



**DESIGN  
PLAN  
SERVICES**

TOWN  
PLANNING  
CONSULTANTS

Fabian Serra  
Planner  
Development and Cultural Services  
Planning and Development Division  
185 Robinson Street,  
Simcoe, Ontario, N3Y 5L6

August 30<sup>th</sup>, 2024  
DPS File: 2069

**RE: ZONING BY-LAW AMENDMENT APPLICATION RESUBMISSION  
185 ROBINSON STREET, SIMCOE (NORFOLK COUNTY)**

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On behalf of our client, 2273925 Ontario Inc., we are pleased to submit a revised submission for the Zoning By-law Amendment application for 185 Robinson Street.

The project is an infill development consisting of one (1), eight (8)-storey mixed-use building consisting of 143 residential dwelling units, five (5) office units on the ground floor, and two (2) retail units on the ground floor, on lands containing one (1) existing three (3)-storey mixed-use building. The Subject Property is subject to Site Plan Control however, a Site Plan Application will be submitted at a later date. Further, a consent to sever is proposed but this will also be dealt with at a later date.

This letter details the documents and plans included with this resubmission for a Zoning By-law Amendment for the Subject Property located at 185 Robinson Street. A pre-consultation meeting was held on April 22nd, 2020 with County staff to assess the requirements for the application. A public meeting was held on April 7th, 2021 and comments from the public as well as County Staff and other commenting agencies/departments have been received since that public meeting. A second public meeting was held October 4<sup>th</sup>, 2023 and additional comments from the public, County Staff, County Council and other commenting agencies/departments have been received since that second public meeting. A Council meeting was held on July 16<sup>th</sup>, 2024 for Council to make a decision on the proposed Zoning By-law Amendment application. Council granted a deferral of the application to the October 16<sup>th</sup>, 2024 Council meeting, in order to allow for more time for us to address comments received from County Council, County Staff, as well as the public. The comments received have been taken into consideration and the plans and submission materials have been revised/updated to address all comments received.

Please find the following within the digital submission package accompanying this letter:

- One (1) PDF version of the architectural drawings consisting of the following (prepared by Stoyanovskyy Architects dated July 25th, 2024):
  - Site Plan;
  - Floor Plans;
  - Elevations.
- Three (3) PDF versions of 3D renderings (prepared by Stoyanovskyy Architects);

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- One (1) PDF version of the Shadow Study (prepared by Stoyanovskyy Architects);
- One (1) PDF version of the Functional Servicing and Stormwater Management Report as well as one (1) PDF version of the associated civil engineering drawings (prepared by Crozier, dated August 2024);
- One (1) PDF version of the Traffic Impact and Parking Study (prepared by Trans-Plan, dated August 2024);
- One (1) PDF version of the revised Draft Zoning By-law (prepared by Design Plan Services Inc.);
- One (1) PDF version of the Planning Justification Report Addendum (prepared by Design Plan Services Inc.);
- One (1) PDF version of the Comment Response Matrix (prepared by Design Plan Services Inc.).

Please note that all of the information listed above is being submitted via email to County Planning Staff. No hard copy package is being submitted unless otherwise requested by County Staff. Further, the revised Draft Zoning By-law that is being provided with this resubmission is subject to County review and is intended to permit the proposal as shown on the submitted architectural plans. Should any additional modifications or revisions to the Draft Zoning By-law be required in order to permit the proposal, we request that County Staff advise DPS of any required modifications or revisions in order to permit the proposal as shown on the submitted architectural plans.

We look forward to continuing to work together on this application. Should you have any questions or concerns please do not hesitate to contact David Igelman at 416-626-5445 ext. 204.

Sincerely,

DESIGN PLAN SERVICES INC.



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David Igelman, BURPL, MCIP, RPP  
Associate

Encl.  
DI/tjc



## Pre-Consultation Meeting



## Minutes

**Description of Proposal: Construction of 8-storey mixed use apartment building**

**Property Location: 185 Robinson Street, Simcoe**

**Roll Number: 40101000100, BLK 68**

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As a result of the information shared at the pre-consultation meeting dated April 22, 2020 the following applications and qualified professional documents / reports are required as part of the development review process.

Please note that various fees are associated with each application and there are also costs for qualified professionals retained to complete various documents / reports. All requirements identified are minimum and determined as of the date of the pre-consultation meeting with the information available at that time. As the proposal proceeds and more information is made available, additional applications, studies, reports, etc. may be required.

This checklist is applicable for a period of one (1) year from the date of meeting. If an application is not received within that time frame, a subsequent pre-consultation meeting may be required due to changes in policies and technical requirements.

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### Attendance

Proponent	Stoyanovskyy Architects Inc., Orest Stoyanovskyy
Planning & Development Division – Planning	Tricia Givens, Interim Director Planning (Chair) Mohammad Alam, Senior Planner Scott Wilson, Planner Fabian Serra, Planner
Planning & Development Division – Building & By-Law	Scott Northcott, Building Inspector III Roxanne Koot, Zoning Administrator
Planning & Development Division – Development Engineering	Kevin Verkindt, Development Technologist
Planning & Development Division – Economic Development	Chris Garwood, Economic Development Supervisor
Corporate Support Services – Realty Services	Lydia Harrison, Realty Services Coordinator

## Privileged Information and Without Prejudice

### Planning

Planning application(s) required to proceed		Required
Zoning By-law Amendment Application (Regular)		X
Zoning By-law Amendment – Removal of Holding		X
Site Plan Application (Major)		X
Other -		
Planning requirements for a complete application The below items are to be submitted as part of the identified Planning Application(s). ** electronic/PDF copies of all plans, studies and reports are required**	Required Zoning Stage	Required at Site Plan Stage
Proposed Site Plan / Drawing	X	X
Planning Impact Analysis Report / Justification Report	X	
Landscaping Plan		X
Elevation Plans		X
Photometrics (Lighting) Plan		X
Shadow Analysis Report		X
Record of Site Condition	X	X
Contaminated Site Study **may be required dependent on the outcome of the record of site condition**	X	X
Parking Assessment	X	
Additional Planning requirements		Required
Development Agreement		X
Parkland Dedication/Cash-in-lieu of Parkland		X

### Provincial Policy Statement, 2020

The PPS provides policy direction on matters of provincial interest related to land use planning and development. It promotes efficient development and land use patterns and encourages growth and development within existing settlement areas, of which Simcoe is considered as.

Policy 1.1.3.1 of the PPS states, “Settlement areas shall be the focus of growth and development, and their vitality and regeneration shall be promoted.”

## Privileged Information and Without Prejudice

Policy 1.1.3.2 states, “Land use patterns within settlement areas shall be based on 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) prepare for impacts of a changing climate;
- e) support active transportation;
- f) are transit-supportive, where transit is planned, exists or may be developed; and
- g) are freight-supportive.

Land use patterns within settlement areas shall be based on a range of uses and opportunities for intensification and redevelopment in accordance with the criteria in policy 1.1.3.3, where this can be accommodated.

Policy 1.1.3.4 states, “Appropriate development standards should be promoted which facilitate intensification, redevelopment and compact form, while avoiding or mitigating risks to public health and safety.”

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

Policy 1.4.1 states, “To provide for an appropriate range and mix of housing options and densities required to meet projected requirements of current and future residents of the regional market area, planning authorities shall:

- a) maintain at all times the ability to accommodate residential growth for a minimum of 15 years through residential intensification and redevelopment and, if necessary, lands which are designated and available for residential development; and
- b) maintain at all times where new development is to occur, land with servicing capacity sufficient to provide at least a three-year supply of residential units available through lands suitably zoned to facilitate residential intensification and redevelopment, and land in draft approved and registered plans.

Upper-tier and single-tier municipalities may choose to maintain land with servicing capacity sufficient to provide at least a five-year supply of residential units available through lands suitably zoned to facilitate *residential intensification* and *redevelopment*, and land in draft approved and registered plans.

## **Privileged Information and Without Prejudice**

Policy 1.4.3 states, “ Planning authorities shall provide for an appropriate range and mix of housing options and densities to meet projected market-based and affordable housing needs 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 and which aligns with applicable housing and homelessness plans. However, where planning is conducted by an upper-tier municipality, the upper-tier municipality in consultation with the lower-tier municipalities may identify a higher target(s) which shall represent the minimum target(s) for these lower-tier municipalities;
- b) permitting and facilitating:
  - 1. all housing options required to meet the social, health, economic and well-being requirements of current and future residents, including special needs requirements and needs arising from demographic changes and employment opportunities; and
  - 2. all types of residential intensification, including additional residential 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;
- e) requiring transit-supportive development and prioritizing intensification, including potential air rights development, in proximity to transit, including corridors and stations; and
- f) 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.

### **Norfolk County Official Plan**

The lands are designated Urban Residential in the Norfolk County Official Plan.

The subject lands are designated “Urban Residential” in the Official Plan. Section 5.3.1 states, that the following shall be the policy of the County

“a) Housing shall, in part, be provided through urban residential intensification, which may include any of the following:

## **Privileged Information and Without Prejudice**

- i) small scale intensification through modifications to an existing dwelling to include a second unit or construction of a new building containing one or two units;
- ii) infill development and residential development of vacant land or underutilized land in existing neighbourhoods; and/or
- iii) redevelopment which includes either the replacement of existing residential uses with compatible new residential developments at a high density or the replacement of non-residential uses with compatible residential or mixed use development with a residential component.”

Section 4.8, Potentially Contaminated Sites, states that the following shall be the policy of the County:

- a) The County encourages the identification of contaminated sites, their remediation, and appropriate redevelopment, in accordance with the *Environmental Protection Act* and its regulations and in accordance with the procedures and the policies of this Plan.
- b) Where the development or redevelopment of land involves the change of use of the property to a more sensitive use, a Record of Site Condition shall be completed by a qualified person and filed on the Brownfields Environmental Site Registry, in accordance with the requirements of *Ontario Regulation 153/04*, before the issuance of a building permit for the proposed use. The issuance of any building permit for the proposed use shall also be consistent with any certificate of property use or order issued for the property on the Environmental Site Registry.
- c) The County shall ensure that the decommissioning and remediation of contaminated sites are completed in an environmentally responsible manner.
- d) Norfolk County is reliant on ground water sources for drinking water. The County shall require that all environmental remediation of contaminated sites be carried out to achieve potable ground water site condition standards as established by the Ministry of the Environment and Climate Change.
- e) The County may prepare community improvement plans for known contaminated properties, in accordance with the applicable policies of this Plan, and may consider a variety of incentives to encourage the remediation and redevelopment of these sites.

Based on the information provided in the pre-consultation meeting it appears that the proposal meets the intent of the Norfolk County Official Plan.

## Privileged Information and Without Prejudice

### Norfolk County Zoning By-Law 1-Z-2014

Under the Norfolk County Zoning By-Law 1-Z-2014, the subject lands are zoned Urban Residential Type 6 Zone (R6) and Urban Residential Type 6 Holding Zone R6(H).

Section 1.4.4 Establishment of Holding Zones states, "Pursuant to Section 36 of the Ontario Planning Act, holding Zones are hereby established by the use of the symbol "H" as a suffix to the Zone symbols in Subsection 1.4.1. Land subject to the symbol "H" shall not be used, nor any building or structure used, altered or erected except in accordance with the Zone applied thereon and until the "H" is removed by an amendment to this By-Law.

Section 5.6.1 of Norfolk County Zoning By-Law 1-Z-2014 outlines the permitted uses. They are as follows:

In an R6 Zone, no land, building or structure shall be used except in accordance with the following uses:

- a) dwelling, apartment
- b) home occupation
- c) retirement home.

Section 5.6.2 outlines the Provisions in the R6 Zone.

In an R6 Zone, no building or structure shall be erected or altered except in accordance with the following provisions:

- a) minimum lot frontage: 30 metres
- b) minimum front yard: 3 metres
- c) minimum exterior side yard: 3 metres
- d) minimum interior side yard: 5 metres
- e) minimum rear yard: 9 metres
- f) maximum building height: eight (8) stories
- g) maximum floor area ratio:
  - i) four (4) storey building 0.72
  - ii) five (5) storey building 0.79
  - iii) six (6) storey building 0.86
  - iv) seven (7) storey building: 0.9
  - v) eight (8) storey building 1

Section 2.87 of the Norfolk County Zoning By-Law 1-Z-2014 defines "**Long-Term Care Facility**" shall mean a building wherein lodging, meals and nursing care are provided in a supervised living environment for individuals. This definition does not include a *retirement home* or senior's apartments.

Section 2.144 of the Norfolk County Zoning By-Law 1-Z-2014 defines "**Retirement Home**" shall mean a multiple *dwelling* where all *dwelling units* do not contain full kitchens but where the *building* provides communal facilities such as kitchen/dining facilities, laundry facilities, lounges and where the residents are supervised in their daily

## **Privileged Information and Without Prejudice**

living activities. A *retirement home* shall not be considered a *long-term care facility*, emergency shelter, lodging house or any other facility which is licensed, approved or regulated under any general or special Act.

Therefore, the use is not permitted in the R6 Zone. To enable the use, site specific zoning may be necessary.

### **Site Plan Control**

The subject lands are under site plan control. A high standard of design will be required for this location. The following is required to be included on the future site plan submission:

- All measurements in metric
- Key map
- Scale, legend and north arrow
- Legal description and municipal address
- Development name
- Drawing title, number, original date and revision dates
- Owner's name, address and telephone number
- Engineer's name, address and telephone number
- Professional engineer's stamp
- Existing and proposed easements and right of ways
- Zoning compliance table – required versus proposed
- Parking space totals – required and proposed
- All entrances to parking areas marked with directional arrows
- All dimensions of the subject lands
- Dimensions and setbacks of all buildings and structures
- Gross, ground and useable floor area
- Lot coverage
- Floor area ratio
- Building entrances, building type, height, grades and extent of overhangs
- Names, dimensions and location of adjacent streets including daylighting triangles
- Driveways, curbs, drop curbs, pavement markings, widths, radii and traffic directional signs
- All exterior stairways and ramps with dimensions and setbacks
- Retaining walls including materials proposed
- Fire access and routes
- Location, dimensions and number of parking spaces (including visitor and accessible) and drive aisles
- Location of mechanical room, and other building services (e.g. A/C, HRV)
- Refuse disposal and storage areas including any related screening (if indoors, need notation on site plan)
- Winter snow storage location

## **Privileged Information and Without Prejudice**

- Landscape areas with dimensions (a significant amount of landscaping is required)
- Natural features, watercourses and trees
- Fire hydrants and utilities location
- Fencing, screening and buffering – size, type and location
- All hard surface materials
- Light standards and wall mounted lights (plus a note on the site plan that all outdoor lighting is to be dark sky compliant)
- Signs
- Sidewalks and walkways with dimensions
- Pedestrian access routes into site and around site
- Bicycle parking
- Architectural elevations of all building sides

## **Agreements**

The requirements for a development agreement include the following:

- Additional user fees and performance securities
- Current Property Identification Number (PIN) (can be obtained at local registry office or your legal representative)
- Owner's Commercial General Liability Insurance to be obtained and kept in force during the term of the agreement:
- Certificate of Insurance for Professional Liability and/or Errors and Omissions coverage for surveyor and engineer
- Postponement of Interest (if there are mortgagees / charges on your property identifier – your legal representative can obtain from your bank or financial institution)
- Transfers/Easements and final reference plan for any easements or lands to be conveyed

Annette Helmig, will lead you throughout the Agreement and Performance Securities processes.

Annette Helmig  
Agreement and Development Coordinator  
Extension 1849  
[Annette.Helmig@norfolkcounty.ca](mailto:Annette.Helmig@norfolkcounty.ca)

## **Current Fees**

Please note that the fees listed below are subject to change. The \$372 pre-consultation fee is credited against future planning applications.

Consent: \$2,761.00

Surplus Farm Dwelling Consent and Zoning Amendment: \$3,301.00

Minor Variance: \$1,529.00



## **Privileged Information and Without Prejudice**

Zoning Amendment – Regular: \$3,727.00  
Zoning Amendment – Major \$5,387.00  
Zoning Amendment – Removal of Holding, Temporary Use Extensions, Down Zoning, Garden Suite 20 year reapplication: \$586.00  
Official Plan Amendment – Regular: \$3,894.00  
Official Plan Amendment – Major: \$5,942.00  
Official Plan and Zoning Amendments Combined – Regular: \$4,392.00  
Official Plan and Zoning Amendments Combined – Major: \$8,627.00  
Site Plan – Regular: \$2,995.00  
Site Plan – Major: \$8,152.00  
Site Plan – Minor or Amendment: \$1,079.00  
Site Plan – Exemption: No Fee  
Subdivision and/or Condominium (plus \$75 per lot): \$5,821.00  
Condominium Conversion: \$3,148.00  
Condominium Exemption from Draft Approval: \$1,816.00  
Communications Tower: \$1,330.00  
Deeming: \$1,816.00  
Green Energy Act Application: \$1,042.00  
Part Lot Control Exemption: \$2,086.00  
Lot Grading Review: \$110.00  
Peer Review: Full Cost Recovery  
Other Engineering Agreements: \$1,357.00  
Subdivision or Condominium Preservicing Agreement: \$1,284.00  
Site Plan Agreement: \$2,485.00  
Subdivision or Condominium Agreement: \$4,173.00  
Agreement Compliance Letter: \$96.00  
Public Works - Road Signs - Subdivisions (regulatory and non-regulatory per sign) (plus HST): \$318.00  
Revenue & Tax Service - Financial Administration: \$399.00  
Community Services - Installation of Trees - Per Tree: \$494.00  
Community Services- Cash in Lieu of Parkland 2016-126 (5% residential or mixed, 2% commercial or industrial): TBD  
Agreement Default: \$745.00  
Deferral or Inactive File: \$410.00  
Recirculation (at first and every recirculation): \$410.00  
Recirculation of Site Plan, Subdivision or Condominium (at third and every recirculation thereafter): \$745.00  
Draft Approval of Subdivision, Condominium, Site Plan or Part Lot Control Extensions: \$1,375.00  
Redline: \$1,095.00  
Civic Addressing – Assignment of Number and Sign Charges: \$107.00

Fabian Serra  
Planner  
Extension 1834  
[fabian.serra@norfolkcounty.ca](mailto:fabian.serra@norfolkcounty.ca)

**Privileged Information and Without Prejudice**

**Development Engineering**

<b>Development Engineering requirements to proceed</b> The below requirements are to be submitted as part of the Planning application.	<b>Required at OPA/ Zoning Stage</b>	<b>Required at Site Plan Stage</b>	<b>Potentially Required (See Notes Section)</b>
<b>General Requirements</b>			
Concept Plan		X	
Area Rough Grading Plan			X <sup>1</sup>
Lot Grading Plan		X	
Siltation and Erosion Control Plan		X	
General Plan of Services		X	
Plan and Profile Drawings			X <sup>2</sup>
Utility Plan		X	
Geotechnical Report			X <sup>3</sup>
Functional Servicing Report		X	
<b>Water Servicing Requirements</b>			
Extension of Watermain			X <sup>4</sup>
Easement and/or Block Registration			X <sup>5</sup>
Disconnection of Water Service(s) to Property Line			X <sup>6</sup>
Disconnection of Water Service(s) to Main			X <sup>7</sup>
Water Modelling (County Consultant)		X	
Backflow Preventer (RPZ)		X	
<b>Sanitary Servicing Requirements</b>			
Disconnection of Sanitary Service(s) to Property Line			X <sup>8</sup>
Disconnection of Sanitary Service(s) to Main			X <sup>9</sup>
Easement and/or Block Registration			X <sup>10</sup>
Sanitary Modelling (County Consultant)		X	
Property Line Inspection Maintenance Hole		X	
<b>Storm Water Servicing Requirements</b>			
Storm Water Management Design Report (including calculations)		X	

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Storm Water Drainage Plan		X	
Establish/Confirm Legal and Adequate Outlet		X	
Anticipated Flow/Analysis to Receiving Collection System		X	
Easement and/or Block Registration			X <sup>11</sup>
<b>Transportation Requirements</b>			
Traffic Impact Study		X	
Improvements to Existing Roads & Sidewalk (urbanization, pavement structure, widening sidewalk replacement, upgrades, extension and accessibility)		X	

#### General Notes:

1. Securities will be required. 10% of site works and 100% of works within the right-of-way. This is to be provided in a security schedule.
2. Recommendations from all reports / modelling must be incorporated into the design. All reports and drawings are to be signed and sealed by a Professional Engineer.
3. All applicable permits and inspections to be issued by Public Works.
4. Any required infrastructure to facilitate development will be at the developer's expense.
5. As per Norfolk County By-law 2013-65, only one domestic water service pipe shall be installed per condominium corp.
6. Any additional sanitary service connections will require approval from Public Works.
7. Water and sanitary modelling is to be completed by Norfolk County's consultant at the developer's expense.
8. Norfolk County's Design Criteria can be provided.
9. Traffic Impact Study will be required as per Norfolk County's ISMP Appendix J – TIS Guidelines. These guidelines can be provided. Criteria for the Traffic impact study can be provided.
10. As-constructed drawings are available upon request.
11. Potential to have design peer reviewed by a third-party consultant at the discretion of Norfolk County, at the Owner's expense.
12. The existing bollards and retaining wall on Queen Street must be fully removed. A new barrier curb and sidewalk must be installed on Queen Street to the satisfaction of Norfolk County.

## **Privileged Information and Without Prejudice**

### **General Requirements Potentially Required Notes:**

1. Area rough grading plan must be submitted for cut/fill in excess of 0.5m
2. Plan and Profile Drawings will be required to show the connection to the existing municipal infrastructure on Queen Street and/or Kars Street only.
3. A Geotechnical Report must be submitted if storm water management practices involving infiltration are proposed (Ex. infiltration galleries, drywells, etc.)
4. Existing watermain on Kars Street may need to be upgraded depending on watermain supply connection point to the development and water modelling results. All associated watermain upgrades, including cost to accommodate the development must be the responsibility of the developer.
5. Preliminary investigation of As Constructed drawings show an existing watermain on a closed section of Kars Street that may be subject to an existing easement.
6. It shall be the developer's responsibility to satisfy themselves that there is an adequate water service to the proposed development and all associated costs of construction for upgrades to existing and new infrastructure shall be the responsibility of the developer.
7. It shall be the developer's responsibility and at the request of Public Works that existing water services not intended to be used by the development shall be fully removed from property line to the watermain.
8. It shall be the developer's responsibility to satisfy themselves that there is an adequate sanitary service to the proposed development and all associated costs of construction for upgrades to existing and new infrastructure shall be the responsibility of the developer.
9. It shall be the developer's responsibility and at the request of Public Works that existing sanitary services not intended to be used by the development shall be plugged by lining. Plugged at property line. Capped and filled.
10. Preliminary investigation of As Constructed drawings show an existing sanitary main on a closed section of Kars Street that may be subject to an existing easement.
11. Preliminary investigation of As Constructed drawings show an existing storm main on a closed section of Kars Street that may be subject to an existing easement.

Kevin Verkindt  
Development Technologist  
Extension 1703  
[Kevin.Verkindt@norfolkcounty.ca](mailto:Kevin.Verkindt@norfolkcounty.ca)

## **Building and By-Law**

### **Zoning Administrator:**

R6 (holding provision)

The concept meets the zone provisions of R6 without a special provision (not including the nursing home component).

By bylaw definitions;

Front lot line = Kars St

Ext lot line = Queen St

Rear lot line= Robinson St

Interior lot line = other lot line facing MG zone

If a severance occurs, there might be a deficiency in rear yard setback. Other zoning considerations: parking requirements per Section 4.0 of Zoning Bylaw, this should be addressed if the proposal is below the required amount, also note site is subject to Special provisions 14.644 and 14.713 of the Zoning Bylaw which will need to be addressed.

Roxanne Koot

Zoning Administrator

Extension 1839

[Roxanne.Koot@norfolkcounty.ca](mailto:Roxanne.Koot@norfolkcounty.ca)

### **Building Inspector:**

If you have building related question, please contact Scott Northcott, Building Inspector III at 519-426-5870 ext. 1848 or [scott.northcott@norfolkcounty.ca](mailto:scott.northcott@norfolkcounty.ca)

### **Building Departments comments for site plan.**

- ☐ Location of fire department connection (Siamese) connection to building [OBC 3.2.5.16]
- ☐ Location of principal entrance/fire alarm annunciator panel [OBC 3.2.4.2]
- ☐ Location of fire hydrants to be indicated on existing streets [OBC 3.2.5]
- ☐ Location of barrier free path of travel, outside the building. [OBC 3.8.1.3]
- ☐ Exterior lighting is to comply with SB-10 requirements [OBC 12.2.1.1.(3)]

### **Building Permits**

- ☐ A completed Building Permit Application Form
  - o Commitment to general review signed by owner and all consultants
  - o Application MUST be signed by owner of the property/authorized agent
- ☐ Electronic PDF's of dimensioned construction drawings. PDF's are to be editable.

## **Privileged Information and Without Prejudice**

- ☐ Building code matrix
- ☐ Completed SB-10 report (energy efficiency),
- ☐ Structural, electrical, plumbing, mechanical design.
- ☐ Sprinkler System design to NFPA 13 standard.
- ☐ Standpipe System to NFPA 14 standard.
- ☐ Fire alarm system design to ULC S524 standard.
- ☐ Water and sewer connection permit (where required)
- ☐ Conservation authority construction permit (where required)
- ☐ Other applicable law (where required)
- ☐ Payment of ALL applicable fees
- ☐ Payment of applicable development charges.

Scott Northcott  
Senior Building Inspector  
Extension 1848  
[Scott.Northcott@norfolkcounty.ca](mailto:Scott.Northcott@norfolkcounty.ca)

## **Fire Department**

No comments received.

Scott Pipe  
Assistant Fire Chief  
Extension 2404  
[Scott.Pipe@norfolkcounty.ca](mailto:Scott.Pipe@norfolkcounty.ca)

## **Paramedic Services**

Please consider elevator size and access when designing the building. Given that the target user appears to be retirees and long term care, it can be presumed that paramedic services will be at the building more frequently than if the residents were a younger demographic. Residents will have to be moved via stretcher or while still in bed. Ease of access into the elevator will make this movement safer for everyone. The same consideration for building access and emergency parking for ambulances would be appreciated. If an overhang is planned for the driveway please be sure to make it high enough for ambulances to drive under without damaging the building or the ambulance.

Stuart Burnett  
Commander  
Extension 2429  
[Stuart.Burnett@norfolkcounty.ca](mailto:Stuart.Burnett@norfolkcounty.ca)

## **Privileged Information and Without Prejudice**

### **Parks, Facilities and Recreation**

Parkland dedication or cash-in-lieu of parkland is required prior to the registration of a site plan agreement or the registration of a plan of subdivision or condominium. It is not a development charge. Development charges are a fee required at the time of a building permit application.

Parks and Recreation will require 5% of the appraised value of the property prior to any construction, to be received prior to the registration of the site plan agreement. The Appraisal Report shall be the responsibility of the land owner. The appraiser must be approved by the County. The Appraisal Report will be reviewed by staff, and will notify the land owner of the required payment.

Todd Shoemaker  
Director, Parks and Recreation  
Extension 2202  
[Todd.Shoemaker@norfolkcounty.ca](mailto:Todd.Shoemaker@norfolkcounty.ca)

### **Forestry**

Any existing roadside trees that are required to be removed to accommodate development will be removed at the developers expense and requires approval by the County Arborist prior to any work taking place.

A Tree Planting Plan will be required for the development and will include tree planting along the frontage of all County roads, adhering to the Street Tree Planting guidelines (attached). The developer will pay to the County a fee for each tree that is designed to be planted on County owned lands (County R.O.W). The fee is established in Norfolk County's User Fee By-law (approximately \$485/tree). The developer should accommodate tree planting and landscaping on the interior of the development property as well. Norfolk County does not have design criteria for tree planting for an apartment development. Norfolk County will retain 100% security for any proposed on-site tree planting and landscaping (estimate provided by developer). All landscaping and tree planting plans will be submitted as part of the Site Plan drawings and are subject to approval by Norfolk County.

Adam Biddle  
Supervisor, Forestry  
Extension 2224  
[Adam.Biddle@norfolkcounty.ca](mailto:Adam.Biddle@norfolkcounty.ca)

## **Privileged Information and Without Prejudice**

### **Corporate Support Services – Realty Services**

If a Site Plan Agreement is to be registered on title, the County will require a postponement agreement from the current mortgage holder, Computershare Trust Company of Canada, and any new mortgage holder. The property owner should be advised to seek the postponement as early in the process as possible to ensure it is ready for registration when the Site Plan Agreement is ready to be registered.

The drawings attached to this proposal indicate the possibility of including the north-east portion of the current parking area. Under the terms of the lease agreement that County has with the property owner, the County is entitled to 60 parking spaces. These spaces consist of the majority of the perimeter parking spots, including those shown in the drawings attached. Signage is in place indicating the County's parking spaces.

Lydia Harrison  
Realty Services Supervisor  
Extension 1323  
[Lydia.Harrison@norfolkcounty.ca](mailto:Lydia.Harrison@norfolkcounty.ca)

#### **Housing Services:**

There is an acute need for additional higher density housing options in Norfolk County, and in particular Simcoe. Will these be rental units or condominium? There is a high demand for rental units in Simcoe, from affordable units to professionals seeking to relocate to Simcoe for work purposes.

### **Economic Development**

Supportive of the proposed use. Please contact us if you require further assistance in this development.

Chris Garwood  
Economic Development Supervisor  
Extension 1264  
[Chris.Garwood@norfolkcounty.ca](mailto:Chris.Garwood@norfolkcounty.ca)



NO.	REVISIONS	DATE
1.	CLIENT	4FEB2020
2.	CLIENT	19JUL2022
3.	CLIENT	14SEP2022
4.	CLIENT	20OCT2022
5.	CLIENT	7NOV2023
6.	CLIENT	24JAN2024
7.	CLIENT	25JULY2024

CITY	CITY	4FEB2020
TO	ISSUED	DATE

**GENERAL NOTES**

ALL DRAWINGS ARE THE PROPERTY OF THE DESIGNER AND THEY ARE NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN CONSENT FROM THE DESIGNER.

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS BEFORE COMMENCING WORK AND TO REPORT ANY DISCREPANCIES TO THE DESIGNER.

DO NOT SCALE DRAWINGS.

ALL CONSTRUCTION TO BE ACCORDING TO BEST COMMON PRACTICE AND CONFORM TO THE ONTARIO BUILDING CODE.



ONTARIO ASSOCIATION  
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73 ABILENE DR., TORONTO, ON, M9A 2N5  
Tel:(416)571-3493 Fax:(416)252-2893  
orest@stoyanovskyy.com www.stoyanovskyy.com

PROJECT

185 ROBINSON ST  
MIX-USE

185 ROBINSON ST.,  
SIMCOE, ONTARIO

DRAWING

GENERAL NOTES  
SITEPLAN

PROJECT NO  
20103

DRAWN  
R.C.

PLOTTED DATE  
FEB. 2020

SCALE  
AS NOTED

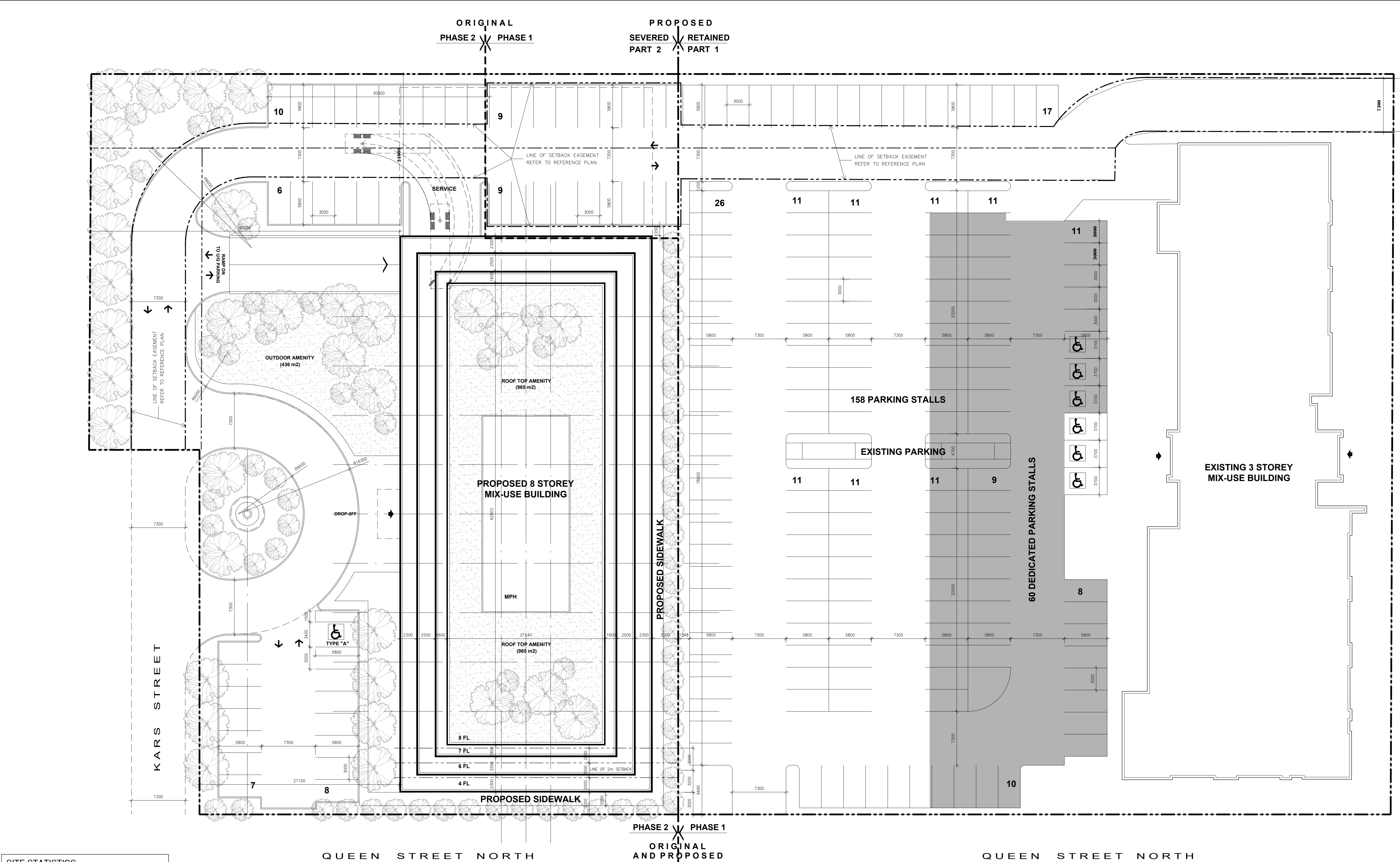
CHECKED  
R.C.

DRAWING NO

A00

OF

—



SITE STATISTICS		
TOTAL LOT AREA	17,049 m <sup>2</sup> (1.70 ha)	
SEVERED LOT AREA	7,293 m <sup>2</sup> (0.73 ha)	
RETAINED LOT AREA	9,756 m <sup>2</sup> (0.97 ha)	
ZONING	R6	
BUILDING HEIGHT	28.20 M	
LOT COVERAGE	-	
FLOOR AREAS:		
		# UNITS:
GROUND FLOOR (COM.)	2,290 m <sup>2</sup>	4
GROUND FLOOR (COM.)	300 m <sup>2</sup>	2
2ND FLOOR (APARTMENTS)	2,590 m <sup>2</sup>	22
3RD FLOOR (APARTMENTS)	2,590 m <sup>2</sup>	22
4TH FLOOR (APARTMENTS)	2,590 m <sup>2</sup>	22
5TH FLOOR (APARTMENTS)	2,165 m <sup>2</sup>	22
6TH FLOOR (APARTMENTS)	2,165 m <sup>2</sup>	22
7TH FLOOR (APARTMENTS)	1,775 m <sup>2</sup>	20
8TH FLOOR (APARTMENTS)	1,355 m <sup>2</sup>	13
TOTAL G.F.A.	17,820 m <sup>2</sup>	149
PARKING AT GRADE		31 STALLS
PARKING GARAGE P-1		69 STALLS
PARKING GARAGE P-2		69 STALLS
PARKING GARAGE P-3		69 STALLS
PARKING GARAGE P-4		69 STALLS
TOTAL PARKING PROVIDED		307 STALLS
SETBACKS		
	EXISTING TO REMAIN	
FRONT	3.0 M	
SIDE	3.5 M	
REAR	-	

2 SITE STATISTICS

A00

LAND USE	PERMITTED	PROPOSED
	Apartment, Dwelling Home Occupation Bedroom Home	Hotel, Store Office

PROVISIONS	REQUIREMENT	PROPOSED
LOT FRONTAGE (min.)	30 m	30.40 m
FRONT YARD (min.)	3 m	27.3 m
EXTENSION FOR YARD (min.)	3 m	12.6 m
EXTENSION SIDE YARD (min.)	3 m	3 m
REAR YARD (min.)	3 m	3.5 m
BUILDING HEIGHT (max.)	8 Storeys	8 Storeys
FAR FOR 8 STOREY BUILDING (max.)	1 FAR	2.5 FAR

This exterior wall of each floor of a building facing a street and located above four (4) storeys shall be stepped back 2m from the exterior wall of the 4th storey and each floor above an (8) storey shall be stepped an additional 2m from the exterior wall facing a street.

Where an R6 Zone abuts an Urban Residential Zone (R1A, R2, R3 or R3), no portion of an apartment dwelling shall exceed the height of a 45 degree angular plane originating at the lot line of the adjacent R1A, R2 or R3 Zone.

Proposal does not penetrate the angular plane.

ACCESSIBLE PARKING SPACE PROVISION TABLE	REQUIREMENT	PROPOSED
TYPE A - ACCESSIBLE SPACE	4	1 total spaces proposed - 3 spaces will be type A accessible space
TYPE B - ACCESSIBLE SPACE	1*	9 total spaces proposed - 4 spaces will be type B accessible space
*Where an uneven number of accessible parking spaces are required, the extra type B space may be changed to a type A space.		

PARKING SPACE PROVISION TABLE	REQUIREMENT	PROPOSED
RESIDENTIAL APARTMENT DWELLING	1.5 parking spaces for each dwelling unit + 215 visitor spaces required based on 143 residential units	219 spaces to be allocated to residential use
VISITOR	1 visitor space for every 3 dwelling units + 48 visitor spaces required based on 143 residential units	48 spaces to be allocated for visitors
RETAIL	1 parking space for every 30 square metres of usable floor area + 10 parking spaces based on 299.6 sq.m of retail G.F.A.	10 spaces to be allocated for retail uses
OFFICE	1 parking space for every 30 square metres of usable floor area + 30 parking spaces based on 894.8 sq.m of office G.F.A.	30 spaces to be allocated for office uses
TOTAL	303 spaces required	307 spaces proposed, proposal compliant

1 SITE PLAN

A00

1/16"=1'-0"


**GENERAL NOTES**

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ONTARIO ASSOCIATION  
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Tel:(416)571 3493 Fax:(416)252 2693  
orests@yahoo.com [www.stoyanovskyy.com](http://www.stoyanovskyy.com)

## DRAWING FLOOR PLANS

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**GENERAL NOTES**

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\_\_\_\_\_

PROPOSED TYP. FLOOR (5th-6th)

**PROPOSED 7th FLOOR**

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PRELIMINARY / 25 JULY 2024

**PROPOSED 8th FLOOR**

PROJECT NO 20103	DRAWING NO
DRAWN R.G.	<b>A02</b>
PLOTTED DATE AUG 2023	
SCALE AS NOTED	
CHECKED O.S.	
	OF — —

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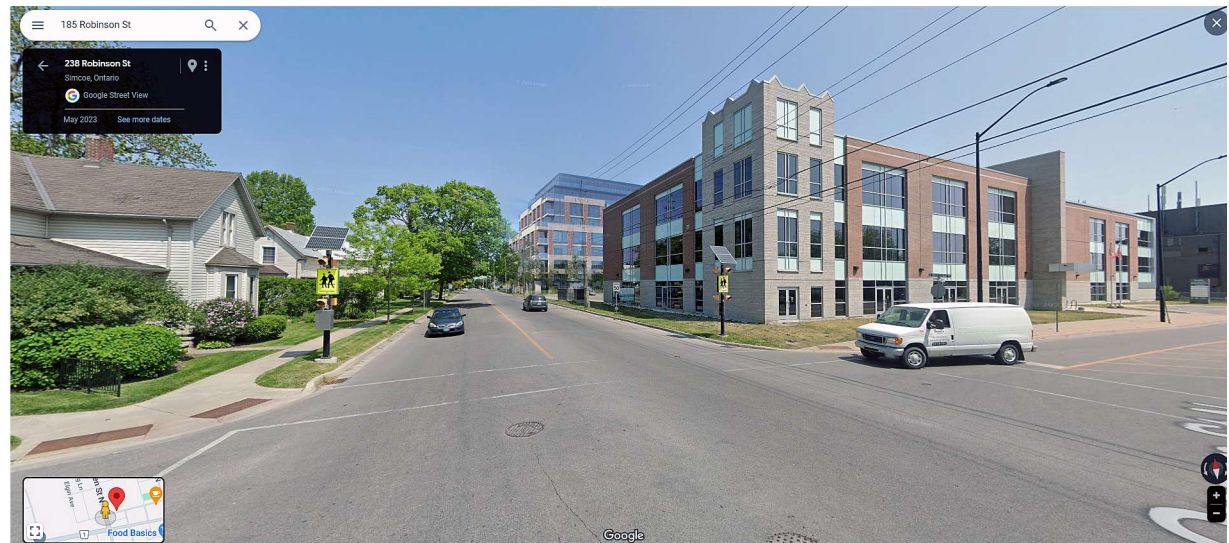
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Current View



Proposed View



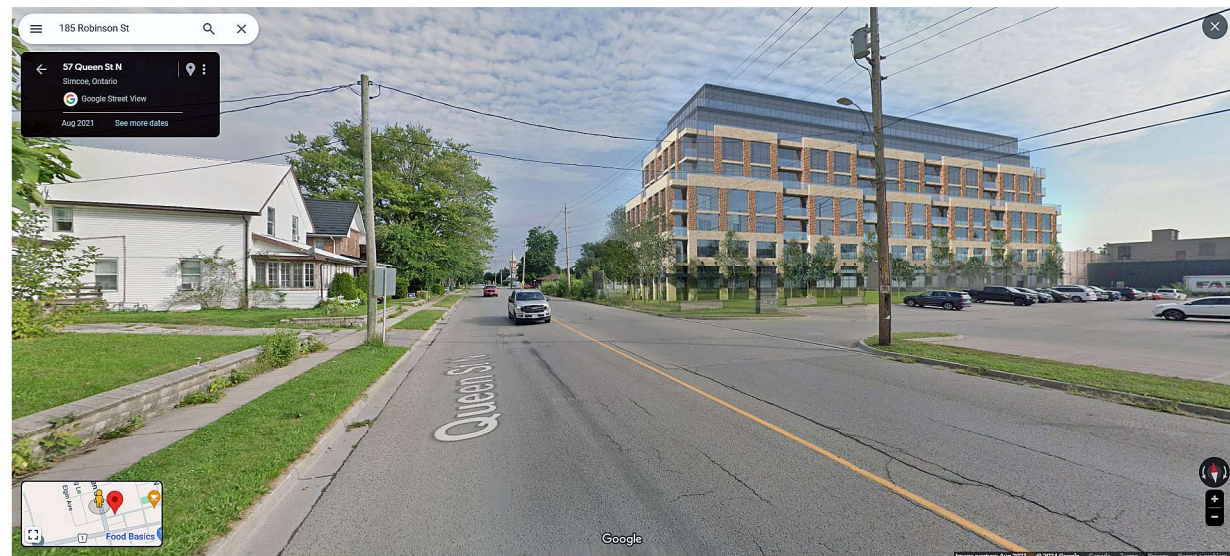
**185 Robinson St.**  
Simcoe, On

**Perspective View Looking North** 1  
Robinson & Queen St Intersection

Current View



Proposed View



**185 Robinson St.**  
Simcoe, On

**Perspective View Looking North** 2  
Queen St Looking North

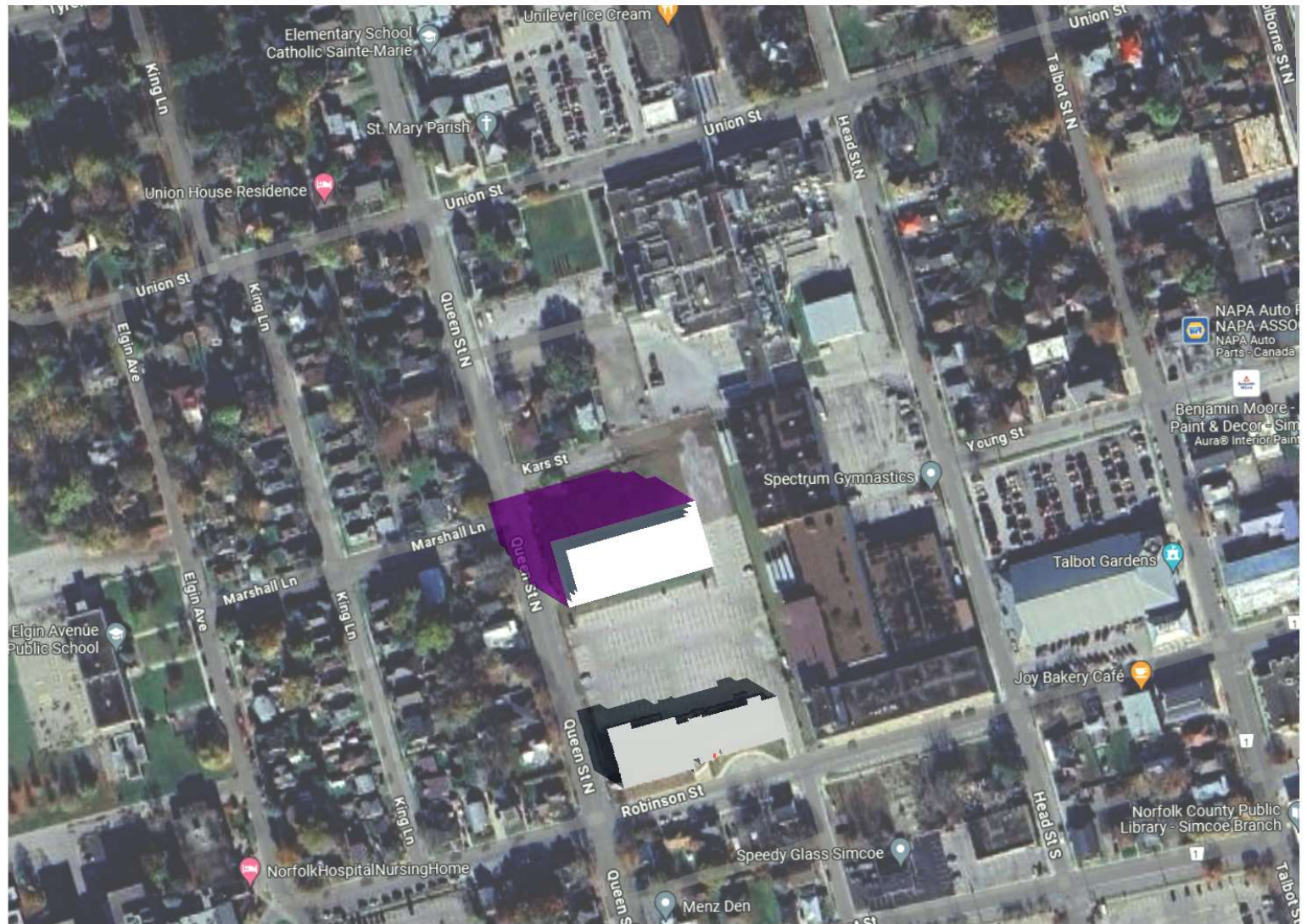




**185 Robinson St.**  
Simcoe, On

**Perspective View**  
Queen St Looking North





March 21 / 9:18am

## SHADOW STUDY

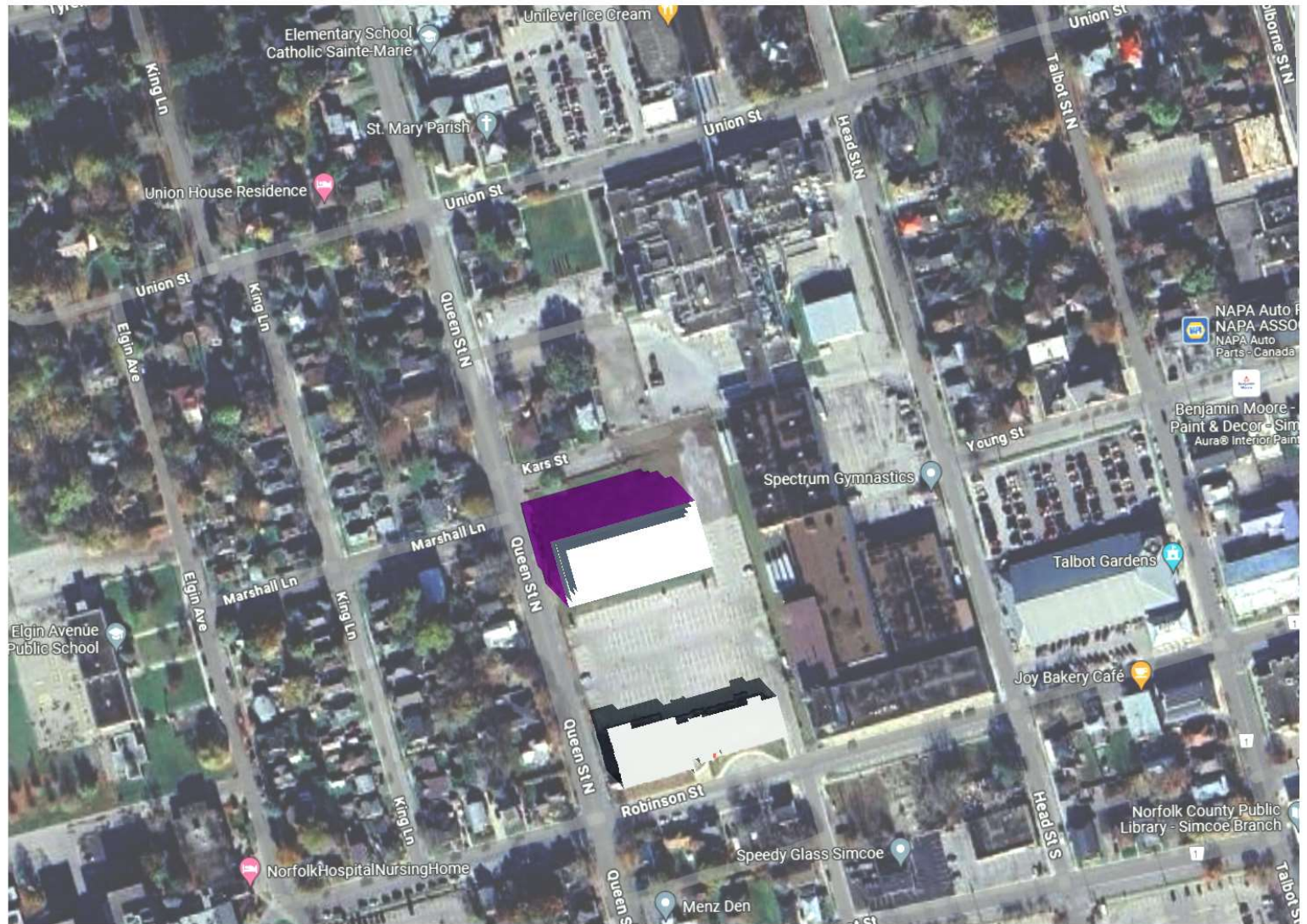


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





March 21 / 10:18am

## SHADOW STUDY

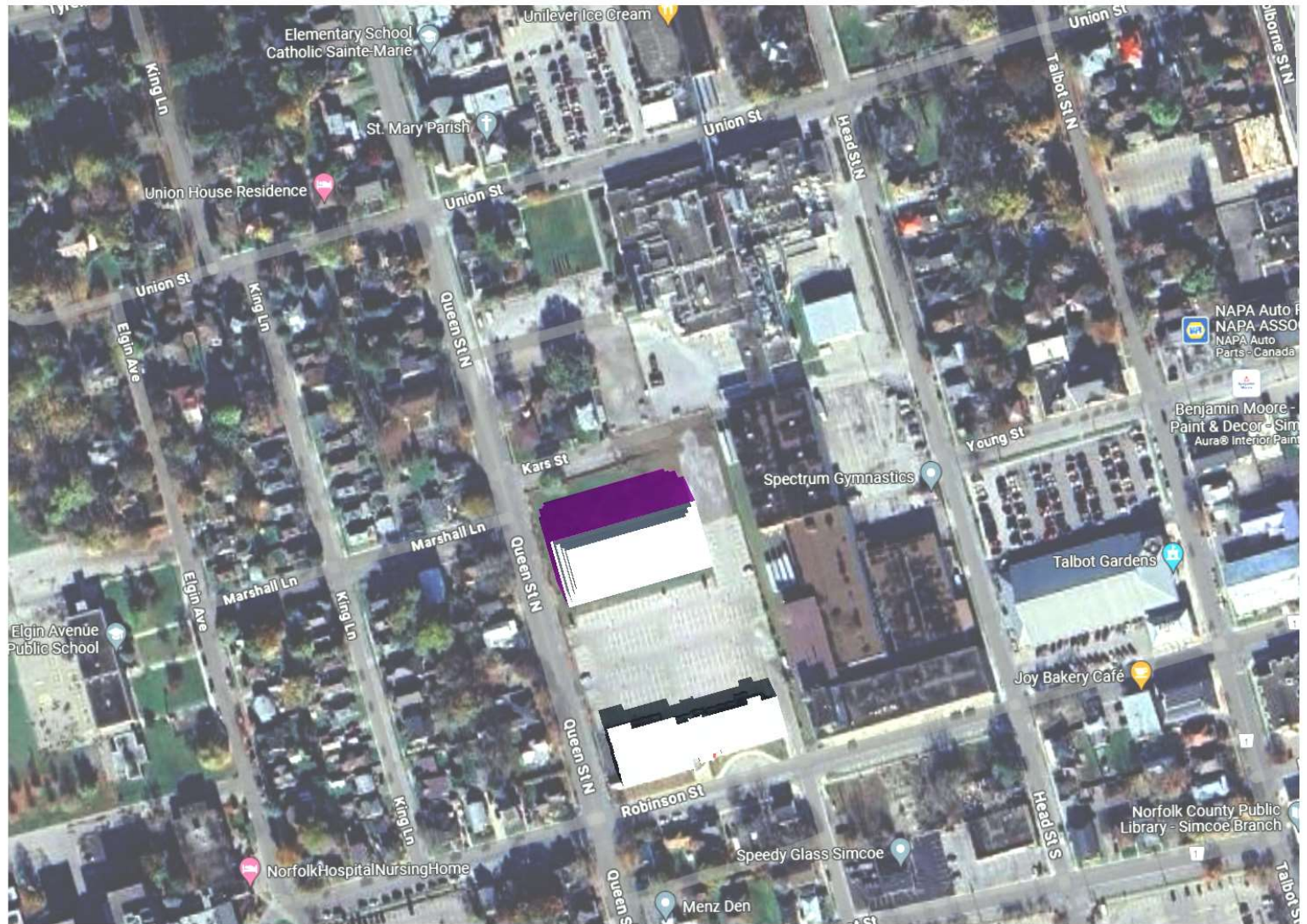


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





March 21 / 11:18am

## SHADOW STUDY

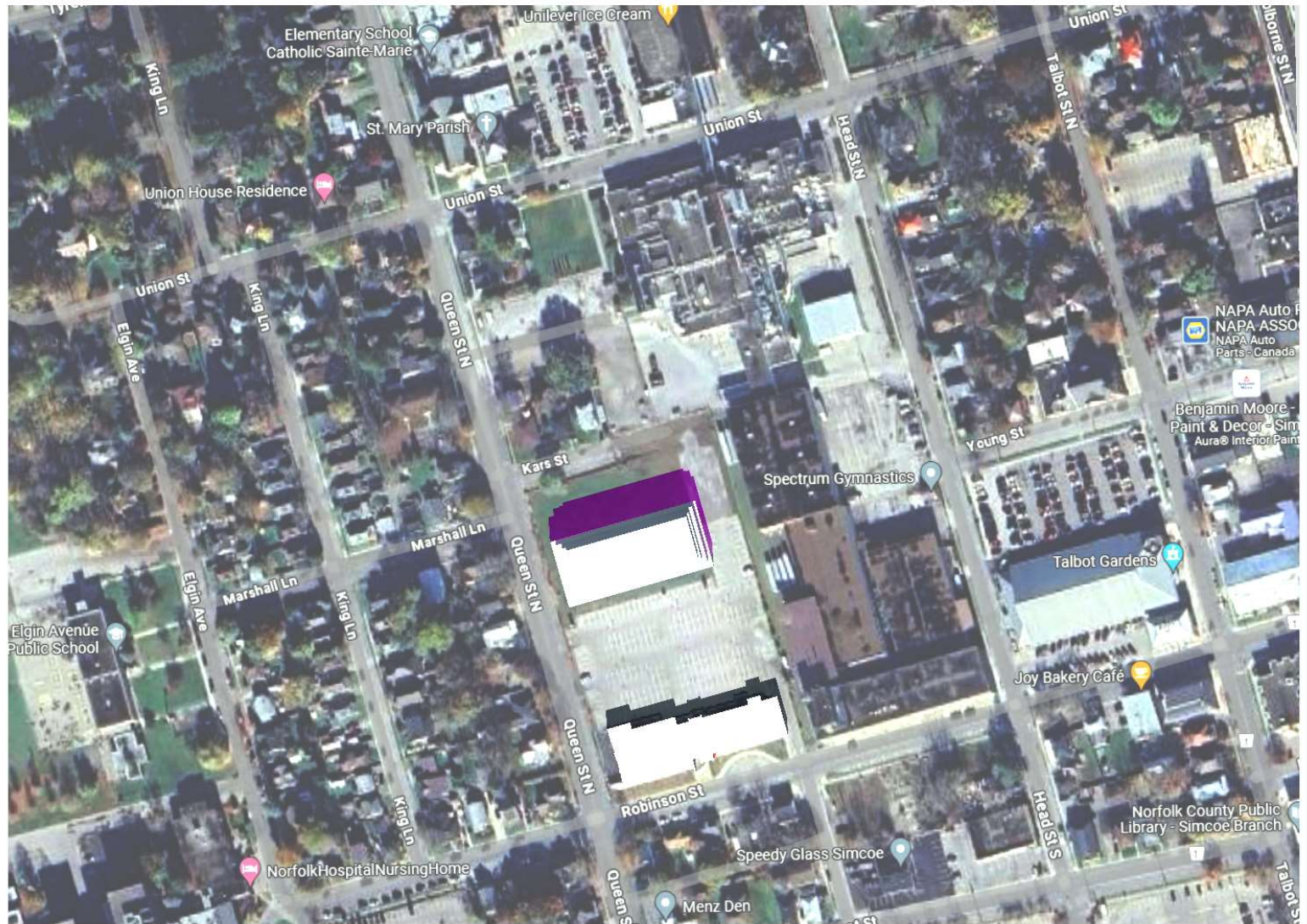


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





March 21 / 12:18pm

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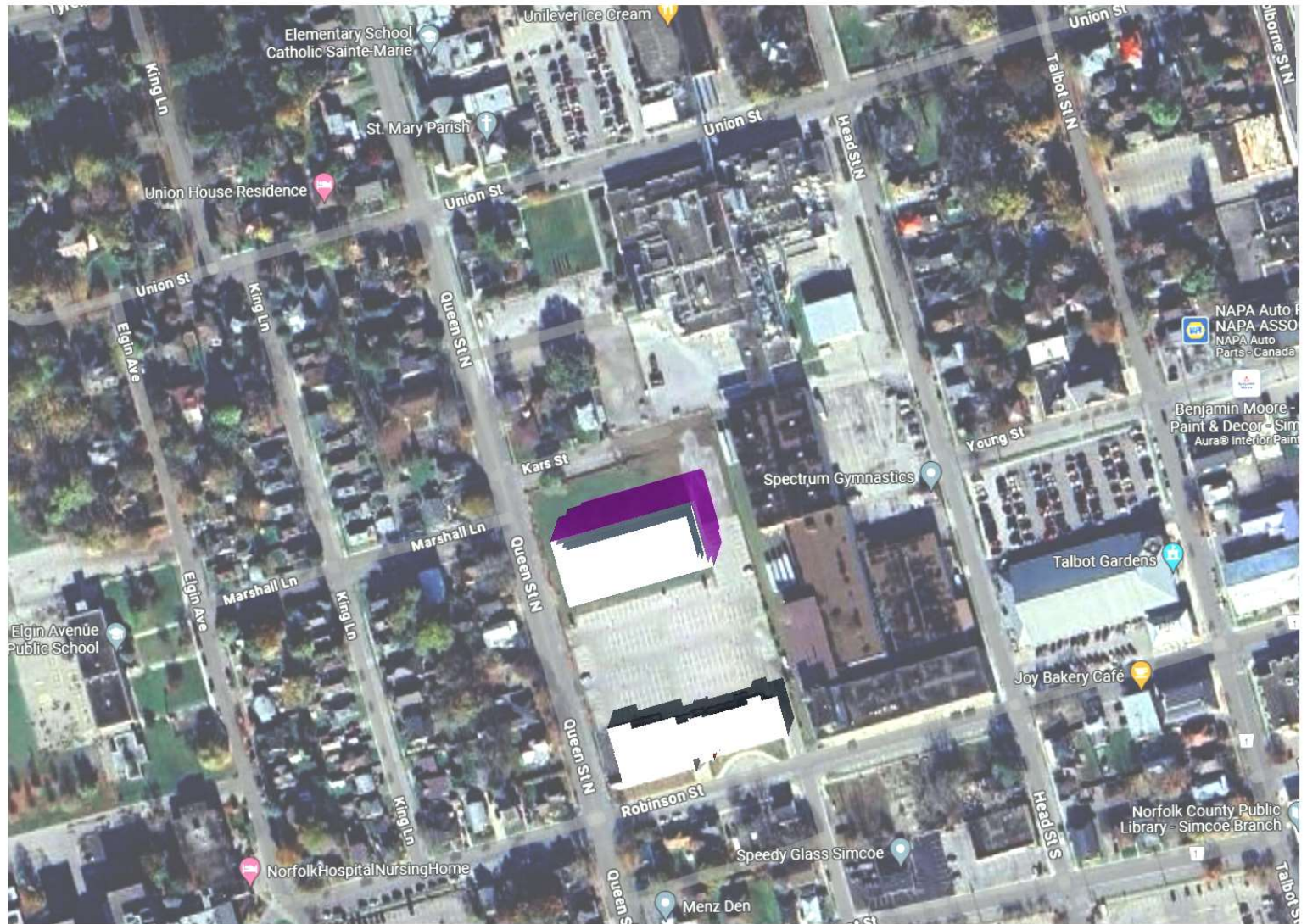


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185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





March 21 / 1:18pm

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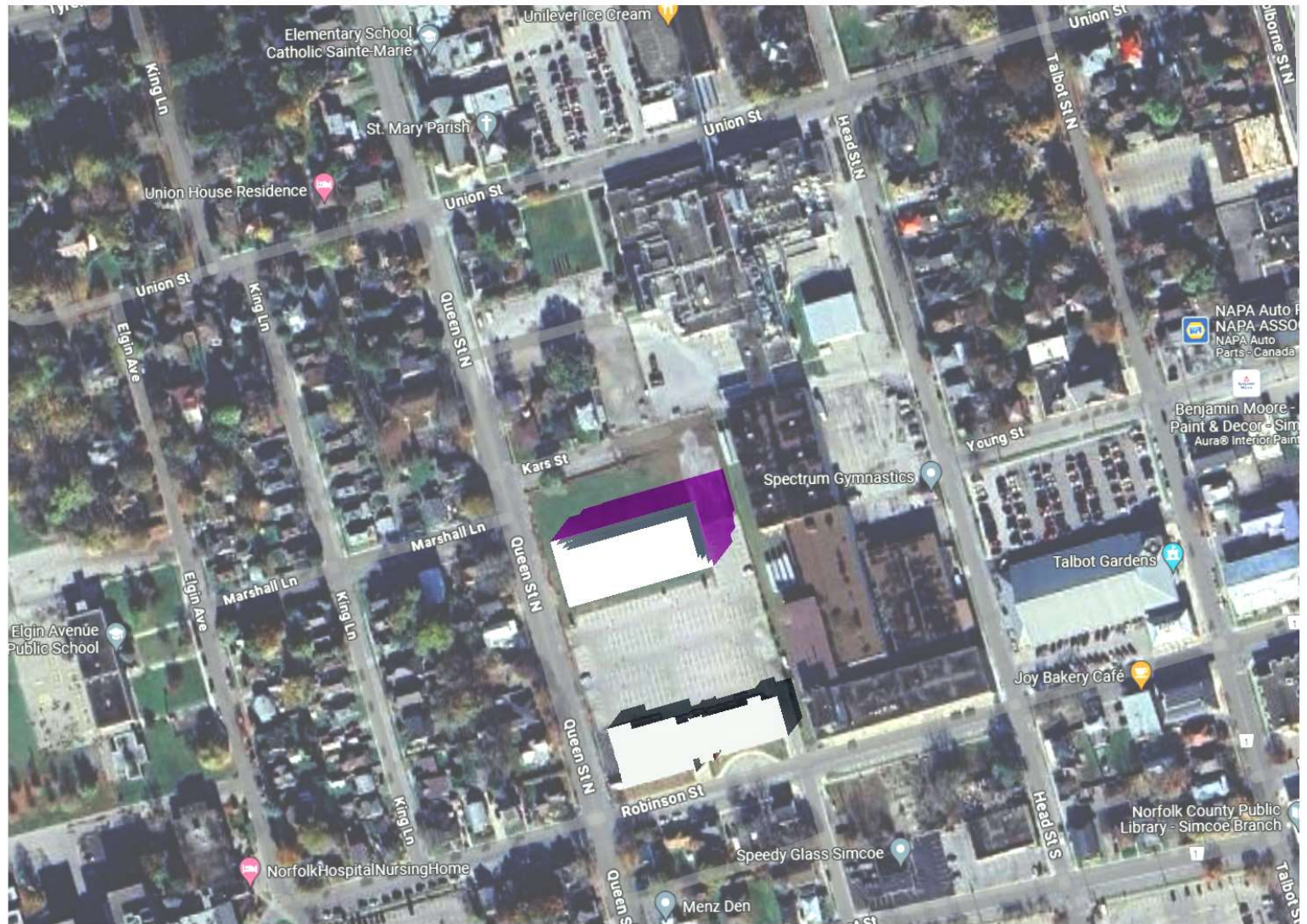


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SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





March 21 / 2:18pm

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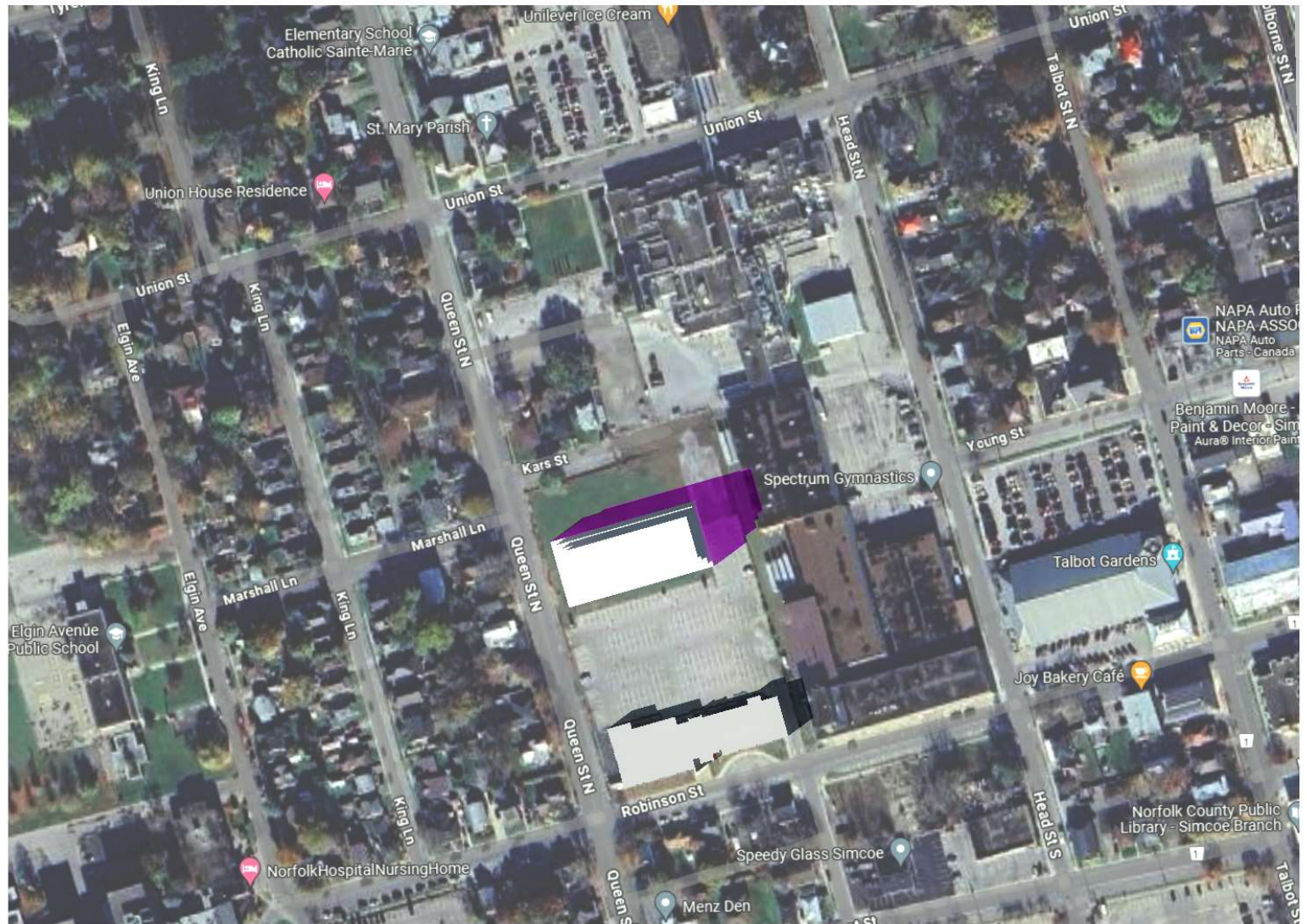


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185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





March 21 / 3:18pm

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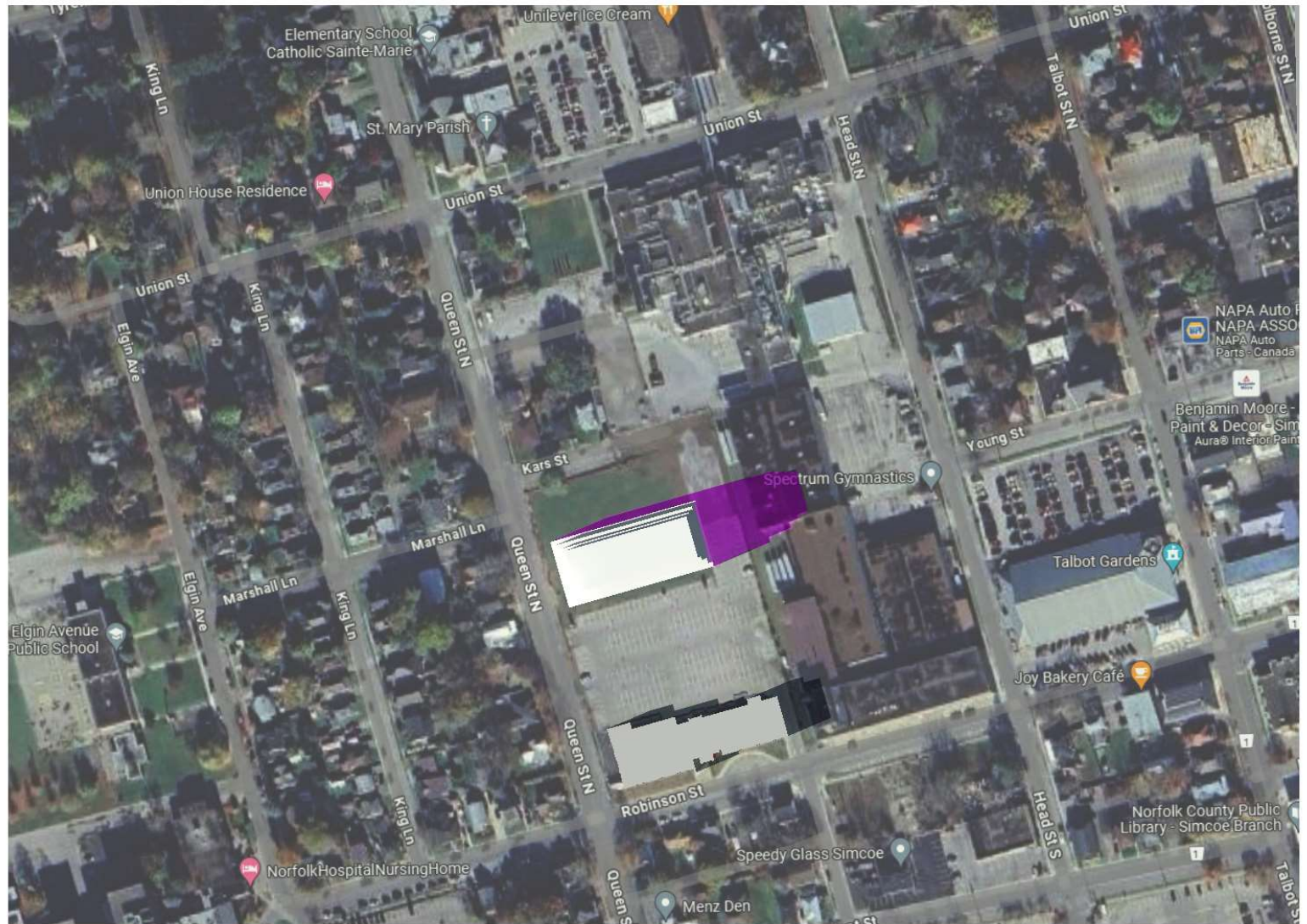


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STOYANOVSKYY  
ARCHITECTS





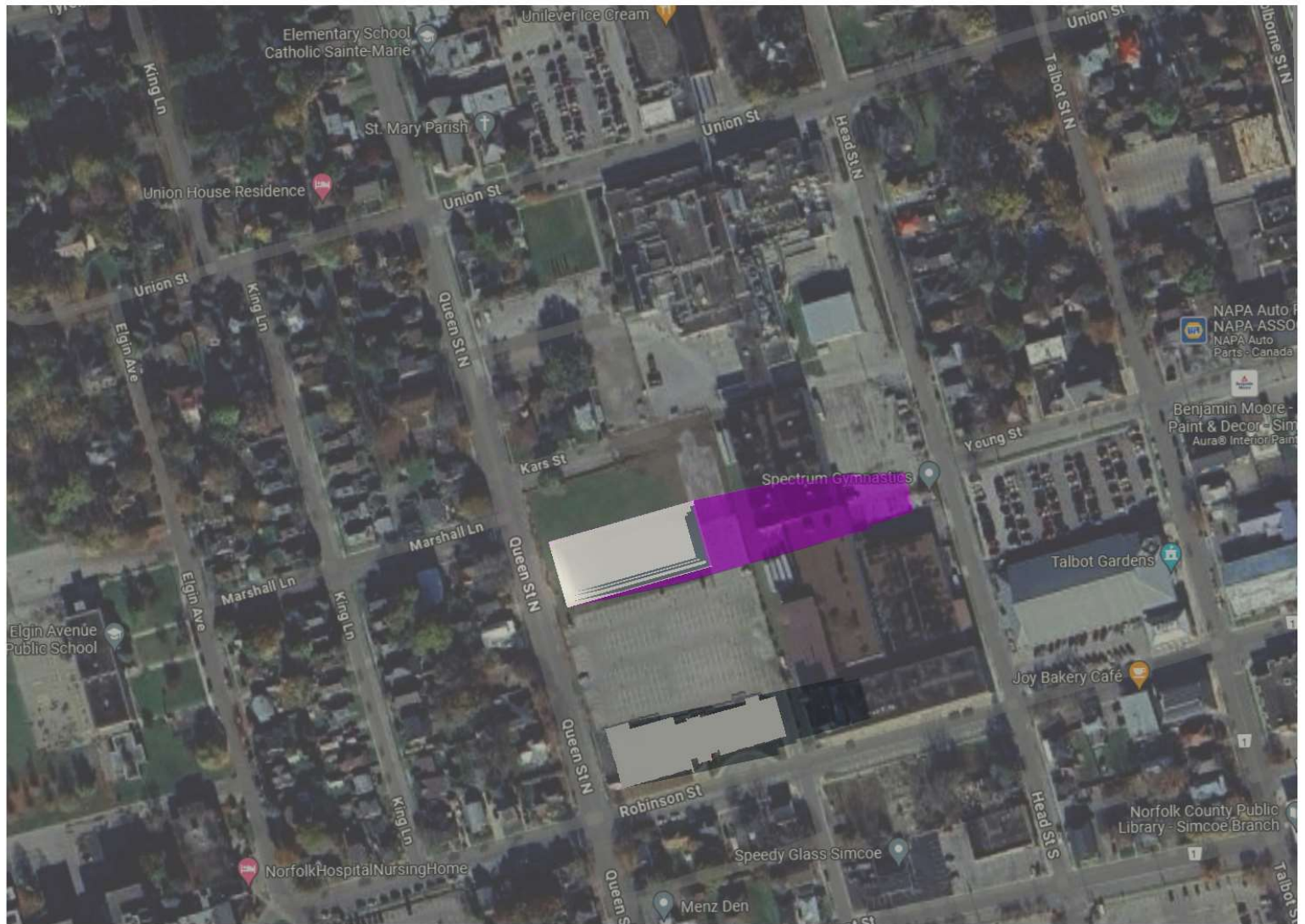
March 21 / 4:18pm

## SHADOW STUDY

Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS



March 21 / 5:18pm

## SHADOW STUDY



Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





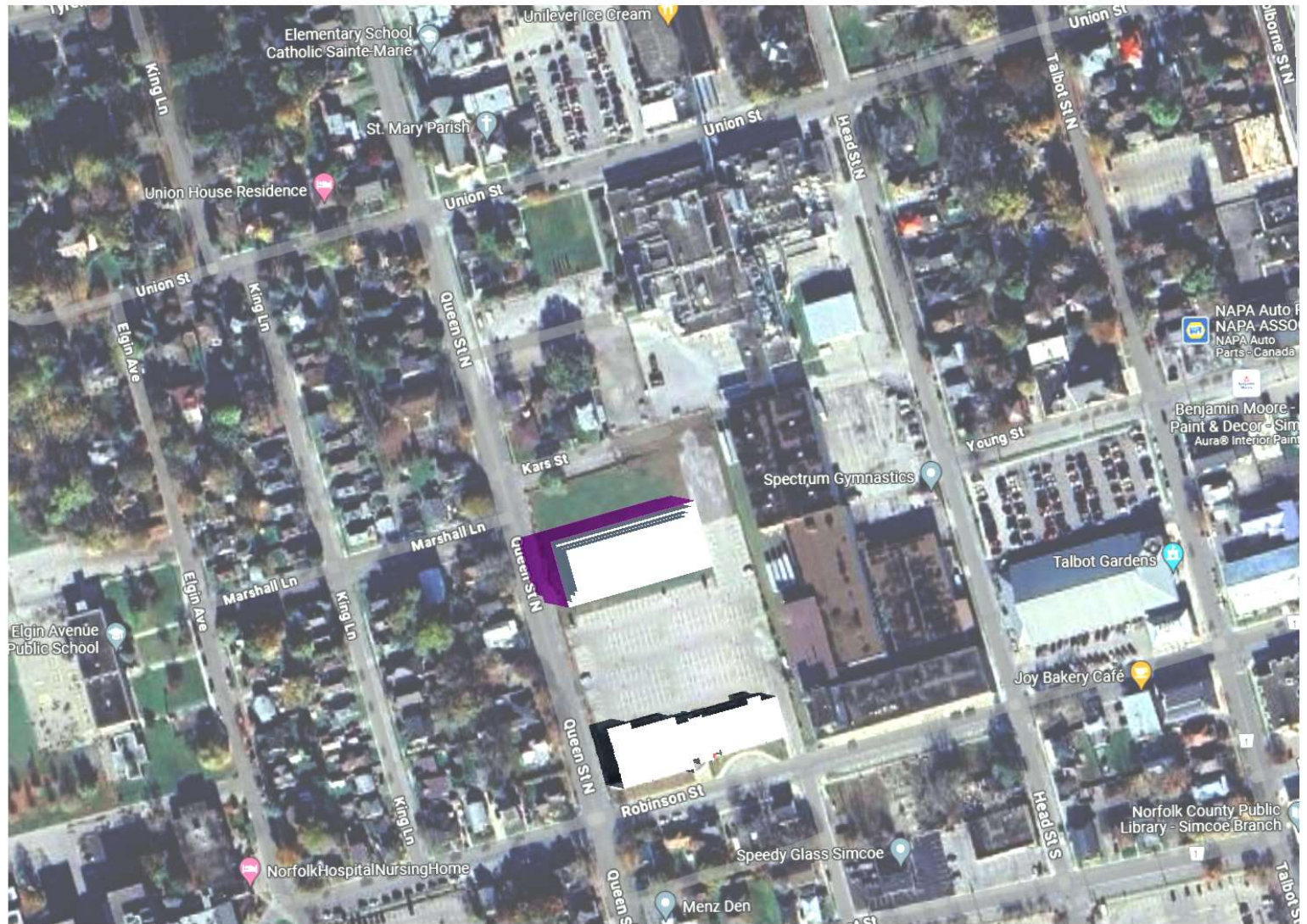
March 21 / 6:18pm

## SHADOW STUDY

 Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS



June 21 / 9:18am

## SHADOW STUDY

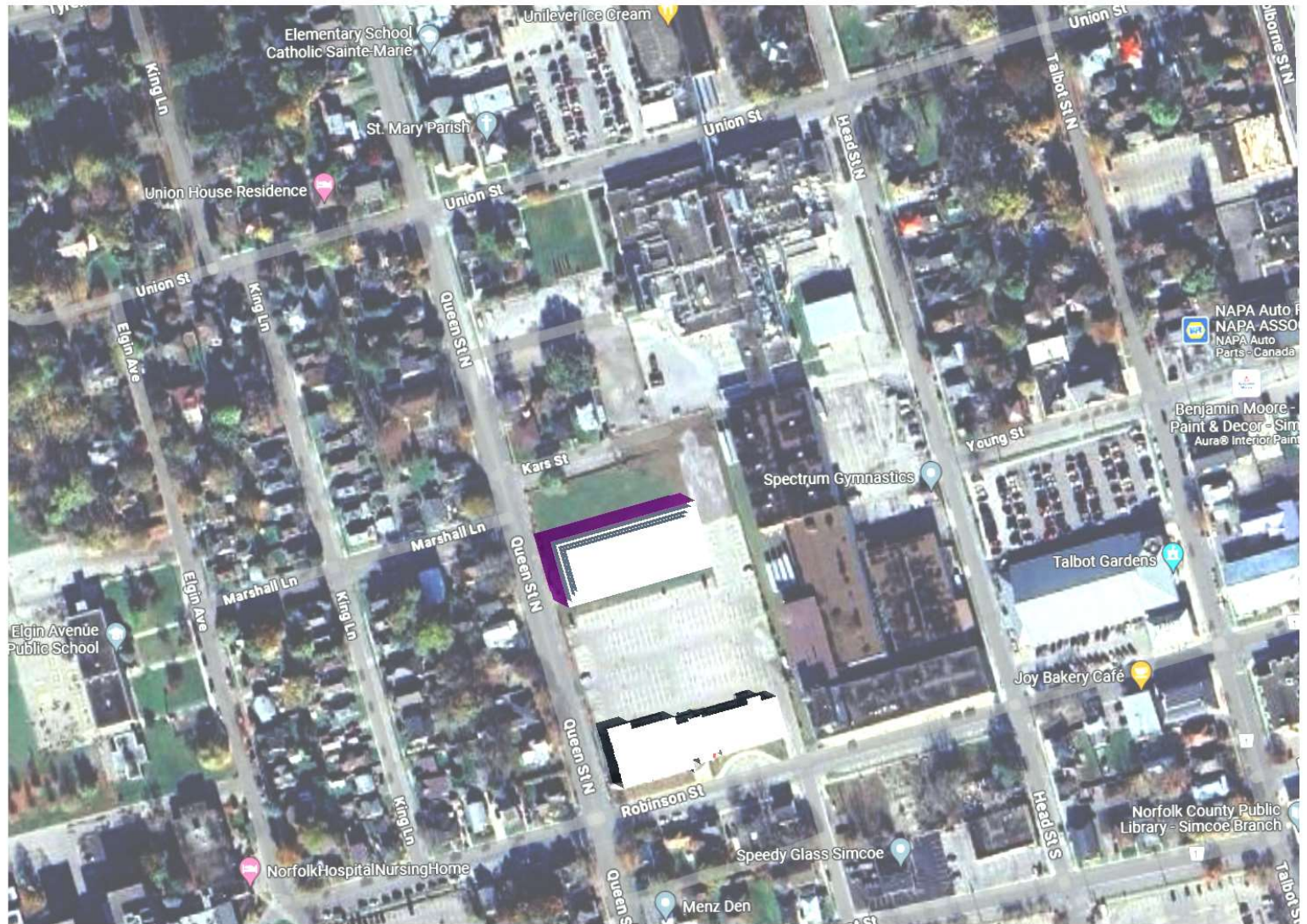


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





June 21 / 10:18am

## SHADOW STUDY



Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





June 21 / 11:18am

## SHADOW STUDY



Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
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June 21 / 12:18pm

