS 'F' during weekday morning peak hours. Similarly, the southbound through/right-turn movements at both the Caron/ Françoise and Caron/Cote/Potvin intersections are projected to operate with a LoS 'F' during the weekday afternoon peak hour. In addition, the southbound through/right-turn movement at the Caron/Laurier intersection, is projected to operate with a LoS 'E' during weekday afternoon peak hour. All other study area intersections are projected to perform with an acceptable Level of Service.

The following **Table 15** summarizes the poorly performing movements at study area intersections.

Table 15: Critical Movements Full Build-out (Year 2044)

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at HWY 17 (Signalized)										
NB	L	80	1.04	85	F	110	0.74	46	D	61
Caron Street at Laurier Street (Signalized)										
SB	T/R	-	0.72	34	C	90	1.05	79	E	125
Caron Street at Françoise Street (Unsignalized)										
SB	T/R	-	0.67	17	C	-	1.03	62	F	-
Caron Street at Cote Street/Potvin Avenue (Unsignalized)										
SB	T/R	-	0.72	19	C	-	1.04	66	F	-

Improving the projected performance of the critical movements listed above in **Table 15**, the following measures are recommended to support the additional traffic generated by the subject expansion lands.

Caron/HWY 17

- Widen the westbound through movement to two lanes; and
- Optimize Signal Phasing

Caron/Laurier

- Increase Signal Cycle Length to 120 seconds; and
- Optimize Signal Phasing.

Caron/Françoise

- Implement Traffic Signal Control.

Caron/Cote/Potvin

- Implement Traffic Signal Control.

With the implementation of the above recommendations, the northbound left-turn movement at the Caron/HWY 17 intersection is projected to operate with a LoS of 'C', during the weekday morning peak hour. The southbound through/right-turn movement at the Caron/Laurier intersection is projected to operate with a LoS of 'D, during afternoon peak hours.

The southbound through/right-turn movements at both Caron/Françoise and Caron/Cote/Potvin intersections are projected to operate with a LoS 'A' during the weekday afternoon peak hour.

A projected performance summary for study area intersections with improvements and the detail output data from Synchro is contained in **Appendix H**.

With regarding to the new study area intersections, STOP control on the minor approaches of the Caron/Street 'C' intersections will be sufficient to support future development contained within the subject expansion lands.

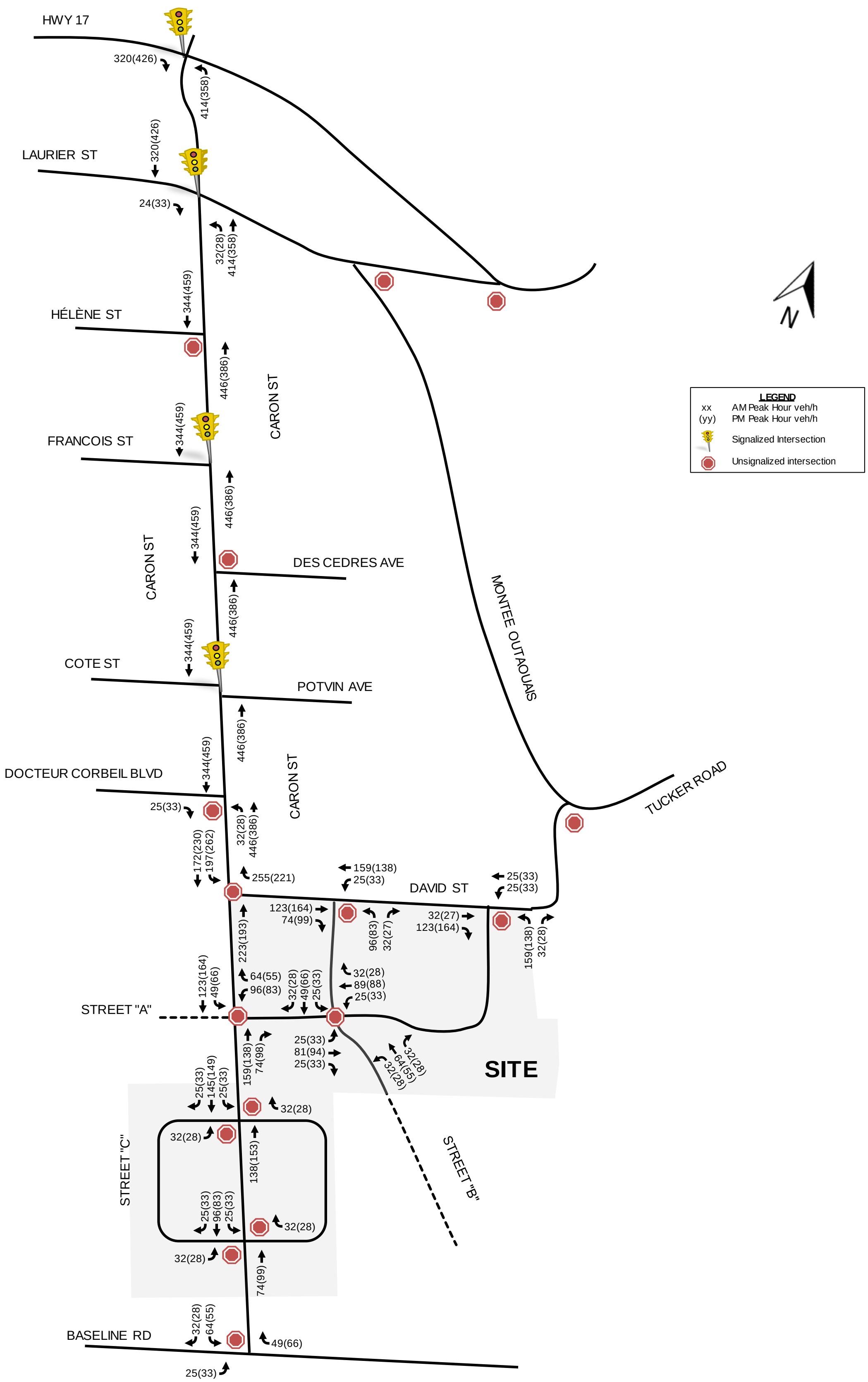


Figure 16: Full Build-out Total New Site-Generated Trips (Year 2044)

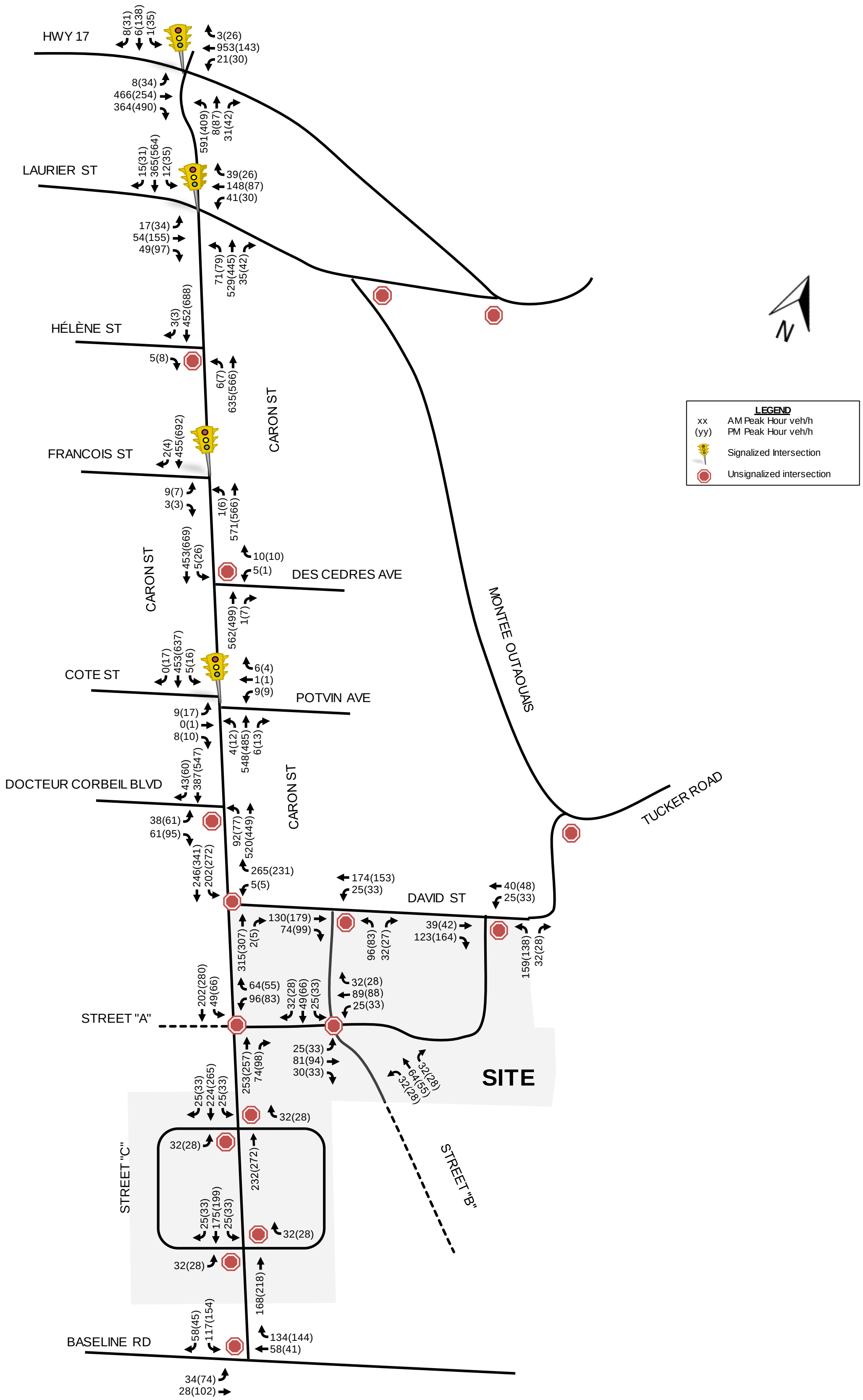


Figure 17: Full Build-out Total Projected Volume (Year 2044)

4. Network Improvement Plan

Based on the foregoing, the following network improvement plan is recommended to support future development contained within the subject expansion lands. It should be noted that the following plan is for collector and arterial roadway only. As new development is built-out, local roadways will be constructed to provide access/egress between new land uses and the higher-order transportation network (i.e. collector and arterial roadways).

As such, it is recommended that access management policies and roadway design standards be developed to direct future development during the City's development approval process.

4.1.1 Phase 1

Along Caron Street, the existing TWLTL should be extended from David Street to Street 'A'. In addition, the following study area intersection improvements are also recommended for Phase 1:

Caron/HWY 17

- Implement dual northbound left-turns lanes;
- Provide dual westbound receiving lanes (i.e. two lanes are needed to receive northbound left-turning traffic);
- Implement a fully protected northbound left-turn signal phase; and
- Optimize Signal Phasing.

All-Way STOP control is recommended at the new Caron/Street 'A' intersection and at the Street 'A'/Street 'B' intersection. At the new David/Street 'B' intersection, STOP control on the minor approach will be sufficient.

Despite the extension of Street 'A' westward, beyond Caron Street, will not occur within the foreseeable future, the City may wish to protect for a right-of-way that can accommodate a single lane roundabout for the intersection of Street 'A'/Street 'B'. A roundabout at this location will be consistent with the intersection treatments within the Morris Village development.

It should be noted that a typical range in diameter for a single-lane roundabout is 36-40 m if the design vehicle is a WB-17 or WB-20, and approximately 32 m if the design vehicle is smaller (i.e. fire truck, transit bus, etc.). If possible, the City should plan to protect a 40 m ROW for single-lane roundabouts where collector roadways intersect.

4.1.2 Phase 2

The previously recommended modifications to the network geometry and signal timing adjustments for Phase 1, are also assumed to be in place by the 2039 build-out year. In addition, the following study area intersection improvements are also recommended for Phase 2:

Caron/HWY 17

- Optimize Signal Phasing

Caron/Laurier

- Optimize Signal Phasing

4.1.3 Full Build-out

Along Caron Street, the TWLTL should be extended from Street ‘A’ to Street ‘C’.

The previously recommended modifications to the network geometry and signal timing adjustments for Phase 2, are also assumed to be in place by the 2044 build-out year. In addition, the following study area intersection improvements are also recommended for the full build-out of the expansion lands:

Caron/HWY 17

- Widen the westbound through movement to two lanes; and
- Optimize Signal Phasing.

Caron/Laurier

- Increase Signal Cycle Length to 120 seconds; and
- Optimize Signal Phasing.

Caron/Françoise

- Implement Traffic Signal Control.

Caron/Cote/Potvin

- Implement Traffic Signal Control.

Additionally, STOP control on the minor approaches of the new Caron/Street ‘C’ intersections are recommended to support future development contained within the subject expansion lands.

5. Findings, Conclusions, and Recommendations

Based on the foregoing analysis, the following transportation findings, conclusions and recommendations are offered:

- Study area intersections are currently operating with an acceptable Levels of Service during both weekday morning and afternoon peak hours. This was confirmed with field observations;
- The pedestrian and cycling network contained within the urban sections of the study area are fairly well developed;
- Based on the preferred Concept Plan, full build-out is projected to generate new two-way traffic in the order of 1,100 to 1,200 veh/h, which is anticipated to occur over a 25-year time period;
- Mitigating the reliance on the private automobile, municipal funding for transit could be reconsidered to support future development (e.g. with municipal funding transit fares can

potentially be lowered to encourage ridership). Additionally, a new local transit route may be provided throughout the expansion lands, which can transport passengers to/from the route currently served by CRT Route 530;

- Sidewalks and dedicated cycling facilities should be provided along all urban collector roadways;
- Along commercial, community and parkland frontages, on-street parking should be considered; and
- With select road improvements (e.g. implementing traffic signal control, additional auxiliary turn lanes, widening HWY 17, etc.), the study area network is projected to operate acceptably.

As future development applications come online, additional and more detailed analysis from a transportation perspective will be required to better develop future network needs. However, by providing safe and efficient links for all modes of transportation, and ensuring sufficient on-street parking is provided for commercial/community spaces, the subject expansion lands will have the means to be a rich and sustainable community.

Based on the foregoing, the proposed expansion lands are recommended from a transportation perspective.

Prepared By:	Reviewed By:
Ehab Elmadhoun, E.I.T	Gordon Scobie, P.Eng.
Engineering Intern, Transportation	Project Manager, Transportation

A

Appendix A

Traffic Data

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Hwy 17, Rockland, On
GPS Coordinates: Lat=45.432940, Lon=-75.598433
Date: 2018-04-05
Day of week: Thursday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	2	2	7	140	0	41	1	7	1	53	13	267
07:45	1	1	2	4	158	3	52	4	10	2	75	14	326
08:00	0	2	1	1	136	0	46	3	6	3	73	5	276
08:15	0	1	3	9	147	0	38	0	8	2	83	12	303

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	2	2	7	140	0	41	1	7	1	53	13	267
07:45	1	1	2	4	158	3	52	4	10	2	75	14	326
08:00	0	2	1	1	136	0	46	3	6	3	73	5	276
08:15	0	1	3	9	147	0	38	0	8	2	83	12	303

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	1	6	8	21	581	3	177	8	31	8	284	44	1172
Factor	0.25	0.75	0.67	0.58	0.92	0.25	0.85	0.50	0.78	0.67	0.86	0.79	0.90
Approach Factor	0.94			0.92			0.82			0.87			

Peak Hour Vehicle Summary

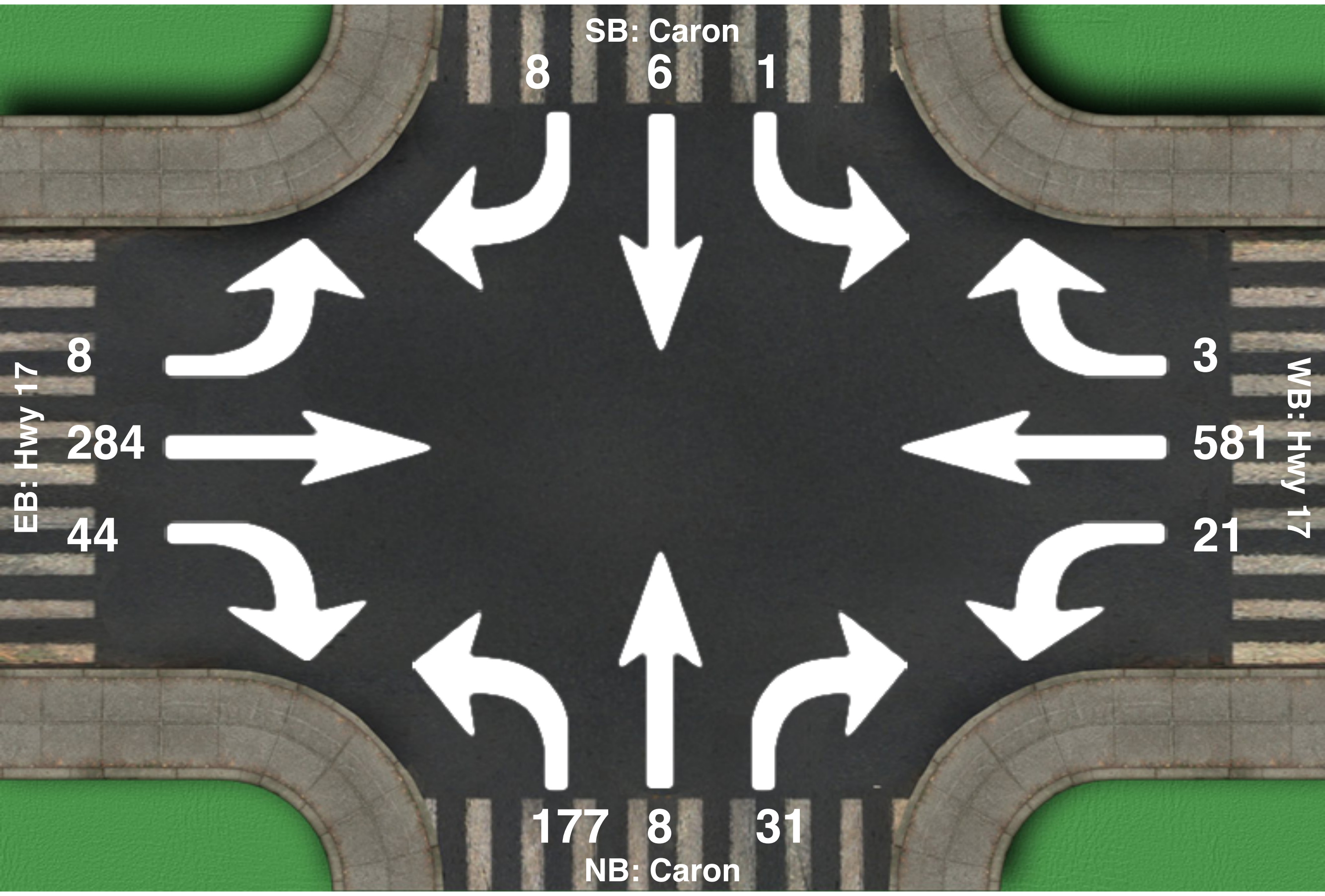
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	1	6	8	21	581	3	177	8	31	8	284	44	1172

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Caron at Hwy 17, Rockland, On
GPS Coordinates: Lat=45.432940, Lon=-75.598433
Date: 2018-04-05
Day of week: Thursday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	1	6	8	21	581	3	177	8	31	8	284	44	1172
Factor	0.25	0.75	0.67	0.58	0.92	0.25	0.85	0.50	0.78	0.67	0.86	0.79	0.90
Approach Factor	0.94			0.92			0.82			0.87			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Hwy 17, Rockland, On
GPS Coordinates: Lat=45.557294, Lon=-75.279173
Date: 2018-04-05
Day of week: Thursday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	1	4	7	3	73	1	19	2	5	3	186	45	349
16:15	0	3	3	1	84	1	33	1	15	3	184	43	371
16:30	1	3	7	2	82	0	26	1	12	6	192	44	376
16:45	2	2	3	6	99	1	29	0	10	3	199	42	396
17:00	0	0	0	0	1	0	0	0	0	0	3	1	5

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	1	4	7	3	73	1	19	2	5	3	186	45	349
16:15	0	3	3	1	84	1	33	1	15	3	184	43	371
16:30	1	3	7	2	82	0	26	1	12	6	192	44	376
16:45	2	2	3	6	99	1	29	0	10	3	199	42	396
17:00	0	0	0	0	1	0	0	0	0	0	3	1	5

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	4	12	20	12	338	3	107	4	42	15	761	174	1492
Factor	0.50	0.75	0.71	0.50	0.85	0.75	0.81	0.50	0.70	0.62	0.96	0.97	0.94
Approach Factor	0.75			0.83			0.78			0.97			

Peak Hour Vehicle Summary

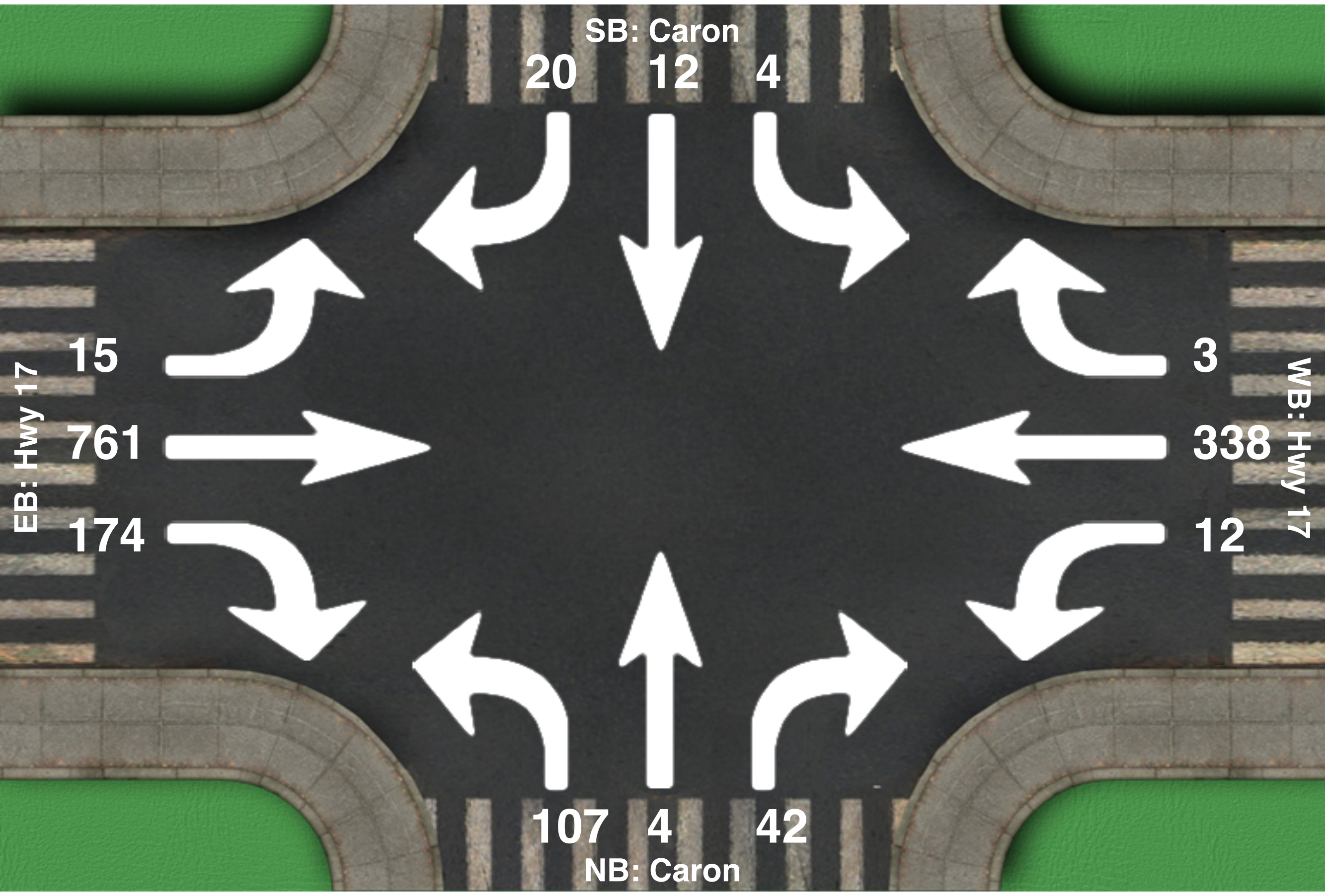
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	4	12	20	12	338	3	107	4	42	15	761	174	1492

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Caron at Hwy 17, Rockland, On
GPS Coordinates: Lat=45.557294, Lon=-75.279173
Date: 2018-04-05
Day of week: Thursday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	4	12	20	12	338	3	107	4	42	15	761	174	1492
Factor	0.50	0.75	0.71	0.50	0.85	0.75	0.81	0.50	0.70	0.62	0.96	0.97	0.94
Approach Factor	0.75			0.83			0.78			0.97			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Laurier, Rockland, On
GPS Coordinates: Lat=45.555171, Lon=-75.276541
Date: 2018-04-09
Day of week: Monday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	1	7	1	11	32	14	9	29	10	1	11	5	131
07:45	4	12	8	11	43	8	12	36	7	6	10	6	163
08:00	2	11	2	14	39	7	7	18	10	6	19	9	144
08:15	5	15	4	5	34	10	11	32	8	4	14	5	147

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	1	7	1	11	32	14	9	29	10	1	11	5	131
07:45	4	12	8	11	43	8	12	36	7	6	10	6	163
08:00	2	11	2	14	39	7	7	18	10	6	19	9	144
08:15	5	15	4	5	34	10	11	32	8	4	14	5	147

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	12	45	15	41	148	39	39	115	35	17	54	25	585
Factor	0.60	0.75	0.47	0.73	0.86	0.70	0.81	0.80	0.88	0.71	0.71	0.69	0.90
Approach Factor	0.75			0.92			0.86			0.71			

Peak Hour Vehicle Summary

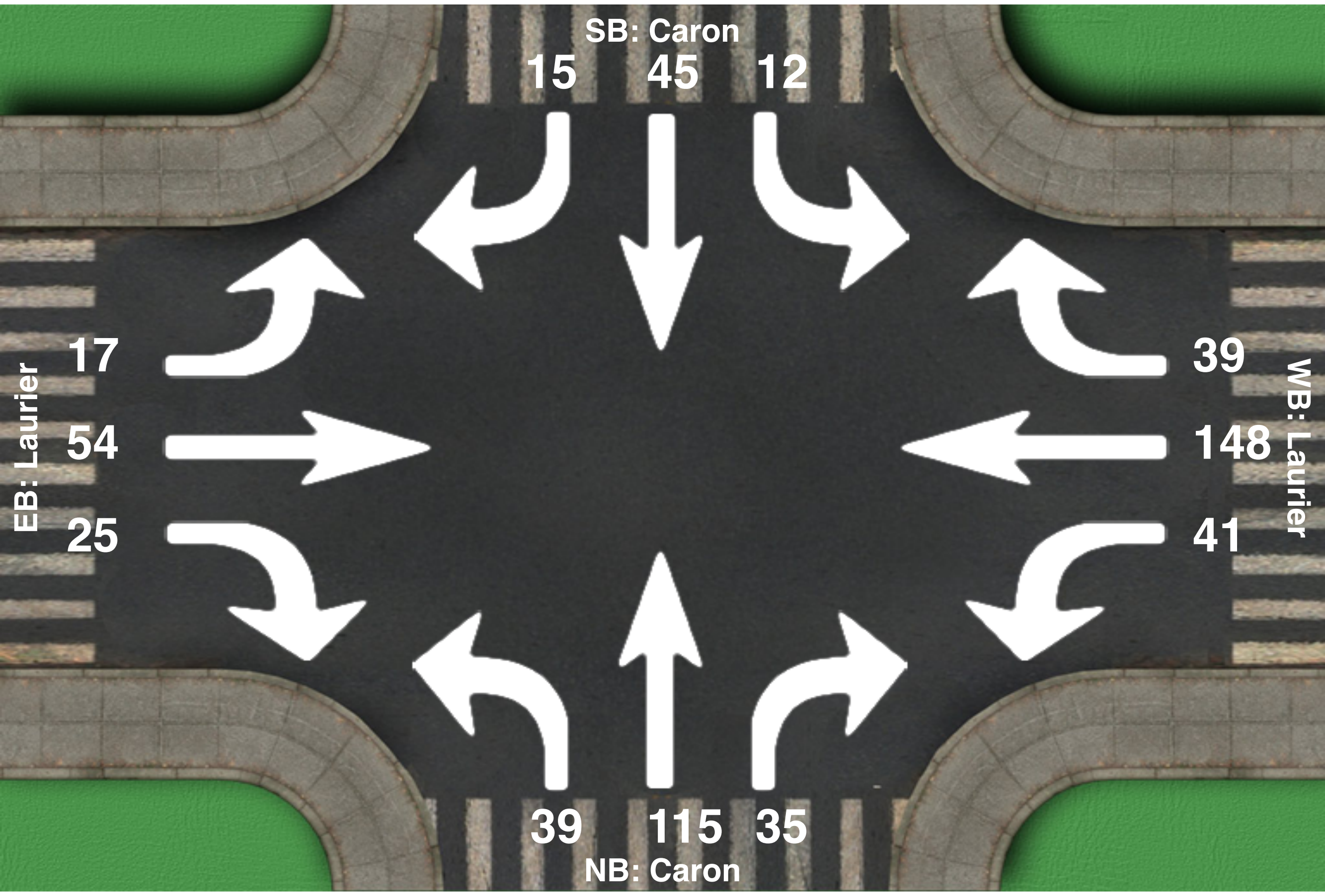
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	12	45	15	41	148	39	39	115	35	17	54	25	585

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Caron at Laurier, Rockland, On
GPS Coordinates: Lat=45.555171, Lon=-75.276541
Date: 2018-04-09
Day of week: Monday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	12	45	15	41	148	39	39	115	35	17	54	25	585
Factor	0.60	0.75	0.47	0.73	0.86	0.70	0.81	0.80	0.88	0.71	0.71	0.69	0.90
Approach Factor	0.75			0.92			0.86			0.71			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Laurier, Rockland, On
GPS Coordinates: Lat=45.554743, Lon=-75.276561
Date: 2018-04-09
Day of week: Monday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	16	34	6	7	20	8	10	18	8	9	40	14	190
16:15	4	41	8	7	23	7	13	18	14	8	42	15	200
16:30	7	32	11	8	24	6	14	24	8	8	34	23	199
16:45	8	31	6	8	20	5	14	27	12	9	39	12	191

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	16	34	6	7	20	8	10	18	8	9	40	14	190
16:15	4	41	8	7	23	7	13	18	14	8	42	15	200
16:30	7	32	11	8	24	6	14	24	8	8	34	23	199
16:45	8	31	6	8	20	5	14	27	12	9	39	12	191

Bicycle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
16:00	2	0	2	0	0	0	0	1	1	0	0	0	3
16:15	0	2	2	0	0	0	0	0	0	0	0	0	2
16:30	0	0	0	2	0	2	0	0	0	2	0	2	4
16:45	1	0	1	0	1	1	0	1	1	1	0	1	4

Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	35	138	31	30	87	26	51	87	42	34	155	64	780
Factor	0.55	0.84	0.70	0.94	0.91	0.81	0.91	0.81	0.75	0.94	0.92	0.70	0.97
Approach Factor	0.91			0.94			0.85			0.97			

Peak Hour Vehicle Summary

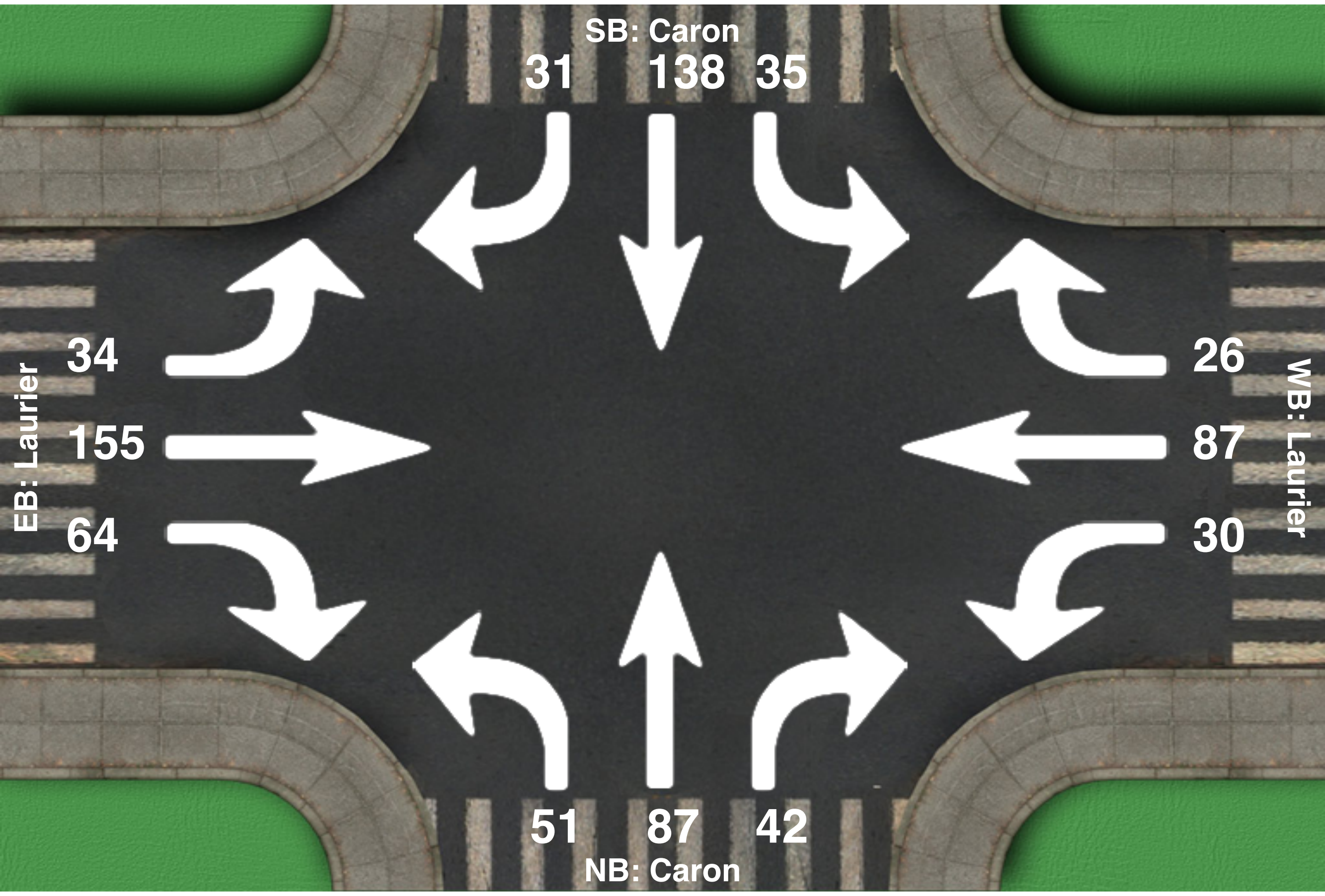
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	35	138	31	30	87	26	51	87	42	34	155	64	780
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	3	2	5	2	1	3	0	2	2	3	0	3	13