## SHADOW STUDY



Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





June 21 / 1:18pm

## SHADOW STUDY



Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
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June 21 / 2:18pm

## SHADOW STUDY



Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





June 21 / 3:18pm

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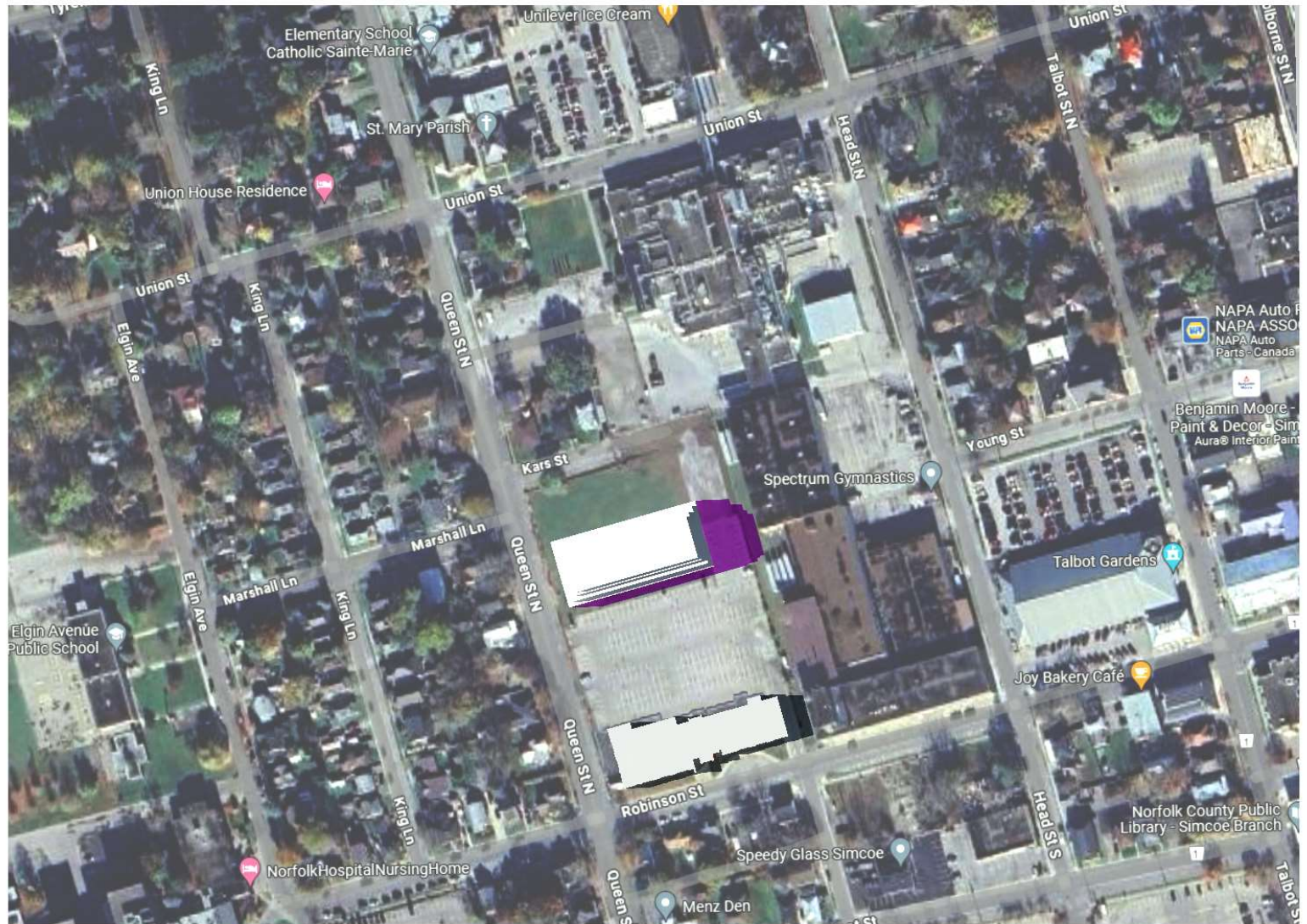


Proposed Shadow

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SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





June 21 / 4:18pm

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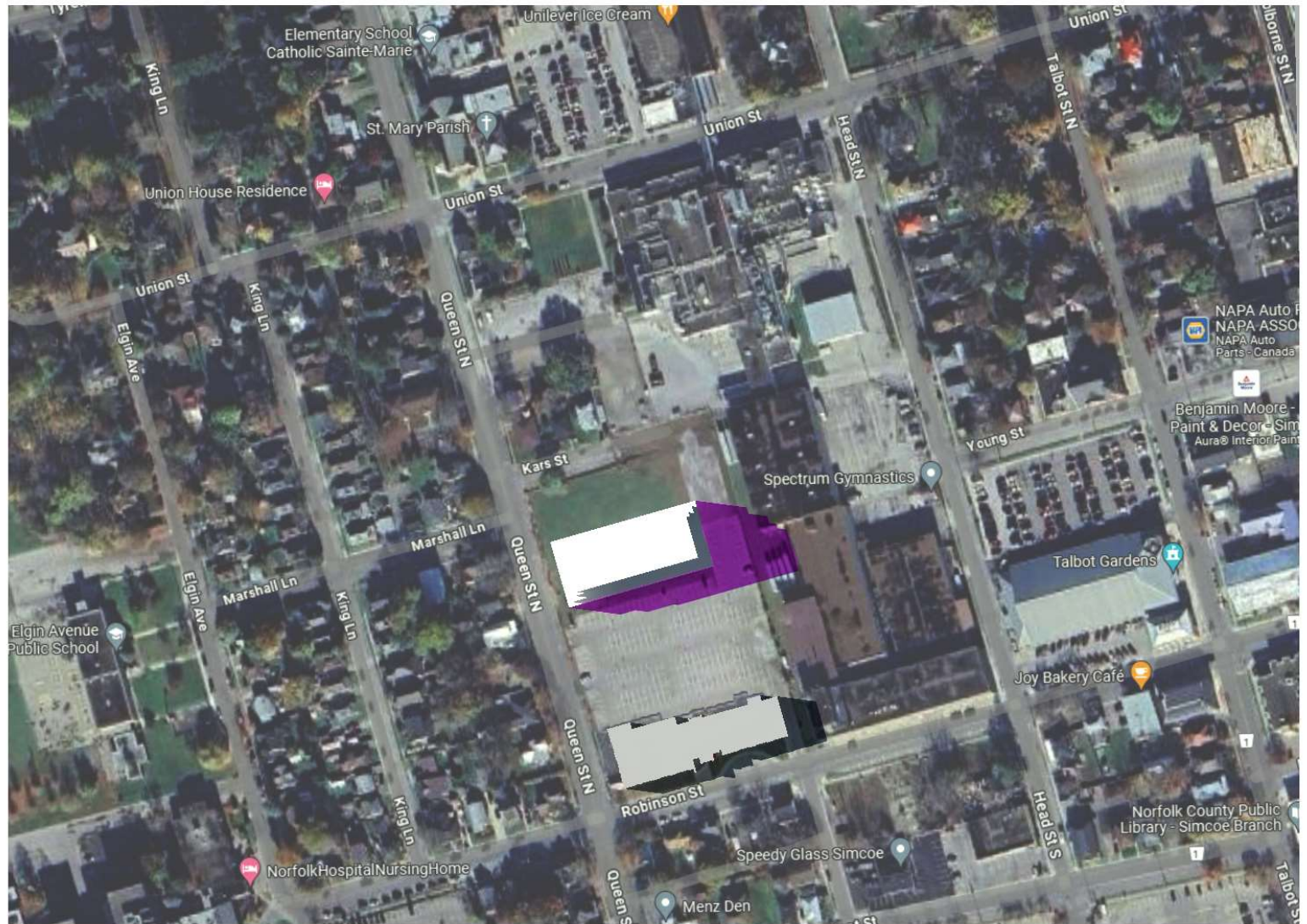


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





June 21 / 5:18pm

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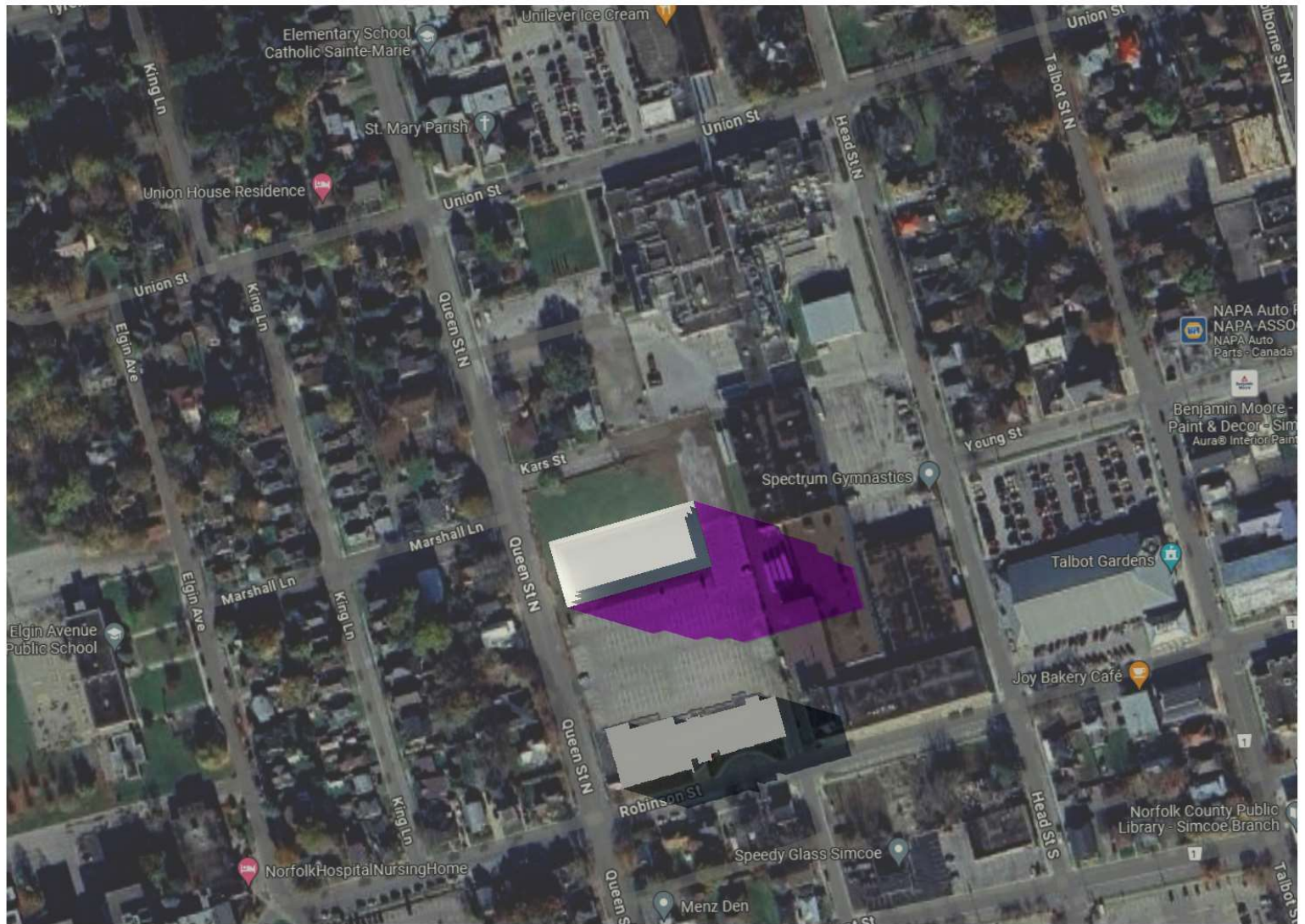


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





June 21 / 6:18pm

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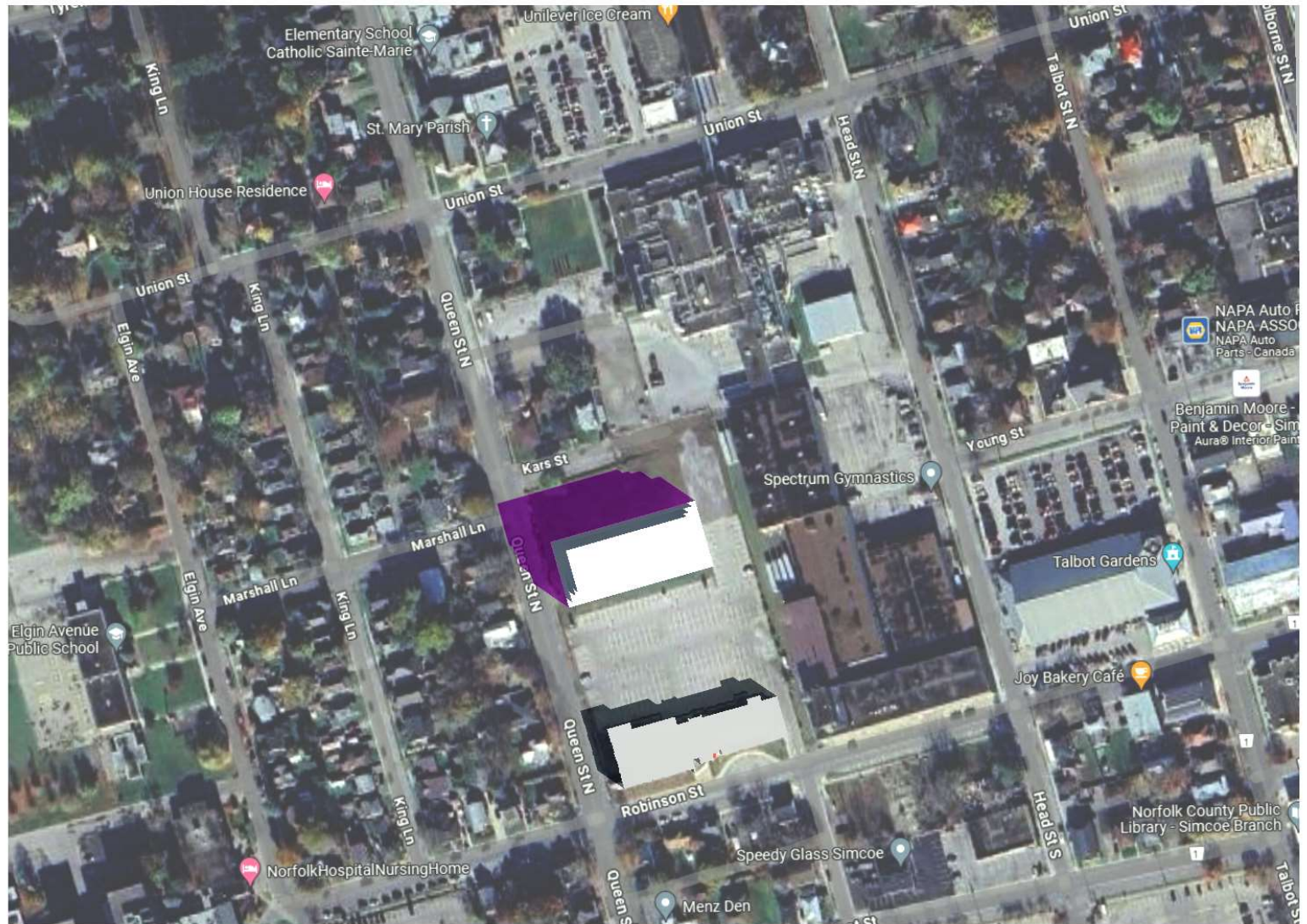


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





September 21 / 9:18am

## SHADOW STUDY

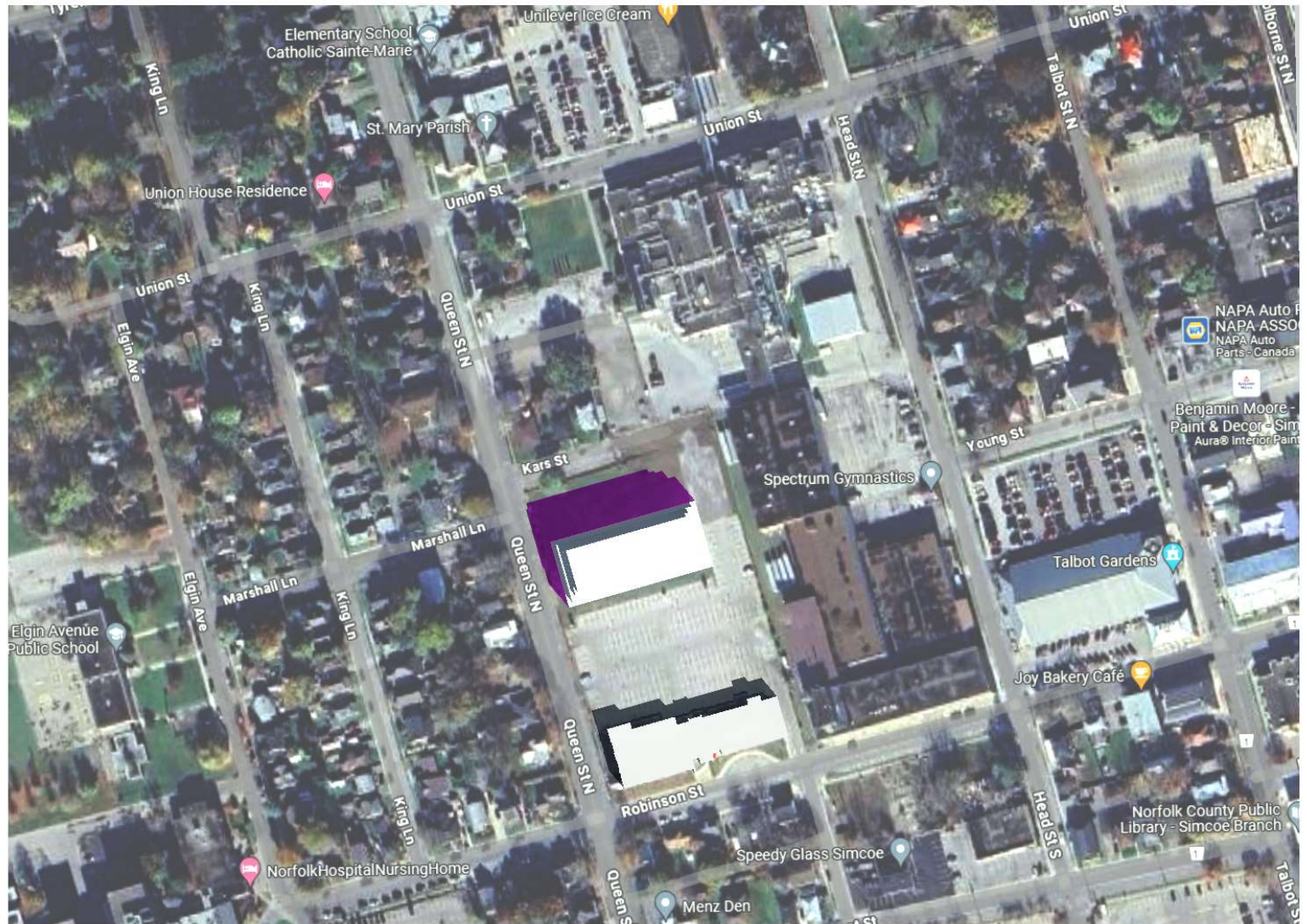


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
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September 21 / 10:18am

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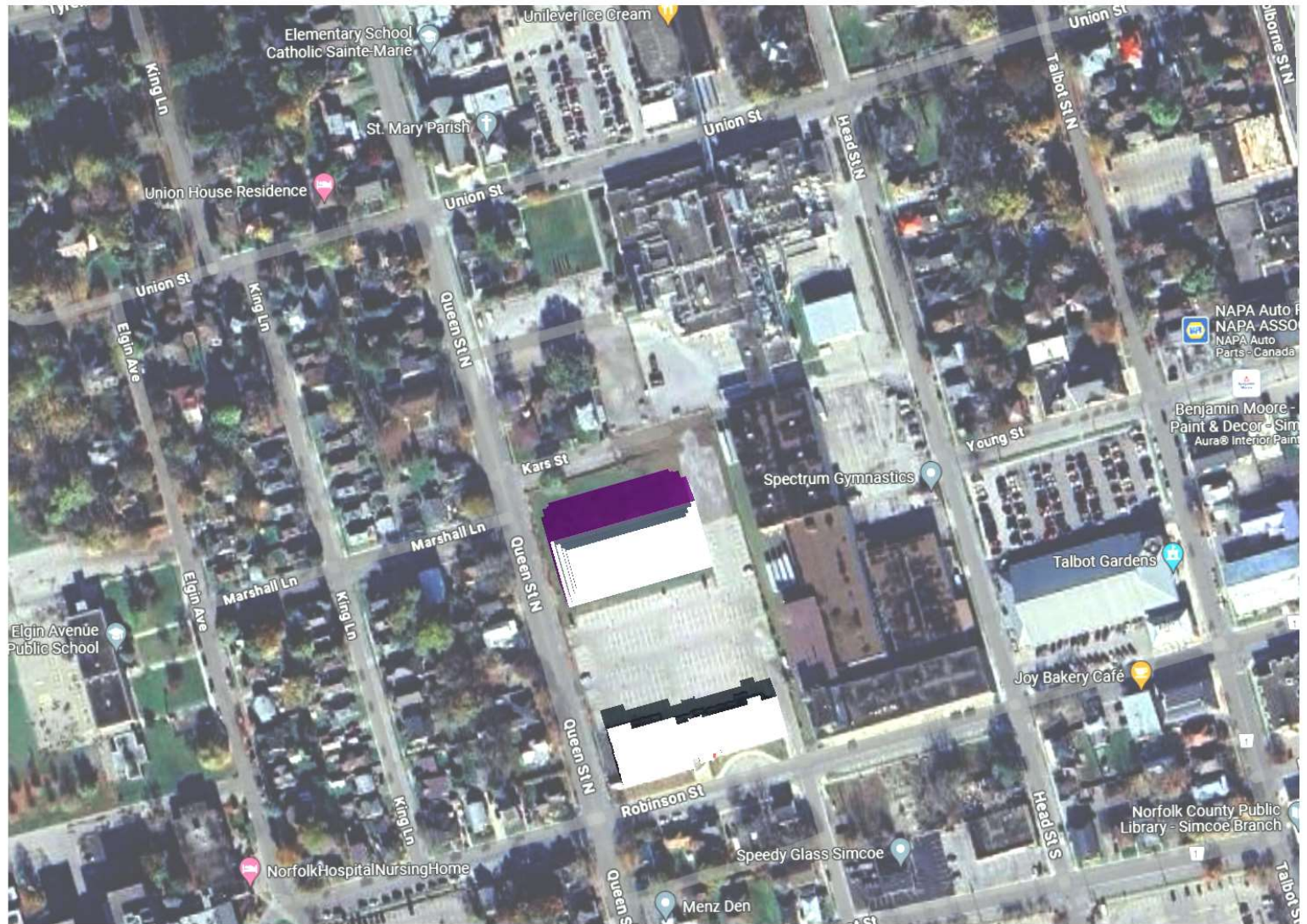


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185 ROBINSON ST.  
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ARCHITECTS





September 21 / 11:18am

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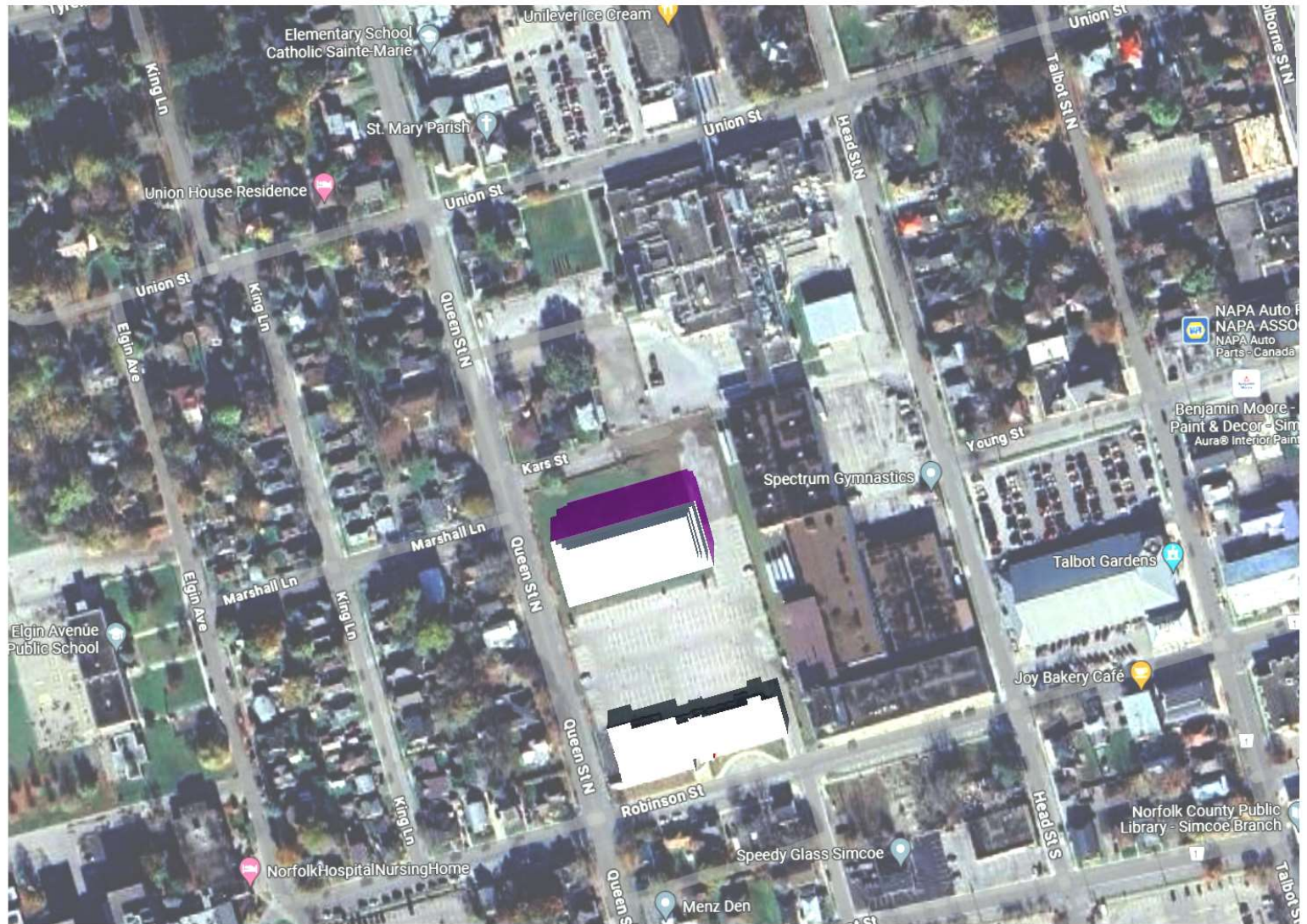


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ARCHITECTS





September 21 / 12:18pm

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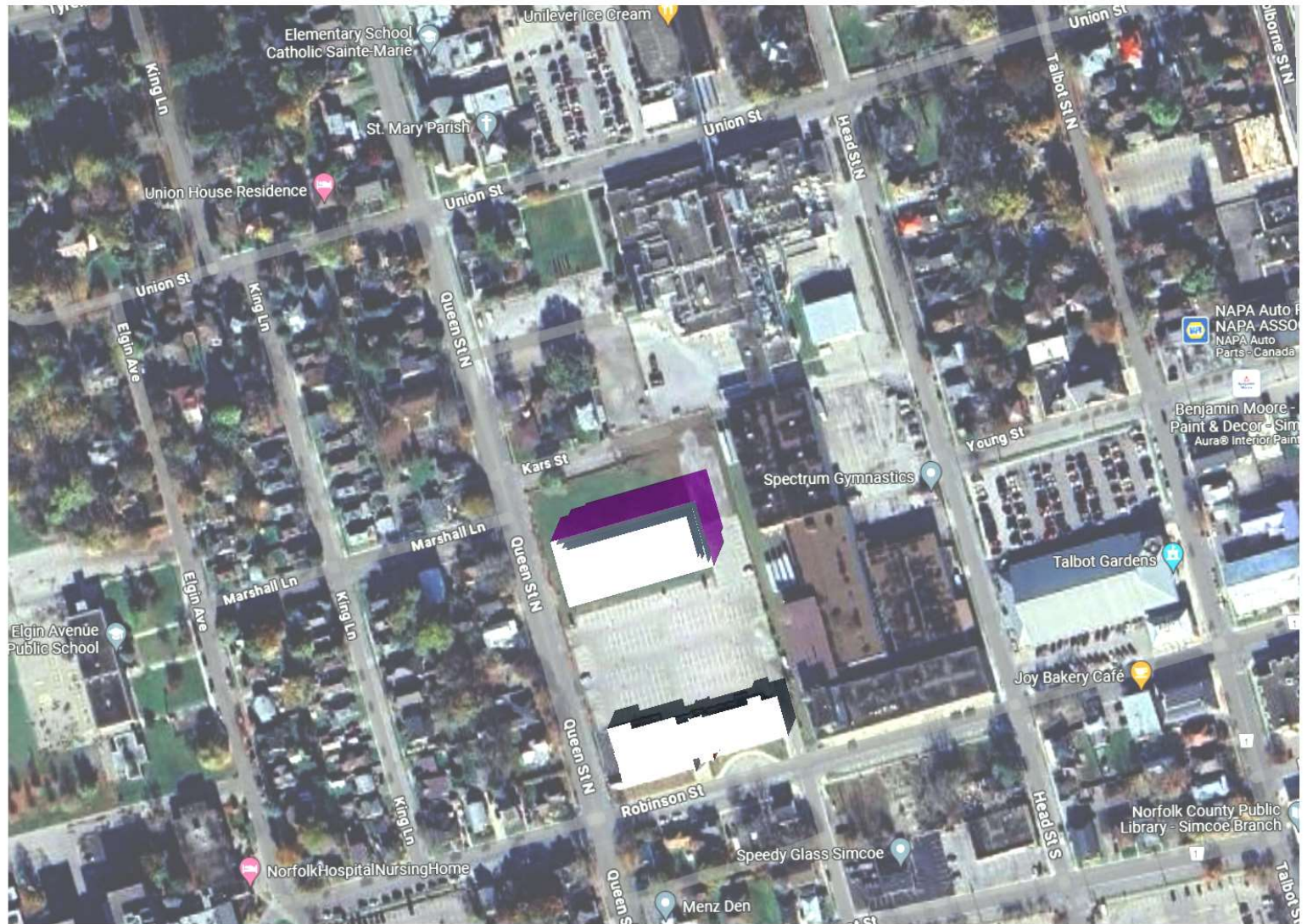


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185 ROBINSON ST.  
SIMCOE, ON

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September 21 / 1:18pm

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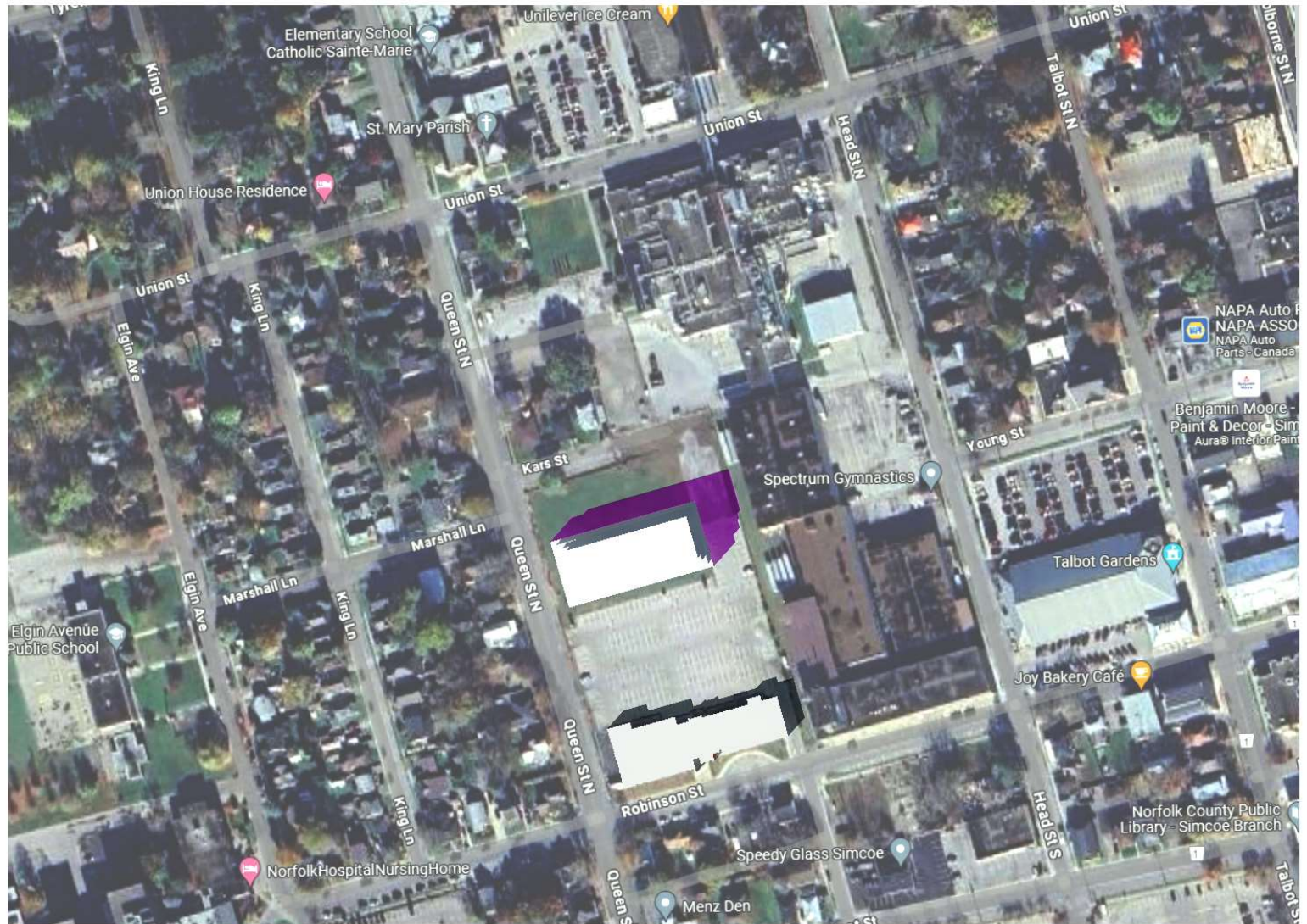


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

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September 21 / 2:18pm

## SHADOW STUDY

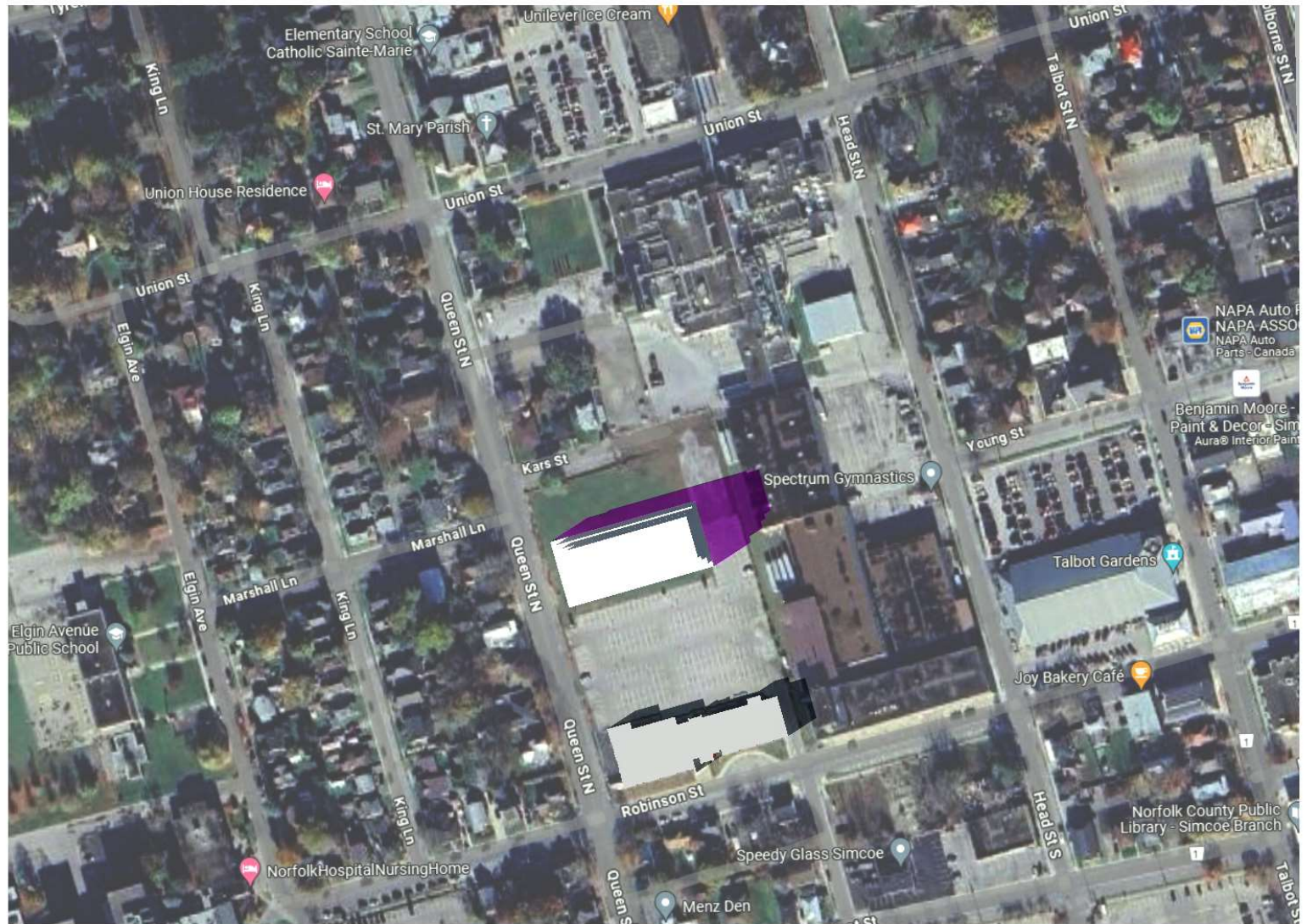


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

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ARCHITECTS





September 21 / 3:18pm

## SHADOW STUDY

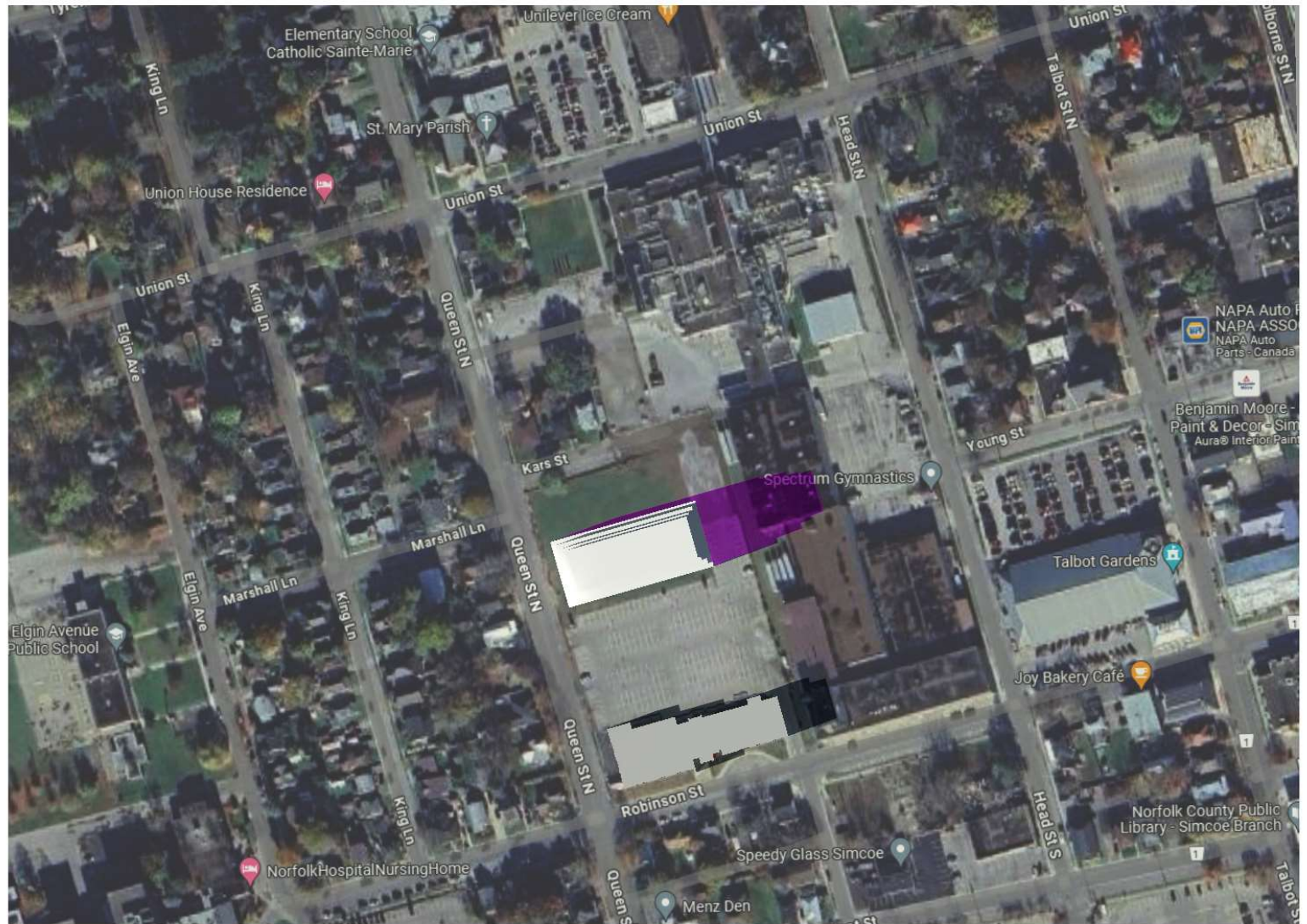


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





September 21 / 4:18pm

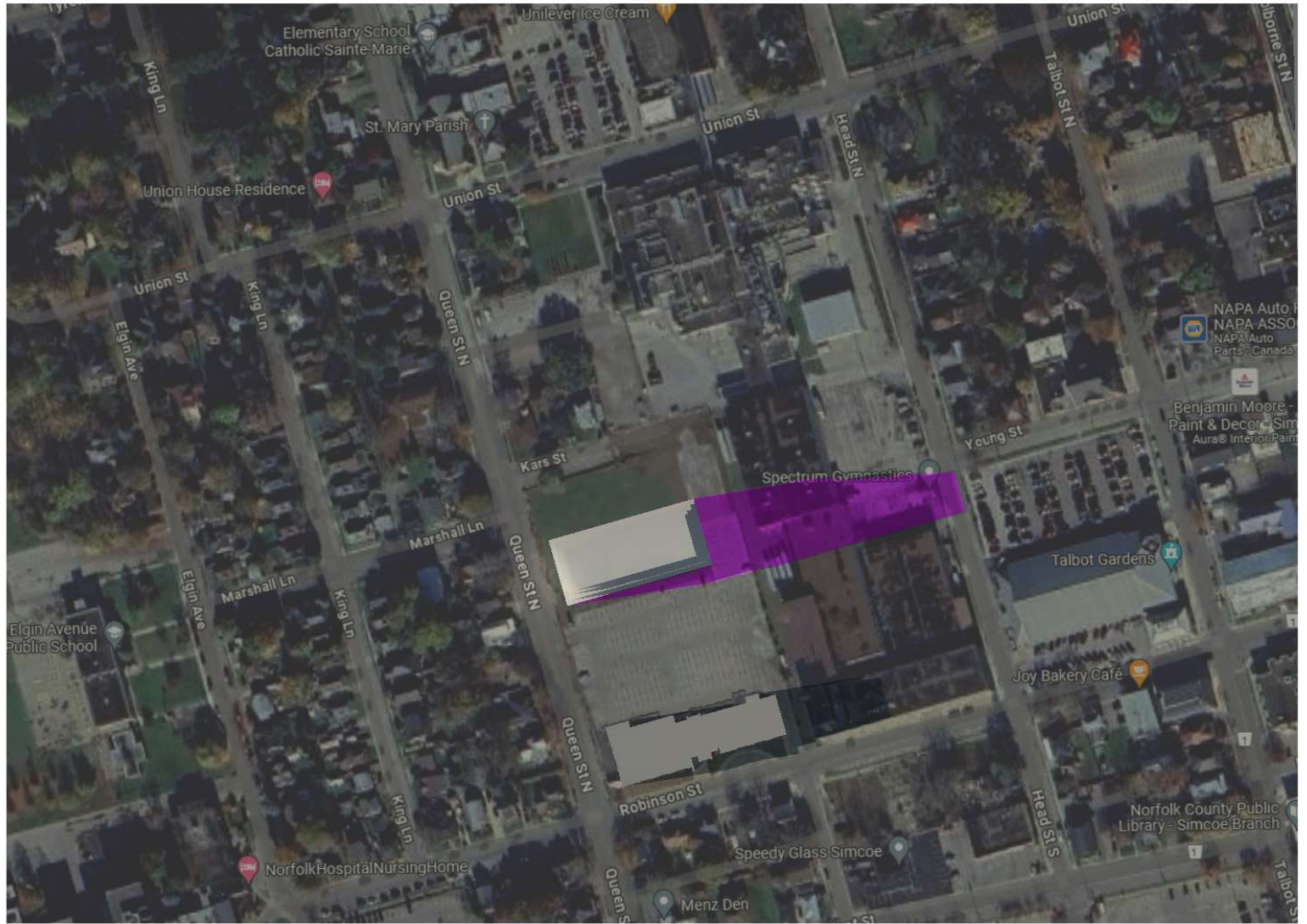
## SHADOW STUDY



Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

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ARCHITECTS



September 21 / 5:18pm

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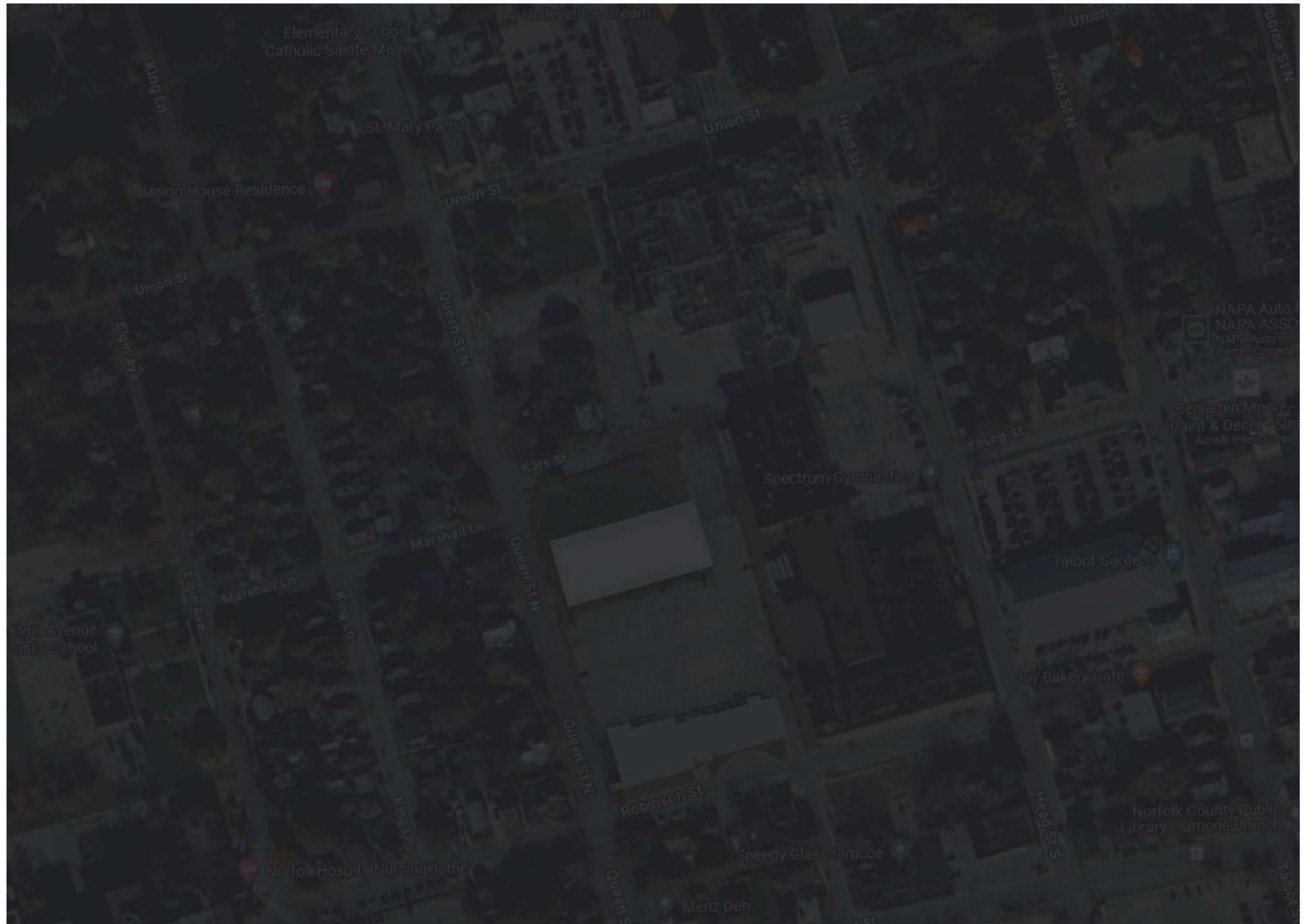


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





September 21 / 6:18pm

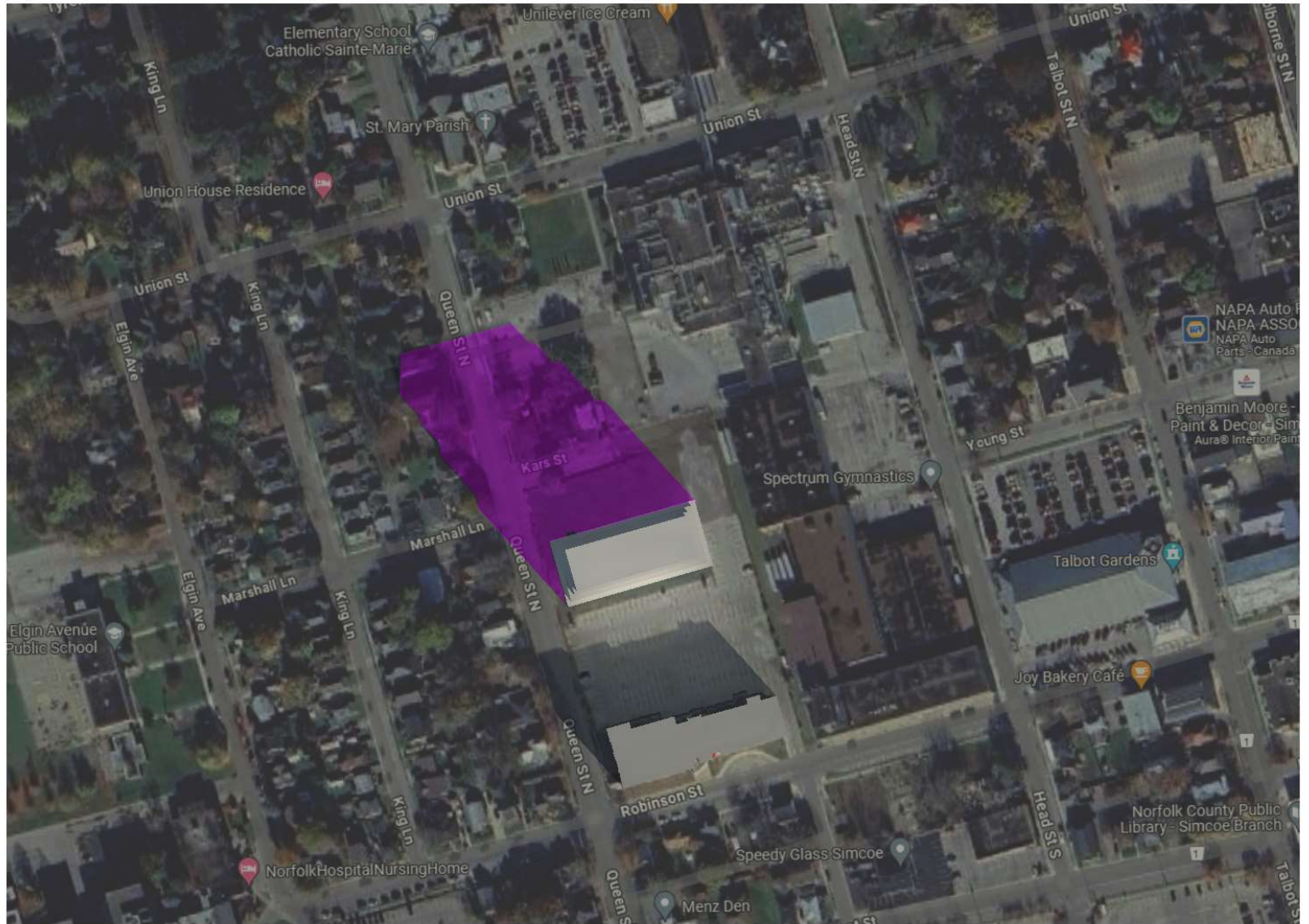
## SHADOW STUDY



Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS



December 21 / 9:18am

## SHADOW STUDY

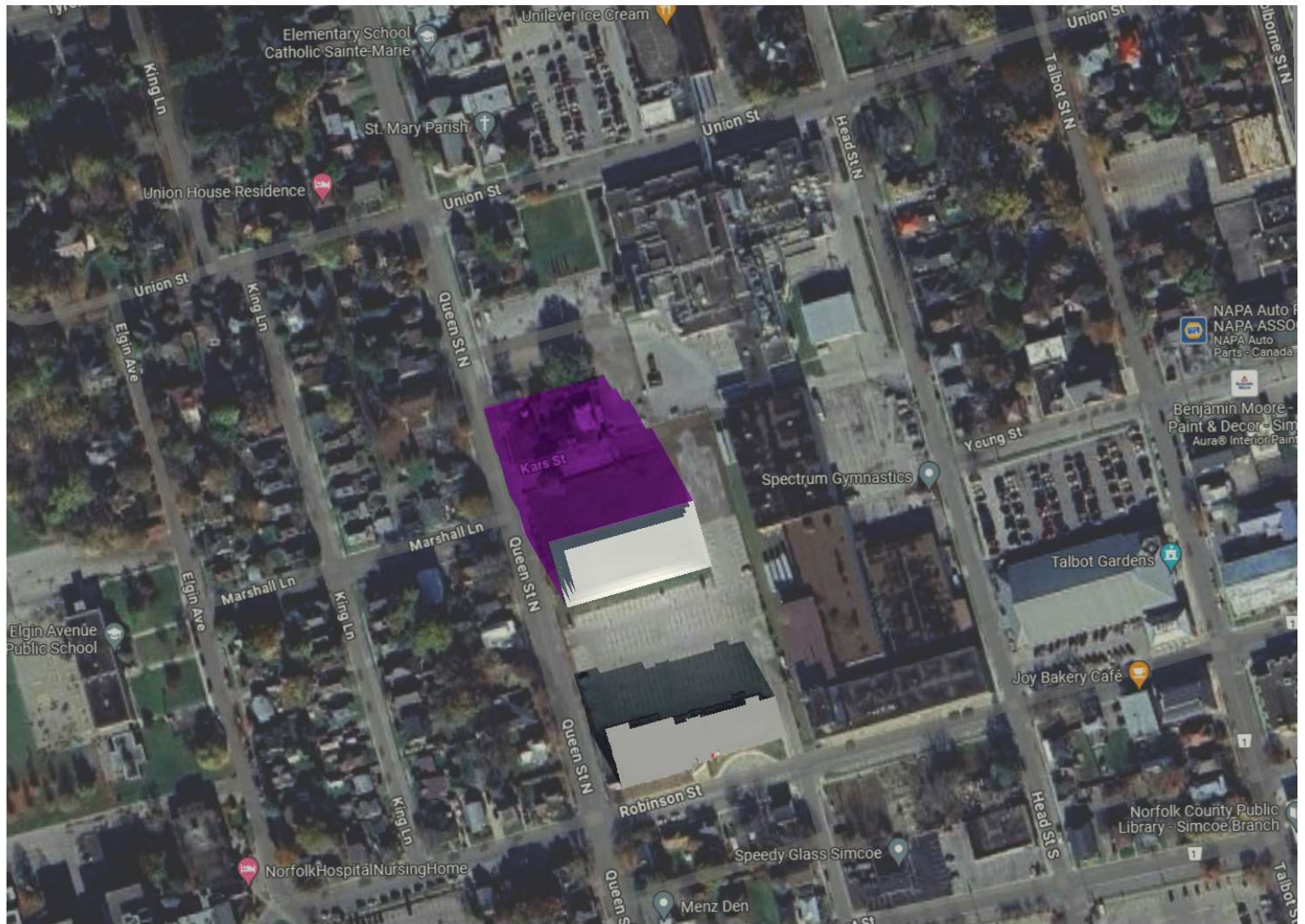


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





December 21 / 10:18am

## SHADOW STUDY

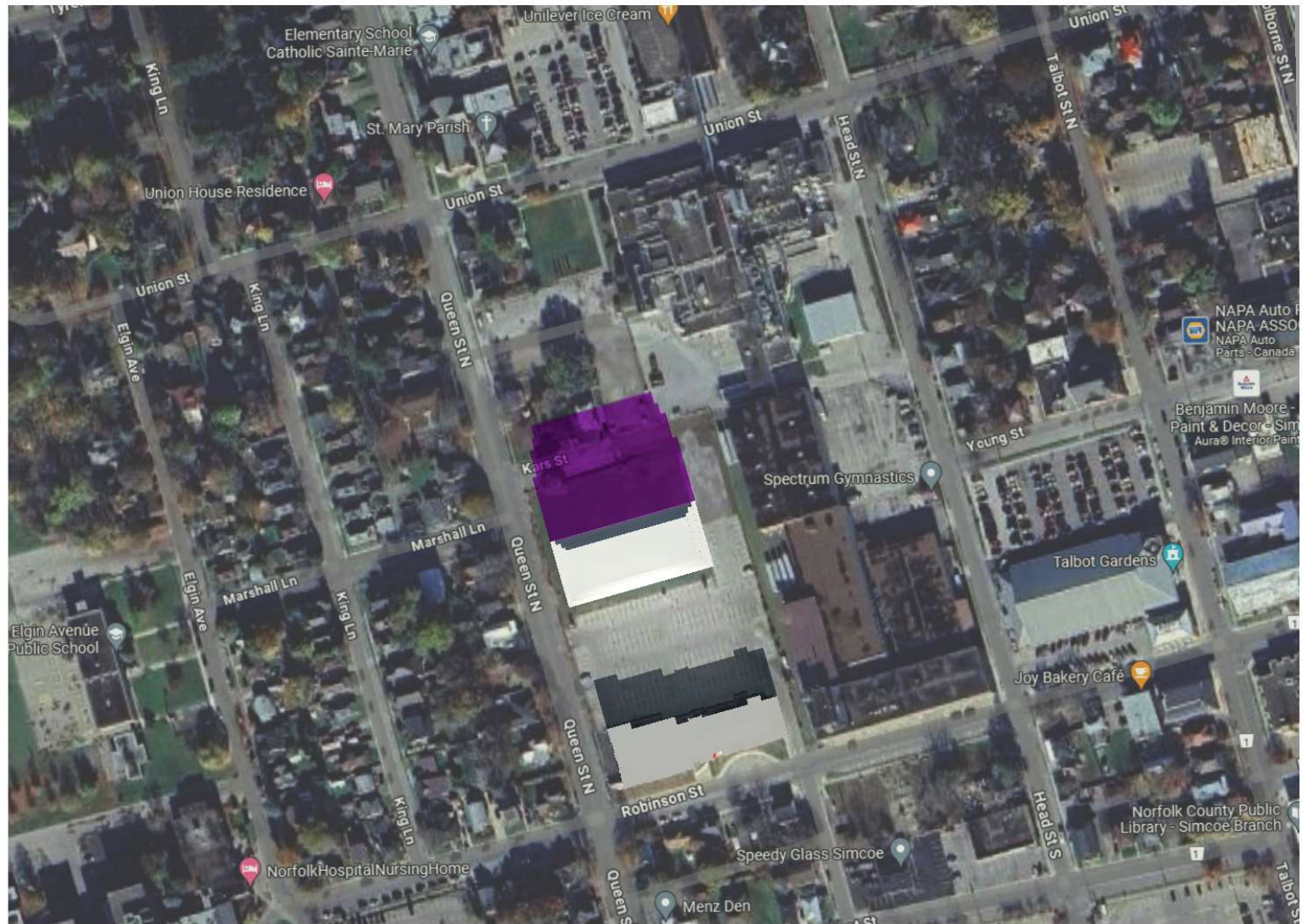


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





December 21 / 11:18am

## SHADOW STUDY

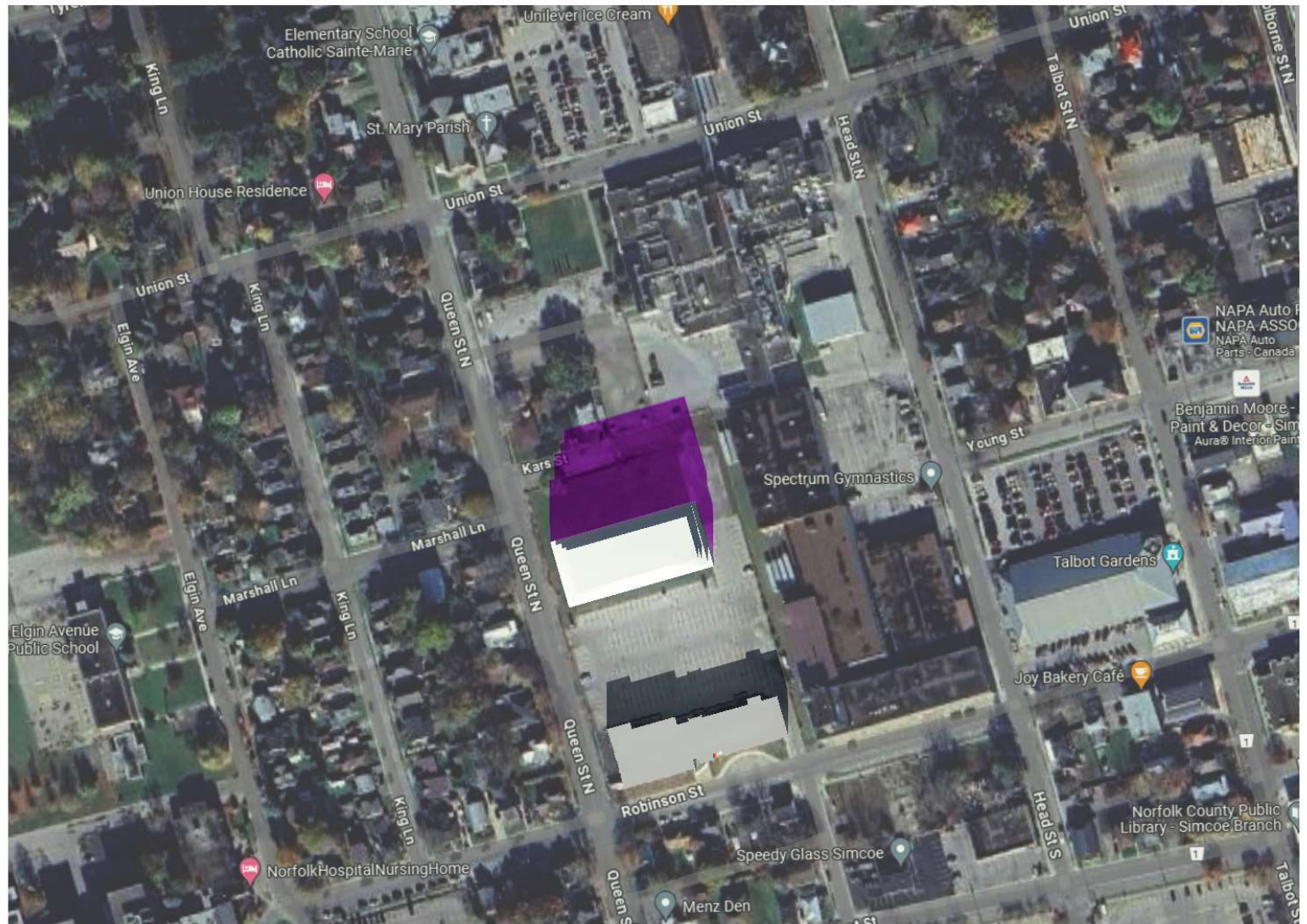


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





December 21 / 12:18pm

## SHADOW STUDY

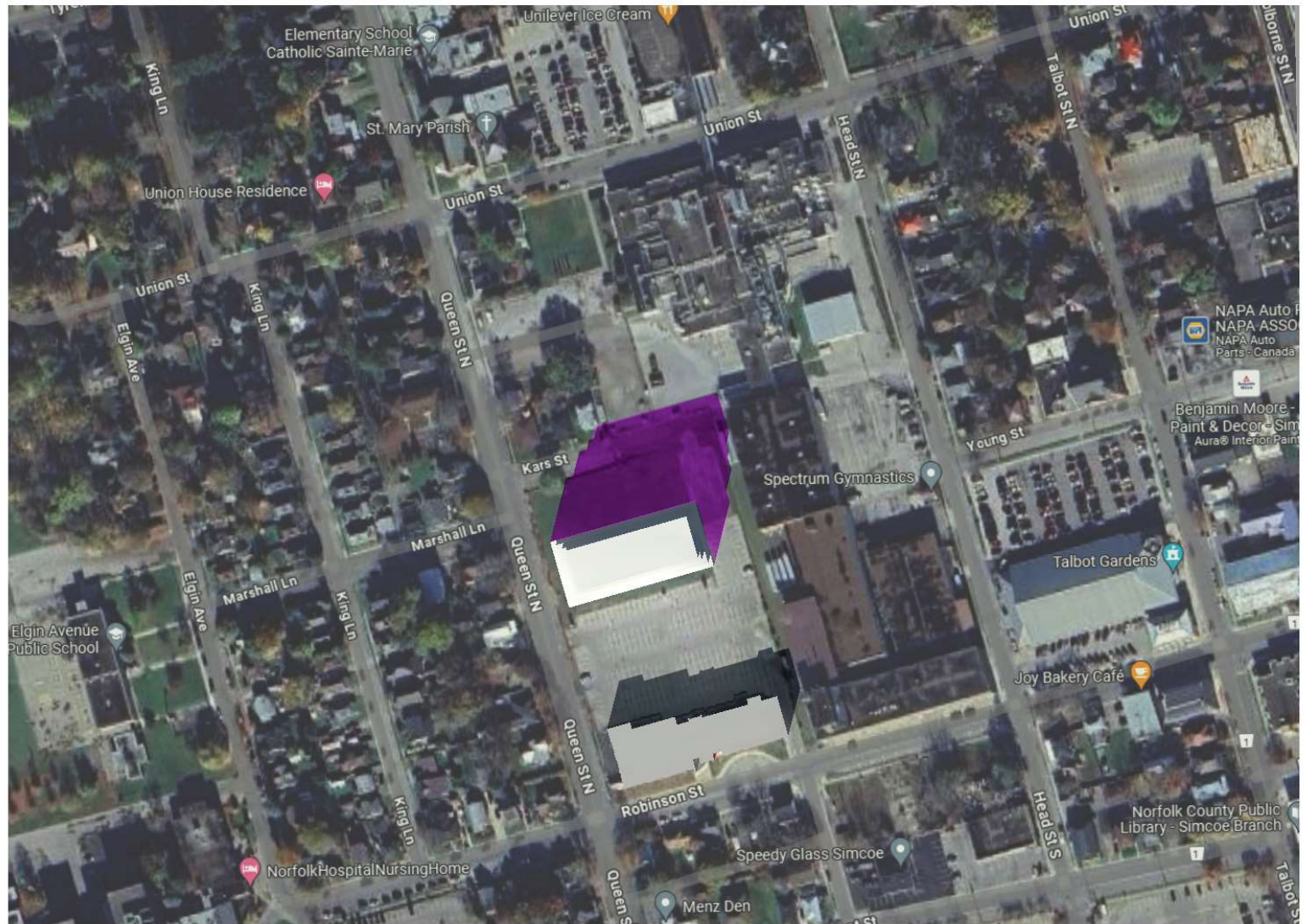


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
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December 21 / 1:18pm

## SHADOW STUDY

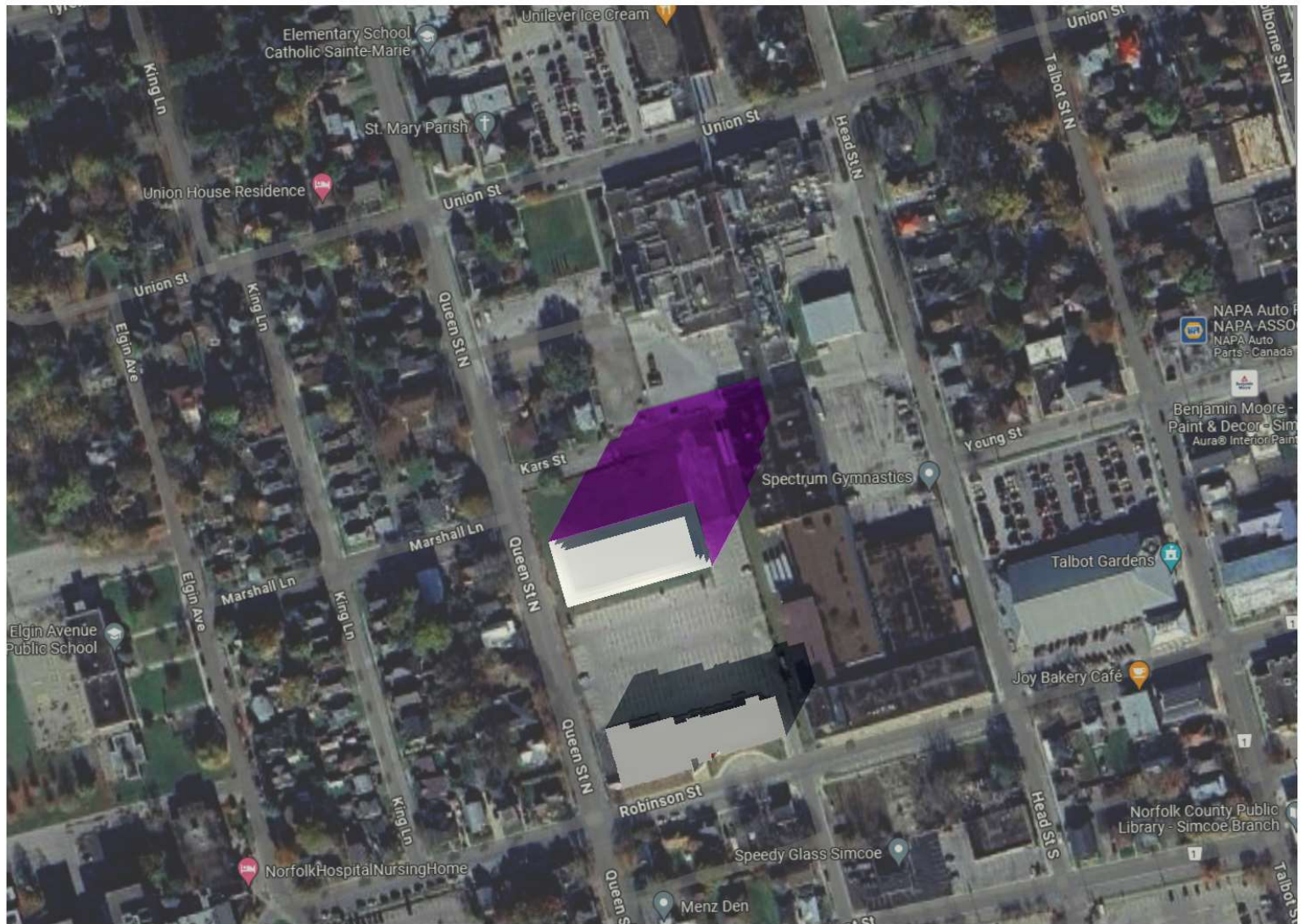


Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





December 21 / 2:18pm

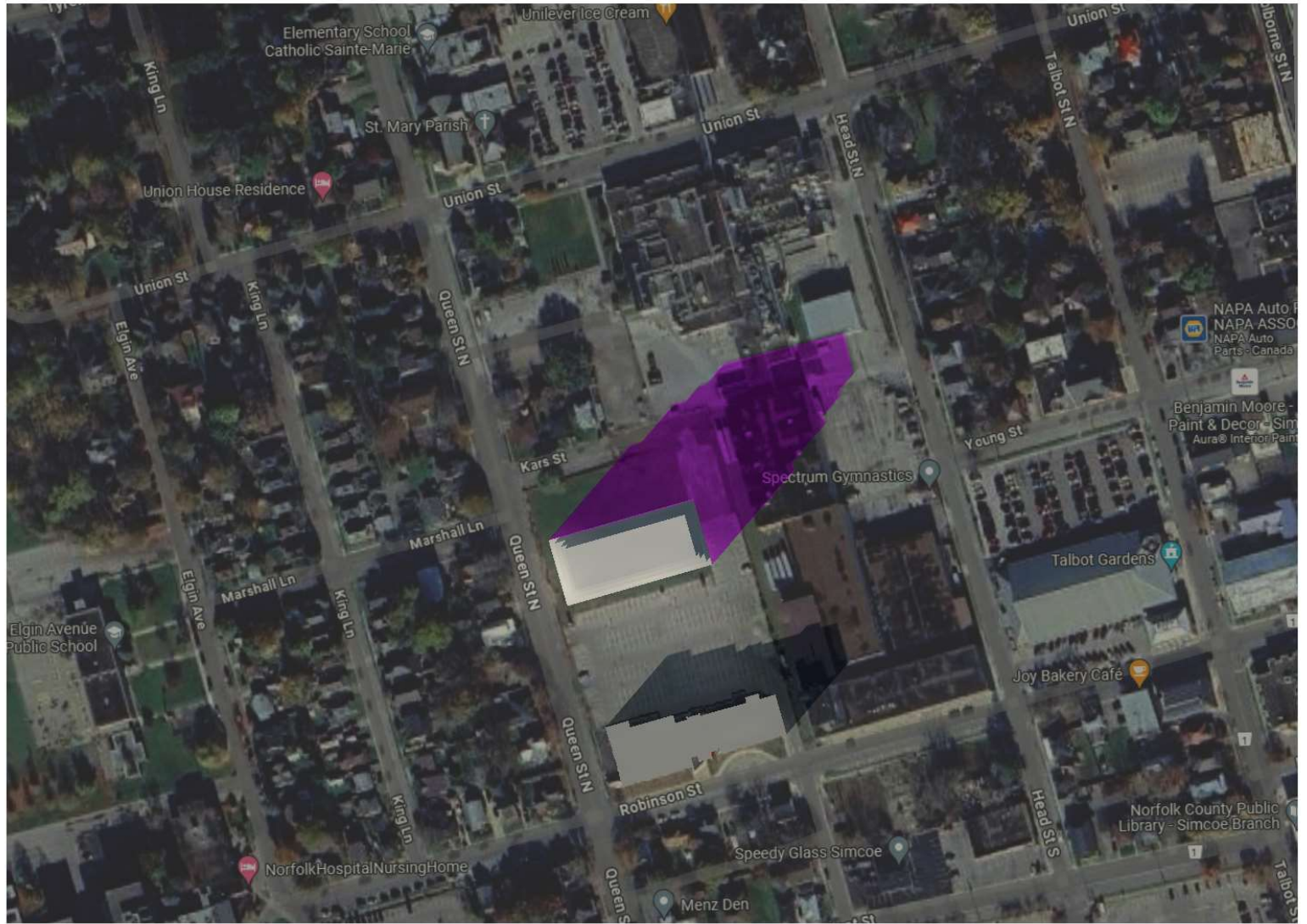
## SHADOW STUDY



Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

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December 21 / 3:18pm

## SHADOW STUDY



Proposed Shadow

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SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS





December 21 / 4:18pm

## SHADOW STUDY



Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS



December 21 / 5:18pm

## SHADOW STUDY



Proposed Shadow

185 ROBINSON ST.  
SIMCOE, ON

STOYANOVSKYY  
ARCHITECTS



**FUNCTIONAL SERVICING &  
STORMWATER MANAGEMENT REPORT**

**185 ROBINSON STREET**

**TOWN OF SIMCOE  
NORFOLK COUNTY**

**PREPARED FOR:**

**2273925 ONTARIO INC.**

**PREPARED BY:**

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

**AUGUST 2024**

**CFCA FILE NO. 2616-6994**

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Revision Number	Date	Comments
Rev.0	August 2024	Issued for First Submission (ZBA)



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## 1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by 2273925 Ontario Inc. to prepare a Functional Servicing & Stormwater Management Report to support the Zoning By-Law Amendment (ZBA) for the site located at 185 Robinson Street in the Town of Simcoe.

This report will demonstrate that the site can be developed in accordance with the Town of Simcoe, Norfolk County, and Long Point Region Conservation Authority guidelines from a functional servicing and stormwater management perspective.

### 1.1 Site Description

The site encompasses an area of approximately 1.7 ha and currently consists of an open undeveloped lot. The site, located in a mixed-use commercial and residential area, is bounded by residential buildings & Kars Street to the north, commercial/industrial buildings to the east, a 3-storey commercial building to the south and Queen Street North to the west.

Based on the Site Plan prepared by Stoyanovskyy Architects dated July 25, 2024, the elements envisioned for the proposed development include:

- An 8-storey mixed-use building containing 149 units.
- At grade and four (4) levels of underground parking area with 307 parking stalls.
- Internal roadway with access to Kars Street and the adjacent property.
- Associated amenity and landscaped areas.

### 1.2 Background Information

The following drawings, design standards, and documents were referenced during the preparation of this report:

- As-Constructed Drawings of the Surrounding Area (Received January 24, 2024)
- Ministry of Environment Stormwater Management Planning and Design Manual (March 2003)
- Norfolk County As-Built Drawings (January 2024)
- Norfolk County Design Criteria (February 2019)
- Norfolk County Grading Plan and Site Servicing Plan (March 2013)
- Norfolk County Development Charges Background Study (December 2018)
- Topographic Survey (Jewitt and Dixon Ltd., April 2024)

Relevant excerpts from the background documents are provided in **Appendix A**.

## 2.0 Water Servicing

Norfolk County is responsible for the operation and maintenance of the public water supply for the site. The existing and proposed water servicing is discussed in the following sections.

### 2.1 Existing Water Servicing

The existing water servicing infrastructure in proximity to the site includes:

- A 200 mm diameter watermain located on Robinson Street (Norfolk County As-Built – Drawing S-0516, November 1981).
- A 200 mm diameter watermain located on Queen Street North (Norfolk County As-Built – Drawing S-0360, received January 2024).
- A 50 mm diameter watermain located on Kars Street (Norfolk County As-Built – Drawing S-0360, received January 2024).
- A fire hydrant located on north-east side of the Kars Street and Queen Street North intersection (Norfolk County As-Built – Drawing S-0360, received January 2024).
- A fire hydrant located on north-west side of the Robinson Street and Queen Street North intersection (Norfolk County As-Built – Drawing S-0983, January 2016).
- A fire hydrant located on south-east side of the Robinson Street and Metcalfe Street South intersection (Norfolk County As-Built – Drawing S-0516, November 1981).

### 2.2 Design Water Demand

The water demand for the proposed development was calculated with reference to the Norfolk County Design Criteria (February 2019). The Norfolk County design criteria requires an average daily water demand of 450 L/capita/day.

Per the Watson & Associates - Norfolk County Development Charges Background Study (December 2018) and Norfolk County Design Criteria (February 2019), the following population per unit (PPU) parameters were used to determine the estimated population equivalent for the proposed development:

- 1.43 for Apartment Units
- 90 persons/ha commercial uses

Considering the above design criteria, the average daily, maximum daily, and peak hourly water demands were calculated for the proposed development using the associated Norfolk County peaking factors. Table 1 below outlines the estimated domestic water demand generated by the proposed development. Supporting calculations are provided in **Appendix B**.



**Table 1: Estimated Domestic Water Demand**

<b>Standard</b>	<b>Average Daily Demand (L/s)</b>	<b>Maximum Daily Demand (L/s)</b>	<b>Peak Hourly Demand (L/s)</b>
Norfolk County	1.13	2.54	4.49

Note: References to Norfolk County design guidelines are provided in **Appendix A**.

As presented in Table 1, a domestic water service is required to convey a peak flow rate of 4.49 L/s.

## 2.3 Fire Flow Demand

The Fire Underwriters Survey (FUS) method (2020) was used to estimate the fire flow requirements for the proposed development. Flow requirements are based on the total Gross Floor Area (GFA) as depicted on the Site Plan prepared by Stoyanovskyy Architects dated July 25, 2024.

This calculation is based on the following assumptions which will be confirmed with the building architect and mechanical engineer throughout the design process:

- Building type of non-combustible construction with protected vertical openings (C-value = 0.8).
- Building to be complete with an automatic sprinkler system (50% flow reduction).
- Building to be classified as residential limited hazard occupancy (15% flow reduction).

The building Architect and Mechanical Engineer will confirm the estimated fire flow demand at the Site Plan Approval and Building Permit stage.

Table 2 summarizes the estimated fire flow requirements and durations necessary to meet fire protection for the proposed development. Supporting calculations are provided in **Appendix B**.

**Table 2: Estimated Fire Demand Flows**

<b>Method</b>	<b>Demand Flow (L/s)</b>	<b>Duration (h)</b>
Fire Underwriters Survey 2020	117	2.00

Based on the results from Table 2 the governing fire flow for the proposed development was calculated to be 117 L/s for a duration of 2.0 hours.

It should be noted that the fire flows determined from the FUS method are a conservative estimate for comparison purposes only. The Mechanical Engineer will complete the required analysis for fire protection and the Architect will design fire separation methods per the determined fire flow rate to meet municipally available flows and pressures at the Site Plan Approval and Building Permit stage.

Based on the estimated domestic water demand (4.59 L/s) and fire flow demand (117 L/s) summarized in Table 1 and Table 2, the total design flow for the internal water distribution system is approximately 121.59 L/s.