Intersection Peak Hour

Location: Caron at Laurier, Rockland, On
GPS Coordinates: Lat=45.554743, Lon=-75.276561
Date: 2018-04-09
Day of week: Monday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	35	138	31	30	87	26	51	87	42	34	155	64	780
Factor	0.55	0.84	0.70	0.94	0.91	0.81	0.91	0.81	0.75	0.94	0.92	0.70	0.97
Approach Factor	0.91			0.94			0.85			0.97			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Baseline , Rockland, On
GPS Coordinates: Lat=45.525226, Lon=-75.259189
Date: 2018-04-10
Day of week: Tuesday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	10	0	6	0	15	26	0	0	0	4	15	0	76
07:45	16	0	5	0	12	20	0	0	0	0	6	0	59
08:00	12	0	8	0	16	13	0	0	0	1	4	0	54
08:15	11	0	3	0	15	25	0	0	0	3	3	0	60

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	10	0	6	0	15	26	0	0	0	4	15	0	76
07:45	16	0	5	0	12	20	0	0	0	0	6	0	59
08:00	12	0	8	0	16	13	0	0	0	1	4	0	54
08:15	11	0	3	0	15	25	0	0	0	3	3	0	60

Bicycle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	49	0	22	0	58	84	0	0	0	8	28	0	249
Factor	0.77	0.00	0.69	0.00	0.91	0.81	0.00	0.00	0.00	0.50	0.47	0.00	0.82
Approach Factor	0.85			0.87			0.00			0.47			

Peak Hour Vehicle Summary

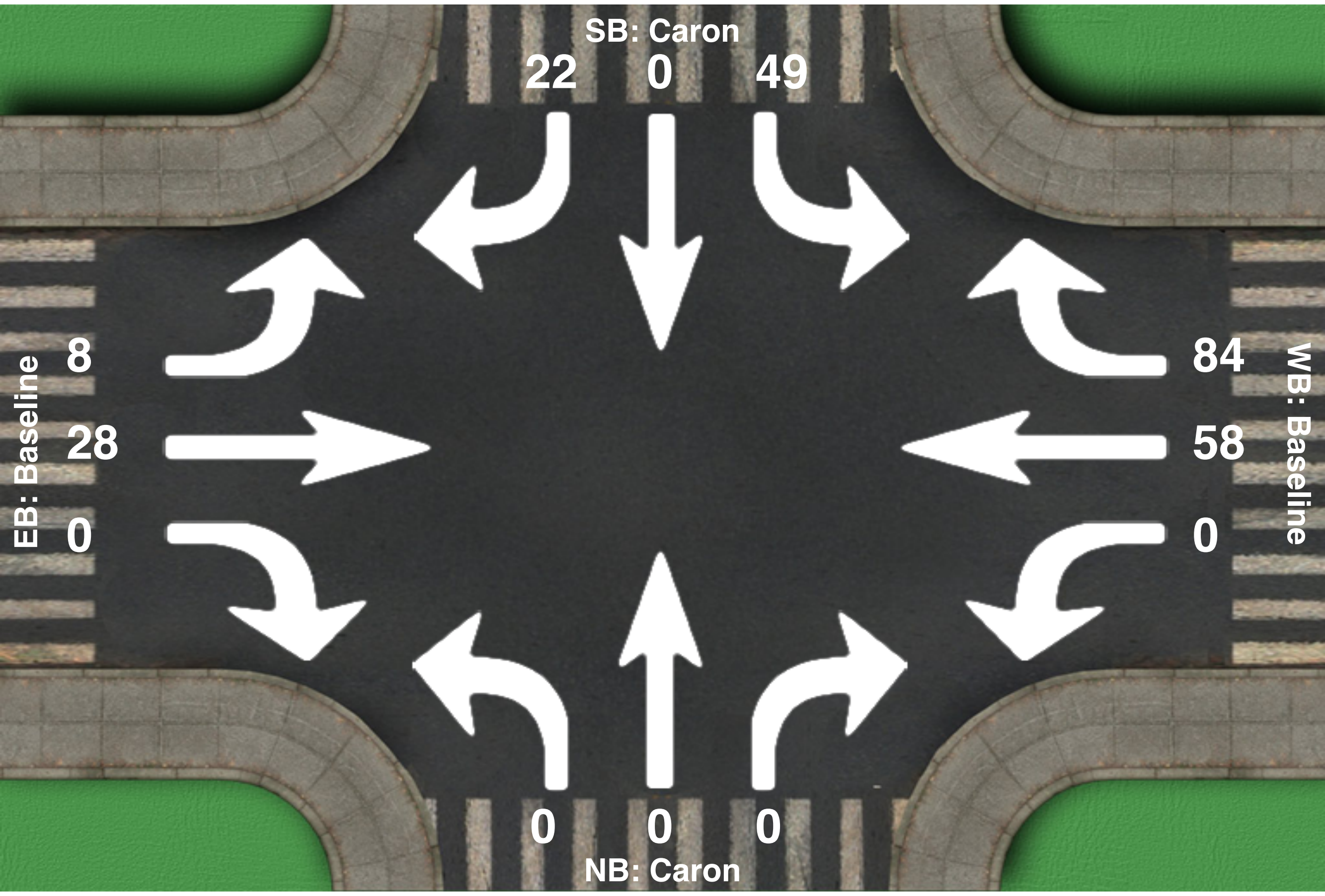
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	49	0	22	0	58	84	0	0	0	8	28	0	249
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Caron at Baseline , Rockland, On
GPS Coordinates: Lat=45.525226, Lon=-75.259189
Date: 2018-04-10
Day of week: Tuesday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	49	0	22	0	58	84	0	0	0	8	28	0	249
Factor	0.77	0.00	0.69	0.00	0.91	0.81	0.00	0.00	0.00	0.50	0.47	0.00	0.82
Approach Factor	0.85			0.87			0.00			0.47			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Baseline , Rockland, On
GPS Coordinates: Lat=45.525226, Lon=-75.259189
Date: 2018-04-10
Day of week: Tuesday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	27	0	2	0	9	25	0	0	0	6	28	0	97
16:15	25	0	4	0	12	23	0	0	0	7	20	0	91
16:30	22	0	3	0	13	17	0	0	0	12	31	0	98
16:45	25	0	8	0	7	11	0	0	0	13	23	0	87

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	27	0	2	0	9	25	0	0	0	6	28	0	97
16:15	25	0	4	0	12	23	0	0	0	7	20	0	91
16:30	22	0	3	0	13	17	0	0	0	12	31	0	98
16:45	25	0	8	0	7	11	0	0	0	13	23	0	87

Bicycle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	99	0	17	0	41	76	0	0	0	38	102	0	373
Factor	0.92	0.00	0.53	0.00	0.79	0.76	0.00	0.00	0.00	0.73	0.82	0.00	0.95
Approach Factor	0.88			0.84			0.00			0.81			

Peak Hour Vehicle Summary

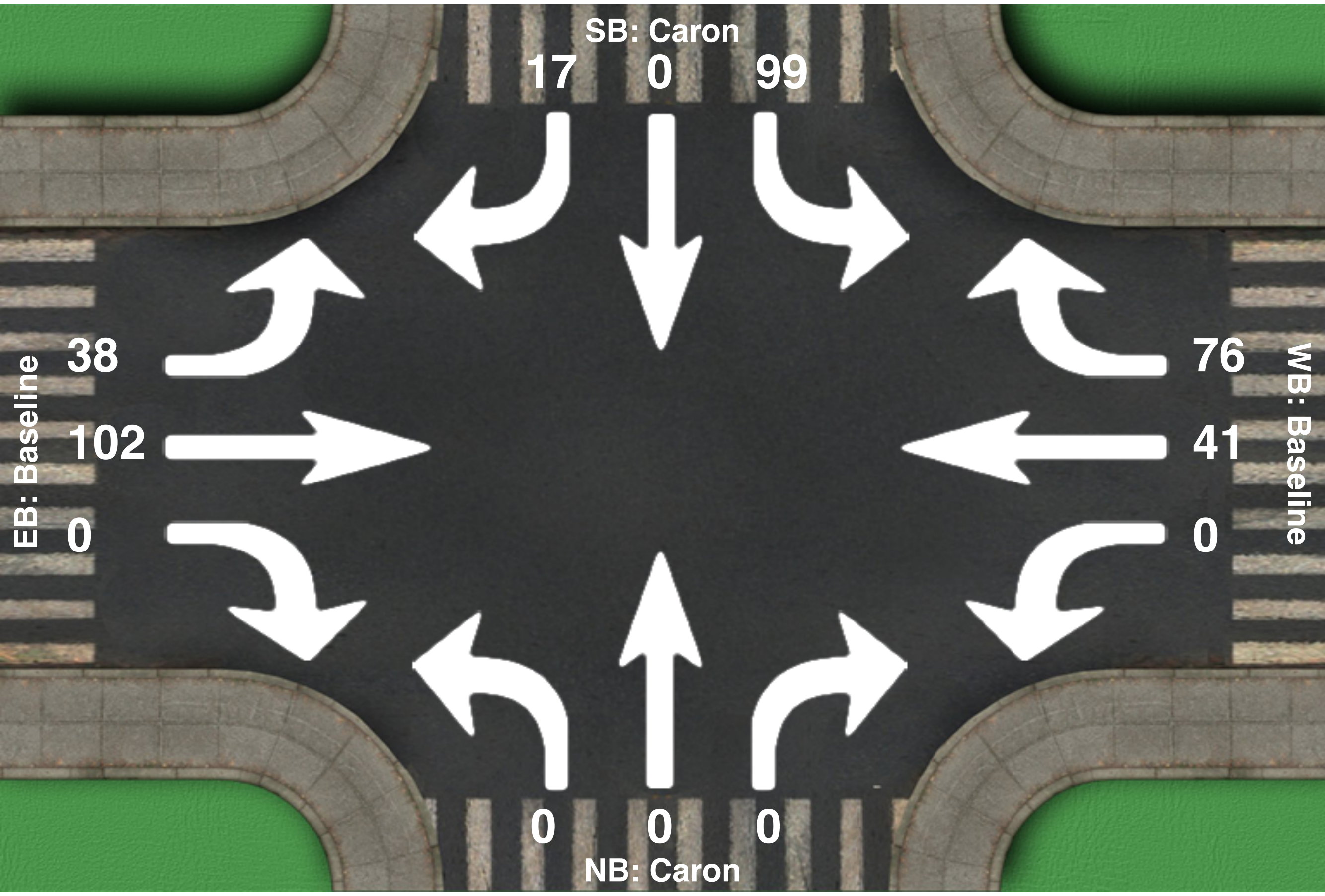
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	99	0	17	0	41	76	0	0	0	38	102	0	373
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Caron at Baseline , Rockland, On
GPS Coordinates: Lat=45.525226, Lon=-75.259189
Date: 2018-04-10
Day of week: Tuesday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	99	0	17	0	41	76	0	0	0	38	102	0	373
Factor	0.92	0.00	0.53	0.00	0.79	0.76	0.00	0.00	0.00	0.73	0.82	0.00	0.95
Approach Factor	0.88			0.84			0.00			0.81			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Docteur Corbeil, Rockland, On
GPS Coordinates: Lat=45.544293, Lon=-75.271567
Date: 2018-04-11
Day of week: Wednesday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	12	9	0	0	0	23	21	0	9	0	9	83
07:45	0	9	18	0	0	0	24	22	0	11	0	14	98
08:00	0	12	9	0	0	0	7	13	0	12	0	8	61
08:15	0	10	7	0	0	0	6	18	0	6	0	5	52
08:30	0	0	0	0	0	0	1	0	0	0	0	0	1

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	12	9	0	0	0	22	21	0	9	0	9	82
07:45	0	9	18	0	0	0	24	22	0	11	0	14	98
08:00	0	12	9	0	0	0	7	13	0	12	0	8	61
08:15	0	10	7	0	0	0	6	18	0	6	0	5	52
08:30	0	0	0	0	0	0	1	0	0	0	0	0	1

Bicycle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	0	0	0	0	0	0	1	0	0	0	0	0	1
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
07:30	0	0	0	0	0	0	1	0	1	0	0	0	1
07:45	0	2	2	0	1	1	0	0	0	0	0	0	3
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	1	1	0	0	0	0	1	1	0	0	0	2
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	0	43	43	0	0	0	60	74	0	38	0	36	294
Factor	0.00	0.90	0.60	0.00	0.00	0.00	0.62	0.84	0.00	0.79	0.00	0.64	0.75
Approach Factor	0.80			0.00			0.73			0.74			

Peak Hour Vehicle Summary

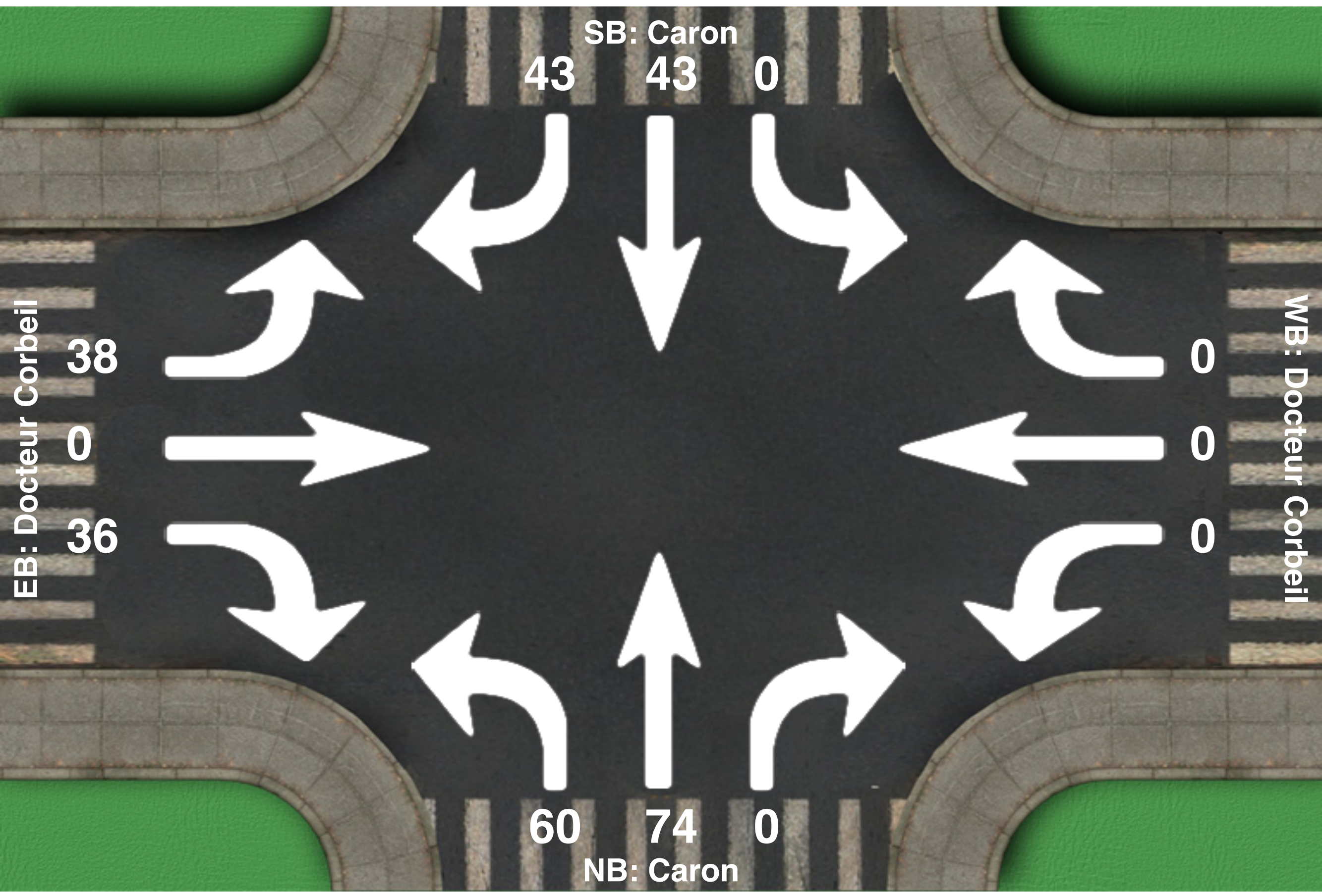
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	0	43	43	0	0	0	59	74	0	38	0	36	293
Bicycle	0	0	0	0	0	0	1	0	0	0	0	0	1

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	3	3	0	1	1	1	1	2	0	0	0	6

Intersection Peak Hour

Location: Caron at Docteur Corbeil, Rockland, On
GPS Coordinates: Lat=45.544293, Lon=-75.271567
Date: 2018-04-11
Day of week: Wednesday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

07:30 - 08:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	0	43	43	0	0	0	60	74	0	38	0	36	294
Factor	0.00	0.90	0.60	0.00	0.00	0.00	0.62	0.84	0.00	0.79	0.00	0.64	0.75
Approach Factor	0.80			0.00			0.73			0.74			

Cima+
240 Catherine st.
Ottawa, ,

Turn Count Summary

Location: Caron at Docteur Corbeil, Rockland, On
GPS Coordinates: Lat=45.544176, Lon=-75.271704
Date: 2018-04-11
Day of week: Wednesday
Weather:
Analyst: Ben Tardioli

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	0	17	10	0	0	1	12	13	0	9	0	21	83
16:15	0	17	16	0	0	0	11	17	0	16	0	11	88
16:30	0	18	14	0	0	0	9	11	0	16	0	13	81
16:45	0	16	10	0	0	0	17	22	0	20	0	17	102

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	0	17	9	0	0	1	12	13	0	9	0	21	82
16:15	0	17	16	0	0	0	11	17	0	16	0	11	88
16:30	0	18	14	0	0	0	9	11	0	15	0	13	80
16:45	0	16	10	0	0	0	17	22	0	20	0	17	102

Bicycle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	0	0	1	0	0	0	0	0	0	0	0	0	1
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	1	0	0	1
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
16:00	0	0	0	3	0	3	0	0	0	0	0	0	3
16:15	0	0	0	0	0	0	1	0	1	0	0	0	1
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	0	68	50	0	0	1	49	63	0	61	0	62	354
Factor	0.00	0.94	0.78	0.00	0.00	0.25	0.72	0.72	0.00	0.76	0.00	0.74	0.87
Approach Factor	0.89			0.25			0.72			0.83			

Peak Hour Vehicle Summary

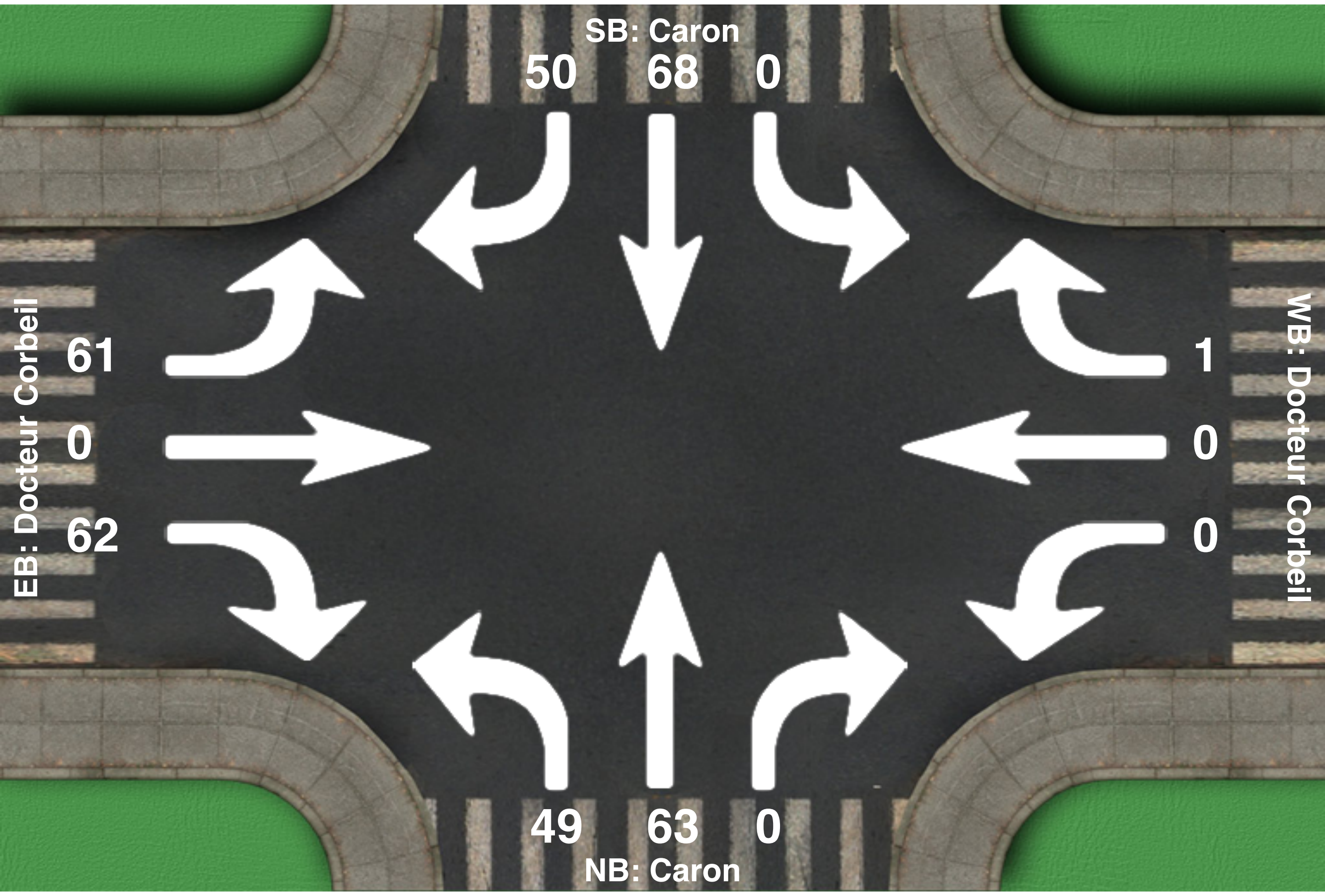
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	0	68	49	0	0	1	49	63	0	60	0	62	352
Bicycle	0	0	1	0	0	0	0	0	0	1	0	0	2

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	3	0	3	1	0	1	0	0	0	4

Intersection Peak Hour

Location: Caron at Docteur Corbeil, Rockland, On
GPS Coordinates: Lat=45.544176, Lon=-75.271704
Date: 2018-04-11
Day of week: Wednesday
Weather:
Analyst: Ben Tardioli



Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	0	68	50	0	0	1	49	63	0	61	0	62	354
Factor	0.00	0.94	0.78	0.00	0.00	0.25	0.72	0.72	0.00	0.76	0.00	0.74	0.87
Approach Factor	0.89			0.25			0.72			0.83			

B

Appendix B

Existing Conditions Traffic Operations

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↱	
Traffic Volume (vph)	8	284	44	21	581	3	177	8	31	1	6	8
Future Volume (vph)	8	284	44	21	581	3	177	8	31	1	6	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3		5.9	6.3	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	1765	1500	1676	1765	1500	1676	1555		1676	1616	
Flt Permitted	0.30	1.00	1.00	0.54	1.00	1.00	0.53	1.00		1.00	1.00	
Satd. Flow (perm)	536	1765	1500	944	1765	1500	941	1555		1765	1616	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	9	316	49	23	646	3	197	9	34	1	7	9
RTOR Reduction (vph)	0	0	22	0	0	1	0	30	0	0	9	0
Lane Group Flow (vph)	9	316	27	23	646	2	197	13	0	1	7	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	50.5	49.5	49.5	53.1	50.8	50.8	18.0	11.2		2.5	1.6	
Effective Green, g (s)	50.5	49.5	49.5	53.1	50.8	50.8	18.0	11.2		2.5	1.6	
Actuated g/C Ratio	0.56	0.55	0.55	0.59	0.57	0.57	0.20	0.12		0.03	0.02	
Clearance Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3		5.9	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	313	971	825	576	997	847	274	193		48	28	
v/s Ratio Prot	0.00	0.18		c0.00	c0.37		c0.08	0.01		0.00	0.00	
v/s Ratio Perm	0.02		0.02	0.02		0.00	c0.06			0.00		
v/c Ratio	0.03	0.33	0.03	0.04	0.65	0.00	0.72	0.07		0.02	0.26	
Uniform Delay, d1	9.7	11.1	9.2	7.7	13.4	8.5	32.7	34.7		42.5	43.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.9	0.1	0.0	3.3	0.0	8.7	0.2		0.2	4.8	
Delay (s)	9.8	12.0	9.3	7.7	16.7	8.5	41.4	34.9		42.7	48.4	
Level of Service	A	B	A	A	B	A	D	C		D	D	
Approach Delay (s)		11.6			16.3			40.2			48.0	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	89.9	Sum of lost time (s)	26.0
Intersection Capacity Utilization	60.3%	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 (vph)	17	54	25	41	148	39	39	115	35	12	45	15
Future Volume (vph)	17	54	25	41	148	39	39	115	35	12	45	15
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.5	6.5		6.5	6.5		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.97		1.00	0.96		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	1680		1676	1710		1676	1703		1676	1698	
Flt Permitted	0.63	1.00		0.66	1.00		0.62	1.00		0.65	1.00	
Satd. Flow (perm)	1109	1680		1161	1710		1086	1703		1150	1698	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	19	60	28	46	164	43	43	128	39	13	50	17
RTOR Reduction (vph)	0	15	0	0	8	0	0	14	0	0	14	0
Lane Group Flow (vph)	19	73	0	46	199	0	43	153	0	13	53	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	33.7	32.8		37.9	34.9		19.2	16.0		14.8	13.8	
Effective Green, g (s)	33.7	32.8		37.9	34.9		19.2	16.0		14.8	13.8	
Actuated g/C Ratio	0.43	0.42		0.49	0.45		0.25	0.21		0.19	0.18	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	485	706		583	765		291	349		224	300	
v/s Ratio Prot	0.00	0.04		c0.00	c0.12		c0.01	c0.09		0.00	0.03	
v/s Ratio Perm	0.02			0.04			0.03			0.01		
v/c Ratio	0.04	0.10		0.08	0.26		0.15	0.44		0.06	0.18	
Uniform Delay, d1	12.7	13.7		10.6	13.5		22.8	27.1		25.8	27.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.1	0.8		0.2	0.9		0.1	0.3	
Delay (s)	12.8	14.0		10.7	14.3		23.0	28.0		25.9	27.6	
Level of Service	B	B		B	B		C	C		C	C	
Approach Delay (s)		13.8			13.6			27.0			27.3	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	78.0	Sum of lost time (s)	25.2
Intersection Capacity Utilization	35.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	5	6	189	108	3
Future Volume (Veh/h)	0	5	6	189	108	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	6	7	210	120	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked						
vC, conflicting volume	346	122	123			
vC1, stage 1 conf vol	122					
vC2, stage 2 conf vol	224					
vCu, unblocked vol	346	122	123			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	759	930	1464			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	6	7	210	123
Volume Left	0	7	0	0
Volume Right	6	0	0	3
cSH	930	1464	1700	1700
Volume to Capacity	0.01	0.00	0.12	0.07
Queue Length 95th (m)	0.1	0.1	0.0	0.0
Control Delay (s)	8.9	7.5	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	8.9	0.2		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	9	3	1	125	111	2
Future Volume (vph)	9	3	1	125	111	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	3	1	139	123	2

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	13	1	139	125
Volume Left (vph)	10	1	0	0
Volume Right (vph)	3	0	0	2
Hadj (s)	0.05	0.53	0.03	0.02
Departure Headway (s)	4.5	5.1	4.6	4.2
Degree Utilization, x	0.02	0.00	0.18	0.15
Capacity (veh/h)	735	686	762	848
Control Delay (s)	7.6	7.0	7.5	7.9
Approach Delay (s)	7.6	7.5		7.9
Approach LOS	A	A		A

Intersection Summary			
Delay	7.7		
Level of Service	A		
Intersection Capacity Utilization	16.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	10	116	1	5	109
Future Volume (Veh/h)	5	10	116	1	5	109
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	129	1	6	121
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	262	130			130	
vC1, stage 1 conf vol	130					
vC2, stage 2 conf vol	133					
vCu, unblocked vol	262	130			130	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			100	
cM capacity (veh/h)	817	920			1455	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	17	130	6	121
Volume Left	6	0	6	0
Volume Right	11	1	0	0
cSH	881	1700	1455	1700
Volume to Capacity	0.02	0.08	0.00	0.07
Queue Length 95th (m)	0.4	0.0	0.1	0.0
Control Delay (s)	9.2	0.0	7.5	0.0
Lane LOS	A		A	
Approach Delay (s)	9.2	0.0	0.4	
Approach LOS	A			

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	16.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	0	8	9	1	6	4	102	6	5	109	0
Future Volume (vph)	9	0	8	9	1	6	4	102	6	5	109	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	0	9	10	1	7	4	113	7	6	121	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	19	18	4	120	6	121
Volume Left (vph)	10	10	4	0	6	0
Volume Right (vph)	9	7	0	7	0	0
Hadj (s)	-0.14	-0.09	0.53	-0.01	0.53	0.03
Departure Headway (s)	4.4	4.4	5.2	4.7	5.2	4.7
Degree Utilization, x	0.02	0.02	0.01	0.16	0.01	0.16
Capacity (veh/h)	778	759	675	755	673	749
Control Delay (s)	7.5	7.5	7.0	7.3	7.1	7.4
Approach Delay (s)	7.5	7.5	7.3		7.4	
Approach LOS	A	A	A		A	

Intersection Summary			
Delay	7.4		
Level of Service	A		
Intersection Capacity Utilization	16.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	36	60	74	43	43
Future Volume (Veh/h)	38	36	60	74	43	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	42	40	67	82	48	48
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	290	74	98			
vC1, stage 1 conf vol	74					
vC2, stage 2 conf vol	216					
vCu, unblocked vol	290	74	98			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	96	96			
cM capacity (veh/h)	752	986	1493			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	82	67	82	96
Volume Left	42	67	0	0
Volume Right	40	0	0	48
cSH	851	1493	1700	1700
Volume to Capacity	0.10	0.04	0.05	0.06
Queue Length 95th (m)	2.2	1.0	0.0	0.0
Control Delay (s)	9.7	7.5	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.7	3.4		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	10	92	2	5	79
Future Volume (vph)	5	10	92	2	5	79
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	102	2	6	88

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	17	104	6	88
Volume Left (vph)	6	0	6	0
Volume Right (vph)	11	2	0	0
Hadj (s)	-0.28	0.02	0.53	0.03
Departure Headway (s)	4.1	4.2	5.1	4.6
Degree Utilization, x	0.02	0.12	0.01	0.11
Capacity (veh/h)	842	850	684	762
Control Delay (s)	7.1	7.7	7.0	7.0
Approach Delay (s)	7.1	7.7	7.0	
Approach LOS	A	A	A	

Intersection Summary			
Delay	7.4		
Level of Service	A		
Intersection Capacity Utilization	15.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	28	58	84	49	22
Future Volume (Veh/h)	8	28	58	84	49	22
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	31	64	93	54	24
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	157				160	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	157				160	110
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				93	97
cM capacity (veh/h)	1423				826	943

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	40	157	78
Volume Left	9	0	54
Volume Right	0	93	24
cSH	1423	1700	859
Volume to Capacity	0.01	0.09	0.09
Queue Length 95th (m)	0.1	0.0	2.1
Control Delay (s)	1.7	0.0	9.6
Lane LOS	A		A
Approach Delay (s)	1.7	0.0	9.6
Approach LOS			A

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	19.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: Rue Caron/Rue Industrielle & HWY 17

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (m)	8.5	43.7	12.6	8.3	65.3	4.6	53.8	14.3	4.1	11.0
Average Queue (m)	1.9	16.5	2.7	2.4	27.7	0.2	25.0	4.9	0.1	2.5
95th Queue (m)	7.3	33.6	9.2	8.3	51.4	1.9	43.7	11.7	1.7	8.1
Link Distance (m)		833.3			805.3			415.2		113.3
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Storage Blk Time (%)					0		0			
Queuing Penalty (veh)					0		0			

Intersection: 2: Caron St/Rue Caron & Laurier St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	8.3	16.8	15.0	34.4	15.8	44.0	8.2	27.3
Average Queue (m)	1.7	4.4	3.4	9.8	4.9	17.9	1.4	9.6
95th Queue (m)	6.3	12.1	10.4	23.2	12.7	34.0	5.8	19.1
Link Distance (m)		928.0		698.5		142.0		415.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	35.0		60.0		55.0		50.0	
Storage Blk Time (%)						0		
Queuing Penalty (veh)						0		

Intersection: 3: Caron St & Hélène St

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	8.2	5.1
Average Queue (m)	1.2	0.2
95th Queue (m)	5.8	2.1
Link Distance (m)	266.6	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Caron St & Francois St

Movement	EB	NB	NB	SB
Directions Served	LR	L	T	TR
Maximum Queue (m)	10.7	5.2	20.2	18.9
Average Queue (m)	3.1	0.2	11.1	11.2
95th Queue (m)	10.4	2.2	17.2	17.1
Link Distance (m)	343.3		122.7	232.6
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)		15.0		
Storage Blk Time (%)			1	
Queuing Penalty (veh)			0	

Intersection: 5: Caron St & Des Cedres Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (m)	8.7	3.4
Average Queue (m)	3.0	0.1
95th Queue (m)	9.7	1.8
Link Distance (m)	109.3	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Caron St & Cote St/Potvin Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (m)	9.1	8.9	8.7	22.5	5.5	17.6
Average Queue (m)	3.7	3.2	0.9	11.2	0.7	9.2
95th Queue (m)	10.9	10.1	5.3	18.2	3.7	14.6
Link Distance (m)	73.6	115.9		507.4		263.8
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)			30.0		40.0	
Storage Blk Time (%)				0		
Queuing Penalty (veh)				0		

Intersection: 7: Caron St & Docteur Corbeil Blvd

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	15.7	10.1
Average Queue (m)	8.1	1.7
95th Queue (m)	14.4	7.6
Link Distance (m)	486.3	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 8: David St & Caron St

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (m)	9.1	21.9	9.2	19.4
Average Queue (m)	3.2	10.2	1.1	9.5
95th Queue (m)	10.1	17.0	6.1	16.1
Link Distance (m)	509.7	82.9		518.2
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)			40.0	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: Baseline Rd & Caron St

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	7.5	14.2
Average Queue (m)	0.4	7.3
95th Queue (m)	3.2	12.2
Link Distance (m)	763.0	1938.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	155	64	30	87	26	51	87	42	35	138	31
Future Volume (vph)	34	155	64	30	87	26	51	87	42	35	138	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3		5.9	6.3	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	1765	1500	1676	1765	1500	1676	1678		1676	1717	
Flt Permitted	0.69	1.00	1.00	0.65	1.00	1.00	0.44	1.00		0.67	1.00	
Satd. Flow (perm)	1223	1765	1500	1144	1765	1500	774	1678		1174	1717	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	172	71	33	97	29	57	97	47	39	153	34
RTOR Reduction (vph)	0	0	36	0	0	15	0	15	0	0	7	0
Lane Group Flow (vph)	38	172	35	33	97	14	57	129	0	39	180	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	55.8	51.9	51.9	55.6	51.8	51.8	26.1	19.5		21.7	17.3	
Effective Green, g (s)	55.8	51.9	51.9	55.6	51.8	51.8	26.1	19.5		21.7	17.3	
Actuated g/C Ratio	0.53	0.49	0.49	0.53	0.49	0.49	0.25	0.18		0.21	0.16	
Clearance Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3		5.9	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	662	867	737	621	865	735	247	309		262	281	
v/s Ratio Prot	c0.00	c0.10		0.00	0.05		c0.01	0.08		0.01	c0.11	
v/s Ratio Perm	0.03		0.02	0.03		0.01	0.04			0.02		
v/c Ratio	0.06	0.20	0.05	0.05	0.11	0.02	0.23	0.42		0.15	0.64	
Uniform Delay, d1	12.0	15.1	14.0	12.1	14.5	13.8	31.2	38.0		34.1	41.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.5	0.1	0.0	0.3	0.0	0.5	0.9		0.3	4.9	
Delay (s)	12.1	15.6	14.1	12.1	14.8	13.9	31.6	39.0		34.4	46.2	
Level of Service	B	B	B	B	B	B	C	D		C	D	
Approach Delay (s)		14.8			14.1			36.9			44.2	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	27.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	105.6	Sum of lost time (s)	26.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
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)	34	155	64	30	87	26	51	87	42	35	138	31
Future Volume (vph)	34	155	64	30	87	26	51	87	42	35	138	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.5	6.5		6.5	6.5		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	1675		1672	1694		1674	1665		1673	1709	
Flt Permitted	0.66	1.00		0.61	1.00		0.58	1.00		0.67	1.00	
Satd. Flow (perm)	1153	1675		1070	1694		1030	1665		1172	1709	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	172	71	33	97	29	57	97	47	39	153	34
RTOR Reduction (vph)	0	14	0	0	10	0	0	22	0	0	10	0
Lane Group Flow (vph)	38	229	0	33	116	0	57	122	0	39	177	0
Confl. Peds. (#/hr)	4		4	4		4	2		2	2		2
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	35.3	32.4		33.3	31.4		16.5	13.4		16.5	13.4	
Effective Green, g (s)	35.3	32.4		33.3	31.4		16.5	13.4		16.5	13.4	
Actuated g/C Ratio	0.46	0.43		0.44	0.41		0.22	0.18		0.22	0.18	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	555	714		483	699		249	293		274	301	
v/s Ratio Prot	c0.00	c0.14		0.00	0.07		c0.01	0.07		0.01	c0.10	
v/s Ratio Perm	0.03			0.03			0.04			0.03		
v/c Ratio	0.07	0.32		0.07	0.17		0.23	0.42		0.14	0.59	
Uniform Delay, d1	11.2	14.5		12.2	14.1		24.1	27.8		23.8	28.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.2		0.1	0.5		0.5	1.0		0.2	2.9	
Delay (s)	11.2	15.7		12.3	14.6		24.6	28.8		24.1	31.7	
Level of Service	B	B		B	B		C	C		C	C	
Approach Delay (s)		15.1			14.1			27.6			30.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	25.2
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	8	7	180	229	3
Future Volume (Veh/h)	0	8	7	180	229	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	9	8	200	254	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	472	256	257			
vC1, stage 1 conf vol	256					
vC2, stage 2 conf vol	216					
vCu, unblocked vol	421	195	196			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	707	807	1312			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	9	8	200	257
Volume Left	0	8	0	0
Volume Right	9	0	0	3
cSH	807	1312	1700	1700
Volume to Capacity	0.01	0.01	0.12	0.15
Queue Length 95th (m)	0.2	0.1	0.0	0.0
Control Delay (s)	9.5	7.8	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.5	0.3		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	7	3	6	180	233	4
Future Volume (vph)	7	3	6	180	233	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	3	7	200	259	4

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	11	7	200	263
Volume Left (vph)	8	7	0	0
Volume Right (vph)	3	0	0	4
Hadj (s)	0.02	0.53	0.03	0.02
Departure Headway (s)	5.0	5.2	4.7	4.3
Degree Utilization, x	0.02	0.01	0.26	0.31
Capacity (veh/h)	656	674	748	825
Control Delay (s)	8.0	7.1	8.2	9.2
Approach Delay (s)	8.0	8.2		9.2
Approach LOS	A	A		A

Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	10	113	7	26	210
Future Volume (Veh/h)	1	10	113	7	26	210
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	11	126	8	29	233
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	421	130			134	
vC1, stage 1 conf vol	130					
vC2, stage 2 conf vol	291					
vCu, unblocked vol	421	130			134	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			98	
cM capacity (veh/h)	701	920			1451	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	12	134	29	233
Volume Left	1	0	29	0
Volume Right	11	8	0	0
cSH	896	1700	1451	1700
Volume to Capacity	0.01	0.08	0.02	0.14
Queue Length 95th (m)	0.3	0.0	0.4	0.0
Control Delay (s)	9.1	0.0	7.5	0.0
Lane LOS	A		A	
Approach Delay (s)	9.1	0.0	0.8	
Approach LOS	A			

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	1	10	9	1	4	12	99	13	16	99	17
Future Volume (vph)	17	1	10	9	1	4	12	99	13	16	99	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	19	1	11	10	1	4	13	110	14	18	110	19

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	31	15	13	124	18	129
Volume Left (vph)	19	10	13	0	18	0
Volume Right (vph)	11	4	0	14	0	19
Hadj (s)	-0.06	0.01	0.53	-0.05	0.53	-0.07
Departure Headway (s)	4.5	4.6	5.3	4.7	5.2	4.6
Degree Utilization, x	0.04	0.02	0.02	0.16	0.03	0.17
Capacity (veh/h)	741	727	669	753	667	758
Control Delay (s)	7.7	7.7	7.2	7.4	7.2	7.4
Approach Delay (s)	7.7	7.7	7.3		7.3	
Approach LOS	A	A	A		A	

Intersection Summary			
Delay	7.4		
Level of Service	A		
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	62	49	63	68	50
Future Volume (Veh/h)	61	62	49	63	68	50
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	69	54	70	76	56
Pedestrians	4					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	286	108	136			
vC1, stage 1 conf vol	108					
vC2, stage 2 conf vol	178					
vCu, unblocked vol	286	108	136			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	93	96			
cM capacity (veh/h)	775	943	1443			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	137	54	70	132
Volume Left	68	54	0	0
Volume Right	69	0	0	56
cSH	851	1443	1700	1700
Volume to Capacity	0.16	0.04	0.04	0.08
Queue Length 95th (m)	4.0	0.8	0.0	0.0
Control Delay (s)	10.0	7.6	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.0	3.3		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	10	114	5	10	116
Future Volume (vph)	5	10	114	5	10	116
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	127	6	11	129

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	17	133	11	129
Volume Left (vph)	6	0	11	0
Volume Right (vph)	11	6	0	0
Hadj (s)	-0.28	0.01	0.53	0.03
Departure Headway (s)	4.2	4.2	5.2	4.7
Degree Utilization, x	0.02	0.15	0.02	0.17
Capacity (veh/h)	798	843	681	759
Control Delay (s)	7.3	8.0	7.0	7.4
Approach Delay (s)	7.3	8.0	7.4	
Approach LOS	A	A	A	

Intersection Summary			
Delay	7.6		
Level of Service	A		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	102	41	76	99	17
Future Volume (Veh/h)	38	102	41	76	99	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	42	113	46	84	110	19
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	130				285	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	130				285	88
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				84	98
cM capacity (veh/h)	1455				685	970

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	155	130	129
Volume Left	42	0	110
Volume Right	0	84	19
cSH	1455	1700	716
Volume to Capacity	0.03	0.08	0.18
Queue Length 95th (m)	0.6	0.0	4.6
Control Delay (s)	2.2	0.0	11.1
Lane LOS	A		B
Approach Delay (s)	2.2	0.0	11.1
Approach LOS			B

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	28.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: Rue Caron/Rue Industrielle & HWY 17

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (m)	16.5	31.9	17.1	16.6	27.7	11.2	36.4	46.0	37.0	59.7
Average Queue (m)	3.8	13.3	5.0	3.8	6.5	2.5	9.7	17.9	7.7	26.5
95th Queue (m)	12.3	26.3	13.7	11.8	18.7	8.7	23.2	34.9	21.2	48.5
Link Distance (m)		833.3			805.3			415.2		113.3
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Storage Blk Time (%)								0	0	4
Queuing Penalty (veh)								0	0	1

Intersection: 2: Caron St/Rue Caron & Laurier St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	19.5	38.5	13.3	21.0	18.3	37.4	20.2	50.0
Average Queue (m)	3.9	14.3	2.9	6.4	6.7	17.6	5.3	22.9
95th Queue (m)	12.2	30.4	9.2	16.4	14.9	30.9	13.7	41.8
Link Distance (m)		928.0		698.5		142.0		415.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	35.0		60.0		55.0		50.0	
Storage Blk Time (%)		1						0
Queuing Penalty (veh)		0						0

Intersection: 3: Caron St & Hélène St

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	8.3	7.1
Average Queue (m)	2.4	0.5
95th Queue (m)	8.3	3.7
Link Distance (m)	266.6	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Caron St & Francois St

Movement	EB	NB	NB	SB
Directions Served	LR	L	T	TR
Maximum Queue (m)	9.3	9.1	21.5	27.8
Average Queue (m)	2.7	1.3	12.4	16.0
95th Queue (m)	9.5	6.4	19.2	24.4
Link Distance (m)	343.3		122.7	232.6
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)		15.0		
Storage Blk Time (%)		0	1	
Queuing Penalty (veh)		0	0	

Intersection: 5: Caron St & Des Cedres Ave

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (m)	8.7	9.1
Average Queue (m)	2.4	1.1
95th Queue (m)	8.8	5.8
Link Distance (m)	109.3	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 6: Caron St & Cote St/Potvin Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (m)	16.0	8.9	8.8	18.1	5.6	16.8
Average Queue (m)	5.8	3.1	2.5	10.4	2.2	8.8
95th Queue (m)	13.6	10.0	8.9	16.1	6.6	13.5
Link Distance (m)	73.6	115.9		507.4		263.8
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)			30.0		40.0	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Caron St & Docteur Corbeil Blvd

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	17.9	13.1
Average Queue (m)	10.0	1.7
95th Queue (m)	15.1	8.2
Link Distance (m)	486.3	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 8: David St & Caron St

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (m)	9.1	18.7	9.3	16.7
Average Queue (m)	3.3	10.7	2.7	10.1
95th Queue (m)	10.2	16.6	9.5	14.5
Link Distance (m)	509.7	82.9		518.2
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)			40.0	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: Baseline Rd & Caron St

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	12.2	18.3
Average Queue (m)	1.1	9.7
95th Queue (m)	6.1	15.6
Link Distance (m)	763.0	1938.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 2

C

Appendix C

Projected Phase 1 Traffic Operations

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at HWY 17 (Signalized)										
EB	L	90	0.03	6	A	2	0.06	12	B	8
	T	-	0.36	12	B	67	0.26	20	B	45
	R	85	0.34	3	A	13	0.43	4	A	16
WB	L	60	0.04	6	A	4	0.06	12	B	7
	T	-	0.71	17	B	200	0.14	19	B	26
	R	56	0.00	0	A	0	0.04	0	A	0
NB	L	60	1.95	463	F	155	1.17	136	F	110
	T/R	-	0.17	17	B	10	0.34	33	C	39
SB	L	40	0.01	29	C	1	0.12	26	C	12
	T/R	-	0.07	26	C	7	0.67	50	D	53
Overall			**1.95**	**119**	**F**	**-**	**1.17**	**47**	**D**	**-**
Caron Street at Laurier Street (Signalized)										
EB	L	35	0.04	15	B	5	0.08	16	B	9
	T/R	-	0.18	15	B	19	0.46	25	C	53
WB	L	60	0.09	16	B	10	0.09	16	B	8
	T/R	-	0.31	21	C	42	0.22	22	C	26
NB	L	55	0.23	17	B	13	0.37	20	B	15
	T/R	-	0.72	30	C	123	0.74	35	C	115
SB	L	50	0.05	16	B	4	0.15	16	B	9
	T/R	-	0.75	37	D	81	0.90	50	D	134
Overall			**0.75**	**28**	**C**	**-**	**0.90**	**35**	**C**	**-**
Caron Street at Hélène Street (Unsignalized)										
EB	L/R	-	0.01	10	B	1	0.02	11	B	1
NB	L	15	0.01	8	A	1	0.01	9	A	1
	T	-	0.32	0	A	0	0.31	0	A	0
SB	T/R	-	0.27	0	A	0	0.35	0	A	0
Overall			**0.27**	**1**	**A**	**-**	**0.35**	**1**	**A**	**-**
Caron Street at Françoise Street (Unsignalized)										
EB	L/R	-	0.02	9	A	-	0.02	10	A	-
NB	L	15	0.00	7	A	-	0.01	7	A	-
	T	-	0.64	15	B	-	0.74	19	A	-
SB	T/R	-	0.58	14	B	-	0.78	22	C	-
Overall			**0.64**	**14**	**B**	**-**	**0.78**	**21**	**C**	**-**

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at Des Cèdres Avenue (Unsignalized)										
WB	L/R	-	0.03	12	B	1	0.02	11	B	1
NB	T/R	-	0.27	0	A	0	0.27	0	A	0
SB	L	15	0.01	8	A	1	0.03	8	A	1
	T	-	0.26	0	A	0	0.34	0	A	0
Overall			**0.27**	**1**	**A**	**-**	**0.34**	**1**	**A**	**-**
Caron Street at Cote Street/Potvin Avenue (Unsignalized)										
EB	L/T/R	-	0.03	9	A	-	0.05	10	A	-
WB	L/T/R	-	0.03	9	A	-	0.03	10	A	-
NB	L	15	0.01	7	A	-	0.02	8	A	-
	T/R	-	0.62	15	B	-	0.65	16	C	-
SB	L	15	0.01	7	A	-	0.03	8	A	-
	T/R	-	0.62	15	B	-	0.78	22	C	-
Overall			**0.62**	**14**	**B**	**-**	**0.78**	**19**	**C**	**-**
Caron Street at Docteur Corbeil Boulevard (Unsignalized)										
EB	L/R	-	0.19	13	B	5	0.31	15	B	9
NB	L	15	0.08	9	A	2	0.07	9	A	2
	T	-	0.24	0	A	0	0.24	0	A	0
SB	T/R	-	0.25	0	A	0	0.30	0	A	0
Overall			**0.25**	**2**	**A**	**-**	**0.30**	**3**	**A**	**-**
Caron Street at David Street (Unsignalized)										
WB	L/R	-	0.33	11	B	-	0.34	11	B	-
NB	T/R	-	0.42	12	B	-	0.47	13	B	-
SB	L	40	0.32	11	B	-	0.34	11	B	-
	T	-	0.38	11	B	-	0.45	12	B	-
Overall			**0.42**	**11**	**B**	**-**	**0.47**	**12**	**B**	**-**
Caron Street at Baseline Road (Unsignalized)										
EB	L/T	-	0.02	4	A	1	0.05	3	A	1
WB	T/R	-	0.12	0	A	0	0.11	0	A	0
SB	L/R	-	0.20	11	B	5	0.31	13	B	9
Overall			**0.20**	**5**	**A**	**-**	**0.31**	**6**	**A**	**-**
Caron Street at Street A (Unsignalized)										
WB	L	-	0.27	9	A	-	0.29	10	A	-
	R	-	0.27	9	A	-	0.29	10	A	-
NB	T/R	-	0.26	9	A	-	0.30	10	A	-
SB	L/T	25	0.24	9	A	-	0.30	10	A	-

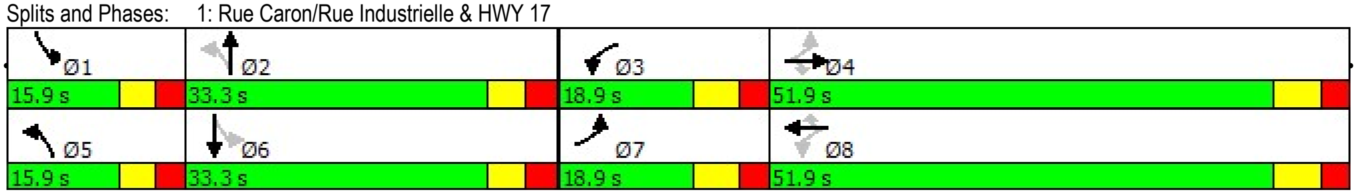
Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Overall			**0.27**	**9**	**A**	**-**	**0.30**	**10**	**A**	**-**
Street B at David Street (Unsignalized)										
EB	T/R	-	0.12	0	A	0	0.12	0	A	0
WB	L/T	-	0.03	6	A	1	0.04	6	A	1
NB	L/R	-	0.30	12	B	9	0.31	12	B	9
Overall			**0.30**	**6**	**A**	**-**	**0.31**	**6**	**A**	**6**
Street B at Street A (Unsignalized)										
EB	L/T/R	-	0.18	8	A	-	0.18	8	A	-
WB	L/T/R	-	-	-	-	-	-	-	-	-
NB	L/T/R	-	-	-	-	-	-	-	-	-
SB	L/T/R	-	0.14	7	A	-	0.15	7	A	-
Overall			**0.18**	**8**	**A**	**-**	**0.18**	**8**	**A**	**-**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	8	346	319	21	708	3	452	8	1	6
Future Volume (vph)	8	346	319	21	708	3	452	8	1	6
Lane Group Flow (vph)	9	384	354	23	787	3	502	43	1	16
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8	2		6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	51.9	51.9	11.9	51.9	51.9	10.9	33.3	10.9	33.3
Total Split (s)	18.9	51.9	51.9	18.9	51.9	51.9	15.9	33.3	15.9	33.3
Total Split (%)	15.8%	43.3%	43.3%	15.8%	43.3%	43.3%	13.3%	27.8%	13.3%	27.8%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	48.0	45.9	45.9	49.5	48.5	48.5	12.8	10.9	7.3	10.2
Actuated g/C Ratio	0.63	0.60	0.60	0.65	0.63	0.63	0.17	0.14	0.10	0.13
v/c Ratio	0.03	0.36	0.34	0.04	0.71	0.00	1.95	0.17	0.01	0.07
Control Delay	6.4	11.7	2.6	6.0	17.0	0.0	462.6	17.2	29.0	25.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	11.7	2.6	6.0	17.0	0.0	462.6	17.2	29.0	25.9
LOS	A	B	A	A	B	A	F	B	C	C
Approach Delay		7.3			16.6			427.4		26.0
Approach LOS		A			B			F		C
Queue Length 50th (m)	0.3	16.5	0.0	0.8	47.7	0.0	~93.5	0.9	0.1	0.7
Queue Length 95th (m)	2.3	67.4	13.4	4.3	#200.2	0.0	#154.5	9.9	1.3	6.7
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Base Capacity (vph)	436	1057	1040	685	1115	1001	258	580	260	586
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.36	0.34	0.03	0.71	0.00	1.95	0.07	0.00	0.03

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 76.7
Natural Cycle: 150
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.95
Intersection Signal Delay: 118.9 Intersection LOS: F
Intersection Capacity Utilization 83.4% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17

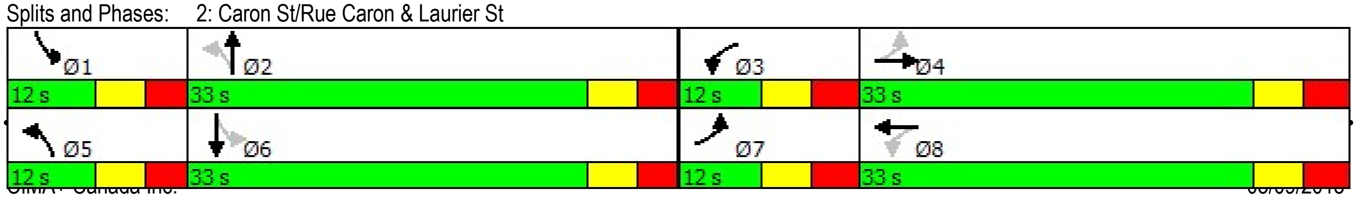


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	17	54	41	148	60	390	12	320
Future Volume (vph)	17	54	41	148	60	390	12	320
Lane Group Flow (vph)	19	111	46	207	67	472	13	373
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	12.0	33.0	12.0	33.0	12.0	33.0	12.0	33.0
Total Split (%)	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	30.4	27.5	31.5	29.6	30.1	29.1	26.4	22.1
Actuated g/C Ratio	0.39	0.35	0.40	0.38	0.39	0.37	0.34	0.28
v/c Ratio	0.04	0.18	0.09	0.31	0.23	0.72	0.05	0.75
Control Delay	15.2	15.2	15.5	21.1	17.2	30.4	15.5	37.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.2	15.2	15.5	21.1	17.2	30.4	15.5	37.4
LOS	B	B	B	C	B	C	B	D
Approach Delay		15.2		20.1		28.7		36.7
Approach LOS		B		C		C		D
Queue Length 50th (m)	1.6	6.9	3.8	17.5	6.1	56.1	1.2	52.2
Queue Length 95th (m)	5.3	18.6	9.9	41.9	13.1	#122.5	4.1	80.9
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	472	609	509	659	289	716	262	627
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.18	0.09	0.31	0.23	0.66	0.05	0.59

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 78
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 28.1 Intersection LOS: C
Intersection Capacity Utilization 58.6% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Caron St/Rue Caron & Laurier St



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	5	6	485	404	3
Future Volume (Veh/h)	0	5	6	485	404	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	6	7	539	449	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked	0.82	0.82	0.82			
vC, conflicting volume	1004	450	452			
vC1, stage 1 conf vol	450					
vC2, stage 2 conf vol	553					
vCu, unblocked vol	894	219	221			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	481	672	1105			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	6	7	539	452
Volume Left	0	7	0	0
Volume Right	6	0	0	3
cSH	672	1105	1700	1700
Volume to Capacity	0.01	0.01	0.32	0.27
Queue Length 95th (m)	0.2	0.1	0.0	0.0
Control Delay (s)	10.4	8.3	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.4	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	9	3	1	421	407	2
Future Volume (vph)	9	3	1	421	407	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	3	1	468	452	2

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	13	1	468	454
Volume Left (vph)	10	1	0	0
Volume Right (vph)	3	0	0	2
Hadj (s)	0.05	0.53	0.03	0.03
Departure Headway (s)	6.0	5.4	4.9	4.6
Degree Utilization, x	0.02	0.00	0.64	0.58
Capacity (veh/h)	512	654	729	774
Control Delay (s)	9.1	7.2	14.8	13.7
Approach Delay (s)	9.1	14.8		13.7
Approach LOS	A	B		B

Intersection Summary			
Delay	14.2		
Level of Service	B		
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	10	412	1	5	405
Future Volume (Veh/h)	5	10	412	1	5	405
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	458	1	6	450
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	920	458			459	
vC1, stage 1 conf vol	458					
vC2, stage 2 conf vol	462					
vCu, unblocked vol	920	458			459	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			99	
cM capacity (veh/h)	510	602			1102	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	17	459	6	450
Volume Left	6	0	6	0
Volume Right	11	1	0	0
cSH	566	1700	1102	1700
Volume to Capacity	0.03	0.27	0.01	0.26
Queue Length 95th (m)	0.6	0.0	0.1	0.0
Control Delay (s)	11.6	0.0	8.3	0.0
Lane LOS	B		A	
Approach Delay (s)	11.6	0.0	0.1	
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	0	8	9	1	6	4	398	6	5	405	0
Future Volume (vph)	9	0	8	9	1	6	4	398	6	5	405	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	0	9	10	1	7	4	442	7	6	450	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	19	18	4	449	6	450
Volume Left (vph)	10	10	4	0	6	0
Volume Right (vph)	9	7	0	7	0	0
Hadj (s)	-0.14	-0.09	0.53	0.02	0.53	0.03
Departure Headway (s)	5.9	5.9	5.5	5.0	5.5	5.0
Degree Utilization, x	0.03	0.03	0.01	0.62	0.01	0.62
Capacity (veh/h)	513	516	636	714	636	713
Control Delay (s)	9.0	9.1	7.3	14.6	7.3	14.7
Approach Delay (s)	9.0	9.1	14.5		14.6	
Approach LOS	A	A	B		B	

Intersection Summary			
Delay	14.4		
Level of Service	B		
Intersection Capacity Utilization	32.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	57	81	370	339	43
Future Volume (Veh/h)	38	57	81	370	339	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	42	63	90	411	377	48
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	994	403	427			
vC1, stage 1 conf vol	403					
vC2, stage 2 conf vol	591					
vCu, unblocked vol	994	403	427			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	90	92			
cM capacity (veh/h)	449	646	1130			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	105	90	411	425
Volume Left	42	90	0	0
Volume Right	63	0	0	48
cSH	550	1130	1700	1700
Volume to Capacity	0.19	0.08	0.24	0.25
Queue Length 95th (m)	4.9	1.8	0.0	0.0
Control Delay (s)	13.1	8.5	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.1	1.5		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	26	179	240	23	174	222
Future Volume (vph)	26	179	240	23	174	222
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	29	199	267	26	193	247

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	228	293	193	247
Volume Left (vph)	29	0	193	0
Volume Right (vph)	199	26	0	0
Hadj (s)	-0.46	-0.02	0.53	0.03
Departure Headway (s)	5.1	5.2	6.0	5.5
Degree Utilization, x	0.33	0.42	0.32	0.38
Capacity (veh/h)	643	669	579	634
Control Delay (s)	10.6	11.8	10.6	10.6
Approach Delay (s)	10.6	11.8	10.6	
Approach LOS	B	B	B	

Intersection Summary			
Delay	11.0		
Level of Service	B		
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	28	58	127	95	47
Future Volume (Veh/h)	30	28	58	127	95	47
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	33	31	64	141	106	52
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	205				232	134
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	205				232	134
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				86	94
cM capacity (veh/h)	1366				738	914

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	64	205	158
Volume Left	33	0	106
Volume Right	0	141	52
cSH	1366	1700	788
Volume to Capacity	0.02	0.12	0.20
Queue Length 95th (m)	0.5	0.0	5.2
Control Delay (s)	4.1	0.0	10.7
Lane LOS	A		B
Approach Delay (s)	4.1	0.0	10.7
Approach LOS			B

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	7	169	42	15	169	43
Future Volume (Veh/h)	7	169	42	15	169	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	188	47	17	188	48
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			196		213	102
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			196		213	102
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		75	95
cM capacity (veh/h)			1377		749	953

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	196	64	236
Volume Left	0	47	188
Volume Right	188	0	48
cSH	1700	1377	783
Volume to Capacity	0.12	0.03	0.30
Queue Length 95th (m)	0.0	0.7	8.9
Control Delay (s)	0.0	5.7	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	5.7	11.6
Approach LOS			B

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	127	0	5	0	0	0	0	0	0	0	0	126
Future Volume (vph)	127	0	5	0	0	0	0	0	0	0	0	126
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	141	0	6	0	0	0	0	0	0	0	0	140

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	147	0	0	140
Volume Left (vph)	141	0	0	0
Volume Right (vph)	6	0	0	140
Hadj (s)	0.20	0.00	0.00	-0.57
Departure Headway (s)	4.4	4.3	4.4	3.7
Degree Utilization, x	0.18	0.00	0.00	0.14
Capacity (veh/h)	797	803	795	941
Control Delay (s)	8.3	7.3	7.4	7.3
Approach Delay (s)	8.3	0.0	0.0	7.3
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.8		
Level of Service	A		
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	63	127	115	63	127	100
Future Volume (vph)	63	127	115	63	127	100
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	70	141	128	70	141	111

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	211	198	94	158
Volume Left (vph)	70	0	94	47
Volume Right (vph)	141	70	0	0
Hadj (s)	-0.30	-0.18	0.53	0.18
Departure Headway (s)	4.7	4.7	5.8	5.4
Degree Utilization, x	0.27	0.26	0.15	0.24
Capacity (veh/h)	715	731	597	638
Control Delay (s)	9.4	9.3	8.6	8.9
Approach Delay (s)	9.4	9.3	8.8	
Approach LOS	A	A	A	

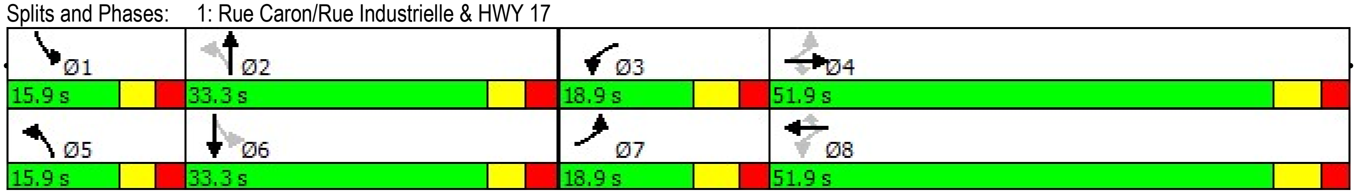
Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	34	189	346	30	106	26	328	87	35	138
Future Volume (vph)	34	189	346	30	106	26	328	87	35	138
Lane Group Flow (vph)	38	210	384	33	118	29	364	144	39	187
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8	2		6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	51.9	51.9	11.9	51.9	51.9	10.9	33.3	10.9	33.3
Total Split (s)	18.9	51.9	51.9	18.9	51.9	51.9	15.9	33.3	15.9	33.3
Total Split (%)	15.8%	43.3%	43.3%	15.8%	43.3%	43.3%	13.3%	27.8%	13.3%	27.8%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	49.7	45.7	45.7	49.5	45.6	45.6	30.0	24.0	23.2	15.6
Actuated g/C Ratio	0.50	0.46	0.46	0.50	0.46	0.46	0.30	0.24	0.24	0.16
v/c Ratio	0.06	0.26	0.43	0.06	0.14	0.04	1.17	0.34	0.12	0.67
Control Delay	11.9	19.6	3.8	11.8	18.8	0.1	136.2	32.9	25.6	50.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	19.6	3.8	11.8	18.8	0.1	136.2	32.9	25.6	50.2
LOS	B	B	A	B	B	A	F	C	C	D
Approach Delay		9.5			14.5			106.9		46.0
Approach LOS		A			B			F		D
Queue Length 50th (m)	3.0	24.2	0.0	2.6	12.9	0.0	~59.1	20.7	5.1	31.5
Queue Length 95th (m)	8.1	44.6	16.3	7.3	26.4	0.0	#109.5	38.9	11.9	52.9
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Base Capacity (vph)	696	819	901	649	817	773	311	484	363	483
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.26	0.43	0.05	0.14	0.04	1.17	0.30	0.11	0.39

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 98.5
Natural Cycle: 110
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.17
Intersection Signal Delay: 47.4 Intersection LOS: D
Intersection Capacity Utilization 65.2% ICU Level of Service C
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17

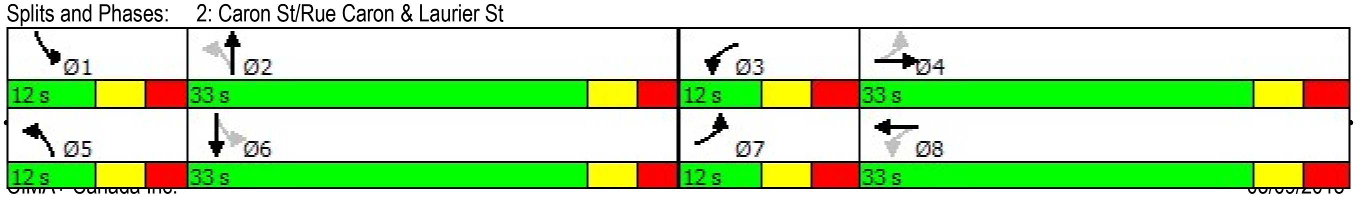


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	34	155	30	87	72	364	35	420
Future Volume (vph)	34	155	30	87	72	364	35	420
Lane Group Flow (vph)	38	268	33	126	80	451	39	501
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	12.0	33.0	12.0	33.0	12.0	33.0	12.0	33.0
Total Split (%)	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	30.2	27.2	30.2	27.2	31.6	28.4	30.3	25.8
Actuated g/C Ratio	0.37	0.33	0.37	0.33	0.39	0.35	0.37	0.32
v/c Ratio	0.08	0.46	0.09	0.22	0.37	0.74	0.15	0.90
Control Delay	16.1	24.7	16.1	21.5	19.9	35.0	16.1	50.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.1	24.7	16.1	21.5	19.9	35.0	16.1	50.4
LOS	B	C	B	C	B	C	B	D
Approach Delay		23.6		20.4		32.7		47.9
Approach LOS		C		C		C		D
Queue Length 50th (m)	3.5	31.0	3.0	13.0	7.4	66.5	3.5	77.3
Queue Length 95th (m)	8.6	52.6	7.8	25.7	15.1	#114.6	8.8	#133.9
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	475	578	385	579	220	645	268	593
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.46	0.09	0.22	0.36	0.70	0.15	0.84

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 81.5
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 35.0 Intersection LOS: C
Intersection Capacity Utilization 68.8% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Caron St/Rue Caron & Laurier St



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	8	7	478	533	3
Future Volume (Veh/h)	0	8	7	478	533	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	9	8	531	592	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked	0.73	0.73	0.73			
vC, conflicting volume	1140	594	595			
vC1, stage 1 conf vol	594					
vC2, stage 2 conf vol	547					
vCu, unblocked vol	1009	261	264			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	99			
cM capacity (veh/h)	436	569	952			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	9	8	531	595
Volume Left	0	8	0	0
Volume Right	9	0	0	3
cSH	569	952	1700	1700
Volume to Capacity	0.02	0.01	0.31	0.35
Queue Length 95th (m)	0.3	0.2	0.0	0.0
Control Delay (s)	11.4	8.8	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.4	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	7	3	6	478	537	4
Future Volume (vph)	7	3	6	478	537	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	3	7	531	597	4

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	11	7	531	601
Volume Left (vph)	8	7	0	0
Volume Right (vph)	3	0	0	4
Hadj (s)	0.02	0.53	0.03	0.03
Departure Headway (s)	6.4	5.5	5.0	4.7
Degree Utilization, x	0.02	0.01	0.74	0.78
Capacity (veh/h)	508	642	707	766
Control Delay (s)	9.6	7.4	19.4	21.9
Approach Delay (s)	9.6	19.2		21.9
Approach LOS	A	C		C