## 2.4 Proposed Water Servicing

The proposed development is to be serviced by connecting to the existing 200 mm diameter watermain located within Queen Street North. An internal watermain network will connect the proposed building to the existing 200 mm watermain near the northwest corner of the proposed building. The existing fire hydrants located on Queen Street North and Robinson Street do not provide sufficient fire coverage for the proposed development, therefore an additional internal hydrant is proposed. Refer to the Preliminary Servicing Plan (Drawing C103) for an illustration of the location of the proposed water connection and internal network. The water system internal to the building will be designed by the mechanical engineer.

## 3.0 Sanitary Servicing

Norfolk County is responsible for the operation and maintenance of the public sanitary sewage conveyance and treatment near the site. The existing and proposed sanitary servicing are outlined in the following sections.

### 3.1 Existing Sanitary Servicing

The existing sanitary servicing infrastructure close to the site includes:

- A 300 mm diameter sanitary sewer on Robinson Street, draining west to east at a slope of 1.1% (Norfolk County As-Builts – Drawing S-0983, January 2016).
- A 250 mm diameter sanitary sewer on Queen Street North, draining south to north at a slope of 0.67% (Norfolk County As-Builts – Drawing S-0213, received January 2024).
- A 200 mm diameter sanitary sewer on Kars Street, draining east to west at a slope of 0.26% (Norfolk County As-Builts – Drawing S-0360, received January 2024).

Based on the as-constructed drawings provided by Norfolk County (January 2024), there are two (2) existing sanitary laterals installed from the Queen Street sewer to service future development. These laterals are to be decommissioned and capped as part of the proposed development.

### 3.2 Design Sanitary Flow

The Norfolk County Design Criteria (February 2019) were referenced to calculate the sanitary sewage design flows for the proposed development. A unit sewage flow of 450 L/capita/day was used to determine the average daily flow for the proposed development. Infiltration flow into the sanitary sewer and a peaking factor were applied to the unit sewage flow to obtain the total estimated sanitary design flow. A summary of the estimated sanitary design flow is presented in Table 3. Supporting calculations are provided in **Appendix C**.

**Table 3: Estimated Sanitary Design Flows**

Standard <sup>1</sup>	Average Flow (L/s)	Residential Peaking Factor	Commercial Peaking Factor	Infiltration Flow (L/s)	Total Peak Flow <sup>2</sup> (L/s)
Norfolk County	1.11	4.14	3.56	0.48	5.09

Note: <sup>1</sup> References to Norfolk County design guidelines are provided in **Appendix C**.

<sup>2</sup> Peak flow includes infiltration flow.



As shown in Table 3, a sanitary service is required to convey 5.09 L/s to service the proposed development.

Sanitary servicing for the proposed development is proposed to connect to the existing 200 mm diameter sewer within Kars Street at a newly proposed maintenance hole location.

### **3.3 Proposed Sanitary Servicing**

The development is proposed to be serviced by a 200 mm diameter sanitary service, connecting to the existing 200 mm diameter sanitary sewer on Kars Street. The proposed sanitary service will be designed per the Norfolk County standards.

The Preliminary Servicing Plan (Drawing C103) illustrates the location of the sanitary sewer and connection to the building. The internal sanitary system of the building will be designed per the mechanical engineer's details and specifications.

## **4.0 Grading and Drainage Conditions**

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

### **4.1 Existing Storm Servicing**

The Norfolk County Grading Plan and Site Servicing Plan (March 2013) was referenced to determine the existing municipal storm infrastructure surrounding the site. The existing storm infrastructure close to the site includes:

- An 825 mm diameter concrete storm sewer on the south side of Queen Street North draining south to north at a slope of 0.65% (Norfolk County Grading Plan and Site Servicing Plan (March 2013)).
- A storm sewer network exists on the retained portion of the Site. Stormwater runoff is collected via catch basins and is treated by an Oil and Grit Separator (OGS) prior to being discharged to a 450 mm storm sewer at a slope of 0.8% to the existing 900 mm diameter storm sewer on Queen Street.
- A 900 mm diameter concrete storm sewer on the North side of Queen Street North draining south to north at a slope between 0.7% and 0.9% abutting the site (Norfolk County Grading Plan and Site Servicing Plan (March 2013)).
- A 450 mm diameter concrete storm sewer on Kars Street draining east to west at a slope of 0.30% (Norfolk County Grading Plan and Site Servicing Plan (March 2013)).
- A 375 mm diameter storm sewer on Robinson Street draining west to east at a slope of 1.0% (Norfolk County As-Builts – Drawing S-0516, January 2024)

Referenced as-constructed drawings have been included in **Appendix A**.

## 4.2 Existing Drainage Conditions

The site is currently comprised of a grassed landscaped area, bounded by residential buildings & Kars Street to the north, commercial/industrial buildings to the east, a 3-storey commercial building to the south, and Queen Street North to the west.

Based on the review of the Norfolk County Grading Plan and Site Servicing Plan (March 2013), there are three existing catchbasins located adjacent to the western property line. These catchbasins are connected to the existing 900 mm diameter concrete storm sewer on Queen Street North. There is an existing catchbasin located near the northeast corner of the site for swale drainage. This catchbasin is proposed to remain following site development.

Under existing conditions, the site can be divided into four (4) drainage catchments. Figure 1 illustrates the existing (pre-development) drainage conditions of the Site. The following discussion outlines the pre-development drainage catchments, outlined in Figure 1.

- Catchment 101 (0.43 ha) consists of drainage from primarily grassed area on the northeast portion of the site, discharging northeast towards the existing catchbasin near the northeast corner of the Site.
- Catchment 102 (0.18 ha) consists of drainage from the grassed area on the north-west portion of the site, discharging northwest towards the existing catchbasins along Queen Street North.
- Catchment EXT-1 (1.03 ha) consists of controlled drainage from the retained portion of the site, including the existing building and parking lot on the south. Runoff from this catchment is directed into catchbasins located throughout the parking lot and is conveyed to the existing storm sewer on Queen Street North after passing through an oil and grit separator.
- Catchment EXT-2 (0.07 ha) consists of uncontrolled drainage along the frontage of the existing building. This flow is outside the limit of work for this development and therefore will remain unchanged in post-development conditions.

Table 4 summarizes the pre-development land areas and weighted runoff coefficients.



**Table 4: Pre-Development Land Areas and Runoff Coefficients**

<b>Catchment ID</b>	<b>Pervious Area (ha)</b>	<b>Impervious Area (ha)</b>	<b>Total Area (ha)</b>	<b>Runoff Coefficient</b>
101	0.37	0.06	0.43	0.34
102	0.18	0.00	0.18	0.25
EXT-1	0.11	0.92	1.03	0.83
EXT-2	0.02	0.05	0.07	0.70
<b>Site Total</b>	<b>0.68</b>	<b>1.03</b>	<b>1.70</b>	<b>0.61</b>

1. Impervious area has a runoff coefficient of 0.90 and pervious area has a runoff coefficient of 0.25.
2. Sum of areas may not necessarily add up to the total value due to rounding and significant digits.

The pre-development flows and associated target release rates are summarized in Table 5 below. As demonstrated in Table 5, post-development flows will be controlled to 5-yr pre-development rates for all storm events.

**Table 5: Pre-Development and Target Release Rates**

<b>Return Period (years)</b>	<b>Pre-Development Discharge Rate (101 + 102) (m<sup>3</sup>/s)</b>	<b>Maximum Release Rate (m<sup>3</sup>/s)</b>
2	0.031	0.041
5	0.041	0.041
10	0.047	0.041
25	0.055	0.041
50	0.062	0.041
100	0.068	0.041

### 4.3 Proposed Storm servicing

Storm servicing for the proposed development will be provided by an internal storm sewer and catchbasin network, capturing post-development drainage, conveying it to an underground storage tank before being treated and discharged into the existing 450 mm diameter storm sewer on Kars Street. Storm sewers will be sized at a subsequent design stage.

Runoff will be attenuated using a proposed underground storage tank. The tank will hold runoff from the entirety of the severed portion of the lands, including the building, amenity areas, parking areas, and the access road. The tank has been sized to store the post-development flows resulting from the 100-year event. Prior to discharging to the existing storm sewer, the post-development drainage will be controlled using an orifice tube to meet the target release rates in Table 5.

All stormwater collected will discharge to an Oil and Grit separator unit for water quality treatment prior to discharging into the existing 450 mm storm sewer. The proposed stormwater management controls are further discussed in Section 5.0 below. The Preliminary Site Servicing Plan (Drawing C103) illustrates the proposed storm sewer network. A Storm Sewer Drainage Plan and an associated Storm Sewer Design Sheet will be prepared at a subsequent design stage to ensure all proposed storm sewers are sized appropriately.

#### 4.4 Proposed Drainage Conditions

The proposed development consists of an 8-storey mixed-use building, above and below ground parking, internal roadway, and landscaped areas. Under post-development conditions, the Site can be separated into three catchment areas: Catchments 201, 202 and 203 with areas of 0.67 ha, 0.96 ha, and 0.07 ha, respectively. Figure 2 illustrates the post-development drainage conditions of the Site.

- Catchment 201 (0.67 ha) consists of drainage from the proposed building, parking lot, roadway, and landscaped areas. Stormwater runoff in this catchment will be collected by catchbasins and conveyed via storm sewers to a stormwater storage tank. The stormwater collection system including the proposed tank are further discussed in section 6.2. Stormwater leaving the tank is conveyed to the existing 450 mm diameter storm sewer on Kars Street before entering the existing 900 mm diameter storm sewer on Queen Street North.
- Catchment 202 (0.96 ha) consists of controlled drainage from the retained portion of the site, including the existing building and parking lot on the south. Runoff from this catchment is directed to catchbasins located throughout the parking lot and is conveyed to the existing storm sewer on Queen Street North after passing through an oil and grit separator.
- Catchment 203 (0.07 ha) consists of uncontrolled drainage along the frontage of the existing building on Robinson Street. This flow is outside the limit of work for this development and will remain unchanged in post-development conditions.

Refer to the Preliminary Site Grading Plan (Drawing C103) and the Post-Development Drainage Plan (Figure 2) for the proposed development grading and post-development catchments.

Table 6 provides details of the catchment areas and runoff coefficients for the post-development conditions.

**Table 6: Post-Development Land Areas and Runoff Coefficients**

<b>Catchment ID</b>	<b>Impervious Area (ha)</b>	<b>Pervious Area (ha)</b>	<b>Total Area (ha)</b>	<b>Runoff Coefficient</b>
201	0.48	0.19	0.67	0.72
202	0.92	0.04	0.96	0.87
203	0.02	0.05	0.07	0.70
<b>Site Total</b>	<b>1.42</b>	<b>0.28</b>	<b>1.70</b>	<b>0.80</b>

1. Impervious area has a runoff coefficient of 0.90 and pervious area has a runoff coefficient of 0.25.
2. Sum of areas may not necessarily add up to the total value due to rounding and significant digits.



The storm sewer system will be designed to capture and convey runoff events up to and including the 5-year design storm. The underground storage tank has been designed to provide storage for storm events up to and including the 100-year storm event. A major overland flow route conveys runoff in excess of the 100-yr event northeast towards an adjacent parking lot for storage. The proposed emergency overland flow route for the Site mimics the flow direction and patterns of the existing condition, discharging east towards the adjacent parking lot.

Figures 1 and 2 highlight the pre- and post-development pervious and impervious areas for the Site. The Site Grading and Site Servicing Plans (Drawings C102 and C103) illustrate the proposed drainage of the Site, the location and design of the storm sewer and all connections. Existing stormwater management and proposed strategies are proposed in the following section.

## 5.0 Stormwater Management

### 5.1 Stormwater Management Criteria

The stormwater management design criteria are based on the Norfolk County Design Criteria (February 2019). The stormwater management criteria include:

- **Quantity Control:** Peak runoff flows are to be controlled to the pre-development levels for all storm events (Norfolk County Design Criteria, February 2019).
- **Quality Control:** At least 80% removal of Total Suspended Solids will be provided with "Enhanced Protection" as outlined in the Ministry of Environment Stormwater Management Planning and Design Manual (March 2003).

### 5.3 Stormwater Quantity Control

Pre-development flows were calculated given the existing land use and drainage conditions provided in the topographic survey prepared by Jewitt and Dixon Ltd. (April 2024), and the Site Plan prepared by Stoyanovskyy (July 2024). The Post-Development Drainage Plan (Figure 1) was prepared using the Preliminary Grading Plan and Preliminary Servicing Plan (C102 and C103). Post-development release rates were calculated using the rational method. The existing and proposed peak flows for each respective design storm are presented in Table 7. Rational method calculations are provided in **Appendix C**.

**Table 7: Peak Flow Summary (Discharge towards Queen Street)**

Return Period (year)	Peak Flow (Queen Street N), Q	
	Existing (m <sup>3</sup> /s)	Proposed (uncontrolled) (m <sup>3</sup> /s)
2	0.031	0.078
5	0.041	0.103
10	0.047	0.120
25	0.055	0.141
50	0.062	0.157
100	0.068	0.172

Based on the Modified Rational Calculations and results outlined in Table 7, a total of 127 m<sup>3</sup> of on-site storage will be required to control the 100-year post-development storm event to the 5-year pre-development flow rate. An underground stormwater storage tank is proposed to provide 130 m<sup>3</sup> of stormwater storage just beyond the northeast building footprint.

At this preliminary stage, site specific water quantity controls are not proposed for the site. Options will be considered throughout the design process as it is advanced to further reduce post-development peak flows discharging to Queen Street North.

#### **5.4 Stormwater Quality Control**

Stormwater quality controls for the Site must incorporate measures to provide an Enhanced Level of Protection (Level 1) according to the MOE (March 2003) guidelines. Enhanced water quality protection is the long-term average removal of at least 80% of the total suspended solids (TSS) from 90% of the annual runoff volume.

Water quality control for Catchment 201 will be provided using an oil-grit separator (Stormceptor EF4 or approved equivalent). The oil-grit-separator, located downstream of the underground stormwater storage unit, will provide quality control for runoff before discharging the Ontario Street South storm sewer. Details of the oil-grit separator can be referenced in **Appendix C**.

### **6.0 Erosion and Sediment Controls During Construction**

The design of the erosion and sediment controls will be completed during the detailed design phase of the proposed development. The erosion and sediment controls will be required to be installed prior to the beginning of any construction activities. They will be maintained until the site is stabilized or as directed by the Site Engineer and/or Norfolk County. Controls will be inspected after each significant rainfall event and maintained in proper working condition.

#### Light Duty Silt Fencing

Light duty silt fencing will be installed on the perimeter of the site to intercept sheet flow. Additional silt fencing may be added based on field decisions by the Site Engineer and Owner, prior to, during, and following construction.

#### Rock Mud Mat

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

#### Silt sacks in Catchbasins

A silt sack will be installed in each new catch basin as they are installed. The silt sack will provide sediment control to prevent silt and sediment from entering the storm water system. Silt sacks will also be installed on the existing catchbasins during construction to prevent sediment from entering the existing storm sewer pipe.

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



Refer to drawing C101 for the Erosion and Sediment Control Plan.

## **7.0 Conclusions and Recommendations**

The proposed development of the Site includes the construction of an eight-storey, 149-unit mixed-use building, including above and below ground parking. Based on the information offered in this report, we believe that this proposed development can be serviced from a functional servicing and stormwater management perspective.

Our conclusions for the proposed development include:

### Proposed Water Services

1. The domestic peak hourly water demand for the proposed development is 4.19 L/s. The design fire flow is 117 L/s for 2.0 hours.
2. Water demand for the proposed development will be met by connecting a 200 mm diameter PVC water service with tapping sleeve to the existing 200 mm diameter water service on Queen Street North.

### Proposed Sanitary Services

1. Total peak sanitary flow for the proposed development is 5.09 L/s.
2. Sanitary conveyance for the proposed development will be provided using a 200 mm diameter PVC sanitary sewer which will connect to the existing 200 mm sanitary sewer on Queen Street North.

### Storm Services and Stormwater Management

1. The Site's stormwater runoff will be collected in catch basins and conveyed to a storm water storage tank that controls events up to and including the 100-year storm event to the 5-year pre-development peak flows before discharging into the existing storm sewer on Queen Street North.
2. Stormwater quality controls for the Site will be provided by an in-line-oil-grit separator (Stormceptor EF4 or approved equivalent) unit installed downstream of the underground stormwater storage tank.

It is recommended that all as-built information be confirmed in the field prior to detailed design.

Based on the above conclusions, we recommend the approval of the Zoning By-Law Amendment from the perspective of functional servicing and stormwater management.

Respectfully submitted,

**C.F. CROZIER & ASSOCIATES INC.**



Trevor Fraser, P. Eng.  
Project Manager, Land Development

**C.F. CROZIER & ASSOCIATES INC.**



Matt Bowman  
Engineering Intern, Land Development

MB/tc:jp

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# APPENDIX A

## As-Constructed Drawings & Background Material



301

STREET

67

M. Therkens



lane

Alley

STREET

E

152

151

W. L. Innes



GEORGE

QUEEN

E. Schellberg

60



Alley

STREET

F

154

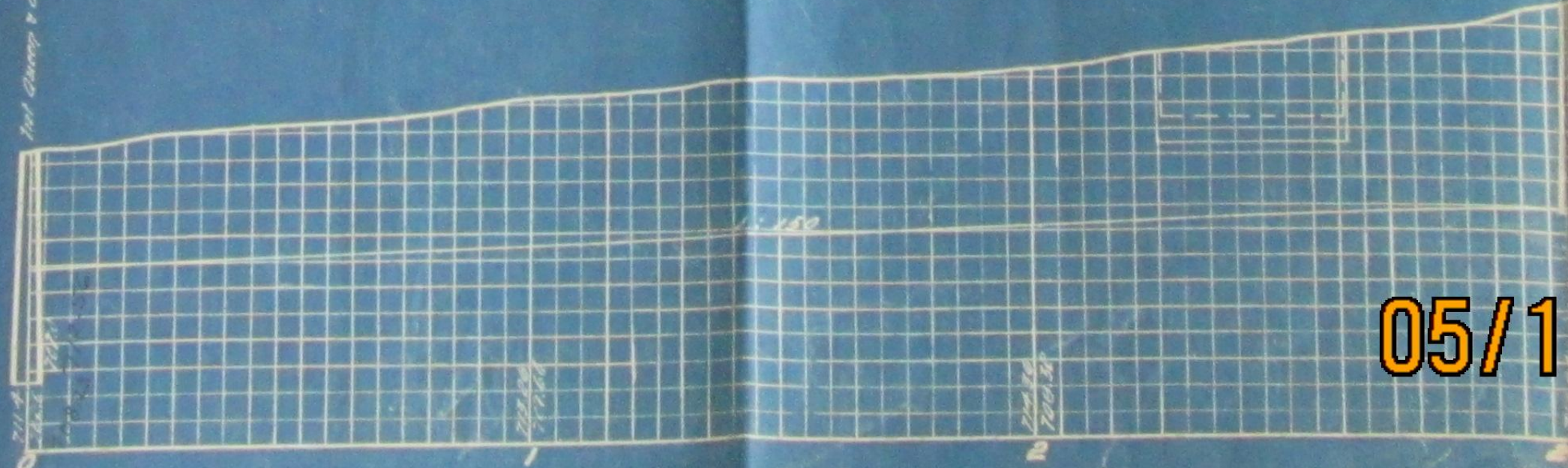
153

W. L. Innes



HING

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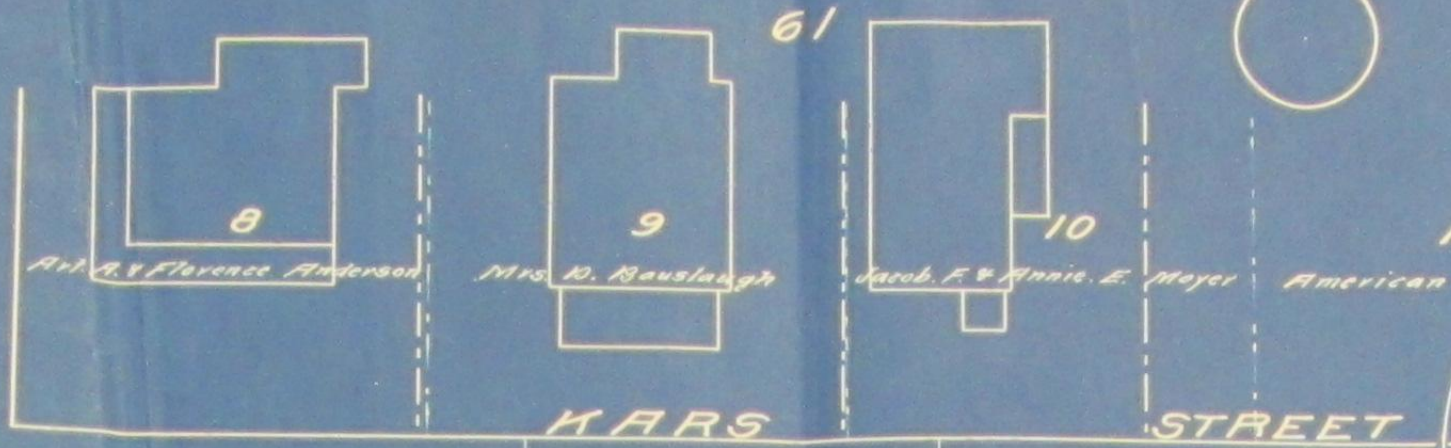


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QUEEN STREET



MARS STREET

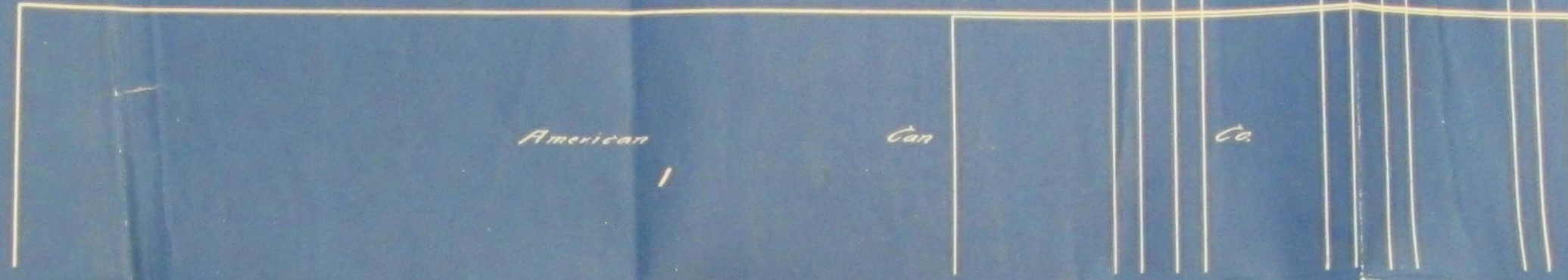
STREET

Sanitary Sewer

Sanitary

Sewer

Sanitary

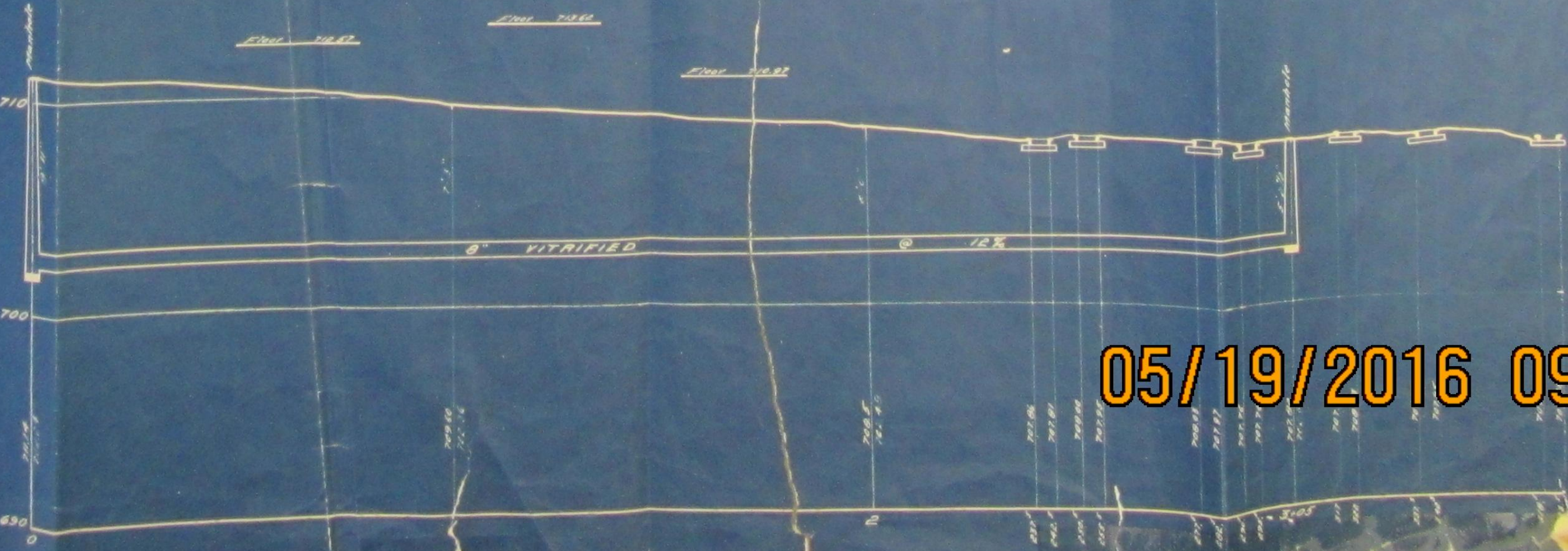


American

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68



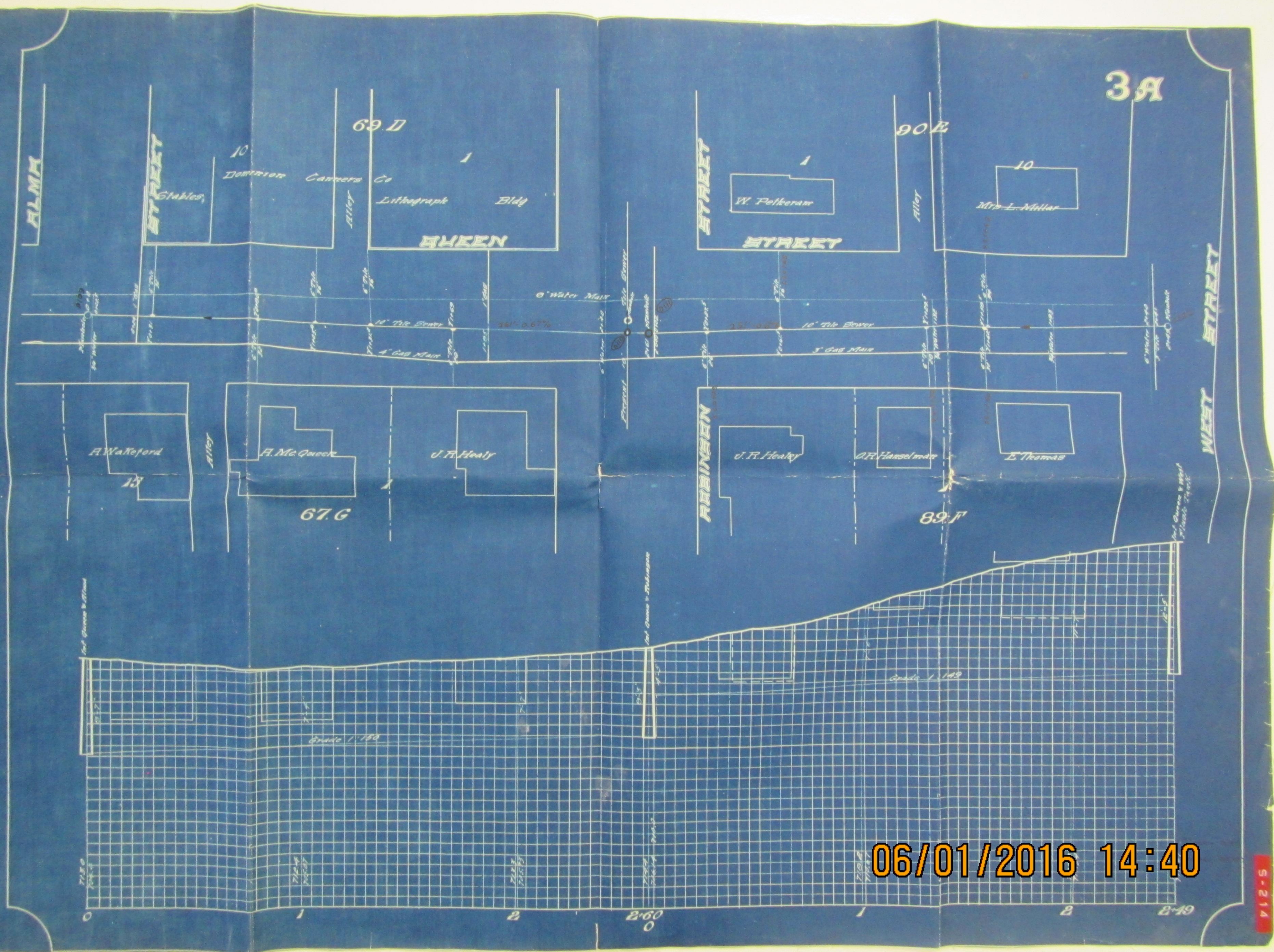
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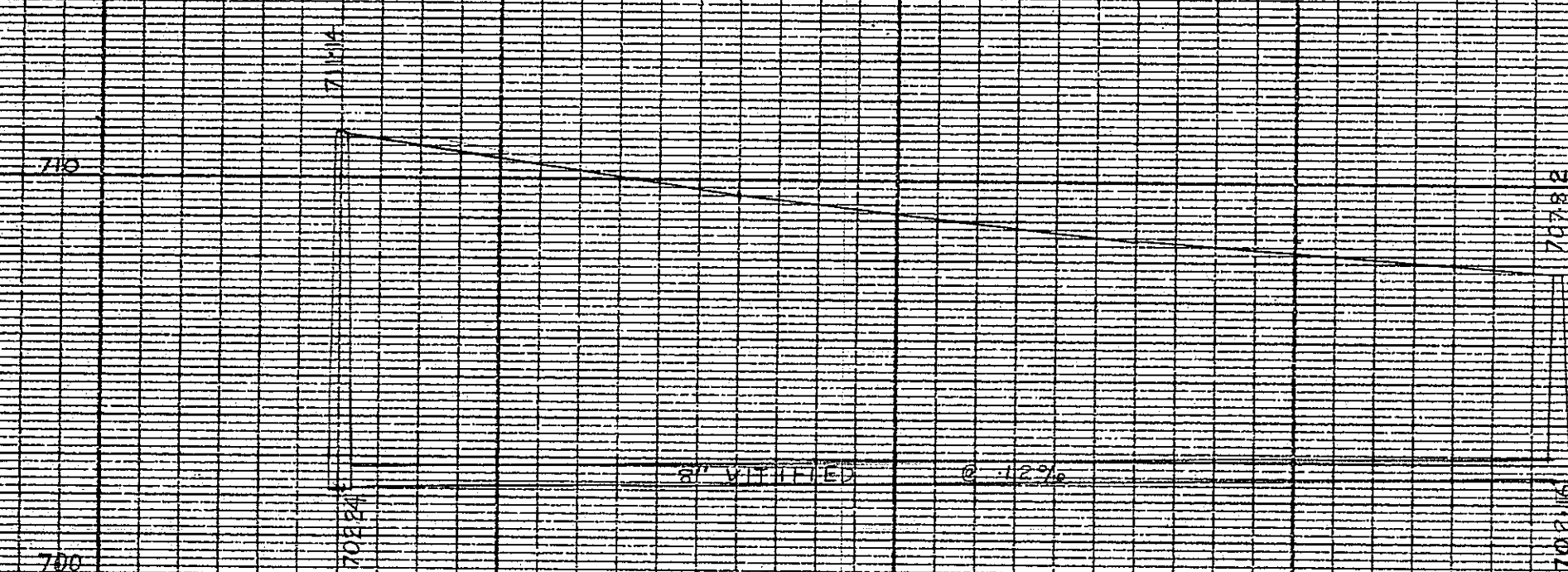
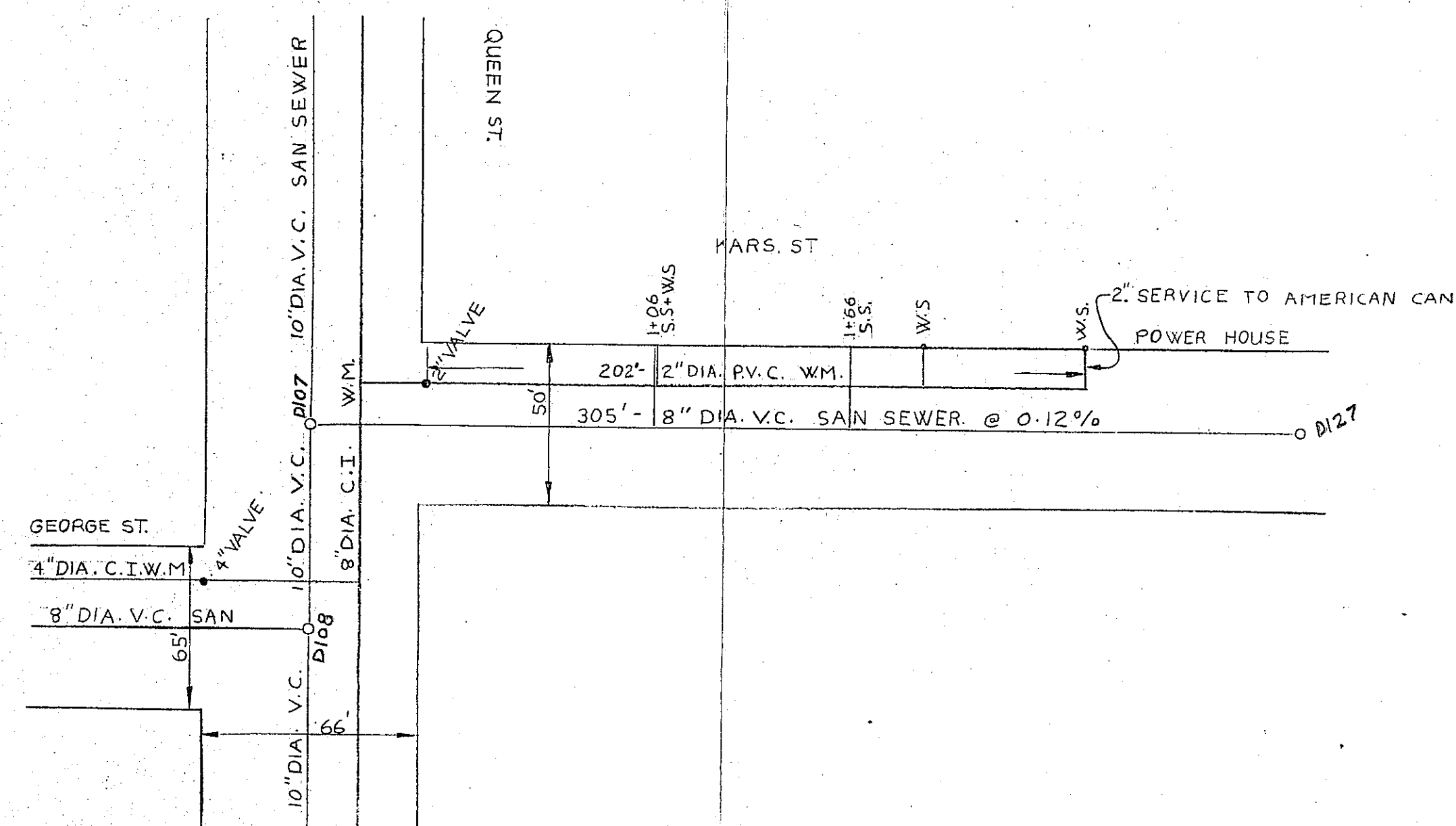






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REGIONAL MUNICIPALITY OF HALDIMAND-NORFOLK

ENGINEERING DEPARTMENT

WATER, SEWER & SOLID WASTES DIVISION

WATER & SEWER

KARS ST

SIMCOE

VERTICAL SCALE

HORIZONTAL SCALE

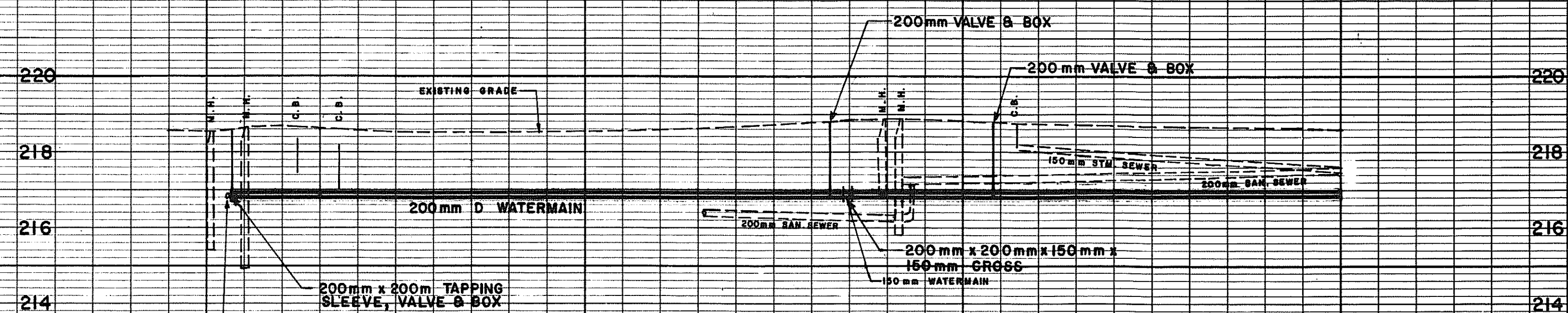
APPROVED BY

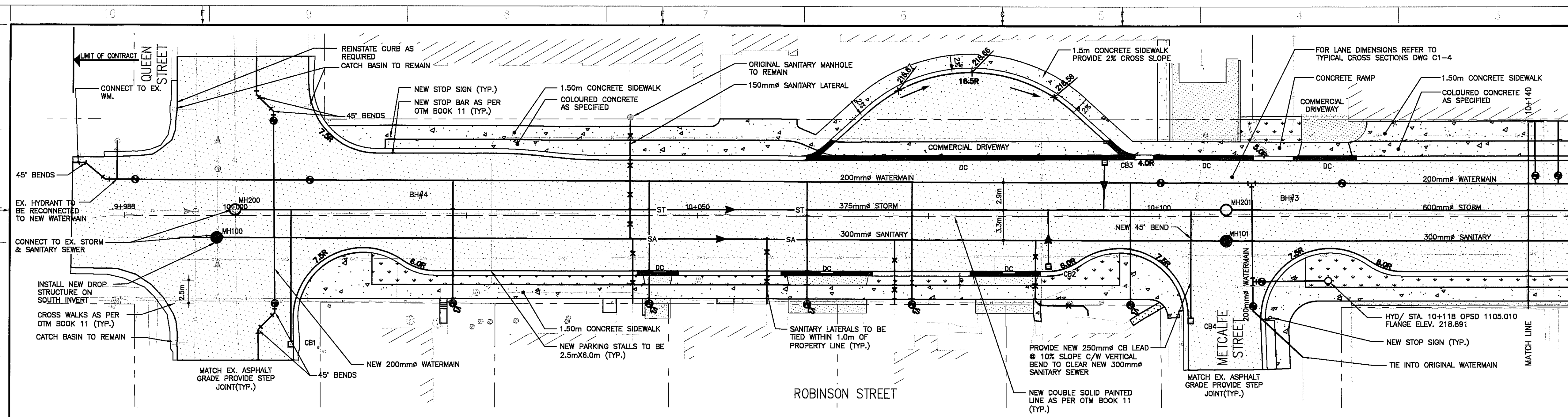
DRAWN BY

DATE

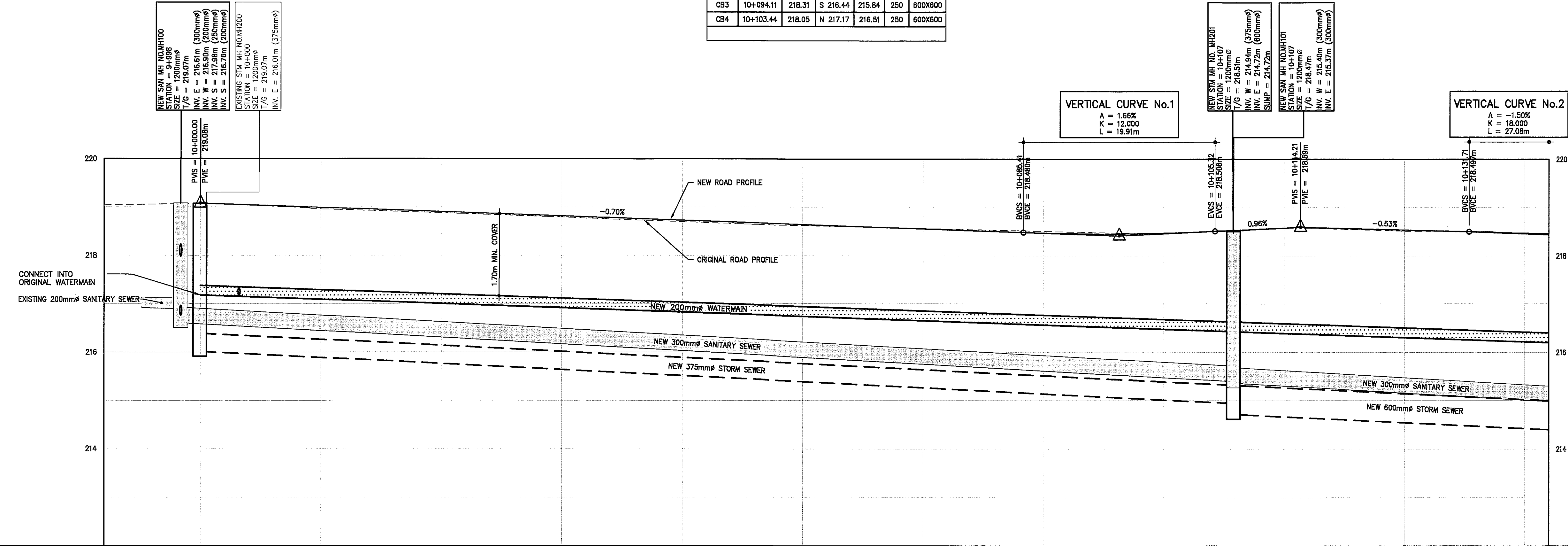
DIRECTOR OF ENGINEERING







SCHEDULE OF CATCH BASINS						
CB No.	STATION	TOP OF GRATE	INVERT	SUMP	LEAD	SIZE
CB1	10+006.02	219.05	N 216.26	215.67	250	600X600
CB2	10+088.01	218.32	N 216.86	216.32	250	600X600
CB3	10+094.11	218.31	S 216.44	215.84	250	600X600
CB4	10+103.44	218.05	N 217.17	216.51	250	600X600



STATION		10+000	10+025	10+050	10+075	10+100	10+125	10+140	STATION	
CENTERLINE GRADE	NEW	219.04	219.08	218.73	218.55	218.47	218.53	218.43	CENTERLINE GRADE	NEW
	ORIGINAL	219.04	218.88	218.70	218.55	218.45	218.51	218.43		ORIGINAL
TOP OF WATERMAIN		217.38	217.20	217.03	216.85	216.68	216.50	216.40	TOP OF WATERMAIN	
SANITARY SEWER INVERT		216.82	216.82	216.82	216.82	216.82	216.82	216.82	SANITARY SEWER INVERT	
STORM SEWER INVERT		216.01	216.01	216.01	216.01	216.01	216.01	216.01	STORM SEWER INVERT	

**NOTES:**

- CONTRACTOR TO VERIFY LOCATION OF ALL BURIED SERVICES PRIOR TO START OF CONSTRUCTION.
- TOPOGRAPHIC INFORMATION PROVIDED BY WSP SURVEYOR.
- ELEVATIONS ARE GEODETIC, BM: IB #10 (218.804m) ON NORTH EAST CORNER OF QUEEN STREET.
- ALL DISTURBED AREAS TO BE REINSTATED USING 100mm OF TOPSOIL AND SOD UNLESS OTHERWISE NOTED.
- VERIFY LOCATION AND ELEVATION OF ORIGINAL WATER AND SANITARY SERVICES PRIOR TO CONSTRUCTION. MATCH ORIGINAL LOCATION AND GRADE AT PROPERTY LINE.
- REINSTATE DRIVEWAYS AS SPECIFIED.
- ALL STREET SIGNAGE TO BE REINSTATED.

**LEGEND:**

- ORIGINAL PROPERTY LINE
- NEW CENTERLINE OF ROAD
- NEW EDGE OF PAVEMENT
- ORIGINAL EDGE OF PAVEMENT
- NEW CURB
- NEW DEPRESSED CURB
- OPSD 600.040
- ORIGINAL CURB
- NEW EDGE OF SHOULDER
- ORIGINAL EDGE OF SHOULDER
- NEW DITCH
- ORIGINAL DITCH
- NEW BOTTOM OF SLOPE
- ORIGINAL BOTTOM OF SLOPE
- ORIGINAL TOP OF SLOPE
- ORIGINAL FENCE
- NEW SANITARY SEWER
- ORIGINAL SANITARY SEWER
- NEW STORM SEWER
- ORIGINAL STORM SEWER
- NEW WATERMAIN
- ORIGINAL WATERMAIN
- ORIGINAL GAS
- ORIGINAL BELL LINE
- ORIGINAL HYDRO
- ORIGINAL FENCE
- NEW SANITARY MANHOLE
- ORIGINAL SANITARY MANHOLE
- NEW STORM MANHOLE
- ORIGINAL STORM MANHOLE
- NEW CATCH BASIN
- ORIGINAL CATCH BASIN
- NEW HYDRANT
- ORIGINAL HYDRANT
- NEW VALVE
- ORIGINAL VALVE
- SITE TEMPORARY BENCHMARK
- ORIGINAL UTILITY POLE
- ORIGINAL LIGHT POLE
- ORIGINAL TREE
- NEW SIDEWALK OPSD - 310.010, 310.020, 310.030, 310.050, 350.010, 351.010
- NEW SIDEWALK OPSD
- NEW ASPHALT
- NEW SERVICE LATERAL
- 125mm MIN. SANITARY SERVICE
- 19mm WATER SERVICE
- BORE HOLE
- NEW CURB & GUTTER OPSD 600.040

73 WATER STREET NORTH, SUITE 605  
CAMBRIDGE, ONTARIO  
CANADA N1R 7L5  
PHONE: 226-765-0800 FAX: 519-740-6104  
WWW.WSPGROUP.COM

CONSULTANT:

CLIENT: PW-E-15-62

PROJECT: ROBINSON STREET RECONSTRUCTION QUEEN STREET TO TALBOT STREET

KEY PLAN:

DISCLAIMER: THIS DRAWING AND DESIGN IS COPYRIGHT PROTECTED WHICH SHALL NOT BE USED, REPRODUCED OR REVISED WITHOUT WRITTEN PERMISSION BY WSP. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND UTILITY LOCATIONS AND REPORT ALL ERRORS AND OMISSIONS PRIOR TO COMMENCING WORK. THIS DRAWING IS NOT TO BE SCALED.

ISSUED FOR AS-BUILT

IS	RE	DATE	DESCRIPTION
0		2016/01/20	ISSUED FOR AS-BUILT

PROJECT NO: 141-14142-00

DATE: 09-05-2014

ORIGINAL SCALE: 1:250

DESIGNED BY: MG

DRAWN BY: MG

CHECKED BY: AT

DISCIPLINE: MUNICIPAL

TITLE: ROBINSON STREET PLAN AND PROFILE STA. 10+000 TO STA. 10+140

SHEET NUMBER: C1-1

ISSUE: 4 OF 12

ISSUED FOR AS-BUILT

DATE OF: 2016/01/20

REV # 0

3860-S-138 Jun 20, 2016-11:18am BY: Jonathan Ausland

# APPENDIX B

## Water Demand Calculations



## Domestic Water Demand Calculations

Population Estimate				Notes & References
Site Area =	1.70	ha		Per Site Plan prepared by Stoyanovskyy Architects (July 2024)
Number of Residential Units =	149	units		Population Density from Norfolk County DC
Residential Population Density =	1.43	persons/unit		Background Study (December 2018), assuming high density Residential Development
Total Residential Population =	214	persons		
Area of Commercial Units =	0.03	ha		
Commercial Population Density =	90	persons/ha		Population Density from Norfolk County Design Criteria (February 2019), assuming commercial development
Total Commercial Population =	3	persons		
<b>Total Population =</b>	<b>217</b>	persons		
Water Demand				
Average Daily Demand =	0.45	m <sup>3</sup> /person/d		Average Per Capita Demand and Peaking Factors from Norfolk County Design Criteria (February 2019), Section 10.1.2
Avg. Residential Daily Demand =	96	m <sup>3</sup> /d		
	<b>1.11</b>	<b>L/s</b>		
Avg. Commercial Daily Demand =	1.35	m <sup>3</sup> /d		
	<b>0.02</b>	<b>L/s</b>		
Average Total Daily Demand =	97.65	m <sup>3</sup> /d		
	<b>1.13</b>	<b>L/s</b>		
Maximum Day Factor =	2.25			
Residential Peak Hour Factor =	4.00			
Commercial Peak Hour Factor =	2.00			
Maximum Daily Flow =	<b>2.54</b>	<b>L/s</b>		
Peak Hour Flow =	<b>4.49</b>	<b>L/s</b>		
Summary Table				
Average Daily Flow (L/s)	Maximum Daily Flow (L/s)	Peak Hour Flow (L/s)		
1.13	2.54	4.49		



**CROZIER**  
CONSULTING ENGINEERS

185 Robinson Street  
Fire Protection Volume Calculation  
CFCA File: 2616-6994

Date: 2024-08-16  
Designed By: DC  
Checked By:

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \sqrt{A}$$

Where:

F = the required fire flow in litres per minute

C = coefficient related to the type of construction:

= 1.5	for wood frame construction (structure essentially all combustible)
= 0.8	for type IV-A mass timber construction
= 0.9	for type IV-B mass timber construction
= 1.0	for type IV-C mass timber construction
= 1.5	for type IV-D mass timber construction
= 1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
= 0.8	for non-combustible construction (unprotected metal structural components)
= 0.6	for fire-resistive construction (fully protected frame, floors, roof)

A = The largest floor area in square meters (plus the following percentages of the total areas of the other floors).

For Construction Coefficient from 1.0 to 1.5:

= 100% of ALL Floor Areas

For Construction Coefficient below 1.0:

- Floors With Any Unprotected Vertical Openings in the Building

= two largest adjoining floors + 50% all floors immediately above (max 8 floors)

- Floors With Any Protected Vertical Openings and Protected Exterior Vertical Communications

= 25% each of two immediately adjoining floors

Proposed Buildings

Area: 3,885 sq.m

A= 3,885 sq.m

- Gross floor area (G.F.A) for Proposed Addition Area per Site Plan prepared by Stoyanovskyy Architects, dated July 2024

C= 0.8

- non-combustible construction (unprotected metal structural components)

Therefore RFF = 10,970 L/min

Fire flow determined above shall not exceed:

30,000 L/min for wood frame construction

30,000 L/min for ordinary construction

25,000 L/min for non-combustible construction

25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

*Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	0%		

Occupancy Type: Residential (C)

Reduction %: -15%

- Combustible to Free Burning

Subtotal = 1,646 L/min reduction  
9,325 L/min

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above may be reduced by up to 50% for complete automatic sprinkler protection.

Automatic Sprinkler Design System	Credit to part of building with coverage
Automatic sprinkler protection designed and installed in accordance with NFPA 13.	30%
Water supply is standard for both the system and Fire Department hose lines.	10%
Fully supervised system.	10%

Reduction %: 50%

Building to be sprinklered.

Subtotal = 5,485 L/min reduction  
3,840 L/min



Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 30 meters by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	>30 m	0%
10.1 to 20 m	15%		

Exposed buildings

Direction	Distance (m)	Charge	Surcharge (L/min)
North	>30	0%	0
South	>30	0%	0
East	30	10%	1,097
West	25	10%	1,097
Total Surcharge			2,194

- Existing Industrial Building  
- Existing residential

Determine Required Fire Flow

No.1 10,970  
No. 2 1,646 reduction  
No. 3 5,485 reduction  
No. 4 2,194 surcharge

Required Flow: 6,034 L/min  
Rounded to nearest 1000 L/min: 7,000 L/min or 117 L/s  
1,848 USGPM

Note: USGPM = 0.264\*(L/min)

Required Duration of Fire Flow	
Flow Required (L/min)	Duration (hours)
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	2.00
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

# APPENDIX C

## Sanitary Flow Calculations



## Sanitary Flow Calculations

				<u>Notes &amp; References</u>
<b>Population Estimate</b>				
Subject Property Area =	1.7	ha		
Number of Residential Units =	149	units		Population Density from Norfolk County DC Background Study (December 2018), assuming high density Residential Development
Residential Population Density =	1.43	persons/unit		
Total Residential Population =	214	persons		Commercial unit area from Site Plan prepared by Stoyanovskyy Architects (July 2024)
Area of Commercial Units =	0.03	ha		Population Density from Norfolk County Design Criteria (February 2019), assuming commercial development
Commercial Population Density =	90	persons/ha		
Total Commercial Population =	3	persons		
<b>Total Population =</b>	<b>217</b>	persons		
<b>Sanitary Design Flow</b>				
Residential Average Daily Flow =	0.45	m <sup>3</sup> /person/d		Average Sanitary Flow and Infiltration Allowance from Norfolk County Design Criteria (February 2019), Section 9.2.02 and 9.2.04
Commercial Average Daily Flow =	0.40	m <sup>3</sup> /ha/d		
Average Residential Daily Flow =	96.30	m <sup>3</sup> /d		
	<b>1.11</b>	<b>L/s</b>		
Average Commercial Daily Flow =	0.01	m <sup>3</sup> /d		
	<b>0.00014</b>	<b>L/s</b>		
Average Total Daily Flow =	96.31	m <sup>3</sup> /d		
	<b>1.11</b>	<b>L/s</b>		
Modified Harmon Peak Factor, M = (Residential)	<b>4.14</b>			$M = 1 + [14 / (4 + (P^{0.5}))]$
Modified Harmon Peak Factor, Me = (Commercial)	<b>3.56</b>			$Me = 0.8 * [1 + 14 / (4 + (P^{0.5}))]$
Infiltration Allowance, I =	0.28	L/s/ha		
Total Infiltration =	<b>0.48</b>	L/s		Total Infiltration = Infiltration Allowance * Site Area
Total Peak Flow, Q =	<b>5.09</b>	L/s		$Q = \text{Average Daily Flow} \times \text{Peaking Factor} + \text{Infiltration}$
<b>Summary Table</b>				
Average Daily Flow (L/s)	Residential Peaking Factor	Commercial Peaking Factor	Infiltration Flow (L/s)	Total Peak Flow (L/s)
1.11	4.14	3.56	0.48	5.09

# APPENDIX D

## Stormwater Management Calculations





Project: 185 Robinson St  
Project No.: 2616-6994  
Created By: AD  
Checked By:  
Date: 2024-07-30  
Updated: 2024-08-16

Modified Rational Calculations - Input Parameters

Storm Data:

Time of Concentration:  $T_c = 15$  min (per Norfolk County standards)

Return Period	A	B	C	I (mm/hr)
2 yr	529.711	4.501	0.745	57.94
5 yr	583.017	3.007	0.703	76.40
10 yr	670.324	3.007	0.698	89.12
25 yr	721.533	2.253	0.679	104.33
50 yr	766.038	1.898	0.668	115.89
100 yr	801.041	1.501	0.657	126.98

Pre-Development Conditions

Catchment ID	Area (ha)	Area (m <sup>2</sup> )	C	Weighted Average C <sup>1</sup>
101	0.43	4319	0.34	0.09
102	0.18	1757	0.25	0.03
EXT-1	1.03	10300	0.83	0.50
EXT-2	0.07	660	0.70	0.03
Total Site	1.70	17036	-	0.61

Post-Development Conditions

Catchment ID	Area (ha)	Area (m <sup>2</sup> )	C	Weighted Average C <sup>1</sup>
201	0.67	6730	0.72	0.28
202	0.96	9646	0.87	0.49
203	0.07	660	0.70	0.03
Total Site	1.70	17036	-	0.80

Equations:

Peak Flow  
 $Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i(T_d) \cdot A$

Intensity  
 $I = \frac{A}{(t_c + B)^c}$

## Modified Rational Calculations - Summary

Outlet to Ontario Street

Storm Event	Pre-Development (m3/s)	Post-Development (m3/s)		Storage Required (m3/s)	Storage Provided (m3/s)
	101+102	201	201-Controlled*		
2 yr	0.031	0.078	0.041	34	130
5 yr	0.041	0.103		56	
10 yr	0.047	0.120		72	
25 yr	0.055	0.141		93	
50 yr	0.062	0.157		110	
100 yr	0.068	0.172		127	

\*Catchment 201 controlled to the 5-yr pre-development peak flow rate for Catchment 101.





Project: 185 Robinson St  
Project No.: 2616-6994

Date: 2024-01-16  
Revised: 2024-08-16  
Designed By: AD  
Checked By: BP

**MODIFIED RATIONAL METHOD CALCULATIONS - 100 YEAR STORM EVENT**

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

Norfolk County IDF (100-Year)	
a=	801.041
b=	1.501
c=	0.657

		CONTROLLED AREA		UNCONTROLLED AREA	
		Drainage Area ID = 201 Drainage Area = 0.67 ha Runoff Coefficient = 0.72		Drainage Area ID = n/a Drainage Area = n/a Runoff Coefficient = n/a	
		Controlled Release Rate at MH1 = 40.6 L/s		Target Site Release Rate = 40.6 L/s	
		Max. Storage Volume Required = 127 m3 Storage Volume Provided = 130 m3		Controlled Release Rate at MH1 = 40.6 L/s Uncontrolled Release Rate = 0.0 L/s Total Site Release Rate = 40.6 L/s	
Time (minutes)	Rainfall Intensity (mm/hr)	Q <sub>Runoff</sub> (L/s)	Q <sub>Release</sub> (L/s)	Storage Volume Required (m <sup>3</sup> )	
5	234.2	314.1	40.6	82.0	
10	161.0	215.9	40.6	105.2	
15	127.0	170.3	40.6	116.7	
20	106.7	143.1	40.6	123.0	
25	93.0	124.8	40.6	126.2	
30	83.0	111.4	40.6	127.4	
35	75.4	101.1	40.6	127.0	
40	69.3	92.9	40.6	125.5	
45	64.3	86.2	40.6	123.1	
50	60.1	80.6	40.6	120.0	
55	56.6	75.9	40.6	116.3	
60	53.5	71.8	40.6	112.1	
65	50.8	68.2	40.6	107.4	
70	48.5	65.0	40.6	102.4	
75	46.4	62.2	40.6	97.0	
80	44.5	59.6	40.6	91.3	
85	42.8	57.4	40.6	85.3	
90	41.2	55.3	40.6	79.1	
95	39.8	53.4	40.6	72.7	
100	38.5	51.6	40.6	66.1	
105	37.3	50.0	40.6	59.3	
110	36.2	48.5	40.6	52.3	
115	35.2	47.2	40.6	45.2	
120	34.2	45.9	40.6	37.9	
125	33.3	44.7	40.6	30.5	
130	32.5	43.6	40.6	22.9	



Project: 185 Robinson St  
Project No.: 2616-6994

Date: 2024-01-16  
Revised: 2024-08-16  
Designed By: AD  
Checked By: BP

**MODIFIED RATIONAL METHOD CALCULATIONS - 50 YEAR STORM EVENT**

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

Town of Milton IDF (50-Year)	
a=	766.038
b=	1.898
c=	0.668

		CONTROLLED AREA		UNCONTROLLED AREA	
		Drainage Area ID = 201 Drainage Area = 0.67 ha Runoff Coefficient = 0.72		Drainage Area ID = n/a Drainage Area = n/a Runoff Coefficient = n/a	
		Controlled Release Rate at MH1 = 40.6 L/s		Target Site Release Rate = 40.6 L/s	
		Max. Storage Volume Required = 110.0 m3 Storage Volume Provided = 130.0 m3		Controlled Release Rate at MH1 = 40.6 L/s Uncontrolled Release Rate = 0.0 L/s Total Site Release Rate = 40.6 L/s	
Time (minutes)	Rainfall Intensity (mm/hr)	Q <sub>Runoff</sub> (L/s)	Q <sub>Release</sub> (L/s)	Storage Volume Required (m <sup>3</sup> )	
5	210.9	282.8	40.6	72.7	
10	146.5	196.5	40.6	93.5	
15	115.9	155.4	40.6	103.3	
20	97.5	130.7	40.6	108.1	
25	85.0	113.9	40.6	110.0	
30	75.8	101.7	40.6	109.9	
35	68.8	92.3	40.6	108.4	
40	63.2	84.7	40.6	105.9	
45	58.6	78.6	40.6	102.6	
50	54.8	73.5	40.6	98.5	
55	51.5	69.1	40.6	93.9	
60	48.7	65.3	40.6	88.9	
65	46.2	62.0	40.6	83.4	
70	44.1	59.1	40.6	77.6	
75	42.1	56.5	40.6	71.4	
80	40.4	54.2	40.6	65.0	
85	38.8	52.1	40.6	58.4	
90	37.4	50.1	40.6	51.5	
95	36.1	48.4	40.6	44.4	
100	34.9	46.8	40.6	37.1	
105	33.8	45.3	40.6	29.7	
110	32.8	44.0	40.6	22.1	
115	31.8	42.7	40.6	14.4	
120	31.0	41.5	40.6	6.5	
125	30.1	40.4	40.4	0.0	
130	29.4	39.4	39.4	0.0	





Project: 185 Robinson St  
Project No.: 2616-6994

Date: 2024-01-11  
Revised: 2024-08-16  
Designed By: AD  
Checked By: BP

**MODIFIED RATIONAL METHOD CALCULATIONS - 25 YEAR STORM EVENT**

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

Town of Milton IDF (25-Year)	
a=	721.533
b=	2.253
c=	0.679

		CONTROLLED AREA		UNCONTROLLED AREA	
		Drainage Area ID = 201 Drainage Area = 0.67 ha Runoff Coefficient = 0.72		Drainage Area ID = n/a Drainage Area = n/a Runoff Coefficient = n/a	
		Controlled Release Rate at MH1 = 40.6 L/s		Target Site Release Rate = 40.6 L/s	
		Max. Storage Volume Required = 93.0 m3 Storage Volume Provided = 130.0 m3		Controlled Release Rate at MH1 = 40.6 L/s Uncontrolled Release Rate = 0.0 L/s Total Site Release Rate = 40.6 L/s	
Time (minutes)	Rainfall Intensity (mm/hr)	Q <sub>Runoff</sub> (L/s)	Q <sub>Release</sub> (L/s)	Storage Volume Required (m <sup>3</sup> )	
5	187.9	252.0	40.6	63.4	
10	131.6	176.5	40.6	81.6	
15	104.3	139.9	40.6	89.4	
20	87.8	117.7	40.6	92.5	
25	76.5	102.6	40.6	93.0	
30	68.2	91.5	40.6	91.6	
35	61.9	83.0	40.6	89.0	
40	56.8	76.2	40.6	85.3	
45	52.6	70.6	40.6	81.0	
50	49.2	65.9	40.6	76.0	
55	46.2	62.0	40.6	70.5	
60	43.7	58.6	40.6	64.6	
65	41.4	55.6	40.6	58.3	
70	39.5	52.9	40.6	51.7	
75	37.7	50.6	40.6	44.8	
80	36.1	48.5	40.6	37.6	
85	34.7	46.6	40.6	30.3	
90	33.4	44.8	40.6	22.7	
95	32.2	43.2	40.6	15.0	
100	31.2	41.8	40.6	7.1	
105	30.2	40.5	40.5	0.0	
110	29.3	39.2	39.2	0.0	
115	28.4	38.1	38.1	0.0	
120	27.6	37.0	37.0	0.0	
125	26.9	36.0	36.0	0.0	
130	26.2	35.1	35.1	0.0	



Project: 185 Robinson St  
Project No.: 2616-6994

Date: 2024-01-11  
Revised: 2024-08-16  
Designed By: AD  
Checked By: BP

**MODIFIED RATIONAL METHOD CALCULATIONS - 10 YEAR STORM EVENT**

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

Town of Milton IDF (10-Year)	
a=	670.324
b=	3.007
c=	0.698

		CONTROLLED AREA		UNCONTROLLED AREA	
		Drainage Area ID = 201 Drainage Area = 0.67 ha Runoff Coefficient = 0.72		Drainage Area ID = n/a Drainage Area = n/a Runoff Coefficient = n/a	
		Controlled Release Rate at MH1 = 40.6 L/s		Target Site Release Rate = 40.6 L/s	
		Max. Storage Volume Required = 72.2 m3 Storage Volume Provided = 130.0 m3		Controlled Release Rate at MH1 = 40.6 L/s Uncontrolled Release Rate = 0.0 L/s Total Site Release Rate = 40.6 L/s	
Time (minutes)	Rainfall Intensity (mm/hr)	Q <sub>Runoff</sub> (L/s)	Q <sub>Release</sub> (L/s)	Storage Volume Required (m <sup>3</sup> )	
5	156.9	210.5	40.6	51.0	
10	111.8	150.0	40.6	65.6	
15	89.1	119.5	40.6	71.0	
20	75.1	100.7	40.6	72.2	
25	65.5	87.8	40.6	70.8	
30	58.4	78.3	40.6	67.8	
35	52.9	71.0	40.6	63.7	
40	48.5	65.1	40.6	58.8	
45	45.0	60.3	40.6	53.1	
50	41.9	56.3	40.6	46.9	
55	39.4	52.8	40.6	40.3	
60	37.2	49.9	40.6	33.3	
65	35.3	47.3	40.6	26.0	
70	33.5	45.0	40.6	18.4	
75	32.0	43.0	40.6	10.6	
80	30.7	41.1	40.6	2.5	
85	29.4	39.5	39.5	0.0	
90	28.3	38.0	38.0	0.0	
95	27.3	36.6	36.6	0.0	
100	26.4	35.4	35.4	0.0	
105	25.5	34.2	34.2	0.0	
110	24.7	33.2	33.2	0.0	
115	24.0	32.2	32.2	0.0	
120	23.3	31.3	31.3	0.0	
125	22.7	30.4	30.4	0.0	
130	22.1	29.6	29.6	0.0	





Project: 185 Robinson St  
Project No.: 2616-6994

Date: 2024-01-11  
Revised: 2024-08-16  
Designed By: AD  
Checked By: BP

**MODIFIED RATIONAL METHOD CALCULATIONS - 5 YEAR STORM EVENT**

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

Town of Milton IDF (5-Year)	
a=	583.017
b=	3.007
c=	0.703

		CONTROLLED AREA		UNCONTROLLED AREA	
		Drainage Area ID = 201 Drainage Area = 0.67 ha Runoff Coefficient = 0.72		Drainage Area ID = n/a Drainage Area = n/a Runoff Coefficient = n/a	
		Controlled Release Rate at MH1 = 40.6 L/s		Target Site Release Rate = 40.6 L/s	
		Max. Storage Volume Required = 55.7 m3 Storage Volume Provided = 130.0 m3		Controlled Release Rate at MH1 = 40.6 L/s Uncontrolled Release Rate = 0.0 L/s Total Site Release Rate = 40.6 L/s	
Time (minutes)	Rainfall Intensity (mm/hr)	Q <sub>Runoff</sub> (L/s)	Q <sub>Release</sub> (L/s)	Storage Volume Required (m <sup>3</sup> )	
5	135.1	181.2	40.6	42.2	
10	96.0	128.8	40.6	52.9	
15	76.4	102.5	40.6	55.7	
20	64.3	86.3	40.6	54.8	
25	56.0	75.1	40.6	51.8	
30	49.9	66.9	40.6	47.4	
35	45.2	60.6	40.6	42.0	
40	41.4	55.6	40.6	35.9	
45	38.3	51.4	40.6	29.2	
50	35.8	48.0	40.6	22.1	
55	33.6	45.0	40.6	14.6	
60	31.7	42.5	40.6	6.7	
65	30.0	40.3	40.3	0.0	
70	28.6	38.3	38.3	0.0	
75	27.3	36.6	36.6	0.0	
80	26.1	35.0	35.0	0.0	
85	25.0	33.6	33.6	0.0	
90	24.1	32.3	32.3	0.0	
95	23.2	31.1	31.1	0.0	
100	22.4	30.1	30.1	0.0	
105	21.7	29.1	29.1	0.0	
110	21.0	28.2	28.2	0.0	
115	20.4	27.3	27.3	0.0	
120	19.8	26.5	26.5	0.0	
125	19.2	25.8	25.8	0.0	
130	18.7	25.1	25.1	0.0	



Project: 185 Robinson St  
Project No.: 2616-6994

Date: 2024-01-11  
Revised: 2024-08-16  
Designed By: AD  
Checked By: BP

**MODIFIED RATIONAL METHOD CALCULATIONS - 2 YEAR STORM EVENT**

Rainfall Intensity Equation:

$$I = \frac{A}{(T+b)^c}$$

Town of Milton IDF (2-Year)	
a=	529.711
b=	4.501
c=	0.745

		CONTROLLED AREA		UNCONTROLLED AREA	
		Drainage Area ID = 201 Drainage Area = 0.67 ha Runoff Coefficient = 0.72		Drainage Area ID = n/a Drainage Area = n/a Runoff Coefficient = n/a	
		Controlled Release Rate at MH1 = 40.6 L/s		Target Site Release Rate = 40.6 L/s	
		Max. Storage Volume Required = 33.8 m3 Storage Volume Provided = 130.0 m3		Controlled Release Rate at MH1 = 40.6 L/s Uncontrolled Release Rate = 0.0 L/s Total Site Release Rate = 40.6 L/s	
Time (minutes)	Rainfall Intensity (mm/hr)	Q <sub>Runoff</sub> (L/s)	Q <sub>Release</sub> (L/s)	Storage Volume Required (m <sup>3</sup> )	
5	99.0	132.8	40.6	27.6	
10	72.2	96.9	40.6	33.8	
15	57.9	77.7	40.6	33.4	
20	48.9	65.6	40.6	29.9	
25	42.6	57.1	40.6	24.7	
30	37.9	50.8	40.6	18.3	
35	34.2	45.9	40.6	11.2	
40	31.3	42.0	40.6	3.4	
45	28.9	38.8	38.8	0.0	
50	26.9	36.1	36.1	0.0	
55	25.2	33.8	33.8	0.0	
60	23.8	31.9	31.9	0.0	
65	22.5	30.1	30.1	0.0	
70	21.3	28.6	28.6	0.0	
75	20.3	27.3	27.3	0.0	
80	19.4	26.1	26.1	0.0	
85	18.6	25.0	25.0	0.0	
90	17.9	24.0	24.0	0.0	
95	17.2	23.1	23.1	0.0	
100	16.6	22.2	22.2	0.0	
105	16.0	21.5	21.5	0.0	
110	15.5	20.8	20.8	0.0	
115	15.0	20.1	20.1	0.0	
120	14.6	19.5	19.5	0.0	
125	14.1	19.0	19.0	0.0	
130	13.7	18.4	18.4	0.0	





**CROZIER**  
CONSULTING ENGINEERS

**Project:** 185 Robinson St  
**Project No.:** 2616-6994  
**Created By:** AD  
**Checked By:** BP  
**Date:** 2021-07-26  
**Updated:** 2024-08-16

### 120mm Dia. Orifice Tube Design Summary

Orifice Type =	Orifice Tube	
Invert Elevation =	214.88	m
Diameter of Orifice =	120	mm
Area of Orifice (A) =	0.0113	sq.m
Orifice Coefficient (Cd) =	0.82	

#### **Calculation of Head**

Centroid Elevation =	214.94	m	
Water Elevation =	215.41	m	*Lowest CB Elevation
Upstream Head*, (h) =	0.47	m	

$$Q_a = (C_d)(A)(2gh)^{0.5}$$

<b>Actual Controlled Discharge, Qa =</b>	<b>0.03</b>	<b>cms</b>
--	-------------	------------

28 L/s

\*Head is based upon orifice area @ orifice face not Vena Contracta





## Stormceptor® EF Sizing Report

## Imbrium® Systems

## ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

08/01/2024

Province:	Ontario	Project Name:	Robinson St
City:	Town of Simcoe	Project Number:	65368
Nearest Rainfall Station:	BRANTFORD MOE	Designer Name:	Daniel Caberlin
Climate Station Id:	6140954	Designer Company:	CF Crozier and Associates
Years of Rainfall Data:	41	Designer Email:	dcaberlin@cfcrozier.ca
		Designer Phone:	905-864-3670
Site Name:		EOR Name:	
		EOR Company:	
Drainage Area (ha):	0.67	EOR Email:	
% Imperviousness:	72.00	EOR Phone:	

Runoff Coefficient 'c': 0.73

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	17.84
Oil / Fuel Spill Risk Site?	No
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	31.00
Peak Conveyance (maximum) Flow Rate (L/s):	172.00
Influent TSS Concentration (mg/L):	100
Estimated Average Annual Sediment Load (kg/yr):	284
Estimated Average Annual Sediment Volume (L/yr):	231

**Net Annual Sediment  
(TSS) Load Reduction  
Sizing Summary**

Stormceptor Model	TSS Removal Provided (%)
EF4	85
EF6	92
EF8	96
EF10	98
EF12	99

**Recommended Stormceptor EF Model:** EF4  
**Estimated Net Annual Sediment (TSS) Load Reduction (%):** 85  
**Water Quality Runoff Volume Capture (%):** > 90

## Stormceptor® EF Sizing Report

### THIRD-PARTY TESTING AND VERIFICATION

► **Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

### PERFORMANCE

► **Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

### PARTICLE SIZE DISTRIBUTION (PSD)

► The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5



## Stormceptor®EF Sizing Report

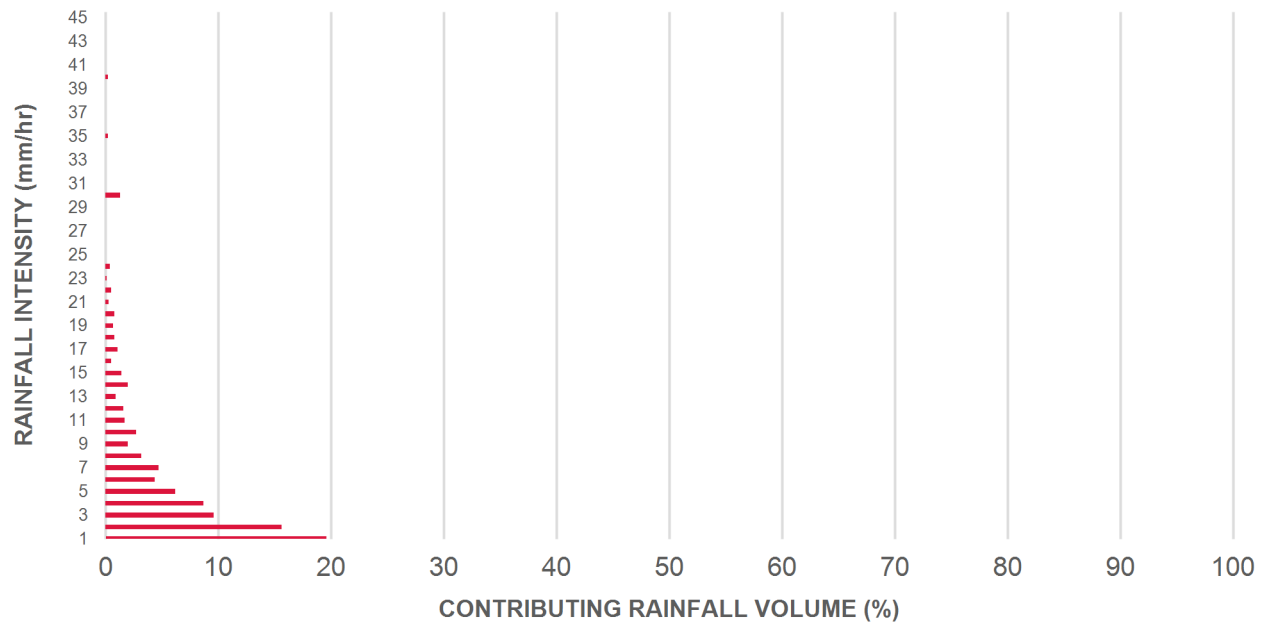
## Upstream Flow Controlled Results

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	9.1	9.1	0.68	41.0	34.0	100	9.1	9.1
1.00	19.6	28.8	1.36	82.0	68.0	100	19.6	28.8
2.00	15.6	44.4	2.73	164.0	136.0	92	14.4	43.1
3.00	9.6	54.0	4.09	245.0	205.0	83	8.0	51.2
4.00	8.7	62.7	5.45	327.0	273.0	80	6.9	58.1
5.00	6.2	68.9	6.82	409.0	341.0	77	4.7	62.8
6.00	4.4	73.3	8.18	491.0	409.0	74	3.2	66.0
7.00	4.7	77.9	9.54	573.0	477.0	73	3.4	69.4
8.00	3.2	81.1	10.91	654.0	545.0	72	2.3	71.7
9.00	2.0	83.1	12.27	736.0	614.0	71	1.4	73.1
10.00	2.7	85.7	13.63	818.0	682.0	70	1.9	75.0
11.00	1.7	87.4	15.00	900.0	750.0	70	1.2	76.1
12.00	1.6	89.0	16.36	982.0	818.0	69	1.1	77.2
13.00	0.9	89.8	17.72	1063.0	886.0	69	0.6	77.8
14.00	2.0	91.8	19.09	1145.0	954.0	68	1.3	79.1
15.00	1.4	93.2	20.45	1227.0	1023.0	68	1.0	80.1
16.00	0.5	93.7	21.81	1309.0	1091.0	69	0.3	80.4
17.00	1.1	94.8	23.18	1391.0	1159.0	71	0.8	81.2
18.00	0.8	95.5	24.54	1472.0	1227.0	72	0.5	81.7
19.00	0.7	96.2	25.91	1554.0	1295.0	73	0.5	82.3
20.00	0.8	97.0	27.27	1636.0	1363.0	75	0.6	82.9
21.00	0.3	97.4	28.63	1718.0	1432.0	74	0.2	83.1
22.00	2.6	100.0	30.00	1800.0	1500.0	70	1.9	85.0
23.00	0.0	100.0	31.00	1860.0	1550.0	68	0.0	85.0
24.00	0.0	100.0	31.00	1860.0	1550.0	68	0.0	85.0
25.00	0.0	100.0	31.00	1860.0	1550.0	68	0.0	85.0
30.00	0.0	100.0	31.00	1860.0	1550.0	68	0.0	85.0
35.00	0.0	100.0	31.00	1860.0	1550.0	68	0.0	85.0
40.00	0.0	100.0	31.00	1860.0	1550.0	68	0.0	85.0
45.00	0.0	100.0	31.00	1860.0	1550.0	68	0.0	85.0
Estimated Net Annual Sediment (TSS) Load Reduction =								85 %

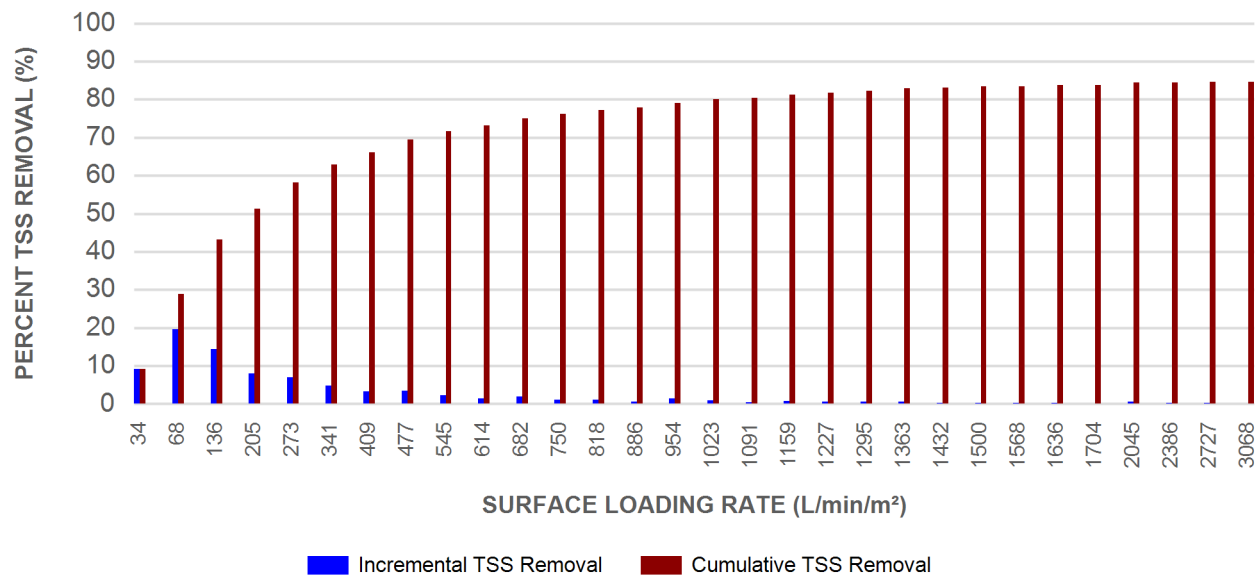
Climate Station ID: 6140954 Years of Rainfall Data: 41

# Stormceptor®EF Sizing Report

## RAINFALL DATA FROM BRANTFORD MOE RAINFALL STATION



## INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL





## Stormceptor® EF Sizing Report

### Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

### SCOUR PREVENTION AND ONLINE CONFIGURATION

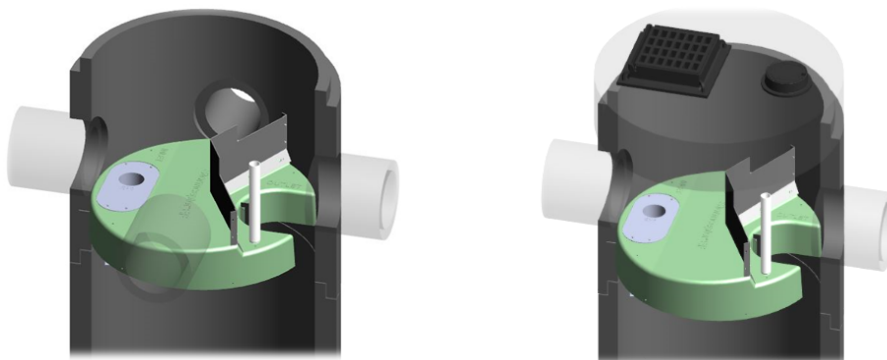
► Stormceptor® EF and EFO feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

### DESIGN FLEXIBILITY

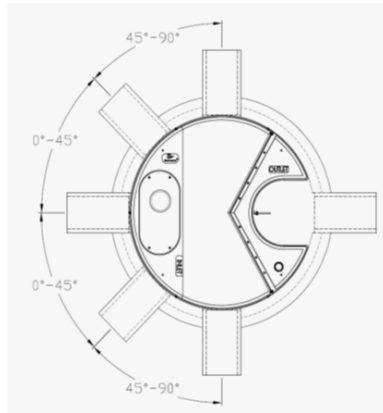
► Stormceptor® EF and EFO offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

### OIL CAPTURE AND RETENTION

► While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, Stormceptor® EFO has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.



## Stormceptor® EF Sizing Report



### INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

### HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1.

For submerged conditions the applicable K value is 3.0.

### Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

\*Increased sump depth may be added to increase sediment storage capacity

\*\* Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³ )

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

### STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

### STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>



## STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE

### PART 1 – GENERAL

#### 1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

#### 1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program’s **Procedure for Laboratory Testing of Oil-Grit Separators.**

#### 1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

### PART 2 – PRODUCTS

#### 2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The **minimum** sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m <sup>3</sup> sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m <sup>3</sup> sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m <sup>3</sup> sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m <sup>3</sup> sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m <sup>3</sup> sediment / 2,476 L oil

### PART 3 – PERFORMANCE & DESIGN

#### 3.1 GENERAL

## Stormceptor®EF Sizing Report

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

### 3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m<sup>2</sup> to 1400 L/min/m<sup>2</sup>, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m<sup>2</sup> and 1400 L/min/m<sup>2</sup> shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m<sup>2</sup> shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m<sup>2</sup>. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m<sup>2</sup>.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m<sup>2</sup> shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m<sup>2</sup>, and shall be calculated using a simple proportioning formula, with 1400 L/min/m<sup>2</sup> in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m<sup>2</sup>.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

### 3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

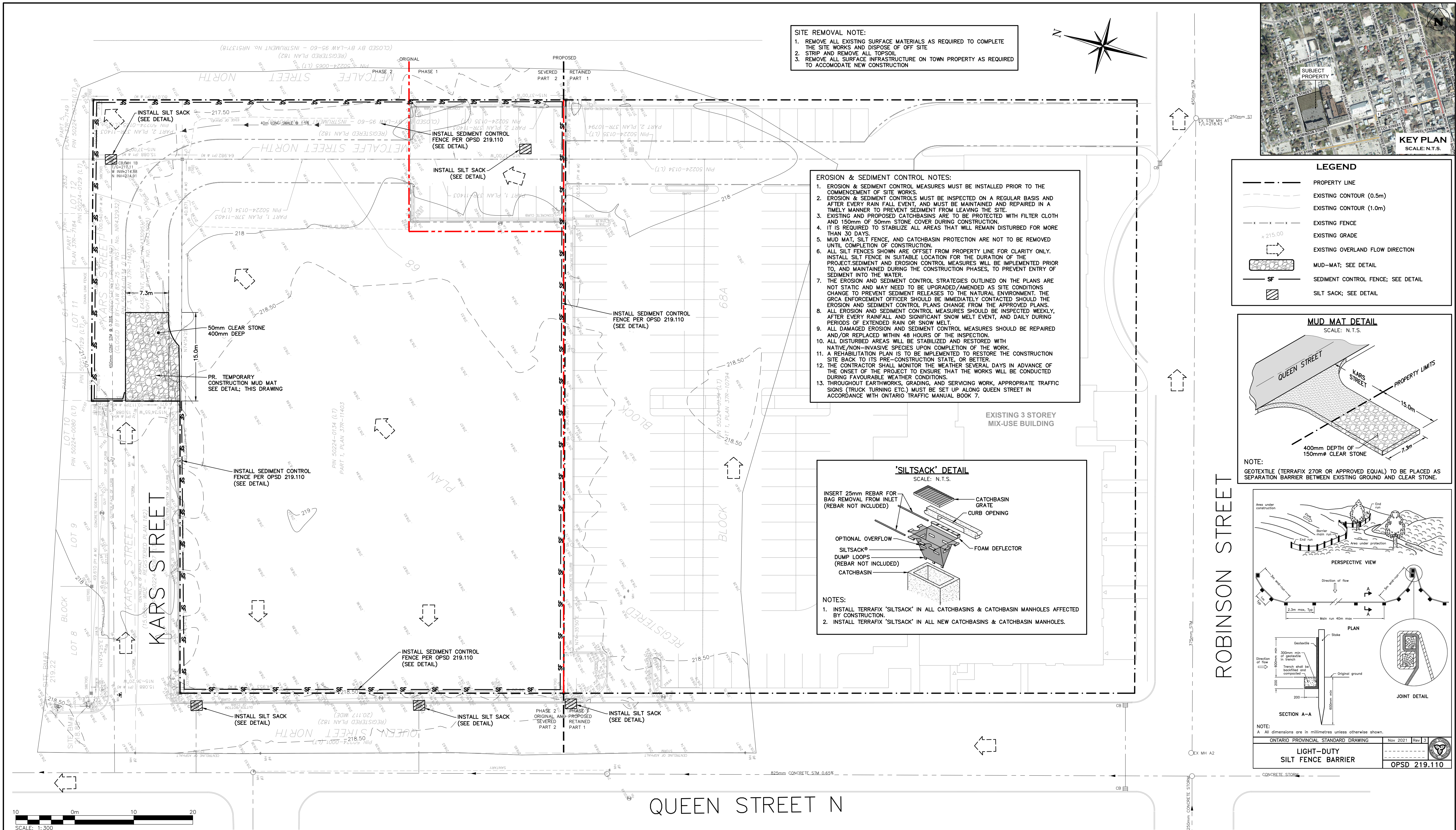
The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m<sup>2</sup>.



# DRAWINGS





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TM#1-SPIKE IN FACE OF WOOD HYDRO POLE, ELEV=218.85  
TM#2-TOP OF MAIN OUTLET OF FIRE HYDRANT, ELEV=219.22

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No.	ISSUE	DATE: MM/DD/YYYY
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**FOR REVIEW**  
NOT TO BE USED FOR CONSTRUCTION

185 ROBINSON ST, SIMCOE, ON.

EROSION AND SEDIMENT CONTROL PLAN

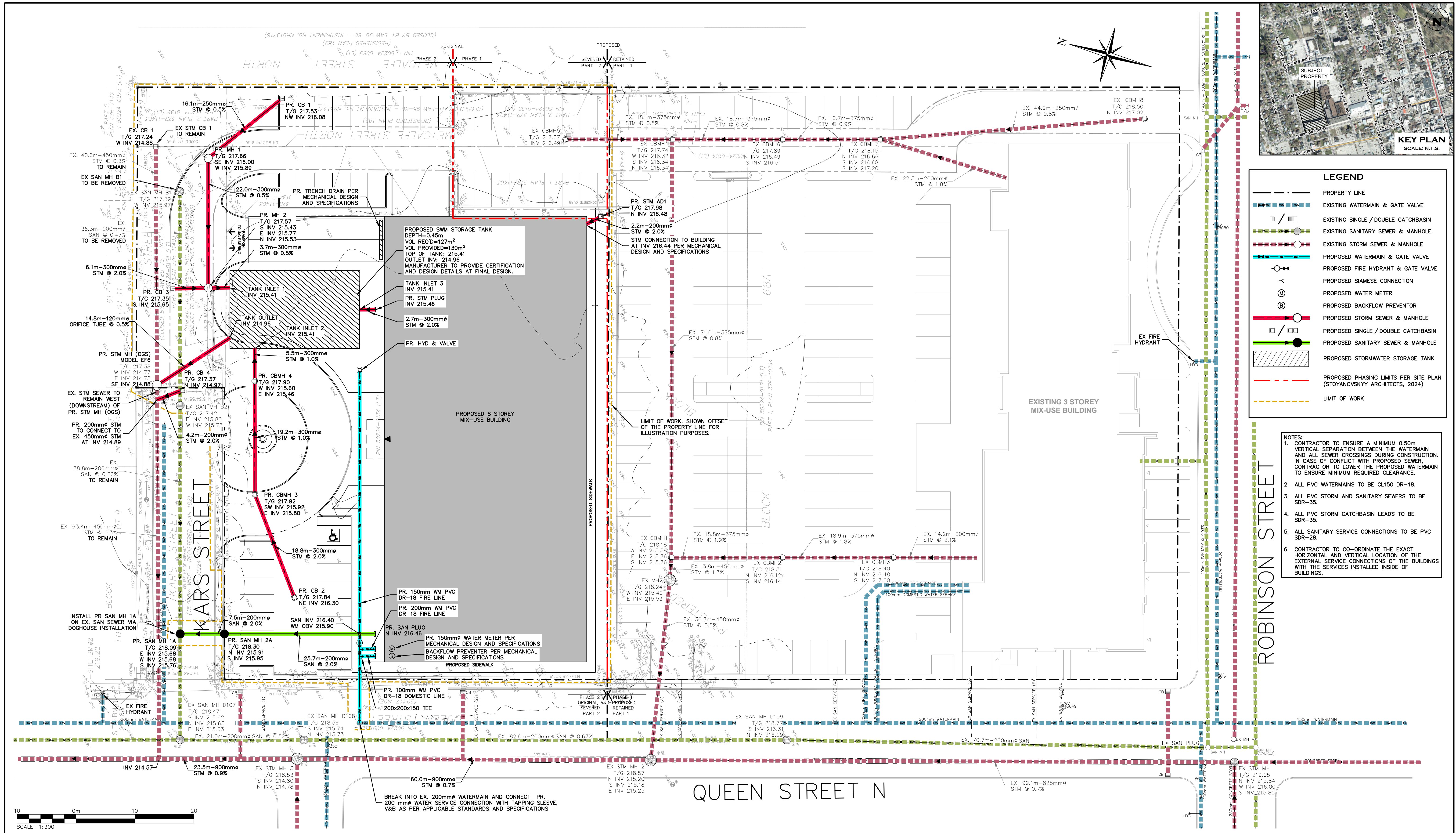
**CROZIER CONSULTING ENGINEERS**

Drawn By: M.B. Design By: M.B. Project: 2616-6994  
Check By: T.F. Check By: B.W. Drawing: C101





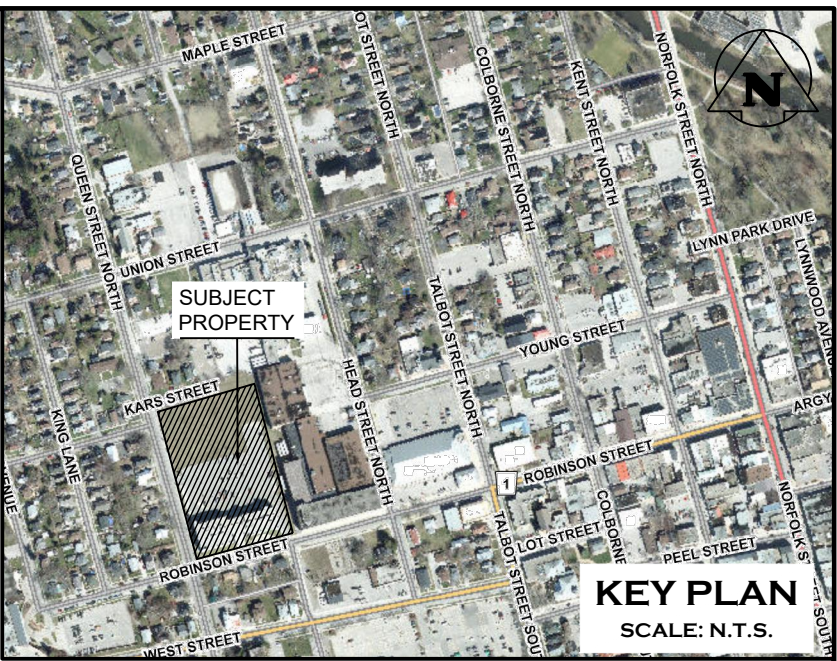
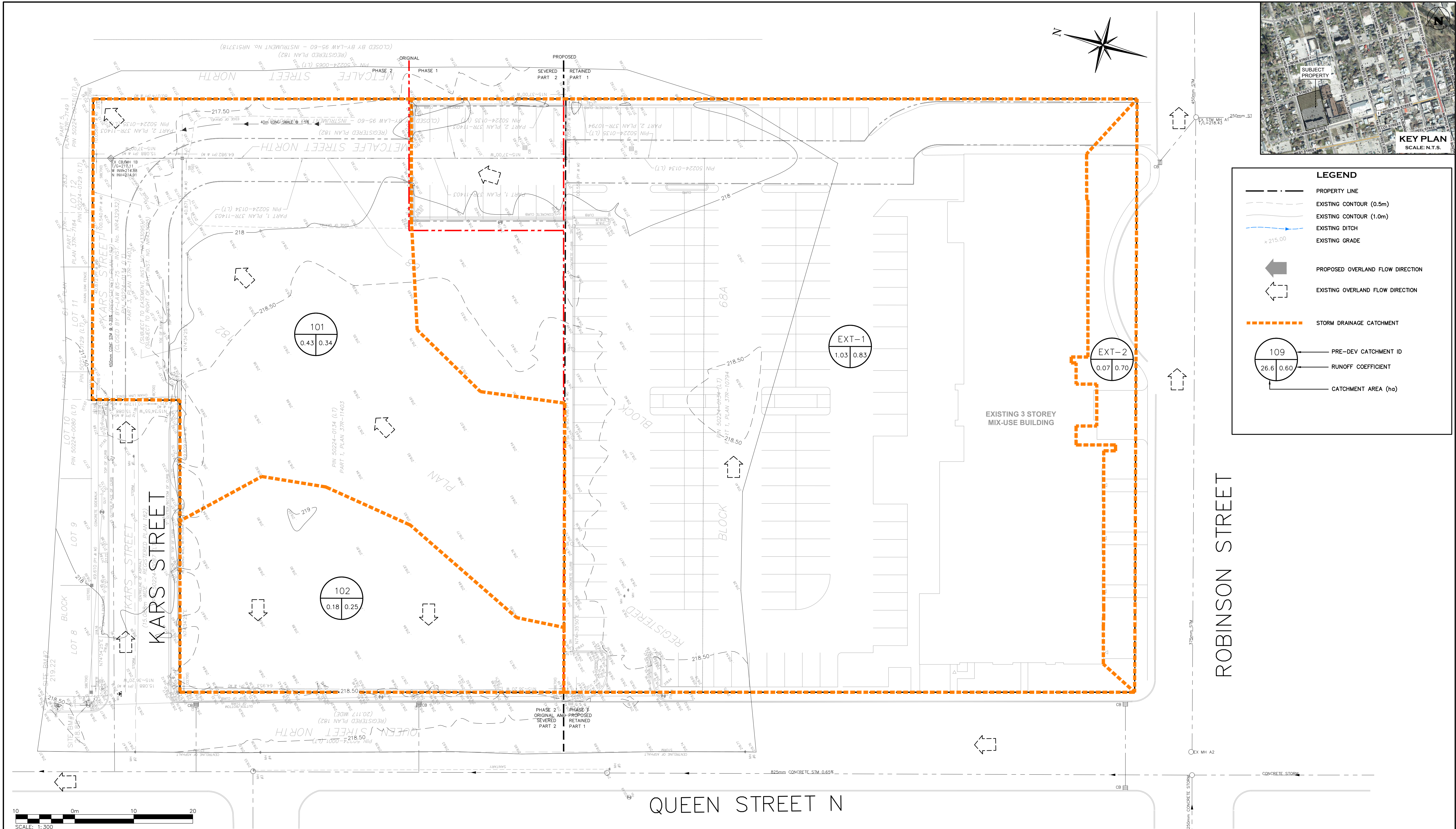




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# FIGURES



**LEGEND**

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING GRADE
- PROPOSED OVERLAND FLOW DIRECTION
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0	ISSUED FOR 1st ZBA SUBMISSION	08/22/2024

**FOR REVIEW**

NOT TO BE USED FOR CONSTRUCTION

185 ROBINSON ST, SIMCOE, ON.

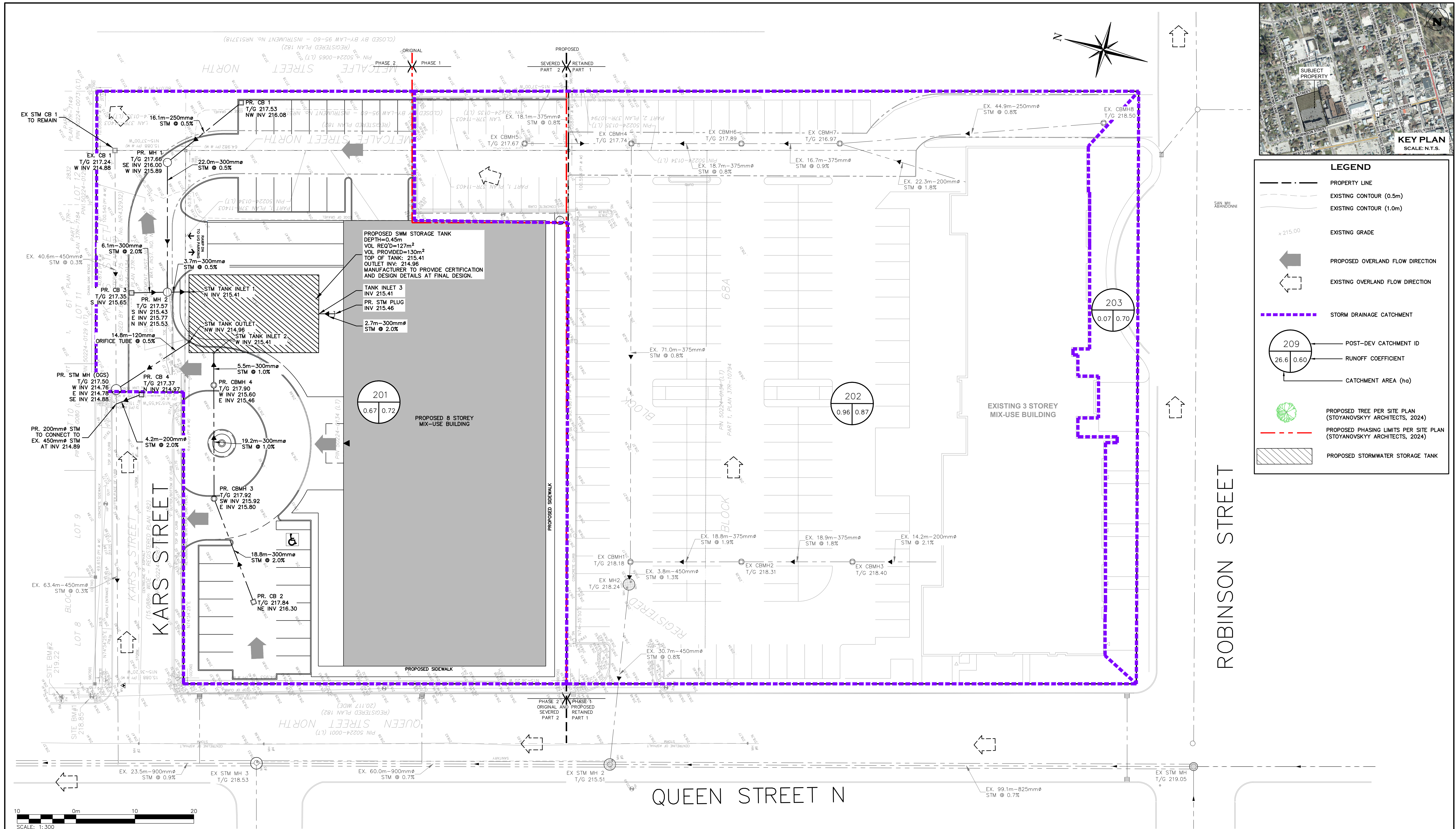
PRE-DEVELOPMENT DRAINAGE PLAN

**CROZIER CONSULTING ENGINEERS**

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Check By: T.F. Check By: B.W. Drawing: FIG 1





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Project: 185 ROBINSON ST, SIMCOE, ON.

Drawing: POST-DEVELOPMENT DRAINAGE PLAN

Drawn By: M.B. Design By: M.B. Project: 2616-6994

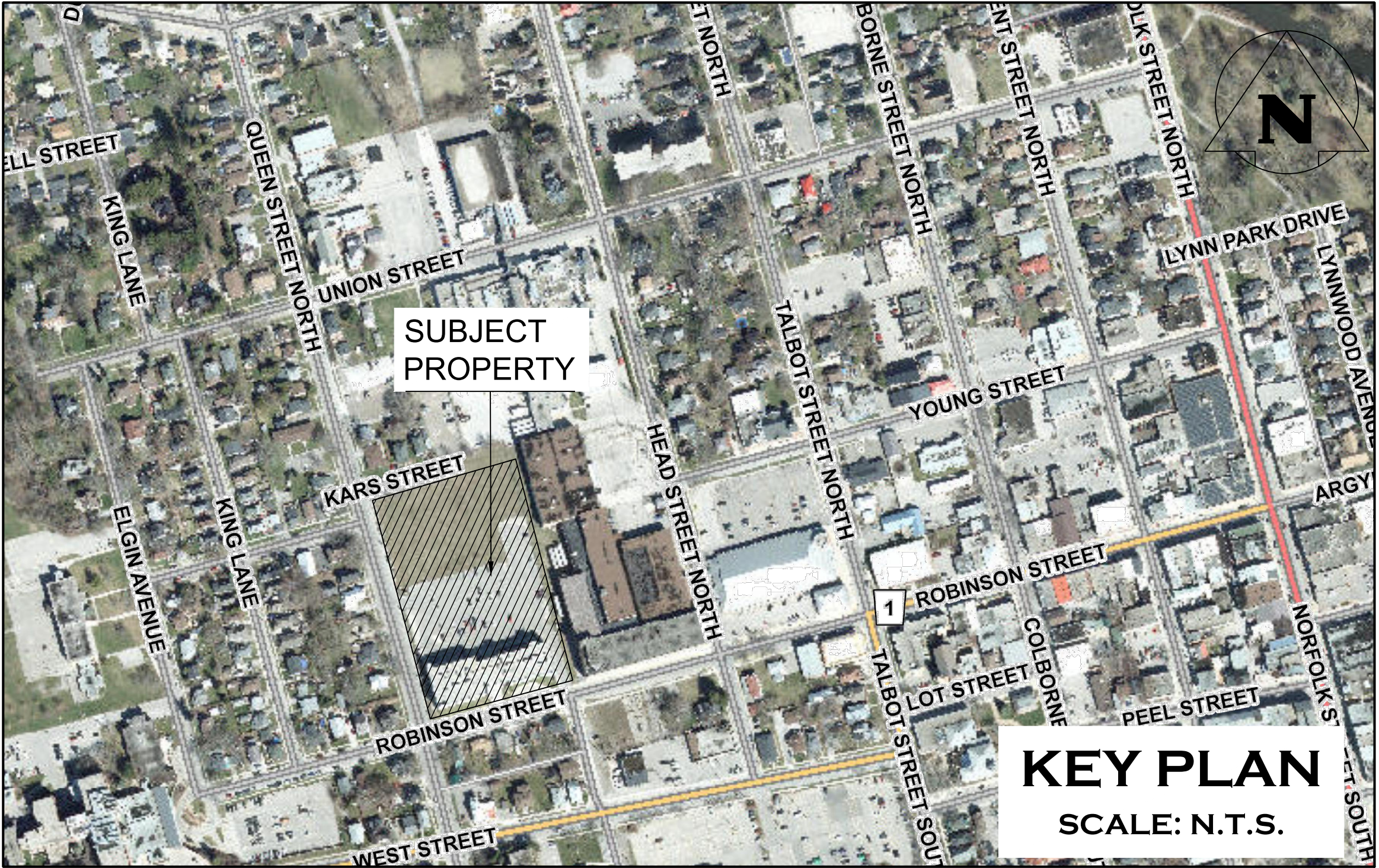
Check By: T.F. Check By: B.W. Drawing: FIG 2



185 ROBINSON ST.

SIMCOE, ONTARIO

NORFOLK COUNTY



MUNICIPALITY

NORFOLK COUNTY  
50 COLBORNE STREET SOUTH  
SIMCOE, ONTARIO, N3Y 4H2

DEVELOPER

2273925 ONTARIO INC c/o DESIGN PLAN SERVICES INC.  
185 ROBINSON STREET, SIMCOE, ON N3Y 5L6

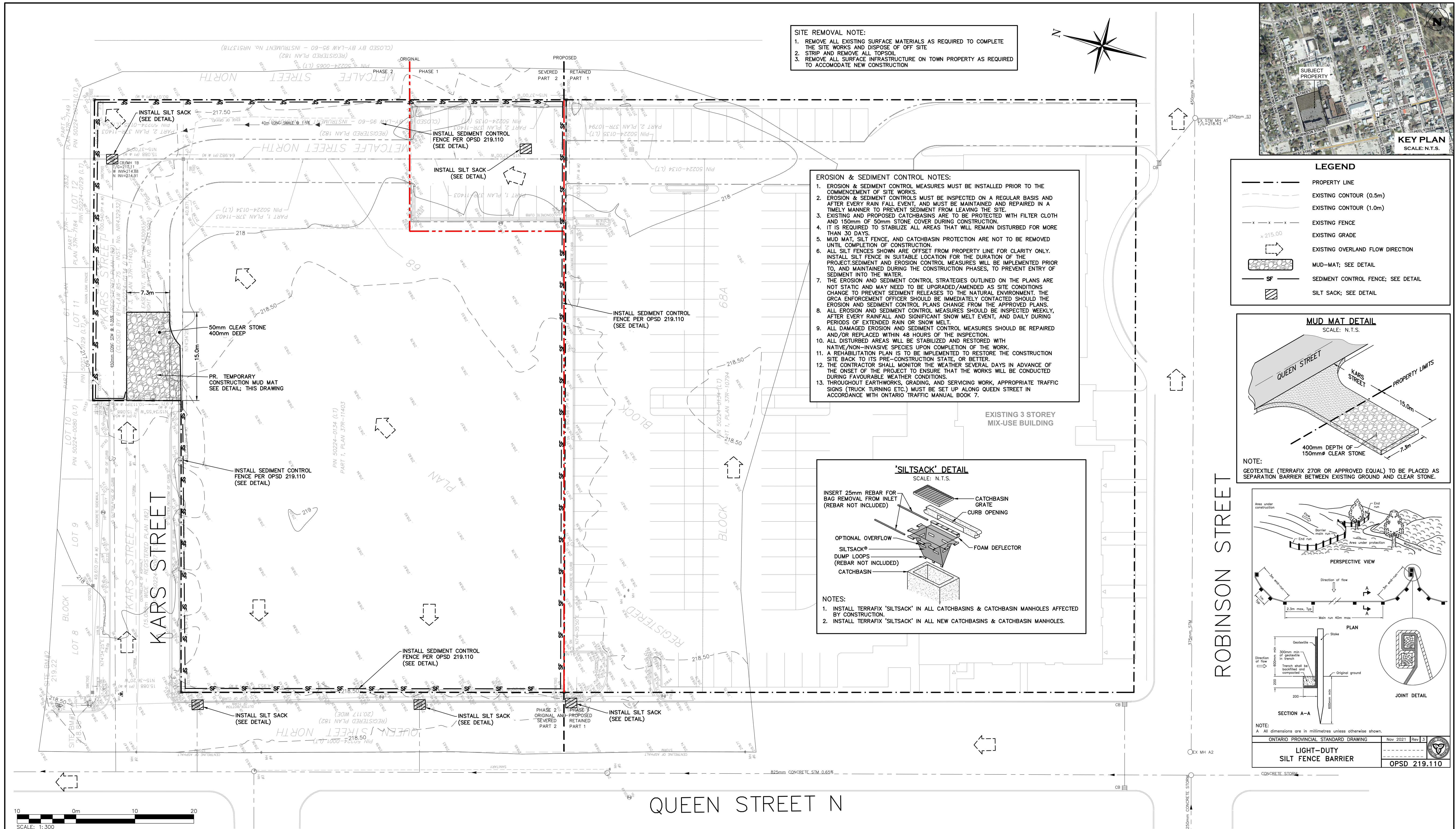
DEVELOPER'S ENGINEER



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

DRAWING	TITLE
C101	EROSION AND SEDIMENT CONTROL PLAN
C102	PRELIMINARY SITE GRADING PLAN
C103	PRELIMINARY SITE SERVICING PLAN
FIG 1	PRE-DEVELOPMENT DRAINAGE PLAN
FIG 2	POST-DEVELOPMENT DRAINAGE PLAN





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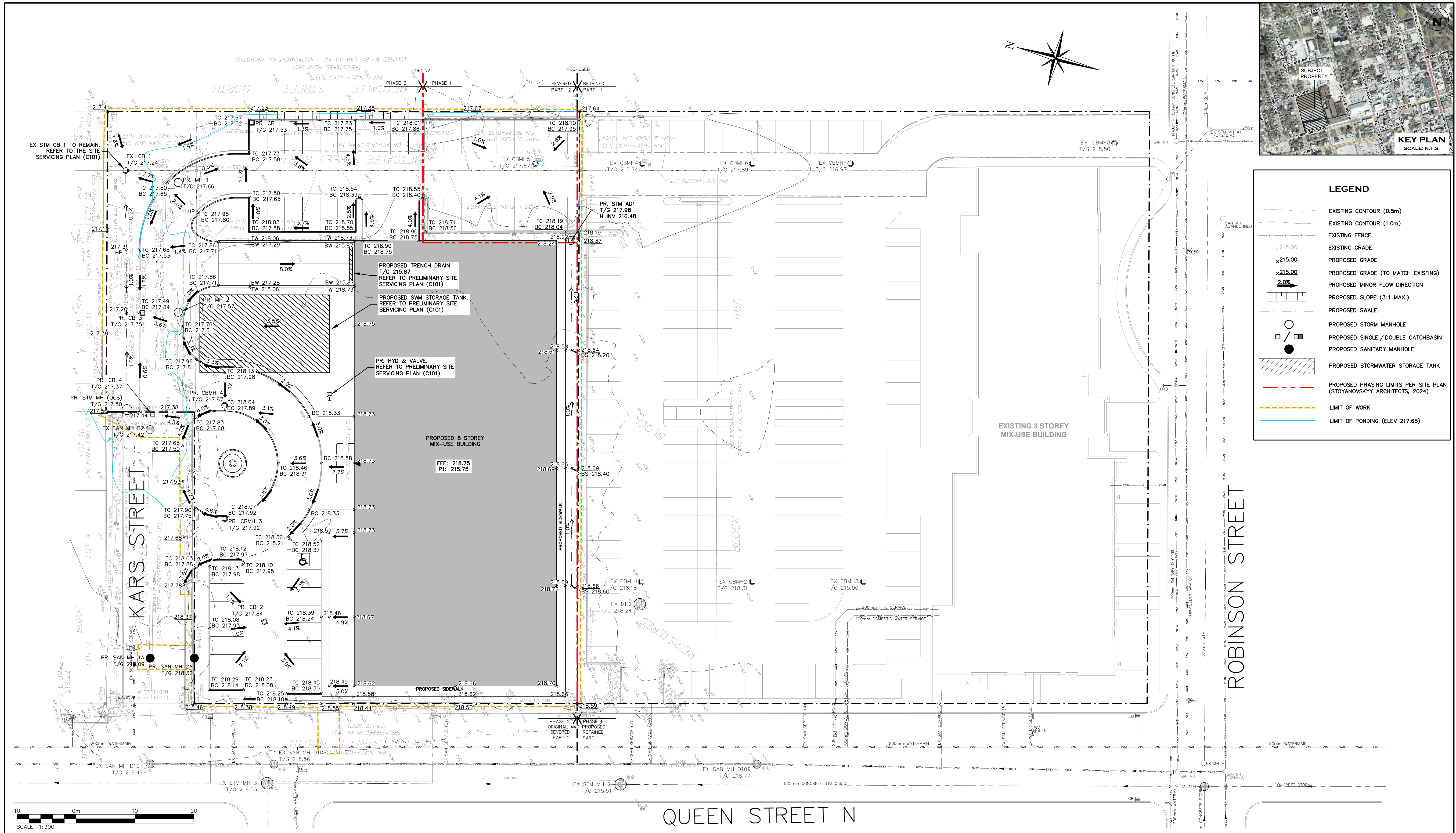
185 ROBINSON ST, SIMCOE, ON.

EROSION AND SEDIMENT CONTROL PLAN

**CROZIER CONSULTING ENGINEERS**

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Check By: T.F. Check By: B.W. Drawing: C101





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Norfolk  
COUNTY

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FOR REVIEW

NOT TO BE USED FOR CONSTRUCTION

185 ROBINSON ST, SIMCOE, ON.

PRELIMINARY SITE GRADING PLAN

Drawn By  
M.B.

Design By  
T.F.

Check By  
T.F.

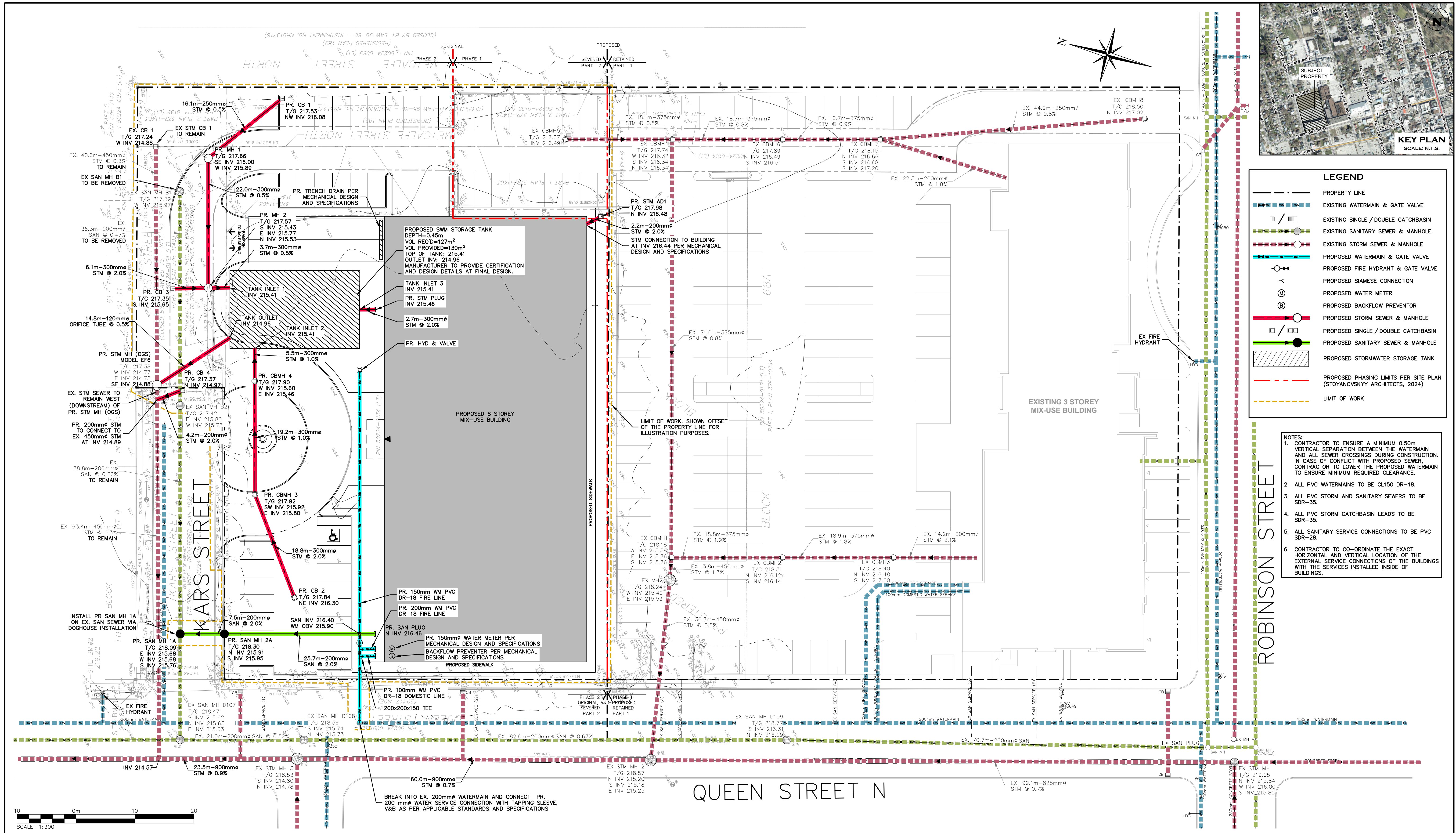
Project  
M.B.




Project  
B.W.

2616-6994

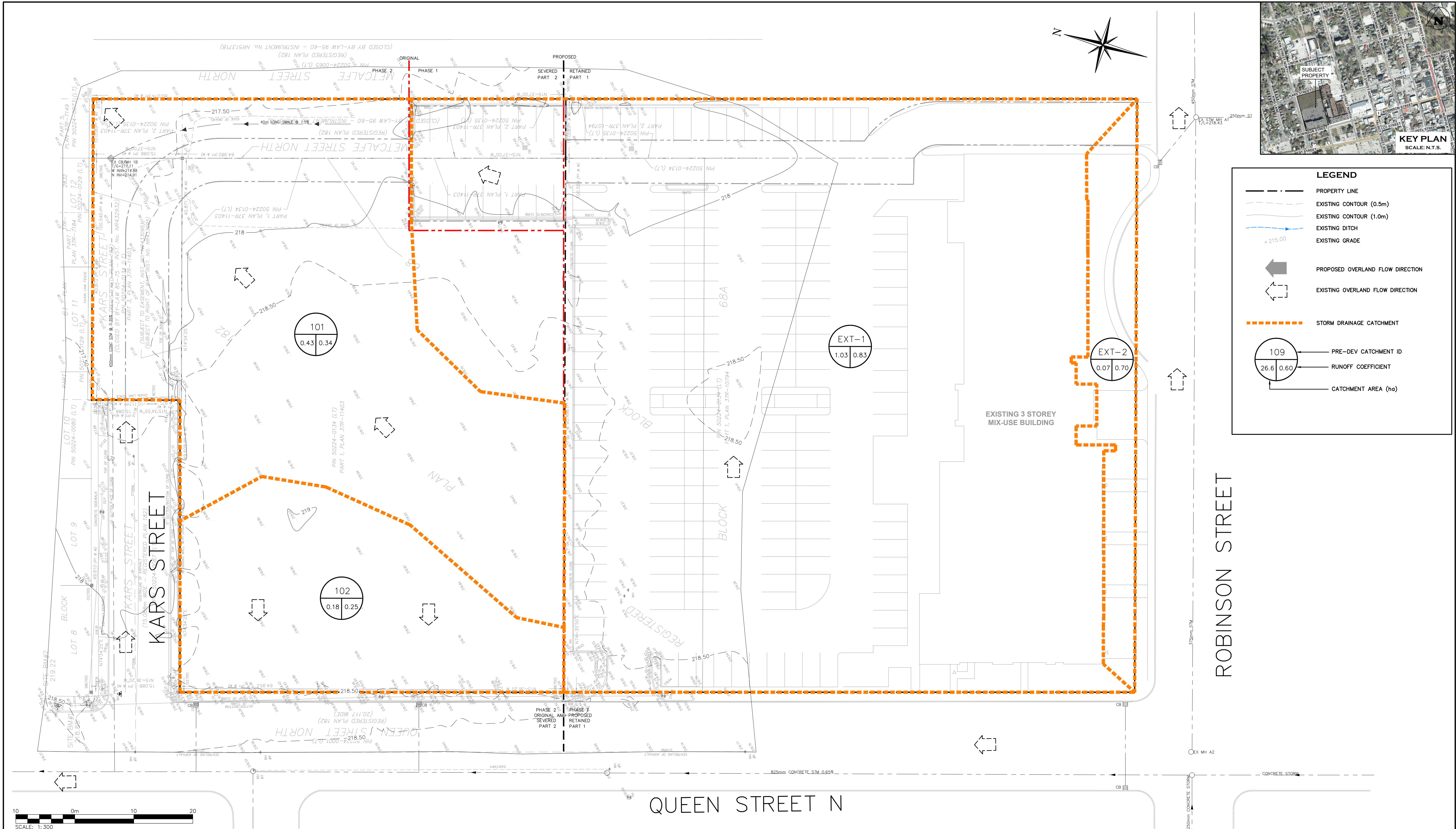
C102





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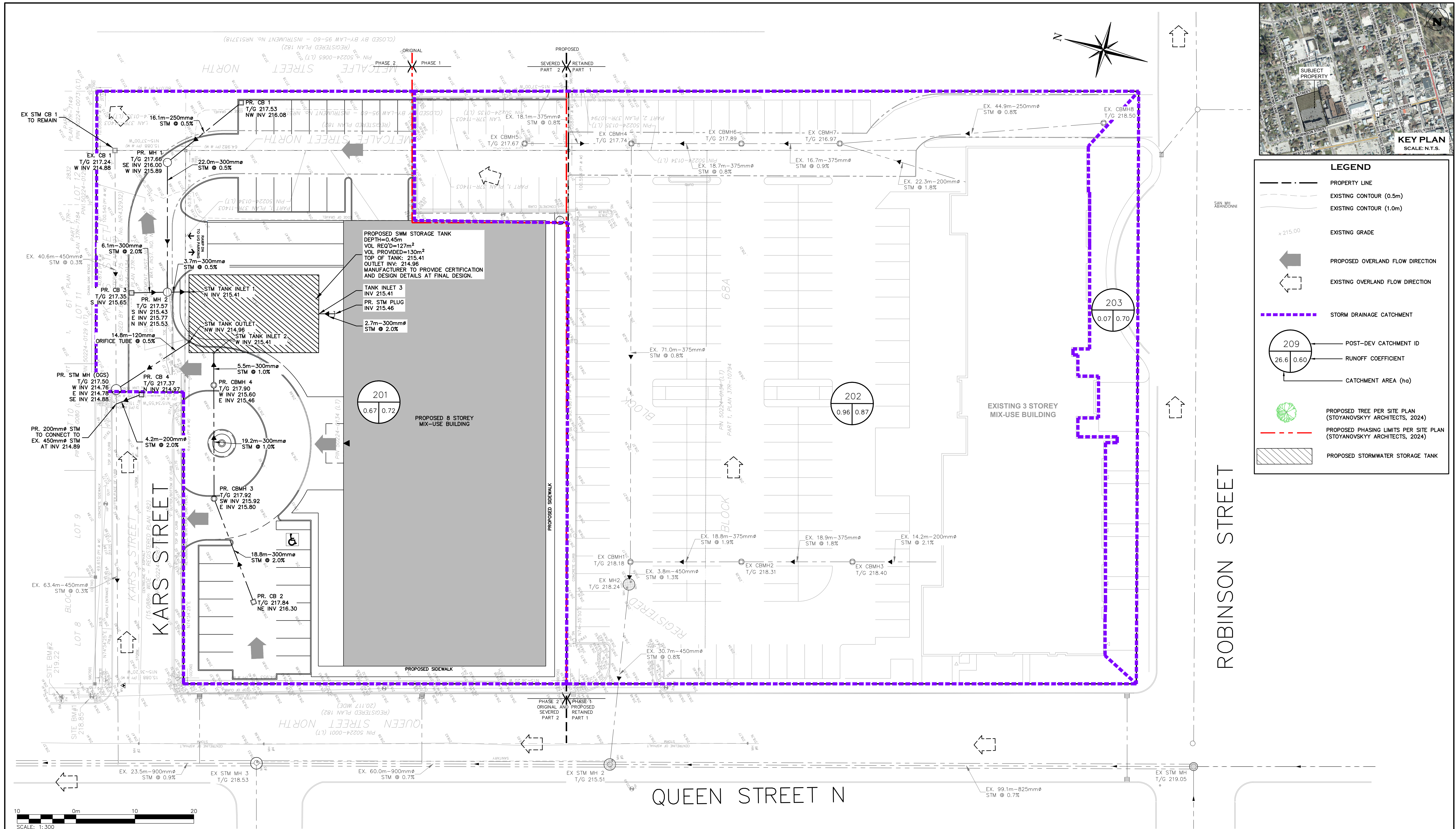
PRE-DEVELOPMENT DRAINAGE PLAN

**CROZIER CONSULTING ENGINEERS**

Drawn By: M.B. Design By: M.B. Project: 2616-6994

Check By: T.F. Check By: B.W. Drawing: FIG 1





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Project: 185 ROBINSON ST, SIMCOE, ON.

Drawing: POST-DEVELOPMENT DRAINAGE PLAN

Drawn By: M.B. Design By: M.B. Project: 2616-6994

Check By: T.F. Check By: B.W. Drawing: FIG 2



# TRAFFIC IMPACT AND PARKING STUDY (UPDATE)

Proposed Mixed-used Development  
185 Robinson Street  
Norfolk County (Simcoe), ON

August 2024

Prepared For  
2273925 Ontario Inc.

c/o  
Design Plan Services Inc.



67 Mowat Ave, Suite 331  
Toronto, ON M6K 3E3



1 (647) 931 7383  
1 (877) 668 8784



trans-plan.com  
admin@trans-plan.com







August 29, 2024

2273925 Ontario Inc.  
Client / Owner

c/o Mr. David Igelman, BURPL, MCIP, RPP  
Design Plan Services Inc.  
900 The East Mall, Suite 300  
Toronto, ON M9B 6K2

**Re: Proposed 8-Storey Mixed-Use Development, 185 Robinson Street, Norfolk County (Simcoe), ON – Transportation Study**

Dear Mr. Igelman,

TRANS-PLAN is pleased to submit this Transportation Study for the proposed 8-storey mixed-use building. The site is located at 185 Robinson Street, on the southeast quadrant of Kars Street and Queen Street North in the Community of Simcoe, Norfolk County, Ontario.

Trans-Plan previously prepared a Traffic Impact Study, dated August 2020. This is a Traffic Impact Study and Parking Study Update to reflect current (and future background) traffic conditions and based on the latest site plan.

Our Traffic Impact Study indicates that the study area intersections are expected to operate acceptably and there would be no additional roadway improvements required to accommodate the proposed development.

Our parking study has reviewed the parking requirements outlined by the municipal Zoning By-law. The proposed site is in conformance with the Zoning By-Law requirements.

Sincerely,



Anil Seegobin, P.Eng.  
Partner, Engineer  
**Trans-Plan Transportation Inc.**  
Transportation Consultants



August 29, 2024





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### Transmittal Letter

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## 1. INTRODUCTION

Trans-Plan has been retained by 2273925 Ontario Inc. to complete a Transportation Study, which is comprised of a Traffic Impact Study and Parking Study Update for the proposed mixed-use apartment building development located at 185 Robinson Street in the community of Simcoe (Norfolk County), Ontario. Trans-Plan has previously prepared a Traffic Impact and Parking Study, dated August 2020. This Update reflects current (and future background) traffic conditions and is based on the latest site plan. This assessment includes the following components:

### Traffic Impact Study

- Review and assessment of the existing road network
- Assessment of future background conditions based on anticipated traffic growth, area developments, and planned transportation improvements in the study area
- Assessment of the impact of site-generated traffic on the adjacent roadway network under future total traffic conditions at full-build out including five and ten-year horizons
- Determination of roadway and intersection improvements, as required, to accommodate the proposed development

### Parking Study

- Review of the site parking requirements for the proposed land use based on the County of Simcoe Zoning By-law in comparison to the parking supply on-site

This report follows the County's TIS Guidelines, dated September 2016, prepared by MMM Group Limited for Norfolk County.

## 2. SITE LOCATION

The site, shown in Figure 1, is on the southeast corner of the Queen Street North and Kars Street West intersection. The site is currently vacant, with predominantly residential uses surrounding the study area to the west. The downtown core of the community is located to the east of the site, while a commercial office building currently exists directly adjacent to the south of the subject site. The construction of the office building was part of the Phase 1 development of 185 Robinson Street and is currently used by the County as a tourism and development office.

## 3. PROPOSED DEVELOPMENT

The study area is proposed to be the future site of an 8-storey mixed-use apartment building for residential, commercial and office uses as part of the Phase 2 plan of the development at 185 Robinson Street.

The proposed site plan, prepared by Stoyanovskyy Architects Inc., is shown in Figure 2. The proposed development consists of an 8-storey mixed-use apartment building with the following uses:

- 143 residential dwelling unit
- 9,632 sq.ft (895 sq.m) of office GFA
- 3,229 sq.ft. (300 sq.m.) of commercial GFA

The development will consist of 143 total units for residential use and 6 units for retail and office use. Parking is provided via four levels of underground garage parking and at-grade parking, with 69 parking spaces on each underground level and 31 spaces at ground level. Access to the site is proposed via Kars Street and via the parking area of the existing development immediately to the south of the subject site on Robinson Street.

#### **4. EXISTING CONDITIONS**

##### **4.1 Road Network**

The study area roadway characteristics are shown in Figure 3. The boundary roadways located in the study area are described as follows:

**Queen Street North** is a roadway under the jurisdiction of Norfolk County that generally runs in a north-south direction. Queen Street North contains two travel lanes: one in each direction. Sidewalks are present on both sides of the street, with the posted speed limit on Queen Street North set at 40 km/h in the vicinity of the site.

**Kars Street** is a local roadway under the jurisdiction of Norfolk County that runs in an east-west direction. The roadway contains two travel lanes: one in each direction. The cul-de-sac currently provides homes fronting the street with a connection to Queen Street West and is also proposed to provide access to future development. A sidewalk facility is available on the north side of the roadway, allowing for connectivity to Queen Street West. The assumed speed limit on the roadway is 40 km/h.

**Marshall Lane** is a local roadway under the jurisdiction of Norfolk County that runs in an east-west direction. The roadway contains two travel lanes: one in each direction. The roadway provides the residential neighborhood with a connection to Queen Street West. The assumed speed limit on the roadway is 40 km/h.

**Metcalfe Street South** is a roadway under the jurisdiction of Norfolk County that runs in a north-south direction. The roadway contains two travel lanes: one in each direction. At West Street, Metcalfe Street becomes a southbound-only roadway. The assumed speed limit on the roadway is 50 km/h.

**Robinson Street** is a roadway under the jurisdiction of Norfolk County that runs in an east-west direction, connecting Queen Street West with the downtown area to the east. Robinson Street contains two travel lanes: one in each direction. Sidewalk connectivity exists on both sides of the roadway, with an assumed speed limit of 50 km/h.

**Union Street** is an east-west street under the jurisdiction of Norfolk County, providing residents with connections to various institutional and commercial uses. The assumed speed limit of the roadway is 40 km/h.

**West Street / Norfolk County Road 1** is a roadway under the jurisdiction of Norfolk County that connects the community of Simcoe to neighboring communities to the west. The assumed speed limit of the roadway is 50 km/h.



## 4.2 Transit Service

The study area is served by Ride Norfolk which serves the community of Simcoe and various other surrounding communities. Details of the Simcoe route serving the vicinity of the study area are provided below:

The bus service operates a Monday to Friday schedule which includes a daily route across Simcoe and occasional service to Brantford and other neighboring communities in the region. In Simcoe, the route provides connections to several amenities including the local hospital, library, and various retailers. The closest bus stop to the site is located approximately 450 meters away at Simcoe Library to the subject site's west. Further details for the transit route are shown in Table 1. Figure 4 provides a map of the local transit route.

Table 1 – Study Area Transit Service

Route	Nearest Bus Stop at Site	Approximate Service Times		Approximate Peak Service Frequency (min)		
		Weekdays	Weekends	AM	PM	SAT
Simcoe Schedule	Simcoe Library	08:00 – 17:45	No service	60	85	N/A

Source: Norfolk County Open Data – Bus Stops

## 4.3 Site Visit and Traffic Counts

Turning movement counts (TMC) were conducted by Trans-Plan, as summarized in Table 2 since recent TMC data was unavailable from the County. Figure 5 show the balanced volumes for the weekday AM and PM peak hours, where the highest counted intersection volumes were used to be conservative and were balanced across the entire network. The raw count data and STP diagrams are provided in Appendix A.

Table 2 – Intersection Turning Movement Count Details

Intersection	Count Date	Peak Hours	
		AM	PM
Queen Street North at Union Street	Tuesday, April 23, 2024	8:30 – 9:30	4:00 – 5:00
Queen Street North at Kars Street / Marshall Lane		8:30 – 9:30	4:00 – 5:00
Queen Street North at Robinson Street		8:15 – 9:15	4:00 – 5:00
Queen Street North at West Street		8:15 – 9:15	4:00 – 5:00
Robinson Street at Metcalfe Street South		8:15 – 9:15	4:00 – 5:00
West Street at Metcalfe Street South		8:30 – 9:30	4:00 – 5:00

## **5. FUTURE BACKGROUND CONDITIONS**

Future background traffic volumes were determined based on a review of planned developments and future traffic volume growth in the study area. Planned roadway improvements are also discussed in this section.

### **5.1 Horizon Years**

For our traffic impact study, three horizon years were analyzed:

- Full build-out of the development: anticipated by the year 2026
- 5 years after full build-out: year 2031
- 10 years after full build-out: year 2036

### **5.2 Background Growth Rate**

Traffic growth in the study area was determined through analysis of Annual Average Daily Traffic (AADT) volumes provided by Norfolk County between the years 2013 and 2016. The AADT growth calculations for Queen Street North and West Street are shown in Appendix B. The trend in traffic growth rate for Queen Street and West Street was not conclusive from our calculations (either the growth was too large or too minimal). To be conservative, a typical growth rate of 2 percent per annum was applied to the study area intersections.

### **5.3 Planned Background Developments**

Based on correspondence with Norfolk County staff, there is no notable background development that is expected to be completed within the analysis horizon years located near the study area.

### **5.4 Planned Roadway and Transit Improvements**

Based on a review of the Norfolk County Integrated Sustainable Master Plan (ISMP), dated September 2016, there are two road improvements proposed to be applied to some of the study area roadways. The summary of the road improvements is provided below:

- Robinson Street between Elgin Avenue and Talbot Avenue – Proposed signed bike route to be completed within a 5-year timeframe.
- Queen Street between Maple Street and South Drive – Proposed Bicycle Lane to be completed within a 5- to 10-year timeframe.

Based on the review of background conditions, future background traffic volumes for each study horizon year for the weekday AM and PM peak hours are shown in Figure 6, Figure 7, and Figure 8.

## **6. SITE TRAFFIC**

### **6.1 Trip Generation**

Trips for the proposed development were generated using the Institute of Transportation Engineers (ITE) Trip Generation manuals, 11<sup>th</sup> Edition. The ITE Land Use Code 221 for apartment units, ITE Land Use Code 710 for General Office Building, and ITE Land Use Code 822 for the commercial area were used to determine suitable trip rates. An additional reduction of 10 percent was applied to account for the internal interaction of uses between residential and non-residential uses. The site trip generation is shown in Table 3.



Table 3 – Site Trip Generation

Land Use	Size / Units		AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Multifamily Housing (Mid-Rise) LUC 221	143	Distribution	23%	77%	100%	61%	39%	100%
		Equation	$T = 0.44 (X) - 11.61$			$T = 0.39 (X) + 0.34$		
		Rate	0.08	0.28	0.36	0.24	0.15	0.39
		<b>Trips</b>	<b>12</b>	<b>40</b>	<b>52</b>	<b>34</b>	<b>22</b>	<b>56</b>
General Office Building LUC 710	9.63	Distribution	88%	12%	100%	17%	83%	100%
		Equation	$\ln(T) = 0.86\ln(X) + 1.16$			$\ln(T) = 0.83\ln(X) + 1.29$		
		Rate	2.01	0.27	2.28	0.42	2.07	2.49
		<b>Trips</b>	<b>19</b>	<b>3</b>	<b>22</b>	<b>4</b>	<b>20</b>	<b>24</b>
Strip Retail Plaza (<40k) LUC 822	3.23 sq.ft. of GFA	Distribution	60%	40%	100%	50%	50%	100%
		Average Rate	$\ln(T) = 0.66 \ln(X) + 1.84$			$\ln(T) = 0.71 \ln(X) + 2.72$		
		Rate	2.60	1.73	4.34	5.57	5.57	11.15
		<b>Trips</b>	<b>8</b>	<b>6</b>	<b>14</b>	<b>18</b>	<b>18</b>	<b>36</b>
<b>Total Trips</b>			<b>39</b>	<b>49</b>	<b>88</b>	<b>56</b>	<b>60</b>	<b>116</b>
<b>Internal Trip Reduction 10%</b>			<b>4</b>	<b>5</b>	<b>9</b>	<b>6</b>	<b>6</b>	<b>12</b>
<b>Total New Trips</b>			<b>35</b>	<b>44</b>	<b>79</b>	<b>50</b>	<b>54</b>	<b>104</b>

The subject site is expected to generate approximately 79 and 104 new two-way trips in the weekday AM and PM peak hours respectively after applying the reduction resulting from the pass-by trips and internal trip reductions.

## 6.2 Trip Distribution and Assignment

Site trips were generally distributed and assigned to the major travel routes based on the existing local traffic patterns of the study area intersection. North of the site is Highway 3 a Ministry of Transportation Ontario (MTO) roadway and east of the site is County Road 24 a Norfolk County roadway. Site trips were distributed towards Highway 3 and County Road 24, which are major arterial roadways connecting to other major routes across the County and other neighboring municipalities. The site traffic assignment for the weekday AM and PM peak hours is shown in Figure 9.

## 7. FUTURE TOTAL TRAFFIC CONDITIONS

Site traffic volumes were added to the future year background traffic volumes to obtain the future year total traffic volumes for the weekday AM and PM peak hours for each study horizon. The total traffic volumes for the 2026, 2031, and 2036 horizon years are shown in Figure 10, Figure 11, and Figure 12, respectively.

### 7.1 Capacity and Vehicle Queueing Analysis

A capacity analysis was performed for the study area intersections and site driveways using Synchro and SimTraffic analysis software, version 11.0. The capacity analysis tables for existing conditions as well as the 2026, 2031, and 2036 horizon years are shown in Table 4, Table 5, Table 6, and Table 7. Capacity

Analysis sheets and Level of Service (LOS) Definitions are provided in Appendix C and Appendix D, respectively.

According to the County's Traffic Impact Study Guidelines, for signalized intersections, individual movements with a volume-to-capacity (v/c) ratio that is greater than 0.85 are generally considered to be "critical" and should be evaluated for possible operational improvement. This section summarizes the results of the capacity analysis for each intersection:

#### Queen Street North & Union Street

Under existing conditions in the weekday AM and PM peak hour, all movements operate at an acceptable LOS of C or better with minimal delays.

Under the future and total condition of 2026, operates at a reasonable LOS of C with few minor delays.

Under the future and total condition of 2031, the westbound and eastbound at the intersection operate with delays up to 17-20 seconds at LOS of C and 20-26 seconds at LOS of D in the weekday AM and PM peak hours, respectively.

Under the future and total condition of 2036, the westbound and eastbound at the intersection operate with delays of up to 19-22 seconds at LOS of C and 19-30 seconds at LOS of D in the weekday AM and PM peak hours, respectively.

#### Queen Street North & Marshall Lane / Site Access 3

Under existing conditions, the intersection is expected to operate at a good LOS of C or better during the weekday AM and PM peak hours.

Under 2036 Total Traffic conditions, the eastbound movement is expected to operate at a LOS of E with a maximum delay of 38 seconds during weekday PM peak hour. The delay is common for vehicles turning from the approach of minor roadways into major roadways. The increased delay is mainly due to background growth. The rest of the movements at the intersection are expected to operate at an acceptable LOS of C or better throughout the course of the day.

#### Queen Street North & Site Access 2

Under existing conditions, the intersection operates at a good LOS of C or better during weekday AM and PM peak hours. Under future conditions, the intersection is expected to continue operating at an acceptable LOS of C or better.

#### Queen Street North & Robinson Street

Under existing conditions, the intersection operates at an acceptable LOS of B or better during weekday AM and PM peak hours.

Under 2031 and 2036 future conditions, due to the delay experienced at the intersection, a scenario with traffic signal is included in our analysis. The cycle lengths are assumed to be 75 seconds to be consistent with the intersection of Queen Street South / Queen Street North & West Street. The signal timing plans and the capacity results are included in Appendix C. Under future and overall conditions, the intersection is expected to operate with a good LOS of C or better with minimal delays during weekday AM and PM peak hours.



Metcalfe Street North / Site Access 1 & Robinson Street

Under existing conditions, the intersection operates at a good LOS of B or better with minimal delays during weekday AM and PM peak hours. Under future conditions, the intersection is expected to continue operating at a good LOS of B or better.

Queen Street South / Queen Street North & West Street

Under existing conditions, the intersection operates with a v/c ratio of 0.44 or better with minimal delays during weekday AM and PM peak hours. Under future conditions, all movements at the intersection are expected to continue operating well with a LOS of B or better and an overall v/c ratio of 0.61 which is below the critical v/c ratio outlined by the County.

Metcalfe Street South & West Street

Under existing conditions, the intersection operates at a good LOS of B during weekday AM and PM peak hours. Under future conditions, all movements at the intersection are expected to continue operating at acceptable levels.

Table 4 - Existing Conditions Capacity Analysis Results

Intersection Movement	Existing Traffic Conditions					
	AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS
<b>Queen Street North &amp; Union Street</b>						
Eastbound Left / Through / Right		15	B		16	C
Westbound Left / Through / Right		15	B		17	C
Northbound Left / Through / Right		0	A		1	A
Southbound Left / Through / Right		1	A		1	A
<b>Queen Street North &amp; Marshall Lane / Site Access 3</b>						
Eastbound Left / Through / Right		15	B		18	C
Westbound Left / Through / Right		20	C		11	B
Northbound Left / Through / Right		1	A		0	A
Southbound Left / Through / Right		0	A		0	A
<b>Queen Street North &amp; Site Access 2</b>						
Westbound Left / Right		11	B		17	C
Northbound Through / Right		0	A		0	A
Southbound Left / Through		0	A		0	A
<b>Queen Street North &amp; Robinson Street</b>	<b>0.41</b>	<b>7</b>	<b>A</b>	<b>0.48</b>	<b>8</b>	<b>A</b>
Eastbound Left / Through / Right	0.11	16	B	0.12	14	B
Westbound Left / Through / Right	0.31	17	B	0.33	16	B
Northbound Left / Through / Right	0.43	5	A	0.39	6	A
Southbound Left / Through / Right	0.42	5	A	0.52	7	A
<b>Metcalfe Street South / Site Access 1 &amp; Robinson Street</b>						
Eastbound Left / Through / Right		0	A		0	A
Westbound Left / Through / Right		2	A		2	A
Northbound Left / Through / Right		10	A		10	A
Southbound Left / Through / Right		12	B		12	B
<b>Queen Street South / Queen Street North &amp; West Street</b>	<b>0.41</b>	<b>13</b>	<b>B</b>	<b>0.44</b>	<b>15</b>	<b>B</b>
Eastbound Left / Through / Right	0.43	18	B	0.31	18	B
Westbound Left / Through / Right	0.11	17	B	0.18	17	B
Northbound Left	0.07	9	A	0.15	13	B
Northbound Through / Right	0.36	11	B	0.40	15	B
Southbound Left	0.09	7	A	0.09	9	A
Southbound Through / Right	0.35	9	A	0.46	12	B
<b>Metcalfe Street South &amp; West Street</b>						
Eastbound Left / Through / Right		1	A		1	A
Westbound Left / Through / Right		1	A		1	A
Northbound Left / Through / Right		0	A		11	B
Southbound Left / Through / Right		11	B		11	B



Table 5 - Future 2026 Capacity Analysis Results

Intersection Movement	2026 Background Traffic Conditions						2026 Total Traffic Conditions					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
<b>Queen Street North &amp; Union Street</b>												
Eastbound Left / Through / Right	0.08	15	C	0.08	17	C	0.08	16	C	0.09	17	C
Westbound Left / Through / Right	0.16	15	C	0.19	17	C	0.18	17	C	0.22	19	C
Northbound Left / Through / Right	0.00	0	A	0.02	1	A	0.00	1	A	0.02	1	A
Southbound Left / Through / Right	0.02	1	A	0.02	1	A	0.02	1	A	0.02	1	A
<b>Queen Street North &amp; Marshall Lane / Kars Street</b>												
Eastbound Left / Through / Right	0.31	15	C	0.23	19	C	0.35	18	C	0.27	23	C
Westbound Left / Through / Right	0.02	21	C	0.00	11	B	0.21	19	C	0.19	17	C
Northbound Left / Through / Right	0.02	1	A	0.01	0	A	0.02	1	A	0.01	0	A
Southbound Left / Through / Right	0.00	0	A	0.00	0	A	0.02	1	A	0.03	1	A
<b>Queen Street North &amp; Queen Street Site Access</b>												
Westbound Left / Right	0.01	11	B	0.03	1	C	0.03	13	B	0.07	19	C
Northbound Through / Right	0.24	0	A	0.26	0	A	0.25	0	A	0.27	0	A
Southbound Left / Through	0.01	0	A	0.01	0	A	0.01	0	A	0.01	0	A
<b>Queen Street North &amp; Robinson Street</b>							<b>0.39</b>	<b>67</b>	<b>A</b>	<b>0.51</b>	<b>8</b>	<b>A</b>
Eastbound Left / Through / Right	0.15	18	C	0.22	23	C	0.12	28	C	0.13	14	B
Westbound Left / Through / Right	0.39	24	C	0.53	33	D	0.38	30	C	0.33	15	B
Northbound Left / Through / Right	0.04	1	A	0.02	1	A	0.39	4	A	0.43	5	A
Southbound Left / Through / Right	0.08	2	A	0.07	2	A	0.39	4	A	0.56	7	A
<b>Metcalfe Street South / Robinson Street Site Access &amp; Robinson Street</b>												
Eastbound Left / Through / Right	0.00	0	A	0.00	0	A	0.00	0	A	0.00	0	A
Westbound Left / Through / Right	0.02	2	A	0.02	2	A	0.02	2	A	0.02	2	A
Northbound Left / Through / Right	0.07	10	A	0.03	9	A	0.07	10	A	0.03	9	A
Southbound Left / Through / Right	0.00	12	B	0.01	12	B	0.03	12	B	0.06	12	B
<b>Queen Street South / Queen Street North &amp; West Street</b>	<b>0.43</b>	<b>13</b>	<b>B</b>	<b>0.46</b>	<b>15</b>	<b>B</b>	<b>0.50</b>	<b>14</b>	<b>B</b>	<b>0.48</b>	<b>15</b>	<b>B</b>
Eastbound Left / Through / Right	0.44	18	B	0.33	18	B	0.50	18	B	0.35	18	B
Westbound Left / Through / Right	0.12	16	B	0.19	17	B	0.13	16	B	0.19	17	B
Northbound Left	0.07	9	A	0.15	13	B	0.09	9	A	0.16	13	B
Northbound Through / Right	0.39	12	B	0.42	15	B	0.44	11	B	0.43	15	B
Southbound Left	0.09	7	A	0.09	8	A	0.52	7	A	0.09	8	A
Southbound Through / Right	0.37	9	A	0.48	12	B	0.52	8	A	0.50	13	B
<b>Metcalfe Street South &amp; West Street</b>												
Eastbound Left / Through / Right	0.01	1	A	0.01	1	A	0.01	1	A	0.01	1	A
Westbound Left / Through / Right	0.00	0	A	0.01	1	A	0.00	1	A	0.01	1	A
Northbound Left / Through / Right	0.02	0	A	0.01	10	B	0.01	0	A	0.01	10	B
Southbound Left / Through / Right	0.15	11	B	0.06	11	B	0.17	11	B	0.06	11	B

Table 6 - Future 2031 Capacity Analysis Results

Intersection Movement	2031 Background Traffic Conditions						2031 Total Traffic Conditions					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
<b>Queen Street North &amp; Union Street</b>												
Eastbound Left / Through / Right	0.10	17	C	0.10	19	C	0.10	20	C	0.11	20	C
Westbound Left / Through / Right	0.20	17	C	0.25	20	C	0.23	21	C	0.41	26	D
Northbound Left / Through / Right	0.01	0	A	0.02	1	A	0.01	1	A	0.02	1	A
Southbound Left / Through / Right	0.03	1	A	0.02	1	A	0.03	1	A	0.02	1	A
<b>Queen Street North &amp; Marshall Lane / Kars Street</b>												
Eastbound Left / Through / Right	0.38	18	C	0.28	22	C	0.43	20	C	0.40	33	D
Westbound Left / Through / Right	0.02	24	C	0.00	11	B	0.27	21	C	0.32	22	C
Northbound Left / Through / Right	0.02	1	A	0.01	0	A	0.02	1	A	0.01	0	A
Southbound Left / Through / Right	0.00	0	A	0.00	0	A	0.02	1	A	0.03	1	A
<b>Queen Street North &amp; Queen Street Site Access</b>												
Westbound Left / Right	0.01	11	B	0.03	19	C	0.03	14	B	0.05	22	C
Northbound Through / Right	0.27	0	A	0.29	0	A	0.27	0	A	0.32	0	A
Southbound Left / Through	0.01	0	A	0.01	0	A	0.01	0	A	0.01	0	A
<b>Queen Street North &amp; Robinson Street</b>	<b>0.42</b>	<b>8</b>	<b>A</b>	<b>0.50</b>	<b>9</b>	<b>A</b>	<b>0.43</b>	<b>8</b>	<b>A</b>	<b>0.57</b>	<b>11</b>	<b>B</b>
Eastbound Left / Through / Right	0.14	28	C	0.16	27	C	0.14	28	C	0.16	26	C
Westbound Left / Through / Right	0.40	30	C	0.48	30	C	0.40	29	C	0.57	30	C
Northbound Left / Through / Right	0.42	4	A	0.38	4	A	0.43	3	A	0.43	5	A
Southbound Left / Through / Right	0.42	4	A	0.51	6	A	0.43	3	A	0.57	7	A
<b>Metcalfe Street South / Robinson Street Site Access &amp; Robinson Street</b>												
Eastbound Left / Through / Right	0.00	0	A	0.00	0	A	0.00	0	A	0.00	0	A
Westbound Left / Through / Right	0.02	2	A	0.02	2	A	0.02	2	A	0.03	2	A
Northbound Left / Through / Right	0.08	10	B	0.04	10	A	0.08	10	B	0.07	10	A
Southbound Left / Through / Right	0.00	13	B	0.01	12	B	0.03	13	B	0.04	14	B
<b>Queen Street South / Queen Street North &amp; West Street</b>	<b>0.48</b>	<b>13</b>	<b>B</b>	<b>0.51</b>	<b>15</b>	<b>B</b>	<b>0.50</b>	<b>14</b>	<b>B</b>	<b>0.61</b>	<b>14</b>	<b>B</b>
Eastbound Left / Through / Right	0.49	18	B	0.37	18	B	0.50	18	B	0.41	18	B
Westbound Left / Through / Right	0.13	16	B	0.21	17	B	0.13	16	B	0.23	17	B
Northbound Left	0.09	10	A	0.18	13	B	0.09	9	A	0.21	11	B
Northbound Through / Right	0.43	13	B	0.46	16	B	0.44	11	B	0.46	13	B
Southbound Left	0.11	7	A	0.11	7	A	0.11	7	A	0.12	7	A
Southbound Through / Right	0.41	10	A	0.54	13	B	0.43	10	A	0.63	13	B
<b>Metcalfe Street South &amp; West Street</b>												
Eastbound Left / Through / Right	0.01	1	A	0.01	1	A	0.01	1	A	0.01	1	A
Westbound Left / Through / Right	0.00	1	A	0.01	1	A	0.00	1	A	0.01	1	A
Northbound Left / Through / Right	0.01	0	A	0.01	11	B	0.01	0	A	0.01	11	B
Southbound Left / Through / Right	0.17	11	B	0.07	11	B	0.17	11	B	0.19	11	B



Table 7 - Future 2036 Capacity Analysis Results

Intersection Movement	2036 Background Traffic Conditions						2036 Total Traffic Conditions					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
<b>Queen Street North &amp; Union Street</b>												
Eastbound Left / Through / Right	0.11	18	C	0.11	20	C	0.11	19	C	0.12	22	C
Westbound Left / Through / Right	0.25	19	C	0.29	22	C	0.27	9	C	0.48	30	D
Northbound Left / Through / Right	0.01	0	A	0.02	1	A	0.01	0	A	0.02	1	A
Southbound Left / Through / Right	0.03	1	A	0.03	1	A	0.03	1	A	0.03	1	A
<b>Queen Street North &amp; Marshall Lane / Kars Street</b>												
Eastbound Left / Through / Right	0.42	16	B	0.30	24	C	0.47	20	C	0.44	38	E
Westbound Left / Through / Right	0.02	1	A	0.00	11	B	0.28	9	C	0.35	25	C
Northbound Left / Through / Right	0.02	1	A	0.01	0	A	0.02	1	A	0.01	0	A
Southbound Left / Through / Right	0.00	0	A	0.00	0	A	0.02	1	A	0.03	1	A
<b>Queen Street North &amp; Queen Street Site Access</b>												
Westbound Left / Right	0.01	11	B	0.03	20	B	0.03	15	C	0.06	24	C
Northbound Through / Right	0.29	0	A	0.31	0	A	0.30	0	A	0.35	0	A
Southbound Left / Through	0.01	0	A	0.01	0	A	0.01	0	A	0.01	0	A
<b>Queen Street North &amp; Robinson Street</b>	<b>0.47</b>	<b>8</b>	<b>A</b>	<b>0.51</b>	<b>9</b>	<b>A</b>	<b>0.48</b>	<b>8</b>	<b>A</b>	<b>0.59</b>	<b>11</b>	<b>B</b>
Eastbound Left / Through / Right	0.13	28	C	0.15	27	C	0.13	28	C	0.15	25	C
Westbound Left / Through / Right	0.43	28	C	0.51	30	C	0.43	30	C	0.61	32	C
Northbound Left / Through / Right	0.47	3	A	0.42	5	A	0.48	5	A	0.48	6	A
Southbound Left / Through / Right	0.48	3	A	0.52	6	A	0.49	5	A	0.58	8	A
<b>Metcalfe Street South / Robinson Street Site Access &amp; Robinson Street</b>												
Eastbound Left / Through / Right	0.00	0	A	0.00	0	A	0.00	0	A	0.00	0	A
Westbound Left / Through / Right	0.02	2	A	0.02	2	A	0.02	2	A	0.03	2	A
Northbound Left / Through / Right	0.09	10	B	0.04	10	A	0.09	10	B	0.08	10	A
Southbound Left / Through / Right	0.00	13	B	0.01	12	B	0.03	13	B	0.05	14	B
<b>Queen Street South / Queen Street North &amp; West Street</b>	<b>0.51</b>	<b>14</b>	<b>B</b>	<b>0.51</b>	<b>14</b>	<b>B</b>	<b>0.53</b>	<b>14</b>	<b>B</b>	<b>0.61</b>	<b>14</b>	<b>B</b>
Eastbound Left / Through / Right	0.49	18	B	0.38	18	B	0.50	18	B	0.41	18	B
Westbound Left / Through / Right	0.14	16	B	0.23	17	B	0.14	16	B	0.25	17	B
Northbound Left	0.10	10	A	0.20	12	B	0.10	10	A	0.24	10	B
Northbound Through / Right	0.48	13	B	0.51	14	B	0.49	13	B	0.51	11	B
Southbound Left	0.13	7	A	0.12	9	A	0.13	7	A	0.13	7	A
Southbound Through / Right	0.45	10	B	0.54	11	B	0.47	10	B	0.63	10	B
<b>Metcalfe Street South &amp; West Street</b>												
Eastbound Left / Through / Right	0.01	1	A	0.01	1	A	0.01	1	A	0.01	1	A
Westbound Left / Through / Right	0.00	1	A	0.01	1	A	0.00	1	A	0.01	1	A
Northbound Left / Through / Right	0.01	0	A	0.01	11	B	0.01	0	A	0.02	11	B
Southbound Left / Through / Right	0.19	11	B	0.07	11	B	0.19	11	B	0.19	11	B

### Table 8 - Queue Analysis - Pre-road widening

[illegible]



**Table 8 - Queue Analysis - Pre-road Table 8 - Queue Analysis - Pre-road widening**

Intersection	95th Percentile Vehicle Queues									
	2026 Total Traffic Conditions				2031 Total Traffic Conditions				2036 Total Traffic Conditions	
Movement	Available Storage Length [Taper] (m)	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Available Storage Length [Taper] (m)	Weekday AM Peak Hour	Weekday PM Peak Hour	Available Storage Length [Taper] (m)	Weekday AM Peak Hour
<b>Queen Street North &amp; Union Street</b>										
Eastbound Left/Through/Right		13.1	11.9	15.5	11.2		15.5	12.4		12.4
Westbound Left/Through/Right		14.5	16.7	15.9	16.4		15.9	14.3		14.3
Northbound Left/Through/Right		3	16.1	3.6	12.3		3.6	13.4		13.4
Southbound Left/Through/Right		12.2	18.1	13.1	19.4		13.1	29.8		29.8
<b>Queen Street North &amp; Marshall Lane/Site Access 3</b>										
Eastbound Left/Through/Right		14.2	13.2	15.1	13.8		15.1	12.7		12.7
Westbound Left/Through/Right		17.9	16.8	13.7	14.4		13.7	15.3		15.3
Northbound Left/Through/Right		7	5.4	13.7	11.9		13.7	7.2		7.2
Southbound Left/Through/Right		7.6	13	11.6	13.6		11.6	17		17
<b>Queen Street North &amp; Site Access 2</b>										
Westbound Left/Right		8.8	8.4	6.1	9.3		6.1	7.5		7.5
Southbound Left/Through		3	32.2	8.3	15.1		8.3	3		3
<b>Queen Street North &amp; Robinson Street</b>										
Eastbound Left/Through/Right		13.9	13.6	20.8	18.6		20.8	26.3		26.3
Westbound Left/Through/Right		16.9	22.1	21.1	26.4		21.1	28.8		28.8
Northbound Left/Through/Right		28.2	49.3	40.4	38.5		40.4	36.1		36.1
Southbound Left/Through/Right		46.8	70.6	44.6	55.6		44.6	61.8		61.8
<b>Metcalfe Street South/Site Access 1 &amp; Robinson Street</b>										
Westbound Left/Through/Right		5.3	3	7.1	10.6		7.1	6.9		6.9
Northbound Left/Through/Right		12.4	7.7	7.7	9.3		7.7	9.3		9.3
Southbound Left/Through/Right		4.1	9.1	9.5	11.1		9.5	8.5		8.5
<b>Queen Street North &amp; West Street</b>										
Eastbound Left/Through		50	37.8	54.6	40.6		54.6	38.9		38.9
Eastbound Through/Right		14.2	12.6	20.4	18.9		20.4	20.4		20.4
Westbound Left/Through		19.6	21.1	14.6	24.8		14.6	25		25
Westbound Through/Right		9.8	18	11.2	21		11.2	19.9		19.9
Northbound Left	23	13.1	13.9	13.1	17.9	23	13.1	19.1		19.1
Northbound Through/Right		37.1	44.5	43.2	40.4		43.2	45.1		45.1
Southbound Left	27	13	28.8	25.4	16.5	27	25.4	20.4		20.4
Southbound Through/Right		37.5	58.7	44.1	59.1		44.1	62.4		62.4
<b>Metcalfe Street South &amp; West Street</b>										
Eastbound Left/Through/Right		2.7		2.8	4.3		2.8	2.8		2.8
Westbound Left/Through/Right		4	7.9		5.2			6		6
Northbound Left/Through/Right										
Southbound Left/Through/Right		11.9	11.2	12.2	12.3		12.2	11.3		11.3

## 8. PARKING STUDY

### 8.1 Parking Supply

The site proposes 31 at-grade parking spaces and 4 underground parking levels containing 69 parking spaces each for a total of 307 parking spaces. The proposal indicates a plan to sever a segment of the existing parking lot currently occupied by the adjacent municipal building directly to the site's south.

### 8.2 Parking Requirements

The parking requirements were reviewed based on the Norfolk County Zoning By-law 1-Z-2014. The source material is provided in Appendix E. A comparison of the proposed parking supply and requirements is shown in Table 9.

Table 9 – Site Parking Requirements, Norfolk County Zoning By-law

Land Use		Units / GFA (sq.m.)	Minimum Parking Rate	Required Spaces	Proposed Spaces
Residential	Resident	143	1.5 spaces per unit	215	219
	Visitor		1 space per 3 units	48	48
Retail		299.6	1 space per 30 sq.m.	10	10
Office		894.8	1 space per 30 sq.m.	30	30
Total Parking Requirement				303	307

Source: Norfolk County Zoning By-Law Z-1-2014

The parking requirement is 303 spaces compared to the proposed parking supply of 307 spaces, resulting in a parking surplus of +4 spaces. Therefore, the proposed parking supply will be adequate to meet the future parking demands of the development.

## 9. FINDINGS AND RECOMMENDATIONS

Our findings and recommendations of this Transportation Study, for the proposed mixed-use development at 185 Robinson Street in the community of Simcoe, are summarized as follows:

### Traffic Impact Study

- The proposed development consists of a mixed-use development accommodating various uses including apartments, commercial, and office. Two site accesses – one connected to the existing parking lot to the south of the site and one proposed access via Kars Street – are proposed to provide connections with the surface parking area consisting of 158 parking spaces that will be maintained on the retained lot for the existing 3-storey building on the site, and there are 49 surface parking spaces for the severed lot where the new building is proposed. An additional 276 underground parking spaces are also proposed for a total of 307 parking spaces.



- Based on the ITE Trip Generation manual, the subject site is expected to generate 79 new two-way trips in the weekday AM peak hour and 104 new two-way trips in the weekday PM peak hour.
- The auto site trips were distributed to/from the surrounding road network based on the existing travel patterns in the surrounding area.
- The proposed development is acceptable for traffic operations with traffic signals at the intersections of Queen Street North and Robinson Street. No further roadway improvements would be required to support the development, aside from the construction of the proposed internal roadways and site accesses.
- Due to the similarities between the future background and total conditions, the subject site is expected to have minimal impact on the study area network.

#### Parking Study

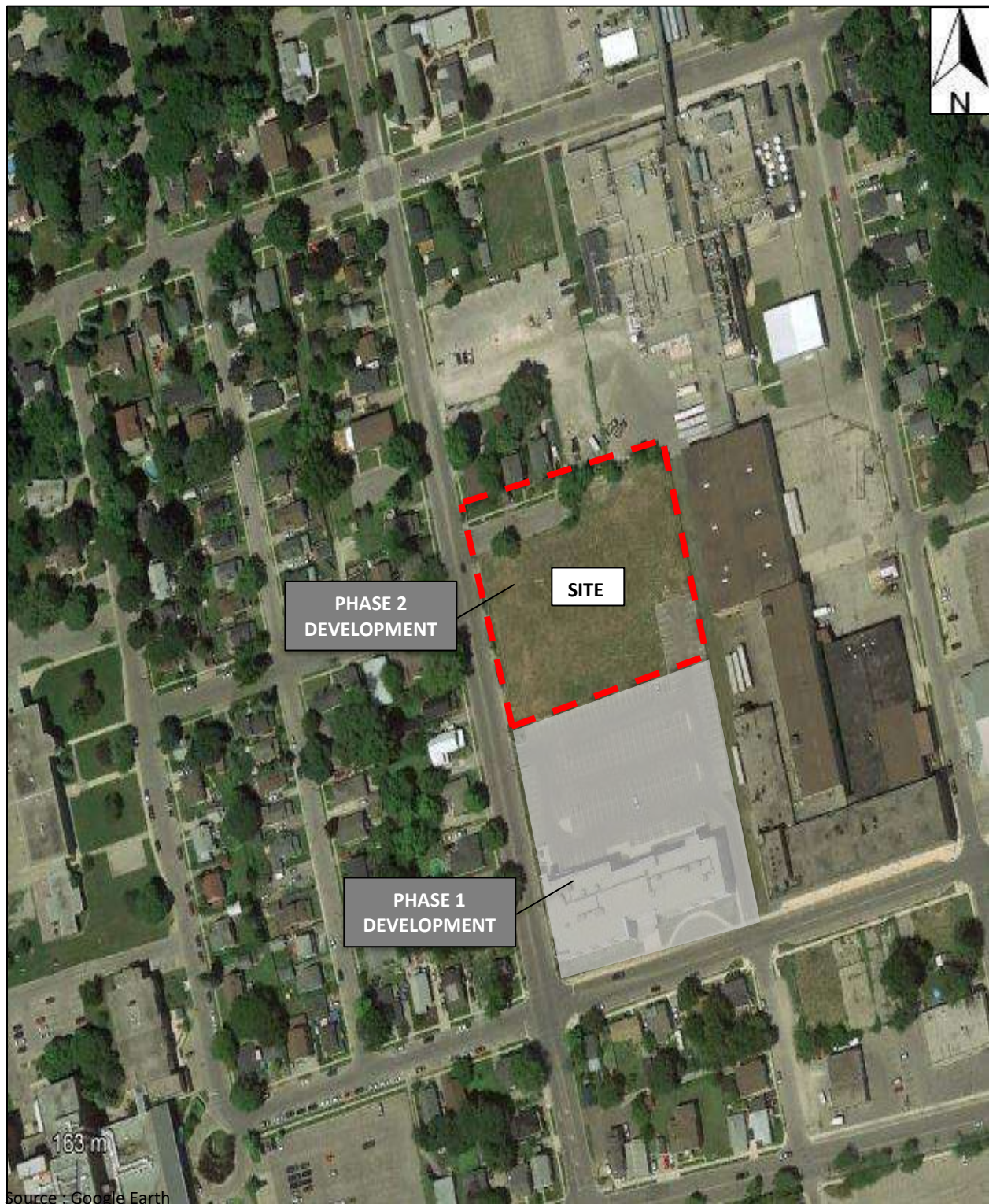
- The proposed parking supply of 307 spaces is in conformance with the County's Zoning By-law and has a parking surplus of 4 spaces.
- The proposed parking supply will be adequate to meet the future parking demands of the development.

Respectfully submitted,



Anil Seegobin, P.Eng.  
Partner, Engineer  
**Trans-Plan Transportation Inc.**  
Transportation Consultants

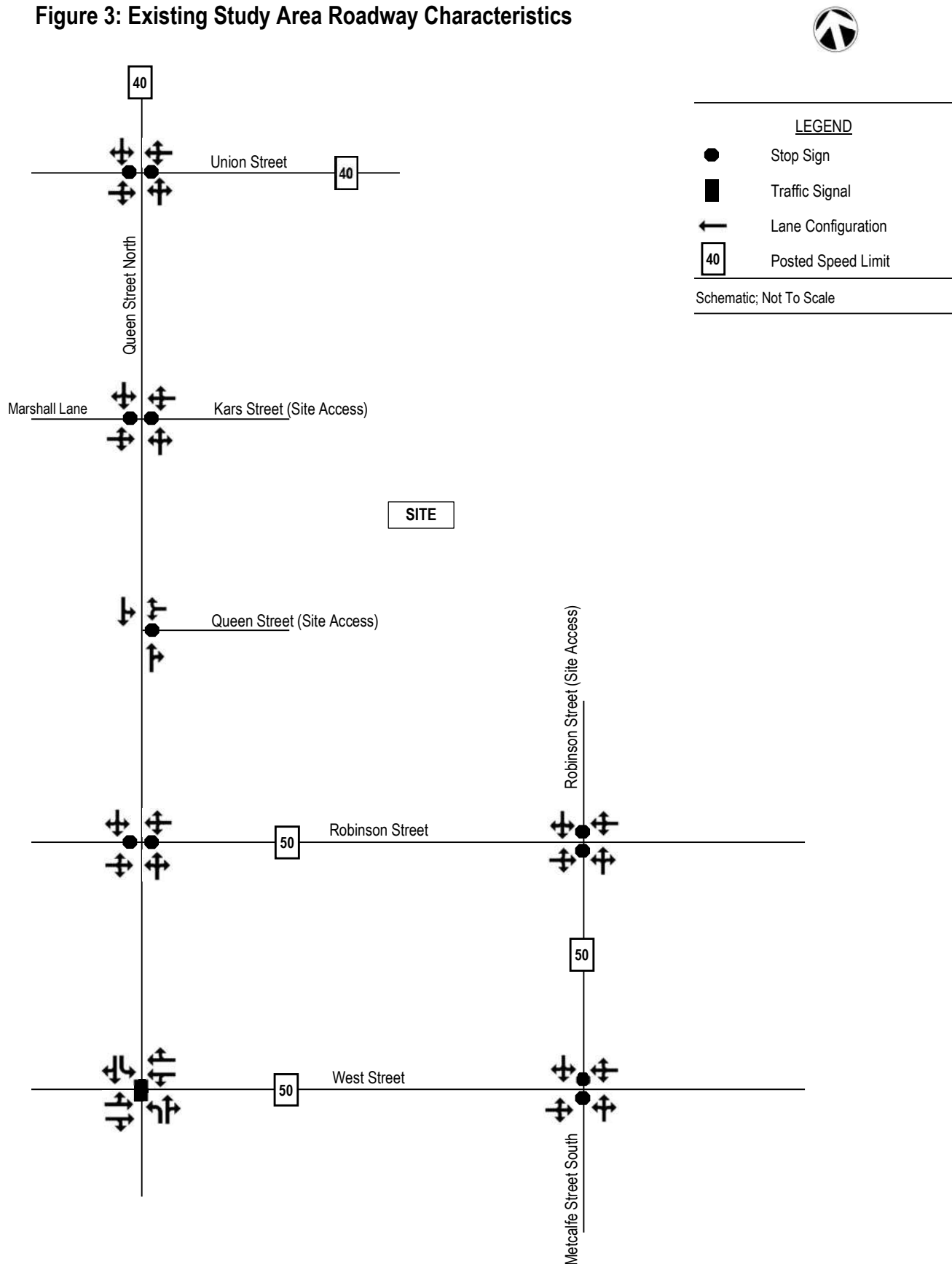
Figure 1 – Site Location





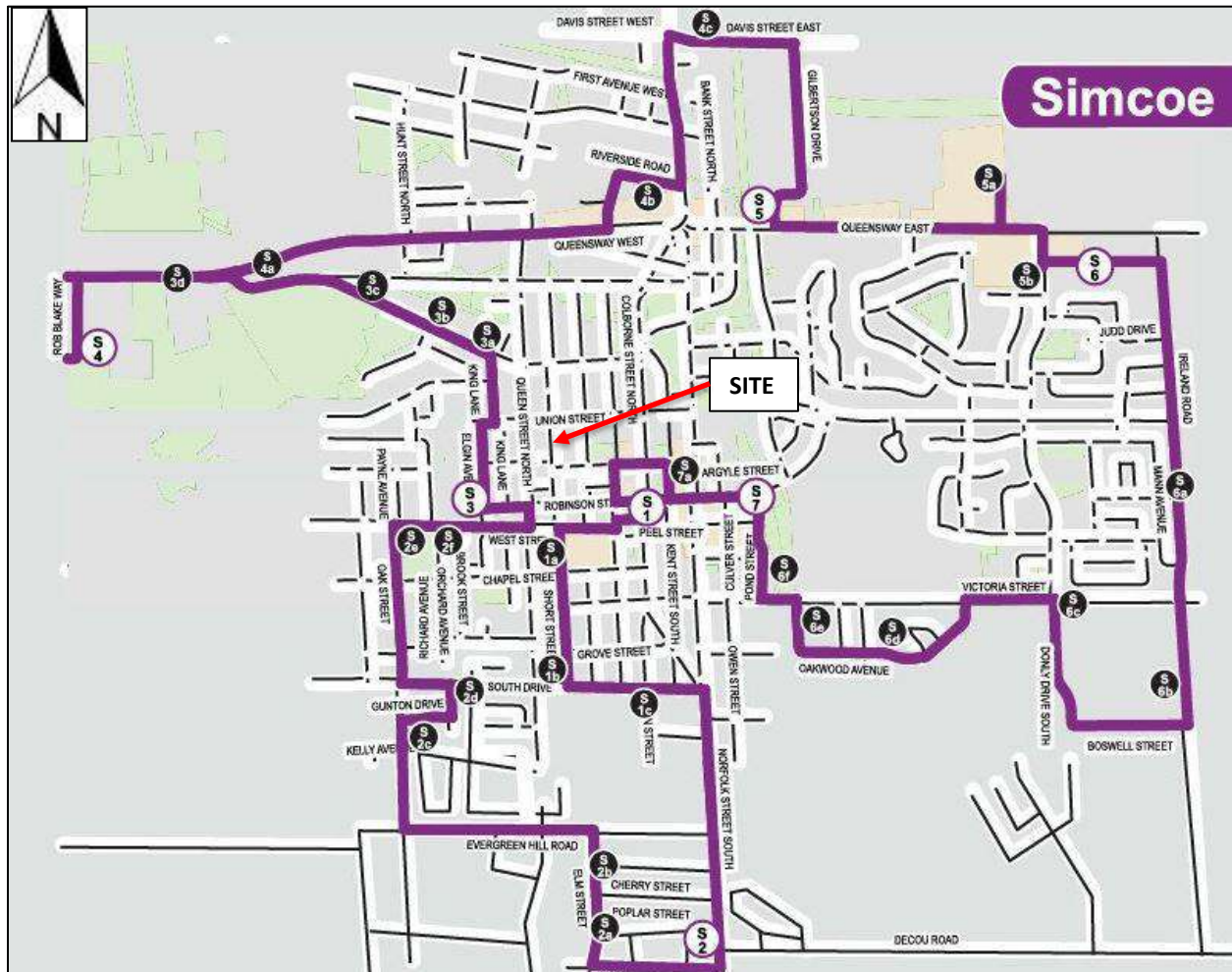


**Figure 3: Existing Study Area Roadway Characteristics**



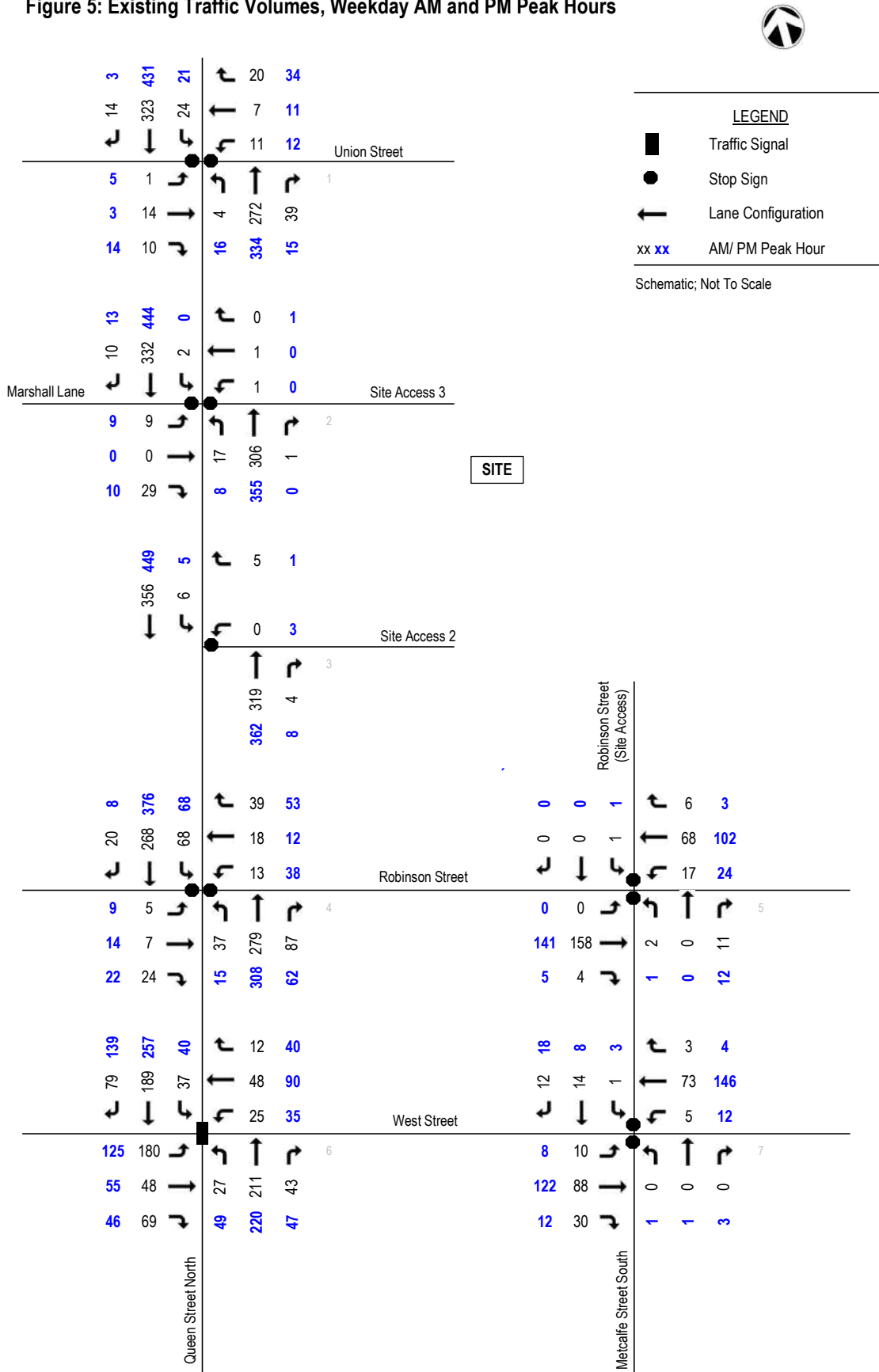


### Figure 4 – Study Area Transit Service



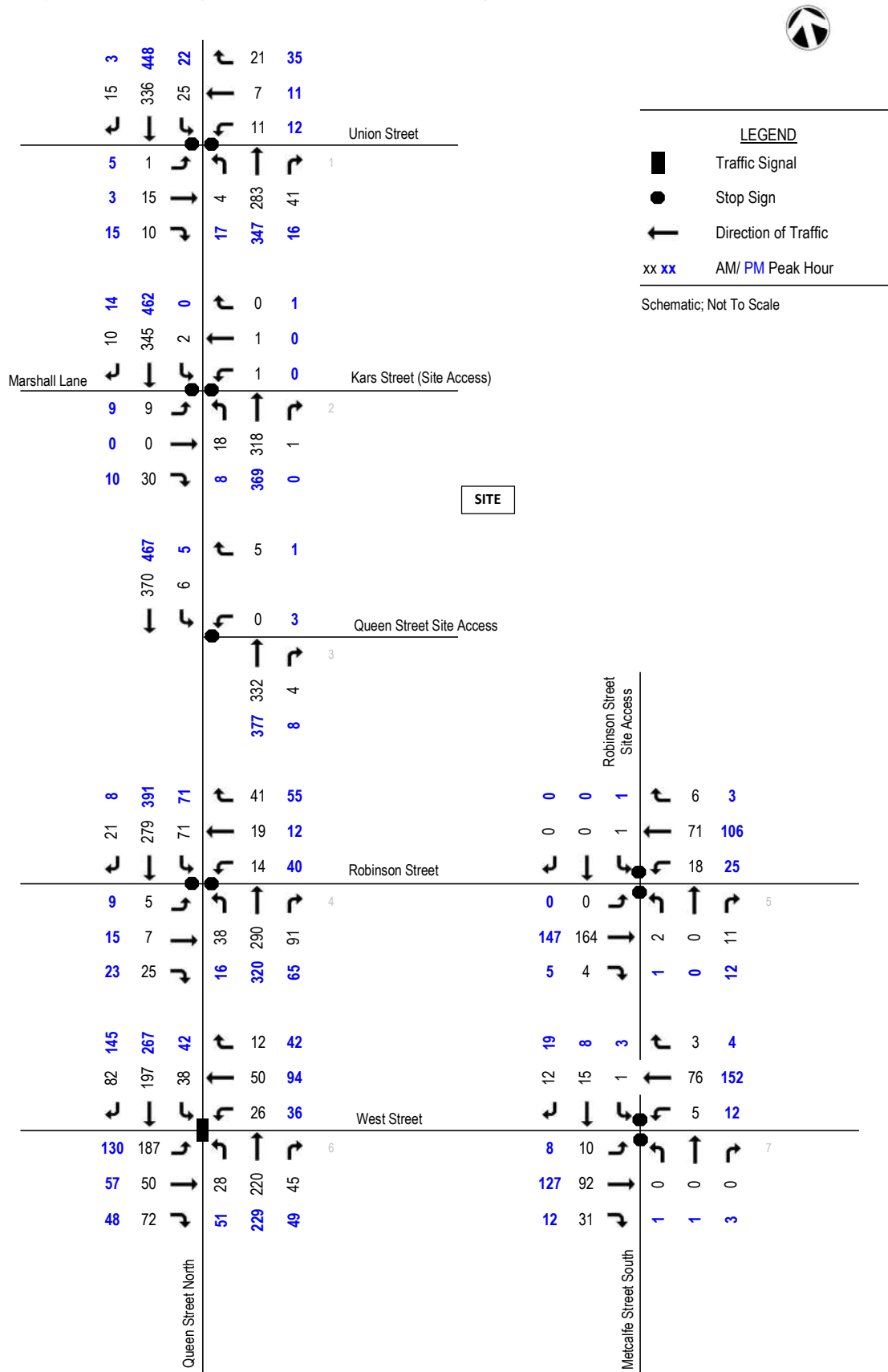
Source : Ride Norfolk website

**Figure 5: Existing Traffic Volumes, Weekday AM and PM Peak Hours**

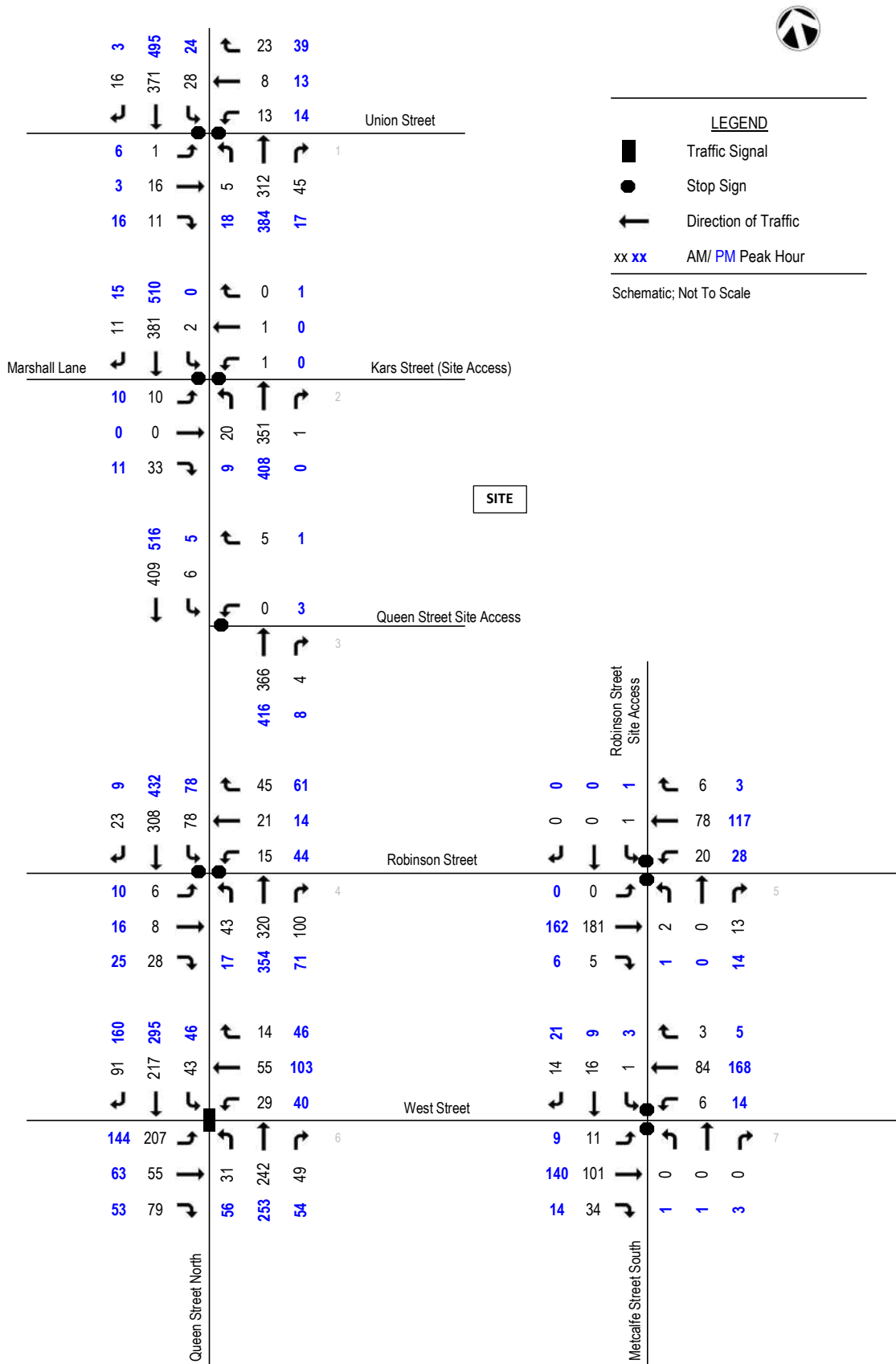




**Figure 6: 2026 Background Traffic Volumes, Weekday AM and PM Peak Hours**

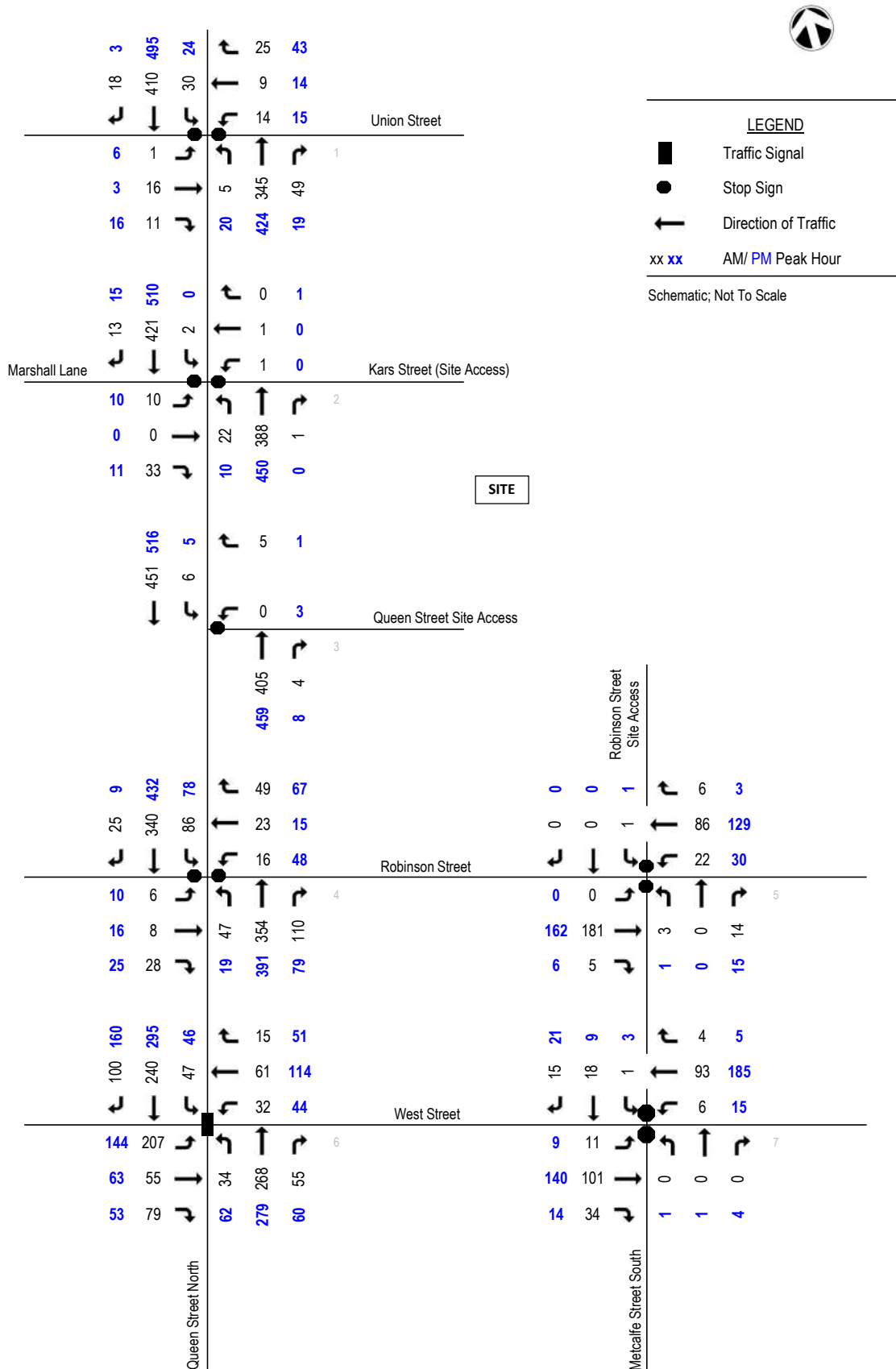


**Figure 7: 2031 Background Traffic Volumes, Weekday AM and PM Peak Hours**

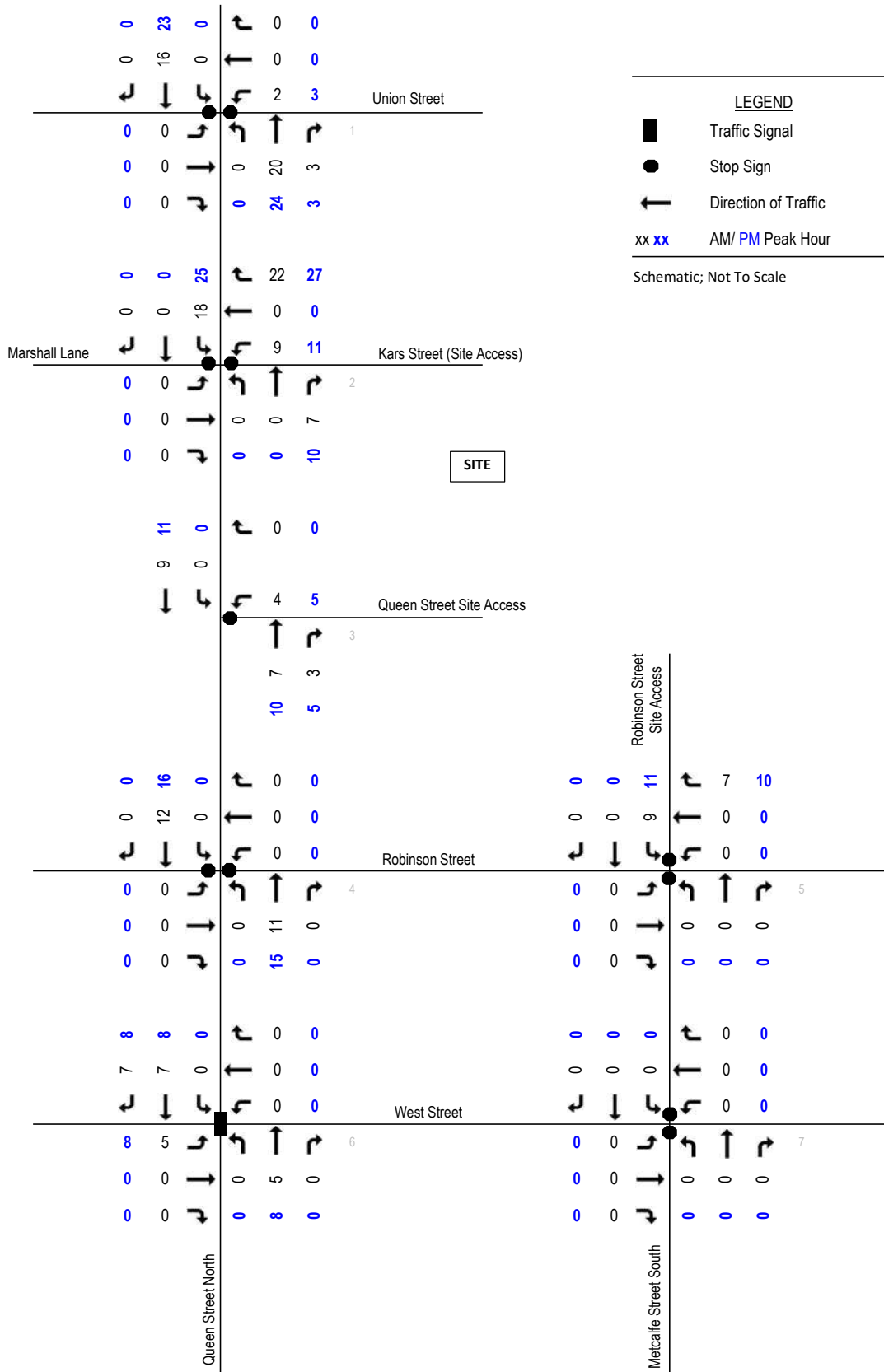




**Figure 8: 2036 Background Traffic Volumes, Weekday AM and PM Peak Hours**

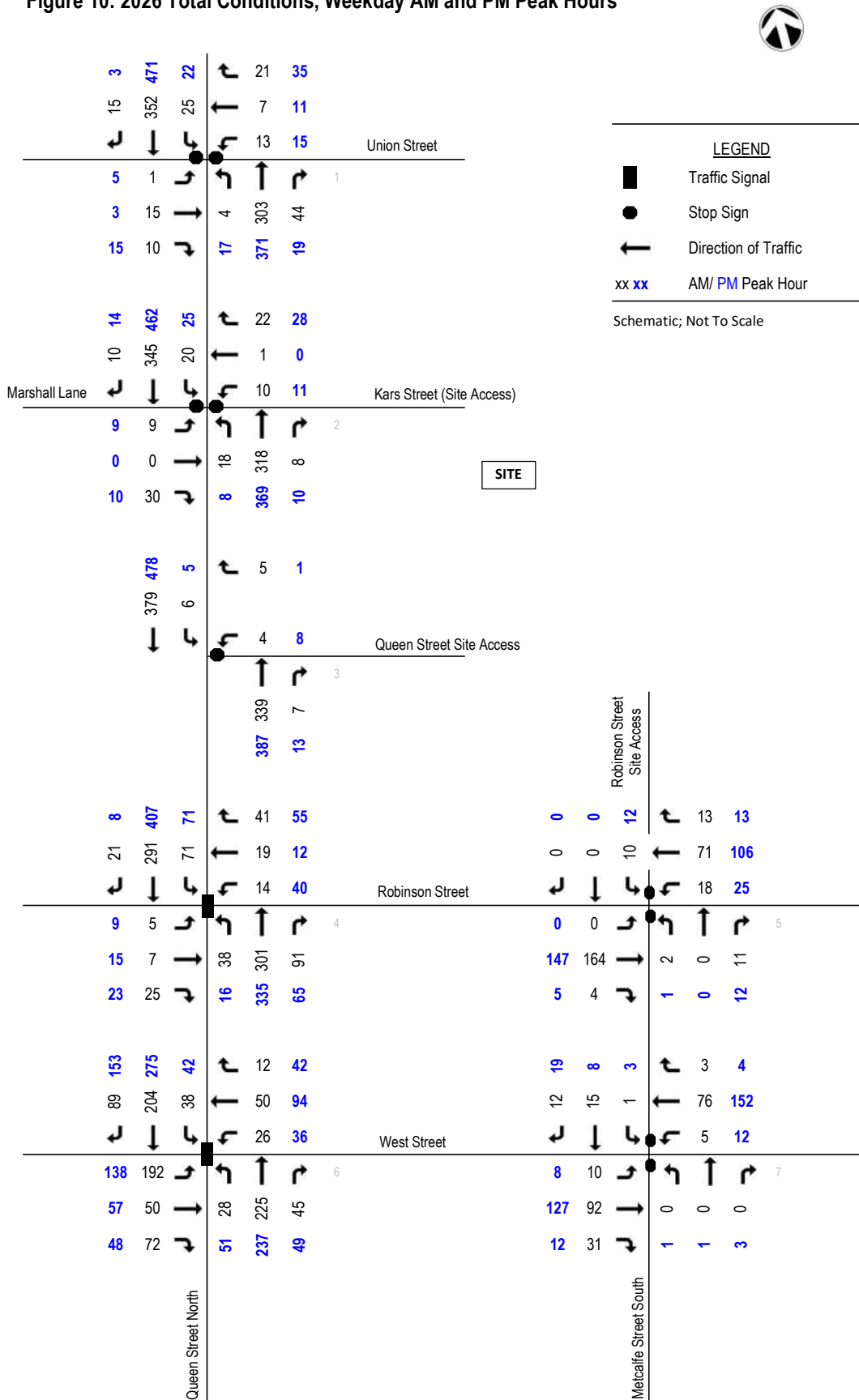


**Figure 9: Site Traffic Assignment, Weekday AM and PM Peak Hours**

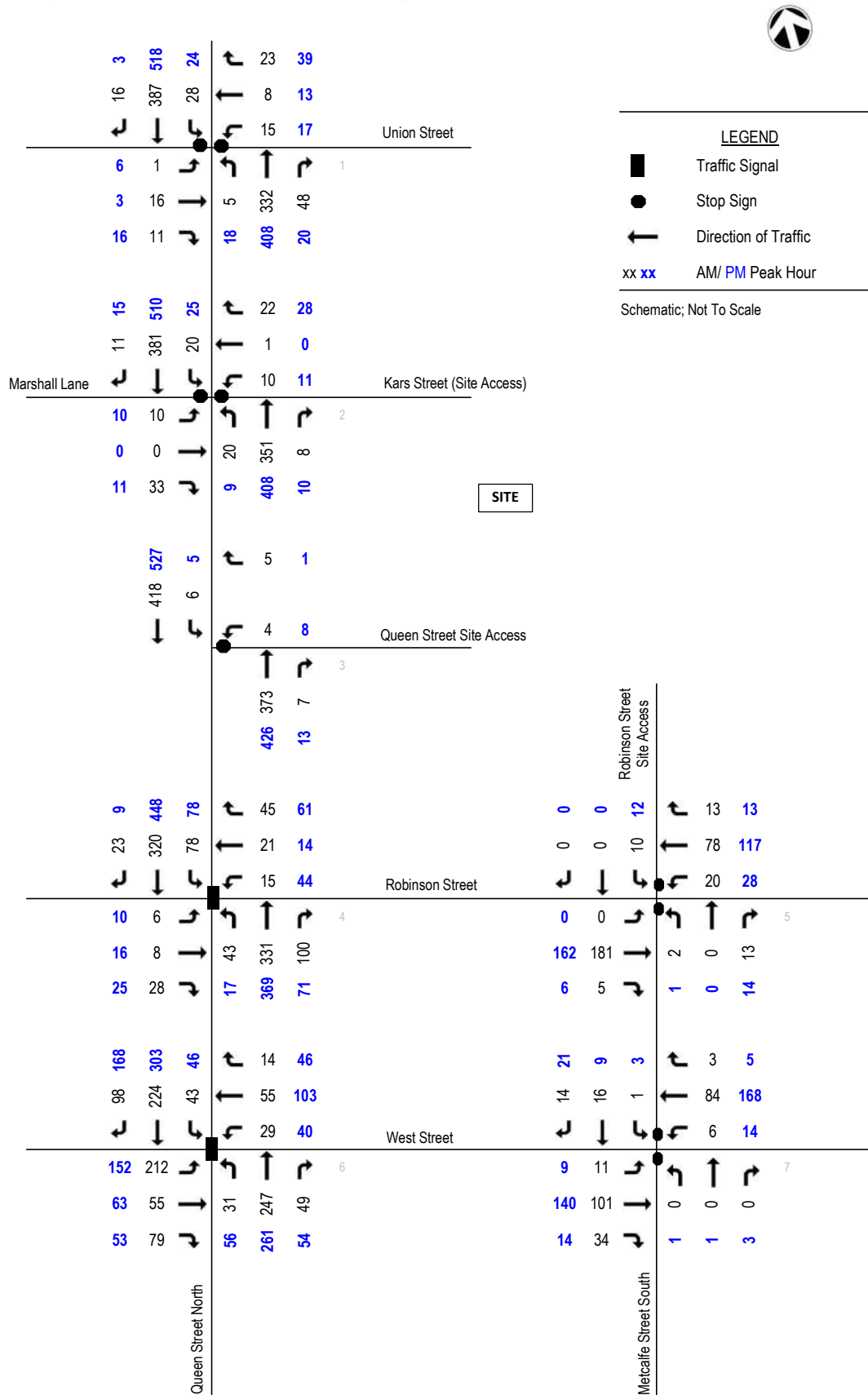




**Figure 10: 2026 Total Conditions, Weekday AM and PM Peak Hours**

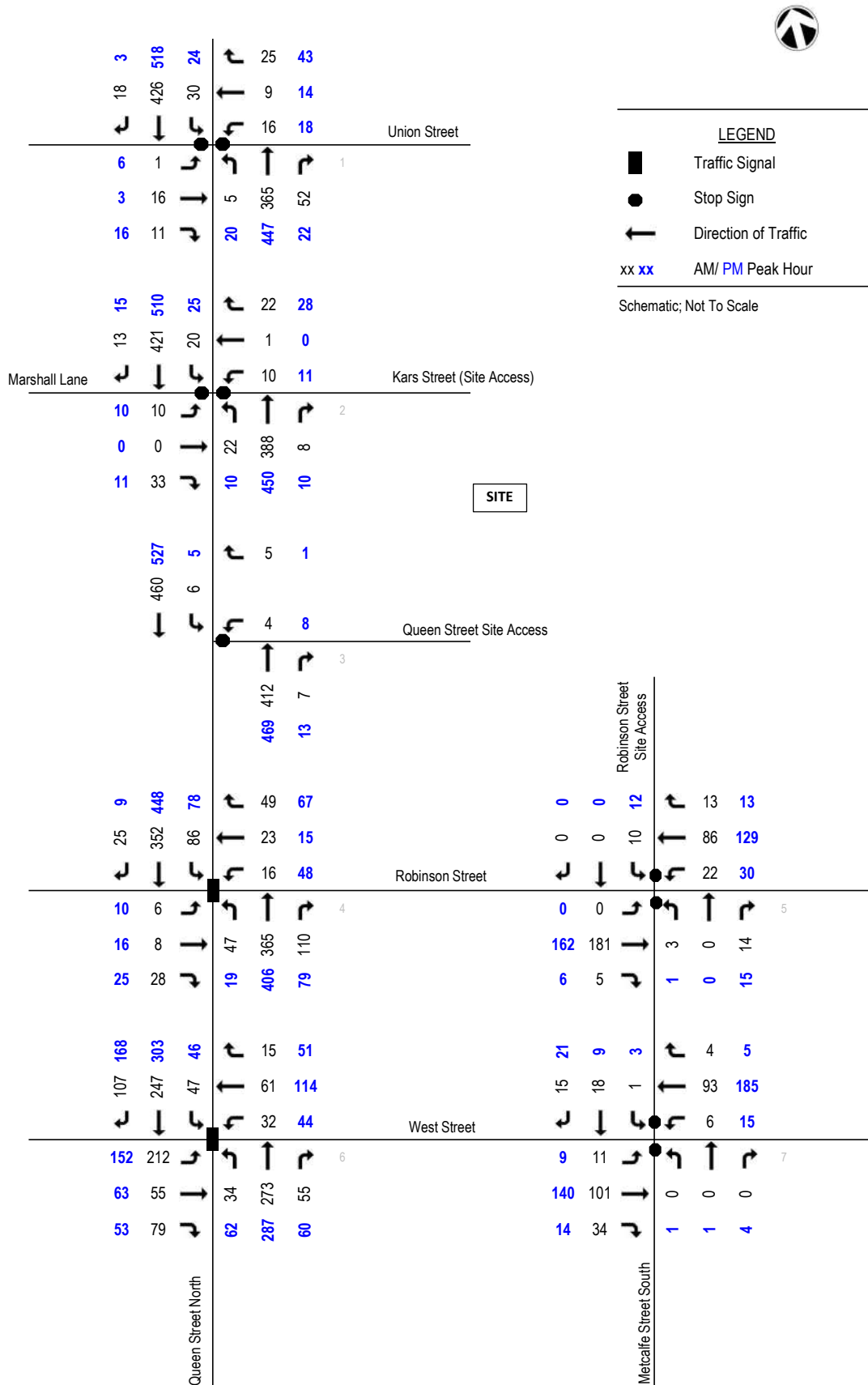


**Figure 11: 2031 Total Conditions, Weekday AM and PM Peak Hours**





**Figure 12: 2036 Total Future Conditions, Weekday AM and PM Peak Hours**



## **APPENDICES**

Appendix A – Turning Movement and Signal Timing Counts

Appendix B – Background Traffic Information

Appendix C – Capacity Analysis Sheets

Appendix D – Level of Service Definitions

Appendix E – Norfolk County and Comparable Municipalities' Zoning By-law, Excerpts





## **APPENDIX A**

### Turning Movement and Signal Timing Counts



## Turning Movement Count Diagram

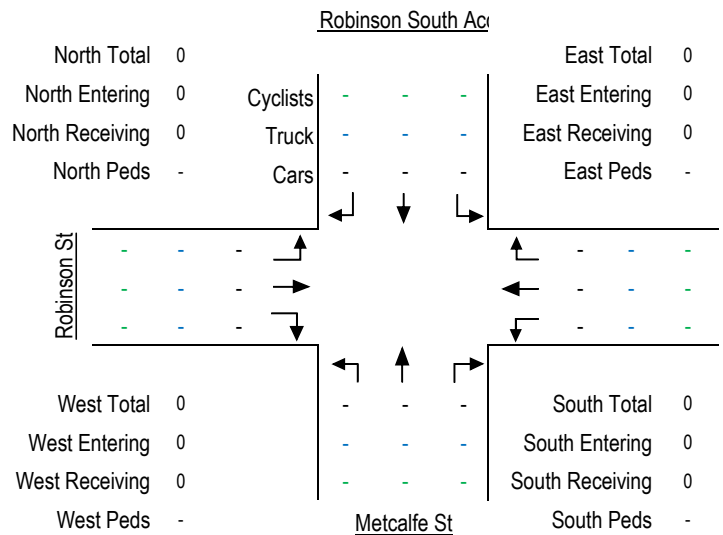
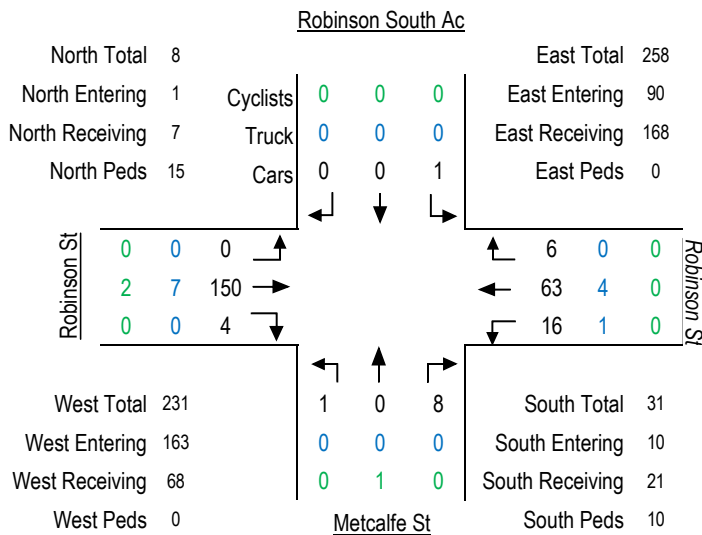
Intersection: Metcalfe Street / 185 Robinson South Access and Robinson Street  
Municipality: Simcoe, Ontario

Intersection ID:

Date: Tuesday, April 23, 2024

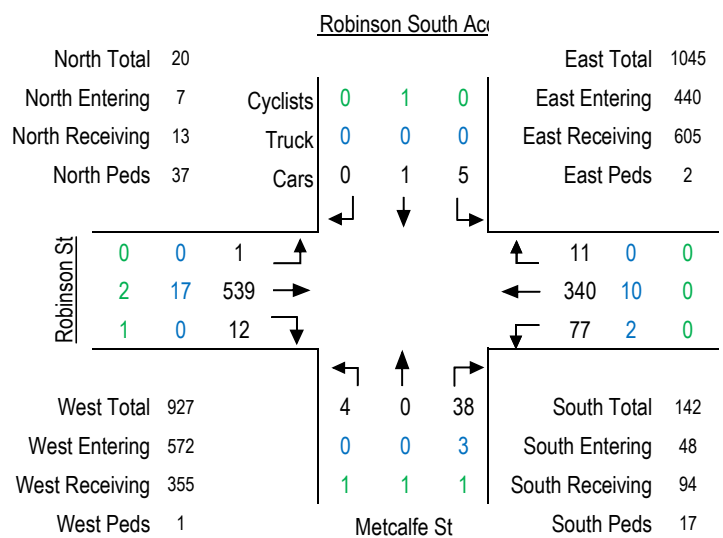
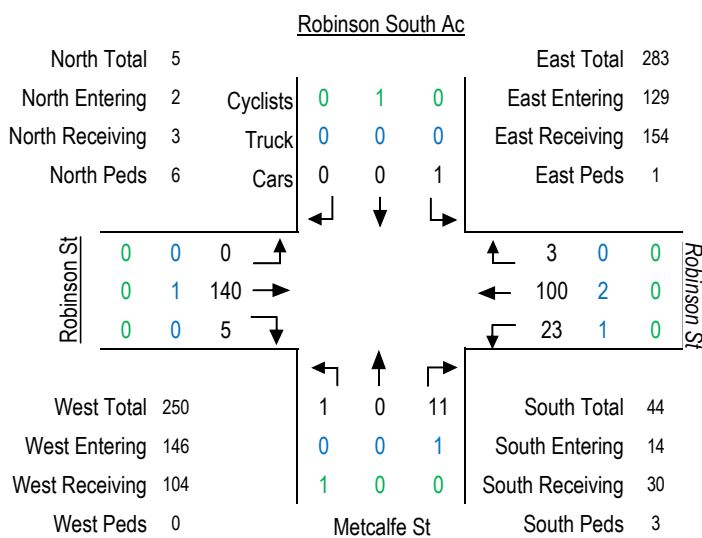
**AM Peak Hour: 8:15 to 9:15**

**MD Peak Hour: - to -**



**PM Peak Hour: 16:00 to 17:00**

**Total 8-Hour Count**









## Turning Movement Count Diagram

Intersection: Queen Street North and Kars Street / Marshall Lane

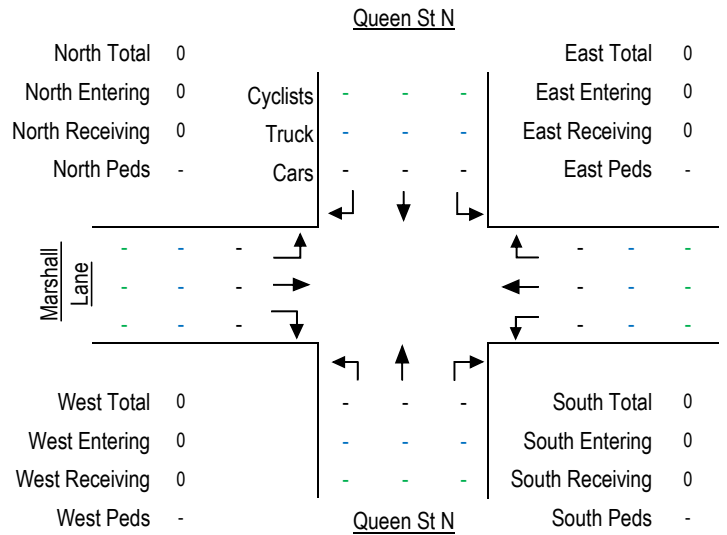
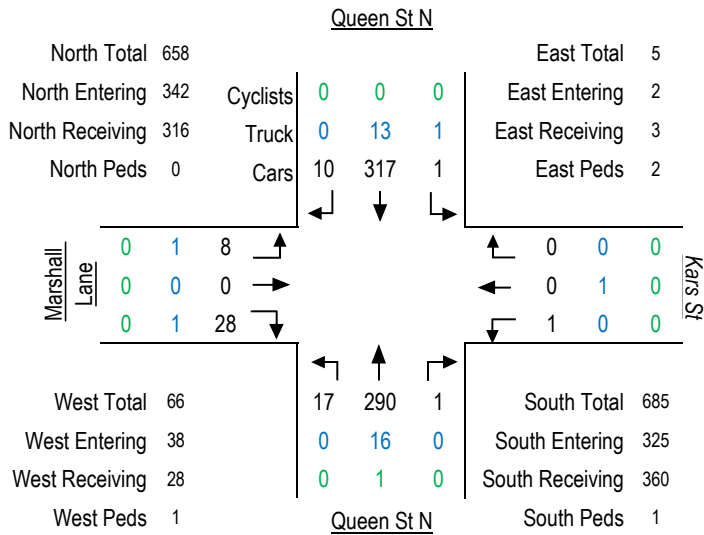
Municipality: Simcoe, Ontario

Intersection ID:

Date: Tuesday, April 23, 2024

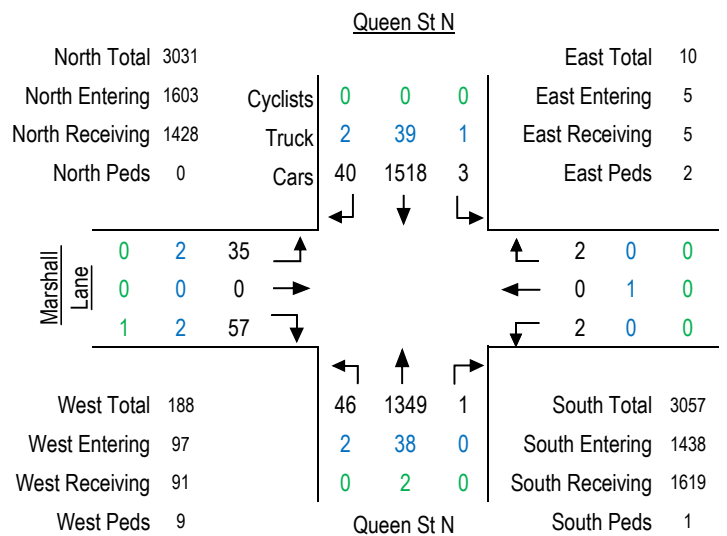
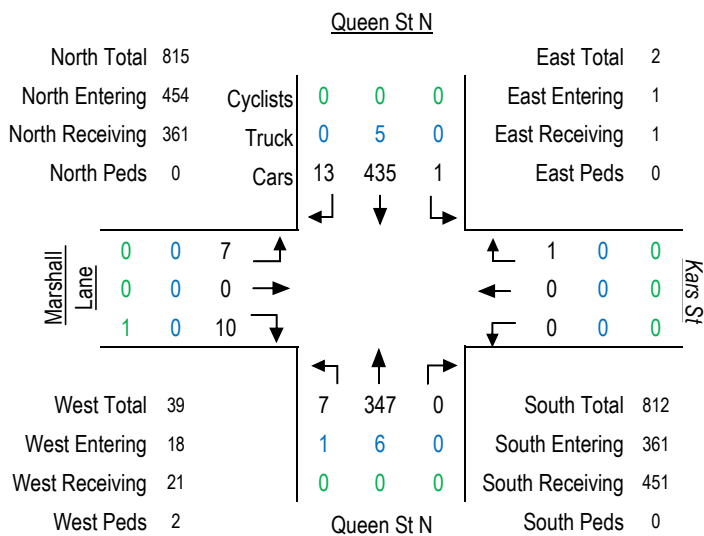
**AM Peak Hour: 8:30 to 9:30**

**MD Peak Hour: - to -**



**PM Peak Hour: 16:00 to 17:00**

**Total 8-Hour Count**







## Turning Movement Count Diagram

Intersection: Queen Street and Robinson Street

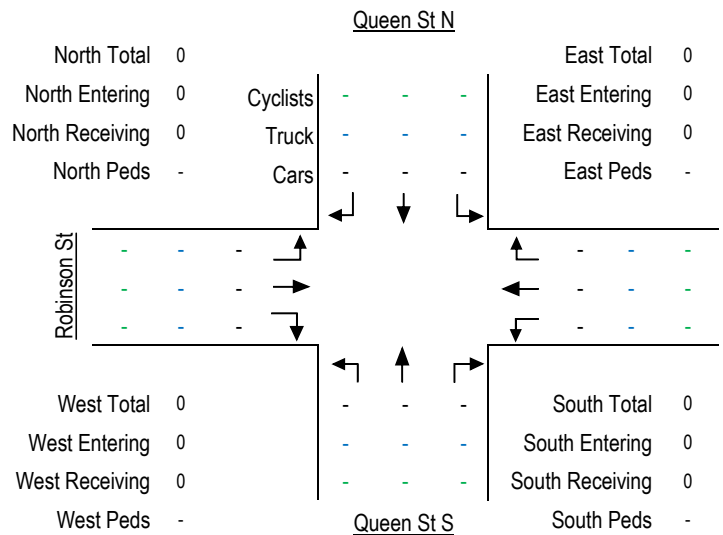
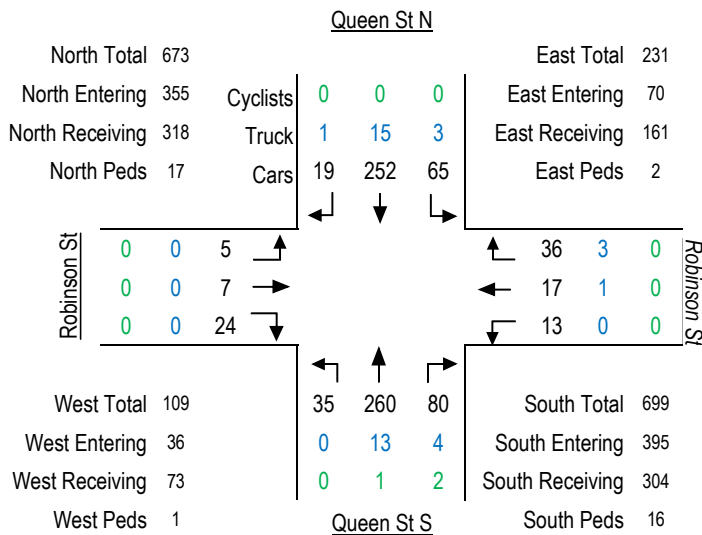
Municipality: Simcoe, Ontario

Intersection ID:

Date: Tuesday, April 23, 2024

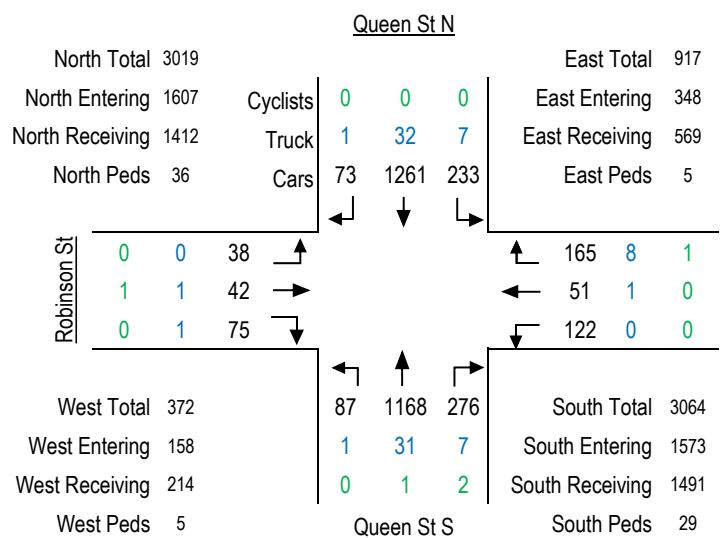
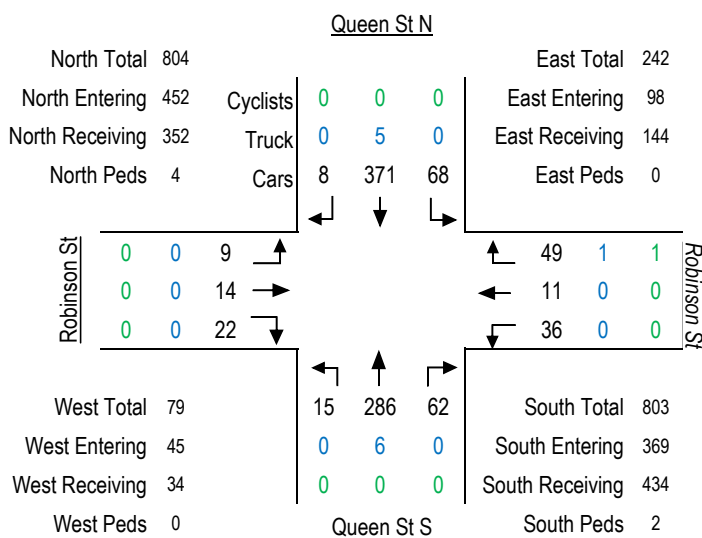
**AM Peak Hour: 8:15 to 9:15**

**MD Peak Hour: - to -**



**PM Peak Hour: 16:00 to 17:00**

**Total 8-Hour Count**





## Turning Movement Count Diagram

Intersection: Queen Street North and Union Street

Municipality: Simcoe, Ontario

Intersection ID:

Date: Tuesday, April 23, 2024

**AM Peak Hour: 8:30 to 9:30**

**MD Peak Hour: - to -**

Queen St N										
North Total 655						East Total 116				
North Entering 361	Cyclists	0	0	0		East Entering 38				
North Receiving 294	Truck	0	13	2		East Receiving 78				
North Peds 19	Cars	14	310	22		East Peds 2				
					←	↓	→			
Union St	0	0	1	↑						Union St
	1	0	14	→						
	0	0	10	↓						
					←	↑	→			
West Total 51			4	258	35	South Total 660				
West Entering 26		0	13	4		South Entering 316				
West Receiving 25		0	2	0		South Receiving 344				
West Peds 5		Queen St N				South Peds 6				

Queen St N											
North Total			0				East Total			0	
North Entering			0	Cyclists	-	-	-	East Entering			0
North Receiving			0	Truck	-	-	-	East Receiving			0
North Peds			-	Cars	-	-	-	East Peds			-
				←	↓	→					
Union St	-	-	-	↑				↑	-	-	-
	-	-	-	→				←	-	-	-
	-	-	-	↓				↓	-	-	-
				←	↑	→					
West Total			0	-	-	-	South Total			0	
West Entering			0	-	-	-	South Entering			0	
West Receiving			0	-	-	-	South Receiving			0	
West Peds			-				South Peds			-	
Queen St N											

**PM Peak Hour: 16:00 to 17:00**

**Total 8-Hour Count**

Queen St N									
North Total 826						East Total 98			
North Entering 453	Cyclists	0	0	0		East Entering 57			
North Receiving 373	Truck	0	4	0		East Receiving 41			
North Peds 1	Cars	3	425	21		East Peds 2			
		←	↓	↘					
Union St	0	0	5	↗		↖	31	3	0
	1	0	3	→		←	11	0	0
	0	1	13	↘		↙	12	0	0
		↖	↑	↗					
West Total 53			16	328	15	South Total 821			
West Entering 23		0	6	0		South Entering 366			
West Receiving 30		0	0	1		South Receiving 455			
West Peds 0						South Peds 7			
Queen St N									

Queen St N										
North Total 3083						East Total 416				
North Entering 1655	Cyclists	0	0	0		East Entering 182				
North Receiving 1428	Truck	0	40	5		East Receiving 234				
North Peds 36	Cars	37	1473	100		East Peds 7				
Union St		0	0	16	↗			93	8	0
		3	1	33	→		←	33	0	0
		0	1	37	↘		↙	44	4	0
West Total 194						South Total 3035				
West Entering 91		32	1273	86		South Entering 1436				
West Receiving 103		1	36	5		South Receiving 1599				
West Peds 9		0	2	1		South Peds 19				
Queen St N										





## Signal Timing Recording

Date: Wednesday July 8, 2020

Surveyor: Trans-Plan

Time Period: AM Peak Hour

Intersection: Queen Street North/Queen Street South at West Street

		Eastbound		Westbound		Northbound		Southbound	
		Record 1	Record 2	Record 1	Record 2	Record 1	Record 2	Record 1	Record 2
Adv. Green Arrow		10	10	0	0	0	0	6	6
Adv. Yellow Arrow		2	2	0	0	0	0	2	2
Green Time		24	24	30	36	29	29	35	35
Yellow		4	4	4	4	4	4	4	4
All Red		2	2	2	2	2	2	2	2
Walk Signal(Man)		16	16	16	16	16	16	16	16
Flash Don't Walk(Hand)		6	6	6	6	6	6	6	6
Lengths	Min.	40	40	28	28	28	28	36	36
	Max.	42	42	36	42	35	35	49	49

Cyclelengths:

Scenario 1 77

Scenario 2 91

Scenario 3 77

Scenario 4 91



## Signal Timing Recording

Date: Wednesday July 8, 2020

Surveyor: Trans-Plan

Time Period: PM Peak Hour

Intersection: Queen Street North/Queen Street South at West Street

		Eastbound		Westbound		Northbound		Southbound	
		Record 1	Record 2	Record 1	Record 2	Record 1	Record 2	Record 1	Record 2
Adv. Green Arrow		8	8	0	0	0	0	8	8
Adv. Yellow Arrow		2	2	0	0	0	0	2	2
Green Time		37	37	29	29	30	30	38	38
Yellow		4	4	4	4	4	4	4	4
All Red		2	2	2	2	2	2	2	2
Walk Signal(Man)		16	16	16	16	16	16	16	16
Flash Don't Walk(Hand)		6	6	6	6	6	6	6	6
Lengths	Min.	38	38	28	28	28	28	38	38
	Max.	53	53	35	35	36	36	54	54

Cyclelengths:

Scenario 1 89

Scenario 2 107

Scenario 3 71

Scenario 4 89



## **APPENDIX B**

### Background Traffic Information



## AADT Growth Calculation

Review of Traffic Volume Growth on Queen Street, 0.1km South of Cedar Street

Year	AADT (vehicles)	xy	x^2	Growth by Linear Regression n	Annual Growth Rate
2013	8,416	16941408	4052169	7954	
2014	8,074	16261036	4056196	7246	
2015	3,496	7044440	4060225	6538	
2016	7,581	15283296	4064256	5829	
8058	27567	55530180	16232846		-8.9%

Source: Norfolk County, AADT Listing 2013 to 2016

events 4  
m -708.3  
b 1433762.1

Review of Traffic Volume Growth on West Street, Between Queen Street and Head Street

Year	AADT (vehicles)	xy	x^2	Growth by Linear Regression n	Annual Growth Rate
2013	4,155	8364015	4052169	4411	
2014	3,787	7627018	4056196	4636	
2015	7,329	14767935	4060225	4862	
2016	3,725	7509600	4064256	5087	
8058	18996	38268568	16232846		5.1%

Source: Norfolk County, AADT Listing 2013 to 2016

events 4  
m 225.2  
b -448916.4



## **APPENDIX C**

Capacity & Queueing Analysis Sheets







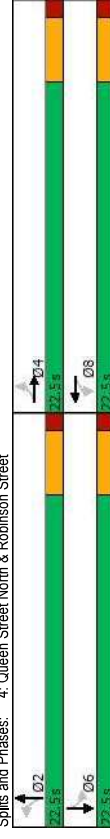
HCM Unsignalized Intersection Capacity Analysis  
 1: Queen Street North & Union Street  
 <Existing> Weekday AM Peak Hour  
 08-15-2024












Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		4				4			4	
Traffic Volume (veh/h)	1	14	10	11	7	20	4	272	39	24	323	14
Future Volume (Veh/h)	1	14	10	11	7	20	4	272	39	24	323	14
Sign Control		Stop		Stop				Free			Free	
Grade		0%		0%				0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.59	0.59	0.59	0.88	0.88	0.88	0.91	0.91	0.81
Hourly flow rate (vph)	1	16	12	19	12	34	5	309	44	26	355	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				
Median storage (veh)												
Upstream signal (m)									315			
pX platoon unblocked												
VC conflicting volume	796	778	362	776	763	331	370				353	
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	796	778	362	776	763	331	370				353	
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	100	95	98	93	96	95	100				98	
cM capacity (veh/h)	277	319	682	292	326	711	1189				1206	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	29	65	358	396								
Volume Left	1	19	5	26								
Volume Right	12	34	44	15								
cSH	407	434	1189	1206								
Volume to Capacity	0.07	0.15	0.00	0.02								
Queue Length 95th (m)	1.8	4.2	0.1	0.5								
Control Delay (s)	14.5	14.8	0.2	0.7								
Lane LOS	B	B	A	A								
Approach Delay (s)	14.5	14.8	0.2	0.7								
Approach LOS	B	B										
Intersection Summary												
Average Delay				2.0								
Intersection Capacity Utilization				46.1%							A	
Analysis Period (min)				15								

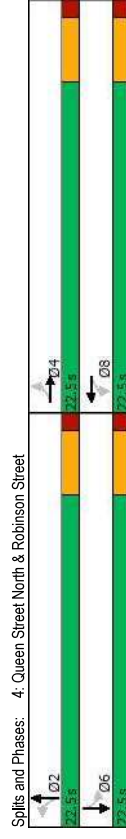
HCM Unsignalized Intersection Capacity Analysis  
 2: Queen Street North & Marshall Lane/Site Access 3  
 <Existing> Weekday AM Peak Hour  
 08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		4				4			4	
Traffic Volume (veh/h)	9	0	29	1	1	0	17	306	1	2	332	10
Future Volume (Veh/h)	9	0	29	1	1	0	17	306	1	2	332	10
Sign Control		Stop		Stop				Free			Free	
Grade		0%		0%				0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.40	0.40	0.40	0.84	0.84	0.84	0.87	0.87	0.87
Hourly flow rate (vph)	36	0	116	2	2	0	20	364	1	2	382	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				
Median storage (veh)												
Upstream signal (m)									177			
pX platoon unblocked												
VC conflicting volume	797	796	388	912	802	364	393				365	
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	797	796	388	912	802	364	393				365	
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	88	100	82	99	99	100	98				100	
cM capacity (veh/h)	299	314	661	207	312	680	1166				1194	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	152	4	385	395								
Volume Left	36	2	20	2								
Volume Right	116	0	1	11								
cSH	513	249	1166	1194								
Volume to Capacity	0.30	0.02	0.02	0.00								
Queue Length 95th (m)	9.8	0.4	0.4	0.0								
Control Delay (s)	14.9	19.7	0.6	0.1								
Lane LOS	B	C	A	A								
Approach Delay (s)	14.9	19.7	0.6	0.1								
Approach LOS	B	C										
Intersection Summary												
Average Delay				2.8								
Intersection Capacity Utilization				38.1%							A	
Analysis Period (min)				15								

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	5	319	4	6	356
Future Volume (Veh/h)	0	5	319	4	6	356
Sign Control	Stop		Free		Free	Free
Grade	0%		0%		0%	0%
Peak Hour Factor	0.75	0.75	0.82	0.82	0.88	0.88
Hourly flow rate (vph)	0	7	389	5	7	405
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	None
Median storage (veh)						
Upstream signal (m)			99			
pX, platoon unblocked						
vC, conflicting volume	810	392			394	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	810	392			394	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			99	
cM capacity (veh/h)	347	657			1165	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	7	394	412			
Volume Left	0	0	7			
Volume Right	7	5	0			
cSH	657	1700	1165			
Volume to Capacity	0.01	0.23	0.01			
Queue Length 95th (m)	0.3	0.0	0.1			
Control Delay (s)	10.5	0.0	0.2			
Lane LOS	B	A	A			
Approach Delay (s)	10.5	0.0	0.2			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			33.5%		ICU Level of Service	A
Analysis Period (min)			15			



Comprehensive Traffic Signal Performance Report - Q3 2023												
Lane Group		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Signal Timing & Control		
												
Lane Configurations												
Traffic Volume (vph)		5	7	13	18	37	279	68	268			
Future Volume (vph)		5	7	13	18	37	279	68	268			
Turn Type		Perm	NA	Perm	NA	Perm	NA	Perm	NA			
Protected Phases		4	4	8	8	2	2	6	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)		22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5			
Total Split (%)		50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%			
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	0.0	0.0			
Total Lost Time (s)		4.5	4.5	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 Effd Green (s)		6.8	6.8	6.8	6.8	26.1	26.1	26.1	26.1			
Actuated g/C Ratio		0.19	0.19	0.19	0.19	0.72	0.72	0.72	0.72			
v/c Ratio		0.15	0.33	0.33	0.33	0.39	0.39	0.38	0.38			
Control Delay		7.6	9.1	9.1	9.1	5.4	5.4	5.8	5.8			
Queue Delay		0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0			
Total Delay		7.6	9.1	9.1	9.1	5.6	5.6	5.8	5.8			
LOS		A	A	A	A	A	A	A	A			
Approach Delay		7.6	9.1	9.1	9.1	5.6	5.6	5.8	5.8			
Approach LOS		A	A	A	A	A	A	A	A			
Intersection Summary												
Cycle Length: 45												
Actuated Cycle Length: 36.3												
Natural Cycle: 50												
Control Type: Semi-Act-Uncoordinated												
Maximum v/c Ratio: 0.39												
Intersection Signal Delay: 6.2												
Intersection Capacity Utilization: 46.7%												
Analysis Period (min): 15												
Intersection LOS: A												
ICU Level of Service: A												





HCM Signalized Intersection Capacity Analysis  
4: Queen Street North & Robinson Street

HCM Unsignalized Intersection Capacity Analysis  
5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	7	24	13	18	39	37	279	87	68	268	20
Traffic Volume (vph)	5	7	24	13	18	39	37	279	87	68	268	20
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.97	0.99	0.99	0.99
Flt Protected	1685	1685	1685	1707	1707	1707	1800	1800	1800	1831	1831	1831
Satd. Flow (prot)	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94	0.86	0.86	0.86
Flt Permitted	1610	1610	1610	1588	1588	1588	1706	1706	1706	1588	1588	1588
Satd. Flow (perm)	0.73	0.73	0.73	0.60	0.60	0.60	0.84	0.84	0.84	0.83	0.83	0.83
Peak-hour factor, PHF	7	10	33	22	30	65	44	332	104	82	323	24
Adj. Flow (vph)	0	29	0	0	57	0	0	13	0	0	3	0
RTOR Reduction (vph)	0	21	0	0	60	0	0	467	0	0	426	0
Lane Group Flow (vph)	Perm	NA	NA	Perm	NA	NA	Perm	NA	NA	Perm	NA	NA
Turn Type	Protected Phases	4	8	8	2	2	6	6	6	6	6	6
Permitted Phases	Actuated Green, G (s)	4.7	4.7	4.7	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4
Effective Green, g (s)	4.7	4.7	4.7	0.12	0.12	0.12	0.64	0.64	0.64	0.64	0.64	0.64
Actuated g/C Ratio	0.2	4.5	4.5	3.0	3.0	3.0	4.5	4.5	4.5	4.5	4.5	4.5
Clearance Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Vehicle Extension (s)	198	198	198	195	195	195	1092	1092	1092	1016	1016	1016
Lane Grp Cap (vph)	v/s Ratio Prot	0.01	0.11	0.31	0.43	0.43	0.27	0.27	0.27	0.27	0.27	0.27
v/s Ratio Prot	v/c Ratio	0.11	0.31	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42	0.42
v/c Ratio	Uniform Delay, d1	14.8	14.8	15.2	15.2	15.2	3.4	3.4	3.4	3.4	3.4	3.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.2	0.2	0.9	0.9	0.9	1.2	1.2	1.2	1.3	1.3	1.3
Delay (s)	15.1	15.1	15.1	16.1	16.1	16.1	4.6	4.6	4.6	4.6	4.6	4.6
Level of Service	B	B	B	B	B	B	A	A	A	A	A	A
Approach Delay (s)	15.1	15.1	15.1	16.1	16.1	16.1	4.6	4.6	4.6	4.6	4.6	4.6
Approach LOS	B	B	B	B	B	B	A	A	A	A	A	A
Intersection Summary	HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A	A	A	A	A	A	A	A	A
HCM 2000 Control Delay	HCM 2000 Volume to Capacity ratio	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
HCM 2000 Volume to Capacity ratio	Actuated Cycle Length (s)	38.1	Sum of lost time (s)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Actuated Cycle Length (s)	Intersection Capacity Utilization	46.7%	ICU Level of Service	A	A	A	A	A	A	A	A	A
Intersection Capacity Utilization	Analysis Period (min)	15	15	15	15	15	15	15	15	15	15	15
Analysis Period (min)	c Critical Lane Group											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	0	158	4	17	68	6	2	0	11	1	0	0
Traffic Volume (veh/h)	0	158	4	17	68	6	2	0	11	1	0	0
Future Volume (Veh/h)	0	158	4	17	68	6	2	0	11	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.74	0.74	0.74	0.25	0.25	0.25	0.62	0.62	0.62
Hourly flow rate (vph)	0	190	5	23	92	8	8	0	44	2	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)	107	107	107	107	107	107	107	107	107	107	107	107
pK, platoon unblocked												
VC, conflicting volume	100	195	195	334	338	192	378	337	96			
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	100	195	195	334	338	192	378	337	96			
IC, single (s)	4.1	4.1	4.1	7.1	6.5	6.2	7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)	2.2	2.2	2.2	3.5	4.0	3.3	3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100	98	98	99	100	95	100	100	100	100	100	100
p0 capacity (veh/h)	1493	1378	1378	611	573	849	542	574	960			
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1	SB 1
Volume Total	195	123	52	2	2	2	2	2	2	2	2	2
Volume Left	0	23	8	2	2	2	2	2	2	2	2	2
Volume Right	5	8	44	0	0	0	0	0	0	0	0	0
cSH	1493	1378	801	542	542	542	542	542	542	542	542	542
Volume to Capacity	0.00	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.4	1.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Control Delay (s)	0.0	1.5	9.8	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Lane LOS	A	A	A	B	B	B	B	B	B	B	B	B
Approach Delay (s)	0.0	1.5	9.8	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Approach LOS	A	A	A	B	B	B	B	B	B	B	B	B
Intersection Summary												
Average Delay				1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Intersection Capacity Utilization				28.8%	28.8%	28.8%	28.8%	28.8%	28.8%	28.8%	28.8%	28.8%
Analysis Period (min)				15	15	15	15	15	15	15	15	15

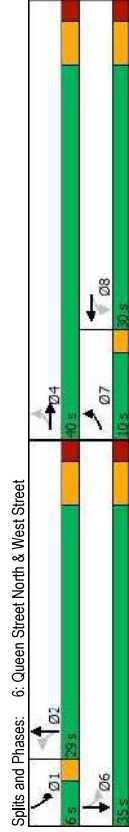
Timings  
6: Queen Street North & West Street

HCM Signalized Intersection Capacity Analysis  
6: Queen Street North & West Street

<Existing> Weekday AM Peak Hour  
08-15-2024

<Existing> Weekday AM Peak Hour  
08-15-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		4TB	4TB	4TB	4TB	4TB	4TB	4TB
Traffic Volume (vph)	180	48	25	48	27	211	37	189
Future Volume (vph)	180	48	25	48	27	211	37	189
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	2	2	2	1	6
Permitted Phases	4	8	8	2	2	2	1	6
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	15.0	15.0	15.0	23.0	23.0	4.0	29.0
Minimum Split (s)	9.5	28.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (s)	10.0	40.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (%)	13.3%	53.3%	40.0%	40.0%	38.7%	38.7%	8.0%	46.7%
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	Max	None	Max
Act Eff Green (s)	15.0	15.0	26.6	26.6	33.0	33.0	29.0	29.0
Actuated g/C Ratio	0.27	0.27	0.48	0.48	0.43	0.59	0.52	0.52
v/c Ratio	0.45	0.12	0.07	0.07	0.36	0.07	0.37	0.37
Control Delay	15.8	14.3	10.0	11.2	5.2	8.6	10.2	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	14.3	10.0	11.2	5.2	8.6	10.2	10.2
LOS	B	B	A	A	B	A	A	B
Approach Delay	15.8	14.3	11.1	9.6				
Approach LOS	B	B	B	B	A	A		
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 56								
Natural Cycle: 75								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.45								
Intersection Signal Delay: 12.2								
Intersection Capacity Utilization 57.4%								
Analysis Period (min) 15								



Movement	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		4TB	4TB	4TB	4TB	4TB	4TB	4TB
Traffic Volume (vph)	180	48	25	48	12	27	211	43
Future Volume (vph)	180	48	25	48	12	27	211	43
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	2	2	2	1	6
Permitted Phases	4	8	8	2	2	2	1	6
Actuated Green, G (s)	15.0	15.0	15.0	15.0	26.6	26.6	30.2	30.2
Effective Green, g (s)	15.0	15.0	15.0	15.0	26.6	26.6	30.2	30.2
Actuated g/C Ratio	0.26	0.26	0.26	0.26	0.47	0.47	0.53	0.53
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	677	732	480	844	17	17	539	939
v/s Ratio Prot	c0.11	0.03	0.03	0.03	0.03	0.03	0.04	c0.18
v/c Ratio	0.43	0.11	0.07	0.36	0.07	0.36	0.09	0.35
Uniform Delay, d1	17.5	16.0	16.0	8.5	9.8	9.8	6.6	7.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	0.1	0.3	1.2	1.2	0.1	1.0
Delay (s)	18.0	16.1	16.1	8.7	11.0	11.0	6.7	8.8
Level of Service	B	B	B	A	B	B	A	A
Approach Delay (s)	18.0	16.1	16.1	10.8	10.8	10.8	8.6	8.6
Approach LOS	B	B	B	B	B	B	A	A
Intersection Summary								
HCM 2000 Control Delay								
HCM 2000 Volume to Capacity ratio								
Actuated Cycle Length (s)								
Intersection Capacity Utilization								
Analysis Period (min)								
c Critical Lane Group								



HCM Unsignalized Intersection Capacity Analysis <Existing> Weekday AM Peak Hour 08-15-2024  
7: Metcalfe Street South & West Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	3	5	4	3	0	0	0	1	14	12
Traffic Volume (veh/h)	10	88	30	5	73	3	0	0	0	0	1	14
Future Volume (Veh/h)	10	88	30	5	73	3	0	0	0	0	1	14
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.98	0.98	0.98	0.61	0.61	0.61	0.25	0.25	0.25
Hourly flow rate (vph)	12	106	36	5	74	3	0	0	0	4	56	48
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)												
pX platoon unblocked												
VC conflicting volume	77			142			310	235	124	234	252	76
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	77			142			310	235	124	234	252	76
IC single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC 2 stage (s)												
IC queue free %	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	99	91	95
CM capacity (veh/h)	1522			1441			566	658	927	715	644	966
Direction Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	154	82	0	108								
Volume Left	12	5	0	4								
Volume Right	36	3	0	48								
cSH	1522	1441	1700	765								
Volume to Capacity	0.01	0.00	0.01	0.14								
Queue Length 95th (m)	0.2	0.1	0.0	3.9								
Control Delay (s)	0.6	0.5	0.0	10.5								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.6	0.5	0.0	10.5								
Approach LOS	A	B										
Intersection Summary												
Average Delay			3.7									
Intersection Capacity Utilization			19.6%									
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis  
1: Queen Street North & Union Street

HCM Unsignalized Intersection Capacity Analysis  
2: Queen Street North & Marshall Lane/Site Access 3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	3	14	12	11	34	16	334	15	21	431	3
Traffic Volume (veh/h)	5	3	14	12	11	34	16	334	15	21	431	3
Future Volume (Veh/h)	5	3	14	12	11	34	16	334	15	21	431	3
Sign Control	Stop	0%	Stop	0%	Stop	0%	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.84	0.84	0.84	0.82	0.82	0.82	0.91	0.91	0.91	0.88	0.88	0.88
Hourly flow rate (vph)	6	4	17	15	13	41	18	367	16	24	490	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None	None	None	None	None	None
Median storage (veh)								315				
Upstream signal (m)												
pX platoon unblocked												
VC conflicting volume	998	958	492	970	952	375	493					383
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	998	958	492	970	952	375	493					383
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	97	98	97	93	95	94	98					98
cM capacity (veh/h)	195	248	577	217	250	671	1071					1175
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	27	69	401	517								
Volume Left	6	15	18	24								
Volume Right	17	41	16	3								
cSH	354	379	1071	1175								
Volume to Capacity	0.08	0.18	0.02	0.02								
Queue Length 95th (m)	2.0	5.3	0.4	0.5								
Control Delay (s)	16.0	16.6	0.6	0.6								
Lane LOS	C	C	A	A								
Approach Delay (s)	16.0	16.6	0.6	0.6								
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			41.5%									A
Analysis Period (min)			15									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	9	0	10	0	0	1	8	355	0	0	444	13
Traffic Volume (veh/h)	9	0	10	0	0	1	8	355	0	0	444	13
Future Volume (Veh/h)	9	0	10	0	0	1	8	355	0	0	444	13
Sign Control	Stop	0%	Stop	0%	Stop	0%	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.25	0.25	0.25	0.56	0.56	0.56	0.92	0.92	0.92	0.88	0.88	0.88
Hourly flow rate (vph)	36	0	40	0	0	2	9	386	0	0	505	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None	None	None	None	None	None
Median storage (veh)								177				
Upstream signal (m)												
pX platoon unblocked												
VC conflicting volume	918	916	512	956	924	386	520					386
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	918	916	512	956	924	386	520					386
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	86	100	93	100	100	100	99					100
cM capacity (veh/h)	250	270	562	219	267	662	1046					1172
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	76	2	395	520								
Volume Left	36	0	9	0								
Volume Right	40	2	0	15								
cSH	353	662	1046	1172								
Volume to Capacity	0.22	0.00	0.01	0.00								
Queue Length 95th (m)	6.4	0.1	0.2	0.0								
Control Delay (s)	18.0	10.5	0.3	0.0								
Lane LOS	C	B	A	A								
Approach Delay (s)	18.0	10.5	0.3	0.0								
Approach LOS	C	B										
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			39.6%									A
Analysis Period (min)			15									

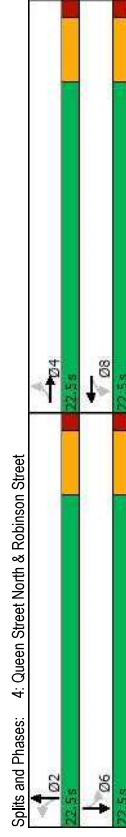


HCM Unsignalized Intersection Capacity Analysis <Existing> Weekday PM Peak Hour  
3: Queen Street North & Site Access 2 08-15-2024

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W					A
Traffic Volume (veh/h)	3	1	362	8	5	449
Future Volume (Veh/h)	3	1	362	8	5	449
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.50	0.50	0.86	0.86	0.88	0.88
Hourly flow rate (vph)	6	2	421	9	6	510
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			99			
pK, platoon unblocked	0.95	0.95			0.95	
VC, conflicting volume	948	426			430	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VC, unblocked vol	919	370			374	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	98	100			99	
cM capacity (veh/h)	285	643			1126	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	8	430	516			
Volume Left	6	0	6			
Volume Right	2	9	0			
cSH	331	1700	1126			
Volume to Capacity	0.02	0.25	0.01			
Queue Length 95th (m)	0.6	0.0	0.1			
Control Delay (s)	16.1	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	16.1	0.0	0.2			
Approach LOS	C		A			
Intersection Summary						
Average Delay			0.2			A
Intersection Capacity Utilization			37.6%			ICU Level of Service
Analysis Period (min)			15			

Timings <Existing> Weekday PM Peak Hour  
4: Queen Street North & Robinson Street 08-15-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	9	14	38	12	15	308	68	376
Future Volume (vph)	9	14	38	12	15	308	68	376
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases								
Permitted Phases	4	4	8	8	2	2	6	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)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
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	0.0	0.0
Total Lost Time (s)	4.5	4.5	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)	7.4	7.4	7.4	7.4	24.2	24.2	24.2	24.2
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.64	0.64	0.64	0.64
v/c Ratio	0.16	0.16	0.40	0.38	6.0	6.0	7.7	7.7
Control Delay	8.3	10.3	10.3	10.3	6.3	6.3	7.7	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0
Total Delay	8.3	10.3	10.3	10.3	6.3	6.3	7.7	7.7
LOS	A	A	B	B	A	A	A	A
Approach Delay	8.3	10.3	10.3	10.3	6.3	6.3	7.7	7.7
Approach LOS	A	A	B	B	A	A	A	A
Intersection Summary								
Cycle Length: 45								
Actuated Cycle Length: 37.8								
Natural Cycle: 35								
Control Type: Semi Act-Uncoordinated								
Maximum v/c Ratio: 0.49								
Intersection Signal Delay: 7.5								
Intersection Capacity Utilization 66.6%								
Analysis Period (min) 15								



HCM Signalized Intersection Capacity Analysis  
 4: Queen Street North & Robinson Street

HCM Unsignalized Intersection Capacity Analysis  
 5: Metcalfe Street South/Site Access 1 & Robinson Street