Intersection Summary			
Delay	20.6		
Level of Service	C		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	10	411	7	26	514
Future Volume (Veh/h)	1	10	411	7	26	514
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	11	457	8	29	571
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1090	461			465	
vC1, stage 1 conf vol	461					
vC2, stage 2 conf vol	629					
vCu, unblocked vol	1090	461			465	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			97	
cM capacity (veh/h)	442	600			1096	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	12	465	29	571
Volume Left	1	0	29	0
Volume Right	11	8	0	0
cSH	583	1700	1096	1700
Volume to Capacity	0.02	0.27	0.03	0.34
Queue Length 95th (m)	0.4	0.0	0.6	0.0
Control Delay (s)	11.3	0.0	8.4	0.0
Lane LOS	B		A	
Approach Delay (s)	11.3	0.0	0.4	
Approach LOS	B			

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	1	10	9	1	4	12	397	13	16	482	17
Future Volume (vph)	17	1	10	9	1	4	12	397	13	16	482	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	19	1	11	10	1	4	13	441	14	18	536	19

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	31	15	13	455	18	555
Volume Left (vph)	19	10	13	0	18	0
Volume Right (vph)	11	4	0	14	0	19
Hadj (s)	-0.06	0.01	0.53	0.01	0.53	0.01
Departure Headway (s)	6.2	6.3	5.6	5.1	5.6	5.0
Degree Utilization, x	0.05	0.03	0.02	0.65	0.03	0.78
Capacity (veh/h)	517	500	617	693	627	700
Control Delay (s)	9.6	9.5	7.6	15.8	7.5	22.1
Approach Delay (s)	9.6	9.5	15.6		21.6	
Approach LOS	A	A	C		C	

Intersection Summary			
Delay	18.5		
Level of Service	C		
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	84	70	361	392	60
Future Volume (Veh/h)	61	84	70	361	392	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	93	78	401	436	67
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1028	472	505			
vC1, stage 1 conf vol	472					
vC2, stage 2 conf vol	557					
vCu, unblocked vol	1028	472	505			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	85	84	93			
cM capacity (veh/h)	449	591	1058			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	161	78	401	503
Volume Left	68	78	0	0
Volume Right	93	0	0	67
cSH	522	1058	1700	1700
Volume to Capacity	0.31	0.07	0.24	0.30
Queue Length 95th (m)	9.1	1.7	0.0	0.0
Control Delay (s)	15.0	8.7	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	15.0	1.4		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	27	180	263	26	184	263
Future Volume (vph)	27	180	263	26	184	263
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	30	200	292	29	204	292

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	230	321	204	292
Volume Left (vph)	30	0	204	0
Volume Right (vph)	200	29	0	0
Hadj (s)	-0.46	-0.02	0.53	0.03
Departure Headway (s)	5.3	5.3	6.1	5.6
Degree Utilization, x	0.34	0.47	0.34	0.45
Capacity (veh/h)	622	660	574	628
Control Delay (s)	11.1	12.9	11.0	11.9
Approach Delay (s)	11.1	12.9	11.5	
Approach LOS	B	B	B	

Intersection Summary			
Delay	11.8		
Level of Service	B		
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	63	102	41	121	142	38
Future Volume (Veh/h)	63	102	41	121	142	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	70	113	46	134	158	42
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	180				366	113
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	180				366	113
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				74	96
cM capacity (veh/h)	1396				602	940

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	183	180	200
Volume Left	70	0	158
Volume Right	0	134	42
cSH	1396	1700	651
Volume to Capacity	0.05	0.11	0.31
Queue Length 95th (m)	1.1	0.0	9.1
Control Delay (s)	3.2	0.0	13.0
Lane LOS	A		B
Approach Delay (s)	3.2	0.0	13.0
Approach LOS			B

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	15	174	43	15	170	42
Future Volume (Veh/h)	15	174	43	15	170	42
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	193	48	17	189	47
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			210		226	114
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			210		226	114
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		74	95
cM capacity (veh/h)			1361		735	939

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	210	65	236
Volume Left	0	48	189
Volume Right	193	0	47
cSH	1700	1361	768
Volume to Capacity	0.12	0.04	0.31
Queue Length 95th (m)	0.0	0.8	9.1
Control Delay (s)	0.0	5.8	11.8
Lane LOS		A	B
Approach Delay (s)	0.0	5.8	11.8
Approach LOS			B

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	129	0	0	0	0	0	0	0	0	0	0	129
Future Volume (vph)	129	0	0	0	0	0	0	0	0	0	0	129
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	143	0	0	0	0	0	0	0	0	0	0	143

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	143	0	0	143
Volume Left (vph)	143	0	0	0
Volume Right (vph)	0	0	0	143
Hadj (s)	0.23	0.00	0.00	-0.57
Departure Headway (s)	4.4	4.3	4.4	3.7
Degree Utilization, x	0.18	0.00	0.00	0.15
Capacity (veh/h)	790	802	797	943
Control Delay (s)	8.4	7.3	7.4	7.3
Approach Delay (s)	8.4	0.0	0.0	7.3
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.8		
Level of Service	A		
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	64	128	140	65	130	138
Future Volume (vph)	64	128	140	65	130	138
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	71	142	156	72	144	153

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	213	228	96	201
Volume Left (vph)	71	0	96	48
Volume Right (vph)	142	72	0	0
Hadj (s)	-0.30	-0.16	0.53	0.15
Departure Headway (s)	4.9	4.8	5.8	5.4
Degree Utilization, x	0.29	0.30	0.16	0.30
Capacity (veh/h)	687	717	592	636
Control Delay (s)	9.8	9.9	8.7	9.6
Approach Delay (s)	9.8	9.9	9.3	
Approach LOS	A	A	A	

Intersection Summary			
Delay	9.6		
Level of Service	A		
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

D

Appendix D

Projected Phase 1 Traffic Operations with Improvements

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at HWY 17 (Signalized)										
EB	L	90	0.04	10	A	3	0.08	17	B	10
	T	-	0.40	16	B	72	0.32	26	C	51
	R	85	0.36	3	A	14	0.48	5	A	20
WB	L	60	0.04	9	A	5	0.07	17	B	9
	T	-	0.78	24	C	213	0.18	24	C	30
	R	56	0.00	0	A	0	0.04	1	A	0
NB	L	80	0.84	50	D	80	0.65	42	D	46
	T/R	-	0.12	14	B	9	0.24	21	C	29
SB	L	40	0.01	26	C	1	0.13	19	B	9
	T/R	-	0.08	29	C	7	0.63	44	D	51
Overall			**0.84**	**25**	**C**	**-**	**0.65**	**25**	**C**	**-**
Caron Street at Laurier Street (Signalized)										
EB	L	35	0.04	15	B	5	0.08	16	B	9
	T/R	-	0.18	15	B	19	0.46	25	C	53
WB	L	60	0.09	16	B	10	0.09	16	B	8
	T/R	-	0.31	21	C	42	0.22	22	C	26
NB	L	55	0.23	17	B	13	0.37	20	B	15
	T/R	-	0.72	30	C	123	0.74	35	C	115
SB	L	50	0.05	16	B	4	0.15	16	B	9
	T/R	-	0.75	37	D	81	0.90	50	D	134
Overall			**0.75**	**28**	**C**	**-**	**0.90**	**35**	**C**	**-**
Caron Street at Hélène Street (Unsignalized)										
EB	L/R	-	0.01	10	B	1	0.02	11	B	1
NB	L	15	0.01	8	A	1	0.01	9	A	1
	T	-	0.32	0	A	0	0.31	0	A	0
SB	T/R	-	0.27	0	A	0	0.35	0	A	0
Overall			**0.27**	**1**	**A**	**-**	**0.35**	**1**	**A**	**-**
Caron Street at Françoise Street (Unsignalized)										
EB	L/R	-	0.02	9	A	-	0.02	10	A	-
NB	L	15	0.00	7	A	-	0.01	7	A	-
	T	-	0.64	15	B	-	0.74	19	A	-
SB	T/R	-	0.58	14	B	-	0.78	22	C	-
Overall			**0.64**	**14**	**B**	**-**	**0.78**	**21**	**C**	**-**

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at Des Cèdres Avenue (Unsignalized)										
WB	L/R	-	0.03	12	B	1	0.02	11	B	1
NB	T/R	-	0.27	0	A	0	0.27	0	A	0
SB	L	15	0.01	8	A	1	0.03	8	A	1
	T	-	0.26	0	A	0	0.34	0	A	0
Overall			**0.27**	**1**	**A**	**-**	**0.34**	**1**	**A**	**-**
Caron Street at Cote Street/Potvin Avenue (Unsignalized)										
EB	L/T/R	-	0.03	9	A	-	0.05	10	A	-
WB	L/T/R	-	0.03	9	A	-	0.03	10	A	-
NB	L	15	0.01	7	A	-	0.02	8	A	-
	T/R	-	0.62	15	B	-	0.65	16	C	-
SB	L	15	0.01	7	A	-	0.03	8	A	-
	T/R	-	0.62	15	B	-	0.78	22	C	-
Overall			**0.62**	**14**	**B**	**-**	**0.78**	**19**	**C**	**-**
Caron Street at Docteur Corbeil Boulevard (Unsignalized)										
EB	L/R	-	0.19	13	B	5	0.31	15	B	9
NB	L	15	0.08	9	A	2	0.07	9	A	2
	T	-	0.24	0	A	0	0.24	0	A	0
SB	T/R	-	0.25	0	A	0	0.30	0	A	0
Overall			**0.25**	**2**	**A**	**-**	**0.30**	**3**	**A**	**-**
Caron Street at David Street (Unsignalized)										
WB	L/R	-	0.33	11	B	-	0.34	11	B	-
NB	T/R	-	0.42	12	B	-	0.47	13	B	-
SB	L	40	0.32	11	B	-	0.34	11	B	-
	T	-	0.38	11	B	-	0.45	12	B	-
Overall			**0.42**	**11**	**B**	**-**	**0.47**	**12**	**B**	**-**
Caron Street at Baseline Road (Unsignalized)										
EB	L/T	-	0.02	4	A	1	0.05	3	A	1
WB	T/R	-	0.12	0	A	0	0.11	0	A	0
SB	L/R	-	0.20	11	B	5	0.31	13	B	9
Overall			**0.20**	**5**	**A**	**-**	**0.31**	**6**	**A**	**-**
Caron Street at Street A (Unsignalized)										
WB	L	-	0.27	9	A	-	0.29	10	A	-
	R	-	0.27	9	A	-	0.29	10	A	-
NB	T/R	-	0.26	9	A	-	0.30	10	A	-
SB	L/T	25	0.24	9	A	-	0.30	10	A	-

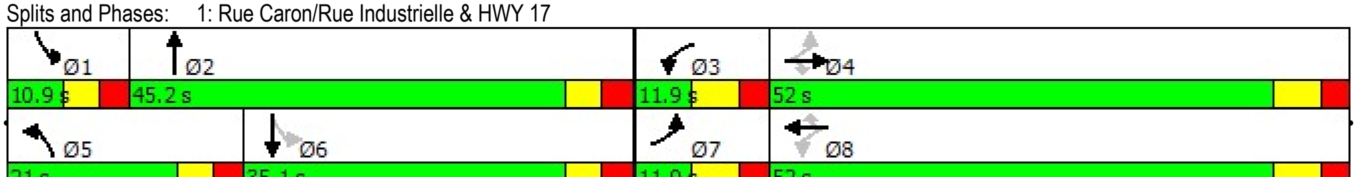
Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Overall			**0.27**	**9**	**A**	**-**	**0.30**	**10**	**A**	**-**
Street B at David Street (Unsignalized)										
EB	T/R	-	0.12	0	A	0	0.12	0	A	0
WB	L/T	-	0.03	6	A	1	0.04	6	A	1
NB	L/R	-	0.30	12	B	9	0.31	12	B	9
Overall			**0.30**	**6**	**A**	**-**	**0.31**	**6**	**A**	**6**
Street B at Street A (Unsignalized)										
EB	L/T/R	-	0.18	8	A	-	0.18	8	A	-
WB	L/T/R	-	-	-	-	-	-	-	-	-
NB	L/T/R		-	-	-	-	-	-	-	-
SB	L/T/R	-	0.14	7	A	-	0.15	7	A	-
Overall			**0.18**	**8**	**A**	**-**	**0.18**	**8**	**A**	**-**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	8	346	319	21	708	3	452	8	1	6
Future Volume (vph)	8	346	319	21	708	3	452	8	1	6
Lane Group Flow (vph)	9	384	354	23	787	3	502	43	1	16
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8			6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	32.9	32.9	11.9	32.9	32.9	10.9	33.3	10.9	33.3
Total Split (s)	11.9	52.0	52.0	11.9	52.0	52.0	21.0	45.2	10.9	35.1
Total Split (%)	9.9%	43.3%	43.3%	9.9%	43.3%	43.3%	17.5%	37.7%	9.1%	29.3%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	47.9	46.3	46.3	49.1	48.3	48.3	15.5	18.7	8.6	10.3
Actuated g/C Ratio	0.57	0.55	0.55	0.58	0.57	0.57	0.18	0.22	0.10	0.12
v/c Ratio	0.04	0.40	0.36	0.04	0.78	0.00	0.84	0.12	0.01	0.08
Control Delay	9.6	15.6	3.1	9.2	23.8	0.0	50.1	14.1	26.0	28.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.6	15.6	3.1	9.2	23.8	0.0	50.1	14.1	26.0	28.9
LOS	A	B	A	A	C	A	D	B	C	C
Approach Delay		9.6			23.3			47.2		28.8
Approach LOS		A			C			D		C
Queue Length 50th (m)	0.4	21.0	0.0	1.0	60.5	0.0	30.8	0.9	0.1	0.8
Queue Length 95th (m)	2.6	71.5	14.0	4.9	#212.8	0.0	#79.4	9.4	1.3	7.0
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	80.0		40.0	
Base Capacity (vph)	235	968	983	524	1010	944	597	754	174	572
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.40	0.36	0.04	0.78	0.00	0.84	0.06	0.01	0.03

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 84.3
Natural Cycle: 150
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 24.7 Intersection LOS: C
Intersection Capacity Utilization 70.6% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17

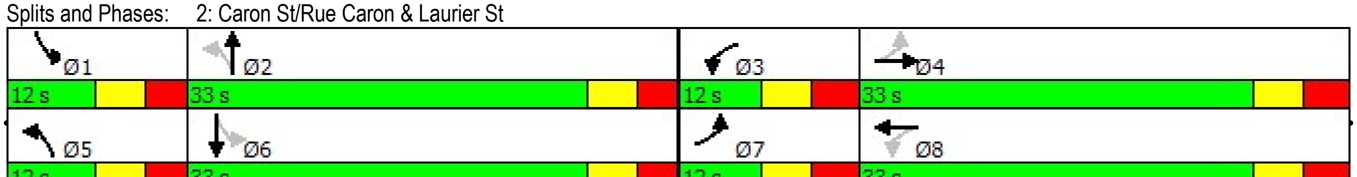


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	17	54	41	148	60	390	12	320
Future Volume (vph)	17	54	41	148	60	390	12	320
Lane Group Flow (vph)	19	111	46	207	67	472	13	373
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	12.0	33.0	12.0	33.0	12.0	33.0	12.0	33.0
Total Split (%)	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	30.4	27.5	31.5	29.6	30.1	29.1	26.4	22.1
Actuated g/C Ratio	0.39	0.35	0.40	0.38	0.39	0.37	0.34	0.28
v/c Ratio	0.04	0.18	0.09	0.31	0.23	0.72	0.05	0.75
Control Delay	15.2	15.2	15.5	21.1	17.2	30.4	15.5	37.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.2	15.2	15.5	21.1	17.2	30.4	15.5	37.4
LOS	B	B	B	C	B	C	B	D
Approach Delay		15.2		20.1		28.7		36.7
Approach LOS		B		C		C		D
Queue Length 50th (m)	1.6	6.9	3.8	17.5	6.1	56.1	1.2	52.2
Queue Length 95th (m)	5.3	18.6	9.9	41.9	13.1	#122.5	4.1	80.9
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	472	609	509	659	289	716	262	627
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.18	0.09	0.31	0.23	0.66	0.05	0.59

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 78
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 28.1 Intersection LOS: C
Intersection Capacity Utilization 58.6% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Caron St/Rue Caron & Laurier St



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	5	6	485	404	3
Future Volume (Veh/h)	0	5	6	485	404	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	6	7	539	449	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (m)					169	
pX, platoon unblocked	0.82	0.82	0.82			
vC, conflicting volume	1004	450	452			
vC1, stage 1 conf vol	450					
vC2, stage 2 conf vol	553					
vCu, unblocked vol	894	219	221			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	481	672	1105			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	6	7	539	452
Volume Left	0	7	0	0
Volume Right	6	0	0	3
cSH	672	1105	1700	1700
Volume to Capacity	0.01	0.01	0.32	0.27
Queue Length 95th (m)	0.2	0.1	0.0	0.0
Control Delay (s)	10.4	8.3	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.4	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	9	3	1	421	407	2
Future Volume (vph)	9	3	1	421	407	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	3	1	468	452	2

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	13	1	468	454
Volume Left (vph)	10	1	0	0
Volume Right (vph)	3	0	0	2
Hadj (s)	0.05	0.53	0.03	0.03
Departure Headway (s)	6.0	5.4	4.9	4.6
Degree Utilization, x	0.02	0.00	0.64	0.58
Capacity (veh/h)	512	654	729	774
Control Delay (s)	9.1	7.2	14.8	13.7
Approach Delay (s)	9.1	14.8		13.7
Approach LOS	A	B		B

Intersection Summary			
Delay	14.2		
Level of Service	B		
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	10	412	1	5	405
Future Volume (Veh/h)	5	10	412	1	5	405
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	458	1	6	450
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	920	458			459	
vC1, stage 1 conf vol	458					
vC2, stage 2 conf vol	462					
vCu, unblocked vol	920	458			459	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			99	
cM capacity (veh/h)	510	602			1102	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	17	459	6	450
Volume Left	6	0	6	0
Volume Right	11	1	0	0
cSH	566	1700	1102	1700
Volume to Capacity	0.03	0.27	0.01	0.26
Queue Length 95th (m)	0.6	0.0	0.1	0.0
Control Delay (s)	11.6	0.0	8.3	0.0
Lane LOS	B		A	
Approach Delay (s)	11.6	0.0	0.1	
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	0	8	9	1	6	4	398	6	5	405	0
Future Volume (vph)	9	0	8	9	1	6	4	398	6	5	405	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	0	9	10	1	7	4	442	7	6	450	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	19	18	4	449	6	450
Volume Left (vph)	10	10	4	0	6	0
Volume Right (vph)	9	7	0	7	0	0
Hadj (s)	-0.14	-0.09	0.53	0.02	0.53	0.03
Departure Headway (s)	5.9	5.9	5.5	5.0	5.5	5.0
Degree Utilization, x	0.03	0.03	0.01	0.62	0.01	0.62
Capacity (veh/h)	513	516	636	714	636	713
Control Delay (s)	9.0	9.1	7.3	14.6	7.3	14.7
Approach Delay (s)	9.0	9.1	14.5		14.6	
Approach LOS	A	A	B		B	

Intersection Summary			
Delay	14.4		
Level of Service	B		
Intersection Capacity Utilization	32.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	57	81	370	339	43
Future Volume (Veh/h)	38	57	81	370	339	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	42	63	90	411	377	48
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	994	403	427			
vC1, stage 1 conf vol	403					
vC2, stage 2 conf vol	591					
vCu, unblocked vol	994	403	427			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	90	92			
cM capacity (veh/h)	449	646	1130			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	105	90	411	425
Volume Left	42	90	0	0
Volume Right	63	0	0	48
cSH	550	1130	1700	1700
Volume to Capacity	0.19	0.08	0.24	0.25
Queue Length 95th (m)	4.9	1.8	0.0	0.0
Control Delay (s)	13.1	8.5	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.1	1.5		0.0
Approach LOS	B			

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	42.3%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	26	179	240	23	174	222
Future Volume (vph)	26	179	240	23	174	222
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	29	199	267	26	193	247

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	228	293	193	247
Volume Left (vph)	29	0	193	0
Volume Right (vph)	199	26	0	0
Hadj (s)	-0.46	-0.02	0.53	0.03
Departure Headway (s)	5.1	5.2	6.0	5.5
Degree Utilization, x	0.33	0.42	0.32	0.38
Capacity (veh/h)	643	669	579	634
Control Delay (s)	10.6	11.8	10.6	10.6
Approach Delay (s)	10.6	11.8	10.6	
Approach LOS	B	B	B	

Intersection Summary			
Delay	11.0		
Level of Service	B		
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	28	58	127	95	47
Future Volume (Veh/h)	30	28	58	127	95	47
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	33	31	64	141	106	52
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	205				232	134
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	205				232	134
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				86	94
cM capacity (veh/h)	1366				738	914

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	64	205	158
Volume Left	33	0	106
Volume Right	0	141	52
cSH	1366	1700	788
Volume to Capacity	0.02	0.12	0.20
Queue Length 95th (m)	0.5	0.0	5.2
Control Delay (s)	4.1	0.0	10.7
Lane LOS	A		B
Approach Delay (s)	4.1	0.0	10.7
Approach LOS			B

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	7	169	42	15	169	43
Future Volume (Veh/h)	7	169	42	15	169	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	188	47	17	188	48
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			196		213	102
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			196		213	102
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		75	95
cM capacity (veh/h)			1377		749	953

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	196	64	236
Volume Left	0	47	188
Volume Right	188	0	48
cSH	1700	1377	783
Volume to Capacity	0.12	0.03	0.30
Queue Length 95th (m)	0.0	0.7	8.9
Control Delay (s)	0.0	5.7	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	5.7	11.6
Approach LOS			B

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	127	0	5	0	0	0	0	0	0	0	0	126
Future Volume (vph)	127	0	5	0	0	0	0	0	0	0	0	126
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	141	0	6	0	0	0	0	0	0	0	0	140

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	147	0	0	140
Volume Left (vph)	141	0	0	0
Volume Right (vph)	6	0	0	140
Hadj (s)	0.20	0.00	0.00	-0.57
Departure Headway (s)	4.4	4.3	4.4	3.7
Degree Utilization, x	0.18	0.00	0.00	0.14
Capacity (veh/h)	797	803	795	941
Control Delay (s)	8.3	7.3	7.4	7.3
Approach Delay (s)	8.3	0.0	0.0	7.3
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.8		
Level of Service	A		
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	63	127	115	63	127	100
Future Volume (vph)	63	127	115	63	127	100
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	70	141	128	70	141	111

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	211	198	94	158
Volume Left (vph)	70	0	94	47
Volume Right (vph)	141	70	0	0
Hadj (s)	-0.30	-0.18	0.53	0.18
Departure Headway (s)	4.7	4.7	5.8	5.4
Degree Utilization, x	0.27	0.26	0.15	0.24
Capacity (veh/h)	715	731	597	638
Control Delay (s)	9.4	9.3	8.6	8.9
Approach Delay (s)	9.4	9.3	8.8	
Approach LOS	A	A	A	

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	34	189	346	30	106	26	328	87	35	138
Future Volume (vph)	34	189	346	30	106	26	328	87	35	138
Lane Group Flow (vph)	38	210	384	33	118	29	364	144	39	187
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8			6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	32.9	32.9	11.9	32.9	32.9	10.9	33.3	10.9	33.3
Total Split (s)	12.0	39.0	39.0	12.0	39.0	39.0	29.0	58.0	11.0	40.0
Total Split (%)	10.0%	32.5%	32.5%	10.0%	32.5%	32.5%	24.2%	48.3%	9.2%	33.3%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	35.6	32.9	32.9	35.6	32.9	32.9	15.3	30.6	20.8	15.1
Actuated g/C Ratio	0.40	0.37	0.37	0.40	0.37	0.37	0.17	0.34	0.23	0.17
v/c Ratio	0.08	0.32	0.48	0.07	0.18	0.04	0.65	0.24	0.13	0.63
Control Delay	17.2	25.7	5.2	17.2	24.3	0.1	41.8	20.5	19.2	44.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	25.7	5.2	17.2	24.3	0.1	41.8	20.5	19.2	44.3
LOS	B	C	A	B	C	A	D	C	B	D
Approach Delay		12.7			19.1			35.7		40.0
Approach LOS		B			B			D		D
Queue Length 50th (m)	3.3	26.0	0.0	2.9	13.8	0.0	29.7	15.4	4.0	28.2
Queue Length 95th (m)	10.2	51.0	19.7	9.2	30.2	0.0	46.1	28.8	9.3	50.5
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	80.0		40.0	
Base Capacity (vph)	506	649	794	459	649	678	861	1005	302	668
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.32	0.48	0.07	0.18	0.04	0.42	0.14	0.13	0.28

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 89.4
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 25.0 Intersection LOS: C
Intersection Capacity Utilization 55.9% ICU Level of Service B
Analysis Period (min) 15

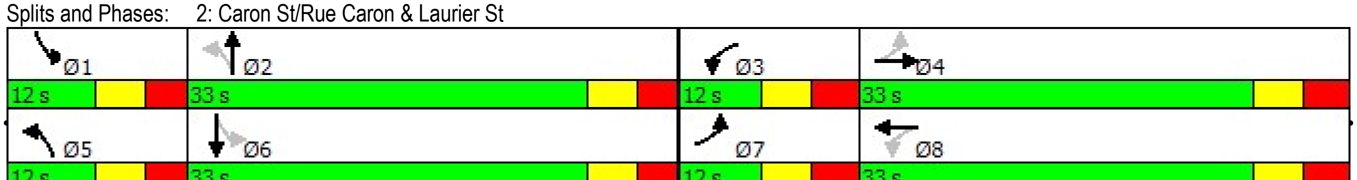
Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	34	155	30	87	72	364	35	420
Future Volume (vph)	34	155	30	87	72	364	35	420
Lane Group Flow (vph)	38	268	33	126	80	451	39	501
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	12.0	33.0	12.0	33.0	12.0	33.0	12.0	33.0
Total Split (%)	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	30.2	27.2	30.2	27.2	31.6	28.4	30.3	25.8
Actuated g/C Ratio	0.37	0.33	0.37	0.33	0.39	0.35	0.37	0.32
v/c Ratio	0.08	0.46	0.09	0.22	0.37	0.74	0.15	0.90
Control Delay	16.1	24.7	16.1	21.5	19.9	35.0	16.1	50.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.1	24.7	16.1	21.5	19.9	35.0	16.1	50.4
LOS	B	C	B	C	B	C	B	D
Approach Delay		23.6		20.4		32.7		47.9
Approach LOS		C		C		C		D
Queue Length 50th (m)	3.5	31.0	3.0	13.0	7.4	66.5	3.5	77.3
Queue Length 95th (m)	8.6	52.6	7.8	25.7	15.1	#114.6	8.8	#133.9
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	475	578	385	579	220	645	268	593
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.46	0.09	0.22	0.36	0.70	0.15	0.84

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 81.5
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 35.0 Intersection LOS: C
Intersection Capacity Utilization 68.8% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Caron St/Rue Caron & Laurier St



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	8	7	478	533	3
Future Volume (Veh/h)	0	8	7	478	533	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	9	8	531	592	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked	0.73	0.73	0.73			
vC, conflicting volume	1140	594	595			
vC1, stage 1 conf vol	594					
vC2, stage 2 conf vol	547					
vCu, unblocked vol	1009	261	264			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	99			
cM capacity (veh/h)	436	569	952			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	9	8	531	595
Volume Left	0	8	0	0
Volume Right	9	0	0	3
cSH	569	952	1700	1700
Volume to Capacity	0.02	0.01	0.31	0.35
Queue Length 95th (m)	0.3	0.2	0.0	0.0
Control Delay (s)	11.4	8.8	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.4	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	7	3	6	478	537	4
Future Volume (vph)	7	3	6	478	537	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	3	7	531	597	4

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	11	7	531	601
Volume Left (vph)	8	7	0	0
Volume Right (vph)	3	0	0	4
Hadj (s)	0.02	0.53	0.03	0.03
Departure Headway (s)	6.4	5.5	5.0	4.7
Degree Utilization, x	0.02	0.01	0.74	0.78
Capacity (veh/h)	508	642	707	766
Control Delay (s)	9.6	7.4	19.4	21.9
Approach Delay (s)	9.6	19.2		21.9
Approach LOS	A	C		C

Intersection Summary			
Delay	20.6		
Level of Service	C		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	10	411	7	26	514
Future Volume (Veh/h)	1	10	411	7	26	514
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	11	457	8	29	571
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1090	461			465	
vC1, stage 1 conf vol	461					
vC2, stage 2 conf vol	629					
vCu, unblocked vol	1090	461			465	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			97	
cM capacity (veh/h)	442	600			1096	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	12	465	29	571
Volume Left	1	0	29	0
Volume Right	11	8	0	0
cSH	583	1700	1096	1700
Volume to Capacity	0.02	0.27	0.03	0.34
Queue Length 95th (m)	0.4	0.0	0.6	0.0
Control Delay (s)	11.3	0.0	8.4	0.0
Lane LOS	B		A	
Approach Delay (s)	11.3	0.0	0.4	
Approach LOS	B			

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	1	10	9	1	4	12	397	13	16	482	17
Future Volume (vph)	17	1	10	9	1	4	12	397	13	16	482	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	19	1	11	10	1	4	13	441	14	18	536	19

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	31	15	13	455	18	555
Volume Left (vph)	19	10	13	0	18	0
Volume Right (vph)	11	4	0	14	0	19
Hadj (s)	-0.06	0.01	0.53	0.01	0.53	0.01
Departure Headway (s)	6.2	6.3	5.6	5.1	5.6	5.0
Degree Utilization, x	0.05	0.03	0.02	0.65	0.03	0.78
Capacity (veh/h)	517	500	617	693	627	700
Control Delay (s)	9.6	9.5	7.6	15.8	7.5	22.1
Approach Delay (s)	9.6	9.5	15.6		21.6	
Approach LOS	A	A	C		C	

Intersection Summary			
Delay	18.5		
Level of Service	C		
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	84	70	361	392	60
Future Volume (Veh/h)	61	84	70	361	392	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	93	78	401	436	67
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1028	472	505			
vC1, stage 1 conf vol	472					
vC2, stage 2 conf vol	557					
vCu, unblocked vol	1028	472	505			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	85	84	93			
cM capacity (veh/h)	449	591	1058			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	161	78	401	503
Volume Left	68	78	0	0
Volume Right	93	0	0	67
cSH	522	1058	1700	1700
Volume to Capacity	0.31	0.07	0.24	0.30
Queue Length 95th (m)	9.1	1.7	0.0	0.0
Control Delay (s)	15.0	8.7	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	15.0	1.4		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	27	180	263	26	184	263
Future Volume (vph)	27	180	263	26	184	263
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	30	200	292	29	204	292

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	230	321	204	292
Volume Left (vph)	30	0	204	0
Volume Right (vph)	200	29	0	0
Hadj (s)	-0.46	-0.02	0.53	0.03
Departure Headway (s)	5.3	5.3	6.1	5.6
Degree Utilization, x	0.34	0.47	0.34	0.45
Capacity (veh/h)	622	660	574	628
Control Delay (s)	11.1	12.9	11.0	11.9
Approach Delay (s)	11.1	12.9	11.5	
Approach LOS	B	B	B	

Intersection Summary			
Delay	11.8		
Level of Service	B		
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	63	102	41	121	142	38
Future Volume (Veh/h)	63	102	41	121	142	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	70	113	46	134	158	42
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	180				366	113
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	180				366	113
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				74	96
cM capacity (veh/h)	1396				602	940

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	183	180	200
Volume Left	70	0	158
Volume Right	0	134	42
cSH	1396	1700	651
Volume to Capacity	0.05	0.11	0.31
Queue Length 95th (m)	1.1	0.0	9.1
Control Delay (s)	3.2	0.0	13.0
Lane LOS	A		B
Approach Delay (s)	3.2	0.0	13.0
Approach LOS			B

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	15	174	43	15	170	42
Future Volume (Veh/h)	15	174	43	15	170	42
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	193	48	17	189	47
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			210		226	114
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			210		226	114
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		74	95
cM capacity (veh/h)			1361		735	939

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	210	65	236
Volume Left	0	48	189
Volume Right	193	0	47
cSH	1700	1361	768
Volume to Capacity	0.12	0.04	0.31
Queue Length 95th (m)	0.0	0.8	9.1
Control Delay (s)	0.0	5.8	11.8
Lane LOS		A	B
Approach Delay (s)	0.0	5.8	11.8
Approach LOS			B

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	129	0	0	0	0	0	0	0	0	0	0	129
Future Volume (vph)	129	0	0	0	0	0	0	0	0	0	0	129
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	143	0	0	0	0	0	0	0	0	0	0	143

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	143	0	0	143
Volume Left (vph)	143	0	0	0
Volume Right (vph)	0	0	0	143
Hadj (s)	0.23	0.00	0.00	-0.57
Departure Headway (s)	4.4	4.3	4.4	3.7
Degree Utilization, x	0.18	0.00	0.00	0.15
Capacity (veh/h)	790	802	797	943
Control Delay (s)	8.4	7.3	7.4	7.3
Approach Delay (s)	8.4	0.0	0.0	7.3
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.8		
Level of Service	A		
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	64	128	140	65	130	138
Future Volume (vph)	64	128	140	65	130	138
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	71	142	156	72	144	153

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	213	228	96	201
Volume Left (vph)	71	0	96	48
Volume Right (vph)	142	72	0	0
Hadj (s)	-0.30	-0.16	0.53	0.15
Departure Headway (s)	4.9	4.8	5.8	5.4
Degree Utilization, x	0.29	0.30	0.16	0.30
Capacity (veh/h)	687	717	592	636
Control Delay (s)	9.8	9.9	8.7	9.6
Approach Delay (s)	9.8	9.9	9.3	
Approach LOS	A	A	A	

Intersection Summary			
Delay	9.6		
Level of Service	A		
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

E

Appendix E

Projected Phase 2 Traffic Operations

CIMA+

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at HWY 17 (Signalized)										
EB	L	90	0.05	9	A	3	0.08	18	B	11
	T	-	0.47	16	B	90	0.39	27	C	65
	R	85	0.37	3	A	14	0.55	6	A	22
WB	L	60	0.05	9	A	5	0.08	18	B	10
	T	-	0.92	34	C	278	0.22	25	C	37
	R	56	0.00	0	A	0	0.04	1	A	0
NB	L	80	1.05	90	F	100	0.69	44	D	53
	T/R	-	0.12	15	B	10	0.24	21	C	29
SB	L	40	0.01	27	C	1	0.13	20	C	10
	T/R	-	0.08	29	C	7	0.17	47	D	53
Overall			**1.05**	**38**	**D**	**-**	**0.69**	**26**	**C**	**-**
Caron Street at Laurier Street (Signalized)										
EB	L	35	0.04	15	B	5	0.08	16	B	9
	T/R	-	0.19	15	B	19	0.48	25	C	54
WB	L	60	0.09	16	B	10	0.09	16	B	8
	T/R	-	0.33	22	C	42	0.22	21	C	26
NB	L	55	0.24	17	B	14	0.42	22	C	16
	T/R	-	0.79	33	C	152	0.79	38	D	132
SB	L	50	0.06	16	B	4	0.16	16	B	9
	T/R	-	0.73	36	D	94	1.01	71	E	165
Overall			**0.79**	**29**	**C**	**-**	**1.01**	**44**	**D**	**-**
Caron Street at Hélène Street (Unsignalized)										
EB	L/R	-	0.01	11	B	1	0.02	12	B	0.4
NB	L	15	0.01	8	A	1	0.01	9	A	0.2
	T	-	0.37	0	A	0	0.34	0	A	0
SB	T/R	-	0.28	0	A	0	0.40	0	A	0
Overall			**0.37**	**0.1**	**A**	**-**	**0.40**	**0.1**	**A**	**-**
Caron Street at Françoise Street (Unsignalized)										
EB	L/R	-	0.02	9	A	-	0.02	10	A	-
NB	L	15	0.00	7	A	-	0.01	7	A	-
	T	-	0.75	20	C	-	0.82	25	D	-
SB	T/R	-	0.62	15	C	-	0.90	35	A	-
Overall			**0.75**	**18**	**C**	**-**	**0.90**	**30**	**D**	**-**