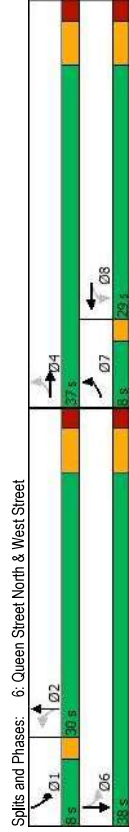
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	9	14	22	38	12	53	15	308	62	68	376	8
Traffic Volume (veh/h)	9	14	22	38	12	53	15	308	62	68	376	8
Future Volume (veh/h)	9	14	22	38	12	53	15	308	62	68	376	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Flt Protected	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Satd. Flow (prot)	1722	1722	1702	1702	1702	1702	1702	1702	1702	1702	1702	1702
Flt Permitted	0.92	0.92	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Satd. Flow (perm)	1607	1607	1482	1482	1482	1482	1482	1482	1482	1482	1482	1482
Peak-hour factor, PHF	0.82	0.82	0.82	0.75	0.75	0.75	0.89	0.89	0.89	0.87	0.87	0.87
Adj. Flow (vph)	11	17	27	51	16	71	17	346	70	78	432	9
RTOR Reduction (vph)	0	23	0	0	59	0	0	10	0	0	1	0
Lane Group Flow (vph)	0	32	0	0	79	0	0	423	0	0	518	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4	4	8	8	8	8	2	2	2	6	6	6
Permitted Phases	4	4	8	8	8	8	2	2	2	6	6	6
Actuated Green, G (s)	6.3	6.3	6.3	6.3	6.3	6.3	23.3	23.3	23.3	23.3	23.3	23.3
Effective Green, g (s)	6.3	6.3	6.3	6.3	6.3	6.3	23.3	23.3	23.3	23.3	23.3	23.3
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16	0.16	0.60	0.60	0.60	0.60	0.60	0.60
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	262	262	241	241	241	241	1075	1075	1075	1000	1000	1000
v/s Ratio Prot	0.02	0.02	c0.05	c0.05	c0.05	c0.05	0.24	0.24	0.24	c0.31	c0.31	c0.31
v/c Ratio	0.12	0.12	0.33	0.33	0.33	0.33	0.39	0.39	0.39	0.52	0.52	0.52
Uniform Delay, d1	13.8	13.8	14.3	14.3	14.3	14.3	4.0	4.0	4.0	4.4	4.4	4.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.2	0.8	0.8	0.8	0.8	1.1	1.1	1.1	1.9	1.9	1.9
Delay (s)	14.0	14.0	15.1	15.1	15.1	15.1	5.1	5.1	5.1	6.3	6.3	6.3
Level of Service	B	B	B	B	B	B	A	A	A	A	A	A
Approach Delay (s)	14.0	14.0	15.1	15.1	15.1	15.1	5.1	5.1	5.1	6.3	6.3	6.3
Approach LOS	B	B	B	B	B	B	A	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	7.3											
HCM 2000 Volume to Capacity ratio	0.48											
Actuated Cycle Length (s)	38.6											
Intersection Capacity Utilization	66.6%											
Analysis Period (min)	15											
c Critical Lane Group												

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	0	141	5	24	102	3	1	0	12	1	0	0
Traffic Volume (veh/h)	0	141	5	24	102	3	1	0	12	1	0	0
Future Volume (veh/h)	0	141	5	24	102	3	1	0	12	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.87	0.87	0.87	0.89	0.89	0.89	0.50	0.50	0.50	0.35	0.35	0.35
Hourly flow rate (vph)	0	162	6	27	115	3	2	0	24	3	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)	107											
pX platoon unblocked												
VC, conflicting volume	118			168			336	337	165	360	338	116
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	118			168			336	337	165	360	338	116
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	97	99	100	100
pM capacity (veh/h)	1470			1410			609	573	879	571	572	936
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	168	145	26	3								
Volume Left	0	27	2	3								
Volume Right	6	3	24	0								
cSH	1470	1410	850	571								
Volume to Capacity	0.00	0.02	0.03	0.01								
Queue Length 95th (m)	0.0	0.5	0.8	0.1								
Control Delay (s)	0.0	1.5	9.4	11.3								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.0	1.5	9.4	11.3								
Approach LOS	A	A	B	B								
Intersection Summary												
Average Delay	1.5											
Intersection Capacity Utilization	27.9%											
Analysis Period (min)	15											



Timings  
6: Queen Street North & West Street <Existing> Weekday PM Peak Hour 08-15-2024

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	125	55	35	49	220	40	257	139
Traffic Volume (vph)	125	55	35	90	49	220	40	257
Future Volume (vph)	125	55	35	90	49	220	40	257
Turn Type	pm-pt	4	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	2	2	1	6	
Permitted Phases	4	8	8	2	2	1	6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	3.5	20.0	20.0	20.0	20.0	5.0	20.0	
Minimum Split (s)	8.0	37.0	29.0	30.0	30.0	8.0	38.0	
Total Split (s)	8.0	37.0	29.0	30.0	30.0	8.0	38.0	
Total Split (%)	10.7%	49.3%	38.7%	38.7%	40.0%	10.7%	50.7%	
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	2.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	2.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	Max	Max	None	Max	
Act Effct Green (s)	20.0	20.0	27.2	27.2	36.0	32.0	32.0	
Actuated g/C Ratio	0.31	0.31	0.42	0.42	0.56	0.56	0.50	
v/c Ratio	0.34	0.21	0.14	0.40	0.07	0.48		
Control Delay	15.1	12.8	14.2	15.2	6.7	11.5		
Queue Delay	0.0	0.0	0.0	0.0	0.0	4.8		
Total Delay	15.1	12.8	14.2	15.2	6.7	16.4		
LOS	B	B	B	B	B	A	B	
Approach Delay	15.1	12.8	15.0	15.0	15.5			
Approach LOS	B	B	B	B	B			
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 64								
Natural Cycle: 75								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.48								
Intersection Signal Delay: 14.9								
Intersection Capacity Utilization 89.1%								
Analysis Period (min) 15								



HCM Signalized Intersection Capacity Analysis  
6: Queen Street North & West Street <Existing> Weekday PM Peak Hour 08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		LT	LT		LT	LT		LT	LT		LT	LT
Traffic Volume (vph)	125	35	46	35	90	40	49	220	47	40	257	139
Future Volume (vph)	125	55	46	35	90	40	49	220	47	40	257	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	6.0	6.0	6.0		2.0	6.0	
Lane Util. Factor	0.95			0.95	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	0.97			0.96	0.99	1.00	0.97	1.00		0.95	0.95	
Flt Protected	0.97			0.99	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3339			3374	3374	1770	1814	1770		1770	1764	
Flt Permitted	0.72			0.84	0.84	0.51	0.51	1.00		0.49	1.00	
Satd. Flow (perm)	2476			2862	2862	950	1814	918		1764		
Peak-hour factor, PHF	0.82	0.82	0.82	0.86	0.86	0.86	0.85	0.85	0.85	0.91	0.91	0.91
Adj. Flow (vph)	152	67	56	41	105	47	58	259	55	44	282	153
RTOR Reduction (vph)	0	35	0	0	32	0	0	9	0	0	22	0
Lane Group Flow (vph)	0	240	0	0	161	0	58	305	0	44	413	0
Turn Type	pm+pt	NA	NA	Perm	NA	NA	Perm	NA	NA	pm+pt	NA	NA
Protected Phases	7	4			8			2		1		6
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.0			20.0			27.2	27.2		32.8		32.8
Effective Green, g (s)	20.0			20.0			27.2	27.2		32.8		32.8
Actuated g/C Ratio	0.31			0.31			0.42	0.42		0.51		0.51
Clearance Time (s)	6.0			6.0			6.0	6.0		2.0		6.0
Vehicle Extension (s)	3.0			3.0			3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	764			883			398	761		512		892
v/s Ratio Prot	c0.10			0.06			0.06	0.17		0.00		c0.23
v/c Ratio Perm	0.31			0.18			0.15	0.40		0.09		0.46
Uniform Delay, d1	17.1			16.4			11.6	13.1		8.2		10.3
Progression Factor	1.00			1.00			1.00	1.00		1.00		1.00
Incremental Delay, d2	0.2			0.1			0.8	1.6		0.1		1.7
Delay (s)	17.4			16.5			12.4	14.7		8.3		12.0
Level of Service	B			B			B	B		A		B
Approach Delay (s)	17.4			16.5			14.3	14.3		11.7		
Approach LOS	B			B			B	B		B		
Intersection Summary												
HCM 2000 Control Delay			14.3				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.44									
Actuated Cycle Length (s)			64.8				Sum of lost time (s)				16.0	
Intersection Capacity Utilization			89.1%				ICU Level of Service				E	
Analysis Period (min)			15									
Critical Lane Group												

## HCM Unsignalized Intersection Capacity Analysis

### 7: Metcalfe Street South & West Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔			↔↔	↔		↔			↔	
Traffic Volume (veh/h)	8	122	12	12	146	4	1	1	3	3	8	18
Future Volume (Veh/h)	8	122	12	12	146	4	1	1	3	3	8	18
Sign Control	Free	Free			Free			Stop			Stop	
Grade	0%	0%			0%			0%			0%	
Peak Hour Factor	0.82	0.82	0.82	0.80	0.80	0.80	0.81	0.91	0.91	0.75	0.75	0.75
Hourly flow rate (vph)	10	149	15	15	182	5	1	1	3	4	11	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	187			164			420	394	156	394	398	184
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCn, unblocked vol	187			164			420	394	156	394	398	184
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	100	99	98	97
cM capacity (veh/h)	1387			1414			513	533	889	555	530	858
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	174	202	5	39								
Volume Left	10	15	1	4								
Volume Right	15	5	3	24								
cSH	1387	1414	694	697								
Volume to Capacity	0.01	0.01	0.01	0.06								
Queue Length 95th (m)	0.2	0.3	0.2	1.4								
Control Delay (s)	0.5	0.6	10.2	10.5								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.5	0.6	10.2	10.5								
Approach LOS			B	B								
Intersection Summary												
Average Delay	1.6			ICU Level of Service			A					
Intersection Capacity Utilization	21.8%											
Analysis Period (min)	15											



HCM Unsignalized Intersection Capacity Analysis:Background 2026> Weekday AM Peak Hour  
1: Queen Street North & Union Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	15	10	11	7	21	4	283	41	25	336	15
Future Volume (Veh/h)	1	15	10	11	7	21	4	283	41	25	336	15
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.86	0.86	0.86	0.59	0.59	0.59	0.88	0.88	0.88	0.91	0.91	0.81
Hourly flow rate (vph)	1	17	12	19	12	36	5	322	47	27	369	16
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				None
Median storage (veh)												
Upstream signal (m)								315				
pX platoon unblocked												
VC conflicting volume	828	810	377	807	794	346	385					369
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	828	810	377	807	794	346	385					369
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	100	94	98	93	96	95	100					98
cM capacity (veh/h)	262	305	670	276	312	697	1173					1190
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 1							
Volume Total	30	67	374	412								
Volume Left	1	19	5	27								
Volume Right	12	36	47	16								
cSH	388	422	1173	1190								
Volume to Capacity	0.08	0.16	0.00	0.02								
Queue Length 95th (m)	2.0	4.5	0.1	0.6								
Control Delay (s)	15.1	15.1	0.2	0.8								
Lane LOS	C	C	A	A								
Approach Delay (s)	15.1	15.1	0.2	0.8								
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			47.8%									A
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis:Background 2026> Weekday AM Peak Hour  
2: Queen Street North & Marshall Lane/Site Access 3

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	0	30	1	1	0	18	318	1	2	345	10
Future Volume (Veh/h)	9	0	30	1	1	0	18	318	1	2	345	10
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.25	0.25	0.25	0.40	0.40	0.40	0.84	0.84	0.84	0.87	0.87	0.87
Hourly flow rate (vph)	36	0	120	2	2	0	21	379	1	2	397	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				None
Median storage (veh)												
Upstream signal (m)								177				
pX platoon unblocked												
VC conflicting volume	829	828	402	948	834	380	408					380
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	829	828	402	948	834	380	408					380
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	87	100	81	99	99	100	98					100
cM capacity (veh/h)	284	300	648	193	238	667	1151					1178
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 1							
Volume Total	156	4	401	410								
Volume Left	36	2	21	2								
Volume Right	120	0	1	11								
cSH	500	234	1151	1178								
Volume to Capacity	0.31	0.02	0.02	0.00								
Queue Length 95th (m)	10.6	0.4	0.4	0.0								
Control Delay (s)	15.4	20.6	0.6	0.1								
Lane LOS	C	C	A	A								
Approach Delay (s)	15.4	20.6	0.6	0.1								
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.8									
Intersection Capacity Utilization			39.5%									A
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis Background 2026 > Weekday AM Peak Hour  
 3: Queen Street North & Site Access 2

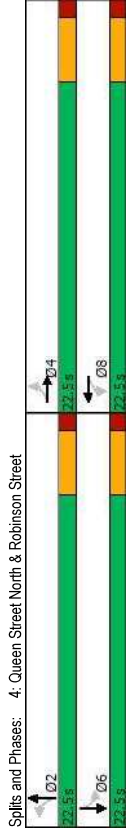
08-15-2024

Movement	WBL	WBR	NBT	NBR	SBT
Lane Configurations	W				A
Traffic Volume (veh/h)	0	5	332	4	6
Future Volume (Veh/h)	0	5	332	4	6
Sign Control	Stop		Free		Free
Grade	0%		0%		0%
Peak Hour Factor	0.75	0.75	0.82	0.82	0.88
Hourly flow rate (vph)	0	7	405	5	7
Pedestrians					420
Lane Width (m)					
Walking Speed (m/s)					
Percent Blockage					
Right turn flare (veh)					
Median type			None		None
Median storage (veh)					
Upstream signal (m)			99		
pK, platoon unblocked	1.00	1.00			1.00
VC, conflicting volume	842	408			410
VC1, stage 1 conf vol					
VC2, stage 2 conf vol					
VCu, unblocked vol	840	404			407
IC, single (s)	6.4	6.2			4.1
IC, 2 stage (s)					
IF (s)	3.5	3.3			2.2
p0 queue free %	100	99			99
cM capacity (veh/h)	333	644			1149
Direction, Lane #	WB 1	NB 1	SB 1		
Volume Total	7	410	427		
Volume Left	0	0	7		
Volume Right	7	5	0		
cSH	644	1700	1149		
Volume to Capacity	0.01	0.24	0.01		
Queue Length 95th (m)	0.3	0.0	0.1		
Control Delay (s)	10.6	0.0	0.2		
Lane LOS	B		A		
Approach Delay (s)	10.6	0.0	0.2		
Approach LOS	B		A		
Intersection Summary					
Average Delay			0.2		A
Intersection Capacity Utilization			34.3%		ICU Level of Service
Analysis Period (min)			15		

Timings  
 4: Queen Street North & Robinson Street

08-15-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	5	7	14	19	38	290	71
Future Volume (vph)	5	7	14	19	38	290	71
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases							
Permitted Phases	4	4	8	8	2	2	6
Detector Phase	4	4	8	8	2	2	6
Switch Phase							
Minimum Initial (s)	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
Total Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	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
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)							
Lead/Lag	4.5		4.5		4.5		4.5
Lead-Lag Optimize?							
Recall Mode	None	None	None	None	Max	Max	Max
Act Effct Green (s)	6.9	6.9	6.9	6.9	26.0	26.0	26.0
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.72	0.72	0.72
v/c Ratio	0.15	0.34	0.15	0.34	0.40	0.40	0.40
Control Delay	7.5	9.1	7.5	9.1	5.7	5.7	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.2	0.0
Total Delay	7.5	9.1	7.5	9.1	5.9	5.9	6.0
LOS	A	A	A	A	A	A	A
Approach Delay	7.5		9.1		5.9		6.0
Approach LOS	A		A		A		A
Intersection Summary							
Cycle Length: 45							
Actuated Cycle Length: 36.3							
Natural Cycle: 30							
Control Type: Semi Act-Uncoordinated							
Maximum v/c Ratio: 0.40							
Intersection Signal Delay: 6.4							
Intersection Capacity Utilization 48.8%							
Analysis Period (min) 15							





HCM Signalized Intersection Capacity Analysis <Background 2026> Weekday AM Peak Hour  
4: Queen Street North & Robinson Street

08-15-2024

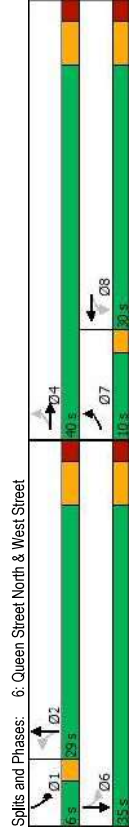
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	7	25	14	19	41	38	290	91	71	279	21
Future Volume (vph)	5	7	25	14	19	41	38	290	91	71	279	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5				4.5			4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.91			0.93				0.97			0.99	
Flt Protected	0.99			0.99				1.00			0.99	
Satd. Flow (prot)	1684			1708				1800			1831	
Flt Permitted	0.95			0.92				0.94			0.85	
Satd. Flow (perm)	1615			1589				1703			1576	
Peak-hour factor, PHF	0.73	0.73	0.73	0.60	0.60	0.60	0.84	0.84	0.84	0.83	0.83	0.83
Adj. Flow (vph)	7	10	34	23	32	68	45	345	108	86	336	25
RTOR Reduction (vph)	0	30	0	0	59	0	0	13	0	0	3	0
Lane Group Flow (vph)	0	21	0	0	64	0	0	485	0	0	444	0
Turn Type	Perm	NA	NA	Perm	NA	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4			8			2			6		6
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	4.8			4.8			24.2			24.2		24.2
Effective Green, g (s)	4.8			4.8			24.2			24.2		24.2
Actuated g/C Ratio	0.13			0.13			0.64			0.64		0.64
Clearance Time (s)	4.5			4.5			4.5			4.5		4.5
Vehicle Extension (s)	3.0			3.0			3.0			3.0		3.0
Lane Grp Cap (vph)	204			200			1084			1003		1003
v/s Ratio Prot	0.01			c0.04			c0.28			0.28		0.28
v/c Ratio	0.10			0.32			0.45			0.44		0.44
Uniform Delay, d1	14.7			15.1			3.5			3.5		3.5
Progression Factor	1.00			1.00			1.00			1.00		1.00
Incremental Delay, d2	0.2			0.9			1.3			1.4		1.4
Delay (s)	14.9			16.0			4.8			4.9		4.9
Level of Service	B			B			A			A		A
Approach Delay (s)	14.9			16.0			4.8			4.9		4.9
Approach LOS	B			B			A			A		A
Intersection Summary												
HCM 2000 Control Delay	6.6			HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.43											
Actuated Cycle Length (s)	38.0			Sum of lost time (s)			9.0					
Intersection Capacity Utilization	48.8%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis<Background 2026> Weekday AM Peak Hour  
5: Metcalfe Street South/Site Access 1 & Robinson Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	164	4	18	71	6	2	0	11	1	0	0
Future Volume (Veh/h)	0	164	4	18	71	6	2	0	11	1	0	0
Sign Control		Free		Free				Stop			Stop	
Grade		0%		0%				0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.74	0.74	0.74	0.25	0.25	0.25	0.62	0.62	0.62
Hourly flow rate (vph)	0	198	5	24	96	8	8	0	44	2	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)		None										
Median type		None										
Median storage (veh)												
Upstream signal (m)		107										
pX, platoon unblocked												
VC, conflicting volume	104			203			348	352	200	382	351	100
VC1, stage 1 conf vol												
VC2, stage 2 conf vol	104			203			348	352	200	392	351	100
VCu, unblocked vol	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, single (s)												
IC, 2 stage (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
IF (s)												
p0 queue free %	100			98			99	100	95	100	100	100
pM capacity (veh/h)	1488			1369			598	562	840	530	563	956
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	203	128	52	2								
Volume Left	0	24	8	2								
Volume Right	5	8	44	0								
cSH	1488	1369	791	530								
Volume to Capacity	0.00	0.02	0.07	0.00								
Queue Length 95th (m)	0.0	0.4	1.7	0.1								
Control Delay (s)	0.0	1.6	9.9	11.8								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.0	1.6	9.9	11.8								
Approach LOS	A	A	B									
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			27.3%				ICU Level of Service			A		
Analysis Period (min)			15									

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	187	50	26	50	28	220	38	197
Traffic Volume (vph)	187	50	26	50	28	220	38	197
Future Volume (vph)	187	50	26	50	28	220	38	197
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	2	2	2	1	6
Permitted Phases	4	4	8	8	2	2	1	6
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	15.0	15.0	15.0	23.0	23.0	4.0	29.0
Minimum Split (s)	9.5	28.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (s)	10.0	40.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (%)	13.3%	53.3%	40.0%	40.0%	38.7%	38.7%	8.0%	46.7%
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	Max	Max	Max	None	Max
Act Eff Green (s)	15.1	15.1	25.4	25.4	33.0	33.0	29.0	29.0
Actuated g/C Ratio	0.27	0.27	0.45	0.45	0.59	0.59	0.52	0.52
v/c Ratio	0.47	0.13	0.07	0.39	0.08	0.38	0.08	0.38
Control Delay	16.0	14.3	10.7	12.4	5.3	8.9	1.8	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
Total Delay	16.0	14.3	10.7	12.4	5.3	10.7	1.8	10.7
LOS	B	B	B	B	A	A	B	B
Approach Delay	16.0	14.3	12.2	10.0				
Approach LOS	B	B	B	B	B	B	B	B
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 56.1								
Natural Cycle: 75								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.47								
Intersection Signal Delay: 12.8								
Intersection Capacity Utilization 63.9%								
Analysis Period (min) 15								



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	187	50	72	26	50	12	28	220	45	38	197	82
Traffic Volume (vph)	187	50	72	26	50	12	28	220	45	38	197	82
Future Volume (vph)	187	50	72	26	50	12	28	220	45	38	197	82
Initial Flow (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Flow (vph)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Frt	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Flt Protected	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Satd. Flow (prot)	3315	3315	3315	3315	3315	3315	3315	3315	3315	3315	3315	3315
Flt Permitted	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Satd. Flow (perm)	2581	2581	2581	2581	2581	2581	2581	2581	2581	2581	2581	2581
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	212	57	82	28	54	13	34	268	55	49	253	105
RTOR Reduction (vph)	0	51	0	0	10	0	0	8	0	0	15	0
Lane Group Flow (vph)	0	301	0	0	85	0	34	315	0	49	343	0
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	Perm	NA	pm-pt	NA	NA	NA
Protected Phases	7	4	8	2	2	2	1	6				
Permitted Phases	4	4	8	8	2	2	1	6				
Actuated Green, G (s)	15.1	15.1	25.4	25.4	33.0	33.0	29.0	29.0				
Effective Green, g (s)	15.1	15.1	25.4	25.4	33.0	33.0	29.0	29.0				
Actuated g/C Ratio	0.27	0.27	0.45	0.45	0.59	0.59	0.52	0.52				
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	684	737	454	810	810	810	528	932				
v/s Ratio Prot	c0.12	0.03	0.03	0.03	0.03	0.03	0.04	c0.19				
v/c Ratio	0.44	0.12	0.07	0.39	0.09	0.37	0.09	0.37				
Uniform Delay, d1	17.4	15.8	10.6	10.6	6.7	8.0	6.7	8.0				
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	0.5	0.1	0.3	0.3	0.1	0.1	0.1	0.1				
Delay (s)	17.8	15.9	10.9	10.9	6.8	9.1	6.8	9.1				
Level of Service	B	B	A	A	B	A	B	A				
Approach Delay (s)	17.8	15.9	11.7	11.7	6.8	8.8	6.8	8.8				
Approach LOS	B	B	B	B	B	A	B	A				
Intersection Summary												
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B									
HCM 2000 Volume to Capacity ratio	0.43											
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	16.0									
Intersection Capacity Utilization	63.9%	ICU Level of Service	B									
Analysis Period (min)	15											
c Critical Lane Group												



HCM Unsignalized Intersection Capacity Analysis Background 2026 > Weekday AM Peak Hour  
 7: Metcalfe Street South & West Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	3	5	4	3	0	0	0	1	1	4
Traffic Volume (veh/h)	10	92	31	5	76	3	0	0	0	1	15	12
Future Volume (Veh/h)	10	92	31	5	76	3	0	0	0	1	15	12
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.98	0.98	0.98	0.61	0.61	0.61	0.25	0.25	0.25
Hourly flow rate (vph)	12	111	37	5	78	3	0	0	0	4	60	48
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)												
pX platoon unblocked												
VC conflicting volume	81			148			321	244	130	243	262	80
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	81			148			321	244	130	243	262	80
IC single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC 2 stage (s)												
IC queue free %	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	99	91	95
CM capacity (veh/h)	1517			1434			553	650	920	705	636	981
Direction Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	160	86	0	112								
Volume Left	12	5	0	4								
Volume Right	37	3	0	48								
cSH	1517	1434	1700	752								
Volume to Capacity	0.01	0.00	0.01	0.15								
Queue Length 95th (m)	0.2	0.1	0.0	4.2								
Control Delay (s)	0.6	0.5	0.0	10.6								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.6	0.5	0.0	10.6								
Approach LOS	A	B										
Intersection Summary												
Average Delay			3.7									
Intersection Capacity Utilization			18.9%									
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis:Background 2031> Weekday AM Peak Hour  
1: Queen Street North & Union Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	16	11	13	8	23	5	312	45	28	371	16
Future Volume (Veh/h)	1	16	11	13	8	23	5	312	45	28	371	16
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.86	0.86	0.86	0.59	0.59	0.59	0.88	0.88	0.88	0.91	0.91	0.81
Hourly flow rate (vph)	1	19	13	22	14	39	6	355	51	31	408	18
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)								315				
pX platoon unblocked												
VC conflicting volume	918	897	417	894	880	380	426					406
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	918	897	417	894	880	380	426					406
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	100	93	98	91	95	94	99					97
cM capacity (veh/h)	223	270	636	237	276	667	1133					1153
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	33	75	412	457								
Volume Left	1	22	6	31								
Volume Right	13	39	51	18								
cSH	347	371	1133	1153								
Volume to Capacity	0.10	0.20	0.01	0.03								
Queue Length 95th (m)	2.5	6.0	0.1	0.7								
Control Delay (s)	16.5	17.1	0.2	0.8								
Lane LOS	C	C	A	A								
Approach Delay (s)	16.5	17.1	0.2	0.8								
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			52.4%									A
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis:Background 2031> Weekday AM Peak Hour  
2: Queen Street North & Marshall Lane/Site Access 3

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	0	33	1	1	0	20	351	1	2	381	11
Future Volume (Veh/h)	10	0	33	1	1	0	20	351	1	2	381	11
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.25	0.25	0.25	0.40	0.40	0.40	0.84	0.84	0.84	0.87	0.87	0.87
Hourly flow rate (vph)	40	0	132	2	2	0	24	418	1	2	438	13
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)								177				
pX platoon unblocked												
VC conflicting volume	916	916	444	1047	922	418	451					419
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	916	916	444	1047	922	418	451					419
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	84	100	78	99	99	100	98					100
cM capacity (veh/h)	247	266	614	159	264	635	1109					1140
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	172	4	443	453								
Volume Left	40	2	24	2								
Volume Right	132	0	1	13								
cSH	456	198	1109	1140								
Volume to Capacity	0.38	0.02	0.02	0.00								
Queue Length 95th (m)	13.9	0.5	0.5	0.0								
Control Delay (s)	17.6	23.5	0.7	0.1								
Lane LOS	C	C	A	A								
Approach Delay (s)	17.6	23.5	0.7	0.1								
Approach LOS	C	C										
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			42.8%									A
Analysis Period (min)			15									

3: Queen Street North & Site Access 2

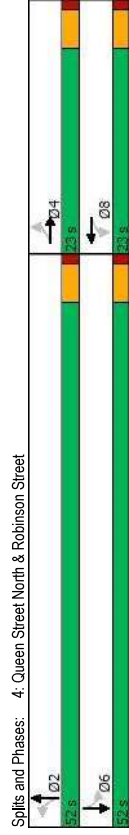
08-15-2024

4: Queen Street North & Robinson Street

08-15-2024

Movement	WBL	WBR	NBT	NBR	SBT
Lane Configurations	W				
Traffic Volume (veh/h)	0	5	366	4	6
Future Volume (Veh/h)	0	5	366	4	6
Sign Control	Stop		Free		Free
Grade	0%		0%		0%
Peak Hour Factor	0.75	0.75	0.82	0.82	0.88
Hourly flow rate (vph)	0	7	446	5	7
Pedestrians					
Lane Width (m)					
Walking Speed (m/s)					
Percent Blockage					
Right turn flare (veh)					
Median type					
Median storage (veh)					
Upstream signal (m)					
pK platoon unblocked	0.97	0.97			0.97
VC conflicting volume	928	448			451
VC1 stage 1 conf vol					
VC2 stage 2 conf vol					
VCu unblocked vol	908	412			415
IC single (s)	6.4	6.2			4.1
IC 2 stage (s)					
p0 queue free %	3.5	3.3			2.2
IF (s)					99
CM capacity (veh/h)	294	618			1106
Direction, Lane #	WB 1	NB 1	SB 1		
Volume Total	7	451	472		
Volume Left	0	0	7		
Volume Right	7	5	0		
cSH	618	1700	1106		
Volume to Capacity	0.01	0.27	0.01		
Queue Length 95th (m)	0.3	0.0	0.2		
Control Delay (s)	10.9	0.0	0.2		
Lane LOS	B		A		
Approach Delay (s)	10.9	0.0	0.2		
Approach LOS	B		A		
Intersection Summary					
Average Delay			0.2		A
Intersection Capacity Utilization			36.3%		ICU Level of Service
Analysis Period (min)			15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	6	8	15	21	43	320	78
Future Volume (vph)	6	8	15	21	43	320	78
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases							
Permitted Phases	4	4	8	8	2	2	6
Detector Phase	4	4	8	8	2	2	6
Switch Phase							
Minimum Initial (s)	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
Total Split (s)	23.0	23.0	23.0	23.0	52.0	52.0	52.0
Total Split (%)	30.7%	30.7%	30.7%	30.7%	69.3%	69.3%	69.3%
Yellow Time (s)	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
Lost Time Adjust (s)	0.0	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	4.5
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	None	None	None	None	Max	Max	Max
Act Effct Green (s)	8.3	8.3	8.3	8.3	53.1	53.1	53.1
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.79	0.79	0.79
v/c Ratio	0.25	0.25	0.25	0.25	0.41	0.41	0.41
Control Delay	15.6	20.7	20.7	20.7	4.4	4.7	4.7
Queue Delay	0.0	0.0	0.0	0.0	1.5	0.0	0.0
Total Delay	15.6	20.7	20.7	20.7	5.9	4.7	4.7
LOS	B	C	C	C	A	A	A
Approach Delay	15.6	20.7	20.7	20.7	5.9	4.7	4.7
Approach LOS	B	C	C	C	A	A	A
Intersection Summary							
Cycle Length: 75							
Actuated Cycle Length: 67.5							
Natural Cycle: 35							
Control Type: Semi Act-Uncoord							
Maximum v/c Ratio: 0.52							
Intersection Signal Delay: 7.4							
Intersection Capacity Utilization 52.3%							
Analysis Period (min) 15							





HCM Signalized Intersection Capacity Analysis <Background 2031> Weekday AM Peak Hour  
4: Queen Street North & Robinson Street

08-15-2024

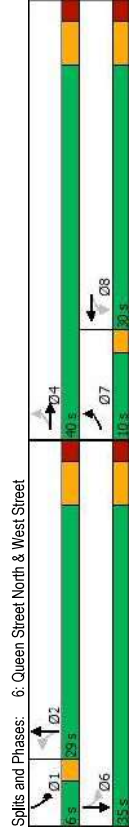
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	6	8	28	15	21	45	43	320	100	78	308	23
Traffic Volume (vph)	6	8	28	15	21	45	43	320	100	78	308	23
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.91	0.91	0.93	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1683	1683	1707	1707	1800	1800	1831	1831	1831	1831	1831	1831
Satd. Flow (prot)	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Flt Permitted	1582	1582	1599	1599	1682	1682	1682	1682	1682	1682	1682	1682
Satd. Flow (perm)	0.73	0.73	0.73	0.60	0.60	0.60	0.84	0.84	0.84	0.83	0.83	0.83
Peak-hour factor, PHF	8	11	38	25	35	75	51	381	119	94	371	28
Adj. Flow (vph)	0	34	0	0	67	0	0	9	0	0	2	0
RTOR Reduction (vph)	0	23	0	0	68	0	0	542	0	0	491	0
Lane Group Flow (vph)	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Turn Type	Protected Phases	4	8	8	8	8	2	2	2	6	6	6
Permitted Phases	4	8	8	8	8	8	2	2	2	6	6	6
Actuated Green, G (s)	7.2	7.2	7.2	7.2	7.2	7.2	52.2	52.2	52.2	52.2	52.2	52.2
Effective Green, g (s)	7.2	7.2	7.2	7.2	7.2	7.2	52.2	52.2	52.2	52.2	52.2	52.2
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.11	0.11	0.76	0.76	0.76	0.76	0.76	0.76
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	166	166	168	168	168	168	1283	1283	1283	1283	1283	1283
v/s Ratio Prot	0.01	0.01	0.04	c0.04	c0.04	c0.04	0.32	0.32	0.32	0.32	0.32	0.32
v/s Ratio Perm	0.14	0.14	0.40	0.40	0.40	0.40	0.42	0.42	0.42	0.42	0.42	0.42
Uniform Delay, d1	27.8	27.8	28.6	28.6	28.6	28.6	2.8	2.8	2.8	2.8	2.8	2.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.4	1.6	1.6	1.6	1.6	1.0	1.0	1.0	1.1	1.1	1.1
Delay (s)	28.2	28.2	30.2	30.2	30.2	30.2	3.9	3.9	3.9	3.9	3.9	3.9
Level of Service	C	C	C	C	C	C	A	A	A	A	A	A
Approach Delay (s)	28.2	28.2	30.2	30.2	30.2	30.2	3.9	3.9	3.9	3.9	3.9	3.9
Approach LOS	C	C	C	C	C	C	A	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	7.9 HCM 2000 Level of Service											
HCM 2000 Volume to Capacity ratio	0.42											
Actuated Cycle Length (s)	68.4 Sum of lost time (s)											
Intersection Capacity Utilization	52.3% ICU Level of Service											
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis<Background 2031> Weekday AM Peak Hour  
5: Metcalfe Street South/Site Access 1 & Robinson Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	181	5	20	78	6	2	0	13	1	0	0
Future Volume (Veh/h)	0	181	5	20	78	6	2	0	13	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.74	0.74	0.74	0.25	0.25	0.25	0.62	0.62	0.62
Hourly flow rate (vph)	0	218	6	27	105	8	8	0	52	2	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (m)	107											
pX, platoon unblocked												
vC, conflicting volume	113			224			384	388	221	436	387	109
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCU, unblocked vol	113			224			384	388	221	436	387	109
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			99	100	94	100	100	100
cM capacity (veh/h)	1476			1345			565	536	819	489	536	945
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	224	140	60	2								
Volume Left	0	27	8	2								
Volume Right	6	8	52	0								
cSH	1476	1345	772	489								
Volume to Capacity	0.00	0.02	0.08	0.00								
Queue Length 95th (m)	0.0	0.5	2.0	0.1								
Control Delay (s)	0.0	1.6	10.1	12.4								
Lane LOS	A	B	B	B								
Approach Delay (s)	0.0	1.6	10.1	12.4								
Approach LOS	B	B	B	B								
Intersection Summary												
Average Delay			2.0									
Intersection Capacity Utilization			28.7%									A
Analysis Period (min)			15									

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	207	55	29	55	31	242	43	217
Traffic Volume (vph)	207	55	29	55	31	242	43	217
Future Volume (vph)	207	55	29	55	31	242	43	217
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	8	2	2	1	6
Permitted Phases	4	4	8	8	2	2	1	6
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	15.0	15.0	15.0	23.0	23.0	4.0	29.0
Minimum Split (s)	9.5	28.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (s)	10.0	40.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (%)	13.3%	53.3%	40.0%	40.0%	38.7%	38.7%	8.0%	46.7%
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	Max	None	Max
Act Eff Green (s)	15.4	15.4	25.4	25.4	33.0	33.0	29.0	29.0
Actuated g/C Ratio	0.27	0.27	0.45	0.45	0.59	0.59	0.51	0.51
v/c Ratio	0.52	0.14	0.09	0.43	0.10	0.42	0.10	0.42
Control Delay	17.0	14.2	11.1	13.1	5.6	9.6	2.3	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Total Delay	17.0	14.2	11.1	13.1	5.6	11.9	2.3	11.9
LOS	B	B	B	B	B	A	A	B
Approach Delay	17.0	14.2	12.9	11.1				
Approach LOS	B	B	B	B	B	B	B	B
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 56.4								
Natural Cycle: 75								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.52								
Intersection Signal Delay: 13.6								
Intersection Capacity Utilization 70.7%								
Analysis Period (min) 15								



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	207	55	79	29	55	14	31	242	49	43	217	91
Traffic Volume (vph)	207	55	79	29	55	14	31	242	49	43	217	91
Future Volume (vph)	207	55	79	29	55	14	31	242	49	43	217	91
Initial Flow (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Frt	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Flt Protected	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Satd. Flow (prot)	3316	3316	3316	3316	3316	3316	3316	3316	3316	3316	3316	3316
Flt Permitted	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Satd. Flow (perm)	2562	2562	2562	2562	2562	2562	2562	2562	2562	2562	2562	2562
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	235	62	90	32	60	15	38	295	60	55	278	117
RTOR Reduction (vph)	0	50	0	0	11	0	0	8	0	0	16	0
Lane Group Flow (vph)	0	338	0	0	96	0	38	347	0	55	379	0
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	Perm	NA	pm-pt	NA	NA	NA
Protected Phases	7	4	8	8	2	2	1	6				
Permitted Phases	4	4	8	8	2	2	1	6				
Actuated Green, G (s)	15.4	15.4	25.4	25.4	33.0	33.0	29.0	29.0				
Effective Green, g (s)	15.4	15.4	25.4	25.4	33.0	33.0	29.0	29.0				
Actuated g/C Ratio	0.27	0.27	0.45	0.45	0.59	0.59	0.51	0.51				
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	689	733	733	733	733	733	733	733				
v/s Ratio Prot	c0.13	0.04	0.04	0.04	0.04	0.04	0.04	0.04				
v/c Ratio	0.49	0.13	0.13	0.09	0.43	0.11	0.41	0.41				
Uniform Delay, d1	17.6	15.8	15.8	9.2	10.9	6.9	8.3	8.3				
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	0.6	0.1	0.1	0.4	1.7	0.1	1.3	1.3				
Delay (s)	18.1	15.9	15.9	9.6	12.6	7.0	9.7	9.7				
Level of Service	B	B	B	A	B	A	A	A				
Approach Delay (s)	18.1	15.9	15.9	12.3	12.3	9.4	9.4	9.4				
Approach LOS	B	B	B	B	B	A	A	A				
Intersection Summary												
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B									
HCM 2000 Volume to Capacity ratio	0.48											
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	16.0									
Intersection Capacity Utilization	70.7%	ICU Level of Service	C									
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis Background 2031 > Weekday AM Peak Hour  
 7: Metcalfe Street South & West Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (veh/h)	11	101	34	6	84	3	0	0	0	1	16	14
Future Volume (Veh/h)	11	101	34	6	84	3	0	0	0	1	16	14
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.98	0.98	0.98	0.61	0.61	0.61	0.25	0.25	0.25
Hourly flow rate (vph)	13	122	41	6	86	3	0	0	0	4	64	56
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)		105										
pX platoon unblocked												
VC conflicting volume	89			163			356	270	142	268	288	88
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	89			163			356	270	142	268	288	88
IC single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC 2 stage (s)												
IC queue free %	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	99	90	94
CM capacity (veh/h)	1506			1416			515	629	905	678	613	971
Direction Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	176	95	0	124								
Volume Left	13	6	0	4								
Volume Right	41	3	0	56								
cSH	1506	1416	1700	739								
Volume to Capacity	0.01	0.00	0.01	0.17								
Queue Length 95th (m)	0.2	0.1	0.0	4.8								
Control Delay (s)	0.6	0.5	0.0	10.9								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.6	0.5	0.0	10.9								
Approach LOS	A	B										
Intersection Summary												
Average Delay			3.8									
Intersection Capacity Utilization			20.7%								A	
Analysis Period (min)			15									



HCM Unsignalized Intersection Capacity Analysis:Background 2036> Weekday AM Peak Hour  
1: Queen Street North & Union Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	16	11	14	9	25	5	345	49	30	410	18
Future Volume (Veh/h)	1	16	11	14	9	25	5	345	49	30	410	18
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.86	0.86	0.86	0.59	0.59	0.59	0.88	0.88	0.88	0.91	0.91	0.91
Hourly flow rate (vph)	1	19	13	24	15	42	6	392	56	33	451	20
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None	None				
Median storage (veh)												
Upstream signal (m)								315				
pX platoon unblocked												
VC conflicting volume	1008	987	461	982	969	420	471					448
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	1008	987	461	982	969	420	471					448
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	99	92	98	88	94	93	99					97
cM capacity (veh/h)	190	239	600	204	245	633	1091					1112
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	33	81	454	504								
Volume Left	1	24	6	33								
Volume Right	13	42	56	20								
cSH	310	330	1091	1112								
Volume to Capacity	0.11	0.25	0.01	0.03								
Queue Length 95th (m)	2.8	7.6	0.1	0.7								
Control Delay (s)	18.0	19.4	0.2	0.9								
Lane LOS	C	C	A	A								
Approach Delay (s)	18.0	19.4	0.2	0.9								
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			56.9%									
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis:Background 2036> Weekday AM Peak Hour  
2: Queen Street North & Marshall Lane/Site Access 3

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	0	33	1	1	0	22	388	1	2	421	13
Future Volume (Veh/h)	10	0	33	1	1	0	22	388	1	2	421	13
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.25	0.25	0.25	0.40	0.40	0.40	0.84	0.84	0.84	0.87	0.87	0.87
Hourly flow rate (vph)	40	0	132	2	2	0	26	462	1	2	484	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None	None				
Median storage (veh)												
Upstream signal (m)								177				
pX platoon unblocked												
VC conflicting volume	1011	1010	492	1142	1018	462	499					463
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	1011	1010	492	1142	1018	462	499					463
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	81	100	77	99	99	100	98					100
cM capacity (veh/h)	212	233	577	134	231	599	1065					1098
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	172	4	489	501								
Volume Left	40	2	26	2								
Volume Right	132	0	1	15								
cSH	412	170	1065	1098								
Volume to Capacity	0.42	0.02	0.02	0.00								
Queue Length 95th (m)	16.1	0.6	0.6	0.0								
Control Delay (s)	19.8	26.7	0.7	0.1								
Lane LOS	C	D	A	A								
Approach Delay (s)	19.8	26.7	0.7	0.1								
Approach LOS	C	D										
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			46.4%									
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis Background 2036 > Weekday AM Peak Hour  
 3: Queen Street North & Site Access 2

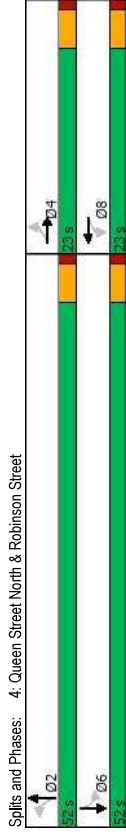
08-15-2024

Movement	WBL	WBR	NBT	NBR	SBT
Lane Configurations	W				
Traffic Volume (veh/h)	0	5	405	4	6
Future Volume (Veh/h)	0	5	405	4	6
Sign Control	Stop		Free		Free
Grade	0%		0%		0%
Peak Hour Factor	0.75	0.75	0.82	0.82	0.88
Hourly flow rate (vph)	0	7	494	5	7
Pedestrians					
Lane Width (m)					
Walking Speed (m/s)					
Percent Blockage					
Right turn flare (veh)					
Median type			None		None
Median storage (veh)					
Upstream signal (m)			99		
pK, platoon unblocked	0.94	0.94			0.94
VC, conflicting volume	1022	496			499
VC1, stage 1 conf vol					
VC2, stage 2 conf vol					
VC, unblocked vol	994	436			439
IC, single (s)	6.4	6.2			4.1
IC, 2 stage (s)					
IF (s)	3.5	3.3			2.2
p0 queue free %	100	99			99
cM capacity (veh/h)	255	585			1057
Direction, Lane #	WB 1	NB 1	SB 1		
Volume Total	7	499	519		
Volume Left	0	0	7		
Volume Right	7	5	0		
cSH	585	1700	1057		
Volume to Capacity	0.01	0.29	0.01		
Queue Length 95th (m)	0.3	0.0	0.2		
Control Delay (s)	11.2	0.0	0.2		
Lane LOS	B		A		
Approach Delay (s)	11.2	0.0	0.2		
Approach LOS	B				
Intersection Summary					
Average Delay			0.2		
Intersection Capacity Utilization			38.5%		A
Analysis Period (min)			15		

Timings  
 4: Queen Street North & Robinson Street

08-15-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	6	8	16	23	47	354	86
Future Volume (vph)	6	8	16	23	47	354	86
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases							
Permitted Phases	4	4	8	8	2	2	6
Detector Phase	4	4	8	8	2	2	6
Switch Phase							
Minimum Initial (s)	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
Total Split (s)	23.0	23.0	23.0	23.0	52.0	52.0	52.0
Total Split (%)	30.7%	30.7%	30.7%	30.7%	69.3%	69.3%	69.3%
Yellow Time (s)	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
Lost Time Adjust (s)	0.0	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	4.5
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	None	None	None	None	Max	Max	Max
Act Effct Green (s)	8.6	8.6	8.6	8.6	52.7	52.7	52.7
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.78	0.78	0.78
v/c Ratio	0.24	0.24	0.54	0.54	0.46	0.46	0.46
Control Delay	15.3	21.0	21.0	21.0	5.0	5.4	5.4
Queue Delay	0.0	0.0	0.0	0.0	1.8	0.0	0.0
Total Delay	15.3	21.0	21.0	21.0	6.8	5.4	5.4
LOS	B	B	C	C	A	A	A
Approach Delay	15.3	21.0	21.0	21.0	6.8	5.4	5.4
Approach LOS	B	B	C	C	A	A	A
Intersection Summary							
Cycle Length: 75							
Actuated Cycle Length: 67.4							
Natural Cycle: 60							
Control Type: Semi Act-Uncoordinated							
Maximum v/c Ratio: 0.54							
Intersection Signal Delay: 8.1							
Intersection Capacity Utilization: 56.9%							
Analysis Period (min): 15							



HCM Signalized Intersection Capacity Analysis <Background 2036> Weekday AM Peak Hour  
 4: Queen Street North & Robinson Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	6	8	28	16	23	49	47	354	110	86	340	25
Traffic Volume (vph)	6	8	28	16	23	49	47	354	110	86	340	25
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.91	0.92	0.92	0.99	0.97	0.97	0.97	0.99	0.99	0.99	0.99	0.99
Flt Protected	1683	1707	1707	1800	1800	1800	1800	1831	1831	1831	1831	1831
Satd. Flow (prot)	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.81	0.81	0.81	0.81	0.81
Flt Permitted	1572	1597	1597	1668	1668	1668	1668	1501	1501	1501	1501	1501
Satd. Flow (perm)	0.73	0.73	0.73	0.60	0.60	0.60	0.60	0.84	0.84	0.83	0.83	0.83
Peak-hour factor, PHF	8	11	38	27	38	82	56	421	131	104	410	30
Adj. Flow (vph)	0	34	0	0	71	0	0	9	0	0	2	0
RTOR Reduction (vph)	0	23	0	0	76	0	0	599	0	0	542	0
Lane Group Flow (vph)	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Turn Type	4	8	8	2	2	2	2	6	6	6	6	6
Protected Phases	4	8	8	2	2	2	2	6	6	6	6	6
Permitted Phases	4	8	8	2	2	2	2	6	6	6	6	6
Actuated Green, G (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	51.8	51.8	51.8	51.8	51.8
Effective Green, g (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	51.8	51.8	51.8	51.8	51.8
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.76	0.76	0.76	0.76	0.76
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	172	172	172	175	175	175	175	1265	1265	1265	1265	1265
v/s Ratio Prot	0.01	0.01	0.01	c0.05	c0.05	c0.05	c0.05	0.36	0.36	c0.36	c0.36	c0.36
v/c Ratio	0.13	0.13	0.13	0.43	0.43	0.43	0.43	0.47	0.47	0.47	0.47	0.47
Uniform Delay, d1	27.5	27.5	27.5	28.4	28.4	28.4	28.4	3.1	3.1	3.1	3.1	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.4	0.4	1.7	1.7	1.7	1.7	1.3	1.3	1.4	1.4	1.4
Delay (s)	27.8	27.8	27.8	30.1	30.1	30.1	30.1	4.4	4.4	4.6	4.6	4.6
Level of Service	C	C	C	C	C	C	C	A	A	A	A	A
Approach Delay (s)	27.8	27.8	27.8	30.1	30.1	30.1	30.1	4.4	4.4	4.6	4.6	4.6
Approach LOS	C	C	C	C	C	C	C	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	8.2 HCM 2000 Level of Service											
HCM 2000 Volume to Capacity ratio	0.47											
Actuated Cycle Length (s)	68.3 Sum of lost time (s)											
Intersection Capacity Utilization	55.9% ICU Level of Service											
Analysis Period (min)	15											
c Critical Lane Group												

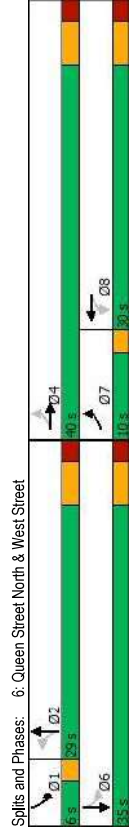
HCM Unsignalized Intersection Capacity Analysis<Background 2036> Weekday AM Peak Hour  
 5: Metcalfe Street South/Site Access 1 & Robinson Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	0	181	5	22	86	6	3	0	14	1	0	0
Future Volume (Veh/h)	0	181	5	22	86	6	3	0	14	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	0%
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.74	0.74	0.74	0.25	0.25	0.25	0.62	0.62	0.62
Hourly flow rate (vph)	0	218	6	30	116	8	12	0	56	2	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		107										
pX, platoon unblocked												
VC, conflicting volume	124			224			401	405	221	457	404	120
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	124			224			401	405	221	457	404	120
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			98	100	93	100	100	100
cM capacity (veh/h)	1463			1345			550	523	819	471	524	931
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	224	154	68	2								
Volume Left	0	30	12	2								
Volume Right	6	8	56	0								
cSH	1463	1345	754	471								
Volume to Capacity	0.00	0.02	0.09	0.00								
Queue Length 95th (m)	0.0	0.5	2.4	0.1								
Control Delay (s)	0.0	1.7	10.2	12.7								
Lane LOS	A	B	B	B								
Approach Delay (s)	0.0	1.7	10.2	12.7								
Approach LOS	B	B	B	B								
Intersection Summary												
Average Delay	2.2											
Intersection Capacity Utilization	29.3%			ICU Level of Service			A					
Analysis Period (min)	15											



	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	207	55	32	61	34	268	47	240
Traffic Volume (vph)	207	55	32	61	34	268	47	240
Future Volume (vph)	207	55	32	61	34	268	47	240
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	2	2	2	1	6
Permitted Phases	4	4	8	8	2	2	1	6
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	15.0	15.0	15.0	23.0	23.0	4.0	29.0
Minimum Split (s)	9.5	28.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (s)	10.0	40.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (%)	13.3%	53.3%	40.0%	40.0%	38.7%	38.7%	8.0%	46.7%
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	Max	Max	Max	None	Max
Act Eff Green (s)	15.4	15.4	25.4	25.4	33.0	33.0	29.0	29.0
Actuated g/C Ratio	0.27	0.27	0.45	0.45	0.45	0.59	0.59	0.51
v/c Ratio	0.52	0.16	0.10	0.48	0.11	0.47	0.11	0.47
Control Delay	17.0	14.2	11.3	13.9	5.7	10.2	3.0	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
Total Delay	17.0	14.2	11.3	13.9	5.7	10.2	3.0	13.3
LOS	B	B	B	B	B	A	B	B
Approach Delay	17.0	14.2	13.5	12.3				
Approach LOS	B	B	B	B	B	B	B	B
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 56.4								
Natural Cycle: 75								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.52								
Intersection Signal Delay: 14.1								
Intersection Capacity Utilization 76.6%								
Analysis Period (min) 15								



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	207	55	79	32	61	15	34	268	55	47	240	100
Traffic Volume (vph)	207	55	79	32	61	15	34	268	55	47	240	100
Future Volume (vph)	207	55	79	32	61	15	34	268	55	47	240	100
Initial Flow (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Frt	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Flt Protected	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Satd. Flow (prot)	3316	3316	3316	3316	3316	3316	3316	3316	3316	3316	3316	3316
Flt Permitted	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Satd. Flow (perm)	2547	2547	2547	2547	2547	2547	2547	2547	2547	2547	2547	2547
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	235	62	90	35	66	16	41	327	67	60	308	128
RTOR Reduction (vph)	0	50	0	0	12	0	0	8	0	0	16	0
Lane Group Flow (vph)	0	338	0	0	105	0	41	386	0	60	420	0
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	Perm	NA	pm-pt	NA	NA	NA
Protected Phases	7	4	8	2	2	1	6					
Permitted Phases	4	4	8	8	2	2	1	6				
Actuated Green, G (s)	15.4	15.4	25.4	25.4	33.0	33.0	29.0	29.0				
Effective Green, g (s)	15.4	15.4	25.4	25.4	33.0	33.0	29.0	29.0				
Actuated g/C Ratio	0.27	0.27	0.45	0.45	0.45	0.59	0.59	0.51				
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	685	729	421	805	461	927						
v/s Ratio Prot	c0.13	0.04	0.04	0.04	0.06							
v/c Ratio	0.49	0.14	0.10	0.48	0.13	0.45						
Uniform Delay, d1	17.6	15.9	9.2	11.2	7.0	8.6						
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00						
Incremental Delay, d2	0.6	0.1	0.5	2.0	0.1	1.6						
Delay (s)	18.2	16.0	9.7	13.3	7.1	10.2						
Level of Service	B	B	B	B	A	B						
Approach Delay (s)	18.2	16.0	12.9									
Approach LOS	B	B	B									
Intersection Summary												
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B									
HCM 2000 Volume to Capacity ratio	0.51											
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	16.0									
Intersection Capacity Utilization	76.6%	ICU Level of Service	D									
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis Background 2036 > Weekday AM Peak Hour  
 7. Metcalfe Street South & West Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (veh/h)	11	101	34	6	93	4	0	0	0	1	18	15
Future Volume (Veh/h)	11	101	34	6	93	4	0	0	0	1	18	15
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.98	0.98	0.98	0.61	0.61	0.61	0.25	0.25	0.25
Hourly flow rate (vph)	13	122	41	6	95	4	0	0	0	4	72	60
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)		105										
pX platoon unblocked												
VC, conflicting volume	99			163			374	280	142	278	298	97
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	99			163			374	280	142	278	298	97
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	99	88	94
CM capacity (veh/h)	1494			1416			492	621	905	688	606	959
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	176	105	0	136								
Volume Left	13	6	0	4								
Volume Right	41	4	0	60								
cSH	1494	1416	1700	726								
Volume to Capacity	0.01	0.00	0.01	0.19								
Queue Length 95th (m)	0.2	0.1	0.0	5.5								
Control Delay (s)	0.6	0.5	0.0	11.1								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.6	0.5	0.0	11.1								
Approach LOS	A	B										
Intersection Summary												
Average Delay				4.0								
Intersection Capacity Utilization				21.0%								A
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis:Background 2036> Weekday PM Peak Hour  
1: Queen Street North & Union Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (veh/h)	6	3	16	15	14	43	20	424	19	24	495	3
Future Volume (Veh/h)	6	3	16	15	14	43	20	424	19	24	495	3
Sign Control	Stop	0%	Stop	0%	Stop	0%	Free	0%	Free	0%	Free	0%
Grade	0.84	0.84	0.84	0.82	0.82	0.82	0.91	0.91	0.91	0.88	0.88	0.88
Peak Hour Factor	7	4	19	18	17	52	22	466	21	27	562	3
Hourly flow rate (vph)												
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None					None
Median storage (veh)												
Upstream signal (m)								315				
pX platoon unblocked												
VC conflicting volume	1198	1148	564	1159	1140	476	565					487
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	1198	1148	564	1159	1140	476	565					487
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	95	98	96	89	91	91	98					97
cM capacity (veh/h)	133	189	525	158	192	589	1007					1076
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	30	87	509	592								
Volume Left	7	18	22	27								
Volume Right	19	52	21	3								
cSH	273	299	1007	1076								
Volume to Capacity	0.11	0.29	0.02	0.03								
Queue Length 95th (m)	2.9	9.4	0.5	0.6								
Control Delay (s)	19.8	21.9	0.6	0.7								
Lane LOS	C	C	A	A								
Approach Delay (s)	19.8	21.9	0.6	0.7								
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.6									
Intersection Capacity Utilization			47.0%									A
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis:Background 2036> Weekday PM Peak Hour  
2: Queen Street North & Marshall Lane/Site Access 3

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (veh/h)	10	0	11	0	0	1	10	450	0	0	510	15
Future Volume (Veh/h)	10	0	11	0	0	1	10	450	0	0	510	15
Sign Control	Stop	0%	Stop	0%	Stop	0%	Free	0%	Free	0%	Free	0%
Grade	0.25	0.25	0.25	0.56	0.56	0.56	0.92	0.92	0.92	0.88	0.88	0.88
Peak Hour Factor	40	0	44	0	0	2	11	489	0	0	580	17
Hourly flow rate (vph)												
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None					None
Median storage (veh)												
Upstream signal (m)								177				
pX platoon unblocked	0.97	0.97	0.97	0.97	0.97	0.97	0.97					0.97
VC conflicting volume	1102	1100	588	1144	1108	489	597					489
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	1089	1087	588	1133	1096	458	597					458
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	78	100	91	100	100	100	99					100
cM capacity (veh/h)	185	207	509	158	205	585	980					1070
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	84	2	500	597								
Volume Left	40	0	11	0								
Volume Right	44	2	0	17								
cSH	277	585	980	1070								
Volume to Capacity	0.30	0.00	0.01	0.00								
Queue Length 95th (m)	9.9	0.1	0.3	0.0								
Control Delay (s)	23.5	11.2	0.3	0.0								
Lane LOS	C	B	A	A								
Approach Delay (s)	23.5	11.2	0.3	0.0								
Approach LOS	C	B										
Intersection Summary												
Average Delay			1.8									
Intersection Capacity Utilization			46.3%									A
Analysis Period (min)			15									



HCM Unsignalized Intersection Capacity Analysis Background 2036 > Weekday PM Peak Hour  
 3: Queen Street North & Site Access 2

08-15-2024

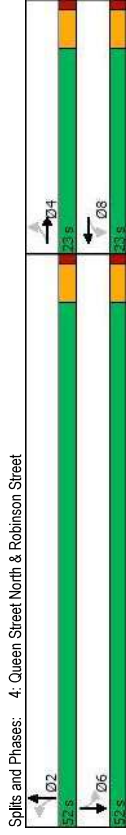
Movement	WBL	WBR	NBT	NBR	SBT
Lane Configurations	W				A
Traffic Volume (veh/h)	3	1	459	8	5
Future Volume (Veh/h)	3	1	459	8	5
Sign Control	Stop		Free		Free
Grade	0%		0%		0%
Peak Hour Factor	0.50	0.50	0.86	0.86	0.88
Hourly flow rate (vph)	6	2	534	9	6
Pedestrians					586
Lane Width (m)					
Walking Speed (m/s)					
Percent Blockage					
Right turn flare (veh)					
Median type			None		None
Median storage (veh)					
Upstream signal (m)			99		
pK, platoon unblocked	0.91	0.91			0.91
VC, conflicting volume	1136	538			543
VC1, stage 1 conf vol					
VC2, stage 2 conf vol					
VCu, unblocked vol	1100	442			447
IC, single (s)	6.4	6.2			4.1
IC, 2 stage (s)					
p0 queue free %	3.5	3.3			2.2
IF (s)	97	100			99
cM capacity (veh/h)	212	559			1012
Direction, Lane #	WB 1	NB 1	SB 1		
Volume Total	8	543	592		
Volume Left	6	0	6		
Volume Right	2	9	0		
cSH	251	1700	1012		
Volume to Capacity	0.03	0.32	0.01		
Queue Length 95th (m)	0.8	0.0	0.1		
Control Delay (s)	19.8	0.0	0.2		
Lane LOS	C		A		
Approach Delay (s)	19.8	0.0	0.2		
Approach LOS	C				
Intersection Summary					
Average Delay			0.2		A
Intersection Capacity Utilization			41.1%		
Analysis Period (min)			15		

185 Robinson Street, Community of Simcoe (Norfolk County), ON  
 Trans-Plan Inc.

Timings  
 4: Queen Street North & Robinson Street

08-15-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	10	16	48	15	19	391	78
Future Volume (vph)	10	16	48	15	19	391	78
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases							
Permitted Phases	4	4	8	8	2	2	6
Detector Phase	4	4	8	8	2	2	6
Switch Phase							
Minimum Initial (s)	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
Total Split (s)	23.0	23.0	23.0	23.0	52.0	52.0	52.0
Total Split (%)	30.7%	30.7%	30.7%	30.7%	69.3%	69.3%	69.3%
Yellow Time (s)	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
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)							
Lead/Lag	4.5		4.5		4.5		4.5
Lead-Lag Optimize?							
Recall Mode	None	None	None	None	Max	Max	Max
Act Effct Green (s)	10.5	10.5	10.5	10.5	51.1	51.1	51.1
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.72	0.72	0.72
v/c Ratio	0.23	0.23	0.61	0.61	0.43	0.52	0.52
Control Delay	16.9	25.7	5.6	5.6	7.0	7.0	7.0
Queue Delay	0.0	0.0	0.0	0.0	2.6	0.0	0.0
Total Delay	16.9	25.7	5.6	5.6	8.1	7.0	7.0
LOS	B	C	C	C	A	A	A
Approach Delay	16.9	25.7	8.1	8.1	7.0	7.0	7.0
Approach LOS	B	C	C	C	A	A	A
Intersection Summary							
Cycle Length: 75							
Actuated Cycle Length: 70.7							
Natural Cycle: 60							
Control Type: Semi Act-Uncoord							
Maximum v/c Ratio: 0.61							
Intersection Signal Delay: 10.3							
Intersection Capacity Utilization 77.4%							
Analysis Period (min) 15							













HCM Signalized Intersection Capacity Analysis <Background 2036> Weekday PM Peak Hour  
4: Queen Street North & Robinson Street

08-15-2024

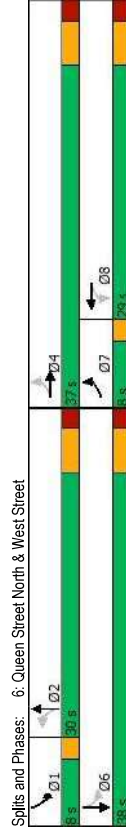
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (vph)	10	16	25	48	15	67	19	391	79	78	432	9
Future Volume (vph)	10	16	25	48	15	67	19	391	79	78	432	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Flt Protected	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Satd. Flow (prot)	1724	1724	1724	1702	1702	1702	1819	1819	1819	1845	1845	1845
Flt Permitted	0.93	0.93	0.93	0.87	0.87	0.87	0.97	0.97	0.97	0.86	0.86	0.86
Satd. Flow (perm)	1622	1622	1622	1509	1509	1509	1774	1774	1774	1599	1599	1599
Peak-hour factor, PHF	0.82	0.82	0.82	0.75	0.75	0.75	0.89	0.89	0.89	0.87	0.87	0.87
Adj. Flow (vph)	12	20	30	64	20	89	21	439	89	90	497	10
RTOR Reduction (vph)	0	26	0	0	58	0	0	7	0	0	1	0
Lane Group Flow (vph)	0	36	0	0	115	0	0	542	0	0	596	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm	NA	NA
Protected Phases	4	4	8	8	2	2	2	2	2	6	6	6
Permitted Phases	4	4	8	8	2	2	2	2	2	6	6	6
Actuated Green, G (s)	10.5	10.5	10.5	10.5	51.1	51.1	51.1	51.1	51.1	51.1	51.1	51.1
Effective Green, g (s)	10.5	10.5	10.5	10.5	51.1	51.1	51.1	51.1	51.1	51.1	51.1	51.1
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	241	241	224	224	1284	1284	1284	1284	1284	1157	1157	1157
v/s Ratio Prot	0.02	0.02	c0.08	c0.08	0.31	0.31	0.31	0.31	0.31	c0.37	c0.37	c0.37
v/c Ratio	0.15	0.15	0.51	0.51	0.42	0.42	0.42	0.42	0.42	0.52	0.52	0.52
Uniform Delay, d1	26.2	26.2	27.7	27.7	3.9	3.9	3.9	3.9	3.9	4.3	4.3	4.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.3	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.6	1.6	1.6
Delay (s)	26.5	26.5	29.7	29.7	4.9	4.9	4.9	4.9	4.9	5.9	5.9	5.9
Level of Service	C	C	C	C	A	A	A	A	A	A	A	A
Approach Delay (s)	26.5	26.5	29.7	29.7	4.9	4.9	4.9	4.9	4.9	5.9	5.9	5.9
Approach LOS	C	C	C	C	A	A	A	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	9.4											
HCM 2000 Volume to Capacity ratio	0.51											
Actuated Cycle Length (s)	70.6											
Intersection Capacity Utilization	77.4%											
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis<Background 2036> Weekday PM Peak Hour  
5: Metcalfe Street South/Site Access 1 & Robinson Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	162	6	30	129	3	1	0	15	1	0	0
Future Volume (Veh/h)	0	162	6	30	129	3	1	0	15	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.87	0.87	0.87	0.89	0.89	0.89	0.50	0.50	0.50	0.35	0.35	0.35
Hourly flow rate (vph)	0	186	7	34	145	3	2	0	30	3	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None					None						
Median storage (veh)												
Upstream signal (m)	107											
pX, platoon unblocked												
VC, conflicting volume	148			193			404	406	190	434	408	146
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	148			193			404	406	190	434	408	146
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF, 2 stage (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	96	99	100	100
cM capacity (veh/h)	1434			1380			547	521	852	504	520	901
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	193	182	32	3								
Volume Left	0	34	2	3								
Volume Right	7	3	30	0								
cSH	1434	1380	824	504								
Volume to Capacity	0.00	0.02	0.04	0.01								
Queue Length 95th (m)	0.0	0.6	1.0	0.1								
Control Delay (s)	0.0	1.6	9.5	12.2								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.0	1.6	9.5	12.2								
Approach LOS	A	A	B	B								
Intersection Summary												
Average Delay	1.5				ICU Level of Service				A			
Intersection Capacity Utilization	30.9%											
Analysis Period (min)	15											

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	144	63	44	114	62	279	46	295
Traffic Volume (vph)	144	63	44	114	62	279	46	295
Future Volume (vph)	144	63	44	114	62	279	46	295
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	2	2	1	6	
Permitted Phases	4	4	8	2	2	1	6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	3.5	20.0	20.0	20.0	20.0	20.0	5.0	20.0
Minimum Split (s)	8.0	37.0	29.0	30.0	30.0	30.0	8.0	38.0
Total Split (s)	8.0	37.0	29.0	30.0	30.0	30.0	8.0	38.0
Total Split (%)	10.7%	49.3%	38.7%	38.7%	40.0%	40.0%	10.7%	50.7%
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	Max	Max	Max	None	Max
Act Effct Green (s)	20.0	20.0	27.2	27.2	27.2	36.0	32.0	32.0
Actuated g/C Ratio	0.31	0.31	0.42	0.42	0.42	0.56	0.50	0.50
v/c Ratio	0.40	0.27	0.20	0.51	0.10	0.55	0.10	0.55
Control Delay	16.2	13.3	15.1	17.0	6.8	12.8	9.9	22.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9
Total Delay	16.2	13.3	15.1	17.0	6.8	22.7		
LOS	B	B	B	B	B	A	C	C
Approach Delay	16.2	13.3	13.3	16.7	21.2			
Approach LOS	B	B	B	B	C			
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 64								
Natural Cycle: 75								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.55								
Intersection Signal Delay: 17.6								
Intersection Capacity Utilization 95.3%								
Analysis Period (min) 15								



	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Movement	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	144	63	53	44	114	51	62	279
Traffic Volume (vph)	144	63	53	44	114	51	62	279
Future Volume (vph)	144	63	53	44	114	51	62	279
Initial Flow (vph)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	0.95
Frt	0.97	0.97	0.96	0.96	0.97	0.97	1.00	0.95
Flt Protected	0.97	0.97	0.99	0.99	0.95	0.95	1.00	0.95
Satd. Flow (prot)	3338	3338	3375	3375	1770	1813	1770	1764
Flt Permitted	0.70	0.70	0.82	0.82	0.47	0.47	1.00	0.41
Satd. Flow (perm)	2411	2411	2799	2799	871	871	756	1764
Peak-hour factor, PHF	0.82	0.82	0.82	0.86	0.85	0.85	0.85	0.91
Adj. Flow (vph)	176	77	65	51	133	59	73	328
RTOR Reduction (vph)	0	36	0	0	41	0	9	0
Lane Group Flow (vph)	0	282	0	0	202	0	73	390
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	8	2	2	1	6
Permitted Phases	4	4	8	8	2	2	1	6
Actuated Green, G (s)	20.0	20.0	20.0	20.0	27.2	27.2	32.8	32.8
Effective Green, g (s)	20.0	20.0	20.0	20.0	27.2	27.2	32.8	32.8
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.42	0.42	0.51	0.51
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	744	744	863	863	365	761	439	892
v/s Ratio Prot	c0.12	0.07	0.08	0.08	0.22	0.01	c0.27	
v/c Ratio	0.38	0.23	0.20	0.20	0.51	0.12	0.54	
Uniform Delay, d1	17.5	16.7	16.7	16.7	11.9	13.9	8.5	10.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1	0.1	0.1	1.2	2.5	0.1	2.3
Delay (s)	17.9	16.8	16.8	16.8	13.1	16.4	8.6	13.1
Level of Service	B	B	B	B	B	B	A	B
Approach Delay (s)	17.9	16.8	16.8	16.8	15.9		12.7	
Approach LOS	B	B	B	B	B		B	
Intersection Summary								
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B					
HCM 2000 Volume to Capacity ratio	0.51							
Actuated Cycle Length (s)	64.8	Sum of lost time (s)	16.0					
Intersection Capacity Utilization	95.3%	ICU Level of Service	F					
Analysis Period (min)	15							
c Critical Lane Group								



HCM Unsignalized Intersection Capacity Analysis Background 2036> Weekday PM Peak Hour  
 7: Metcalfe Street South & West Street

08-15-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (veh/h)	9	140	14	15	185	5	1	1	4	3	9	21
Future Volume (Veh/h)	9	140	14	15	185	5	1	1	4	3	9	21
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.82	0.82	0.82	0.80	0.80	0.80	0.91	0.91	0.91	0.75	0.75	0.75
Hourly flow rate (vph)	11	171	17	19	231	6	1	1	4	4	12	28
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)												
dx platoon unblocked												
VC, conflicting volume	237			188			508	476	180	478	482	234
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	237			188			508	476	180	478	482	234
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	100	99	97	97
CM capacity (veh/h)	1330			1386			443	477	863	486	473	805
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	199	256	6	44								
Volume Left	11	19	1	4								
Volume Right	17	6	4	28								
cSH	1330	1386	667	644								
Volume to Capacity	0.01	0.01	0.01	0.07								
Queue Length 95th (m)	0.2	0.3	0.2	1.8								
Control Delay (s)	0.5	0.7	10.4	11.0								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.5	0.7	10.4	11.0								
Approach LOS	B	B	B	B								
Intersection Summary												
Average Delay				1.6								
Intersection Capacity Utilization				24.9%								A
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2026> Weekday AM Peak Hour  
1: Queen Street North & Union Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		4			4		4		4	
Traffic Volume (veh/h)	1	15	10	13	7	21	4	303	44	25	352	15
Future Volume (Veh/h)	1	15	10	13	7	21	4	303	44	25	352	15
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.86	0.86	0.86	0.59	0.59	0.59	0.88	0.88	0.88	0.91	0.91	0.81
Hourly flow rate (vph)	1	17	12	22	12	36	5	344	50	27	387	16
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None					None
Median storage (veh)								315				
Upstream signal (m)												
pX platoon unblocked												
VC conflicting volume	870	853	395	848	836	369	403					394
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	870	853	395	848	836	369	403					394
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	100	94	98	91	96	95	100					98
cM capacity (veh/h)	244	288	654	258	295	677	1156					1165
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	30	70	399	430								
Volume Left	1	22	5	27								
Volume Right	12	36	50	16								
cSH	368	391	1156	1165								
Volume to Capacity	0.08	0.18	0.00	0.02								
Queue Length 95th (m)	2.1	5.2	0.1	0.6								
Control Delay (s)	15.6	16.2	0.1	0.7								
Lane LOS	C	C	A	A								
Approach Delay (s)	15.6	16.2	0.1	0.7								
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			50.0%									A
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2026> Weekday AM Peak Hour  
2: Queen Street North & Marshall Lane/Site Access 3 08-29-2024

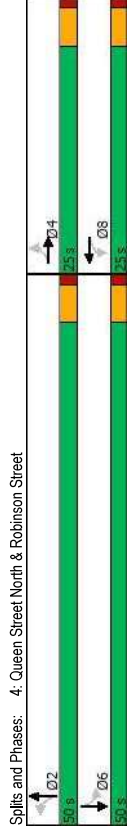
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		4			4		4		4	
Traffic Volume (veh/h)	9	0	30	10	1	22	18	318	8	20	345	10
Future Volume (Veh/h)	9	0	30	10	1	22	18	318	8	20	345	10
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.25	0.25	0.25	0.40	0.40	0.40	0.84	0.84	0.84	0.87	0.87	0.87
Hourly flow rate (vph)	36	0	120	25	2	55	21	379	10	23	397	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None					None
Median storage (veh)								177				
Upstream signal (m)												
pX platoon unblocked												
VC conflicting volume	930	880	402	994	880	384	408					389
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	930	880	402	994	880	384	408					389
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	84	100	81	86	99	92	98					98
cM capacity (veh/h)	219	275	648	177	275	664	1151					1170
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	156	82	410	431								
Volume Left	36	25	21	23								
Volume Right	120	55	10	11								
cSH	446	355	1151	1170								
Volume to Capacity	0.35	0.23	0.02	0.02								
Queue Length 95th (m)	12.4	7.0	0.4	0.5								
Control Delay (s)	17.3	18.2	0.6	0.6								
Lane LOS	C	C	A	A								
Approach Delay (s)	17.3	18.2	0.6	0.6								
Approach LOS	C	C										
Intersection Summary												
Average Delay			4.4									
Intersection Capacity Utilization			35.4%									A
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2026> Weekday AM Peak Hour  
 3: Queen Street North & Site Access 2 08-29-2024

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W					A
Traffic Volume (veh/h)	4	5	339	7	6	379
Future Volume (Veh/h)	4	5	339	7	6	379
Sign Control	Stop		Free		Free	Free
Grade	0%		0%		0%	0%
Peak Hour Factor	0.75	0.75	0.82	0.82	0.88	0.88
Hourly flow rate (vph)	5	7	413	9	7	431
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			99			
pK, platoon unblocked	0.98	0.98			0.98	
VC, conflicting volume	862	418			422	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VC, unblocked vol	847	391			396	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			99	
cM capacity (veh/h)	322	642			1135	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	12	422	438			
Volume Left	5	0	7			
Volume Right	7	9	0			
cSH	454	1700	1135			
Volume to Capacity	0.03	0.25	0.01			
Queue Length 95th (m)	0.7	0.0	0.1			
Control Delay (s)	13.1	0.0	0.2			
Lane LOS	B		A			
Approach Delay (s)	13.1	0.0	0.2			
Approach LOS	B					
Intersection Summary						
Average Delay			0.3			A
Intersection Capacity Utilization			34.7%			
Analysis Period (min)			15			

Timings <TOTAL 2026> Weekday AM Peak Hour  
 4: Queen Street North & Robinson Street 08-29-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	5	7	14	19	38	301	71	291
Future Volume (vph)	5	7	14	19	38	301	71	291
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases								
Permitted Phases	4	4	8	8	2	2	6	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)	25.0	25.0	25.0	25.0	50.0	50.0	50.0	50.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	66.7%	66.7%	66.7%	66.7%
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	0.0	0.0
Total Lost Time (s)	4.5	4.5	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)	8.0	8.0	8.0	8.0	52.0	52.0	52.0	52.0
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.79	0.79	0.79	0.79
v/c Ratio	0.23	0.23	0.49	0.49	0.38	0.37	0.37	0.37
Control Delay	15.2	15.2	20.1	20.1	4.1	4.1	4.3	4.3
Queue Delay	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0
Total Delay	15.2	15.2	20.1	20.1	5.3	4.3	4.3	4.3
LOS	B	B	C	C	A	A	A	A
Approach Delay	15.2	15.2	20.1	20.1	5.3	4.3	4.3	4.3
Approach LOS	B	B	C	C	A	A	A	A
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 66.1								
Natural Cycle: 50								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.49								
Intersection Signal Delay: 6.9								
Intersection Capacity Utilization 49.6%								
Analysis Period (min) 15								





HCM Signalized Intersection Capacity Analysis <TOTAL 2026> Weekday AM Peak Hour  
4: Queen Street North & Robinson Street

08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	7	25	14	19	41	38	301	91	71	291	21
Future Volume (vph)	5	7	25	14	19	41	38	301	91	71	291	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.99	0.99	0.99	0.99	0.99
Flt Protected	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Satd. Flow (prot)	1684	1684	1708	1708	1708	1802	1802	1832	1832	1832	1832	1832
Flt Permitted	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.85	0.85	0.85	0.85	0.85
Satd. Flow (perm)	1607	1607	1589	1589	1589	1700	1700	1566	1566	1566	1566	1566
Peak-hour factor, PHF	0.73	0.73	0.73	0.60	0.60	0.60	0.60	0.84	0.84	0.83	0.83	0.83
Adj. Flow (vph)	7	10	34	23	32	68	45	358	108	86	351	25
RTOR Reduction (vph)	0	30	0	0	61	0	0	8	0	0	2	0
Lane Group Flow (vph)	0	21	0	0	62	0	0	503	0	0	460	0
Turn Type	Perm	NA	NA	Perm	NA	NA	Perm	NA	Perm	NA	NA	NA
Protected Phases	4	4	4	8	8	8	2	2	6	6	6	6
Permitted Phases	4	4	4	8	8	8	2	2	6	6	6	6
Actuated Green, G (s)	6.9	6.9	6.9	6.9	6.9	6.9	51.0	51.0	51.0	51.0	51.0	51.0
Effective Green, g (s)	6.9	6.9	6.9	6.9	6.9	6.9	51.0	51.0	51.0	51.0	51.0	51.0
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10	0.10	0.76	0.76	0.76	0.76	0.76	0.76
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	165	165	163	163	163	163	1295	1295	1193	1193	1193	1193
v/s Ratio Prot	0.01	0.01	0.01	c0.04	c0.04	c0.04	c0.30	c0.30	0.29	0.29	0.29	0.29
v/c Ratio	0.12	0.12	0.38	0.38	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Uniform Delay, d1	27.3	27.3	28.0	28.0	28.0	27.7	2.7	2.7	2.7	2.7	2.7	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.3	1.5	1.5	1.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Delay (s)	27.6	27.6	29.5	29.5	29.5	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Level of Service	C	C	C	C	C	A	A	A	A	A	A	A
Approach Delay (s)	27.6	27.6	29.5	29.5	29.5	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Approach LOS	C	C	C	C	C	A	A	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	7.4	7.4	7.4	HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.39	0.39	0.39									
Actuated Cycle Length (s)	68.9	68.9	68.9	Sum of lost time (s)			9.0					
Intersection Capacity Utilization	49.6%	49.6%	49.6%	ICU Level of Service			A					
Analysis Period (min)	15	15	15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2026> Weekday AM Peak Hour  
5: Metcalfe Street South/Site Access 1 & Robinson Street

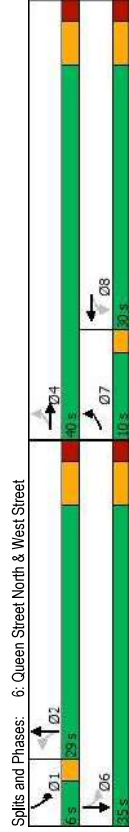
08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	164	4	18	71	13	2	0	11	10	0	0
Future Volume (Veh/h)	0	164	4	18	71	13	2	0	11	10	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.74	0.74	0.74	0.25	0.25	0.25	0.62	0.62	0.62
Hourly flow rate (vph)	0	198	5	24	96	18	8	0	44	16	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)	107	107	107	107	107	107	107	107	107	107	107	107
pX, platoon unblocked												
VC, conflicting volume	114	114	203	354	362	200	398	356	105	105	105	105
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	114	114	203	354	362	200	398	356	105	105	105	105
IC, single (s)	4.1	4.1	4.1	7.1	6.5	6.2	7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)	2.2	2.2	2.2	3.5	4.0	3.3	3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100	100	98	99	100	95	97	100	100	99	100	100
p0 capacity (veh/h)	1475	1475	1369	593	555	840	526	560	949	560	949	949
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	203	138	52	16								
Volume Left	0	24	8	16								
Volume Right	5	18	44	0								
cSH	1475	1369	790	526								
Volume to Capacity	0.00	0.02	0.07	0.03								
Queue Length 95th (m)	0.0	0.4	1.7	0.8								
Control Delay (s)	0.0	1.5	9.9	12.1								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.0	1.5	9.9	12.1								
Approach LOS	A	A	B									
Intersection Summary												
Average Delay	2.2	2.2	2.2	2.2								
Intersection Capacity Utilization	27.7%	27.7%	27.7%	27.7%								
Analysis Period (min)	15	15	15	15								

Timings  
6: Queen Street North & West Street













HCM Signalized Intersection Capacity Analysis  
6: Queen Street North & West Street

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	212	55	29	55	31	247	43	224
Future Volume (vph)	212	55	29	55	31	247	43	224
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	8	2	2	1	6
Permitted Phases	4	4	8	8	2	2	1	6
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	15.0	15.0	15.0	23.0	23.0	4.0	29.0
Minimum Split (s)	9.5	28.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (s)	10.0	40.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (%)	13.3%	53.3%	40.0%	40.0%	38.7%	38.7%	8.0%	46.7%
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	Max	None	Max
Act Eff Green (s)	15.4	15.4	25.4	25.4	33.0	33.0	29.0	29.0
Actuated g/C Ratio	0.27	0.27	0.45	0.45	0.45	0.59	0.59	0.51
v/c Ratio	0.53	0.14	0.09	0.44	0.10	0.44	0.10	0.44
Control Delay	14.7	12.7	9.7	11.4	4.7	8.3	4.7	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
Total Delay	14.7	12.7	9.7	11.4	4.7	10.1	4.7	10.1
LOS	B	B	A	A	B	A	A	B
Approach Delay	14.7	12.7	11.2	11.2	9.5	9.5	9.5	9.5
Approach LOS	B	B	B	B	B	A	A	A
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 56.4								
Natural Cycle: 75								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.53								
Intersection Signal Delay: 11.8								
Intersection Capacity Utilization 70.7%								
Analysis Period (min) 15								



Movement	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	212	55	79	29	55	14	31	247	49	43
Future Volume (vph)	212	55	79	29	55	14	31	247	49	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0	6.0
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00
Frt	0.97	0.97	0.98	0.98	0.98	0.98	0.98	1.00	0.95	0.95
Flt Protected	0.97	0.97	0.99	0.99	0.95	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3317	3317	3414	3414	1770	1770	1816	1770	1778	1778
Flt Permitted	0.75	0.75	0.79	0.79	0.52	0.52	1.00	0.47	1.00	1.00
Satd. Flow (perm)	2559	2559	2720	2720	969	969	1816	869	1778	1778
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.92	0.82	0.82	0.78	0.78
Adj. Flow (vph)	241	62	90	32	60	15	38	301	60	55
RTOR Reduction (vph)	0	50	0	0	11	0	8	0	0	16
Lane Group Flow (vph)	0	344	0	0	96	0	38	353	0	55
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	Perm	pm-pt	NA	NA
Protected Phases	7	4	8	8	2	2	1	6	6	6
Permitted Phases	4	4	8	8	2	2	1	6	6	6
Actuated Green, G (s)	15.4	15.4	15.4	15.4	25.4	25.4	25.4	29.8	29.8	29.8
Effective Green, g (s)	15.4	15.4	15.4	15.4	25.4	25.4	25.4	29.8	29.8	29.8
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.44	0.44	0.44	0.52	0.52	0.52
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0	6.0
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)	688	732	732	430	806	806	490	926	926	926
v/s Ratio Prot	c0.13	0.04	0.04	0.04	0.04	0.04	0.05	c0.22	c0.22	c0.22
v/c Ratio	0.50	0.13	0.13	0.09	0.44	0.44	0.11	0.43	0.43	0.43
Uniform Delay, d1	17.7	15.8	15.8	9.2	11.0	11.0	6.9	8.4	8.4	8.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.1	0.4	1.7	1.7	0.1	1.4	1.4	1.4
Delay (s)	18.2	15.9	15.9	9.6	12.7	12.7	7.0	9.9	9.9	9.9
Level of Service	B	B	B	A	B	B	A	A	A	A
Approach Delay (s)	18.2	15.9	15.9	12.4	12.4	12.4	9.6	9.6	9.6	9.6
Approach LOS	B	B	B	B	B	B	A	A	A	A
Intersection Summary										
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B							
HCM 2000 Volume to Capacity ratio	0.50									
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	16.0							
Intersection Capacity Utilization	70.7%	ICU Level of Service	C							
Analysis Period (min)	15									
c Critical Lane Group										

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2026> Weekday AM Peak Hour  
 7: Metcalfe Street South & West Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	101	34	6	84	3	0	0	0	1	16	14
Future Volume (Veh/h)	11	101	34	6	84	3	0	0	0	1	16	14
Sign Control	Free			Free			Stop			Stop		
Grade	0%											
Peak Hour Factor	0.83	0.83	0.83	0.98	0.98	0.98	0.61	0.61	0.61	0.25	0.25	0.25
Hourly flow rate (vph)	13	122	41	6	86	3	0	0	0	4	64	56
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)	105											
pX platoon unblocked												
VC, conflicting volume	89			163			356	270	142	268	288	88
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	89			163			356	270	142	268	288	88
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	99	90	94
CM capacity (veh/h)	1506			1416			515	629	905	678	613	971
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	176	95	0	124								
Volume Left	13	6	0	4								
Volume Right	41	3	0	56								
cSH	1506	1416	1700	739								
Volume to Capacity	0.01	0.00	0.01	0.17								
Queue Length 95th (m)	0.2	0.1	0.0	4.8								
Control Delay (s)	0.6	0.5	0.0	10.9								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.6	0.5	0.0	10.9								
Approach LOS	A	B										
Intersection Summary												
Average Delay				3.8			ICU Level of Service			A		
Intersection Capacity Utilization				20.7%								
Analysis Period (min)				15								







HCM Unsignalized Intersection Capacity Analysis <TOTAL 2031> Weekday AM Peak Hour  
1: Queen Street North & Union Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		4				4			4	
Traffic Volume (veh/h)	1	16	11	15	8	23	5	332	48	28	387	16
Future Volume (Veh/h)	1	16	11	15	8	23	5	332	48	28	387	16
Sign Control		Stop		Stop				Free			Free	
Grade		0%		0%				0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.59	0.59	0.59	0.88	0.88	0.88	0.91	0.91	0.81
Hourly flow rate (vph)	1	19	13	25	14	39	6	377	55	31	425	18
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				
Median storage (veh)								315				
Upstream signal (m)												
pK platoon unblocked												
VC conflicting volume	958	940	434	935	922	404	443				432	
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	958	940	434	935	922	404	443				432	
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	100	93	98	89	95	94	99				97	
cM capacity (veh/h)	208	255	622	221	261	646	1117				1128	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	33	78	438	474								
Volume Left	1	25	6	31								
Volume Right	13	39	55	18								
cSH	329	344	1117	1128								
Volume to Capacity	0.10	0.23	0.01	0.03								
Queue Length 95th (m)	2.6	6.9	0.1	0.7								
Control Delay (s)	17.1	18.5	0.2	0.8								
Lane LOS	C	C	A	A								
Approach Delay (s)	17.1	18.5	0.2	0.8								
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.4									
Intersection Capacity Utilization			54.3%									A
Analysis Period (min)			15									

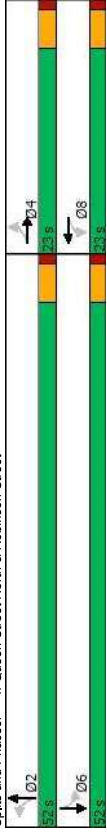
HCM Unsignalized Intersection Capacity Analysis <TOTAL 2031> Weekday AM Peak Hour  
2: Queen Street North & Marshall Lane/Site Access 3 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		4				4			4	
Traffic Volume (veh/h)	10	0	33	10	1	22	20	351	8	20	381	11
Future Volume (Veh/h)	10	0	33	10	1	22	20	351	8	20	381	11
Sign Control		Stop		Stop				Free			Free	
Grade		0%		0%				0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.40	0.40	0.40	0.84	0.84	0.84	0.87	0.87	0.87
Hourly flow rate (vph)	40	0	132	25	2	55	24	418	10	23	438	13
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				
Median storage (veh)								177				
Upstream signal (m)												
pK platoon unblocked												
VC conflicting volume	1018	966	444	1094	968	423	451				428	
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	1018	966	444	1094	968	423	451				428	
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	79	100	78	83	99	91	98				98	
cM capacity (veh/h)	190	244	614	146	243	631	1109				1131	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	172	82	452	474								
Volume Left	40	25	24	23								
Volume Right	132	55	10	13								
cSH	404	307	1109	1131								
Volume to Capacity	0.43	0.27	0.02	0.02								
Queue Length 95th (m)	16.6	8.4	0.5	0.5								
Control Delay (s)	20.4	20.9	0.7	0.6								
Lane LOS	C	C	A	A								
Approach Delay (s)	20.4	20.9	0.7	0.6								
Approach LOS	C	C										
Intersection Summary												
Average Delay			4.9									
Intersection Capacity Utilization			37.3%									A
Analysis Period (min)			15									

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	4	5	373	7	6	418
Future Volume (Veh/h)	4	5	373	7	6	418
Sign Control	Stop		Free		Free	Free
Grade	0%		0%		0%	0%
Peak Hour Factor	0.75	0.75	0.82	0.82	0.88	0.88
Hourly flow rate (vph)	5	7	455	9	7	475
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)			99			
pX, platoon unblocked	0.96	0.96			0.96	
vC, conflicting volume	948	460			464	
vc1, stage 1 conf vol						
vc2, stage 2 conf vol						
vcCu, unblocked vol	925	415			420	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			99	
cM capacity (veh/h)	285	611			1093	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	12	464	482			
Volume Left	5	0	7			
Volume Right	7	9	0			
cSH	414	1700	1093			
Volume to Capacity	0.03	0.27	0.01			
Queue Length 95th (m)	0.7	0.0	0.2			
Control Delay (s)	14.0	0.0	0.2			
Lane LOS	B		A			
Approach Delay (s)	14.0	0.0	0.2			
Approach LOS	B					
Intersection Summary						
Average Delay				0.3		
Intersection Capacity Utilization				36.8%	ICU Level of Service	A
Analysis Period (min)				15		



Traffic Signal Timing and Control Data													
Lane Group		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Lane Configurations										🚦			
Traffic Volume (vph)		6	8	15	21	43	331	78	320	🚦			
Future Volume (vph)		6	8	15	21	43	331	78	320				
Turn Type		Perm	NA	Perm	NA	Perm	NA	Perm	NA				
Protected Phases		4	4	8	8	2	2	6	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	52.0	52.0	52.0	52.0				
Total Split (%)		30.7%	30.7%	30.7%	30.7%	69.3%	69.3%	69.3%	69.3%				
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	0.0	0.0				
Total Lost Time (s)		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Lead-Lag Optimize?													
Recall Mode		None	None	None	None	Max	Max	Max	Max				
Act Effct Green (s)			8.3		8.3		53.1		53.1				
Actuated g/c Ratio			0.12		0.12		0.79		0.79				
v/c Ratio			0.25		0.52		0.42		0.42				
Control Delay			15.6		20.7		4.5		4.8				
Queue Delay			0.0		0.0		1.5		0.0				
Total Delay			15.6		20.7		6.0		4.8				
LOS			B		C		A		A				
Approach Delay			15.6		20.7		6.0		4.8				
Approach LOS			B		C		A		A				
Intersection Summary													
Cycle Length: 75													
Actuated Cycle Length: 67.5													
Natural Cycle: 55													
Control Type: Semi Act-Uncoord													
Maximum v/c Ratio: 0.52													
Intersection Signal Delay: 7.5													
Intersection Capacity Utilization 53.2%													
Analysis Period (min) 15													
Intersection LOS: A													
ICU Level of Service A													







HCM Signalized Intersection Capacity Analysis <TOTAL 2031> Weekday AM Peak Hour  
4: Queen Street North & Robinson Street

08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	8	28	15	21	45	43	331	100	78	320	23
Future Volume (vph)	6	8	28	15	21	45	43	331	100	78	320	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.97	0.99	0.99	0.99	0.99
Flt Protected	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Satd. Flow (prot)	1683	1683	1707	1707	1707	1802	1802	1802	1832	1832	1832	1832
Flt Permitted	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.83	0.83	0.83	0.83
Satd. Flow (perm)	1582	1582	1599	1599	1599	1683	1683	1683	1538	1538	1538	1538
Peak-hour factor, PHF	0.73	0.73	0.73	0.60	0.60	0.60	0.60	0.84	0.84	0.83	0.83	0.83
Adj. Flow (vph)	8	11	38	25	35	75	51	394	119	94	386	28
RTOR Reduction (vph)	0	34	0	0	67	0	0	8	0	0	2	0
Lane Group Flow (vph)	0	23	0	0	68	0	0	556	0	0	506	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4	4	8	8	8	8	2	2	6	6	6	6
Permitted Phases	4	4	8	8	8	8	2	2	6	6	6	6
Actuated Green, G (s)	7.2	7.2	7.2	7.2	7.2	7.2	52.2	52.2	52.2	52.2	52.2	52.2
Effective Green, g (s)	7.2	7.2	7.2	7.2	7.2	7.2	52.2	52.2	52.2	52.2	52.2	52.2
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.11	0.11	0.76	0.76	0.76	0.76	0.76	0.76
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	166	166	168	168	168	168	1284	1284	1173	1173	1173	1173
v/s Ratio Prot	0.01	0.01	c0.04	c0.04	c0.04	c0.04	c0.33	c0.33	0.33	0.33	0.33	0.33
v/c Ratio	0.14	0.14	0.40	0.40	0.40	0.40	0.43	0.43	0.43	0.43	0.43	0.43
Uniform Delay, d1	27.8	27.8	28.6	28.6	28.6	28.6	2.9	2.9	2.9	2.9	2.9	2.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.4	1.6	1.6	1.6	1.6	1.1	1.1	1.2	1.2	1.2	1.2
Delay (s)	28.2	28.2	30.2	30.2	30.2	30.2	3.9	3.9	4.0	4.0	4.0	4.0
Level of Service	C	C	C	C	C	C	A	A	A	A	A	A
Approach Delay (s)	28.2	28.2	30.2	30.2	30.2	30.2	3.9	3.9	4.0	4.0	4.0	4.0
Approach LOS	C	C	C	C	C	C	A	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	7.9 HCM 2000 Level of Service											
HCM 2000 Volume to Capacity ratio	0.43											
Actuated Cycle Length (s)	68.4 Sum of lost time (s)											
Intersection Capacity Utilization	53.2% ICU Level of Service											
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2031> Weekday AM Peak Hour  
5: Metcalfe Street South/Site Access 1 & Robinson Street

08-29-2024

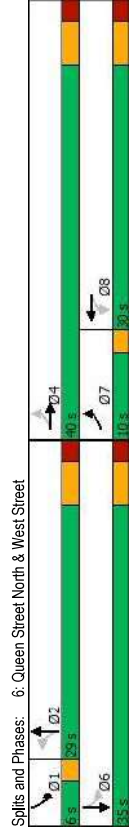
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	181	5	20	78	13	2	0	13	10	0	0
Future Volume (Veh/h)	0	181	5	20	78	13	2	0	13	10	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.74	0.74	0.74	0.25	0.25	0.25	0.62	0.62	0.62
Hourly flow rate (vph)	0	218	6	27	105	18	8	0	52	16	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)	107											
pX, platoon unblocked												
vC, conflicting volume	123			224			389	398	221	441	392	114
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vC3, unblocked vol	123			224			389	398	221	441	392	114
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
p0 queue free %	100			98			99	100	94	97	100	100
cM capacity (veh/h)	1464			1345			561	529	819	486	533	939
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	224	150	60	16								
Volume Left	0	27	8	16								
Volume Right	6	18	52	0								
cSH	1464	1345	771	486								
Volume to Capacity	0.00	0.02	0.08	0.03								
Queue Length 95th (m)	0.0	0.5	2.0	0.8								
Control Delay (s)	0.0	1.5	10.1	12.7								
Lane LOS	A	B	B	B								
Approach Delay (s)	0.0	1.5	10.1	12.7								
Approach LOS	B	B	B	B								
Intersection Summary												
Average Delay					2.3				A			
Intersection Capacity Utilization					29.2%				A			
Analysis Period (min)					15							



Timings  
6: Queen Street North & West Street









HCM Signalized Intersection Capacity Analysis  
6: Queen Street North & West Street

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	212	55	29	55	31	247	43	224
Traffic Volume (vph)	212	55	29	55	31	247	43	224
Future Volume (vph)	212	55	29	55	31	247	43	224
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	8	2	2	1	6
Permitted Phases	4	4	8	8	2	2	1	6
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	15.0	15.0	15.0	23.0	23.0	4.0	29.0
Minimum Split (s)	9.5	28.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (s)	10.0	40.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (%)	13.3%	53.3%	40.0%	40.0%	38.7%	38.7%	8.0%	46.7%
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	Max	None	Max
Act Eff Green (s)	15.4	15.4	25.4	25.4	25.4	33.0	29.0	29.0
Actuated g/C Ratio	0.27	0.27	0.45	0.45	0.45	0.59	0.51	0.51
v/c Ratio	0.53	0.14	0.09	0.44	0.10	0.44	0.10	0.44
Control Delay	17.2	14.2	11.2	13.3	5.7	9.9	12.4	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5
Total Delay	17.2	14.2	11.2	13.3	5.7	12.4	12.4	12.4
LOS	B	B	B	B	B	A	B	B
Approach Delay	17.2	14.2	14.2	13.1	11.6	11.6	11.6	11.6
Approach LOS	B	B	B	B	B	B	B	B
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 56.4								
Natural Cycle: 75								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.53								
Intersection Signal Delay: 13.8								
Intersection Capacity Utilization 70.7%								
Analysis Period (min) 15								



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	212	55	79	29	55	14	31	247	49	43	224	98
Traffic Volume (vph)	212	55	79	29	55	14	31	247	49	43	224	98
Future Volume (vph)	212	55	79	29	55	14	31	247	49	43	224	98
Initial Flow (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Frt	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Flt Protected	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Satd. Flow (prot)	3317	3317	3317	3317	3317	3317	3317	3317	3317	3317	3317	3317
Flt Permitted	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Satd. Flow (perm)	2559	2559	2559	2559	2559	2559	2559	2559	2559	2559	2559	2559
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	241	62	90	32	60	15	38	301	60	55	287	126
RTOR Reduction (vph)	0	50	0	0	11	0	0	8	0	0	16	0
Lane Group Flow (vph)	0	344	0	0	96	0	38	353	0	55	397	0
Turn Type	pm-pt	NA	NA	Perm	NA	Perm	NA	NA	pm-pt	NA	NA	NA
Protected Phases	7	4	8	8	2	2	1	6	7	4	8	8
Permitted Phases	4	4	8	8	2	2	1	6	4	4	8	8
Actuated Green, G (s)	15.4	15.4	15.4	15.4	25.4	25.4	25.4	25.4	29.8	29.8	29.8	29.8
Effective Green, g (s)	15.4	15.4	15.4	15.4	25.4	25.4	25.4	25.4	29.8	29.8	29.8	29.8
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.44	0.44	0.44	0.44	0.52	0.52	0.52	0.52
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	688	732	732	732	430	806	490	826	490	826	490	826
v/s Ratio Prot	c0.13	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
v/c Ratio	0.50	0.13	0.13	0.13	0.09	0.44	0.11	0.43	0.11	0.43	0.11	0.43
Uniform Delay, d1	17.7	15.8	15.8	15.8	9.2	11.0	6.9	8.4	6.9	8.4	6.9	8.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.1	0.1	0.4	1.7	0.1	1.4	0.1	1.4	0.1	1.4
Delay (s)	18.2	15.9	15.9	15.9	9.6	12.7	7.0	9.9	7.0	9.9	7.0	9.9
Level of Service	B	B	B	B	A	B	A	A	A	A	A	A
Approach Delay (s)	18.2	15.9	15.9	15.9	12.4	12.4	9.6	9.6	9.6	9.6	9.6	9.6
Approach LOS	B	B	B	B	B	B	A	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B									
HCM 2000 Volume to Capacity ratio	0.50											
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	16.0									
Intersection Capacity Utilization	70.7%	ICU Level of Service	C									
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2031> Weekday AM Peak Hour  
 7: Metcalfe Street South & West Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	101	34	6	84	3	0	0	0	1	16	14
Future Volume (Veh/h)	11	101	34	6	84	3	0	0	0	1	16	14
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.98	0.98	0.98	0.61	0.61	0.61	0.25	0.25	0.25
Hourly flow rate (vph)	13	122	41	6	86	3	0	0	0	4	64	56
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Upstream signal (m)												
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
VC, conflicting volume	89			163			356	270	142	268	288	88
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	89			163			356	270	142	268	288	88
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	99	90	94
CM capacity (veh/h)	1506			1416			515	629	905	678	613	971
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	176	95	0	124								
Volume Left	13	6	0	4								
Volume Right	41	3	0	56								
cSH	1506	1416	1700	739								
Volume to Capacity	0.01	0.00	0.01	0.17								
Queue Length 95th (m)	0.2	0.1	0.0	4.8								
Control Delay (s)	0.6	0.5	0.0	10.9								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.6	0.5	0.0	10.9								
Approach LOS	A	B										
Intersection Summary												
Average Delay				3.8			ICU Level of Service			A		
Intersection Capacity Utilization				20.7%								
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2036> Weekday AM Peak Hour  
 1: Queen Street North & Union Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	16	11	16	9	25	5	365	52	30	426	18
Traffic Volume (veh/h)	1	16	11	16	9	25	5	365	52	30	426	18
Future Volume (Veh/h)	1	16	11	16	9	25	5	365	52	30	426	18
Sign Control	Stop	0%	0%	Stop	0%	0%	Free	0%	Free	0%	Free	0%
Grade	0.86	0.86	0.86	0.59	0.59	0.59	0.88	0.88	0.88	0.91	0.91	0.91
Peak Hour Factor	1	19	13	27	15	42	6	415	59	33	468	20
Hourly flow rate (vph)	1	19	13	27	15	42	6	415	59	33	468	20
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				None
Median storage (veh)								315				
Upstream signal (m)												
pX platoon unblocked												
VC conflicting volume	1050	1030	478	1023	1010	444	488					474
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	1050	1030	478	1023	1010	444	488					474
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	99	92	98	86	94	93	99					97
cM capacity (veh/h)	177	225	587	191	231	614	1075					1088
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	33	84	480	521								
Volume Left	1	27	6	33								
Volume Right	13	42	59	20								
cSH	294	305	1075	1088								
Volume to Capacity	0.11	0.28	0.01	0.03								
Queue Length 95th (m)	3.0	8.8	0.1	0.8								
Control Delay (s)	18.8	21.2	0.2	0.9								
Lane LOS	C	C	A	A								
Approach Delay (s)	18.8	21.2	0.2	0.9								
Approach LOS	C	C										
Intersection Summary												
Average Delay					2.6							
Intersection Capacity Utilization					58.3%						B	
Analysis Period (min)					15							

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2036> Weekday AM Peak Hour  
 2: Queen Street North & Marshall Lane/Site Access 3 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	10	0	33	10	1	22	22	388	8	20	421	13
Traffic Volume (veh/h)	10	0	33	10	1	22	22	388	8	20	421	13
Future Volume (Veh/h)	10	0	33	10	1	22	22	388	8	20	421	13
Sign Control	Stop	0%	0%	Stop	0%	0%	Free	0%	Free	0%	Free	0%
Grade	0.25	0.25	0.25	0.40	0.40	0.40	0.84	0.84	0.84	0.87	0.87	0.87
Peak Hour Factor	40	0	132	25	2	55	26	462	10	23	484	15
Hourly flow rate (vph)	40	0	132	25	2	55	26	462	10	23	484	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				None
Median storage (veh)								177				
Upstream signal (m)												
pX platoon unblocked												
VC conflicting volume	1112	1062	492	1188	1064	467	499					472
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	1112	1062	492	1188	1064	467	499					472
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	75	100	77	80	99	91	98					98
cM capacity (veh/h)	162	214	577	123	213	596	1065					1090
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	172	82	498	522								
Volume Left	40	25	26	23								
Volume Right	132	55	10	15								
cSH	361	269	1065	1090								
Volume to Capacity	0.48	0.31	0.02	0.02								
Queue Length 95th (m)	19.7	10.0	0.6	0.5								
Control Delay (s)	23.7	24.2	0.7	0.6								
Lane LOS	C	C	A	A								
Approach Delay (s)	23.7	24.2	0.7	0.6								
Approach LOS	C	C										
Intersection Summary												
Average Delay					5.3							
Intersection Capacity Utilization					39.5%						A	
Analysis Period (min)					15							

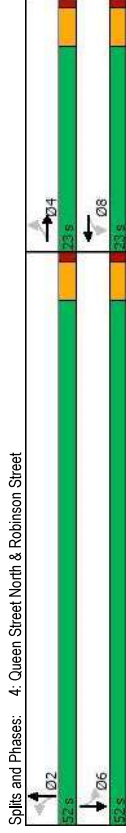


HCM Unsignalized Intersection Capacity Analysis <TOTAL 2036> Weekday AM Peak Hour  
 3: Queen Street North & Site Access 2 08-29-2024

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W					A
Traffic Volume (veh/h)	4	5	412	7	6	460
Future Volume (Veh/h)	4	5	412	7	6	460
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.75	0.75	0.82	0.82	0.88	0.88
Hourly flow rate (vph)	5	7	502	9	7	523
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			99			
pK, platoon unblocked	0.94	0.94			0.94	
VC, conflicting volume	1044	506			511	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
IC, single (s)	1013	439			444	
IC, 2 stage (s)	6.4	6.2			4.1	
IF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			99	
cM capacity (veh/h)	246	579			1045	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	12	511	530			
Volume Left	5	0	7			
Volume Right	7	9	0			
cSH	370	1700	1045			
Volume to Capacity	0.03	0.30	0.01			
Queue Length 95th (m)	0.8	0.0	0.2			
Control Delay (s)	15.0	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	15.0	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			A
Intersection Capacity Utilization			39.0%			
Analysis Period (min)			15			

Timings <TOTAL 2036> Weekday AM Peak Hour  
 4: Queen Street North & Robinson Street 08-29-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		A			A			A
Traffic Volume (vph)	6	8	16	23	47	365	86	352
Future Volume (vph)	6	8	16	23	47	365	86	352
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases								
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	52.0	52.0	52.0	52.0
Total Split (%)	30.7%	30.7%	30.7%	30.7%	69.3%	69.3%	69.3%	69.3%
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	0.0	0.0
Total Lost Time (s)		4.5		4.5		4.5		4.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
Act Eff Green (s)	8.6	8.6	8.6	8.6	52.7	52.7	52.7	52.7
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.78	0.78	0.78	0.78
v/c Ratio	0.24	0.24	0.54	0.54	0.47	0.47	0.47	0.47
Control Delay	15.3	21.0	5.1	5.1	5.6	5.6	5.6	5.6
Queue Delay	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0
Total Delay	15.3	21.0	5.1	5.1	7.0	5.6	5.6	5.6
LOS	B	C	C	C	A	A	A	A
Approach Delay	15.3	21.0	5.1	5.1	7.0	5.6	5.6	5.6
Approach LOS	B	C	C	C	A	A	A	A
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 67.4								
Natural Cycle: 60								
Control Type: Semi Act-Uncoordinated								
Maximum v/c Ratio: 0.54								
Intersection Signal Delay: 8.3								
Intersection Capacity Utilization 57.8%								
Analysis Period (min) 15								



HCM Signalized Intersection Capacity Analysis <TOTAL 2036> Weekday AM Peak Hour  
4: Queen Street North & Robinson Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	6	8	28	16	23	49	47	365	110	86	352	25
Traffic Volume (vph)	6	8	28	16	23	49	47	365	110	86	352	25
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Frt Protected	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Satd. Flow (prot)	1683	1707	1707	1707	1707	1707	1707	1707	1707	1707	1707	1707
Flt Permitted	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Satd. Flow (perm)	1572	1597	1597	1597	1597	1597	1597	1597	1597	1597	1597	1597
Peak-hour factor, PHF	0.73	0.73	0.73	0.60	0.60	0.60	0.84	0.84	0.84	0.83	0.83	0.83
Adj. Flow (vph)	8	11	38	27	38	82	56	435	131	104	424	30
RTOR Reduction (vph)	0	34	0	0	71	0	0	8	0	0	2	0
Lane Group Flow (vph)	0	23	0	0	76	0	0	614	0	0	556	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4	4	8	8	2	2	6	6	6	6	6	6
Permitted Phases	4	8	8	8	2	2	6	6	6	6	6	6
Actuated Green, G (s)	7.5	7.5	7.5	7.5	51.8	51.8	51.8	51.8	51.8	51.8	51.8	51.8
Effective Green, g (s)	7.5	7.5	7.5	7.5	51.8	51.8	51.8	51.8	51.8	51.8	51.8	51.8
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	172	172	175	175	1265	1265	1265	1265	1265	1265	1265	1265
v/s Ratio Prot	0.01	0.01	c0.05	c0.05	0.37	0.37	c0.37	c0.37	c0.37	c0.37	c0.37	c0.37
v/c Ratio	0.13	0.13	0.43	0.43	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
Uniform Delay, d1	27.5	27.5	28.4	28.4	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.4	1.7	1.7	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Delay (s)	27.8	27.8	30.1	30.1	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Level of Service	C	C	C	C	A	A	A	A	A	A	A	A
Approach Delay (s)	27.8	27.8	30.1	30.1	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Approach LOS	C	C	C	C	A	A	A	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	8.2 HCM 2000 Level of Service											
HCM 2000 Volume to Capacity ratio	0.48											
Actuated Cycle Length (s)	68.3 Sum of lost time (s)											
Intersection Capacity Utilization	57.8% ICU Level of Service											
Analysis Period (min)	15											
c Critical Lane Group												

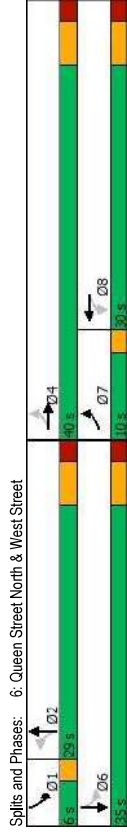
HCM Unsignalized Intersection Capacity Analysis <TOTAL 2036> Weekday AM Peak Hour  
5: Metcalfe Street South/Site Access 1 & Robinson Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	0	181	5	22	86	13	3	0	14	10	0	0
Traffic Volume (veh/h)	0	181	5	22	86	13	3	0	14	10	0	0
Future Volume (Veh/h)	0	181	5	22	86	13	3	0	14	10	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.74	0.74	0.74	0.25	0.25	0.25	0.62	0.62	0.62
Hourly flow rate (vph)	0	218	6	30	116	18	12	0	56	16	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)	107											
pX platoon unblocked												
vC conflicting volume	134			224			406	415	221	462	409	125
vC1 stage 1 conf vol												
vC2 stage 2 conf vol	134			224			406	415	221	462	409	125
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			98	100	93	97	100	100
p0 capacity (veh/h)	1451			1345			546	516	819	467	520	926
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	224	164	68	16								
Volume Left	0	30	12	16								
Volume Right	6	18	56	0								
cSH	1451	1345	752	467								
Volume to Capacity	0.00	0.02	0.09	0.03								
Queue Length 95th (m)	0.0	0.5	2.4	0.8								
Control Delay (s)	0.0	1.6	10.3	13.0								
Lane LOS	A	B	B	B								
Approach Delay (s)	0.0	1.6	10.3	13.0								
Approach LOS	B	B	B	B								
Intersection Summary												
Average Delay	2.5											
Intersection Capacity Utilization	28.7% ICU Level of Service											
Analysis Period (min)	15											

Timings  
6: Queen Street North & West Street

<TOTAL 2036> Weekday AM Peak Hour  
08-29-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	212	55	32	61	34	273	47	247
Future Volume (vph)	212	55	32	61	34	273	47	247
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	8	2	2	1	6
Permitted Phases	4	4	8	8	2	2	1	6
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	15.0	15.0	15.0	23.0	23.0	4.0	29.0
Minimum Split (s)	9.5	28.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (s)	10.0	40.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (%)	13.3%	53.3%	40.0%	40.0%	38.7%	38.7%	8.0%	46.7%
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	Max	None	Max
Act Eff Green (s)	15.4	15.4	25.4	25.4	33.0	33.0	29.0	29.0
Actuated g/C Ratio	0.27	0.27	0.45	0.45	0.45	0.59	0.59	0.51
v/c Ratio	0.53	0.16	0.10	0.48	0.11	0.49	0.11	0.49
Control Delay	17.2	14.2	11.4	14.0	5.8	10.5	3.6	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6
Total Delay	17.2	14.2	11.4	14.0	5.8	14.1	3.6	14.1
LOS	B	B	B	B	B	A	A	B
Approach Delay	17.2	14.2	13.7	13.1				
Approach LOS	B	B	B	B	B	B	B	B
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 56.4								
Natural Cycle: 75								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.53								
Intersection Signal Delay: 14.5								
Intersection Capacity Utilization 76.6%								
Analysis Period (min) 15								



HCM Signalized Intersection Capacity Analysis  
6: Queen Street North & West Street

<TOTAL 2036> Weekday AM Peak Hour  
08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	55	79	32	61	15	34	273	55	47	247	107
Future Volume (vph)	212	55	79	32	61	15	34	273	55	47	247	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0	6.0
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Frt	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Flt Protected	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Satd. Flow (prot)	3317	3317	3317	3317	3317	3317	3317	3317	3317	3317	3317	3317
Flt Permitted	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Satd. Flow (perm)	2545	2545	2545	2545	2545	2545	2545	2545	2545	2545	2545	2545
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	241	62	90	35	66	16	41	333	67	60	317	137
RTOR Reduction (vph)	0	50	0	0	12	0	0	8	0	0	16	0
Lane Group Flow (vph)	0	344	0	0	105	0	41	392	0	60	438	0
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	Perm	NA	pm-pt	NA	NA	NA
Protected Phases	7	4	8	8	2	2	1	6				
Permitted Phases	4	4	8	8	2	2	1	6				
Actuated Green, G (s)	15.4	15.4	15.4	15.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Effective Green, g (s)	15.4	15.4	15.4	15.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	685	728	728	728	414	806	457	826				
v/s Ratio Prot	c0.14	0.04	0.04	0.04	0.04	0.04	0.01	c0.25				
v/c Ratio	0.50	0.14	0.10	0.49	0.13	0.47	0.06	0.47				
Uniform Delay, d1	17.7	15.9	15.9	15.9	9.2	11.3	7.0	8.7				
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	0.6	0.1	0.1	0.1	0.5	2.1	0.1	1.7				
Delay (s)	18.2	16.0	16.0	16.0	9.7	13.4	7.2	10.4				
Level of Service	B	B	B	B	A	B	A	B				
Approach Delay (s)	18.2	16.0	16.0	16.0	13.0	10.1						
Approach LOS	B	B	B	B	B	B						
Intersection Summary												
HCM 2000 Control Delay												
HCM 2000 Volume to Capacity ratio												
Actuated Cycle Length (s)												
Intersection Capacity Utilization												
Analysis Period (min)												
c Critical Lane Group												



HCM Unsignalized Intersection Capacity Analysis <TOTAL 2036> Weekday AM Peak Hour  
 7: Metcalfe Street South & West Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (veh/h)	11	101	34	6	93	4	0	0	0	1	18	15
Future Volume (Veh/h)	11	101	34	6	93	4	0	0	0	1	18	15
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.98	0.98	0.98	0.61	0.61	0.61	0.25	0.25	0.25
Hourly flow rate (vph)	13	122	41	6	95	4	0	0	0	4	72	60
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)		105										
pX platoon unblocked												
VC, conflicting volume	99			163			374	280	142	278	298	97
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	99			163			374	280	142	278	298	97
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	99	88	94
CM capacity (veh/h)	1494			1416			492	621	905	688	606	959
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	176	105	0	136								
Volume Left	13	6	0	4								
Volume Right	41	4	0	60								
cSH	1494	1416	1700	726								
Volume to Capacity	0.01	0.00	0.01	0.19								
Queue Length 95th (m)	0.2	0.1	0.0	5.5								
Control Delay (s)	0.6	0.5	0.0	11.1								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.6	0.5	0.0	11.1								
Approach LOS	A	B										
Intersection Summary												
Average Delay				4.0								
Intersection Capacity Utilization				21.0%								
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2026> Weekday PM Peak Hour  
1: Queen Street North & Union Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		4				4			4	
Traffic Volume (veh/h)	5	3	15	11	35	17	371	19	22	471	3	3
Future Volume (Veh/h)	5	3	15	11	35	17	371	19	22	471	3	3
Sign Control	Stop	0%	Stop	0%	Stop	Free	Free	0%	Free	0%	Free	0%
Grade												
Peak Hour Factor	0.84	0.84	0.84	0.82	0.82	0.82	0.91	0.91	0.91	0.88	0.88	0.88
Hourly flow rate (vph)	6	4	18	18	13	43	19	408	21	25	535	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)								315				
Upstream signal (m)												
pX platoon unblocked												
VC conflicting volume	1092	1054	536	1063	1044	418	538				429	
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	1092	1054	536	1063	1044	418	538				429	
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	96	98	97	90	94	93	98				98	
cM capacity (veh/h)	166	217	544	186	220	635	1030				1130	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	28	74	448	563								
Volume Left	6	18	19	25								
Volume Right	18	43	21	3								
cSH	319	331	1030	1130								
Volume to Capacity	0.09	0.22	0.02	0.02								
Queue Length 95th (m)	2.3	6.7	0.5	0.5								
Control Delay (s)	17.4	19.0	0.6	0.6								
Lane LOS	C	C	A	A								
Approach Delay (s)	17.4	19.0	0.6	0.6								
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			44.8%								A	
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2026> Weekday PM Peak Hour  
2: Queen Street North & Marshall Lane/Site Access 3 08-29-2024

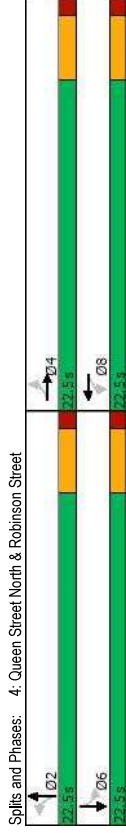
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		4				4			4	
Traffic Volume (veh/h)	9	0	10	11	0	28	8	369	10	25	462	14
Future Volume (Veh/h)	9	0	10	11	0	28	8	369	10	25	462	14
Sign Control	Stop	0%	Stop	0%	Stop	0%	Free	Free	0%	Free	0%	Free
Grade												
Peak Hour Factor	0.25	0.25	0.25	0.56	0.56	0.56	0.92	0.92	0.92	0.88	0.88	0.88
Hourly flow rate (vph)	36	0	40	20	0	50	9	401	11	28	525	16
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)								177				
Upstream signal (m)												
pX platoon unblocked												
VC conflicting volume	1064	1019	533	1054	1022	406	541				412	
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	1064	1019	533	1054	1022	406	541				412	
IC single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
IC 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	80	100	93	89	100	92	99				98	
cM capacity (veh/h)	181	229	547	184	228	644	1028				1147	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	76	70	421	569								
Volume Left	36	20	9	28								
Volume Right	40	50	11	16								
cSH	279	376	1028	1147								
Volume to Capacity	0.27	0.19	0.01	0.02								
Queue Length 95th (m)	8.6	5.4	0.2	0.6								
Control Delay (s)	22.7	16.7	0.3	0.7								
Lane LOS	C	C	A	A								
Approach Delay (s)	22.7	16.7	0.3	0.7								
Approach LOS	C	C										
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			48.1%								A	
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2026> Weekday PM Peak Hour  
 3: Queen Street North & Site Access 2 08-29-2024

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W					A
Traffic Volume (veh/h)	8	1	387	13	5	478
Future Volume (Veh/h)	8	1	387	13	5	478
Sign Control	Stop		Free		Free	Free
Grade	0%		0%		0%	0%
Peak Hour Factor	0.50	0.50	0.86	0.86	0.88	0.88
Hourly flow rate (vph)	16	2	450	15	6	543
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			99			
pK, platoon unblocked	0.93	0.93			0.93	
VC, conflicting volume	1012	458			465	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	976	378			386	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	94	100			99	
cM capacity (veh/h)	268	621			1089	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	18	465	549			
Volume Left	16	0	6			
Volume Right	2	15	0			
cSH	276	1700	1089			
Volume to Capacity	0.07	0.27	0.01			
Queue Length 95th (m)	1.7	0.0	0.1			
Control Delay (s)	19.0	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	19.0	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			A
Intersection Capacity Utilization			39.1%			
Analysis Period (min)			15			

Timings <TOTAL 2026> Weekday PM Peak Hour  
 4: Queen Street North & Robinson Street 08-29-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	9	15	40	12	16	335	71	407
Future Volume (vph)	9	15	40	12	16	335	71	407
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases								
Permitted Phases	4	4	8	8	2	2	6	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)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
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	0.0	0.0
Total Lost Time (s)	4.5	4.5	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)	7.4	7.4	7.4	7.4	23.9	23.9	23.9	23.9
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.64	0.64	0.64	0.64
v/c Ratio	0.17	0.40	0.40	0.41	0.53	0.53	0.53	0.53
Control Delay	8.3	10.3	10.3	6.4	9.1	9.1	9.1	9.1
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Total Delay	8.3	10.3	10.3	6.6	9.1	9.1	9.1	9.1
LOS	A	A	B	B	A	A	A	A
Approach Delay	8.3	10.3	10.3	6.6	9.1	9.1	9.1	9.1
Approach LOS	A	B	B	A	A	A	A	A
Intersection Summary								
Cycle Length: 45								
Actuated Cycle Length: 37.5								
Natural Cycle: 35								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.53								
Intersection Signal Delay: 8.2								
Intersection Capacity Utilization 70.9%								
Analysis Period (min) 15								














HCM Signalized Intersection Capacity Analysis <TOTAL 2026> Weekday PM Peak Hour  
4: Queen Street North & Robinson Street 08-29-2024

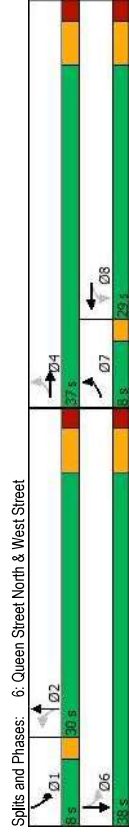
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (vph)	9	15	23	40	12	55	16	335	65	71	407	8
Future Volume (vph)	9	15	23	40	12	55	16	335	65	71	407	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Flt Protected	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Satd. Flow (prot)	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Flt Permitted	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Satd. Flow (perm)	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613	1613
Peak-hour factor, PHF	0.82	0.82	0.82	0.75	0.75	0.75	0.89	0.89	0.89	0.87	0.87	0.87
Adj. Flow (vph)	11	18	28	53	16	73	18	376	73	82	468	9
RTOR Reduction (vph)	0	23	0	0	61	0	0	10	0	0	1	0
Lane Group Flow (vph)	0	34	0	0	81	0	0	457	0	0	558	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4	4	8	8	8	8	2	2	2	6	6	6
Permitted Phases	4	4	8	8	8	8	2	2	2	6	6	6
Actuated Green, G (s)	6.3	6.3	6.3	6.3	6.3	6.3	23.0	23.0	23.0	23.0	23.0	23.0
Effective Green, g (s)	6.3	6.3	6.3	6.3	6.3	6.3	23.0	23.0	23.0	23.0	23.0	23.0
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16	0.16	0.60	0.60	0.60	0.60	0.60	0.60
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	265	265	243	243	243	243	1088	1088	1088	990	990	990
v/s Ratio Prot	0.02	0.02	c0.05	c0.05	c0.05	c0.05	0.26	0.26	0.26	c0.34	c0.34	c0.34
v/c Ratio	0.13	0.13	0.33	0.33	0.33	0.33	0.43	0.43	0.43	0.56	0.56	0.56
Uniform Delay, d1	13.7	13.7	14.1	14.1	14.1	14.1	4.1	4.1	4.1	4.6	4.6	4.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.2	0.8	0.8	0.8	0.8	1.3	1.3	1.3	2.3	2.3	2.3
Delay (s)	13.9	13.9	15.0	15.0	15.0	15.0	5.4	5.4	5.4	6.9	6.9	6.9
Level of Service	B	B	B	B	B	B	A	A	A	A	A	A
Approach Delay (s)	13.9	13.9	15.0	15.0	15.0	15.0	5.4	5.4	5.4	6.9	6.9	6.9
Approach LOS	B	B	B	B	B	B	A	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	7.6 HCM 2000 Level of Service											
HCM 2000 Volume to Capacity ratio	0.51											
Actuated Cycle Length (s)	38.3 Sum of lost time (s)											
Intersection Capacity Utilization	70.3% ICU Level of Service											
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2026> Weekday PM Peak Hour  
5: Metcalfe Street South/Site Access 1 & Robinson Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	147	5	25	106	13	1	0	12	12	0	0
Future Volume (Veh/h)	0	147	5	25	106	13	1	0	12	12	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.87	0.87	0.87	0.89	0.89	0.89	0.50	0.50	0.50	0.35	0.35	0.35
Hourly flow rate (vph)	0	169	6	28	119	15	2	0	24	34	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)	107											
pX, platoon unblocked												
VC, conflicting volume	134			175			354	362	172	378	358	126
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	134			175			354	362	172	378	358	126
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
p0 queue free %	100			98			100	100	97	94	100	100
cM capacity (veh/h)	1451			1401			591	554	872	555	557	924
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	175	162	26	34								
Volume Left	0	28	2	34								
Volume Right	6	15	24	0								
cSH	1451	1401	841	555								
Volume to Capacity	0.00	0.02	0.03	0.06								
Queue Length 95th (m)	0.0	0.5	0.8	1.6								
Control Delay (s)	0.0	1.5	9.4	11.9								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.0	1.5	9.4	11.9								
Approach LOS	A	A	B	B								
Intersection Summary												
Average Delay	2.2											
Intersection Capacity Utilization	30.4%				ICU Level of Service				A			
Analysis Period (min)	15											

Timings  
6: Queen Street North & West Street <TOTAL 2026> Weekday PM Peak Hour 08-29-2024

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	138	57	36	94	51	237	42	275
Traffic Volume (vph)	138	57	36	94	51	237	42	275
Future Volume (vph)	138	57	36	94	51	237	42	275
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	2	2	1	6	
Permitted Phases	4	4	8	2	2	1	6	
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	3.5	20.0	20.0	20.0	20.0	5.0	20.0	
Minimum Split (s)	8.0	37.0	29.0	30.0	30.0	8.0	38.0	
Total Split (s)	8.0	37.0	29.0	30.0	30.0	8.0	38.0	
Total Split (%)	10.7%	49.3%	38.7%	38.7%	40.0%	10.7%	50.7%	
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	2.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	2.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	Max	Max	None	Max	
Act Effct Green (s)	20.0	20.0	27.2	27.2	36.0	32.0	32.0	
Actuated g/C Ratio	0.31	0.31	0.42	0.42	0.56	0.50	0.50	
v/c Ratio	0.37	0.22	0.15	0.43	0.08	0.52	0.52	
Control Delay	15.7	12.9	14.4	15.6	6.7	12.2	12.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	6.5	
Total Delay	15.7	12.9	14.4	15.6	6.7	18.6	18.6	
LOS	B	B	B	B	B	A	B	
Approach Delay	15.7	12.9	12.9	15.5	17.6			
Approach LOS	B	B	B	B	B			
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 64								
Natural Cycle: 75								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.52								
Intersection Signal Delay: 15.9								
Intersection Capacity Utilization 90.7%								
Analysis Period (min) 15								



HCM Signalized Intersection Capacity Analysis <TOTAL 2026> Weekday PM Peak Hour 08-29-2024  
6: Queen Street North & West Street

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	138	57	48	36	94	42	51	237	49	42	275	153
Traffic Volume (vph)	138	57	48	36	94	42	51	237	49	42	275	153
Future Volume (vph)	138	57	48	36	94	42	51	237	49	42	275	153
Initial Flow (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Frt	0.97	0.97	0.96	0.96	0.96	0.96	0.97	0.97	0.97	0.95	0.95	0.95
Flt Protected	0.97	0.97	0.99	0.99	0.99	0.99	0.95	0.95	0.95	0.95	0.95	0.95
Satd. Flow (prot)	3339	3339	3374	3374	3374	3374	1770	1815	1770	1770	1763	1763
Flt Permitted	0.72	0.72	0.83	0.83	0.83	0.83	0.49	0.49	0.49	0.47	0.47	0.47
Satd. Flow (perm)	2459	2459	2845	2845	2845	2845	920	1815	920	873	1763	1763
Peak-hour factor, PHF	0.82	0.82	0.82	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	168	70	59	42	109	49	60	279	58	46	302	168
RTOR Reduction (vph)	0	35	0	0	34	0	0	9	0	0	23	0
Lane Group Flow (vph)	0	262	0	0	165	0	60	328	0	46	447	0
Turn Type	pm-pt	NA	NA	Perm	NA	Perm	NA	NA	pm-pt	NA	NA	NA
Protected Phases	7	4	8	2	2	1	6					
Permitted Phases	4	4	8	2	2	1	6					
Actuated Green, G (s)	20.0	20.0	20.0	27.2	27.2	32.0	32.0	32.8	32.8	32.8	32.8	32.8
Effective Green, g (s)	20.0	20.0	20.0	27.2	27.2	32.0	32.0	32.8	32.8	32.8	32.8	32.8
Actuated g/C Ratio	0.31	0.31	0.31	0.42	0.42	0.51	0.51	0.51	0.51	0.51	0.51	0.51
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	758	758	878	386	761	491	892	892	892	892	892	892
v/s Ratio Prot	c0.11	0.06	0.06	0.07	0.18	0.01	c0.25	c0.25	c0.25	c0.25	c0.25	c0.25
v/c Ratio	0.35	0.19	0.16	0.43	0.09	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Uniform Delay, d1	17.3	16.4	16.4	11.7	13.3	8.3	10.6	10.6	10.6	10.6	10.6	10.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1	0.1	0.9	1.8	0.1	2.0	2.0	2.0	2.0	2.0	2.0
Delay (s)	17.6	16.6	16.6	12.5	15.1	8.4	12.6	12.6	12.6	12.6	12.6	12.6
Level of Service	B	B	B	B	B	A	B	B	B	B	B	B
Approach Delay (s)	17.6	16.6	16.6	14.7	14.7	12.2	12.2	12.2	12.2	12.2	12.2	12.2
Approach LOS	B	B	B	B	B	B	B	B	B	B	B	B
Intersection Summary												
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B									
HCM 2000 Volume to Capacity ratio	0.48											
Actuated Cycle Length (s)	64.8	Sum of lost time (s)	16.0									
Intersection Capacity Utilization	90.7%	ICU Level of Service	E									
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2026> Weekday PM Peak Hour  
7: Metcalfe Street South & West Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		4				4			4	
Traffic Volume (veh/h)	8	127	12	12	152	4	1	1	3	3	8	19
Future Volume (Veh/h)	8	127	12	12	152	4	1	1	3	3	8	19
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.82	0.82	0.82	0.80	0.80	0.80	0.91	0.91	0.91	0.75	0.75	0.75
Hourly flow rate (vph)	10	155	15	15	190	5	1	1	3	4	11	25
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)		105										
pX platoon unblocked												
VC conflicting volume	195			170			436	408	162	408	412	192
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	195			170			436	408	162	408	412	192
IC single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	100	99	98	97
CM capacity (veh/h)	1378			1407			500	524	882	543	520	849
Direction Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	180	210	5	40								
Volume Left	10	15	1	4								
Volume Right	15	5	3	25								
cSH	1378	1407	684	690								
Volume to Capacity	0.01	0.01	0.01	0.06								
Queue Length 95th (m)	0.2	0.3	0.2	1.5								
Control Delay (s)	0.5	0.6	10.3	10.5								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.5	0.6	10.3	10.5								
Approach LOS	B	B	B	B								
Intersection Summary												
Average Delay				1.6								
Intersection Capacity Utilization				22.2%								A
Analysis Period (min)				15								



HCM Unsignalized Intersection Capacity Analysis <TOTAL 2031> Weekday PM Peak Hour  
1: Queen Street North & Union Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (veh/h)	6	3	16	17	13	39	18	408	20	24	518	3
Future Volume (Veh/h)	6	3	16	17	13	39	18	408	20	24	518	3
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.86	0.86	0.86	0.59	0.59	0.59	0.88	0.88	0.88	0.91	0.91	0.91
Hourly flow rate (vph)	7	3	19	29	22	66	20	464	23	26	569	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)	315											
Upstream signal (m)												
pX platoon unblocked												
VC conflicting volume	1215	1150	570	1158	1140	476	572			487		
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	1215	1150	570	1158	1140	476	572			487		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	98	96	82	89	89	98			98		
cM capacity (veh/h)	124	190	521	159	192	589	1001			1076		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	29	117	507	598								
Volume Left	7	29	20	26								
Volume Right	19	66	23	3								
cSH	267	286	1001	1076								
Volume to Capacity	0.11	0.41	0.02	0.02								
Queue Length 95th (m)	2.9	15.2	0.5	0.6								
Control Delay (s)	20.1	26.0	0.6	0.7								
Lane LOS	C	D	A	A								
Approach Delay (s)	20.1	26.0	0.6	0.7								
Approach LOS	C	D										
Intersection Summary												
Average Delay				3.4								
Intersection Capacity Utilization				48.6%	ICU Level of Service			A				
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2031> Weekday PM Peak Hour  
2: Queen Street North & Marshall Lane/Site Access 3 08-29-2024

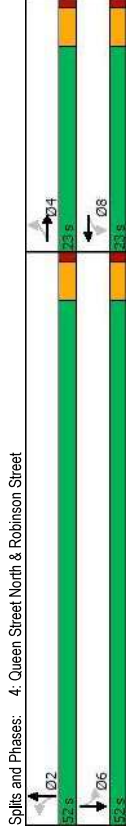
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (veh/h)	10	0	11	11	0	28	9	408	10	25	510	15
Future Volume (Veh/h)	10	0	11	11	0	28	9	408	10	25	510	15
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.25	0.25	0.25	0.40	0.40	0.40	0.84	0.84	0.84	0.87	0.87	0.87
Hourly flow rate (vph)	40	0	44	28	0	70	11	486	12	29	586	17
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)	177											
pX platoon unblocked	0.96	0.96		0.96	0.96	0.96				0.96		
VC conflicting volume	1236	1172	594	1210	1175	492	603			498		
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	1226	1159	594	1199	1162	451	603			457		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	69	100	91	80	100	88	99			97		
cM capacity (veh/h)	128	181	505	138	180	585	975			1060		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	84	98	509	632								
Volume Left	40	28	11	29								
Volume Right	44	70	12	17								
cSH	210	304	975	1060								
Volume to Capacity	0.40	0.32	0.01	0.03								
Queue Length 95th (m)	14.4	10.8	0.3	0.7								
Control Delay (s)	33.2	22.4	0.3	0.7								
Lane LOS	D	C	A	A								
Approach Delay (s)	33.2	22.4	0.3	0.7								
Approach LOS	D	C										
Intersection Summary												
Average Delay				4.2								
Intersection Capacity Utilization				50.5%	ICU Level of Service			A				
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2031> Weekday PM Peak Hour  
 3: Queen Street North & Site Access 2 08-29-2024

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W					A
Traffic Volume (veh/h)	8	1	426	13	5	527
Future Volume (Veh/h)	8	1	426	13	5	527
Sign Control	Stop		Free		Free	Free
Grade	0%		0%		0%	0%
Peak Hour Factor	0.75	0.75	0.82	0.82	0.88	0.88
Hourly flow rate (vph)	11	1	520	16	6	599
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			99			
pK platoon unblocked	0.91	0.91			0.91	
VC conflicting volume	1139	528			536	
VC1 stage 1 conf vol						
VC2 stage 2 conf vol						
VCu unblocked vol	1102	430			438	
IC single (s)	6.4	6.2			4.1	
IC 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	95	100			99	
cM capacity (veh/h)	211	568			1018	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	12	536	605			
Volume Left	11	0	6			
Volume Right	1	16	0			
cSH	223	1700	1018			
Volume to Capacity	0.05	0.32	0.01			
Queue Length 95th (m)	1.4	0.0	0.1			
Control Delay (s)	22.1	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	22.1	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			A
Intersection Capacity Utilization			41.7%			
Analysis Period (min)			15			

Timings <TOTAL 2031> Weekday PM Peak Hour  
 4: Queen Street North & Robinson Street 08-29-2024









Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	10	16	44	14	17	369	78	448
Future Volume (vph)	10	16	44	14	17	369	78	448
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases								
Permitted Phases	4	4	8	8	2	2	6	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	52.0	52.0	52.0	52.0
Total Split (%)	30.7%	30.7%	30.7%	30.7%	69.3%	69.3%	69.3%	69.3%
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	0.0	0.0
Total Lost Time (s)								
Lead/Lag	4.5		4.5		4.5		4.5	
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	11.7	11.7	11.7	11.7	50.7	50.7	50.7	50.7
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.71	0.71	0.71	0.71
v/c Ratio	0.24	0.24	0.65	0.65	0.43	0.43	0.57	0.57
Control Delay	16.3	27.3	27.3	27.3	6.2	6.2	8.5	8.5
Queue Delay	0.0	0.0	0.0	0.0	2.8	2.8	0.0	0.0
Total Delay	16.3	27.3	27.3	27.3	8.9	8.9	8.5	8.5
LOS	B	B	C	C	A	A	A	A
Approach Delay	16.3		27.3		8.9		8.5	
Approach LOS	B		C		A		A	
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 71.4								
Natural Cycle: 60								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.65								
Intersection Signal Delay: 11.6								
Intersection Capacity Utilization 76.7%								
Analysis Period (min) 15								



HCM Signalized Intersection Capacity Analysis <TOTAL 2031> Weekday PM Peak Hour  
 4: Queen Street North & Robinson Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	10	16	25	44	14	61	17	369	71	78	448	9
Traffic Volume (vph)	10	16	25	44	14	61	17	369	71	78	448	9
Future Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Flt Protected	1723	1723	1702	1702	1820	1820	1820	1820	1845	1845	1845	1845
Satd. Flow (prot)	0.92	0.92	0.88	0.88	0.97	0.97	0.97	0.97	0.86	0.86	0.86	0.86
Flt Permitted	1605	1605	1520	1520	1774	1774	1774	1774	1604	1604	1604	1604
Satd. Flow (perm)	0.73	0.73	0.73	0.60	0.60	0.60	0.84	0.84	0.84	0.83	0.83	0.83
Peak-hour factor, PHF	14	22	34	73	23	102	20	439	85	94	540	11
Adj. Flow (vph)	0	28	0	0	57	0	0	7	0	0	1	0
RTOR Reduction (vph)	0	42	0	0	141	0	0	537	0	0	644	0
Lane Group Flow (vph)	Perm	NA	NA	Perm	NA	NA	Perm	NA	Perm	NA	NA	NA
Turn Type	4	4	4	8	8	2	2	2	6	6	6	6
Protected Phases	11.7	11.7	11.7	11.7	11.7	50.6	50.6	50.6	50.6	50.6	50.6	50.6
Permitted Phases	11.7	11.7	11.7	11.7	11.7	50.6	50.6	50.6	50.6	50.6	50.6	50.6
Actuated Green, G (s)	0.16	0.16	0.16	0.16	0.16	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Effective Green, g (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Actuated g/C Ratio	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Clearance Time (s)	263	263	249	249	249	1238	1238	1238	1238	1238	1238	1238
Vehide Extension (s)	0.03	0.03	0.09	0.09	0.09	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Lane Grp Cap (vph)	0.16	0.16	0.57	0.57	0.57	0.43	0.43	0.43	0.43	0.43	0.43	0.43
v/s Ratio Prot	25.6	25.6	27.5	27.5	27.5	4.3	4.3	4.3	4.3	4.3	4.3	4.3
v/c Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay, d1	0.3	0.3	2.9	2.9	2.9	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Progression Factor	25.9	25.9	30.4	30.4	30.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Incremental Delay, d2	C	C	C	C	C	A	A	A	A	A	A	A
Delay (s)	25.9	25.9	30.4	30.4	30.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Level of Service	C	C	C	C	C	A	A	A	A	A	A	A
Approach Delay (s)	C	C	C	C	C	A	A	A	A	A	A	A
Approach LOS	C	C	C	C	C	A	A	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	10.5 HCM 2000 Level of Service B											
HCM 2000 Volume to Capacity ratio	0.57											
Actuated Cycle Length (s)	71.3 Sum of lost time (s) 9.0											
Intersection Capacity Utilization	76.7% ICU Level of Service D											
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2031> Weekday PM Peak Hour  
 5: Metcalfe Street South/Site Access 1 & Robinson Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	162	6	28	117	13	1	0	14	12	0	0
Future Volume (Veh/h)	0	162	6	28	117	13	1	0	14	12	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.74	0.74	0.74	0.25	0.25	0.25	0.62	0.62	0.62
Hourly flow rate (vph)	0	195	7	38	158	18	4	0	56	19	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)	107											
pX platoon unblocked												
vC1 conflicting volume	176			202			442	450	198	498	445	167
vC1 stage 1 conf vol												
vC2 stage 2 conf vol												
vC3 unblocked vol	176			202			442	450	198	498	445	167
IC single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC 2 stage (s)												
IC 2 stage (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			99	100	93	96	100	100
cM capacity (veh/h)	1400			1370			515	490	843	441	494	877
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	202	214	60	19								
Volume Left	0	38	4	19								
Volume Right	7	18	56	0								
cSH	1400	1370	808	441								
Volume to Capacity	0.00	0.03	0.07	0.04								
Queue Length 95th (m)	0.0	0.7	1.9	1.1								
Control Delay (s)	0.0	1.6	9.8	13.5								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.0	1.6	9.8	13.5								
Approach LOS	A	B										
Intersection Summary												
Average Delay	2.4											
Intersection Capacity Utilization	32.4%											
Analysis Period (min)	15											
	ICU Level of Service A											



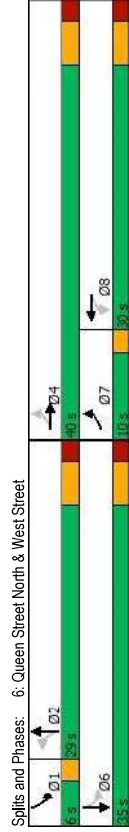
Timings  
6: Queen Street North & West Street

HCM Signalized Intersection Capacity Analysis  
6: Queen Street North & West Street

<TOTAL 2031> Weekday PM Peak Hour  
08-29-2024

<TOTAL 2031> Weekday PM Peak Hour  
08-29-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	152	63	40	103	56	261	46	303
Future Volume (vph)	152	63	40	103	56	261	46	303
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	2	2	2	1	6
Permitted Phases	7	4	8	2	2	2	1	6
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	15.0	15.0	15.0	23.0	23.0	4.0	29.0
Minimum Split (s)	9.5	28.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (s)	10.0	40.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (%)	13.3%	53.3%	40.0%	40.0%	38.7%	38.7%	8.0%	46.7%
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	Max	Max	Max	None	Max
Act Eff Green (s)	15.0	15.0	25.4	25.4	33.0	33.0	29.0	29.0
Actuated g/C Ratio	0.27	0.27	0.45	0.45	0.45	0.59	0.59	0.52
v/c Ratio	0.44	0.26	0.21	0.46	0.11	0.65	0.11	0.65
Control Delay	16.3	13.1	12.7	13.3	5.4	13.0	15.7	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.7
Total Delay	16.3	13.1	12.7	13.3	5.4	28.7	15.7	15.7
LOS	B	B	B	B	B	A	C	C
Approach Delay	16.3	13.1	13.2	13.2	13.2	26.6	15.7	15.7
Approach LOS	B	B	B	B	B	C	C	C
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 56								
Natural Cycle: 75								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.65								
Intersection Signal Delay: 19.3								
Intersection Capacity Utilization 86.5%								
Analysis Period (min) 15								



Movement	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	152	63	40	103	46	56	261	46
Future Volume (vph)	152	63	40	103	46	56	261	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.97	0.97	0.96	0.96	0.97	0.97	1.00	0.95
Flt Protected	0.97	0.97	0.99	0.99	0.95	0.95	1.00	0.95
Satd. Flow (prot)	3340	3340	3374	3374	1770	1815	1770	1763
Flt Permitted	0.72	0.72	0.82	0.82	0.38	0.38	1.00	0.45
Satd. Flow (perm)	2472	2472	2810	2810	711	1815	831	1763
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.82	0.82	0.82	0.78
Adj. Flow (vph)	173	72	60	43	112	50	68	318
RTOR Reduction (vph)	0	38	0	0	37	0	8	0
Lane Group Flow (vph)	0	267	0	0	168	0	68	376
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	8	2	2	1	6
Permitted Phases	7	4	8	8	2	2	1	6
Actuated Green, G (s)	15.0	15.0	15.0	15.0	25.4	25.4	29.8	29.8
Effective Green, g (s)	15.0	15.0	15.0	15.0	25.4	25.4	29.8	29.8
Actuated g/C Ratio	0.26	0.26	0.26	0.26	0.45	0.45	0.52	0.52
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	652	742	742	742	811	811	475	924
v/s Ratio Prot	c0.11	0.06	0.06	0.06	0.10	0.21	0.01	c0.33
v/c Ratio	0.41	0.23	0.23	0.23	0.46	0.12	0.06	0.63
Uniform Delay, d1	17.2	16.4	16.4	16.4	9.6	11.0	6.8	9.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2	0.2	0.2	1.5	1.9	0.1	3.3
Delay (s)	17.7	16.5	16.5	16.5	11.1	12.9	6.9	12.8
Level of Service	B	B	B	B	B	B	A	B
Approach Delay (s)	17.7	16.5	16.5	16.5	12.6	12.6	12.3	12.3
Approach LOS	B	B	B	B	B	B	B	B
Intersection Summary								
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B					
HCM 2000 Volume to Capacity ratio	0.61							
Actuated Cycle Length (s)	56.8	Sum of lost time (s)	16.0					
Intersection Capacity Utilization	86.5%	ICU Level of Service	E					
Analysis Period (min)	15							
c Critical Lane Group								




HCM Unsignalized Intersection Capacity Analysis <TOTAL 2031> Weekday PM Peak Hour  
 7: Metcalfe Street South & West Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4		4	4			4	4		4	4
Traffic Volume (veh/h)	9	140	14	14	168	5	1	1	3	3	9	21
Future Volume (Veh/h)	9	140	14	14	168	5	1	1	3	3	9	21
Sign Control	Free	Free		Free	Free			Stop	Stop		Stop	Stop
Grade	0%	0%		0%	0%			0%	0%		0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.98	0.98	0.98	0.61	0.61	0.61	0.25	0.25	0.25
Hourly flow rate (vph)	11	169	17	14	171	5	2	2	5	12	36	84
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None	None										
Median storage (veh)												
Upstream signal (m)		105										
pX platoon unblocked												
VC conflicting volume	176			186			503	404	178	407	410	174
VC1 stage 1 conf vol												
VC2 stage 2 conf vol												
VCu unblocked vol	176			186			503	404	178	407	410	174
IC single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	99	98	93	90
CM capacity (veh/h)	1400			1388			404	526	866	542	522	870
Direction Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	197	190	9	132								
Volume Left	11	14	2	12								
Volume Right	17	5	5	84								
cSH	1400	1388	620	704								
Volume to Capacity	0.01	0.01	0.01	0.19								
Queue Length 95th (m)	0.2	0.2	0.4	5.5								
Control Delay (s)	0.5	0.6	10.9	11.3								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.5	0.6	10.9	11.3								
Approach LOS	B	B	B	B								
Intersection Summary												
Average Delay				3.4								
Intersection Capacity Utilization				23.7%								A
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2036> Weekday PM Peak Hour  
1: Queen Street North & Union Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	6	3	16	18	14	43	20	447	22	24	518	3
Future Volume (Veh/h)	6	3	16	18	14	43	20	447	22	24	518	3
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.86	0.86	0.86	0.59	0.59	0.59	0.88	0.88	0.88	0.91	0.91	0.91
Hourly flow rate (vph)	7	3	19	31	24	73	23	508	25	26	569	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)	315											
Upstream signal (m)												
pK, platoon unblocked												
VC, conflicting volume	1274	1202	570	1210	1190	520	572			533		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
VCu, unblocked vol	1274	1202	570	1210	1190	520	572			533		
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	98	96	79	87	87	98			97		
cM capacity (veh/h)	108	176	521	146	179	556	1001			1035		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	29	128	556	598								
Volume Left	7	31	23	26								
Volume Right	19	73	25	3								
cSH	245	268	1001	1035								
Volume to Capacity	0.12	0.48	0.02	0.03								
Queue Length 95th (m)	3.2	19.3	0.6	0.6								
Control Delay (s)	21.6	30.2	0.6	0.7								
Lane LOS	C	D	A	A								
Approach Delay (s)	21.6	30.2	0.6	0.7								
Approach LOS	C	D										
Intersection Summary												
Average Delay				4.0			ICU Level of Service			A		
Intersection Capacity Utilization				49.0%								
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2036> Weekday PM Peak Hour  
2: Queen Street North & Marshall Lane/Site Access 3 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	0	11	11	0	28	10	450	10	25	510	151
Future Volume (Veh/h)	10	0	11	11	0	28	10	450	10	25	510	151
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.25	0.25	0.25	0.40	0.40	0.40	0.84	0.84	0.84	0.87	0.87	0.87
Hourly flow rate (vph)	40	0	44	28	0	70	12	536	12	29	586	171
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)	177											
pX, platoon unblocked	0.93	0.93		0.93	0.93	0.93				0.93		
vC, conflicting volume	1288	1224	594	1262	1227	542	603			548		
vc1, stage 1 conf vol												
vc2, stage 2 conf vol												
vCu, unblocked vol	1272	1203	594	1244	1206	469	603			475		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	65	100	91	77	100	87	99			97		
cM capacity (veh/h)	113	164	505	124	164	552	975			1010		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	84	98	560	632								
Volume Left	40	28	12	29								
Volume Right	44	70	12	17								
cSH	191	278	975	1010								
Volume to Capacity	0.44	0.35	0.01	0.03								
Queue Length 95th (m)	16.3	12.2	0.3	0.7								
Control Delay (s)	37.8	24.8	0.3	0.8								
Lane LOS	E	C	A	A								
Approach Delay (s)	37.8	24.8	0.3	0.8								
Approach LOS	E	C										
Intersection Summary												
Average Delay				4.6			ICU Level of Service			A		
Intersection Capacity Utilization				50.4%								
Analysis Period (min)				15								

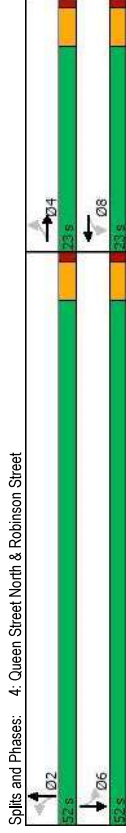


HCM Unsignalized Intersection Capacity Analysis <TOTAL 2036> Weekday PM Peak Hour  
 3: Queen Street North & Site Access 2 08-29-2024

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W					A
Traffic Volume (veh/h)	8	1	469	13	5	527
Future Volume (Veh/h)	8	1	469	13	5	527
Sign Control	Stop		Free		Free	Free
Grade	0%		0%		0%	0%
Peak Hour Factor	0.75	0.75	0.82	0.82	0.88	0.88
Hourly flow rate (vph)	11	1	572	16	6	599
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			99			
pK, platoon unblocked	0.88	0.88			0.88	
VC, conflicting volume	1191	580			588	
VC1, stage 1 conf vol						
VC2, stage 2 conf vol						
VCu, unblocked vol	1150	457			466	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	94	100			99	
cM capacity (veh/h)	192	532			966	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	12	588	605			
Volume Left	11	0	6			
Volume Right	1	16	0			
cSH	203	1700	966			
Volume to Capacity	0.06	0.35	0.01			
Queue Length 95th (m)	1.5	0.0	0.1			
Control Delay (s)	23.8	0.0	0.2			
Lane LOS	C		A			
Approach Delay (s)	23.8	0.0	0.2			
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			A
Intersection Capacity Utilization			41.7%			
Analysis Period (min)			15			

Timings <TOTAL 2036> Weekday PM Peak Hour  
 4: Queen Street North & Robinson Street 08-29-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	10	16	48	15	19	406	78	448
Future Volume (vph)	10	16	48	15	19	406	78	448
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases								
Permitted Phases	4	4	8	8	2	2	6	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	52.0	52.0	52.0	52.0
Total Split (%)	30.7%	30.7%	30.7%	30.7%	69.3%	69.3%	69.3%	69.3%
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	0.0	0.0
Total Lost Time (s)								
Lead/Lag	4.5		4.5		4.5		4.5	
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	12.5	12.5	12.5	12.5	50.5	50.5	50.5	50.5
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.70	0.70	0.70	0.70
v/c Ratio	0.23	0.23	0.68	0.68	0.48	0.48	0.58	0.58
Control Delay	16.0	16.0	29.2	29.2	7.0	7.0	9.1	9.1
Queue Delay	0.0	0.0	0.0	0.0	4.0	4.0	0.0	0.0
Total Delay	16.0	16.0	29.2	29.2	11.0	11.0	9.1	9.1
LOS	B	B	C	C	B	B	A	A
Approach Delay	16.0	16.0	29.2	29.2	11.0	11.0	9.1	9.1
Approach LOS	B	B	C	C	B	B	A	A
Intersection Summary								
Cycle Length: 75								
Actuated Cycle Length: 72								
Natural Cycle: 60								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.68								
Intersection Signal Delay: 13.0								
Intersection Capacity Utilization 78.6%								
Analysis Period (min) 15								



HCM Signalized Intersection Capacity Analysis <TOTAL 2036> Weekday PM Peak Hour  
4: Queen Street North & Robinson Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (vph)	10	16	25	48	15	67	19	406	79	78	448	9
Future Volume (vph)	10	16	25	48	15	67	19	406	79	78	448	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Flt Protected	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Satd. Flow (prot)	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Flt Permitted	0.92	0.92	0.92	0.87	0.87	0.87	0.97	0.97	0.85	0.85	0.85	0.85
Satd. Flow (perm)	1602	1602	1602	1515	1515	1515	1769	1769	1583	1583	1583	1583
Peak-hour factor, PHF	0.73	0.73	0.73	0.60	0.60	0.60	0.84	0.84	0.84	0.83	0.83	0.83
Adj. Flow (vph)	14	22	34	80	25	112	23	483	94	94	540	11
RTOR Reduction (vph)	0	28	0	0	56	0	0	7	0	0	1	0
Lane Group Flow (vph)	0	42	0	0	161	0	0	593	0	0	644	0
Turn Type	Perm	NA	NA	Perm	NA	NA	Perm	NA	Perm	NA	NA	NA
Protected Phases	4	4	4	8	8	8	2	2	2	6	6	6
Permitted Phases	4	4	4	8	8	8	2	2	2	6	6	6
Actuated Green, G (s)	12.5	12.5	12.5	12.5	12.5	12.5	50.4	50.4	50.4	50.4	50.4	50.4
Effective Green, g (s)	12.5	12.5	12.5	12.5	12.5	12.5	50.4	50.4	50.4	50.4	50.4	50.4
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.70	0.70	0.70	0.70	0.70	0.70
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	278	278	278	263	263	263	1240	1240	1240	1240	1240	1240
v/s Ratio Prot	0.03	0.03	0.03	0.11	0.11	0.11	0.34	0.34	0.34	0.34	0.34	0.34
v/c Ratio	0.15	0.15	0.15	0.61	0.61	0.61	0.48	0.48	0.48	0.48	0.48	0.48
Uniform Delay, d1	25.2	25.2	25.2	27.5	27.5	27.5	4.8	4.8	4.8	4.8	4.8	4.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.3	0.3	4.2	4.2	4.2	1.3	1.3	1.3	1.3	1.3	1.3
Delay (s)	25.4	25.4	25.4	31.6	31.6	31.6	6.2	6.2	6.2	6.2	6.2	6.2
Level of Service	C	C	C	C	C	C	A	A	A	A	A	A
Approach Delay (s)	25.4	25.4	25.4	31.6	31.6	31.6	6.2	6.2	6.2	6.2	6.2	6.2
Approach LOS	C	C	C	C	C	C	A	A	A	A	A	A
Intersection Summary												
HCM 2000 Control Delay	11.3											
HCM 2000 Volume to Capacity ratio	0.59											
Actuated Cycle Length (s)	71.9											
Intersection Capacity Utilization	78.6%											
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis <TOTAL 2036> Weekday PM Peak Hour  
5: Metcalfe Street South/Site Access 1 & Robinson Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (veh/h)	0	162	6	30	129	13	1	0	15	12	0	0
Future Volume (Veh/h)	0	162	6	30	129	13	1	0	15	12	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.74	0.74	0.74	0.25	0.25	0.25	0.62	0.62	0.62
Hourly flow rate (vph)	0	195	7	41	174	18	4	0	60	19	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None											
Median storage (veh)												
Upstream signal (m)	107											
pX platoon unblocked												
VC conflicting volume	192	202	202	464	472	198	524	467	183	183	183	183
VC1 stage 1 conf vol	192	202	202	464	472	198	524	467	183	183	183	183
VC2 stage 2 conf vol	192	202	202	464	472	198	524	467	183	183	183	183
IC, single (s)	4.1	4.1	4.1	7.1	6.5	6.2	7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)	2.2	2.2	2.2	3.5	4.0	3.3	3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100	97	97	99	100	93	95	100	100	100	100	100
p0 capacity (veh/h)	1381	1370	1370	457	475	843	421	479	859	421	479	859
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	EB 1	WB 1	NB 1	SB 1	EB 1	WB 1	NB 1	SB 1
Volume Total	202	233	64	19	202	233	64	19	202	233	64	19
Volume Left	0	41	4	19	0	41	4	19	0	41	4	19
Volume Right	7	18	60	0	7	18	60	0	7	18	60	0
cSH	1381	1370	807	421	1381	1370	807	421	1381	1370	807	421
Volume to Capacity	0.00	0.03	0.08	0.05	0.00	0.03	0.08	0.05	0.00	0.03	0.08	0.05
Queue Length 95th (m)	0.0	0.7	2.1	1.1	0.0	0.7	2.1	1.1	0.0	0.7	2.1	1.1
Control Delay (s)	0.0	1.6	9.8	13.9	0.0	1.6	9.8	13.9	0.0	1.6	9.8	13.9
Lane LOS	A	A	A	B	A	A	A	B	A	A	A	B
Approach Delay (s)	0.0	1.6	9.8	13.9	0.0	1.6	9.8	13.9	0.0	1.6	9.8	13.9
Approach LOS	A	A	A	B	A	A	A	B	A	A	A	B
Intersection Summary												
Average Delay	2.4											
Intersection Capacity Utilization	33.3%											
Analysis Period (min)	15											

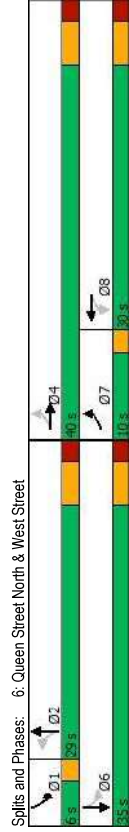
Timings  
6: Queen Street North & West Street

HCM Signalized Intersection Capacity Analysis  
6: Queen Street North & West Street

<TOTAL 2036> Weekday PM Peak Hour  
08-29-2024

<TOTAL 2036> Weekday PM Peak Hour  
08-29-2024

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		4TB	4TB	4TB	4TB	4TB	4TB	4TB
Traffic Volume (vph)	152	63	44	114	62	287	46	303
Future Volume (vph)	152	63	44	114	62	287	46	303
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	2	2	2	1	6
Permitted Phases	4	8	8	2	2	2	1	6
Detector Phase	7	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	15.0	15.0	15.0	23.0	23.0	4.0	29.0
Minimum Split (s)	9.5	28.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (s)	10.0	40.0	30.0	30.0	29.0	29.0	6.0	35.0
Total Split (%)	13.3%	53.3%	40.0%	40.0%	38.7%	38.7%	8.0%	46.7%
Yellow Time (s)	2.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lead/Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	Max	None	Max
Act Eff Green (s)	15.0	15.0	25.4	25.4	33.0	33.0	29.0	29.0
Actuated g/C Ratio	0.27	0.27	0.45	0.45	0.59	0.59	0.52	0.52
v/c Ratio	0.44	0.29	0.24	0.51	0.11	0.65	0.11	0.65
Control Delay	16.4	13.4	13.1	14.0	5.4	13.0	15.7	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.7
Total Delay	16.4	13.4	13.1	14.0	5.4	13.0	15.7	15.7
LOS	B	B	B	B	A	A	C	C
Approach Delay	16.4	13.4	13.4	13.9	13.9	13.9	26.6	26.6
Approach LOS	B	B	B	B	B	B	C	C



Movement	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		4TB	4TB	4TB	4TB	4TB	4TB	4TB
Traffic Volume (vph)	152	63	53	44	51	62	287	46
Future Volume (vph)	152	63	53	44	51	62	287	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.97	0.97	0.96	0.96	0.97	0.97	1.00	0.95
Flt Protected	0.97	0.97	0.99	0.99	0.95	0.95	1.00	0.95
Satd. Flow (prot)	3340	3340	3375	3375	1770	1815	1770	1763
Flt Permitted	0.71	0.71	0.82	0.82	0.38	0.38	1.00	0.41
Satd. Flow (perm)	2444	2444	2791	2791	711	1815	762	1763
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.82	0.82	0.78
Adj. Flow (vph)	173	72	60	48	55	76	350	59
RTOR Reduction (vph)	0	38	0	0	0	0	8	0
Lane Group Flow (vph)	0	267	0	0	187	0	76	415
Turn Type	pm-pt	NA	Perm	NA	Perm	NA	pm-pt	NA
Protected Phases	7	4	8	8	2	2	1	6
Permitted Phases	4	8	8	8	2	2	1	6
Actuated Green, G (s)	15.0	15.0	15.0	15.0	25.4	25.4	29.8	29.8
Effective Green, g (s)	15.0	15.0	15.0	15.0	25.4	25.4	29.8	29.8
Actuated g/C Ratio	0.26	0.26	0.26	0.26	0.45	0.45	0.52	0.52
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	2.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	645	737	737	737	811	811	442	924
v/s Ratio Prot	c0.11	0.07	0.07	0.11	0.23	0.01	c0.33	0.06
v/c Ratio	0.41	0.25	0.24	0.24	0.51	0.13	0.63	0.63
Uniform Delay, d1	17.3	16.5	16.5	11.3	11.3	6.9	9.6	9.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2	0.2	1.8	2.3	0.1	3.3	3.3
Delay (s)	17.7	16.7	16.7	13.6	13.6	7.1	12.8	12.8
Level of Service	B	B	B	B	B	A	B	B
Approach Delay (s)	17.7	16.7	16.7	13.2	13.2	12.3	12.3	12.3
Approach LOS	B	B	B	B	B	B	B	B

Intersection Summary	
HCM 2000 Control Delay	14.2
HCM 2000 Volume to Capacity ratio	0.61
Actuated Cycle Length (s)	56.8
Intersection Capacity Utilization	90.4%
Analysis Period (min)	15

c Critical Lane Group



HCM Unsignalized Intersection Capacity Analysis <TOTAL 2036> Weekday PM Peak Hour  
 7: Metcalfe Street South & West Street 08-29-2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4		4	4		4	4		4	4	
Traffic Volume (veh/h)	9	140	14	15	185	5	1	1	4	3	9	21
Future Volume (Veh/h)	9	140	14	15	185	5	1	1	4	3	9	21
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.83	0.83	0.83	0.98	0.98	0.98	0.61	0.61	0.61	0.25	0.25	0.25
Hourly flow rate (vph)	11	169	17	15	189	5	2	2	7	12	36	84
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None	None	None	None	None	None	None	None	None	None	None	None
Median storage (veh)												
Upstream signal (m)												
pX platoon unblocked												
VC, conflicting volume	194			186			523	424	178	429	430	192
VC1, stage 1 conf vol												
VC2, stage 2 conf vol												
VCu, unblocked vol	194			186			523	424	178	429	430	192
IC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
IC, 2 stage (s)												
IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	100	99	98	93	90
CM capacity (veh/h)	1379			1388			390	512	866	523	508	850
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	197	209	11	132								
Volume Left	11	15	2	12								
Volume Right	17	5	7	84								
cSH	1379	1388	643	685								
Volume to Capacity	0.01	0.01	0.02	0.19								
Queue Length 95th (m)	0.2	0.3	0.4	5.7								
Control Delay (s)	0.5	0.6	10.7	11.5								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.5	0.6	10.7	11.5								
Approach LOS	B	B	B	B								
Intersection Summary												
Average Delay				3.4								
Intersection Capacity Utilization				24.9%							A	
Analysis Period (min)				15								

Intersection: 1: Queen Street North & Union Street									
Movement	EB	WB	NB	SB	LTR	LTR	LTR	LTR	LTR
Directions Served									
Maximum Queue (m)	22.0	9.3	9.0	9.2					
Average Queue (m)	7.1	6.3	0.3	1.5					
95th Queue (m)	17.1	13.2	3.0	7.0					
Link Distance (m)	59.3	118.1	120.9	65.4					
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB	WB	NB	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served									
Maximum Queue (m)	15.8	9.2	22.1						
Average Queue (m)	7.2	0.3	2.4						
95th Queue (m)	15.7	3.0	11.3						
Link Distance (m)	53.0	67.7	63.4						
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served									
Maximum Queue (m)	9.0	9.1							
Average Queue (m)	0.8	0.3							
95th Queue (m)	4.7	3.0							
Link Distance (m)	100.6	63.4							
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 4: Queen Street North & Robinson Street									
Movement	EB	WB	NB	SB	LTR	LTR	LTR	LTR	LTR
Directions Served									
Maximum Queue (m)	15.6	22.1	42.0	34.7					
Average Queue (m)	5.1	10.4	19.7	19.6					
95th Queue (m)	12.9	16.9	38.3	35.3					
Link Distance (m)	132.3	87.9	51.6	80.0					
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB	NB	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served									
Maximum Queue (m)	15.4	9.1							
Average Queue (m)	0.8	3.0							
95th Queue (m)	6.0	9.9							
Link Distance (m)	220.7	59.8							
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 6: Queen Street North & West Street

Movement	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LT	TR	LT	TR	L	TR	L	TR	TR
Maximum Queue (m)	39.5	21.0	15.1	14.7	14.6	44.8	21.2	39.6	
Average Queue (m)	26.6	7.7	7.8	3.0	3.9	20.3	6.2	18.0	
95th Queue (m)	39.3	16.0	16.2	9.8	11.4	37.1	15.7	32.9	
Link Distance (m)	140.6	140.6	85.1	85.1	124.8			51.6	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)					23.0			27.0	
Storage Blk Time (%)						4	0	2	
Queuing Penalty (veh)						1	0	1	

Intersection: 7. Metcalfe Street South & West Street

Movement	WB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	8.6	8.3
Average Queue (m)	0.3	5.1
95th Queue (m)	2.8	11.5
Link Distance (m)	216.9	59.8
Upstream Blk. Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		
Network Summary		
Network wide Queuing Penalty: 2		