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at Des Cèdres Avenue (Unsignalized)										
WB	L/R	-	0.03	12	B	1	0.02	12	B	1
NB	T/R	-	0.32	0	A	0	0.30	0	A	0
SB	L	15	0.01	8.5	A	1	0.03	9	A	1
	T	-	0.28	0	A	0	0.39	0	A	0
Overall			**0.32**	**0.2**	**A**	**-**	**0.39**	**0.3**	**A**	**-**
Caron Street at Cote Street/Potvin Avenue (Unsignalized)										
EB	L/T/R	-	0.03	9	A	-	0.06	10	A	-
WB	L/T/R	-	0.03	9	A	-	0.03	10	A	-
NB	L	15	0.01	7	A	-	0.02	8	A	-
	T/R	-	0.74	20	C	-	0.73	20	C	-
SB	L	15	0.01	7	A	-	0.03	8	A	-
	T/R	-	0.67	17	C	-	0.91	37	E	-
Overall			**0.74**	**18**	**C**	**-**	**0.91**	**28**	**D**	**-**
Caron Street at Docteur Corbeil Boulevard (Unsignalized)										
EB	L/R	-	0.21	14	B	6	0.35	17	C	11
NB	L	15	0.09	9	A	2	0.08	9	A	2
	T	-	0.29	0	A	0	0.26	0	A	0
SB	T/R	-	0.27	0	A	0	0.35	0	A	0
Overall			**0.29**	**2**	**A**	**-**	**0.35**	**3**	**A**	**-**
Caron Street at David Street (Unsignalized)										
WB	L/R	-	0.36	11	B	-	0.35	11	B	-
NB	T/R	-	0.46	13	B	-	0.49	14	B	-
SB	L	40	0.36	11	B	-	0.43	13	B	-
	T	-	0.41	11	B	-	0.52	13	B	-
Overall			**0.46**	**12**	**B**	**-**	**0.52**	**13**	**B**	**-**
Caron Street at Baseline Road (Unsignalized)										
EB	L/T	-	0.03	4	A	1	0.06	3	A	1
WB	T/R	-	0.12	0	A	0	0.11	0	A	0
SB	L/R	-	0.23	11	B	6	0.33	13	B	10
Overall			**0.23**	**5**	**A**	**-**	**0.33**	**6**	**A**	**-**
Caron Street at Street A (Unsignalized)										
WB	L	-	0.28	10	A	-	0.27	10	B	-
	R	-	0.28	10	A	-	0.27	10	B	-
NB	T/R	-	0.35	10	B	-	0.41	11	B	-
SB	L/T	25	0.30	10	A	-	0.39	11	B	-

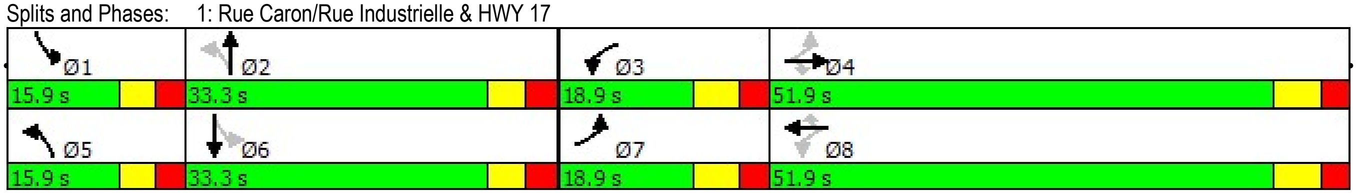
Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Overall			**0.35**	**10**	**A**	**-**	**0.41**	**11**	**B**	**-**
Street B at David Street (Unsignalized)										
EB	T/R	-	0.12	0	A	0	0.15	0	A	0
WB	L/T	-	0.02	2	A	1	0.02	3	A	1
NB	L/R	-	0.28	12	B	8	0.27	12	B	8
Overall			**0.28**	**5**	**A**	**-**	**0.27**	**5**	**A**	**-**
Street B at Street A (Unsignalized)										
EB	L/T/R	-	0.30	10	A	-	0.32	10	B	-
WB	L/T/R	-	0.22	9	A	-	0.23	9	A	-
NB	L/T/R		0.12	9	A	-	0.11	9	A	-
SB	L/T/R	-	0.25	9	A	-	0.27	10	A	-
Overall			**0.30**	**9**	**A**	**-**	**0.32**	**10**	**A**	**-**
Street A at David Street (Unsignalized)										
EB	T/R	-	0.05	0	A	0	0.06	0	A	0
WB	L/T	-	0.02	3	A	1	0.02	3	A	1
NB	L/R	-	0.10	10	A	2	0.10	10	A	2
Overall			**0.10**	**4**	**A**	**-**	**0.10**	**4**	**A**	**-**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	8	422	341	21	863	3	521	8	1	6
Future Volume (vph)	8	422	341	21	863	3	521	8	1	6
Lane Group Flow (vph)	9	469	379	23	959	3	579	43	1	16
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8	2		6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	51.9	51.9	11.9	51.9	51.9	10.9	33.3	10.9	33.3
Total Split (s)	18.9	51.9	51.9	18.9	51.9	51.9	15.9	33.3	15.9	33.3
Total Split (%)	15.8%	43.3%	43.3%	15.8%	43.3%	43.3%	13.3%	27.8%	13.3%	27.8%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	48.0	45.9	45.9	49.5	48.5	48.5	12.8	10.9	7.3	10.2
Actuated g/C Ratio	0.63	0.60	0.60	0.65	0.63	0.63	0.17	0.14	0.10	0.13
v/c Ratio	0.04	0.44	0.36	0.04	0.86	0.00	2.24	0.17	0.01	0.07
Control Delay	6.6	12.7	2.6	6.0	23.9	0.0	593.1	17.2	29.0	25.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.6	12.7	2.6	6.0	23.9	0.0	593.1	17.2	29.0	25.9
LOS	A	B	A	A	C	A	F	B	C	C
Approach Delay		8.2			23.4			553.3		26.0
Approach LOS		A			C			F		C
Queue Length 50th (m)	0.3	21.4	0.0	0.8	70.4	0.0	~112.7	0.9	0.1	0.7
Queue Length 95th (m)	2.3	86.3	13.7	4.3	#266.3	0.0	#184.9	9.9	1.3	6.7
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Base Capacity (vph)	341	1057	1050	624	1115	1001	258	580	260	586
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.44	0.36	0.04	0.86	0.00	2.24	0.07	0.00	0.03

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 76.7
Natural Cycle: 150
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 2.24
Intersection Signal Delay: 151.0 Intersection LOS: F
Intersection Capacity Utilization 96.1% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17

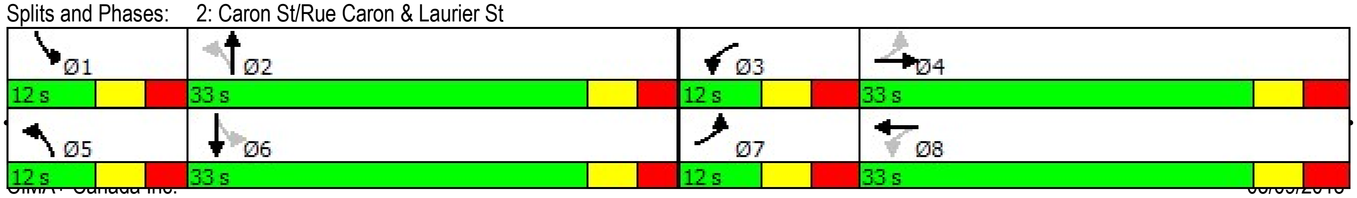


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	17	54	41	148	65	459	12	342
Future Volume (vph)	17	54	41	148	65	459	12	342
Lane Group Flow (vph)	19	113	46	207	72	549	13	397
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	12.0	33.0	12.0	33.0	12.0	33.0	12.0	33.0
Total Split (%)	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	30.0	27.0	31.2	29.2	33.3	32.2	29.5	25.1
Actuated g/C Ratio	0.37	0.33	0.39	0.36	0.41	0.40	0.37	0.31
v/c Ratio	0.04	0.19	0.09	0.33	0.24	0.79	0.06	0.73
Control Delay	15.4	14.9	15.7	21.6	17.2	33.3	15.5	35.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.4	14.9	15.7	21.6	17.2	33.3	15.5	35.8
LOS	B	B	B	C	B	C	B	D
Approach Delay		15.0		20.5		31.4		35.2
Approach LOS		B		C		C		D
Queue Length 50th (m)	1.6	7.1	4.0	18.3	6.6	69.7	1.2	56.6
Queue Length 95th (m)	5.3	18.8	9.9	41.9	13.8	#152.2	4.1	#93.8
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	446	582	485	628	296	698	232	597
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.19	0.09	0.33	0.24	0.79	0.06	0.66

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 80.7
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 29.0 Intersection LOS: C
Intersection Capacity Utilization 62.4% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Caron St/Rue Caron & Laurier St



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	5	6	559	428	3
Future Volume (Veh/h)	0	5	6	559	428	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	6	7	621	476	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked	0.81	0.81	0.81			
vC, conflicting volume	1112	478	479			
vC1, stage 1 conf vol	478					
vC2, stage 2 conf vol	635					
vCu, unblocked vol	1021	236	238			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	442	650	1075			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	6	7	621	479
Volume Left	0	7	0	0
Volume Right	6	0	0	3
cSH	650	1075	1700	1700
Volume to Capacity	0.01	0.01	0.37	0.28
Queue Length 95th (m)	0.2	0.1	0.0	0.0
Control Delay (s)	10.6	8.4	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.6	0.1		0.0
Approach LOS	B			

Intersection Summary				
Average Delay	0.1			
Intersection Capacity Utilization	41.1%		ICU Level of Service	A
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	9	3	1	495	431	2
Future Volume (vph)	9	3	1	495	431	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	3	1	550	479	2

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	13	1	550	481
Volume Left (vph)	10	1	0	0
Volume Right (vph)	3	0	0	2
Hadj (s)	0.05	0.53	0.03	0.03
Departure Headway (s)	6.3	5.4	4.9	4.7
Degree Utilization, x	0.02	0.00	0.75	0.62
Capacity (veh/h)	511	652	719	759
Control Delay (s)	9.4	7.2	20.0	15.1
Approach Delay (s)	9.4	20.0		15.1
Approach LOS	A	C		C

Intersection Summary			
Delay	17.6		
Level of Service	C		
Intersection Capacity Utilization	37.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	10	486	1	5	429
Future Volume (Veh/h)	5	10	486	1	5	429
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	540	1	6	477
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1030	540			541	
vC1, stage 1 conf vol	540					
vC2, stage 2 conf vol	489					
vCu, unblocked vol	1030	540			541	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			99	
cM capacity (veh/h)	473	541			1028	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	17	541	6	477
Volume Left	6	0	6	0
Volume Right	11	1	0	0
cSH	515	1700	1028	1700
Volume to Capacity	0.03	0.32	0.01	0.28
Queue Length 95th (m)	0.7	0.0	0.1	0.0
Control Delay (s)	12.2	0.0	8.5	0.0
Lane LOS	B		A	
Approach Delay (s)	12.2	0.0	0.1	
Approach LOS	B			

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	0	8	9	1	6	4	472	6	5	429	0
Future Volume (vph)	9	0	8	9	1	6	4	472	6	5	429	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	0	9	10	1	7	4	524	7	6	477	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	19	18	4	531	6	477
Volume Left (vph)	10	10	4	0	6	0
Volume Right (vph)	9	7	0	7	0	0
Hadj (s)	-0.14	-0.09	0.53	0.02	0.53	0.03
Departure Headway (s)	6.1	6.2	5.5	5.0	5.6	5.1
Degree Utilization, x	0.03	0.03	0.01	0.74	0.01	0.67
Capacity (veh/h)	516	509	632	702	627	703
Control Delay (s)	9.3	9.3	7.4	19.7	7.4	16.5
Approach Delay (s)	9.3	9.3	19.6		16.4	
Approach LOS	A	A	C		C	

Intersection Summary			
Delay	17.8		
Level of Service	C		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	59	86	444	363	43
Future Volume (Veh/h)	38	59	86	444	363	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	42	66	96	493	403	48
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1114	429	453			
vC1, stage 1 conf vol	429					
vC2, stage 2 conf vol	685					
vCu, unblocked vol	1114	429	453			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	89	91			
cM capacity (veh/h)	406	625	1106			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	108	96	493	451
Volume Left	42	96	0	0
Volume Right	66	0	0	48
cSH	517	1106	1700	1700
Volume to Capacity	0.21	0.09	0.29	0.27
Queue Length 95th (m)	5.5	2.0	0.0	0.0
Control Delay (s)	13.8	8.6	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.8	1.4		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	221	277	2	188	234
Future Volume (vph)	5	221	277	2	188	234
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	246	308	2	209	260

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	252	310	209	260
Volume Left (vph)	6	0	209	0
Volume Right (vph)	246	2	0	0
Hadj (s)	-0.55	0.03	0.53	0.03
Departure Headway (s)	5.2	5.3	6.1	5.6
Degree Utilization, x	0.36	0.46	0.36	0.41
Capacity (veh/h)	640	648	569	621
Control Delay (s)	11.2	12.8	11.3	11.2
Approach Delay (s)	11.2	12.8	11.2	
Approach LOS	B	B	B	

Intersection Summary			
Delay	11.7		
Level of Service	B		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	28	58	131	106	52
Future Volume (Veh/h)	32	28	58	131	106	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	36	31	64	146	118	58
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	210				240	137
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	210				240	137
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				84	94
cM capacity (veh/h)	1361				728	911

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	67	210	176
Volume Left	36	0	118
Volume Right	0	146	58
cSH	1361	1700	780
Volume to Capacity	0.03	0.12	0.23
Queue Length 95th (m)	0.6	0.0	6.0
Control Delay (s)	4.2	0.0	11.0
Lane LOS	A		B
Approach Delay (s)	4.2	0.0	11.0
Approach LOS			B

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	53	137	23	68	159	27
Future Volume (Veh/h)	53	137	23	68	159	27
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	59	152	26	76	177	30
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			211		263	135
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			211		263	135
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		75	97
cM capacity (veh/h)			1360		712	914

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	211	102	207
Volume Left	0	26	177
Volume Right	152	0	30
cSH	1700	1360	736
Volume to Capacity	0.12	0.02	0.28
Queue Length 95th (m)	0.0	0.4	8.1
Control Delay (s)	0.0	2.1	11.8
Lane LOS		A	B
Approach Delay (s)	0.0	2.1	11.8
Approach LOS			B

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	34	46	23	38	53	26
Future Volume (Veh/h)	34	46	23	38	53	26
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	38	51	26	42	59	29
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			89		158	64
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			89		158	64
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		93	97
cM capacity (veh/h)			1506		819	1001

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	89	68	88
Volume Left	0	26	59
Volume Right	51	0	29
cSH	1700	1506	871
Volume to Capacity	0.05	0.02	0.10
Queue Length 95th (m)	0.0	0.4	2.4
Control Delay (s)	0.0	2.9	9.6
Lane LOS		A	A
Approach Delay (s)	0.0	2.9	9.6
Approach LOS			A

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	21.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	99	71	28	23	76	53	26	26	26	46	23	99
Future Volume (vph)	99	71	28	23	76	53	26	26	26	46	23	99
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	110	79	31	26	84	59	29	29	29	51	26	110

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	220	169	87	187
Volume Left (vph)	110	26	29	51
Volume Right (vph)	31	59	29	110
Hadj (s)	0.05	-0.14	-0.10	-0.26
Departure Headway (s)	4.9	4.7	5.0	4.7
Degree Utilization, x	0.30	0.22	0.12	0.25
Capacity (veh/h)	694	706	647	700
Control Delay (s)	9.9	9.1	8.7	9.2
Approach Delay (s)	9.9	9.1	8.7	9.2
Approach LOS	A	A	A	A

Intersection Summary			
Delay	9.3		
Level of Service	A		
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	79	106	173	68	91	148
Future Volume (vph)	79	106	173	68	91	148
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	88	118	192	76	101	164

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	206	268	67	198
Volume Left (vph)	88	0	67	34
Volume Right (vph)	118	76	0	0
Hadj (s)	-0.22	-0.14	0.53	0.12
Departure Headway (s)	5.0	4.8	5.9	5.4
Degree Utilization, x	0.28	0.35	0.11	0.30
Capacity (veh/h)	671	723	587	635
Control Delay (s)	9.9	10.4	8.4	9.5
Approach Delay (s)	9.9	10.4	9.2	
Approach LOS	A	B	A	

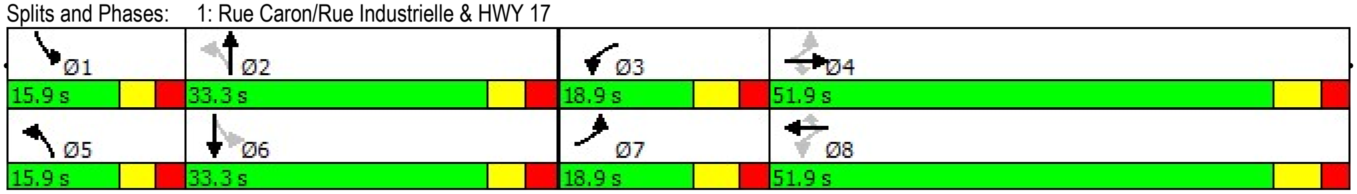
Intersection Summary			
Delay	9.8		
Level of Service	A		
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	34	230	420	30	129	26	369	87	35	138
Future Volume (vph)	34	230	420	30	129	26	369	87	35	138
Lane Group Flow (vph)	38	256	467	33	143	29	410	144	39	187
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8	2		6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	51.9	51.9	11.9	51.9	51.9	10.9	33.3	10.9	33.3
Total Split (s)	18.9	51.9	51.9	18.9	51.9	51.9	15.9	33.3	15.9	33.3
Total Split (%)	15.8%	43.3%	43.3%	15.8%	43.3%	43.3%	13.3%	27.8%	13.3%	27.8%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	49.7	45.7	45.7	49.5	45.6	45.6	30.0	24.0	23.2	15.6
Actuated g/C Ratio	0.50	0.46	0.46	0.50	0.46	0.46	0.30	0.24	0.24	0.16
v/c Ratio	0.06	0.31	0.49	0.06	0.18	0.04	1.32	0.34	0.12	0.67
Control Delay	11.9	20.3	4.0	11.9	19.0	0.1	192.5	32.9	25.6	50.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	20.3	4.0	11.9	19.0	0.1	192.5	32.9	25.6	50.2
LOS	B	C	A	B	B	A	F	C	C	D
Approach Delay		9.9			15.1			151.0		46.0
Approach LOS		A			B			F		D
Queue Length 50th (m)	3.0	30.5	0.0	2.6	15.9	0.0	~76.7	20.7	5.1	31.5
Queue Length 95th (m)	8.1	54.4	17.4	7.3	31.3	0.0	#130.7	38.9	11.9	52.9
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Base Capacity (vph)	684	819	946	612	817	773	311	484	363	483
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.31	0.49	0.05	0.18	0.04	1.32	0.30	0.11	0.39

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 98.5
Natural Cycle: 110
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 59.9 Intersection LOS: E
Intersection Capacity Utilization 69.8% ICU Level of Service C
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17

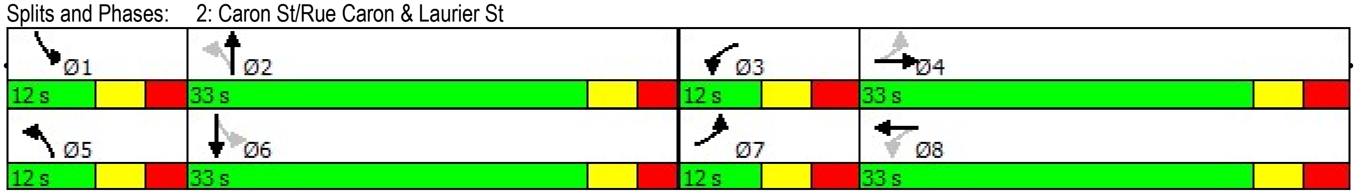


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	34	155	30	87	75	405	35	494
Future Volume (vph)	34	155	30	87	75	405	35	494
Lane Group Flow (vph)	38	273	33	126	83	497	39	583
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	12.0	33.0	12.0	33.0	12.0	33.0	12.0	33.0
Total Split (%)	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%	13.3%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	29.9	26.9	29.9	26.9	33.1	29.9	31.8	27.3
Actuated g/C Ratio	0.36	0.32	0.36	0.32	0.40	0.36	0.38	0.33
v/c Ratio	0.08	0.48	0.09	0.22	0.42	0.79	0.16	1.01
Control Delay	16.1	25.2	16.1	21.4	21.9	37.8	16.3	71.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.1	25.2	16.1	21.4	21.9	37.8	16.3	71.2
LOS	B	C	B	C	C	D	B	E
Approach Delay		24.0		20.3		35.5		67.7
Approach LOS		C		C		D		E
Queue Length 50th (m)	3.5	31.6	3.0	13.0	7.7	76.3	3.5	~107.1
Queue Length 95th (m)	8.6	53.7	7.8	25.7	15.5	#132.1	8.8	#164.6
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	463	564	368	564	198	631	248	579
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.48	0.09	0.22	0.42	0.79	0.16	1.01

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 82.8
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 43.9 Intersection LOS: D
Intersection Capacity Utilization 73.4% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Caron St/Rue Caron & Laurier St



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	8	7	522	612	3
Future Volume (Veh/h)	0	8	7	522	612	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	9	8	580	680	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked	0.69	0.69	0.69			
vC, conflicting volume	1278	682	683			
vC1, stage 1 conf vol	682					
vC2, stage 2 conf vol	596					
vCu, unblocked vol	1178	317	319			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	99			
cM capacity (veh/h)	390	501	859			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	9	8	580	683
Volume Left	0	8	0	0
Volume Right	9	0	0	3
cSH	501	859	1700	1700
Volume to Capacity	0.02	0.01	0.34	0.40
Queue Length 95th (m)	0.4	0.2	0.0	0.0
Control Delay (s)	12.3	9.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.3	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	7	3	6	522	616	4
Future Volume (vph)	7	3	6	522	616	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	3	7	580	684	4

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	11	7	580	688
Volume Left (vph)	8	7	0	0
Volume Right (vph)	3	0	0	4
Hadj (s)	0.02	0.53	0.03	0.03
Departure Headway (s)	6.7	5.6	5.1	4.7
Degree Utilization, x	0.02	0.01	0.82	0.90
Capacity (veh/h)	508	635	701	752
Control Delay (s)	9.9	7.4	25.2	34.8
Approach Delay (s)	9.9	25.0		34.8
Approach LOS	A	C		D

Intersection Summary			
Delay	30.1		
Level of Service	D		
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	10	455	7	26	593
Future Volume (Veh/h)	1	10	455	7	26	593
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	11	506	8	29	659
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1227	510			514	
vC1, stage 1 conf vol	510					
vC2, stage 2 conf vol	717					
vCu, unblocked vol	1227	510			514	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			97	
cM capacity (veh/h)	401	563			1052	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	12	514	29	659
Volume Left	1	0	29	0
Volume Right	11	8	0	0
cSH	545	1700	1052	1700
Volume to Capacity	0.02	0.30	0.03	0.39
Queue Length 95th (m)	0.5	0.0	0.6	0.0
Control Delay (s)	11.8	0.0	8.5	0.0
Lane LOS	B		A	
Approach Delay (s)	11.8	0.0	0.4	
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
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												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	1	10	9	1	4	12	441	13	16	561	17
Future Volume (vph)	17	1	10	9	1	4	12	441	13	16	561	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	19	1	11	10	1	4	13	490	14	18	623	19

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	31	15	13	504	18	642
Volume Left (vph)	19	10	13	0	18	0
Volume Right (vph)	11	4	0	14	0	19
Hadj (s)	-0.06	0.01	0.53	0.01	0.53	0.01
Departure Headway (s)	6.5	6.6	5.7	5.2	5.6	5.1
Degree Utilization, x	0.06	0.03	0.02	0.73	0.03	0.91
Capacity (veh/h)	509	493	615	676	620	699
Control Delay (s)	9.9	9.8	7.7	19.8	7.6	36.6
Approach Delay (s)	9.9	9.8	19.5		35.9	
Approach LOS	A	A	C		E	

Intersection Summary			
Delay	28.0		
Level of Service	D		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	89	73	405	471	60
Future Volume (Veh/h)	61	89	73	405	471	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	99	81	450	523	67
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1170	558	592			
vC1, stage 1 conf vol	558					
vC2, stage 2 conf vol	612					
vCu, unblocked vol	1170	558	592			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	83	81	92			
cM capacity (veh/h)	407	528	982			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	167	81	450	590
Volume Left	68	81	0	0
Volume Right	99	0	0	67
cSH	471	982	1700	1700
Volume to Capacity	0.35	0.08	0.26	0.35
Queue Length 95th (m)	11.1	1.9	0.0	0.0
Control Delay (s)	16.8	9.0	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	16.8	1.4		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	205	285	5	229	302
Future Volume (vph)	5	205	285	5	229	302
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	228	317	6	254	336

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	234	323	254	336
Volume Left (vph)	6	0	254	0
Volume Right (vph)	228	6	0	0
Hadj (s)	-0.55	0.02	0.53	0.03
Departure Headway (s)	5.4	5.4	6.1	5.6
Degree Utilization, x	0.35	0.49	0.43	0.52
Capacity (veh/h)	614	642	574	627
Control Delay (s)	11.3	13.5	12.5	13.4
Approach Delay (s)	11.3	13.5	13.0	
Approach LOS	B	B	B	

Intersection Summary			
Delay	12.8		
Level of Service	B		
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	68	102	41	133	148	41
Future Volume (Veh/h)	68	102	41	133	148	41
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	76	113	46	148	164	46
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	194				385	120
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	194				385	120
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				72	95
cM capacity (veh/h)	1379				584	931

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	189	194	210
Volume Left	76	0	164
Volume Right	0	148	46
cSH	1379	1700	636
Volume to Capacity	0.06	0.11	0.33
Queue Length 95th (m)	1.2	0.0	10.1
Control Delay (s)	3.4	0.0	13.4
Lane LOS	A		B
Approach Delay (s)	3.4	0.0	13.4
Approach LOS			B

Intersection Summary				
Average Delay		5.8		
Intersection Capacity Utilization		41.9%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	70	164	27	64	147	24
Future Volume (Veh/h)	70	164	27	64	147	24
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	78	182	30	71	163	27
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			260		300	169
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			260		300	169
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		76	97
cM capacity (veh/h)			1304		676	875

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	260	101	190
Volume Left	0	30	163
Volume Right	182	0	27
cSH	1700	1304	698
Volume to Capacity	0.15	0.02	0.27
Queue Length 95th (m)	0.0	0.5	7.7
Control Delay (s)	0.0	2.5	12.1
Lane LOS		A	B
Approach Delay (s)	0.0	2.5	12.1
Approach LOS			B

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	39	55	27	42	49	24
Future Volume (Veh/h)	39	55	27	42	49	24
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	43	61	30	47	54	27
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			104		180	74
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			104		180	74
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		93	97
cM capacity (veh/h)			1488		793	988

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	104	77	81
Volume Left	0	30	54
Volume Right	61	0	27
cSH	1700	1488	849
Volume to Capacity	0.06	0.02	0.10
Queue Length 95th (m)	0.0	0.4	2.2
Control Delay (s)	0.0	3.0	9.7
Lane LOS		A	A
Approach Delay (s)	0.0	3.0	9.7
Approach LOS			A

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	104	79	27	27	76	49	24	24	24	55	27	104
Future Volume (vph)	104	79	27	27	76	49	24	24	24	55	27	104
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	116	88	30	30	84	54	27	27	27	61	30	116

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	234	168	81	207
Volume Left (vph)	116	30	27	61
Volume Right (vph)	30	54	27	116
Hadj (s)	0.06	-0.12	-0.10	-0.24
Departure Headway (s)	4.9	4.8	5.1	4.8
Degree Utilization, x	0.32	0.23	0.11	0.27
Capacity (veh/h)	687	690	634	692
Control Delay (s)	10.2	9.2	8.8	9.6
Approach Delay (s)	10.2	9.2	8.8	9.6
Approach LOS	B	A	A	A

Intersection Summary			
Delay	9.6		
Level of Service	A		
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	73	98	192	82	109	198
Future Volume (vph)	73	98	192	82	109	198
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	81	109	213	91	121	220

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	190	304	81	260
Volume Left (vph)	81	0	81	40
Volume Right (vph)	109	91	0	0
Hadj (s)	-0.22	-0.15	0.53	0.11
Departure Headway (s)	5.2	4.8	5.9	5.4
Degree Utilization, x	0.27	0.41	0.13	0.39
Capacity (veh/h)	632	717	589	638
Control Delay (s)	10.1	11.1	8.6	10.7
Approach Delay (s)	10.1	11.1	10.2	
Approach LOS	B	B	B	

Intersection Summary			
Delay	10.5		
Level of Service	B		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

F

Appendix F

Projected Phase 2 Traffic Operations with Improvements

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at HWY 17 (Signalized)										
EB	L	90	0.05	10	B	3	0.08	18	B	11
	T	-	0.49	18	B	18	0.39	27	C	65
	R	85	0.38	3	A	3	0.55	6	A	22
WB	L	60	0.05	10	A	10	0.08	18	B	10
	T	-	0.96	42	D	42	0.22	25	C	37
	R	56	0.00	0	A	0	0.04	1	A	0
NB	L	80	0.92	58	E	58	0.69	44	D	53
	T/R	-	0.11	14	B	14	0.24	21	C	29
SB	L	40	0.01	26	C	26	0.13	20	C	10
	T/R	-	0.08	29	C	29	0.64	47	D	53
Overall			**0.96**	**34**	**C**	**-**	**0.69**	**26**	**C**	**-**
Caron Street at Laurier Street (Signalized)										
EB	L	35	0.04	16	B	6	0.09	17	B	9
	T/R	-	0.20	16	B	19	0.51	27	C	55
WB	L	60	0.10	16	B	10	0.10	17	B	8
	T/R	-	0.33	22	C	43	0.24	23	C	26
NB	L	55	0.25	17	B	13	0.44	21	C	15
	T/R	-	0.79	32	C	143	0.73	32	C	123
SB	L	50	0.06	15	B	4	0.15	15	B	8
	T/R	-	0.73	34	C	83	0.92	51	D	156
Overall			**0.79**	**28**	**C**	**-**	**0.92**	**36**	**D**	**-**
Caron Street at Hélène Street (Unsignalized)										
EB	L/R	-	0.01	11	B	1	0.02	12	B	0.4
NB	L	15	0.01	8	A	1	0.01	9	A	0.2
	T	-	0.37	0	A	0	0.34	0	A	0
SB	T/R	-	0.28	0	A	0	0.40	0	A	0
Overall			**0.37**	**0.1**	**A**	**-**	**0.40**	**0.1**	**A**	**-**
Caron Street at Françoise Street (Unsignalized)										
EB	L/R	-	0.02	9	A	-	0.02	10	A	-
NB	L	15	0.00	7	A	-	0.01	7	A	-
	T	-	0.75	20	C	-	0.82	25	D	-
SB	T/R	-	0.62	15	C	-	0.90	35	A	-
Overall			**0.75**	**18**	**C**	**-**	**0.90**	**30**	**D**	**-**

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at Des Cèdres Avenue (Unsignalized)										
WB	L/R	-	0.03	12	B	1	0.02	12	B	1
NB	T/R	-	0.32	0	A	0	0.30	0	A	0
SB	L	15	0.01	8.5	A	1	0.03	9	A	1
	T	-	0.28	0	A	0	0.39	0	A	0
Overall			**0.32**	**0.2**	**A**	**-**	**0.39**	**0.3**	**A**	**-**
Caron Street at Cote Street/Potvin Avenue (Unsignalized)										
EB	L/T/R	-	0.03	9	A	-	0.06	10	A	-
WB	L/T/R	-	0.03	9	A	-	0.03	10	A	-
NB	L	15	0.01	7	A	-	0.02	8	A	-
	T/R	-	0.74	20	C	-	0.73	20	C	-
SB	L	15	0.01	7	A	-	0.03	8	A	-
	T/R	-	0.67	17	C	-	0.91	37	E	-
Overall			**0.74**	**18**	**C**	**-**	**0.91**	**28**	**D**	**-**
Caron Street at Docteur Corbeil Boulevard (Unsignalized)										
EB	L/R	-	0.21	14	B	6	0.35	17	C	11
NB	L	15	0.09	9	A	2	0.08	9	A	2
	T	-	0.29	0	A	0	0.26	0	A	0
SB	T/R	-	0.27	0	A	0	0.35	0	A	0
Overall			**0.29**	**2**	**A**	**-**	**0.35**	**3**	**A**	**-**
Caron Street at David Street (Unsignalized)										
WB	L/R	-	0.36	11	B	-	0.35	11	B	-
NB	T/R	-	0.46	13	B	-	0.49	14	B	-
SB	L	40	0.36	11	B	-	0.43	13	B	-
	T	-	0.41	11	B	-	0.52	13	B	-
Overall			**0.46**	**12**	**B**	**-**	**0.52**	**13**	**B**	**-**
Caron Street at Baseline Road (Unsignalized)										
EB	L/T	-	0.03	4	A	1	0.06	3	A	1
WB	T/R	-	0.12	0	A	0	0.11	0	A	0
SB	L/R	-	0.23	11	B	6	0.33	13	B	10
Overall			**0.23**	**5**	**A**	**-**	**0.33**	**6**	**A**	**-**
Caron Street at Street A (Unsignalized)										
WB	L	-	0.28	10	A	-	0.27	10	B	-
	R	-	0.28	10	A	-	0.27	10	B	-
NB	T/R	-	0.35	10	B	-	0.41	11	B	-
SB	L/T	25	0.30	10	A	-	0.39	11	B	-

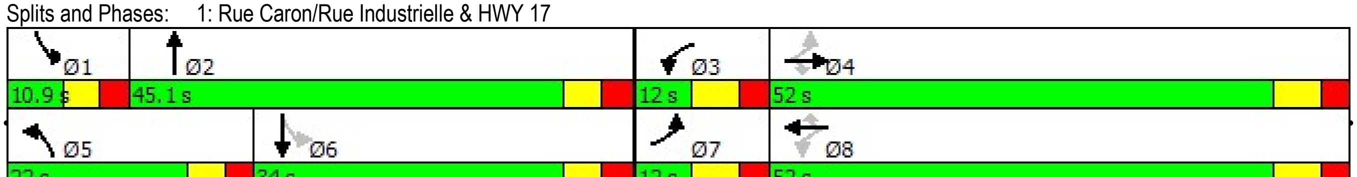
Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Overall			**0.35**	**10**	**A**	**-**	**0.41**	**11**	**B**	**-**
Street B at David Street (Unsignalized)										
EB	T/R	-	0.12	0	A	0	0.15	0	A	0
WB	L/T	-	0.02	2	A	1	0.02	3	A	1
NB	L/R	-	0.28	12	B	8	0.27	12	B	8
Overall			**0.28**	**5**	**A**	**-**	**0.27**	**5**	**A**	**-**
Street B at Street A (Unsignalized)										
EB	L/T/R	-	0.30	10	A	-	0.32	10	B	-
WB	L/T/R	-	0.22	9	A	-	0.23	9	A	-
NB	L/T/R		0.12	9	A	-	0.11	9	A	-
SB	L/T/R	-	0.25	9	A	-	0.27	10	A	-
Overall			**0.30**	**9**	**A**	**-**	**0.32**	**10**	**A**	**-**
Street A at David Street (Unsignalized)										
EB	T/R	-	0.05	0	A	0	0.06	0	A	0
WB	L/T	-	0.02	3	A	1	0.02	3	A	1
NB	L/R	-	0.10	10	A	2	0.10	10	A	2
Overall			**0.10**	**4**	**A**	**-**	**0.10**	**4**	**A**	**-**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	8	422	341	21	863	3	521	8	1	6
Future Volume (vph)	8	422	341	21	863	3	521	8	1	6
Lane Group Flow (vph)	9	469	379	23	959	3	579	43	1	16
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8			6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	32.9	32.9	11.9	32.9	32.9	10.9	33.3	10.9	33.3
Total Split (s)	12.0	52.0	52.0	12.0	52.0	52.0	22.0	45.1	10.9	34.0
Total Split (%)	10.0%	43.3%	43.3%	10.0%	43.3%	43.3%	18.3%	37.6%	9.1%	28.3%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	47.9	46.2	46.2	49.1	48.2	48.2	16.5	19.7	8.6	10.3
Actuated g/C Ratio	0.56	0.54	0.54	0.58	0.57	0.57	0.19	0.23	0.10	0.12
v/c Ratio	0.05	0.49	0.38	0.05	0.96	0.00	0.92	0.11	0.01	0.08
Control Delay	10.2	17.6	3.2	9.6	41.9	0.0	58.2	13.9	26.0	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	17.6	3.2	9.6	41.9	0.0	58.2	13.9	26.0	29.0
LOS	B	B	A	A	D	A	E	B	C	C
Approach Delay		11.1			41.0			55.1		28.8
Approach LOS		B			D			E		C
Queue Length 50th (m)	0.4	28.5	0.0	1.1	93.7	0.0	36.6	0.9	0.1	0.8
Queue Length 95th (m)	2.7	93.4	14.5	5.0	#285.3	0.0	#94.0	9.4	1.3	7.1
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	80.0		40.0	
Base Capacity (vph)	176	956	986	450	998	935	629	743	172	544
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.49	0.38	0.05	0.96	0.00	0.92	0.06	0.01	0.03

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 85.3	
Natural Cycle: 150	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 34.1	Intersection LOS: C
Intersection Capacity Utilization 81.3%	ICU Level of Service D
Analysis Period (min) 15	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17

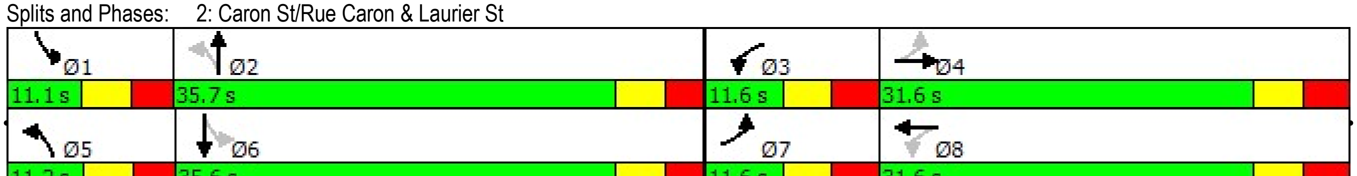


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	17	54	41	148	65	459	12	342
Future Volume (vph)	17	54	41	148	65	459	12	342
Lane Group Flow (vph)	19	113	46	207	72	549	13	397
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	11.6	31.6	11.6	31.6	11.2	35.7	11.1	35.6
Total Split (%)	12.9%	35.1%	12.9%	35.1%	12.4%	39.7%	12.3%	39.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	28.5	25.8	29.7	27.9	31.6	30.8	27.9	24.1
Actuated g/C Ratio	0.37	0.33	0.38	0.36	0.41	0.40	0.36	0.31
v/c Ratio	0.04	0.20	0.10	0.33	0.25	0.79	0.06	0.73
Control Delay	15.9	15.5	16.1	21.9	16.5	32.3	14.8	34.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	15.5	16.1	21.9	16.5	32.3	14.8	34.1
LOS	B	B	B	C	B	C	B	C
Approach Delay		15.6		20.8		30.5		33.5
Approach LOS		B		C		C		C
Queue Length 50th (m)	1.6	6.9	3.8	17.5	6.4	66.8	1.1	54.0
Queue Length 95th (m)	5.5	19.3	10.3	42.9	13.3	#142.8	4.0	83.1
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	442	578	481	625	290	746	216	687
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.20	0.10	0.33	0.25	0.74	0.06	0.58

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 77.6
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 28.2 Intersection LOS: C
Intersection Capacity Utilization 62.4% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Caron St/Rue Caron & Laurier St



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	5	6	559	428	3
Future Volume (Veh/h)	0	5	6	559	428	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	6	7	621	476	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked	0.81	0.81	0.81			
vC, conflicting volume	1112	478	479			
vC1, stage 1 conf vol	478					
vC2, stage 2 conf vol	635					
vCu, unblocked vol	1021	237	239			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	442	649	1075			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	6	7	621	479
Volume Left	0	7	0	0
Volume Right	6	0	0	3
cSH	649	1075	1700	1700
Volume to Capacity	0.01	0.01	0.37	0.28
Queue Length 95th (m)	0.2	0.1	0.0	0.0
Control Delay (s)	10.6	8.4	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.6	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	9	3	1	495	431	2
Future Volume (vph)	9	3	1	495	431	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	3	1	550	479	2

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	13	1	550	481
Volume Left (vph)	10	1	0	0
Volume Right (vph)	3	0	0	2
Hadj (s)	0.05	0.53	0.03	0.03
Departure Headway (s)	6.3	5.4	4.9	4.7
Degree Utilization, x	0.02	0.00	0.75	0.62
Capacity (veh/h)	511	652	719	759
Control Delay (s)	9.4	7.2	20.0	15.1
Approach Delay (s)	9.4	20.0		15.1
Approach LOS	A	C		C

Intersection Summary			
Delay	17.6		
Level of Service	C		
Intersection Capacity Utilization	37.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	10	486	1	5	429
Future Volume (Veh/h)	5	10	486	1	5	429
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	540	1	6	477
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1030	540			541	
vC1, stage 1 conf vol	540					
vC2, stage 2 conf vol	489					
vCu, unblocked vol	1030	540			541	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			99	
cM capacity (veh/h)	473	541			1028	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	17	541	6	477
Volume Left	6	0	6	0
Volume Right	11	1	0	0
cSH	515	1700	1028	1700
Volume to Capacity	0.03	0.32	0.01	0.28
Queue Length 95th (m)	0.7	0.0	0.1	0.0
Control Delay (s)	12.2	0.0	8.5	0.0
Lane LOS	B		A	
Approach Delay (s)	12.2	0.0	0.1	
Approach LOS	B			

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	0	8	9	1	6	4	472	6	5	429	0
Future Volume (vph)	9	0	8	9	1	6	4	472	6	5	429	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	0	9	10	1	7	4	524	7	6	477	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	19	18	4	531	6	477
Volume Left (vph)	10	10	4	0	6	0
Volume Right (vph)	9	7	0	7	0	0
Hadj (s)	-0.14	-0.09	0.53	0.02	0.53	0.03
Departure Headway (s)	6.1	6.2	5.5	5.0	5.6	5.1
Degree Utilization, x	0.03	0.03	0.01	0.74	0.01	0.67
Capacity (veh/h)	516	509	632	702	627	703
Control Delay (s)	9.3	9.3	7.4	19.7	7.4	16.5
Approach Delay (s)	9.3	9.3	19.6		16.4	
Approach LOS	A	A	C		C	

Intersection Summary			
Delay	17.8		
Level of Service	C		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	59	86	444	363	43
Future Volume (Veh/h)	38	59	86	444	363	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	42	66	96	493	403	48
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1114	429	453			
vC1, stage 1 conf vol	429					
vC2, stage 2 conf vol	685					
vCu, unblocked vol	1114	429	453			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	89	91			
cM capacity (veh/h)	406	625	1106			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	108	96	493	451
Volume Left	42	96	0	0
Volume Right	66	0	0	48
cSH	517	1106	1700	1700
Volume to Capacity	0.21	0.09	0.29	0.27
Queue Length 95th (m)	5.5	2.0	0.0	0.0
Control Delay (s)	13.8	8.6	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.8	1.4		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	221	277	2	188	234
Future Volume (vph)	5	221	277	2	188	234
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	246	308	2	209	260

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	252	310	209	260
Volume Left (vph)	6	0	209	0
Volume Right (vph)	246	2	0	0
Hadj (s)	-0.55	0.03	0.53	0.03
Departure Headway (s)	5.2	5.3	6.1	5.6
Degree Utilization, x	0.36	0.46	0.36	0.41
Capacity (veh/h)	640	648	569	621
Control Delay (s)	11.2	12.8	11.3	11.2
Approach Delay (s)	11.2	12.8	11.2	
Approach LOS	B	B	B	

Intersection Summary			
Delay	11.7		
Level of Service	B		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	28	58	131	106	52
Future Volume (Veh/h)	32	28	58	131	106	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	36	31	64	146	118	58
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	210				240	137
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	210				240	137
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				84	94
cM capacity (veh/h)	1361				728	911

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	67	210	176
Volume Left	36	0	118
Volume Right	0	146	58
cSH	1361	1700	780
Volume to Capacity	0.03	0.12	0.23
Queue Length 95th (m)	0.6	0.0	6.0
Control Delay (s)	4.2	0.0	11.0
Lane LOS	A		B
Approach Delay (s)	4.2	0.0	11.0
Approach LOS			B

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	53	137	23	68	159	27
Future Volume (Veh/h)	53	137	23	68	159	27
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	59	152	26	76	177	30
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			211		263	135
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			211		263	135
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		75	97
cM capacity (veh/h)			1360		712	914

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	211	102	207
Volume Left	0	26	177
Volume Right	152	0	30
cSH	1700	1360	736
Volume to Capacity	0.12	0.02	0.28
Queue Length 95th (m)	0.0	0.4	8.1
Control Delay (s)	0.0	2.1	11.8
Lane LOS		A	B
Approach Delay (s)	0.0	2.1	11.8
Approach LOS			B

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	34	46	23	38	53	26
Future Volume (Veh/h)	34	46	23	38	53	26
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	38	51	26	42	59	29
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			89		158	64
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			89		158	64
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		93	97
cM capacity (veh/h)			1506		819	1001

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	89	68	88
Volume Left	0	26	59
Volume Right	51	0	29
cSH	1700	1506	871
Volume to Capacity	0.05	0.02	0.10
Queue Length 95th (m)	0.0	0.4	2.4
Control Delay (s)	0.0	2.9	9.6
Lane LOS		A	A
Approach Delay (s)	0.0	2.9	9.6
Approach LOS			A

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	21.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	99	71	28	23	76	53	26	26	26	46	23	99
Future Volume (vph)	99	71	28	23	76	53	26	26	26	46	23	99
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	110	79	31	26	84	59	29	29	29	51	26	110

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	220	169	87	187
Volume Left (vph)	110	26	29	51
Volume Right (vph)	31	59	29	110
Hadj (s)	0.05	-0.14	-0.10	-0.26
Departure Headway (s)	4.9	4.7	5.0	4.7
Degree Utilization, x	0.30	0.22	0.12	0.25
Capacity (veh/h)	694	706	647	700
Control Delay (s)	9.9	9.1	8.7	9.2
Approach Delay (s)	9.9	9.1	8.7	9.2
Approach LOS	A	A	A	A

Intersection Summary			
Delay	9.3		
Level of Service	A		
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	79	106	173	68	91	148
Future Volume (vph)	79	106	173	68	91	148
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	88	118	192	76	101	164

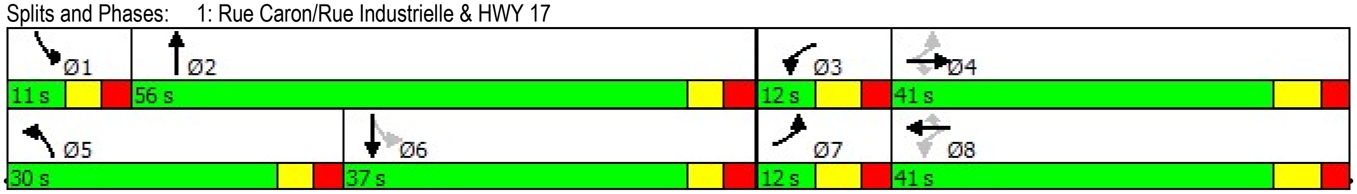
Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	206	268	67	198
Volume Left (vph)	88	0	67	34
Volume Right (vph)	118	76	0	0
Hadj (s)	-0.22	-0.14	0.53	0.12
Departure Headway (s)	5.0	4.8	5.9	5.4
Degree Utilization, x	0.28	0.35	0.11	0.30
Capacity (veh/h)	671	723	587	635
Control Delay (s)	9.9	10.4	8.4	9.5
Approach Delay (s)	9.9	10.4	9.2	
Approach LOS	A	B	A	

Intersection Summary			
Delay	9.8		
Level of Service	A		
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	34	230	420	30	129	26	369	87	35	138
Future Volume (vph)	34	230	420	30	129	26	369	87	35	138
Lane Group Flow (vph)	38	256	467	33	143	29	410	144	39	187
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8			6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	32.9	32.9	11.9	32.9	32.9	10.9	33.3	10.9	33.3
Total Split (s)	12.0	41.0	41.0	12.0	41.0	41.0	30.0	56.0	11.0	37.0
Total Split (%)	10.0%	34.2%	34.2%	10.0%	34.2%	34.2%	25.0%	46.7%	9.2%	30.8%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	37.7	35.0	35.0	37.7	35.0	35.0	17.1	32.7	21.1	15.5
Actuated g/C Ratio	0.40	0.37	0.37	0.40	0.37	0.37	0.18	0.35	0.23	0.17
v/c Ratio	0.08	0.39	0.55	0.08	0.22	0.04	0.69	0.24	0.13	0.64
Control Delay	18.0	27.3	5.5	18.0	25.2	0.1	43.5	20.8	20.1	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.0	27.3	5.5	18.0	25.2	0.1	43.5	20.8	20.1	47.0
LOS	B	C	A	B	C	A	D	C	C	D
Approach Delay		13.4			20.5			37.6		42.3
Approach LOS		B			C			D		D
Queue Length 50th (m)	3.5	33.9	0.0	3.0	17.6	0.0	35.1	16.0	4.1	29.7
Queue Length 95th (m)	10.6	64.5	22.3	9.6	36.9	0.0	53.2	29.4	9.5	52.9
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	80.0		40.0	
Base Capacity (vph)	501	659	852	422	659	685	858	925	293	583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.39	0.55	0.08	0.22	0.04	0.48	0.16	0.13	0.32

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 93.6	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 25.7	Intersection LOS: C
Intersection Capacity Utilization 59.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17

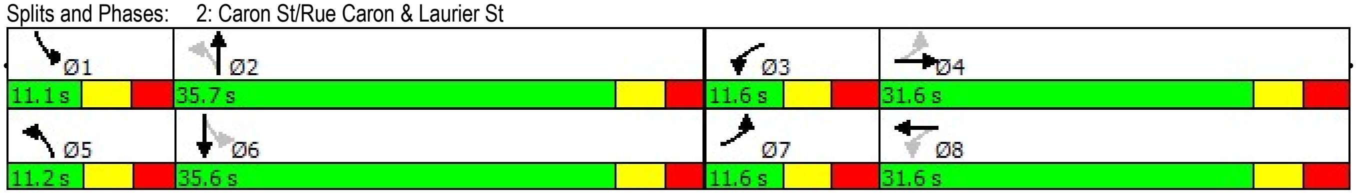


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	34	155	30	87	75	405	35	494
Future Volume (vph)	34	155	30	87	75	405	35	494
Lane Group Flow (vph)	38	273	33	126	83	497	39	583
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	11.6	31.6	11.6	31.6	11.2	35.7	11.1	35.6
Total Split (%)	12.9%	35.1%	12.9%	35.1%	12.4%	39.7%	12.3%	39.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	28.3	25.4	28.3	25.4	35.1	32.3	33.7	29.9
Actuated g/C Ratio	0.34	0.31	0.34	0.31	0.42	0.39	0.41	0.36
v/c Ratio	0.09	0.51	0.10	0.24	0.44	0.73	0.15	0.92
Control Delay	17.2	26.8	17.3	22.5	21.4	32.3	15.1	50.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	26.8	17.3	22.5	21.4	32.3	15.1	50.8
LOS	B	C	B	C	C	C	B	D
Approach Delay		25.6		21.4		30.8		48.6
Approach LOS		C		C		C		D
Queue Length 50th (m)	3.6	32.4	3.1	13.4	7.4	72.6	3.4	~93.9
Queue Length 95th (m)	9.0	55.0	8.2	26.3	14.9	#123.0	8.4	#155.8
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	435	533	339	533	190	681	261	631
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.51	0.10	0.24	0.44	0.73	0.15	0.92

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 83.1
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 35.6 — Intersection LOS: D
Intersection Capacity Utilization 73.4% — ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Caron St/Rue Caron & Laurier St



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	8	7	522	612	3
Future Volume (Veh/h)	0	8	7	522	612	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	9	8	580	680	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked	0.68	0.68	0.68			
vC, conflicting volume	1278	682	683			
vC1, stage 1 conf vol	682					
vC2, stage 2 conf vol	596					
vCu, unblocked vol	1175	303	306			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	99			
cM capacity (veh/h)	390	504	859			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	9	8	580	683
Volume Left	0	8	0	0
Volume Right	9	0	0	3
cSH	504	859	1700	1700
Volume to Capacity	0.02	0.01	0.34	0.40
Queue Length 95th (m)	0.4	0.2	0.0	0.0
Control Delay (s)	12.3	9.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.3	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	7	3	6	522	616	4
Future Volume (vph)	7	3	6	522	616	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	3	7	580	684	4

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	11	7	580	688
Volume Left (vph)	8	7	0	0
Volume Right (vph)	3	0	0	4
Hadj (s)	0.02	0.53	0.03	0.03
Departure Headway (s)	6.7	5.6	5.1	4.7
Degree Utilization, x	0.02	0.01	0.82	0.90
Capacity (veh/h)	508	635	701	752
Control Delay (s)	9.9	7.4	25.2	34.8
Approach Delay (s)	9.9	25.0		34.8
Approach LOS	A	C		D

Intersection Summary			
Delay	30.1		
Level of Service	D		
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	10	455	7	26	593
Future Volume (Veh/h)	1	10	455	7	26	593
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	11	506	8	29	659
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1227	510			514	
vC1, stage 1 conf vol	510					
vC2, stage 2 conf vol	717					
vCu, unblocked vol	1227	510			514	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			97	
cM capacity (veh/h)	401	563			1052	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	12	514	29	659
Volume Left	1	0	29	0
Volume Right	11	8	0	0
cSH	545	1700	1052	1700
Volume to Capacity	0.02	0.30	0.03	0.39
Queue Length 95th (m)	0.5	0.0	0.6	0.0
Control Delay (s)	11.8	0.0	8.5	0.0
Lane LOS	B		A	
Approach Delay (s)	11.8	0.0	0.4	
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
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												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	1	10	9	1	4	12	441	13	16	561	17
Future Volume (vph)	17	1	10	9	1	4	12	441	13	16	561	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	19	1	11	10	1	4	13	490	14	18	623	19

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	31	15	13	504	18	642
Volume Left (vph)	19	10	13	0	18	0
Volume Right (vph)	11	4	0	14	0	19
Hadj (s)	-0.06	0.01	0.53	0.01	0.53	0.01
Departure Headway (s)	6.5	6.6	5.7	5.2	5.6	5.1
Degree Utilization, x	0.06	0.03	0.02	0.73	0.03	0.91
Capacity (veh/h)	509	493	615	676	620	699
Control Delay (s)	9.9	9.8	7.7	19.8	7.6	36.6
Approach Delay (s)	9.9	9.8	19.5		35.9	
Approach LOS	A	A	C		E	

Intersection Summary				
Delay	28.0			
Level of Service	D			
Intersection Capacity Utilization	42.3%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	89	73	405	471	60
Future Volume (Veh/h)	61	89	73	405	471	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	99	81	450	523	67
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1170	558	592			
vC1, stage 1 conf vol	558					
vC2, stage 2 conf vol	612					
vCu, unblocked vol	1170	558	592			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	83	81	92			
cM capacity (veh/h)	407	528	982			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	167	81	450	590
Volume Left	68	81	0	0
Volume Right	99	0	0	67
cSH	471	982	1700	1700
Volume to Capacity	0.35	0.08	0.26	0.35
Queue Length 95th (m)	11.1	1.9	0.0	0.0
Control Delay (s)	16.8	9.0	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	16.8	1.4		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	205	285	5	229	302
Future Volume (vph)	5	205	285	5	229	302
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	228	317	6	254	336

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	234	323	254	336
Volume Left (vph)	6	0	254	0
Volume Right (vph)	228	6	0	0
Hadj (s)	-0.55	0.02	0.53	0.03
Departure Headway (s)	5.4	5.4	6.1	5.6
Degree Utilization, x	0.35	0.49	0.43	0.52
Capacity (veh/h)	614	642	574	627
Control Delay (s)	11.3	13.5	12.5	13.4
Approach Delay (s)	11.3	13.5	13.0	
Approach LOS	B	B	B	

Intersection Summary			
Delay	12.8		
Level of Service	B		
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	68	102	41	133	148	41
Future Volume (Veh/h)	68	102	41	133	148	41
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	76	113	46	148	164	46
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	194				385	120
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	194				385	120
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				72	95
cM capacity (veh/h)	1379				584	931

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	189	194	210
Volume Left	76	0	164
Volume Right	0	148	46
cSH	1379	1700	636
Volume to Capacity	0.06	0.11	0.33
Queue Length 95th (m)	1.2	0.0	10.1
Control Delay (s)	3.4	0.0	13.4
Lane LOS	A		B
Approach Delay (s)	3.4	0.0	13.4
Approach LOS			B

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	70	164	27	64	147	24
Future Volume (Veh/h)	70	164	27	64	147	24
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	78	182	30	71	163	27
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			260		300	169
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			260		300	169
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		76	97
cM capacity (veh/h)			1304		676	875

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	260	101	190
Volume Left	0	30	163
Volume Right	182	0	27
cSH	1700	1304	698
Volume to Capacity	0.15	0.02	0.27
Queue Length 95th (m)	0.0	0.5	7.7
Control Delay (s)	0.0	2.5	12.1
Lane LOS		A	B
Approach Delay (s)	0.0	2.5	12.1
Approach LOS			B

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	39	55	27	42	49	24
Future Volume (Veh/h)	39	55	27	42	49	24
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	43	61	30	47	54	27
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			104		180	74
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			104		180	74
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		93	97
cM capacity (veh/h)			1488		793	988

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	104	77	81
Volume Left	0	30	54
Volume Right	61	0	27
cSH	1700	1488	849
Volume to Capacity	0.06	0.02	0.10
Queue Length 95th (m)	0.0	0.4	2.2
Control Delay (s)	0.0	3.0	9.7
Lane LOS		A	A
Approach Delay (s)	0.0	3.0	9.7
Approach LOS			A

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	104	79	27	27	76	49	24	24	24	55	27	104
Future Volume (vph)	104	79	27	27	76	49	24	24	24	55	27	104
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	116	88	30	30	84	54	27	27	27	61	30	116

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	234	168	81	207
Volume Left (vph)	116	30	27	61
Volume Right (vph)	30	54	27	116
Hadj (s)	0.06	-0.12	-0.10	-0.24
Departure Headway (s)	4.9	4.8	5.1	4.8
Degree Utilization, x	0.32	0.23	0.11	0.27
Capacity (veh/h)	687	690	634	692
Control Delay (s)	10.2	9.2	8.8	9.6
Approach Delay (s)	10.2	9.2	8.8	9.6
Approach LOS	B	A	A	A

Intersection Summary			
Delay	9.6		
Level of Service	A		
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	73	98	192	82	109	198
Future Volume (vph)	73	98	192	82	109	198
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	81	109	213	91	121	220

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	190	304	81	260
Volume Left (vph)	81	0	81	40
Volume Right (vph)	109	91	0	0
Hadj (s)	-0.22	-0.15	0.53	0.11
Departure Headway (s)	5.2	4.8	5.9	5.4
Degree Utilization, x	0.27	0.41	0.13	0.39
Capacity (veh/h)	632	717	589	638
Control Delay (s)	10.1	11.1	8.6	10.7
Approach Delay (s)	10.1	11.1	10.2	
Approach LOS	B	B	B	

Intersection Summary			
Delay	10.5		
Level of Service	B		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

G

Appendix G

Projected Full Build-out Traffic Operations

CIMA+

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at HWY 17 (Signalized)										
EB	L	90	0.05	10	B	3	0.08	18	B	11
	T	-	0.54	19	B	107	0.42	28	C	72
	R	85	0.41	3	A	15	0.60	6	A	24
WB	L	60	0.06	10	A	5	0.08	18	B	10
	T	-	1.06	68	E	325	0.23	26	C	41
	R	56	0.00	0	A	0	0.04	1	A	0
NB	L	80	1.04	85	F	110	0.74	46	D	61
	T/R	-	0.11	14	B	10	0.24	22	C	31
SB	L	40	0.01	26	C	1	0.14	21	C	10
	T/R	-	0.08	29	C	7	0.66	50	D	55
Overall			**1.06**	**51**	**E**	**-**	**0.74**	**27**	**C**	**-**
Caron Street at Laurier Street (Signalized)										
EB	L	35	0.05	16	B	6	0.09	17	B	9
	T/R	-	0.21	16	B	19	0.53	27	C	56
WB	L	60	0.10	17	B	10	0.10	17	B	8
	T/R	-	0.34	23	C	43	0.24	23	C	26
NB	L	55	0.27	17	B	14	0.48	24	C	16
	T/R	-	0.86	37	D	172	0.79	36	D	140
SB	L	50	0.07	15	B	4	0.17	16	B	8
	T/R	-	0.72	34	C	90	1.05	79	E	125
Overall			**0.86**	**30**	**C**	**-**	**1.05**	**48**	**D**	**-**
Caron Street at Hélène Street (Unsignalized)										
EB	L/R	-	0.01	11	B	0.2	0.02	13	B	0.4
NB	L	15	0.01	9	A	0.1	0.01	10	A	0.2
	T	-	0.42	0	A	0	0.37	0	A	0
SB	T/R	-	0.30	0	A	0	0.45	0	A	0
Overall			**0.42**	**0.1**	**A**	**-**	**0.45**	**0.1**	**A**	**-**
Caron Street at Françoise Street (Unsignalized)										
EB	L/R	-	0.02	10	A	-	0.02	10	A	-
NB	L	15	0	7	A	-	0.01	7	A	-
	T	-	0.87	31	D	-	0.89	33	D	-
SB	T/R	-	0.67	17	C	-	1.03	62	F	-
Overall			**0.87**	**24**	**C**	**-**	**1.03**	**48**	**E**	**-**

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at Des Cèdres Avenue (Unsignalized)										
WB	L/R	-	0.04	13	B	1	0.02	12	B	1
NB	T/R	-	0.37	0	A	0	0.33	0	A	0
SB	L	15	0.01	9	A	0.1	0.03	9	A	1
	T	-	0.30	0	A	0	0.44	0	A	0
Overall			**0.30**	**0.2**	**A**	**-**	**0.44**	**0.3**	**A**	**-**
Caron Street at Cote Street/Potvin Avenue (Unsignalized)										
EB	L/T/R	-	0.03	10	A	-	0.06	10	B	-
WB	L/T/R	-	0.03	10	A	-	0.03	10	B	-
NB	L	15	0.01	7	A	-	0.02	8	A	-
	T/R	-	0.86	30	D	-	0.80	25	C	-
SB	L	15	0.01	8	A	-	0.03	8	A	-
	T/R	-	0.72	19	C	-	1.04	66	F	-
Overall			**0.86**	**24**	**C**	**-**	**1.04**	**46**	**E**	**-**
Caron Street at Docteur Corbeil Boulevard (Unsignalized)										
EB	L/R	-	0.23	15	B	6	0.41	19	C	14
NB	L	15	0.09	9	A	2	0.09	9	A	2
	T	-	0.34	0	A	0	0.29	0	A	0
SB	T/R	-	0.28	0	A	0	0.40	0	A	0
Overall			**0.34**	**2**	**A**	**-**	**0.41**	**3**	**A**	**-**
Caron Street at David Street (Unsignalized)										
WB	L/R	-	0.44	16	B	-	0.41	13	B	-
NB	T/R	-	0.21	0	A	-	0.54	15	C	-
SB	L	40	0.19	5	A	-	0.53	15	B	-
	T	-	0.19	5	A	-	0.61	16	C	-
Overall			**0.44**	**6**	**A**	**-**	**0.61**	**15**	**B**	**-**
Caron Street at Baseline Road (Unsignalized)										
EB	L/T	-	0.03	4	A	1	0.06	4	A	1
WB	T/R	-	0.13	0	A	0	0.12	0	A	0
SB	L/R	-	0.25	11	B	7	0.36	14	B	11
Overall			**0.25**	**5**	**A**	**-**	**0.36**	**6**	**A**	**-**
Caron Street at Street A (Unsignalized)										
WB	L	-	0.28	13	B	-	0.24	10	B	-
	R	-	0.28	13	B	-	0.24	10	B	-
NB	T/R	-	0.21	0	A	-	0.53	13	B	-
SB	L/T	25	0.13	8	A	-	0.50	13	B	-

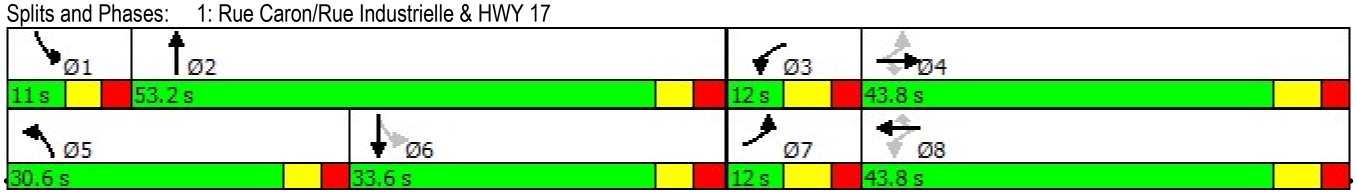
Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Overall			**0.28**	**3**	**A**	**-**	**0.53**	**12**	**B**	**-**
Street B at David Street (Unsignalized)										
EB	T/R	-	0.13	0	A	0	0.18	0	A	0
WB	L/T	-	0.02	1	A	1	0.03	2	A	1
NB	L/R	-	0.23	13	B	6	0.22	13	B	6
Overall			**0.23**	**4**	**A**	**-**	**0.22**	**3**	**A**	**-**
Street B at Street A (Unsignalized)										
EB	L/T/R	-	0.20	9	A	-	0.23	9	A	-
WB	L/T/R	-	0.21	9	A	-	0.22	9	A	-
NB	L/T/R		0.19	9	A	-	0.17	9	A	-
SB	L/T/R	-	0.16	9	A	-	0.19	9	A	-
Overall			**0.21**	**9**	**A**	**-**	**0.23**	**9**	**A**	**-**
Street A at David Street (Unsignalized)										
EB	T/R	-	0.11	0	A	0	0.13	0	A	0
WB	L/T	-	0.02	3	A	1	0.03	3	A	1
NB	L/R	-	0.27	11	B	8	0.25	12	B	7
Overall			**0.27**	**6**	**A**	**-**	**0.25**	**5**	**A**	**-**
Caron Street North at Street C (Unsignalized)										
EB	L/T/R	-	0.06	12	B	1	0.06	13	B	1
WB	L/T/R	-	0.05	10	A	1	0.04	10	B	1
NB	L/T/R	-	0	0	A	0	0.00	0	A	0
SB	L	25	0.02	8	A	1	0.03	8	A	1
	T/R	-	0.16	0	A	0	0.19	0	A	0
Overall			**0.16**	**1.6**	**A**	**-**	**0.19**	**1**	**A**	**-**
Caron Street South at Street C (Unsignalized)										
EB	L/T/R	-	0.06	11	B	1	0.05	12	B	1
WB	L/T/R	-	0.04	9	A	1	0.04	10	A	1
NB	L/T/R	-	0	0	A	0	0.00	0	A	0
SB	L	25	0.02	8	A	1	0.03	8	A	1
	T/R	-	0.13	0	A	0	0.15	0	A	0
Overall			**0.13**	**2**	**A**	**-**	**0.15**	**2**	**A**	**-**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	34	254	490	30	143	26	409	87	35	138
Future Volume (vph)	34	254	490	30	143	26	409	87	35	138
Lane Group Flow (vph)	38	282	544	33	159	29	454	144	39	187
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8			6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	32.9	32.9	11.9	32.9	32.9	10.9	33.3	10.9	33.3
Total Split (s)	12.0	43.8	43.8	12.0	43.8	43.8	30.6	53.2	11.0	33.6
Total Split (%)	10.0%	36.5%	36.5%	10.0%	36.5%	36.5%	25.5%	44.3%	9.2%	28.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	40.5	37.8	37.8	40.5	37.8	37.8	18.6	34.6	21.5	15.9
Actuated g/C Ratio	0.41	0.38	0.38	0.41	0.38	0.38	0.19	0.35	0.22	0.16
v/c Ratio	0.08	0.42	0.60	0.08	0.23	0.04	0.74	0.24	0.14	0.66
Control Delay	18.3	28.1	5.6	18.4	25.6	0.1	46.4	21.6	21.1	49.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.3	28.1	5.6	18.4	25.6	0.1	46.4	21.6	21.1	49.9
LOS	B	C	A	B	C	A	D	C	C	D
Approach Delay		13.5			21.2			40.5		44.9
Approach LOS		B			C			D		D
Queue Length 50th (m)	3.7	39.7	0.0	3.2	20.7	0.0	41.2	16.9	4.3	31.6
Queue Length 95th (m)	10.7	71.9	24.3	9.6	41.0	0.0	61.0	30.7	9.8	54.7
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Base Capacity (vph)	504	678	911	407	678	699	836	831	283	494
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.42	0.60	0.08	0.23	0.04	0.54	0.17	0.14	0.38