Intersection: 1: Queen Street North & Union Street						
Movement	EB	WB	NB	SB		
	LTR	LTR	LTR	LTR		
Directions Served						
Maximum Queue (m)	9.2	15.6	28.3	22.9		
Average Queue (m)	5.3	7.8	2.6	2.0		
95th Queue (m)	12.6	15.5	13.7	11.9		
Link Distance (m)	59.3	118.1	120.9	65.4		
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3						
Movement	EB	WB	NB	SB		
	LTR	LTR	LTR	LTR		
Directions Served						
Maximum Queue (m)	15.6	8.6	22.8			
Average Queue (m)	5.3	0.5	1.7			
95th Queue (m)	13.2	3.5	10.4			
Link Distance (m)	53.0	67.7	63.4			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Queen Street North & Site Access 2						
Movement	WB	SB				
	LR	LT				
Directions Served						
Maximum Queue (m)	8.9	23.0				
Average Queue (m)	1.2	1.9				
95th Queue (m)	6.1	10.5				
Link Distance (m)	100.6	63.4				
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 4: Queen Street North & Robinson Street						
Movement	EB	WB	NB	SB		
	LTR	LTR	LTR	LTR		
Directions Served						
Maximum Queue (m)	9.3	23.3	40.1	73.0		
Average Queue (m)	5.9	12.7	17.3	27.0		
95th Queue (m)	13.0	22.9	35.1	52.4		
Link Distance (m)	132.3	87.9	51.6	80.0		
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street						
Movement	WB	NB	SB			
	LTR	LTR	LTR			
Directions Served						
Maximum Queue (m)	9.2	9.0	8.6			
Average Queue (m)	0.9	2.6	1.0			
95th Queue (m)	5.3	9.2	5.4			
Link Distance (m)	220.7	59.8	35.9			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Queen Street North & West Street										
Movement	EB	EB	WB	WB	NB	NB	SB	SB		
	LT	TR	LT	TR	L	TR	L	TR		
Directions Served										
Maximum Queue (m)	48.2	22.6	28.0	21.1	20.1	58.8	37.4	54.6		
Average Queue (m)	22.4	5.0	10.8	9.3	7.2	22.9	7.7	32.1		
95th Queue (m)	41.9	13.4	22.7	17.1	16.3	40.7	20.9	54.3		
Link Distance (m)	140.6	140.6	85.1	85.1	124.8			51.6		
Upstream Blk Time (%)								2		
Queuing Penalty (veh)								10		
Storage Bay Dist (m)					23.0					
Storage Blk Time (%)					0		5	0	12	
Queuing Penalty (veh)					0		3	2	5	

Intersection: 7. Metcalfe Street South & West Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.4	8.8	8.9	14.9
Average Queue (m)	0.3	0.6	2.2	4.3
95th Queue (m)	2.8	4.2	8.4	11.6
Link Distance (m)	85.1	216.9	128.7	53.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				
Network Summary				
Network wide Queuing Penalty: 19				

Intersection: 1: Queen Street North & Union Street						
Movement	EB	WB	SB	EB	WB	SB
	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served						
Maximum Queue (m)	9.2	9.3	9.0			
Average Queue (m)	4.3	6.7	0.6			
95th Queue (m)	11.5	13.0	4.1			
Link Distance (m)	59.3	118.1	65.4			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB	WB	NB	SB	EB	WB	NB	SB
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served								
Maximum Queue (m)	16.5	9.3	22.2	9.0				
Average Queue (m)	7.2	1.5	2.7	0.3				
95th Queue (m)	14.2	7.1	11.7	3.0				
Link Distance (m)	53.0	67.7	63.4	120.9				
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB	EB	WB	SB	EB	WB	SB
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served								
Maximum Queue (m)	9.0	28.9						
Average Queue (m)	1.2	1.6						
95th Queue (m)	6.1	10.7						
Link Distance (m)	100.6	63.4						
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 4: Queen Street North & Robinson Street								
Movement	EB		WB		NB		SB	
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served								
Maximum Queue (m)	15.7	28.4	23.3	29.7				
Average Queue (m)	7.7	10.6	4.0	10.8				
95th Queue (m)	15.7	18.4	14.5	24.9				
Link Distance (m)	132.3	87.9	51.6	80.0				
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB	NB	SB	WB	NB	SB	WB	NB	SB
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served									
Maximum Queue (m)	9.2	15.4	8.6						
Average Queue (m)	0.9	2.3	0.3						
95th Queue (m)	5.3	9.4	2.9						
Link Distance (m)	220.7	59.8	35.9						
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 6: Queen Street North & West Street

Movement	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served												
Maximum Queue (m)	40.1	20.9	26.4	14.1	8.0	71.6	14.2	34.8				
Average Queue (m)	25.3	9.3	11.2	4.3	3.4	20.3	4.0	20.4				
95th Queue (m)	36.2	16.7	21.8	11.4	9.6	41.6	11.3	36.0				
Link Distance (m)	140.6	140.6	85.1	85.1	124.8			51.6				
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)												
Storage Blk Time (%)												
Queuing Penalty (veh)												



Intersection: 7. Metcalfe Street South & West Street			
Movement	EB	SB	
	LTR	LTR	
Directions Served			
Maximum Queue (m)	14.8	14.6	
Average Queue (m)	0.5	6.2	
95th Queue (m)	4.9	12.3	
Link Distance (m)			
Upstream Blk Time (%)	85.1	59.8	
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			
Network Summary			
Network wide Queuing Penalty: 3			

Intersection: 1: Queen Street North & Union Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.2	16.5	16.1	33.0
Average Queue (m)	4.5	8.7	1.6	4.5
95th Queue (m)	11.9	15.6	8.0	18.9
Link Distance (m)	59.3	118.1	120.9	65.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	15.0	9.1	9.2	
Average Queue (m)	5.3	0.6	0.6	
95th Queue (m)	13.1	4.2	4.4	
Link Distance (m)	53.0	67.7	63.4	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.0	8.4
Average Queue (m)	1.6	0.3
95th Queue (m)	7.2	2.8
Link Distance (m)	100.6	63.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Queen Street North & Robinson Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.3	22.2	48.9	48.7
Average Queue (m)	6.6	12.6	20.7	24.3
95th Queue (m)	12.8	20.5	38.2	43.4
Link Distance (m)	132.3	87.9	51.6	80.0
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB	NB
Directions Served	LTR	LTR
Maximum Queue (m)	15.0	9.1
Average Queue (m)	0.8	3.1
95th Queue (m)	5.9	10.0
Link Distance (m)	220.7	59.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Queen Street North & West Street

Movement	EB	WB	NB	SB
Directions Served	LT	TR	LT	TR
Maximum Queue (m)	42.3	15.1	29.3	20.1
Average Queue (m)	21.8	6.0	15.2	9.4
95th Queue (m)	35.3	12.3	25.0	19.5
Link Distance (m)	140.6	140.6	85.1	124.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)			23.0	27.0
Storage Blk Time (%)			0	7
Queuing Penalty (veh)			0	3

Intersection: 7. Metcalfe Street South & West Street					
Movement	EB	NB	SB		
	LTR	LTR	LTR		
Directions Served					
Maximum Queue (m)	8.3	9.1	8.2		
Average Queue (m)	0.3	1.4	5.3		
95th Queue (m)					
	2.7	6.6	11.4		
Link Distance (m)	85.1	128.7	59.8		
Upstream Blk. Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					
Network Summary					
Network wide Queuing Penalty: 8					



Intersection: 1: Queen Street North & Union Street								
Movement	EB		WB		NB		SB	
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	
Directions Served								
Maximum Queue (m)	15.7	20.5	9.0	27.0				
Average Queue (m)	6.0	7.8	0.8	4.8				
95th Queue (m)	14.1	15.4	4.9	17.8				
Link Distance (m)	59.3	118.1	120.9	65.4				
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB	WB	NB			
	LTR	LTR	LTR			
Directions Served						
Maximum Queue (m)	17.1	9.3	9.3			
Average Queue (m)	8.0	1.2	1.8			
95th Queue (m)	14.6	6.4	7.9			
Link Distance (m)	53.0	67.7	63.4			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB
	LR	LT
Directions Served	9.0	15.6
Maximum Queue (m)	2.0	0.8
Average Queue (m)	8.2	6.1
95th Queue (m)	100.6	63.4
Link Distance (m)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Queen Street North & Robinson Street								
Movement	EB		WB		NB		SB	
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	
Directions Served								
Maximum Queue (m)	23.3	21.4	54.7	45.7				
Average Queue (m)	9.7	10.5	20.9	23.1				
95th Queue (m)	19.0	17.4	40.4	42.5				
Link Distance (m)								
Upstream Blk Time (%)	132.3	87.9	51.6	80.0				
Queuing Penalty (veh)			0					
Storage Bay Dist (m)			2					
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB	NB	SB			
	LTR	LTR	LTR			
Directions Served						
Maximum Queue (m)	9.0	9.0	8.6			
Average Queue (m)	0.3	3.5	0.3			
95th Queue (m)	3.0	10.6	2.9			
Link Distance (m)	220.7	59.8	35.9			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Queen Street North & West Street

Movement	EB	EB	WB	WB	NB	NB	SB	SB	
	LT	TR	LT	TR	L	TR	L	TR	
Directions Served									
Maximum Queue (m)	48.2	20.7	15.7	14.6	26.7	57.1	16.6	55.2	
Average Queue (m)	29.6	10.4	8.1	2.9	5.7	21.9	4.7	28.2	
95th Queue (m)	45.1	18.8	16.3	10.0	15.7	42.0	13.1	52.5	
Link Distance (m)	140.6	140.6	85.1	85.1	124.8		51.6		
Upstream Blk Time (%)									2
Queuing Penalty (veh)									6
Storage Bay Dist (m)									
Storage Blk Time (%)									23.0
Queuing Penalty (veh)									1
Storage Blk Time (%)									7
Queuing Penalty (veh)									2
Storage Blk Time (%)									2
Queuing Penalty (veh)									3

Intersection: 7. Metcalfe Street South & West Street				
Movement	EB	WB	SB	
Directions Served	LTR	LTR	LTR	
Maximum Queue (m)	8.5	8.6	8.2	
Average Queue (m)	0.3	0.6	4.5	
95th Queue (m)	2.8	4.1	11.1	
Link Distance (m)	85.1	216.9	59.8	
Upstream Blk. Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				
Network Summary				
Network wide Queuing Penalty: 14				

Intersection: 1: Queen Street North & Union Street									
Movement	EB	WB	NB	SB	EB	WB	NB	SB	
Directions Served	LTR	LTR	LTR	LTR					
Maximum Queue (m)	9.2	22.2	9.2	23.1					
Average Queue (m)	5.7	10.6	2.1	3.0					
95th Queue (m)	12.9	18.8	8.2	13.1					
Link Distance (m)	55.3	118.1	120.9	65.4					
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB	WB	NB	EB	WB	NB
Directions Served	LTR	LTR	LTR			
Maximum Queue (m)	9.3	9.3	16.7			
Average Queue (m)	5.0	0.6	1.5			
95th Queue (m)	12.3	4.4	8.0			
Link Distance (m)	53.0	67.7	63.4			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB	EB	WB	SB
Directions Served	LT	LT			
Maximum Queue (m)	9.0	22.7			
Average Queue (m)	0.9	1.6			
95th Queue (m)	5.3	10.0			
Link Distance (m)	100.6	63.4			
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 4: Queen Street North & Robinson Street									
Movement	EB	WB	NB	SB	EB	WB	NB	SB	
Directions Served	LTR	LTR	LTR	LTR					
Maximum Queue (m)	26.9	39.2	54.9	41.7					
Average Queue (m)	9.6	17.8	21.6	26.3					
95th Queue (m)	21.2	32.9	42.8	44.9					
Link Distance (m)	132.3	87.9	51.6	80.0					
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB	NB	SB	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR				
Maximum Queue (m)	9.2	9.0	8.0				
Average Queue (m)	1.5	3.6	0.3				
95th Queue (m)	6.9	10.8	2.6				
Link Distance (m)	220.7	59.8	35.9				
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Queen Street North & West Street

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	TR	L	TR	L	TR
Maximum Queue (m)	59.5	15.0	26.7	21.2	20.9	51.4	48.8	55.7
Average Queue (m)	27.0	6.0	12.3	7.5	8.5	28.0	9.5	37.6
95th Queue (m)	47.3	14.1	22.4	16.8	19.1	46.0	25.3	58.4
Link Distance (m)	140.6	140.6	85.1	85.1	124.8		51.6	
Upstream Blk Time (%)						0	2	
Queuing Penalty (veh)						0	9	
Storage Bay Dist (m)					23.0		27.0	
Storage Blk Time (%)					0	10	14	
Queuing Penalty (veh)					1	6	7	



Intersection: 7. Metcalfe Street South & West Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.4	8.8	9.0	15.2
Average Queue (m)	0.6	0.9	1.4	6.1
95th Queue (m)	4.0	5.1	6.6	12.6
Link Distance (m)	85.1	216.9	128.7	53.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				
Network Summary				
Network wide Queuing Penalty: 22				

Intersection: 1: Queen Street North & Union Street								
Movement	EB		WB		NB		SB	
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served								
Maximum Queue (m)	9.2	15.7	9.0	21.8				
Average Queue (m)	5.6	8.0	0.5	3.6				
95th Queue (m)	12.7	13.7	3.7	13.1				
Link Distance (m)	59.3	118.1	120.9	65.4				
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB		WB		NB		SB	
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served								
Maximum Queue (m)	31.4	9.2	22.1	8.6				
Average Queue (m)	7.4	0.3	4.6	0.3				
95th Queue (m)	17.8	3.0	16.2	2.8				
Link Distance (m)	53.0	67.7	63.4	120.9				
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	8.9	9.2
Average Queue (m)	0.9	1.2
95th Queue (m)	5.2	6.1
Link Distance (m)	100.6	63.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Queen Street North & Robinson Street								
Movement	EB		WB		NB		SB	
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	
Directions Served								
Maximum Queue (m)	21.4	22.1	42.9	52.9				
Average Queue (m)	5.9	11.7	22.2	22.4				
95th Queue (m)	14.2	18.6	40.6	42.4				
Link Distance (m)	132.3	87.9	51.6	80.0				
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB		NB	
	LTR	LTR	LTR	LTR
Directions Served				
Maximum Queue (m)	9.3	9.1		
Average Queue (m)	1.2	2.6		
95th Queue (m)	6.3	9.3		
Link Distance (m)	220.7	99.8		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Queen Street North & West Street

Movement	EB	EB	WB	WB	NB	NB	SB	SB	
	LT	TR	LT	TR	L	TR	L	TR	
Directions Served									
Maximum Queue (m)	71.0	54.4	16.1	14.7	14.4	73.9	25.6	55.4	
Average Queue (m)	34.0	11.3	10.4	5.3	5.2	27.4	6.6	28.1	
95th Queue (m)	56.9	29.0	17.9	13.2	12.9	49.6	15.4	48.8	
Link Distance (m)	140.6	140.6	85.1	85.1	124.8		51.6		
Upstream Blk Time (%)									1
Queuing Penalty (veh)									4
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 7. Metcalfe Street South & West Street			
Movement	WB	SB	
Directions Served	LTR	LTR	
Maximum Queue (m)	8.6	8.2	
Average Queue (m)	0.3	5.9	
95th Queue (m)	2.8	11.8	
Link Distance (m)	216.9	59.8	
Upstream Blk. Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			
Network Summary			
Network wide Queuing Penalty: 13			



Intersection: 1: Queen Street North & Union Street									
Movement	EB	WB	NB	SB	LTR	LTR	LTR	LTR	
Directions Served					9.2	23.7	28.4	21.8	
Maximum Queue (m)					5.2	9.7	3.3	4.0	
Average Queue (m)					12.3	18.7	16.1	14.8	
95th Queue (m)					55.3	118.1	120.9	65.4	
Link Distance (m)									
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB	WB	NB	LTR	LTR	LTR	LTR		
Directions Served					9.3	8.5	22.2		
Maximum Queue (m)					4.4	0.3	0.7		
Average Queue (m)					11.7	2.8	7.3		
95th Queue (m)					53.0	67.7	63.4		
Link Distance (m)									
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB	LTR	LTR	LTR	LTR	LTR		
Directions Served					8.9	9.1			
Maximum Queue (m)					1.8	0.6			
Average Queue (m)					7.6	4.3			
95th Queue (m)					100.6	63.4			
Link Distance (m)									
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 4: Queen Street North & Robinson Street									
Movement	EB	WB	NB	SB	LTR	LTR	LTR	LTR	
Directions Served					28.0	48.2	54.0	80.0	
Maximum Queue (m)					10.3	17.0	27.7	30.7	
Average Queue (m)					19.4	29.9	51.5	59.8	
95th Queue (m)					132.3	87.9	51.6	80.0	
Link Distance (m)									
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB	NB	LTR	LTR	LTR	LTR	LTR		
Directions Served					22.9	9.1			
Maximum Queue (m)					2.8	3.5			
Average Queue (m)					11.5	10.6			
95th Queue (m)					220.7	59.8			
Link Distance (m)									
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 6: Queen Street North & West Street

Movement	EB	WB	NB	SB	LTR	LTR	LTR	LTR	
Directions Served					46.9	20.1	23.3	27.5	
Maximum Queue (m)					25.1	7.2	13.6	10.1	
Average Queue (m)					40.4	15.1	22.0	20.0	
95th Queue (m)					140.6	140.6	85.1	85.1	
Link Distance (m)									
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 7. Metcalfe Street South & West Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.5	7.8	8.9	8.2
Average Queue (m)	0.3	0.3	0.6	5.9
95th Queue (m)	2.8	2.6	4.2	11.7
Link Distance (m)	85.1	216.9	128.7	53.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				
Network Summary				
Network wide Queuing Penalty: 27				

Intersection: 1: Queen Street North & Union Street						
Movement	EB	WB	NB	SB		
	LTR	LTR	LTR	LTR		
Directions Served						
Maximum Queue (m)	9.2	15.6	9.1	28.8		
Average Queue (m)	6.6	7.7	0.3	2.1		
95th Queue (m)	13.1	14.5	3.0	12.2		
Link Distance (m)	59.3	118.1	120.9	65.4		
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB		WB		NB		SB	
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served	16.4	22.2	15.6	15.5				
Maximum Queue (m)	6.0	9.0	1.1	1.4				
Average Queue (m)	14.2	17.9	7.0	7.6				
95th Queue (m)	53.0	67.7	63.4	120.9				
Link Distance (m)								
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.0	9.2
Average Queue (m)	2.4	0.3
95th Queue (m)	8.8	3.0
Link Distance (m)	100.6	63.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Queen Street North & Robinson Street						
Movement	EB	WB	NB	SB		
Directions Served	LTR	LTR	LTR	LTR		
Maximum Queue (m)	15.2	21.6	42.2	65.1		
Average Queue (m)	7.0	9.4	13.2	21.6		
95th Queue (m)	13.9	16.9	28.2	46.8		
Link Distance (m)	132.3	87.9	51.6	80.0		
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	9.2	15.5	8.6
Average Queue (m)	0.9	4.6	0.6
95th Queue (m)	5.3	12.4	4.1
Link Distance (m)	220.7	59.8	35.9
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Queen Street North & West Street

Movement	EB	EB	WB	WB	NB	NB	SB	SB	
	LT	TR	LT	TR	L	TR	L	TR	
Directions Served	65.8	19.4	26.5	8.2	14.4	45.9	15.6	39.5	
Maximum Queue (m)	28.4	7.1	10.3	3.4	4.5	20.5	5.3	24.4	
Average Queue (m)	50.0	14.2	19.6	9.8	13.1	37.1	13.0	37.5	
95th Queue (m)	140.6	140.6	85.1	85.1	124.8			51.6	
Link Distance (m)									
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									



Intersection: 7. Metcalfe Street South & West Street

Movement	EB	WB	SB
	LTR	LTR	LTR
Directions Served			
Maximum Queue (m)	8.3	8.8	15.3
Average Queue (m)	0.3	0.6	4.7
95th Queue (m)	2.7	4.0	11.9
Link Distance (m)	85.1	216.9	59.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			
Network Summary			
Network wide Queuing Penalty: 4			

Intersection: 1: Queen Street North & Union Street									
Movement	EB	WB	NB	SB	EB	WB	NB	SB	
Directions Served	LTR	LTR	LTR	LTR					
Maximum Queue (m)	16.6	16.6	8.4	27.6					
Average Queue (m)	6.7	7.8	0.5	2.5					
95th Queue (m)	15.5	15.9	3.6	13.1					
Link Distance (m)	59.3	118.1	120.9	65.4					
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB	WB	NB	SB	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR				
Maximum Queue (m)	16.3	15.5	21.6	22.3				
Average Queue (m)	6.9	6.2	3.6	2.5				
95th Queue (m)	15.1	13.7	13.7	11.6				
Link Distance (m)	53.0	67.7	63.4	120.9				
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB	EB	WB	SB
Directions Served	LR	LT			
Maximum Queue (m)	8.9	16.6			
Average Queue (m)	1.2	1.4			
95th Queue (m)	6.1	8.3			
Link Distance (m)	100.6	63.4			
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 4: Queen Street North & Robinson Street									
Movement	EB	WB	NB	SB	EB	WB	NB	SB	
Directions Served	LTR	LTR	LTR	LTR					
Maximum Queue (m)	30.3	28.7	48.6	59.4					
Average Queue (m)	9.0	12.0	20.4	22.9					
95th Queue (m)	20.8	21.1	40.4	44.6					
Link Distance (m)	132.3	87.9	51.6	80.0					
Upstream Blk Time (%)			0						
Queuing Penalty (veh)			0						
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB	NB	SB	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR				
Maximum Queue (m)	9.2	9.1	8.6				
Average Queue (m)	1.5	1.8	2.9				
95th Queue (m)	7.1	7.7	9.5				
Link Distance (m)	220.7	59.8	35.9				
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Queen Street North & West Street

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	TR	L	TR	L	TR
Maximum Queue (m)	72.2	35.8	15.1	14.1	19.7	52.7	37.9	53.8
Average Queue (m)	34.9	9.5	7.8	4.2	5.1	24.4	9.9	26.3
95th Queue (m)	54.6	20.4	14.6	11.2	13.1	43.2	25.4	44.1
Link Distance (m)	140.6	140.6	85.1	85.1	124.8		51.6	
Upstream Blk Time (%)							0	
Queuing Penalty (veh)							1	
Storage Bay Dist (m)					23.0		27.0	
Storage Blk Time (%)					0		8	
Queuing Penalty (veh)					0		2	
							4	
							3	

Intersection: 7. Metcalfe Street South & West Street

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	8.5	13.9
Average Queue (m)	0.3	5.5
95th Queue (m)	2.8	12.2
Link Distance (m)	85.1	59.8
Upstream Blk. Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		
Network Summary		
Network wide Queuing Penalty: 10		



Intersection: 1: Queen Street North & Union Street						
Movement	EB	WB	SB	EB	WB	SB
Directions Served	LTR	LTR	LTR			
Maximum Queue (m)	9.2	16.5	15.4			
Average Queue (m)	5.7	8.6	3.4			
95th Queue (m)	12.8	14.2	11.6			
Link Distance (m)	59.3	118.1	65.4			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3						
Movement	EB	WB	NB	SB	EB	WB
Directions Served	LTR	LTR	LTR	LTR		
Maximum Queue (m)	15.6	9.3	22.2	16.6		
Average Queue (m)	7.1	6.1	3.7	2.5		
95th Queue (m)	14.9	13.2	15.2	11.3		
Link Distance (m)	53.0	67.7	63.4	120.9		
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Queen Street North & Site Access 2				
Movement	WB	SB	LT	
Directions Served	LR			
Maximum Queue (m)	14.6	28.6		
Average Queue (m)	2.1	3.6		
95th Queue (m)	8.6	17.1		
Link Distance (m)	100.6	63.4		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Queen Street North & Robinson Street						
Movement	EB	WB	NB	SB	EB	WB
Directions Served	LTR	LTR	LTR	LTR		
Maximum Queue (m)	34.4	28.7	55.2	64.7		
Average Queue (m)	9.1	12.2	27.8	24.2		
95th Queue (m)	21.9	20.1	48.7	46.5		
Link Distance (m)	132.3	87.9	51.6	80.0		
Upstream Blk Time (%)			0			
Queuing Penalty (veh)			2			
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street						
Movement	WB	NB	SB	EB	WB	SB
Directions Served	LTR	LTR	LTR			
Maximum Queue (m)	22.4	9.0	8.6			
Average Queue (m)	1.5	2.9	3.1			
95th Queue (m)	9.7	9.6	9.9			
Link Distance (m)	220.7	59.8	35.9			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Queen Street North & West Street										
Movement	EB	EB	WB	WB	NB	NB	SB	SB	L	TR
Directions Served	LT	TR	LT	TR	L	TR	L	TR		
Maximum Queue (m)	51.5	35.8	22.4	15.4	14.4	57.7	30.0	48.4		
Average Queue (m)	29.8	9.4	10.8	6.2	5.7	30.2	8.9	28.1		
95th Queue (m)	45.6	20.0	19.4	12.8	13.1	54.8	18.7	47.6		
Link Distance (m)	140.6	140.6	85.1	85.1	124.8		51.6			
Upstream Blk Time (%)							0			
Queuing Penalty (veh)							0			
Storage Bay Dist (m)					23.0		27.0			
Storage Blk Time (%)					11		0			
Queuing Penalty (veh)					4		0			

Intersection: 7. Metcalfe Street South & West Street					
Movement	EB	WB	SB		
	LTR	LTR	LTR		
Directions Served					
Maximum Queue (m)	7.6	8.4	8.2		
Average Queue (m)	0.5	0.3	6.4		
95th Queue (m)	3.3	2.8	11.8		
Link Distance (m)	85.1	216.9	59.8		
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					
Network Summary					
Network wide Queuing Penalty: 9					

Intersection: 1: Queen Street North & Union Street									
Movement	EB	WB	NB	SB	LTR	LTR	LTR	LTR	
Directions Served									
Maximum Queue (m)	9.2	22.2	28.8	33.3					
Average Queue (m)	4.8	8.1	3.5	4.1					
95th Queue (m)	11.9	16.7	16.1	18.1					
Link Distance (m)	59.3	118.1	120.9	65.4					
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB	WB	NB	SB	LTR	LTR	LTR	LTR	
Directions Served									
Maximum Queue (m)	16.3	22.3	9.3	22.6					
Average Queue (m)	5.2	9.1	0.9	2.7					
95th Queue (m)	13.2	16.8	5.4	13.0					
Link Distance (m)	53.0	67.7	63.4	120.9					
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB	LTR						
Directions Served									
Maximum Queue (m)	9.0	65.4							
Average Queue (m)	2.2	5.3							
95th Queue (m)	8.4	32.2							
Link Distance (m)	100.6	63.4							
Upstream Blk Time (%)		0							
Queuing Penalty (veh)		1							
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 4: Queen Street North & Robinson Street									
Movement	EB	WB	NB	SB	LTR	LTR	LTR	LTR	
Directions Served									
Maximum Queue (m)	14.9	22.2	54.5	82.0					
Average Queue (m)	6.6	13.8	26.2	33.9					
95th Queue (m)	13.6	22.1	49.3	70.6					
Link Distance (m)	132.3	87.9	51.6	80.0					
Upstream Blk Time (%)			0	2					
Queuing Penalty (veh)			2	10					
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB	NB	SB	LTR	LTR	LTR	LTR		
Directions Served									
Maximum Queue (m)	9.2	9.0	8.6						
Average Queue (m)	0.3	1.8	2.6						
95th Queue (m)	3.0	7.7	9.1						
Link Distance (m)	220.7	59.8	35.9						
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 6: Queen Street North & West Street

Movement	EB	EB	WB	WB	NB	NB	SB	SB	
Directions Served	LT	TR	LT	TR	L	TR	L	TR	
Maximum Queue (m)	47.2	18.3	28.6	29.8	20.8	65.4	51.3	55.1	
Average Queue (m)	22.3	5.1	12.1	9.2	5.2	22.8	9.1	34.4	
95th Queue (m)	37.8	12.6	21.1	18.0	13.9	44.5	28.8	58.7	
Link Distance (m)	140.6	140.6	85.1	85.1	124.8		51.6		
Upstream Blk Time (%)						0	2		
Queuing Penalty (veh)						0	7		
Storage Bay Dist (m)					23.0		27.0		
Storage Blk Time (%)					0	8	12		
Queuing Penalty (veh)					0	4	5		



Intersection: 7. Metcalfe Street South & West Street

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	9.0	8.2
Average Queue (m)	2.0	4.8
95th Queue (m)	7.9	11.2
Link Distance (m)	128.7	59.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		
Network Summary		
Network wide Queuing Penalty: 29		

Intersection: 1: Queen Street North & Union Street							
Movement	EB	WB	NB	SB			
	LTR	LTR	LTR	LTR			
Directions Served							
Maximum Queue (m)	9.2	21.6	21.9	34.2			
Average Queue (m)	3.9	10.9	2.7	5.5			
95th Queue (m)	11.2	16.4	12.3	19.4			
Link Distance (m)	59.3	118.1	120.9	65.4			
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB		WB		NB		SB	
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served								
Maximum Queue (m)	16.7	15.0	21.9	21.5				
Average Queue (m)	5.7	8.0	2.8	3.4				
95th Queue (m)	13.8	14.4	11.9	13.6				
Link Distance (m)	53.0	67.7	63.4	120.9				
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.0	39.5
Average Queue (m)	2.6	2.0
95th Queue (m)	9.3	15.1
Link Distance (m)	100.6	63.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Queen Street North & Robinson Street						
Movement	EB	WB	NB	SB		
Directions Served	LTR	LTR	LTR	LTR		
Maximum Queue (m)	28.5	28.7	40.7	81.9		
Average Queue (m)	8.0	14.1	18.5	30.7		
95th Queue (m)	18.6	26.4	38.5	55.6		
Link Distance (m)	132.3	87.9	51.6	80.0		
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	1					
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	16.4	9.1	8.6
Average Queue (m)	2.6	2.6	4.0
95th Queue (m)	10.6	9.3	11.1
Link Distance (m)	220.7	59.8	35.9
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Queen Street North & West Street

Movement	EB	EB	WB	WB	NB	NB	SB	SB	
	LT	TR	LT	TR	L	TR	L	TR	
Directions Served									
Maximum Queue (m)	47.1	35.8	32.9	30.1	21.0	50.9	22.9	55.6	
Average Queue (m)	24.1	7.6	14.2	10.5	7.4	22.5	7.2	35.1	
95th Queue (m)	40.6	18.9	24.8	21.0	17.9	40.4	16.5	59.1	
Link Distance (m)	140.6	140.6	85.1	85.1	124.8			51.6	
Upstream Blk Time (%)									2
Queuing Penalty (veh)									11
Storage Bay Dist (m)									23.0
Storage Blk Time (%)									0
Queuing Penalty (veh)									0
Storage Blk Time (%)									0
Queuing Penalty (veh)									6

Intersection: 7. Metcalfe Street South & West Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.5	8.6	9.1	15.2
Average Queue (m)	0.7	0.3	0.9	5.6
95th Queue (m)	4.3	2.8	5.2	12.3
Link Distance (m)	85.1	216.9	128.7	59.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				
Network Summary				
Network wide Queuing Penalty: 21				



Intersection: 1: Queen Street North & Union Street								
Movement	EB		WB		NB		SB	
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	
Directions Served								
Maximum Queue (m)	15.4	16.9	20.7	57.2				
Average Queue (m)	4.4	9.7	3.4	7.6				
95th Queue (m)	12.4	14.3	13.4	29.8				
Link Distance (m)	59.3	118.1	120.9	65.4				
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 2: Queen Street North & Marshall Lane/Site Access 3

Movement	EB		WB		NB		SB	
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
Directions Served								
Maximum Queue (m)	9.3	21.6	16.8	36.0				
Average Queue (m)	5.6	6.8	1.2	3.8				
95th Queue (m)	12.7	15.3	7.2	17.0				
Link Distance (m)	53.0	67.7	63.4	120.9				
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Queen Street North & Site Access 2

Movement	WB	SB
	LR	LT
Directions Served		
Maximum Queue (m)	9.0	9.2
Average Queue (m)	1.7	0.3
95th Queue (m)	7.5	3.0
Link Distance (m)	100.6	63.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Queen Street North & Robinson Street								
Movement	EB		WB		NB		SB	
	LTR	LTR	LTR	LTR	LTR	LTR	LTR	
Directions Served								
Maximum Queue (m)	33.8	32.9	36.0	72.9				
Average Queue (m)	11.6	17.9	22.9	35.9				
95th Queue (m)	26.3	28.8	36.1	61.8				
Link Distance (m)	132.3	87.9	51.6	80.0				
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 5: Metcalfe Street South/Site Access 1 & Robinson Street

Movement	WB		NB		SB	
	LTR	LTR	LTR	LTR		
Directions Served						
Maximum Queue (m)	9.2	9.0	8.6			
Average Queue (m)	1.5	2.6	2.3			
95th Queue (m)	6.9	9.3	8.5			
Link Distance (m)	220.7	59.8	35.9			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Queen Street North & West Street

Movement	EB	EB	WB	WB	NB	NB	SB	SB	
	LT	TR	LT	TR	L	TR	L	TR	
Directions Served									
Maximum Queue (m)	40.6	36.4	28.1	27.7	26.2	51.7	26.4	55.0	
Average Queue (m)	22.3	7.5	13.5	10.4	8.6	26.0	7.7	42.1	
95th Queue (m)	38.9	20.4	25.0	19.9	19.1	45.1	20.4	62.4	
Link Distance (m)	140.6	140.6	85.1	85.1	124.8			51.6	
Upstream Blk Time (%)									3
Queuing Penalty (veh)									15
Storage Bay Dist (m)									23.0
Storage Blk Time (%)									0
Queuing Penalty (veh)									1
Queuing Penalty (veh)									5
Queuing Penalty (veh)									2
Queuing Penalty (veh)									7

Intersection: 7. Metcalfe Street South & West Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.4	8.0	9.0	8.2
Average Queue (m)	0.3	0.3	1.1	5.0
95th Queue (m)	2.8	2.6	6.0	11.3
Link Distance (m)	85.1	216.9	128.7	59.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				
Network Summary				
Network wide Queuing Penalty: 30				



## **APPENDIX D**

### Level of Service Definitions



## **LEVEL OF SERVICE ANALYSIS AT SIGNALIZED INTERSECTIONS**

To assist in clarifying the arithmetic analysis associated with traffic engineering, it is often useful to refer to “Level of Service”. The term Level of Service implies a qualitative measure of traffic flow at an intersection. It is dependent upon vehicle delay and vehicle queue lengths at the approaches. Specifically, Level of Service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period. The following table describes the characteristics of each level:

<u>Level of Service</u>	<u>Features</u>	<u>Stopped Delay per Vehicle (sec)</u>
A	At this level of service, almost no signal phase is fully utilized by traffic. Very seldom does a vehicle wait longer than one red indication. The approach appears open, turning movements are easily made and drivers have freedom of operation.	$\leq 5.0$
B	At this level, an occasional signal phase is fully utilized and many phases approach full use. Many drivers begin to feel somewhat restricted within platoons of vehicles approaching the intersection.	$> 5.0$ and $\leq 15.0$
C	At this level, the operation is stable though with more frequent fully utilized signal phases. Drivers feel more restricted and occasionally may have to wait more than one red signal indication, and queues may develop behind turning vehicles. This level is normally employed in urban intersection design.	$> 15.0$ and $\leq 25.0$
D	At this level, the motorist experiences increasing restriction and instability of flow. There are substantial delays to approaching vehicles during short peaks within the peak period, but there are enough cycles with lower demand to permit occasional clearance of developing queues and prevent excessive backups.	$> 25.0$ and $\leq 40.0$
E	At this level, capacity is reached. There are long queues of vehicles waiting upstream of the intersection and delays to vehicles may extend to several signal cycles.	$> 40.0$ and $\leq 60.0$
F	At this level, saturation occurs, with vehicle demand exceeding the available capacity.	$> 60.0$

## LEVEL OF SERVICE ANALYSIS AT UNSIGNALIZED INTERSECTIONS<sup>(1)</sup>

The term "level of service" implies a qualitative measure of traffic flow at an intersection. It is dependent upon the vehicle delay and vehicle queue lengths at approaches. The level of service at unsignalized intersections is often related to the delay accumulated by flows on the minor streets, caused by all other conflicting movements. The following table describes the characteristics of each level.

Level of Service	Features
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.
E	Very long traffic delays occur. Operations approach the capacity of the intersection.
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.

---

<sup>(1)</sup> Highway Capacity Manual - Special Report No. 209, Transportation Research Board, 1985.



## **APPENDIX E**

Zoning By-laws of Norfolk County, Excerpts



#### 4.5 **Parking of Vehicles in Residential Zones**

The parking of *vehicles* in residential *Zones* shall be subject to the following:

- a) not more than one (1) *vehicle* per *dwelling unit* shall be a *vehicle* used for commercial purposes;
- b) such commercial *vehicles* shall not exceed a height of 2.2 metres or a length of 6.7 metres;
- c) *recreational vehicles*, trailers, and *vehicles* that do not have a current licence plate, shall be prohibited from parking continuously in any *required front yard* or *required exterior side yard*.

#### 4.6 **Parking for Multiple Uses**

When a *building*, *structure* or *lot* accommodates more than one (1) type of use, the *parking space* requirement for such *building*, *structure* or *lot* shall be the sum of the requirements for the separate uses thereof.

#### 4.7 **Requirements for Loading Spaces**

Where loading docks are provided on a *lot*, a *loading space* for each loading dock shall have a minimum width of 3 metres and a depth of 10 metres, and sufficient space shall be provided on the same *lot* for the manoeuvring of *vehicles* using the loading docks. Such manoeuvring space shall not utilize any *required parking space*.

#### 4.8 **Requirements for Stacking Spaces**

Where a *restaurant* incorporates a drive-through or pick up window, a sufficient number of stacking spaces shall be provided for *vehicles* waiting to be served from the drive-through or pick up window.

#### 4.9 **Number of Parking Spaces**

Any *building*, *structure* or use shall have *parking spaces* provided and maintained in accordance with the following:

	<u>Type of Use</u>	<u>Minimum Requirement</u>
	<u>Residential</u>	
a)	<i>single detached, semi-detached, duplex, tri-plex, four-plex, townhouse dwellings and vacation home [8-Z-2017]</i>	2 <i>parking spaces</i> for each <i>dwelling unit</i>
b)	<i>apartment dwelling[8-Z-2017]</i>	1.5 <i>parking spaces</i> for each <i>dwelling unit</i>
c)	<i>dwelling unit in a non-residential building</i>	1 <i>parking space</i> for each <i>dwelling unit</i>
d)	<i>boarding or lodging house</i>	2 <i>parking spaces</i> for each <i>dwelling unit</i> plus 1 <i>parking space</i> for each room for boarders
e)	<i>accessory residential dwelling unit</i>	1 <i>parking space</i> in addition to those required for the primary residential <i>dwelling unit</i> use

	<u>Type of Use</u>	<u>Minimum Requirement</u>
	<u>Visitor Parking [8-Z-2017]</u>	
f)	All apartment dwellings; and duplex dwellings, tri-plex dwellings, four-plex dwellings, townhouse dwellings or single-detached or semi-detached dwellings as part of a condominium development or when they abut a private road [27-Z-2020].	1 visitor space for every 3 dwelling units
	<u>Non-residential</u>	
g)	animal hospital or animal kennel	1 parking space for every 25 square metres of usable floor area
h)	arena, auditorium, gymnasium, assembly hall	1 parking space for every 8 fixed seats or stadium, skating rink, or for every 10 square metres of usable floor area where there are no fixed seats
i)	auction centre	1 parking space for every 10 square metres of usable floor area
j)	bar or night club	1 parking space for every 5 square metres of usable floor area
k)	bed & breakfast	1 parking space per room for guests
l)	billiard or pool room	1 parking space for every 10 square metres of usable floor area
m)	bowling alley	2 parking spaces for each bowling lane
n)	college, university or technical institutions	1 parking space for every student enrolled full-time for day courses
o)	curling rink	10 parking spaces per curling sheet
p)	dance hall or banquet hall	1 parking space for every 10 square metres of usable floor area
q)	dry cleaning distribution station	2 parking spaces
r)	farm produce outlet	1 parking space for every 10 square metres of usable floor area
s)	financial institution	1 parking space for every 15 square metres of usable floor area
t)	funeral home	1 parking space for every 10 square metres of public assembly area
u)	group home, retirement home [7-Z-2018]	3 parking spaces per bed
v)	golf course	2 parking spaces per hole plus 1 parking space for every 10 square metres of a club house restaurant and lounge floor area
w)	home occupation and home industry excluding an office of a health service practitioner	1 parking space plus 1 additional parking space for each employee
x)	hospital	1 parking space for each bed at rated capacity
y)	hotel	1 parking space for each hotel room plus the applicable requirement contained herein for other hotel uses
z)	industrial establishment	1 parking space for every 90 square metres of

<u>Type of Use</u>	<u>Minimum Requirement</u>
including <i>Cannabis Production</i> <i>and Processing</i> [25-Z-2018]	<i>usable floor area</i>



aa)	laundromat	1 <i>parking space</i> for every 4 washing and drying machines
bb)	liquor or beer store	12 <i>parking spaces</i>
cc)	<i>long-term care facility</i>	1 <i>parking space</i> for every 4 patient beds
dd)	medical or dental <i>clinic</i> , and office of a health service practitioner as a <i>home occupation</i>	1 <i>parking space</i> for every 15 square metres of <i>usable floor area</i> [66-Z-2018]
ee)	movie and other theatres	1 <i>parking space</i> for every 6 seats
ff)	office	1 <i>parking space</i> for every 30 square metres of <i>usable floor area</i>
gg)	<i>Personal service shop</i>	1 <i>parking space</i> for every 20 square metres of <i>usable floor area</i>
hh)	<i>place of worship</i>	1 <i>parking space</i> for every 8 seats or 5 metres of pew space or every 10 square metres of <i>usable floor area</i> where there are no seats or pews
ii)	<i>private club</i>	1 <i>parking space</i> for every 10 square metres of <i>usable floor area</i> , or where applicable in accordance with the requirements for a <i>bar or night club</i> , whichever is greater
jj)	<i>restaurant</i>	1 <i>parking space</i> for every 10 square metres of <i>usable floor area</i>
kk)	<i>restaurant, fast food with drive-through</i>	1 <i>parking space</i> for every 10 square metres of <i>usable floor area</i>
ll)	<i>restaurant, fast food without drive through</i>	1 <i>parking space</i> for every 8 square metres of <i>usable floor area</i>
mm)	<i>restaurant, outdoor patio</i>	1 <i>parking space</i> per every 4 seats
nn)	<i>restaurant, take-out</i>	2 <i>parking spaces</i>
oo)	<i>retail store or merchandise service shop</i>	1 <i>parking space</i> for every 30 square metres of <i>usable floor area</i>
pp)	school, elementary	1.5 <i>parking spaces</i> per classroom including laboratories, libraries and workshops
qq)	school, secondary	5 <i>parking spaces</i> per classroom including laboratories, libraries and workshops
rr)	school, trade adult education	1 <i>parking space</i> for every student enrolled full-time for day courses
ss)	shopping plaza with three (3) or more units	1 <i>parking space</i> for every 20 square metres of <i>usable floor area</i>
tt)	warehouse or wholesale establishment	1 <i>parking space</i> for every 180 square metres of <i>usable floor area</i>
uu)	other non-residential uses	1 <i>parking space</i> for every 35 square metres of <i>usable floor area</i>

Where the calculation for the purposes of meeting this provision results in a partial *parking space*, a full *parking space* shall be provided for the partial space.



## **The Corporation of Norfolk County**

### **By-Law \_\_-Z-2024**

**Being a By-Law to Amend Zoning By-Law 1-Z-2014, as amended, for property described as 185 Robinson Street, Simcoe, Norfolk County.**

**WHEREAS** Norfolk Council is empowered to enact this By-Law, by virtue of the provisions of Section 34 and 36(1)(Holding) of the *Planning Act, R.S.O. 1990, CHAPTER P.13*, as amended;

**AND WHEREAS** this By-Law conforms to the Norfolk County Official Plan.

**NOW THEREFORE** the Council of The Corporation of Norfolk County hereby enacts as follows:

1. That Schedule A of By-Law 1-Z-2014, as amended, is hereby further amended by changing the zoning of the subject lands identified on Schedule A (attached to and forming part of this By-Law) from R6 Special Provision Site Specific 14.664 and 14.713 and R6(H) *Zone* to R6(H) Special Provision Site Specific 14.XXX *Zone*;
2. That Schedule A of By-law 1-Z-2014, as amended, is hereby further amended by amending the CBD Special Provision Site Specific 14.812 *Zone*;
3. That Schedule A of By-Law 1-Z-2014, as amended, is hereby further amended by delineating the lands identified as Part 1 and Part 2 of the subject lands on Schedule A (attached to and forming part of this By-Law) as having reference to Subsection 14.XXX;
4. That Schedule 14.XXX, (attached to and forming part of this By-Law) be included and form part of By-Law 1-Z-2014;
5. That Subsection 14 Special Provisions is hereby further amended by adding the following:

14.XXX In addition to the uses *permitted* in the R6 *Zone*, the following uses will be permitted:

- a) Retail Store or Merchandise Service Shop;

b) Office.

14.XXX In lieu of the corresponding provisions in the R6 *Zone*, the following shall apply:

- a) Minimum *rear yard* – 3.5 metres;
- b) Maximum FAR for 8 Storey Building – 2.5 FAR (17, 820 sq.m.);
- c) Width of parking space for vehicle parked with wall or fence adjacent – 3 metres;
- d) Minimum Step Back of Upper Floors – 1.6m at the 8<sup>th</sup> floor from the 7<sup>th</sup> floor;
- e) Any other Site-Specific provisions to be included to permit the proposal...

7. That Subsection 14.812 Special Provisions is hereby further amended by deleting 14.812(d) and replacing with the following:

- a) Minimum number of parking spaces – one hundred and fifty-eight (158).

8. That the existing holding (H) provision applicable to the subject lands remain in place and shall be amended with additional provisions related to the adequate municipal servicing of the Subject Property to the satisfaction of Norfolk County as well as the submission of a new RSC to the satisfaction of Norfolk County.

9. That the effective date of this By-Law shall be the date of passage thereof.

**ENACTED AND PASSED** this **date** day of **month**, 2024.

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Mayor

---

County Clerk



**Explanation of the Purpose and Effect of**

**By-Law \_\_-Z-2024**

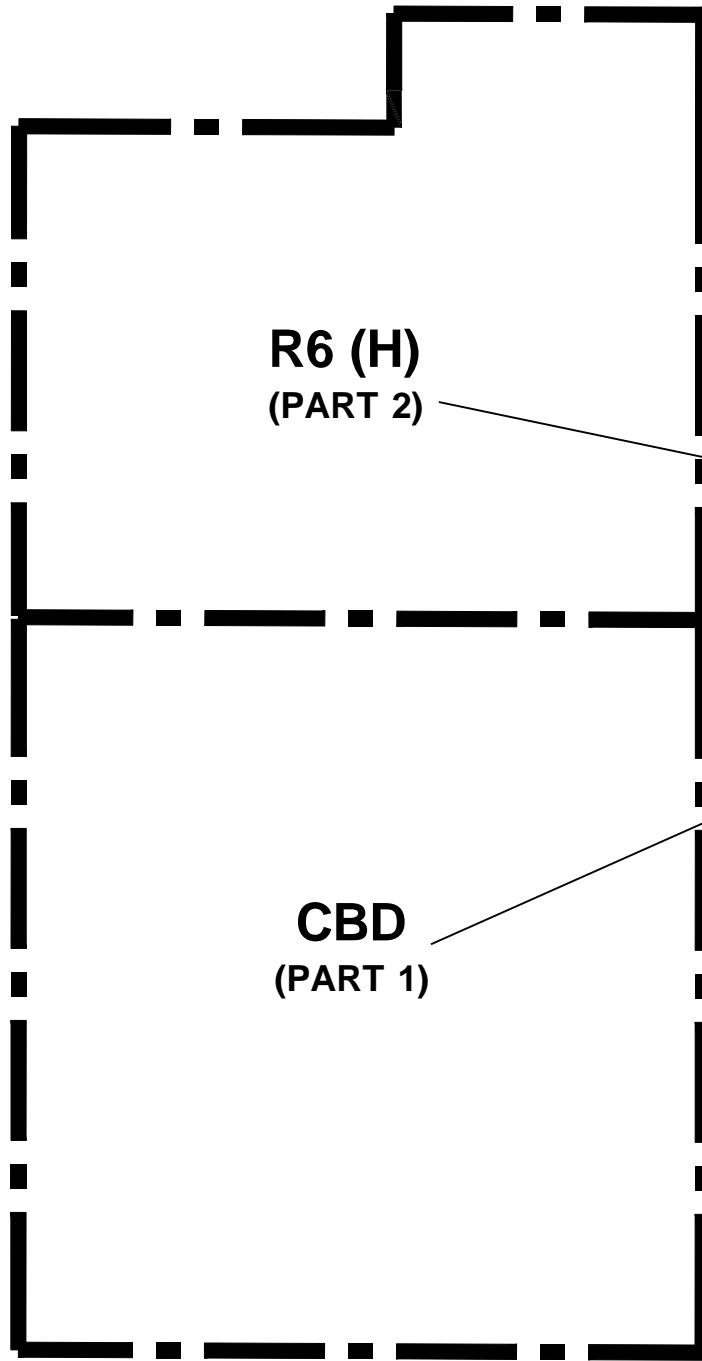
This By-Law affects a parcel of land described as Block 68, Registered Plan 182 including Part 1 and Part 3, Plan 37R-10794, Town of Simcoe, Norfolk County.

The purpose of this By-Law is to change the zoning on the subject lands from R6 Special Provision Site Specific 14.664 and 14.713 and R6(H) Zone to R6(H) Special Provision Site Specific 14.XXX Zone. This By-law will also amend CBD Special Provision Site Specific 14.812 Zone.

An existing holding “(H)” provision applicable to the subject lands is being amended with additional holding provisions related to site servicing and the submission of a new RSC.

This By-law will remove the existing Special Provision Site Specific Zones (14.713 and 14.664) which are applicable to the subject lands and will also amend the existing Special Provision Site Specific 14.812 Zone prior to the enactment of this By-law.

QUEEN STREET



ROBINSON STREET

Schedule A

By-Law\_-Z-2024

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August 30<sup>th</sup>, 2024

DPS File: 2069

## **PLANNING JUSTIFICATION REPORT ADDENDUM PROPOSED ZONING BY-LAW AMENDMENT FOR 8-STOREY MIXED-USE BUILDING**

---

### **Background**

A pre-consultation meeting was held on April 22nd, 2020 with County staff to assess the requirements for the application. A public meeting was held on April 7th, 2021 and comments from the public as well as County Staff and other commenting agencies/departments have been received since that public meeting. A second public meeting was held October 4<sup>th</sup>, 2023 and additional comments from the public, County Staff, County Council and other commenting agencies/departments have been received since that second public meeting. A Council meeting was held on July 16<sup>th</sup>, 2024 for Council to make a decision on the proposed Zoning By-law Amendment application. Council granted a deferral of the application to the October 16<sup>th</sup>, 2024 Council meeting, in order to allow for more time for us to address comments received from County Council, County Staff, as well as the public. The comments received have been taken into consideration and the plans and submission materials have been revised/updated to address all comments received as best as possible.

The proposal has been revised on numerous occasions and based on all the comments and feedback received to-date, the proposal has been revised to an 8-storey mixed-use building consisting of only residential dwelling units and retail as well as office uses on the ground floor. Further, a significant revision that is reflected in the latest proposal is the addition of more parking spaces such that the proposal is now compliant with the minimum required number of parking spaces.

### **Site and Area Description:**

The Subject Property is located within Norfolk County, north of Robinson Street, west of Norfolk Street North, south of Queensway West and east of Queen Street North. The Subject Property has a total lot area of 1.70 hectares and a frontage of approximately 161.84 metres of frontage on Queen Street North. The legal description of the Subject Property is "Block 68, Registered Plan 182 including Part 1 and Part 3, Plan 37R-10794". The proposal includes severing the existing lot into two separate lots however, the severance application will be progressed following approval of the proposed Zoning By-law Amendment,



should Council decide to approve the Zoning By-law Amendment application. A Site Plan Application will be required as well and will be dealt with at a later date, following a decision on the proposed Zoning By-law Amendment application.

The Subject Property is currently occupied by a single 3-storey mixed-use building and an at-grade parking lot located on the southern portion of the Subject Property. It is currently designated as "Urban Residential" and "Downtown" in the Official Plan of Norfolk County and zoned as Urban Residential Type 6 "R6", "Urban Residential Type 6 Holding "R6(H)", and "CBD" as per Norfolk County Zoning By-law 1-Z-2014, as amended. Several Special Provision Site Specific zones are applicable to the Subject Property as well. The portion of the Subject Property containing the existing 3-storey mixed-use building is the portion designated "Downtown" and is zoned "CBD" as per Zoning By-law 1-Z-2014, as amended. The remainder of the Subject Property (which is where the proposed new building will be located) is designated "Urban Residential" and zoned as "R6" and "R6(H)".

### **Original and Updated Proposal**

The original proposal consisted of an 8-storey mixed-use building with residential dwelling units, a long-term care facility, as well as office, medical office, and retail uses. The proposal has now been revised to only consist of residential dwelling units, office and retail uses. An easement is also proposed from Robinson Street, through the proposed retained lot which contains the existing 3-storey mixed-use building, to the proposed severed lot to allow shared access from Robinson Street to the Subject Property. The easement also includes certain parking spaces at the north-east portion of the Subject Property to ensure those spaces are maintained for the existing 3-storey mixed-use building/retained lot. A number of revisions have been made to the building itself as well. The proposed 8-storey mixed-use building is compliant with the maximum permitted height, angular plane requirement, and the minimum building step-backs, save and except for the 8<sup>th</sup> floor building step-back which is proposed at 1.6m where 2m is required from the 7<sup>th</sup> floor. Reconfigured outdoor amenity space has also been provided with the resubmission and the proposal is now compliant with the minimum required number of parking spaces.

The proposed mixed-use building, with a height of 26.5m (8 storeys), will have a GFA of 17,820 sq.m and an FAR of 2.5 times the area of the lot. It will be set back 27.1m from the front lot line along Kars Street, 3m from the side lot line along Queen Street North, and will have a rear yard setback of 3.5m abutting the proposed retained lot which is where the existing 3-storey mixed-use building is located.

The ground floor of the proposed mixed-use building includes retail and office units, whereas residential apartment dwelling units will be located on the 2<sup>nd</sup> floor to the 8<sup>th</sup> floor. The unit sizes of the residential apartment dwelling units will range from:

- 1030 sq. ft. to 1480sq. ft. on the 2nd to 4th floor;
- 890 sq. ft. to 987sq. ft. on the 5th and 6th floor;
- 715 sq. ft. to 765 sq. ft. on the 7th;
- 605 sq. ft. to 1107sq. ft. on the 8th floor.

The proposal has been further revised to include a total of 307 parking spaces, including 9 accessible parking spaces. This includes 31 at-grade parking spaces and 276 underground parking spaces. The proposal is now compliant with the minimum required parking spaces. Note, there are an additional 18 parking spaces within the at-grade parking lot for the proposed new building however, those additional 18 spaces will be subject to an easement and will be for the sole use of the occupants of the existing 3-storey mixed-use building on the Subject Property.

As part of this development, a private driveway has also been proposed to facilitate internal circulation and provide access from Kars Street. The private driveway will also be connected through the proposed at-grade parking lot to the existing at-grade parking lot on the portion of Subject Property where the existing 3-storey mixed-use building is located, which currently has access from Robinson Street.

An updated Traffic Impact and Parking Study, prepared by Trans-Plan, dated August 2024, has been provided with this resubmission. As per the provided updated Traffic Impact and Parking Study, the proposed parking supply is compliant with and exceeds the County's parking requirements and the proposed parking supply will be adequate to meet the future parking demands of the development. Further, the Traffic Impact and Parking Study notes that the proposed development is acceptable for traffic operations with traffic signals at the intersections of Queen Street North and Robinson Street. The Study concludes that no further roadway improvements would be required to support the proposed development, aside from the construction of the proposed internal roadways and site accesses and that the proposed development is expected to have minimal impact on the study area network.

Further, a Functional Servicing and Stormwater Management Report as well as associated civil drawings, prepared by Crozier, dated August 2024, has been provided with this resubmission. The Functional Servicing and Stormwater Management Report concludes that the proposed development can be serviced from a functional servicing and stormwater management perspective. The Report notes that water demand will be met by connecting a 200mm diameter PVC water service to the existing 200mm diameter water service on Queen Street North, that Sanitary conveyance will be provided using a 200mm diameter PVC sanitary sewer that will connect to the existing 200mm diameter sanitary sewer on Queen Street North, and that stormwater runoff will be collected in catch basins and conveyed to a storm water storage tank that controls events up to and including the 100-year storm event to the 5-year pre-development peak flows before discharging into the existing storm sewer on Queen Street North. The Report further notes that Stormwater quality controls for the Site will be provided by an in-line-oil-grit separator (Stormceptor EF4 or approved equivalent) unit installed downstream of the underground stormwater storage tank.

Further, a Shadow Study has been provided with this resubmission. The Shadow Study demonstrates that the proposal will not result in significant shadowing impacts on the surrounding low-rise residential uses. As shown in the submitted Shadow Study, on March 21<sup>st</sup>, the majority of shadow impacts as a result of the proposal are on the adjacent industrial uses to the east. Similarly, the Shadow Study demonstrates that on June 21<sup>st</sup>, the majority of shadowing impacts are also mostly on the industrial uses to the east and the existing parking lot located on the southern portion of the Subject Property. The Shadow Study

demonstrates very similar shadowing conditions on September 21<sup>st</sup> as compared to June 21<sup>st</sup> and March 21<sup>st</sup>. The only shadowing impacts as a result of the proposal on the adjacent and surrounding low-rise residential uses are in the morning hours on December 21<sup>st</sup>. However, by 1:18 p.m on December 21<sup>st</sup>, shadowing impacts as a result of the proposal shift from the adjacent and surrounding low-rise residential uses to the industrial uses to the east. As such, the proposal will not have any significant shadowing impacts on the surrounding low-rise residential uses, will be compatible, and will have little to no impact further than what is already contemplated by the By-law for the Subject Property.

## **Policy Review**

### **1. Provincial Planning Statement, 2024**

At the time of writing this Planning Justification Report Addendum, the Province has released the new Provincial Planning Statement, 2024 ("PPS 2024"). The new PPS 2024 is to come into effect on October 20<sup>th</sup>, 2024, which is subsequent to the Council meeting currently scheduled for this application to be heard at on October 16<sup>th</sup>, 2024. As such, Council's decision on this application will not need to be consistent with the new PPS, 2024. However, it is expected that the new PPS, 2024 will not have any impact on this application in terms of the planning policy context regardless.

### **2. Provincial Policy Statement, 2020**

The analysis provided within the original Planning Justification Report as it relates to the Provincial Policy Statement remains applicable and the proposal represents an efficient use of underutilized lands within a designated "Settlement Area".

### **3. Norfolk County Official Plan, 2020**

The analysis provided within the original Planning Justification Report as it relates to the Norfolk County Official Plan (version that was in-effect at the time of application submission) remains applicable. The proposal represents an efficient use of underutilized lands within a designated "Settlement Area" and the proposed high-density mixed-use development is a permitted use as per the applicable "Urban Residential" designation.

### **4. Proposed Draft Zoning By-law**

The proposed Draft Zoning By-law generally follows the existing R6 provisions that are applicable to the Subject Property with some minor variations to those applicable provisions of the R6 zone. The existing Special Provision Site Specific zones applicable to the Subject Property are proposed to be removed. The proposed Zoning provisions for the Subject Property, which is proposed to be zoned R6(H) Special Provision Site Specific 14.XXX are as follows:

Green indicates no change to existing R6 provisions



Red indicates proposed change to existing R6 provisions

Current Provision		Proposed Provision
Lot Frontage (min.)	30m	90.49m
Front Yard (min.)	3m	27.1m
Interior Side Yard (min.)	5m	21.9m
Exterior Side Yard (min.)	3m	3m
Rear Yard (min.)	9m	3.5m
Building Height (max.)	8 storeys	8 storeys
Floor Area Ration (max.)	1 FAR	2.5 FAR
Step Back of Upper Floors	2m for each floor above the 4 <sup>th</sup> and an additional 2m for each floor above the 6 <sup>th</sup>	5th and 6th Floor - 2.3m from 4th floor 7th Floor - 2.5m from 5th and 6th floors 8th Floor - 1.6m from 7th floor
Angular Plane	Where an R6 Zone abuts an Urban Residential Zone (R1-A, R1-B or R2), no portion of an apartment dwelling shall exceed the height of a 45 degree angular plane originating at the lot line of the nearest R1-A, R1-B or R2 Zone.	Proposal does not penetrate the angular plane
Land Uses	Apartment, Dwelling Home Occupation Retirement Home	Retail Store Office
Parking	Apartment Dwelling – 215 spaces Visitor – 48 spaces Retail Use – 10 spaces Office Use – 30 spaces Total – 303 spaces	Apartment Dwelling – 219 spaces Visitor – 48 spaces Retail – 10 spaces Office – 30 spaces Total – 307 spaces
Accessible Parking	Type A space – 4 spaces Type B space – 5 spaces (if Type B is an uneven number, extra Type B can be Type A space)	Type A space – 5 spaces Type B space – 4 spaces
Width of a parking space adjacent to wall or fence	Width of parking space for vehicle parked with wall or fence adjacent – 3.3 metres	3 metres proposed for parking spaces adjacent to wall or fence

The proposed provisions contained within the Draft Zoning By-law are appropriate and

conform to the County Official Plan. The proposed reduced rear yard setback is appropriate and will have little to no impact further than what the By-law already contemplates considering the rear yard of the proposed new 8-storey building will abut the existing at-grade parking area for the existing 3-storey mixed-use building. The proposed additional permitted uses will facilitate the proposed ground-floor retail and office uses, which will serve the needs of the new residents as well as existing residents in the area and is appropriate. The proposed retail units do not exceed 300 sq.m of GFA and the proposed office and retail uses conform to the policies contained in section 7.7.2(d). The proposed FAR represents an appropriate form of intensification of currently underutilized lands within the County. The proposal is compliant with the existing R6 provisions pertaining to maximum height, angular plane, and the minimum required building step backs above the 4<sup>th</sup> floor, save and except for the 8<sup>th</sup> floor step back which is only deficient by 0.4m and the 5<sup>th</sup>, 6<sup>th</sup>, and 7<sup>th</sup> floor step backs exceed the minimum building step back requirement. As such, the proposal is functionally compliant with the minimum required building step backs when taking into consideration the building step back exceedances at the 5<sup>th</sup>, 6<sup>th</sup>, and 7<sup>th</sup> floors. Additionally, the proposed new 8-storey building is oriented such that the narrow side of the building faces Queen Street North. This building orientation reduces the perceived building mass as perceived from the adjacent low-rise residential neighbourhood to the west. Regarding the low-rise residential uses to the north, the proposed new 8-storey building will be setback 27.1m to the closest portion of the north side lot line. This front yard setback greatly exceeds the minimum front yard setback required and provides a large separation distance to the north side lot line, thereby reducing any potential massing impacts to the residential low-rise uses to the north as it relates to the increase in FAR on the Subject Property. The proposed FAR and other proposed provisions within the draft Zoning By-law are appropriate and contribute to providing a full range of housing types as well as office and retail uses within the County, in an appropriate area that is adjacent to the "Downtown" area of Simcoe.

### **Comment Responses based on Comments received from July 16<sup>th</sup>, 2024 Council Meeting**

1. The proposed development is not supported by a Functional Servicing Report or a General Plan of Services. Development Engineering cannot support a recommendation on the requested ZBA until service modelling has been completed and the Functional Servicing Report is submitted that demonstrates how the proposed amendments would be supported by current and/or upgrades Water, Wastewater and Storm Water infrastructure in Simcoe. It is Staff's opinion that the proposal is premature until a Functional Servicing study is submitted and reviewed for acceptance.
  - a. A Functional Servicing and Stormwater Management Report, as well as associated civil drawings, have been provided as part of this resubmission.
2. The proposed total parking spaces are 235 spaces whereas 308 spaces are required. For clarity, the total requested reduction in the required parking spaces is 73 parking spaces. It is Staff's opinion that the proposed reduction of parking spaces are significant and would result significant traffic overflow on adjacent streets. The proposed amount of parking spaces are not practical considering lack of public transport and connectivity throughout Norfolk

communities.

- a. The proposal has been revised such that the proposal is now compliant with and exceeds the minimum parking requirements of the Zoning By-law.
3. The application also proposed 150% increase (more than double) of the Floor Area Ratio (FAR). With the same building footprint, maintaining the required Floor Area Ratio, the building would not be more than 3 storeys whereas 8-storeys are proposed. Although 8-storeys is permitted in R6 zone, the proposal does not meet the Floor Area Ratio requirement. It is Staff's opinion that a three or four- storey building with an approximate Floor Area Ratio -1.5 would be more compatible and would be able to mitigate the parking deficiency as identified in this report.
  - a. Based on the justification provided within this PJR Addendum, as well as the justification previously provided to Staff and provided within the original Planning Justification Report, the proposed FAR is appropriate and will have little to no impact further than what the By-law already contemplates for the Subject Property.
4. The proposed development includes retail and office spaces on Ground floor on a land currently designated for residential. The proposed retail and office spaces are adjacent to downtown area with high vacancy rate. The proposal of the retail space is not supported by any retail market impact study identifying the need for additional retail space outside of the downtown area.
  - a. The proposed retail units are permitted as per the County's Official Plan. As such, no retail market impact study or analysis is required.
5. The applicant has provided the County with an Environmental Site Assessment (Phase 1 and 2) along with a Record of Site Condition from the Ministry of Environment. The submitted ESA and RSC that were provided to the County were the same documents that were provided in 2012 when the three storey office building was in the planning process. As the current proposed use is for a more sensitive land use, planning staff has requested that the applicant obtain a new RSC from the Ministry.
  - a. The requirement to obtain and submit a new RSC has been included as a provision within the proposed (H) Hold as part of the proposed Zoning By-law Amendment. The proposed (H) Hold cannot be lifted until a new RSC is obtained and provided to the County, to the County's satisfaction.
6. The proposed development is considered a high density residential development. The proposed commercial component of the development is measured at roughly 300 square meters. Staff have requested more detailed information regarding the size of the commercial spaces for the mixed use building as the applicant may require an Official Plan Amendment to address the above noted policies.
  - a. Additional information has been provided through this resubmission as well as previously to County Staff in this regard. The proposed retail units do not exceed 300 sq.m and an Official Plan Amendment is not required.



Other comments provided have been addressed within the submitted comment response matrix included with this resubmission.

### **Conclusion**

In conclusion, based on a review of the applicable Provincial and County policies as well as the County's Zoning By-law, it is my opinion that the proposed development conforms to the Provincial and County policies and represents good planning.

We look forward to continuing to work together on this application. Should you have any questions or concerns please do not hesitate to contact the undersigned.

Sincerely,

DESIGN PLAN SERVICES INC.



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David Igelman, BURPL, MCIP, RPP  
Associate

Encl.  
DI/tjc



	Comments	Response
Comment Number	COMMENT RESPONSE MATRIX - REVISED 3RD SUBMISSION - 185 ROBINSON STREET, SIMCOE	
	Planning	
1	The applicant has provided the County with an Environmental Site Assessment (Phase 1 and 2) along with a Record of Site Condition from the Ministry of Environment. The submitted ESA and RSC that were provided to the County were the same documents that were provided in 2012 when the three storey office building was in the planning process. As the current proposed use is for a more sensitive land use, planning staff has requested that the applicant obtain a new RSC from the Ministry.	New RCS to form part of HOLD provisions in proposed Draft ZBL
2	The proposed apartment building will provide a type of housing that is currently in short supply. This development will help the County meet its 15% targets as outlined above. (See Norfolk County Official Plan - Section 5.3 b)	Noted
3	A Traffic Impact Study (TIS) has been submitted as a part of the application. A Functional Servicing Report (FSR) is required to be submitted at the Site Stage. Greater details within the FSR and TIS may be required during the Site Plan Stage. The proposed residential condominium would provide a high density form of housing within the downtown of Simcoe. The proposed development is proposed to be facing in an east to west direction (parallel to the existing 3 storey office building on the subject lands).	FSR/SWM Report and Updated TIS have been provided with resubmission
4	The proposed development is considered a high density residential development. The proposed commercial component of the development is measured at roughly 300 square meters. Staff have requested more detailed information regarding the size of the commercial spaces for the mixed use building as the applicant may require an Official Plan Amendment to address the above noted policies. (See Norfolk County Official Plan - Section 7.7.1 & Subsection I)	The information regarding the commercial uses has been updated on the Site Plan. The proposed ground floor commercial Gross Floor Area (GFA) has been revised to a maximum of 299.6 square meters. No Official Plan Amendment (OPA) is required
	Zoning	
5	For R4 and R6 zone; Decks or balconies no closer than 1.2m to interior side yards (this includes steps)	Balconies are located with the proposed building footprints and comply with interior side yard setbacks
6	For R4 and R6 zone; For underground parking layout, spots along a wall require to be 3.3m wide, they are showing only 3.0m wide.	Proposed Draft Zoning By-law Amendment has been updated to include parking space width of 3.0m for vehicles parked along the wall
7	For R4 and R6 zone; Zoning table needs to show the required number of accessible parking spots and what is supplied.	Zoning table has been updated to show the number of accessible parking spots.
8	For R4 and R6 zone; Will 14.664 and 14.713 be removed from the lands? If not the zoning table on the drawings is not correct with required setbacks	Yes, they will be replaced with proposed 14.XXX as mentioned in the proposed Draft Zoning By-law
9	For R4 and R6 zone; For section of parking area dedicated to 185 Robinson, and special provision 14.812, a minimum of 66 parking spaces must be provided. The grey shaded area on the general site plan shows 65 parking spots which is deficient by one parking spot. However, the proposed severance will provide 185 Robinson with 87 parking spaces, for a total of 152 parking spaces. The current accessible spaces (6) as shown on the grey area will be sufficient accessible spaces for 152 parking spots. Special provision 14.812(d) will need to be amended.	Special provision 14.812(d) is proposed to be amended to require a minimum of 158 parking spaces and the proposal will be maintaining 158 parking spaces for the existing 3-storey building on the Subject Property. An additional 18 parking spaces at the northeast portion of the development area is provided as additional parking for the existing 3-storey building by way of an easement.

<u>10</u>	Parking is showing as still deficient in the parking table for the uses	Parking proposed is now compliant with the By-law requirements
<u>11</u>	The parking spaces in the parking garages are not dimensioned, the spots by a wall must be 3.3m wide.	Proposed Draft Zoning By-law Amendment has been updated to include parking space width of 3.0m for vehicles parked along the wall
<u>12</u>	The step back of the 8th floor is 1.6m, where 2.0m is required from the 7th to 8th floor	The proposed Draft Zoning By-law includes a provision to permit the reduced 8th floor step back of 1.6m
<b>Development Engineering</b>		
<u>13</u>	The Development will be required to update the Norfolk County Water and Wastewater model to include this site within the model, such that the County can determine if the current system is sufficient to support the development or, if not, what upgrades may be required to support the plan as presented. Water and sanitary modelling are to be completed by Norfolk County's consultant at the developer's expense. Identified system upgrades necessary to support the development will become obligations within the subsequent site plan agreement as undertakings at the sole cost of the Developer. For the benefit of both the County and the Development proposal, a functional servicing report (inclusive of water/wastewater modelling) should be completed and submitted with the rezoning, where such changes in servicing demand are seen as significant – such is the case with this application.	Required civil submission materials are provided with this resubmission.
<u>14</u>	All plans, reports and studies identified are to be submitted at the time of Site Plan application.	Noted
<u>15</u>	Water / wastewater allocation will not be issued as part of the ZBA. Applicant is to confirm capacities at the time of site plan application, at the time registration of agreement\approval allocation will be provided for the development, if available.	Noted
<u>16</u>	Full Development Engineering comments will be provided at the time of Site Plan submission.	Noted
<u>17</u>	A full Storm Water Management report will be required at the time of Site Plan Submission. All SWM reports are to follow Norfolk County Design Criteria Section 7 and adhere to Section 4 of the ISMP.	Noted
<u>18</u>	An updated Traffic Impact Study will be required at the Site Plan submission stage to include a further assessment of the Queen Street/Union Street intersection and a pedestrian circulation plan demonstrating how this site will integrate with the existing community fabric and contribute to a walkable community	An updated Traffic Impact and Parking Study has been provided with this ZBA resubmission. Any further details can be addressed at the Site Plan stage.

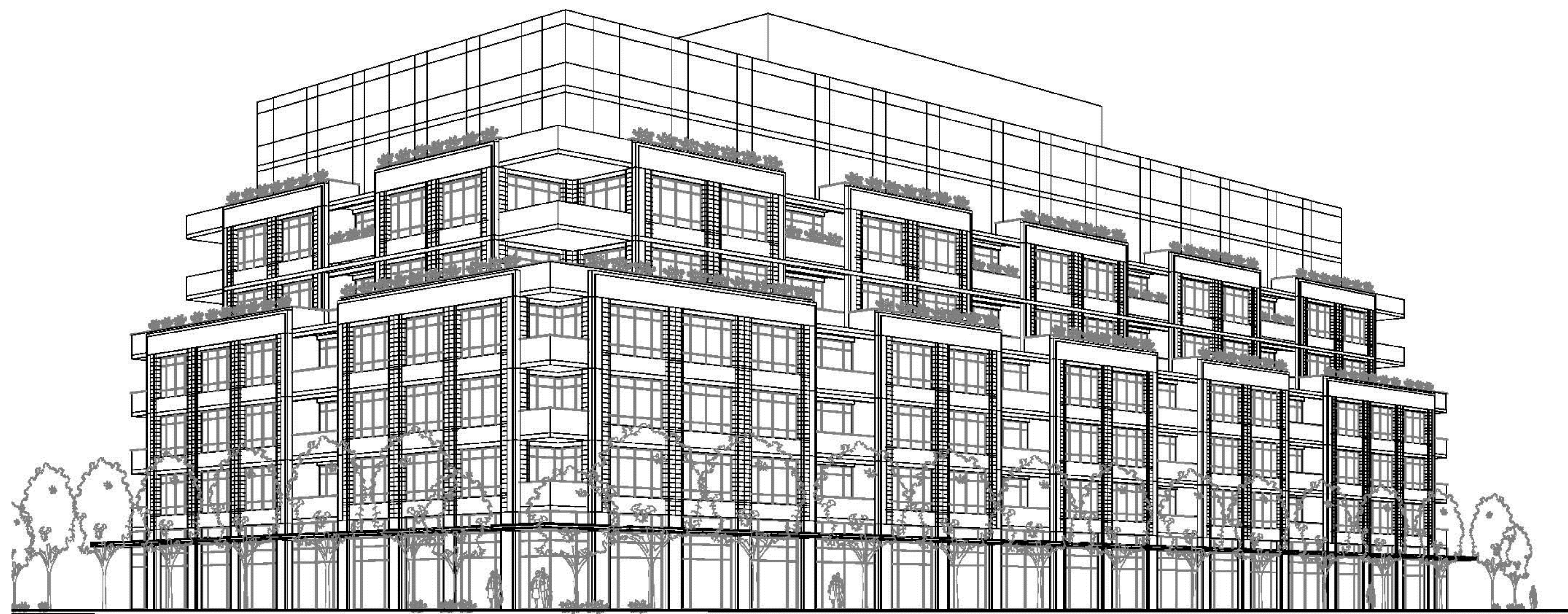


<u>19</u>	Any recommendations/upgrades from the Traffic Impact Study required to facilitate this development will be the responsibility of the developer.	Noted
<u>20</u>	It is recommended by Development Engineering that prior to site plan submission a Pre-Consultation meeting be held to ensure that the applicant has all new and accurate information pertaining to a proposal such as this.	Noted
<b>Building</b>		
<u>21</u>	<p>The building department has reviewed the proposal and has NO comments or conditions. No Ontario Building Code review has been completed at this time and will be done at permit application stage.</p> <p>Please reach out to the building department as you get closer to having the planning and applicable approvals in place and staff will be happy to assist you with information on preparing for the building and septic permit stage of the project.</p> <p>All general permitting inquiries: by email: <a href="mailto:permits@norfolkcounty.ca">permits@norfolkcounty.ca</a> or by phone: 519-426-5870x6016</p> <p>Please refer to our website for current forms, and fees.  <a href="https://www.norfolkcounty.ca/business/building/">https://www.norfolkcounty.ca/business/building/</a></p>	Noted
<b>Social Services and Housing</b>		
<u>22</u>	Social Services and Housing supports various housing options for residents, including the creation of additional housing stock in our communities; in particular, affordable, accessible housing. Rental options are a much needed option for Norfolk County.	Noted
<b>GIS</b>		
<u>23</u>	Please contact Norfolk GIS for new civic addresses when building	Noted
<b>Realty Services</b>		
<u>24</u>	<p>The drawings attached to this proposal indicate the possibility of including the north-east portion of the current parking area. Under the terms of the lease agreement that County has with the property owner, the County is entitled to 60 parking spaces. These spaces consist of the majority of the perimeter parking spots, including those shown in the drawings attached. Signage is in place indicating the County's parking spaces.</p> <p>Should this development proceed, and the parking spaces currently signed to be reserved for County staff be lost, this could have an impact on the County's lease agreement with the landlord/owner of the property.</p>	The parking spaces are being provided to the County as per the lease agreement and are being maintained on the portion of the Subject Property which will continue to function for the County office building.
<u>25</u>	<p>Realty staff have reviewed the application and note that the current Lease for the Robinson Administration Building includes sixty (60) designated reserved parking spaces for Norfolk County employees including two (2) dedicated parking spaces for Justices of the Peace and two (2) dedicated parking spaces for Ontario Provincial Police. Employee parking has been designated by signage along the perimeter of the parking lot which portions of the parking lot are included in this application.</p>	The parking spaces are being provided to the County as per the lease agreement are being maintained on the portion of the Subject Property, which will continue to function for the County office building. Additionally, 18 parking spaces located at the north-east portion of the subject property are being maintained for the existing County Office building by way of an easement.
<b>Fire</b>		
<u>26</u>	Ensure adequate access for fire department apparatus	Noted
<u>27</u>	Ensure adequate water supply for required fire suppression systems	Noted
<b>Paramedic</b>		
<u>28</u>	Reviewed - No comments from Paramedic Service	N/A
<b>Agreement Administrator</b>		

<u>29</u>	A Holding (H) provision on your land zoning should remain in place until the Owner has provided complete accepted engineering drawings, performance securities and entered into a development agreement that has been executed and registered on title.	These matters can be dealt with through the required Site Plan application and through the eventual Site Plan agreement to be executed between the County and the owner. As such, the proposed (H) Hold provision does not need to address these matters but will remain in place with amended provisions to lift the (H) Hold related to other matters as referenced within the proposed Draft Zoning By-law
<b>General Notes</b>		
<u>30</u>	Securities will be required in the form of a schedule. Any works completed within the Municipal Right-of-Way (R.O.W.) is to be shown as 100% security. Any works completed within private property is to be shown as 10% security. This can be submitted at time of Site Plan.	Noted
<u>31</u>	All reports and plans are to be signed and stamped by a Professional Engineer (P.Eng.).	Noted
<u>32</u>	All reports are to be completed in reference to Norfolk County's Design Criteria and Integrated Sustainable Master Plan (ISMP). Recommendations from all reports / modelling must be incorporated into the design and is to adhere to Norfolk County's Design Criteria. A copy of this criteria is available upon request.	Noted
<u>33</u>	Recommendations from all reports (FSR, SWM, TIB, Modelling, etc.) must be incorporated into the design and be constructed at the developer's expense.	Noted
<u>34</u>	All applicable permits and inspections to be issued by Public Works.	Noted
<u>35</u>	As-constructed drawings are available upon request.	Noted
<b>Required at Zoning By-Law Amendment Stage</b>		
<u>36</u>	The following reports/studies will be required at time of a Zoning By-law Amendment: a. Concept Plan; b. Functional Servicing Report (as per Norfolk County Design Criteria); c. Water / Sanitary Modelling. d. Storm Water Management Report. e. Traffic Impact Study (as per ISMP Appendix J – TIS Guidelines);	Civil submission materials and updated TIS are provided with this resubmission
<u>37</u>	Sanitary and Water modelling will be required. This is to be completed by Norfolk County's third-party consultant. The cost to complete the modelling and any recommendations from reports are to be implemented into the design at the applicant's expense. The following information will be required to receive a quote and complete the modelling. a. General Plan of Services b. Functional Servicing Report; i. Total Wastewater Design Flows; ii. Total Domestic Water and Fire Flows as per Norfolk County Design Criteria Section 10.1.1	Civil submission materials and updated TIS are provided with this resubmission
<u>38</u>	The Functional Servicing Report must include water /sanitary servicing and fire flow calculations. Fire Flow calculations are to be completed in accordance with "Water Supply for Public Fire Protection 2020" by Fire Underwriters Survey. Once the quote has been received, approval from the applicant will be required before proceeding.	FSR/SWM Report includes required calculations
<u>39</u>	Stormwater Management Report is to be completed as per Norfolk County Design Criteria. Section 7.0 and Section 8.0 and Section 4.0 of Norfolk County's ISMP.	Noted
<u>40</u>	Development Engineering will require confirmation of a legal and adequate outlet Storm water outlet for this development.	Addressed within FSR/SWM report.

<u>41</u>	As per Norfolk County's Integrated Sustainable Master Plan (ISMP) Appendix J – Traffic Impact Study (TIS) Guidelines, a full Traffic Impact Study will be required.	Updated TIS provided with this resubmission.
<b>Required at Site Plan Stage</b>		
<u>42</u>	All Site Plan submissions are to comply with Section 16 of the Norfolk County Design Criteria. It is the recommendation of Development Engineering that a NEW Pre-Consultation meeting be held prior to Site Plan Application to ensure that all current County standards are identified prior to submission. Any changes to the overall concept from the 2019 Pre con would be commented on appropriately.	Noted
<b>Material Required at OPA/Zoning Stage</b>		
<u>43</u>	<b>General Requirements:</b> Concept Plan, General Plan of Services. <b>Water Servicing Requirements:</b> Water Modelling (County Consultant) <b>Sanitary Servicing Requirements:</b> Sanitary Modelling (County Consultant) <b>Storm Water Servicing Requirements:</b> Storm Water Management Design Report (Including calculations), Establish/Confirm Legal and Adequate Outlet. <b>Transportation Requirements:</b> Traffic Impact Study	FSR/SWM Report and updated TIS included within this resubmission.
<b>Additional Comments from County Staff</b>		
<u>44</u>	Renderings of proposed building from various points, specifically, <ul style="list-style-type: none"> <li>o Kars and Queen Street</li> <li>o West Street by Hospital</li> <li>o Queen street</li> </ul>	3D rendering provided with resubmission but proposal is compliant with maximum height, angular plane, and all minimum floor step-backs save and except for the 8th floor step back.
<u>45</u>	Shadow modeling to show potential impacts on residential properties along Kars and Queen Street. The modeling should show the difference between the setback provision required (step-back at each floor) vs the step backs proposed. <ul style="list-style-type: none"> <li>o This would significantly aid in justifying the step back provision amendment This would also require an update to the Planning justification report submitted.</li> </ul>	Although Proposal is compliant with maximum height, angular plane, and minimum step back provisions, save and except for the 8th floor step back, shadow modelling has been provided at the County's request.
<u>46</u>	Provide examples of other areas that have adopted a similar building proposal with the long term care and residential apartments as one cohesive building. This should be further outlined in the Planning Justification Report. This would aid in addressing the public feedback as it pertains to compatibility.	Long-term care use is no longer being proposed for development on the Subject Property.
<u>47</u>	Explore different proposed uses within the building (ex: remove medical offices).	Medical offices and LTC use are no longer being proposed for development on the Subject Property
<u>48</u>	PJR is missing information about the FAR ratio. Update the PJR	PJR Addendum provided with resubmission and addresses proposed FAR





# 185 ROBINSON ST MIX-USE DEVELOPMENT

185 ROBINSON ST., SIMCOE, ONTARIO

[illegible]

**GENERAL NOTES**

ALL DRAWINGS ARE THE PROPERTY OF THE DESIGNER AND THEY ARE NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN CONSENT FROM THE DESIGNER.

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS BEFORE COMMENCING WORK AND TO REPORT ANY DISCREPANCIES TO THE DESIGNER.

DO NOT SCALE DRAWINGS.

ALL CONSTRUCTION TO BE ACCORDING TO BEST COMMON PRACTICE AND CONFORM TO THE ONTARIO BUILDING CODE.

PRELIMINARY

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PROJECT  
**185 ROBINSON ST**  
**MIX-USE**  
185 ROBINSON ST.,  
SIMCOE, ONTARIO

DRAWING  
3D VIEW  
ARTIST CONCEPT

PROJECT NO 20103	DRAWING NO <b>AC</b>
DRAWN R.G.	
PLOTTED DATE FEB 2020	
SCALE AS NOTED	
CHECKED G.	
OF --	

DRAWING NO. **A00**