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 98.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 26.6 — Intersection LOS: C
Intersection Capacity Utilization 62.6% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17

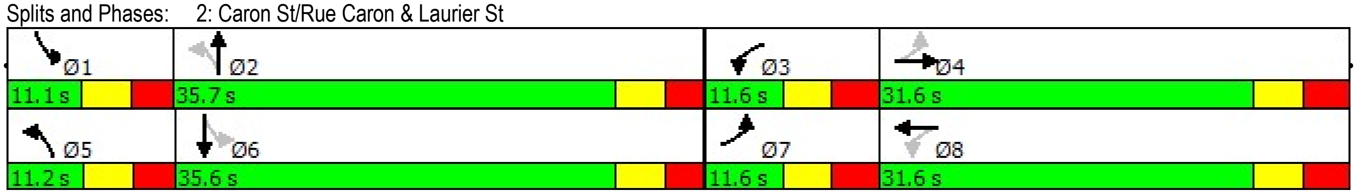


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	34	155	30	87	79	445	35	564
Future Volume (vph)	34	155	30	87	79	445	35	564
Lane Group Flow (vph)	38	280	33	126	88	541	39	661
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	11.6	31.6	11.6	31.6	11.2	35.7	11.1	35.6
Total Split (%)	12.9%	35.1%	12.9%	35.1%	12.4%	39.7%	12.3%	39.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	28.3	25.4	28.3	25.4	35.1	32.3	33.7	29.9
Actuated g/C Ratio	0.34	0.31	0.34	0.31	0.42	0.39	0.41	0.36
v/c Ratio	0.09	0.53	0.10	0.24	0.48	0.79	0.17	1.05
Control Delay	17.2	27.0	17.3	22.5	23.5	36.1	15.5	79.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	27.0	17.3	22.5	23.5	36.1	15.5	79.1
LOS	B	C	B	C	C	D	B	E
Approach Delay		25.8		21.4		34.3		75.6
Approach LOS		C		C		C		E
Queue Length 50th (m)	3.6	33.3	3.1	13.4	7.8	82.0	3.4	~125.1
Queue Length 95th (m)	9.0	56.2	8.2	26.3	15.6	#139.7	8.4	#184.7
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	435	532	334	533	183	681	230	631
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.53	0.10	0.24	0.48	0.79	0.17	1.05

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 83.1
Natural Cycle: 95
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 47.7 Intersection LOS: D
Intersection Capacity Utilization 78.0% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Caron St/Rue Caron & Laurier St



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	5	6	635	452	3
Future Volume (Veh/h)	0	5	6	635	452	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	6	7	706	502	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked	0.80	0.80	0.80			
vC, conflicting volume	1224	504	505			
vC1, stage 1 conf vol	504					
vC2, stage 2 conf vol	720					
vCu, unblocked vol	1153	250	252			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	404	629	1047			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	6	7	706	505
Volume Left	0	7	0	0
Volume Right	6	0	0	3
cSH	629	1047	1700	1700
Volume to Capacity	0.01	0.01	0.42	0.30
Queue Length 95th (m)	0.2	0.1	0.0	0.0
Control Delay (s)	10.8	8.5	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.8	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	9	3	1	571	455	2
Future Volume (vph)	9	3	1	571	455	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	3	1	634	506	2

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	13	1	634	508
Volume Left (vph)	10	1	0	0
Volume Right (vph)	3	0	0	2
Hadj (s)	0.05	0.53	0.03	0.03
Departure Headway (s)	6.5	5.4	4.9	4.8
Degree Utilization, x	0.02	0.00	0.87	0.67
Capacity (veh/h)	506	649	721	745
Control Delay (s)	9.7	7.3	30.5	17.0
Approach Delay (s)	9.7	30.4		17.0
Approach LOS	A	D		C

Intersection Summary			
Delay	24.3		
Level of Service	C		
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	10	562	1	5	453
Future Volume (Veh/h)	5	10	562	1	5	453
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	624	1	6	503
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1140	624			625	
vC1, stage 1 conf vol	624					
vC2, stage 2 conf vol	515					
vCu, unblocked vol	1140	624			625	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			99	
cM capacity (veh/h)	437	485			956	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	17	625	6	503
Volume Left	6	0	6	0
Volume Right	11	1	0	0
cSH	467	1700	956	1700
Volume to Capacity	0.04	0.37	0.01	0.30
Queue Length 95th (m)	0.8	0.0	0.1	0.0
Control Delay (s)	13.0	0.0	8.8	0.0
Lane LOS	B		A	
Approach Delay (s)	13.0	0.0	0.1	
Approach LOS	B			

Intersection Summary			
Average Delay	0.2		
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												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	0	8	9	1	6	4	548	6	5	453	0
Future Volume (vph)	9	0	8	9	1	6	4	548	6	5	453	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	0	9	10	1	7	4	609	7	6	503	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	19	18	4	616	6	503
Volume Left (vph)	10	10	4	0	6	0
Volume Right (vph)	9	7	0	7	0	0
Hadj (s)	-0.14	-0.09	0.53	0.03	0.53	0.03
Departure Headway (s)	6.3	6.4	5.6	5.0	5.6	5.1
Degree Utilization, x	0.03	0.03	0.01	0.86	0.01	0.72
Capacity (veh/h)	514	505	628	703	623	685
Control Delay (s)	9.6	9.6	7.4	30.0	7.5	18.8
Approach Delay (s)	9.6	9.6	29.9		18.7	
Approach LOS	A	A	D		C	

Intersection Summary			
Delay	24.4		
Level of Service	C		
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	61	92	520	387	43
Future Volume (Veh/h)	38	61	92	520	387	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	42	68	102	578	430	48
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1238	456	480			
vC1, stage 1 conf vol	456					
vC2, stage 2 conf vol	782					
vCu, unblocked vol	1238	456	480			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	89	91			
cM capacity (veh/h)	366	603	1081			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	110	102	578	478
Volume Left	42	102	0	0
Volume Right	68	0	0	48
cSH	483	1081	1700	1700
Volume to Capacity	0.23	0.09	0.34	0.28
Queue Length 95th (m)	6.1	2.2	0.0	0.0
Control Delay (s)	14.6	8.7	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.6	1.3		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	45.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	265	315	2	202	246
Future Volume (vph)	5	265	315	2	202	246
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	294	350	2	224	273

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	300	352	224	273
Volume Left (vph)	6	0	224	0
Volume Right (vph)	294	2	0	0
Hadj (s)	-0.55	0.03	0.53	0.03
Departure Headway (s)	5.4	5.6	6.4	5.9
Degree Utilization, x	0.45	0.55	0.40	0.45
Capacity (veh/h)	621	614	545	592
Control Delay (s)	12.8	15.1	12.4	12.4
Approach Delay (s)	12.8	15.1	12.4	
Approach LOS	B	C	B	

Intersection Summary			
Delay	13.3		
Level of Service	B		
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	34	28	58	134	117	58
Future Volume (Veh/h)	34	28	58	134	117	58
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	38	31	64	149	130	64
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	213				246	138
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	213				246	138
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				82	93
cM capacity (veh/h)	1357				722	910

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	69	213	194
Volume Left	38	0	130
Volume Right	0	149	64
cSH	1357	1700	775
Volume to Capacity	0.03	0.13	0.25
Queue Length 95th (m)	0.6	0.0	6.9
Control Delay (s)	4.4	0.0	11.2
Lane LOS	A		B
Approach Delay (s)	4.4	0.0	11.2
Approach LOS			B

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	130	74	25	174	96	32
Future Volume (Veh/h)	130	74	25	174	96	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	144	82	28	193	107	36
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			226		434	185
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			226		434	185
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		81	96
cM capacity (veh/h)			1342		567	857

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	226	221	143
Volume Left	0	28	107
Volume Right	82	0	36
cSH	1700	1342	620
Volume to Capacity	0.13	0.02	0.23
Queue Length 95th (m)	0.0	0.4	6.2
Control Delay (s)	0.0	1.1	12.5
Lane LOS		A	B
Approach Delay (s)	0.0	1.1	12.5
Approach LOS			B

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	39	123	25	40	159	32
Future Volume (Veh/h)	39	123	25	40	159	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	43	137	28	44	177	36
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			180		212	112
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			180		212	112
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		77	96
cM capacity (veh/h)			1396		761	942

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	180	72	213
Volume Left	0	28	177
Volume Right	137	0	36
cSH	1700	1396	787
Volume to Capacity	0.11	0.02	0.27
Queue Length 95th (m)	0.0	0.4	7.7
Control Delay (s)	0.0	3.1	11.3
Lane LOS		A	B
Approach Delay (s)	0.0	3.1	11.3
Approach LOS			B

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	81	30	25	89	32	32	64	32	25	49	32
Future Volume (vph)	25	81	30	25	89	32	32	64	32	25	49	32
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	28	90	33	28	99	36	36	71	36	28	54	36

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	151	163	143	118
Volume Left (vph)	28	28	36	28
Volume Right (vph)	33	36	36	36
Hadj (s)	-0.06	-0.06	-0.07	-0.10
Departure Headway (s)	4.7	4.7	4.8	4.7
Degree Utilization, x	0.20	0.21	0.19	0.16
Capacity (veh/h)	713	719	706	698
Control Delay (s)	8.8	8.9	8.9	8.6
Approach Delay (s)	8.8	8.9	8.9	8.6
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.8		
Level of Service	A		
Intersection Capacity Utilization	28.0%	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)	32	0	0	0	0	32	0	232	0	25	224	25
Future Volume (Veh/h)	32	0	0	0	0	32	0	232	0	25	224	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	36	0	0	0	0	36	0	258	0	28	249	28
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	613	577	263	563	591	258	277			258		
vC1, stage 1 conf vol	319	319		258	258							
vC2, stage 2 conf vol	294	258		305	333							
vCu, unblocked vol	613	577	263	563	591	258	277			258		
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 %	94	100	100	100	100	95	100			98		
cM capacity (veh/h)	556	560	776	605	561	781	1286			1307		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	36	36	258	28	277
Volume Left	36	0	0	28	0
Volume Right	0	36	0	0	28
cSH	556	781	1286	1307	1700
Volume to Capacity	0.06	0.05	0.00	0.02	0.16
Queue Length 95th (m)	1.4	1.0	0.0	0.5	0.0
Control Delay (s)	11.9	9.8	0.0	7.8	0.0
Lane LOS	B	A		A	
Approach Delay (s)	11.9	9.8	0.0	0.7	
Approach LOS	B	A			

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	37.1%	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)	32	0	0	0	0	32	0	168	0	25	175	25
Future Volume (Veh/h)	32	0	0	0	0	32	0	168	0	25	175	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	36	0	0	0	0	36	0	187	0	28	194	28
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)												
pX, platoon unblocked												
vC, conflicting volume	487	451	208	437	465	187	222			187		
vC1, stage 1 conf vol	264	264		187	187							
vC2, stage 2 conf vol	223	187		250	278							
vCu, unblocked vol	487	451	208	437	465	187	222			187		
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 %	94	100	100	100	100	96	100			98		
cM capacity (veh/h)	621	612	832	670	611	855	1347			1387		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	36	36	187	28	222
Volume Left	36	0	0	28	0
Volume Right	0	36	0	0	28
cSH	621	855	1347	1387	1700
Volume to Capacity	0.06	0.04	0.00	0.02	0.13
Queue Length 95th (m)	1.3	0.9	0.0	0.4	0.0
Control Delay (s)	11.2	9.4	0.0	7.6	0.0
Lane LOS	B	A		A	
Approach Delay (s)	11.2	9.4	0.0	0.9	
Approach LOS	B	A			

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	96	64	253	74	49	202
Future Volume (vph)	96	64	253	74	49	202
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	107	71	281	82	54	224

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	178	363	36	242
Volume Left (vph)	107	0	36	18
Volume Right (vph)	71	82	0	0
Hadj (s)	-0.09	-0.10	0.53	0.07
Departure Headway (s)	5.3	4.8	5.9	5.4
Degree Utilization, x	0.26	0.48	0.06	0.37
Capacity (veh/h)	612	728	583	637
Control Delay (s)	10.3	12.2	8.1	10.3
Approach Delay (s)	10.3	12.2	10.0	
Approach LOS	B	B	B	

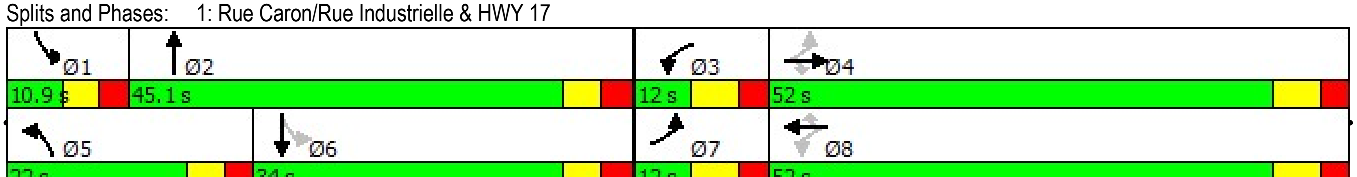
Intersection Summary			
Delay	11.0		
Level of Service	B		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	8	466	364	21	953	3	591	8	1	6
Future Volume (vph)	8	466	364	21	953	3	591	8	1	6
Lane Group Flow (vph)	9	518	404	23	1059	3	657	43	1	16
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8			6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	32.9	32.9	11.9	32.9	32.9	10.9	33.3	10.9	33.3
Total Split (s)	12.0	52.0	52.0	12.0	52.0	52.0	22.0	45.1	10.9	34.0
Total Split (%)	10.0%	43.3%	43.3%	10.0%	43.3%	43.3%	18.3%	37.6%	9.1%	28.3%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	47.9	46.2	46.2	49.1	48.2	48.2	16.5	19.7	8.6	10.3
Actuated g/C Ratio	0.56	0.54	0.54	0.58	0.57	0.57	0.19	0.23	0.10	0.12
v/c Ratio	0.05	0.54	0.41	0.06	1.06	0.00	1.04	0.11	0.01	0.08
Control Delay	10.2	18.6	3.2	9.7	68.0	0.0	84.7	13.9	26.0	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	18.6	3.2	9.7	68.0	0.0	84.7	13.9	26.0	29.0
LOS	B	B	A	A	E	A	F	B	C	C
Approach Delay		11.8			66.6			80.3		28.8
Approach LOS		B			E			F		C
Queue Length 50th (m)	0.4	32.7	0.0	1.1	118.1	0.0	42.8	0.9	0.1	0.8
Queue Length 95th (m)	2.7	106.5	14.9	5.0	#325.1	0.0	#110.4	9.4	1.3	7.1
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Base Capacity (vph)	176	956	997	411	998	935	629	743	172	544
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.54	0.41	0.06	1.06	0.00	1.04	0.06	0.01	0.03

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 85.3
Natural Cycle: 150
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 51.2 Intersection LOS: D
Intersection Capacity Utilization 88.4% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17

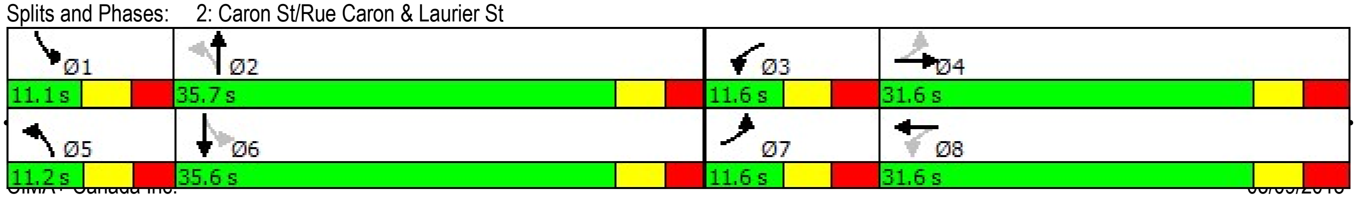


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	17	54	41	148	71	529	12	365
Future Volume (vph)	17	54	41	148	71	529	12	365
Lane Group Flow (vph)	19	114	46	207	79	627	13	423
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	11.6	31.6	11.6	31.6	11.2	35.7	11.1	35.6
Total Split (%)	12.9%	35.1%	12.9%	35.1%	12.4%	39.7%	12.3%	39.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	28.3	25.6	29.5	27.7	34.4	33.5	30.7	26.8
Actuated g/C Ratio	0.35	0.32	0.37	0.35	0.43	0.42	0.38	0.33
v/c Ratio	0.05	0.21	0.10	0.34	0.27	0.86	0.07	0.72
Control Delay	16.3	15.6	16.6	22.6	16.6	36.6	14.8	33.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.3	15.6	16.6	22.6	16.6	36.6	14.8	33.5
LOS	B	B	B	C	B	D	B	C
Approach Delay		15.7		21.5		34.4		33.0
Approach LOS		B		C		C		C
Queue Length 50th (m)	1.6	7.1	4.0	18.3	7.0	81.7	1.1	58.8
Queue Length 95th (m)	5.5	19.4	10.3	42.9	14.3	#171.9	4.0	89.8
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	422	556	461	601	291	733	184	659
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.21	0.10	0.34	0.27	0.86	0.07	0.64

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 80.2
Natural Cycle: 95
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 30.2 — Intersection LOS: C
Intersection Capacity Utilization 66.3% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Caron St/Rue Caron & Laurier St



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	8	7	566	688	3
Future Volume (Veh/h)	0	8	7	566	688	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	9	8	629	764	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)					169	
pX, platoon unblocked	0.66	0.66	0.66			
vC, conflicting volume	1410	766	767			
vC1, stage 1 conf vol	766					
vC2, stage 2 conf vol	645					
vCu, unblocked vol	1364	388	390			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	99			
cM capacity (veh/h)	348	436	772			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	9	8	629	767
Volume Left	0	8	0	0
Volume Right	9	0	0	3
cSH	436	772	1700	1700
Volume to Capacity	0.02	0.01	0.37	0.45
Queue Length 95th (m)	0.4	0.2	0.0	0.0
Control Delay (s)	13.4	9.7	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.4	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	7	3	6	566	692	4
Future Volume (vph)	7	3	6	566	692	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	3	7	629	769	4

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	11	7	629	773
Volume Left (vph)	8	7	0	0
Volume Right (vph)	3	0	0	4
Hadj (s)	0.02	0.53	0.03	0.03
Departure Headway (s)	6.8	5.6	5.1	4.8
Degree Utilization, x	0.02	0.01	0.89	1.03
Capacity (veh/h)	508	636	705	747
Control Delay (s)	10.0	7.4	33.0	61.6
Approach Delay (s)	10.0	32.8		61.6
Approach LOS	A	D		F

Intersection Summary			
Delay	48.3		
Level of Service	E		
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	10	499	7	26	669
Future Volume (Veh/h)	1	10	499	7	26	669
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	11	554	8	29	743
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1359	558			562	
vC1, stage 1 conf vol	558					
vC2, stage 2 conf vol	801					
vCu, unblocked vol	1359	558			562	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			97	
cM capacity (veh/h)	365	529			1009	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	12	562	29	743
Volume Left	1	0	29	0
Volume Right	11	8	0	0
cSH	510	1700	1009	1700
Volume to Capacity	0.02	0.33	0.03	0.44
Queue Length 95th (m)	0.5	0.0	0.6	0.0
Control Delay (s)	12.2	0.0	8.7	0.0
Lane LOS	B		A	
Approach Delay (s)	12.2	0.0	0.3	
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	1	10	9	1	4	12	485	13	16	637	17
Future Volume (vph)	17	1	10	9	1	4	12	485	13	16	637	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	19	1	11	10	1	4	13	539	14	18	708	19

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	31	15	13	553	18	727
Volume Left (vph)	19	10	13	0	18	0
Volume Right (vph)	11	4	0	14	0	19
Hadj (s)	-0.06	0.01	0.53	0.02	0.53	0.02
Departure Headway (s)	6.7	6.8	5.8	5.2	5.7	5.2
Degree Utilization, x	0.06	0.03	0.02	0.80	0.03	1.04
Capacity (veh/h)	509	491	615	678	615	696
Control Delay (s)	10.1	10.0	7.7	24.9	7.6	66.1
Approach Delay (s)	10.1	10.0	24.5		64.6	
Approach LOS	B	B	C		F	

Intersection Summary			
Delay	46.1		
Level of Service	E		
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	95	77	449	547	60
Future Volume (Veh/h)	61	95	77	449	547	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	106	86	499	608	67
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1314	644	677			
vC1, stage 1 conf vol	644					
vC2, stage 2 conf vol	671					
vCu, unblocked vol	1314	644	677			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	82	78	91			
cM capacity (veh/h)	369	472	913			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	174	86	499	675
Volume Left	68	86	0	0
Volume Right	106	0	0	67
cSH	426	913	1700	1700
Volume to Capacity	0.41	0.09	0.29	0.40
Queue Length 95th (m)	13.7	2.2	0.0	0.0
Control Delay (s)	19.2	9.4	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	19.2	1.4		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	231	307	5	272	341
Future Volume (vph)	5	231	307	5	272	341
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	257	341	6	302	379

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	263	347	302	379
Volume Left (vph)	6	0	302	0
Volume Right (vph)	257	6	0	0
Hadj (s)	-0.55	0.02	0.53	0.03
Departure Headway (s)	5.6	5.6	6.3	5.8
Degree Utilization, x	0.41	0.54	0.53	0.61
Capacity (veh/h)	596	609	559	610
Control Delay (s)	12.5	15.2	15.0	16.2
Approach Delay (s)	12.5	15.2	15.7	
Approach LOS	B	C	C	

Intersection Summary			
Delay	14.9		
Level of Service	B		
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	74	102	41	144	154	45
Future Volume (Veh/h)	74	102	41	144	154	45
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	82	113	46	160	171	50
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	206				403	126
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	206				403	126
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				70	95
cM capacity (veh/h)	1365				567	924

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	195	206	221
Volume Left	82	0	171
Volume Right	0	160	50
cSH	1365	1700	621
Volume to Capacity	0.06	0.12	0.36
Queue Length 95th (m)	1.3	0.0	11.2
Control Delay (s)	3.6	0.0	14.0
Lane LOS	A		B
Approach Delay (s)	3.6	0.0	14.0
Approach LOS			B

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	179	99	33	153	83	27
Future Volume (Veh/h)	179	99	33	153	83	27
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	199	110	37	170	92	30
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			309		498	254
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			309		498	254
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		82	96
cM capacity (veh/h)			1252		516	785

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	309	207	122
Volume Left	0	37	92
Volume Right	110	0	30
cSH	1700	1252	563
Volume to Capacity	0.18	0.03	0.22
Queue Length 95th (m)	0.0	0.6	5.7
Control Delay (s)	0.0	1.6	13.1
Lane LOS		A	B
Approach Delay (s)	0.0	1.6	13.1
Approach LOS			B

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	42	164	33	48	138	28
Future Volume (Veh/h)	42	164	33	48	138	28
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	47	182	37	53	153	31
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			229		265	138
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			229		265	138
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		78	97
cM capacity (veh/h)			1339		704	910

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	229	90	184
Volume Left	0	37	153
Volume Right	182	0	31
cSH	1700	1339	732
Volume to Capacity	0.13	0.03	0.25
Queue Length 95th (m)	0.0	0.6	7.0
Control Delay (s)	0.0	3.3	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	3.3	11.6
Approach LOS			B

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	37.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	33	94	33	33	88	28	28	55	28	33	66	28
Future Volume (vph)	33	94	33	33	88	28	28	55	28	33	66	28
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	37	104	37	37	98	31	31	61	31	37	73	31

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	178	166	123	141
Volume Left (vph)	37	37	31	37
Volume Right (vph)	37	31	31	31
Hadj (s)	-0.05	-0.03	-0.07	-0.05
Departure Headway (s)	4.7	4.8	4.9	4.9
Degree Utilization, x	0.23	0.22	0.17	0.19
Capacity (veh/h)	708	705	680	681
Control Delay (s)	9.2	9.1	8.8	9.0
Approach Delay (s)	9.2	9.1	8.8	9.0
Approach LOS	A	A	A	A

Intersection Summary			
Delay	9.0		
Level of Service	A		
Intersection Capacity Utilization	28.7%	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)	28	0	0	0	0	28	0	272	0	33	265	33
Future Volume (Veh/h)	28	0	0	0	0	28	0	272	0	33	265	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	31	0	0	0	0	31	0	302	0	37	294	37
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	720	688	312	670	707	302	331			302		
vC1, stage 1 conf vol	386	386		302	302							
vC2, stage 2 conf vol	333	302		368	405							
vCu, unblocked vol	720	688	312	670	707	302	331			302		
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 %	94	100	100	100	100	96	100			97		
cM capacity (veh/h)	506	512	728	550	513	738	1228			1259		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	31	31	302	37	331
Volume Left	31	0	0	37	0
Volume Right	0	31	0	0	37
cSH	506	738	1228	1259	1700
Volume to Capacity	0.06	0.04	0.00	0.03	0.19
Queue Length 95th (m)	1.4	0.9	0.0	0.6	0.0
Control Delay (s)	12.6	10.1	0.0	7.9	0.0
Lane LOS	B	B		A	
Approach Delay (s)	12.6	10.1	0.0	0.8	
Approach LOS	B	B			

Intersection Summary			
Average Delay	1.4		
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 (veh/h)	28	0	0	0	0	28	0	218	0	33	199	33
Future Volume (Veh/h)	28	0	0	0	0	28	0	218	0	33	199	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	31	0	0	0	0	31	0	242	0	37	221	37
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)												
pX, platoon unblocked												
vC, conflicting volume	586	556	240	537	574	242	258			242		
vC1, stage 1 conf vol	314	314		242	242							
vC2, stage 2 conf vol	273	242		295	332							
vCu, unblocked vol	586	556	240	537	574	242	258			242		
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 %	95	100	100	100	100	96	100			97		
cM capacity (veh/h)	567	563	799	615	564	797	1307			1324		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	31	31	242	37	258
Volume Left	31	0	0	37	0
Volume Right	0	31	0	0	37
cSH	567	797	1307	1324	1700
Volume to Capacity	0.05	0.04	0.00	0.03	0.15
Queue Length 95th (m)	1.2	0.8	0.0	0.6	0.0
Control Delay (s)	11.7	9.7	0.0	7.8	0.0
Lane LOS	B	A		A	
Approach Delay (s)	11.7	9.7	0.0	1.0	
Approach LOS	B	A			

Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	43.6%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	83	55	257	98	66	280
Future Volume (vph)	83	55	257	98	66	280
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	92	61	286	109	73	311

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	153	395	49	335
Volume Left (vph)	92	0	49	24
Volume Right (vph)	61	109	0	0
Hadj (s)	-0.08	-0.13	0.53	0.07
Departure Headway (s)	5.6	4.8	5.9	5.4
Degree Utilization, x	0.24	0.53	0.08	0.50
Capacity (veh/h)	573	725	591	647
Control Delay (s)	10.4	13.1	8.2	12.6
Approach Delay (s)	10.4	13.1	12.0	
Approach LOS	B	B	B	

Intersection Summary			
Delay	12.2		
Level of Service	B		
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		

H

Appendix H

Projected Full Build-out Traffic Operations with Improvements

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at HWY 17 (Signalized)										
EB	L	90	0.04	14	B	3	0.08	18	B	11
	T	-	0.65	27	C	132	0.42	28	C	72
	R	85	0.45	4	A	17	0.60	6	A	24
WB	L	60	0.07	14	B	6	0.08	18	B	10
	T	-	0.67	22	C	122	0.12	24	C	20
	R	56	0.00	0	A	0	0.04	0	A	0
NB	L	80	0.71	35	C	85	0.74	46	D	61
	T/R	-	0.08	11	B	8	0.24	22	C	31
SB	L	40	0.01	23	C	1	0.14	21	C	10
	T/R	-	0.08	29	C	7	0.66	50	D	55
Overall			**0.71**	**23**	**C**	-	**0.74**	**26**	**C**	-
Caron Street at Laurier Street (Signalized)										
EB	L	35	0.05	24	C	8	0.09	27	C	13
	T/R	-	0.21	24	C	30	0.56	38	D	80
WB	L	60	0.10	23	C	15	0.11	27	C	12
	T/R	-	0.35	29	C	61	0.25	33	C	37
NB	L	55	0.24	14	B	13	0.43	19	B	15
	T/R	-	0.80	30	C	145	0.68	27	C	122
SB	L	50	0.06	13	B	4	0.13	13	B	8
	T/R	-	0.67	30	C	86	0.88	42	D	167
Overall			**0.80**	**28**	**C**	-	**0.88**	**34**	**C**	-
Caron Street at Hélène Street (Unsignalized)										
EB	L/R	-	0.01	11	B	0.2	0.02	13	B	1
NB	L	15	0.01	9	A	0.1	0.01	10	A	0
	T	-	0.42	0	A	0	0.37	0	A	0
SB	T/R	-	0.30	0	A	0	0.45	0	A	0
Overall			**0.42**	**0.1**	**A**	-	**0.45**	**0.1**	**A**	-
Caron Street at Françoise Street (Signalized)										
EB	L/R	-	0.05	17	B	5	0.09	35	D	6
NB	L	15	0.00	2	A	0.4	0.01	1	A	1
	T	-	0.38	2	A	43	0.37	1	A	29
SB	T/R	-	0.31	2	A	31	0.45	2	A	42
Overall			**0.38**	**2**	**A**	-	**0.45**	**2**	**A**	-

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Caron Street at Des Cèdres Avenue (Unsignalized)										
WB	L/R	-	0.04	13	B	1	0.02	12	B	1
NB	T/R	-	0.37	0	A	0	0.33	0	A	0
SB	L	15	0.01	9	A	0.1	0.03	9	A	1
	T	-	0.30	0	A	0	0.44	0	A	0
Overall			**0.37**	**0.2**	**A**	**-**	**0.44**	**0.3**	**A**	**-**
Caron Street at Cote Street/Potvin Avenue (Signalized)										
EB	L/T/R	-	0.08	6	A	3	0.21	31	C	10
WB	L/T/R	-	0.08	25	C	7	0.11	33	C	7
NB	L	15	0.01	2	A	1	0.02	2	A	1
	T/R	-	0.37	2	A	47	0.34	2	A	29
SB	L	15	0.01	2	A	1	0.02	2	A	2
	T/R	-	0.30	2	A	35	0.45	3	A	45
Overall			**0.37**	**2**	**A**	**-**	**0.45**	**3**	**A**	**-**
Caron Street at Docteur Corbeil Boulevard (Unsignalized)										
EB	L/R	-	0.23	15	B	6	0.41	19	C	14
NB	L	15	0.09	9	A	2	0.09	9	A	2
	T	-	0.34	0	A	0	0.29	0	A	0
SB	T/R	-	0.28	0	A	0	0.40	0	A	0
Overall			**0.34**	**2**	**A**	**-**	**0.41**	**3**	**A**	**-**
Caron Street at David Street (Unsignalized)										
WB	L/R	-	0.45	13	B	-	0.41	13	B	-
NB	T/R	-	0.55	15	C	-	0.54	15	C	-
SB	L	40	0.40	12	B	-	0.53	15	B	-
	T	-	0.45	12	B	-	0.61	16	C	-
Overall			**0.55**	**13**	**B**	**-**	**0.61**	**15**	**B**	**-**
Caron Street at Baseline Road (Unsignalized)										
EB	L/T	-	0.03	4	A	1	0.06	4	A	1
WB	T/R	-	0.13	0	A	0	0.12	0	A	0
SB	L/R	-	0.25	11	B	7	0.36	14	B	11
Overall			**0.25**	**5**	**A**	**-**	**0.36**	**6**	**A**	**-**
Caron Street at Street A (Unsignalized)										
WB	L	-	0.26	10	B	-	0.24	10	B	-
	R	-	0.26	10	B	-	0.24	10	B	-
NB	T/R	-	0.48	12	B	-	0.53	13	B	-
SB	L/T	25	0.34	10	A	-	0.46	12	B	-

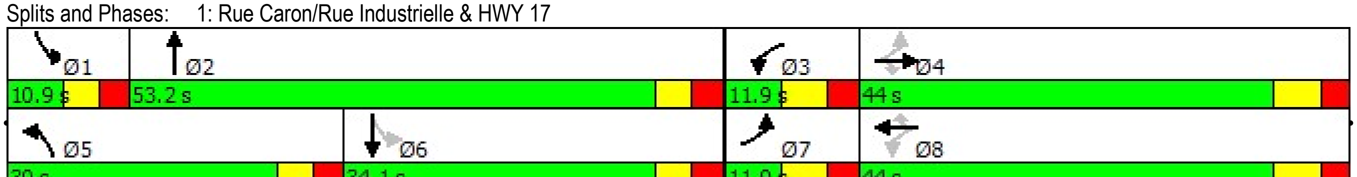
Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Overall			**0.48**	**11**	**B**	**-**	**0.53**	**12**	**B**	**-**
Street B at David Street (Unsignalized)										
EB	T/R	-	0.13	0	A	0	0.18	0	A	0
WB	L/T	-	0.02	1	A	1	0.03	2	A	1
NB	L/R	-	0.23	13	B	6	0.22	13	B	6
Overall			**0.23**	**4**	**A**	**-**	**0.22**	**3**	**A**	**-**
Street B at Street A (Unsignalized)										
EB	L/T/R	-	0.20	9	A	-	0.23	9	A	-
WB	L/T/R	-	0.21	9	A	-	0.22	9	A	-
NB	L/T/R		0.19	9	A	-	0.17	9	A	-
SB	L/T/R	-	0.16	9	A	-	0.19	9	A	-
Overall			**0.21**	**9**	**A**	**-**	**0.23**	**9**	**A**	**-**
Street A at David Street (Unsignalized)										
EB	T/R	-	0.11	0	A	0	0.13	0	A	0
WB	L/T	-	0.02	3	A	1	0.03	3	A	1
NB	L/R	-	0.27	11	B	8	0.25	12	B	7
Overall			**0.27**	**6**	**A**	**-**	**0.25**	**5**	**A**	**-**
Caron Street North at Street C (Unsignalized)										
EB	L/T/R	-	0.06	12	B	1	0.06	13	B	1
WB	L/T/R	-	0.05	10	A	1	0.04	10	B	1
NB	L/T/R	-	0.00	0	A	0	0.00	0	A	0
SB	L	25	0.02	8	A	1	0.03	8	A	1
	T/R	-	0.16	0	A	0	0.19	0	A	0
Overall			**0.16**	**2**	**A**	**-**	**0.19**	**1**	**A**	**-**
Caron Street South at Street C (Unsignalized)										
EB	L/T/R	-	0.06	11	B	1	0.05	12	B	1
WB	L/T/R	-	0.04	9	A	1	0.04	10	A	1
NB	L/T/R	-	0.00	0	A	0	0.00	0	A	0
SB	L	25	0.02	8	A	0	0.03	8	A	1
	T/R	-	0.13	0	A	0	0.15	0	A	0
Overall			**0.13**	**2**	**A**	**-**	**0.15**	**2**	**A**	**-**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	8	466	364	21	953	3	591	8	1	6
Future Volume (vph)	8	466	364	21	953	3	591	8	1	6
Lane Group Flow (vph)	9	518	404	23	1059	3	657	43	1	16
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8			6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	32.9	32.9	11.9	32.9	32.9	10.9	33.3	10.9	33.3
Total Split (s)	11.9	44.0	44.0	11.9	44.0	44.0	30.0	53.2	10.9	34.1
Total Split (%)	9.9%	36.7%	36.7%	9.9%	36.7%	36.7%	25.0%	44.3%	9.1%	28.4%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	39.8	38.1	38.1	40.9	40.1	40.1	24.2	27.4	8.6	10.3
Actuated g/C Ratio	0.47	0.45	0.45	0.48	0.47	0.47	0.29	0.32	0.10	0.12
v/c Ratio	0.04	0.65	0.45	0.07	0.67	0.00	0.71	0.08	0.01	0.08
Control Delay	13.9	26.7	4.2	13.7	22.1	0.0	34.7	10.9	23.0	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	26.7	4.2	13.7	22.1	0.0	34.7	10.9	23.0	29.0
LOS	B	C	A	B	C	A	C	B	C	C
Approach Delay		16.8			21.9			33.2		28.6
Approach LOS		B			C			C		C
Queue Length 50th (m)	0.5	44.1	0.0	1.4	49.0	0.0	36.2	0.8	0.1	0.8
Queue Length 95th (m)	3.2	#132.1	17.2	6.0	#122.3	0.0	#85.2	8.4	1.1	7.1
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Base Capacity (vph)	212	792	896	307	1584	814	949	897	173	550
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.65	0.45	0.07	0.67	0.00	0.69	0.05	0.01	0.03

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 84.8
Natural Cycle: 120
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 23.1 Intersection LOS: C
Intersection Capacity Utilization 63.3% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	17	54	41	148	71	529	12	365
Future Volume (vph)	17	54	41	148	71	529	12	365
Lane Group Flow (vph)	19	114	46	207	79	627	13	423
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	11.6	31.8	11.8	32.0	12.3	65.2	11.2	64.1
Total Split (%)	9.7%	26.5%	9.8%	26.7%	10.3%	54.3%	9.3%	53.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	29.7	27.1	31.2	29.5	39.8	38.9	35.1	31.2
Actuated g/C Ratio	0.34	0.31	0.36	0.34	0.46	0.45	0.40	0.36
v/c Ratio	0.05	0.21	0.10	0.35	0.24	0.80	0.06	0.67
Control Delay	23.7	23.9	23.4	29.3	14.3	29.7	12.7	29.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.7	23.9	23.4	29.3	14.3	29.7	12.7	29.8
LOS	C	C	C	C	B	C	B	C
Approach Delay		23.9		28.3		28.0		29.3
Approach LOS		C		C		C		C
Queue Length 50th (m)	1.7	9.3	4.1	19.4	7.0	82.5	1.1	60.4
Queue Length 95th (m)	8.0	29.8	15.2	61.1	13.3	145.4	3.6	86.2
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	402	531	447	584	325	1254	210	1240
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.21	0.10	0.35	0.24	0.50	0.06	0.34

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 87.2
Natural Cycle: 95
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 28.0 Intersection LOS: C
Intersection Capacity Utilization 66.3% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: Caron St/Rue Caron & Laurier St

Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Traffic Volume (vph)	9	1	571	455
Future Volume (vph)	9	1	571	455
Lane Group Flow (vph)	13	1	634	508
Turn Type	Prot	Perm	NA	NA
Protected Phases	7		2	6
Permitted Phases		2		
Detector Phase	7	2	2	6
Switch Phase				
Minimum Initial (s)	5.0	10.0	10.0	10.0
Minimum Split (s)	11.5	27.1	27.1	27.1
Total Split (s)	13.0	77.0	77.0	77.0
Total Split (%)	14.4%	85.6%	85.6%	85.6%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.1	6.1	6.1
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Min	Min	Min
Act Effct Green (s)	6.2	35.3	35.3	35.3
Actuated g/C Ratio	0.16	0.94	0.94	0.94
v/c Ratio	0.05	0.00	0.38	0.31
Control Delay	17.2	2.0	2.4	2.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	17.2	2.0	2.4	2.0
LOS	B	A	A	A
Approach Delay	17.2		2.4	2.0
Approach LOS	B		A	A
Queue Length 50th (m)	0.4	0.0	0.0	0.0
Queue Length 95th (m)	4.8	0.4	42.7	30.8
Internal Link Dist (m)	329.4		111.2	224.8
Turn Bay Length (m)		15.0		
Base Capacity (vph)	305	842	1765	1763
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.04	0.00	0.36	0.29

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 37.7
Natural Cycle: 40
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.38
Intersection Signal Delay: 2.4 Intersection LOS: A
Intersection Capacity Utilization 46.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Caron St & Francois St

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	9	0	9	1	4	548	5	453
Future Volume (vph)	9	0	9	1	4	548	5	453
Lane Group Flow (vph)	0	19	0	18	4	616	6	503
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	31.5	31.5	31.5	31.5	27.1	27.1	27.1	27.1
Total Split (s)	32.0	32.0	32.0	32.0	58.0	58.0	58.0	58.0
Total Split (%)	35.6%	35.6%	35.6%	35.6%	64.4%	64.4%	64.4%	64.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.5		6.5	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)		10.0		10.0	71.0	71.0	71.0	71.0
Actuated g/C Ratio		0.13		0.13	0.95	0.95	0.95	0.95
v/c Ratio		0.08		0.08	0.01	0.37	0.01	0.30
Control Delay		5.8		24.9	1.8	2.2	1.8	1.9
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		5.8		24.9	1.8	2.2	1.8	1.9
LOS		A		C	A	A	A	A
Approach Delay		5.8		24.9		2.2		1.9
Approach LOS		A		C		A		A
Queue Length 50th (m)		0.0		1.2	0.0	0.0	0.0	0.0
Queue Length 95th (m)		2.8		6.9	0.8	46.9	1.0	35.0
Internal Link Dist (m)		61.3		102.4		500.1		270.2
Turn Bay Length (m)					30.0		40.0	
Base Capacity (vph)		587		573	799	1666	705	1669
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.03		0.03	0.01	0.37	0.01	0.30

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 75.1	
Natural Cycle: 65	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.37	
Intersection Signal Delay: 2.4	Intersection LOS: A
Intersection Capacity Utilization 49.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Caron St & Cote St/Potvin Ave

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	5	6	635	452	3
Future Volume (Veh/h)	0	5	6	635	452	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	6	7	706	502	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				249	169	
pX, platoon unblocked	0.87	0.80	0.80			
vC, conflicting volume	1224	504	505			
vC1, stage 1 conf vol	504					
vC2, stage 2 conf vol	720					
vCu, unblocked vol	824	261	263			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	434	625	1047			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	6	7	706	505
Volume Left	0	7	0	0
Volume Right	6	0	0	3
cSH	625	1047	1700	1700
Volume to Capacity	0.01	0.01	0.42	0.30
Queue Length 95th (m)	0.2	0.1	0.0	0.0
Control Delay (s)	10.8	8.5	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.8	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	10	562	1	5	453
Future Volume (Veh/h)	5	10	562	1	5	453
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	624	1	6	503
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			294			135
pX, platoon unblocked	0.92	0.94			0.94	
vC, conflicting volume	1140	624			625	
vC1, stage 1 conf vol	624					
vC2, stage 2 conf vol	515					
vCu, unblocked vol	961	568			568	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			99	
cM capacity (veh/h)	451	491			943	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	17	625	6	503
Volume Left	6	0	6	0
Volume Right	11	1	0	0
cSH	476	1700	943	1700
Volume to Capacity	0.04	0.37	0.01	0.30
Queue Length 95th (m)	0.8	0.0	0.1	0.0
Control Delay (s)	12.8	0.0	8.8	0.0
Lane LOS	B		A	
Approach Delay (s)	12.8	0.0	0.1	
Approach LOS	B			

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	38	61	92	520	387	43
Future Volume (Veh/h)	38	61	92	520	387	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	42	68	102	578	430	48
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1238	456	480			
vC1, stage 1 conf vol	456					
vC2, stage 2 conf vol	782					
vCu, unblocked vol	1238	456	480			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	89	91			
cM capacity (veh/h)	366	603	1081			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	110	102	578	478
Volume Left	42	102	0	0
Volume Right	68	0	0	48
cSH	483	1081	1700	1700
Volume to Capacity	0.23	0.09	0.34	0.28
Queue Length 95th (m)	6.1	2.2	0.0	0.0
Control Delay (s)	14.6	8.7	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.6	1.3		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	45.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	265	315	2	202	246
Future Volume (vph)	5	265	315	2	202	246
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	294	350	2	224	273

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	300	352	224	273
Volume Left (vph)	6	0	224	0
Volume Right (vph)	294	2	0	0
Hadj (s)	-0.55	0.03	0.53	0.03
Departure Headway (s)	5.4	5.6	6.4	5.9
Degree Utilization, x	0.45	0.55	0.40	0.45
Capacity (veh/h)	621	614	545	592
Control Delay (s)	12.8	15.1	12.4	12.4
Approach Delay (s)	12.8	15.1	12.4	
Approach LOS	B	C	B	

Intersection Summary			
Delay	13.3		
Level of Service	B		
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	34	28	58	134	117	58
Future Volume (Veh/h)	34	28	58	134	117	58
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	38	31	64	149	130	64
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	213				246	138
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	213				246	138
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				82	93
cM capacity (veh/h)	1357				722	910

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	69	213	194
Volume Left	38	0	130
Volume Right	0	149	64
cSH	1357	1700	775
Volume to Capacity	0.03	0.13	0.25
Queue Length 95th (m)	0.6	0.0	6.9
Control Delay (s)	4.4	0.0	11.2
Lane LOS	A		B
Approach Delay (s)	4.4	0.0	11.2
Approach LOS			B

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	130	74	25	174	96	32
Future Volume (Veh/h)	130	74	25	174	96	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	144	82	28	193	107	36
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			226		434	185
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			226		434	185
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		81	96
cM capacity (veh/h)			1342		567	857

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	226	221	143
Volume Left	0	28	107
Volume Right	82	0	36
cSH	1700	1342	620
Volume to Capacity	0.13	0.02	0.23
Queue Length 95th (m)	0.0	0.4	6.2
Control Delay (s)	0.0	1.1	12.5
Lane LOS		A	B
Approach Delay (s)	0.0	1.1	12.5
Approach LOS			B

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	39	123	25	40	159	32
Future Volume (Veh/h)	39	123	25	40	159	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	43	137	28	44	177	36
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			180		212	112
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			180		212	112
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		77	96
cM capacity (veh/h)			1396		761	942

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	180	72	213
Volume Left	0	28	177
Volume Right	137	0	36
cSH	1700	1396	787
Volume to Capacity	0.11	0.02	0.27
Queue Length 95th (m)	0.0	0.4	7.7
Control Delay (s)	0.0	3.1	11.3
Lane LOS		A	B
Approach Delay (s)	0.0	3.1	11.3
Approach LOS			B

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	81	30	25	89	32	32	64	32	25	49	32
Future Volume (vph)	25	81	30	25	89	32	32	64	32	25	49	32
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	28	90	33	28	99	36	36	71	36	28	54	36

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	151	163	143	118
Volume Left (vph)	28	28	36	28
Volume Right (vph)	33	36	36	36
Hadj (s)	-0.06	-0.06	-0.07	-0.10
Departure Headway (s)	4.7	4.7	4.8	4.7
Degree Utilization, x	0.20	0.21	0.19	0.16
Capacity (veh/h)	713	719	706	698
Control Delay (s)	8.8	8.9	8.9	8.6
Approach Delay (s)	8.8	8.9	8.9	8.6
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.8		
Level of Service	A		
Intersection Capacity Utilization	28.0%	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)	32	0	0	0	0	32	0	232	0	25	224	25
Future Volume (Veh/h)	32	0	0	0	0	32	0	232	0	25	224	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	36	0	0	0	0	36	0	258	0	28	249	28
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	613	577	263	563	591	258	277			258		
vC1, stage 1 conf vol	319	319		258	258							
vC2, stage 2 conf vol	294	258		305	333							
vCu, unblocked vol	613	577	263	563	591	258	277			258		
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 %	94	100	100	100	100	95	100			98		
cM capacity (veh/h)	556	560	776	605	561	781	1286			1307		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	36	36	258	28	277
Volume Left	36	0	0	28	0
Volume Right	0	36	0	0	28
cSH	556	781	1286	1307	1700
Volume to Capacity	0.06	0.05	0.00	0.02	0.16
Queue Length 95th (m)	1.4	1.0	0.0	0.5	0.0
Control Delay (s)	11.9	9.8	0.0	7.8	0.0
Lane LOS	B	A		A	
Approach Delay (s)	11.9	9.8	0.0	0.7	
Approach LOS	B	A			

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	37.1%	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)	32	0	0	0	0	32	0	168	0	25	175	25
Future Volume (Veh/h)	32	0	0	0	0	32	0	168	0	25	175	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	36	0	0	0	0	36	0	187	0	28	194	28
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	487	451	208	437	465	187	222			187		
vC1, stage 1 conf vol	264	264		187	187							
vC2, stage 2 conf vol	223	187		250	278							
vCu, unblocked vol	487	451	208	437	465	187	222			187		
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 %	94	100	100	100	100	96	100			98		
cM capacity (veh/h)	621	612	832	670	611	855	1347			1387		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	36	36	187	28	222
Volume Left	36	0	0	28	0
Volume Right	0	36	0	0	28
cSH	621	855	1347	1387	1700
Volume to Capacity	0.06	0.04	0.00	0.02	0.13
Queue Length 95th (m)	1.3	0.9	0.0	0.4	0.0
Control Delay (s)	11.2	9.4	0.0	7.6	0.0
Lane LOS	B	A		A	
Approach Delay (s)	11.2	9.4	0.0	0.9	
Approach LOS	B	A			

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	96	64	253	74	49	202
Future Volume (vph)	96	64	253	74	49	202
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	107	71	281	82	54	224

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	178	363	54	224
Volume Left (vph)	107	0	54	0
Volume Right (vph)	71	82	0	0
Hadj (s)	-0.09	-0.10	0.53	0.03
Departure Headway (s)	5.3	4.8	5.9	5.4
Degree Utilization, x	0.26	0.48	0.09	0.34
Capacity (veh/h)	615	730	584	641
Control Delay (s)	10.2	12.1	8.3	9.9
Approach Delay (s)	10.2	12.1	9.6	
Approach LOS	B	B	A	

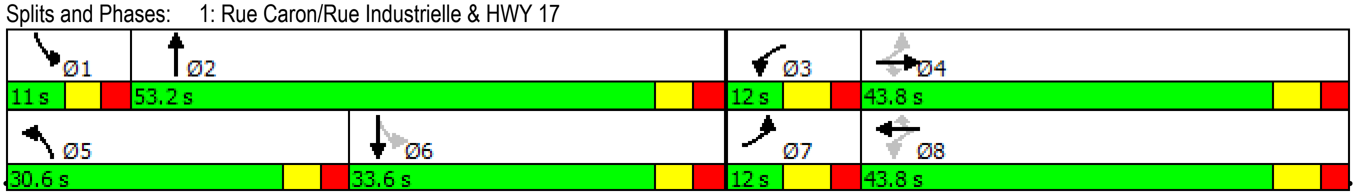
Intersection Summary			
Delay	10.8		
Level of Service	B		
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	34	254	490	30	143	26	409	87	35	138
Future Volume (vph)	34	254	490	30	143	26	409	87	35	138
Lane Group Flow (vph)	38	282	544	33	159	29	454	144	39	187
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8			6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.9	32.9	32.9	11.9	32.9	32.9	10.9	33.3	10.9	33.3
Total Split (s)	12.0	43.8	43.8	12.0	43.8	43.8	30.6	53.2	11.0	33.6
Total Split (%)	10.0%	36.5%	36.5%	10.0%	36.5%	36.5%	25.5%	44.3%	9.2%	28.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.6	3.0	2.6	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9	6.9	5.9	6.3	5.9	6.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None
Act Effct Green (s)	40.5	37.8	37.8	40.5	37.8	37.8	18.6	34.6	21.5	15.9
Actuated g/C Ratio	0.41	0.38	0.38	0.41	0.38	0.38	0.19	0.35	0.22	0.16
v/c Ratio	0.08	0.42	0.60	0.08	0.12	0.04	0.74	0.24	0.14	0.66
Control Delay	18.3	28.1	5.6	18.4	23.6	0.1	46.4	21.6	21.1	49.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.3	28.1	5.6	18.4	23.6	0.1	46.4	21.6	21.1	49.9
LOS	B	C	A	B	C	A	D	C	C	D
Approach Delay		13.5			19.7			40.5		44.9
Approach LOS		B			B			D		D
Queue Length 50th (m)	3.7	39.7	0.0	3.2	10.3	0.0	41.2	16.9	4.3	31.6
Queue Length 95th (m)	10.7	71.9	24.3	9.6	20.0	0.0	61.0	30.7	9.8	54.7
Internal Link Dist (m)		820.6			792.2			422.2		103.9
Turn Bay Length (m)	90.0		85.0	60.0		56.0	60.0		40.0	
Base Capacity (vph)	501	678	911	407	1288	699	836	831	283	494
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.42	0.60	0.08	0.12	0.04	0.54	0.17	0.14	0.38

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 98.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 26.4 — Intersection LOS: C
Intersection Capacity Utilization 62.6% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Rue Caron/Rue Industrielle & HWY 17



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	34	155	30	87	79	445	35	564
Future Volume (vph)	34	155	30	87	79	445	35	564
Lane Group Flow (vph)	38	280	33	126	88	541	39	661
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.5	31.5	11.5	31.5	11.1	27.1	11.1	27.1
Total Split (s)	11.8	34.0	11.8	34.0	12.0	62.8	11.4	62.2
Total Split (%)	9.8%	28.3%	9.8%	28.3%	10.0%	52.3%	9.5%	51.8%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	3.2	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	Max	None	None	None	None
Act Effct Green (s)	31.7	29.0	31.7	29.0	49.0	46.0	46.8	42.8
Actuated g/C Ratio	0.32	0.29	0.32	0.29	0.49	0.46	0.47	0.43
v/c Ratio	0.09	0.56	0.11	0.25	0.43	0.68	0.13	0.88
Control Delay	27.0	38.1	27.4	32.7	18.8	27.2	12.9	41.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	38.1	27.4	32.7	18.8	27.2	12.9	41.6
LOS	C	D	C	C	B	C	B	D
Approach Delay		36.8		31.6		26.0		40.0
Approach LOS		D		C		C		D
Queue Length 50th (m)	4.9	45.5	4.3	18.2	8.3	86.6	3.6	119.0
Queue Length 95th (m)	13.0	79.6	11.7	36.5	15.4	122.1	8.1	166.7
Internal Link Dist (m)		919.9		690.6		145.4		422.2
Turn Bay Length (m)	35.0		60.0		55.0		50.0	
Base Capacity (vph)	404	497	293	500	204	1040	293	1033
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.56	0.11	0.25	0.43	0.52	0.13	0.64

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 100.2
Natural Cycle: 95
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 33.8 Intersection LOS: C
Intersection Capacity Utilization 78.0% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: Caron St/Rue Caron & Laurier St

Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Traffic Volume (vph)	7	6	566	692
Future Volume (vph)	7	6	566	692
Lane Group Flow (vph)	11	7	629	773
Turn Type	Prot	Perm	NA	NA
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5
Total Split (s)	22.6	67.4	67.4	67.4
Total Split (%)	25.1%	74.9%	74.9%	74.9%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effct Green (s)	6.1	81.9	81.9	81.9
Actuated g/C Ratio	0.07	0.97	0.97	0.97
v/c Ratio	0.09	0.01	0.37	0.45
Control Delay	35.1	0.8	1.3	1.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	35.1	0.8	1.3	1.7
LOS	D	A	A	A
Approach Delay	35.1		1.3	1.7
Approach LOS	D		A	A
Queue Length 50th (m)	1.1	0.0	0.0	0.0
Queue Length 95th (m)	6.1	0.7	29.3	41.8
Internal Link Dist (m)	329.4		111.2	224.8
Turn Bay Length (m)		15.0		
Base Capacity (vph)	353	608	1704	1702
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.03	0.01	0.37	0.45

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 84.8
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.45
Intersection Signal Delay: 1.8 Intersection LOS: A
Intersection Capacity Utilization 50.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Caron St & Francois St

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	17	1	9	1	12	485	16	637
Future Volume (vph)	17	1	9	1	12	485	16	637
Lane Group Flow (vph)	0	31	0	15	13	553	18	727
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	23.0	23.0	23.0	23.0	67.0	67.0	67.0	67.0
Total Split (%)	25.6%	25.6%	25.6%	25.6%	74.4%	74.4%	74.4%	74.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.5		4.5	4.5	4.5	4.5	4.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)		6.9		6.8	79.2	79.2	79.2	79.2
Actuated g/C Ratio		0.08		0.08	0.92	0.92	0.92	0.92
v/c Ratio		0.21		0.11	0.02	0.34	0.02	0.45
Control Delay		31.2		33.4	1.6	2.0	1.6	2.6
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		31.2		33.4	1.6	2.0	1.6	2.6
LOS		C		C	A	A	A	A
Approach Delay		31.3		33.4		2.0		2.6
Approach LOS		C		C		A		A
Queue Length 50th (m)		2.7		1.5	0.0	0.0	0.0	0.0
Queue Length 95th (m)		10.3		6.8	1.2	29.1	1.5	44.9
Internal Link Dist (m)		61.3		102.4		500.1		270.2
Turn Bay Length (m)					30.0		40.0	
Base Capacity (vph)		372		370	603	1623	736	1623
Starvation Cap Reductn		0		0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0
Reduced v/c Ratio		0.08		0.04	0.02	0.34	0.02	0.45

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 85.8	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.45	
Intersection Signal Delay: 3.3	Intersection LOS: A
Intersection Capacity Utilization 48.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Caron St & Cote St/Potvin Ave

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	8	7	566	688	3
Future Volume (Veh/h)	0	8	7	566	688	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	9	8	629	764	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)				249	169	
pX, platoon unblocked	0.66	0.64	0.64			
vC, conflicting volume	1410	766	767			
vC1, stage 1 conf vol	766					
vC2, stage 2 conf vol	645					
vCu, unblocked vol	1271	360	362			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	99			
cM capacity (veh/h)	353	441	771			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	9	8	629	767
Volume Left	0	8	0	0
Volume Right	9	0	0	3
cSH	441	771	1700	1700
Volume to Capacity	0.02	0.01	0.37	0.45
Queue Length 95th (m)	0.4	0.2	0.0	0.0
Control Delay (s)	13.3	9.7	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.3	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	10	499	7	26	669
Future Volume (Veh/h)	1	10	499	7	26	669
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	11	554	8	29	743
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			294			135
pX, platoon unblocked	0.90					
vC, conflicting volume	1359	558			562	
vC1, stage 1 conf vol	558					
vC2, stage 2 conf vol	801					
vCu, unblocked vol	1343	558			562	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			97	
cM capacity (veh/h)	356	529			1009	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	12	562	29	743
Volume Left	1	0	29	0
Volume Right	11	8	0	0
cSH	509	1700	1009	1700
Volume to Capacity	0.02	0.33	0.03	0.44
Queue Length 95th (m)	0.5	0.0	0.6	0.0
Control Delay (s)	12.2	0.0	8.7	0.0
Lane LOS	B		A	
Approach Delay (s)	12.2	0.0	0.3	
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	95	77	449	547	60
Future Volume (Veh/h)	61	95	77	449	547	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	106	86	499	608	67
Pedestrians	2					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1314	644	677			
vC1, stage 1 conf vol	644					
vC2, stage 2 conf vol	671					
vCu, unblocked vol	1314	644	677			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	82	78	91			
cM capacity (veh/h)	369	472	913			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	174	86	499	675
Volume Left	68	86	0	0
Volume Right	106	0	0	67
cSH	426	913	1700	1700
Volume to Capacity	0.41	0.09	0.29	0.40
Queue Length 95th (m)	13.7	2.2	0.0	0.0
Control Delay (s)	19.2	9.4	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	19.2	1.4		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	231	307	5	272	341
Future Volume (vph)	5	231	307	5	272	341
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	257	341	6	302	379

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	263	347	302	379
Volume Left (vph)	6	0	302	0
Volume Right (vph)	257	6	0	0
Hadj (s)	-0.55	0.02	0.53	0.03
Departure Headway (s)	5.6	5.6	6.3	5.8
Degree Utilization, x	0.41	0.54	0.53	0.61
Capacity (veh/h)	596	609	559	610
Control Delay (s)	12.5	15.2	15.0	16.2
Approach Delay (s)	12.5	15.2	15.7	
Approach LOS	B	C	C	

Intersection Summary			
Delay	14.9		
Level of Service	B		
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	74	102	41	144	154	45
Future Volume (Veh/h)	74	102	41	144	154	45
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	82	113	46	160	171	50
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	206				403	126
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	206				403	126
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				70	95
cM capacity (veh/h)	1365				567	924

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	195	206	221
Volume Left	82	0	171
Volume Right	0	160	50
cSH	1365	1700	621
Volume to Capacity	0.06	0.12	0.36
Queue Length 95th (m)	1.3	0.0	11.2
Control Delay (s)	3.6	0.0	14.0
Lane LOS	A		B
Approach Delay (s)	3.6	0.0	14.0
Approach LOS			B

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	179	99	33	153	83	27
Future Volume (Veh/h)	179	99	33	153	83	27
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	199	110	37	170	92	30
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			309		498	254
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			309		498	254
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		82	96
cM capacity (veh/h)			1252		516	785

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	309	207	122
Volume Left	0	37	92
Volume Right	110	0	30
cSH	1700	1252	563
Volume to Capacity	0.18	0.03	0.22
Queue Length 95th (m)	0.0	0.6	5.7
Control Delay (s)	0.0	1.6	13.1
Lane LOS		A	B
Approach Delay (s)	0.0	1.6	13.1
Approach LOS			B

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	42	164	33	48	138	28
Future Volume (Veh/h)	42	164	33	48	138	28
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	47	182	37	53	153	31
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			229		265	138
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			229		265	138
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		78	97
cM capacity (veh/h)			1339		704	910

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	229	90	184
Volume Left	0	37	153
Volume Right	182	0	31
cSH	1700	1339	732
Volume to Capacity	0.13	0.03	0.25
Queue Length 95th (m)	0.0	0.6	7.0
Control Delay (s)	0.0	3.3	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	3.3	11.6
Approach LOS			B

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	37.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	33	94	33	33	88	28	28	55	28	33	66	28
Future Volume (vph)	33	94	33	33	88	28	28	55	28	33	66	28
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	37	104	37	37	98	31	31	61	31	37	73	31

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	178	166	123	141
Volume Left (vph)	37	37	31	37
Volume Right (vph)	37	31	31	31
Hadj (s)	-0.05	-0.03	-0.07	-0.05
Departure Headway (s)	4.7	4.8	4.9	4.9
Degree Utilization, x	0.23	0.22	0.17	0.19
Capacity (veh/h)	708	705	680	681
Control Delay (s)	9.2	9.1	8.8	9.0
Approach Delay (s)	9.2	9.1	8.8	9.0
Approach LOS	A	A	A	A

Intersection Summary			
Delay	9.0		
Level of Service	A		
Intersection Capacity Utilization	28.7%	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)	28	0	0	0	0	28	0	272	0	33	265	33
Future Volume (Veh/h)	28	0	0	0	0	28	0	272	0	33	265	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	31	0	0	0	0	31	0	302	0	37	294	37
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	720	688	312	670	707	302	331			302		
vC1, stage 1 conf vol	386	386		302	302							
vC2, stage 2 conf vol	333	302		368	405							
vCu, unblocked vol	720	688	312	670	707	302	331			302		
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 %	94	100	100	100	100	96	100			97		
cM capacity (veh/h)	506	512	728	550	513	738	1228			1259		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	31	31	302	37	331
Volume Left	31	0	0	37	0
Volume Right	0	31	0	0	37
cSH	506	738	1228	1259	1700
Volume to Capacity	0.06	0.04	0.00	0.03	0.19
Queue Length 95th (m)	1.4	0.9	0.0	0.6	0.0
Control Delay (s)	12.6	10.1	0.0	7.9	0.0
Lane LOS	B	B		A	
Approach Delay (s)	12.6	10.1	0.0	0.8	
Approach LOS	B	B			

Intersection Summary			
Average Delay	1.4		
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 (veh/h)	28	0	0	0	0	28	0	218	0	33	199	33
Future Volume (Veh/h)	28	0	0	0	0	28	0	218	0	33	199	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	31	0	0	0	0	31	0	242	0	37	221	37
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	586	556	240	537	574	242	258			242		
vC1, stage 1 conf vol	314	314		242	242							
vC2, stage 2 conf vol	273	242		295	332							
vCu, unblocked vol	586	556	240	537	574	242	258			242		
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 %	95	100	100	100	100	96	100			97		
cM capacity (veh/h)	567	563	799	615	564	797	1307			1324		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	31	31	242	37	258
Volume Left	31	0	0	37	0
Volume Right	0	31	0	0	37
cSH	567	797	1307	1324	1700
Volume to Capacity	0.05	0.04	0.00	0.03	0.15
Queue Length 95th (m)	1.2	0.8	0.0	0.6	0.0
Control Delay (s)	11.7	9.7	0.0	7.8	0.0
Lane LOS	B	A		A	
Approach Delay (s)	11.7	9.7	0.0	1.0	
Approach LOS	B	A			

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	83	55	257	98	66	280
Future Volume (vph)	83	55	257	98	66	280
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	92	61	286	109	73	311

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	153	395	73	311
Volume Left (vph)	92	0	73	0
Volume Right (vph)	61	109	0	0
Hadj (s)	-0.08	-0.13	0.53	0.03
Departure Headway (s)	5.6	4.8	5.9	5.4
Degree Utilization, x	0.24	0.53	0.12	0.46
Capacity (veh/h)	577	727	591	651
Control Delay (s)	10.4	13.0	8.5	11.7
Approach Delay (s)	10.4	13.0	11.1	
Approach LOS	B	B	B	

Intersection Summary			
Delay	11.8		
Level of Service	B		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

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RÈGLEMENT Nº 2019-72

Amendant le Plan officiel de l'aire urbaine de la Cité de Clarence-Rockland

Corporation de la Cité de Clarence-Rockland

Plan Secondaire pour les terrains qui ont été ajouté à l'aire urbaine

rédigé par

Cité de Clarence-Rockland
1560, rue Laurier
Rockland (Ontario)
K4K 1P7
(613) 446-6022

BY-LAW Nº 2019-72

Amending the Official Plan of the Urban Area of the City of Clarence-Rockland

Corporation of the City of Clarence-Rockland

Expansion Lands – Secondary Plan

prepared by

City of Clarence-Rockland
1560 Laurier Street
Rockland, Ontario
K4K 1P7
(613) 446-6022

LA CORPORATION DE LA CITÉ DE CLARENCE-ROCKLAND

RÈGLEMENT Nº 2019-72

RÈGLEMENT AFIN D'ADOPTER L'AMENDEMENT Nº 13 AU *PLAN OFFICIEL DE L'AIRE URBAINE DE LA CITÉ DE CLARENCE-ROCKLAND;*

RÉF: Amendement numéro 13 au Plan officiel conformément aux dispositions de l'article 22 de la *Loi sur l'aménagement du territoire*, R.S.O. 1990, tel qu'amendé.

ATTENDU QUE le *Plan officiel de l'aire urbaine de la Cité de Clarence-Rockland* est en vigueur depuis le 30 septembre 2014;

ET ATTENDU QUE l'amendement numéro 13 au *Plan officiel de l'aire urbaine de la Cité de Clarence-Rockland* représente des bonnes pratiques d'aménagement et est en conformité avec les intentions du *Plan officiel des Comtés unis de Prescott et Russell* et de la *Déclaration de principes provinciale*;

IL EST RÉSOLU QUE le Conseil de la Corporation de la Cité de Clarence-Rockland donne force de loi à ce qui suit:

Article 1 : L'amendement numéro 13 au *Plan officiel de l'aire urbaine de la Cité de Clarence-Rockland*, composé de texte et cédule ci-jointe, est par la présente, adopté.

Article 2 : Conformément à l'article 17 (23) de la *Loi sur l'aménagement du territoire*, le greffier est, par la présente, autorisé à aviser les personnes ou les organismes publics de l'adoption de cet amendement. La Cité de Clarence-Rockland entend aussi aviser et soumettre une application auprès des Comtés unis de Prescott et Russell pour l'approbation de l'amendement numéro 13 au *Plan officiel de l'aire urbaine de la Cité de Clarence-Rockland*.

Article 3 : Ce règlement entrera en vigueur et prendra effet le jour de son adoption finale.

FAIT ET ADOPTÉ EN RÉUNION PUBLIQUE, CE 7ième JOUR D'OCTOBRE, 2019.

Guy Desjardins, Maire	**Monique Ouellet, greffière**

THE CORPORATION OF THE CITY OF CLARENCE-ROCKLAND

BY-LAW NO. 2019-72

BEING A BY-LAW TO ADOPT AMENDMENT NO. 13 TO THE *OFFICIAL PLAN OF THE URBAN AREA OF THE CITY OF CLARENCE-ROCKLAND;*

REF: Official Plan Amendment No. 13 pursuant to Section 22 of the *Planning Act*, R.S.O. 1990, as amended.

WHEREAS the *Official Plan of the Urban Area of the City of Clarence-Rockland* has been in effect since September 30, 2014;

AND WHEREAS Amendment No. 13 to the *Official Plan of the Urban Area of the City of Clarence-Rockland* represents good planning and conforms with the intent of the *United Counties of Prescott and Russell Official Plan* and the *Provincial Policy Statement*;

NOW THEREFORE, the Council of the Corporation of the City of Clarence-Rockland enacts as follows:

Section 1: Amendment No. 13 to the *Official Plan of the Urban Area of the City of Clarence-Rockland*, consisting of the attached text and schedule is hereby adopted.

Section 2: In accordance to Section 17 (23) of the *Planning Act*, the Clerk is hereby authorized to notify persons or public bodies for the adoption of the Amendment. The City of Clarence-Rockland also intends to notify and submit an application to the United Counties of Prescott and Russell for approval of Amendment No. 13 to the *Official Plan of the Urban Area of the City of Clarence-Rockland*.

Section 3: This By-law shall come into force and take effect on the day of the final passing thereof.

DATED AND PASSED IN OPEN COUNCIL, THIS 7TH DAY OF OCTOBER, 2019.

Guy Desjardins, Mayor	**Monique Ouellet, Clerk**