THE ANGRISH GROUP
32 Charing Cross Street, Brantford, ON N3R 2H2

November 24, 2025

File: 2021_119
Bluegrass Estates Phase 4

Planning and Development
Planning Division, County of Norfolk

Re: Official Plan Amendment & Zoning By-Law Amendment
Subject Property: Bluegrass Estates Phase 4

To Whom It May Concern;

We are pleased to submit an Official Plan Amendment and a Zoning By-Law Amendment Applications request on behalf of the owners. A Pre-Consultation meeting was held with the County of Norfolk staff on February 12, 2025. The Official Plan and Zoning By-law Amendment applications propose to redesignate and rezone the Subject Lands to Residential, Commercial and Industrial.

The following information has been included with the applications:

- 2021_119 - Bluegrass Estates Phase 4-Application for Official Plan Amendment-signed
- 2021_119 - Bluegrass Estates Phase 4-Application for Zoning By-law Amendment-signed
- 2021_119 - Bluegrass Estates Phase 4 -R-Plan -37R11444
- 2021_119 - Bluegrass Estates Phase 4 - Site Plan
- 2021_119 - Bluegrass Estates Phase 4 - PJR and Land Use Compatibility
- 2021_119 - Bluegrass Estates Phase 4 - proposed OPA Schedule
- 2021_119 - Bluegrass Estates Phase 4 - proposed ZBA Schedule
- 2021_119 - Bluegrass Estates Phase 4 - Zoning Map
- 2021_119 - Bluegrass Estates Phase 4-Internal Investigation of Fertilizer Plant Report 2021-12-30
- 2021_119 - Bluegrass Estates Phase 4 - Separation Distance Map (2021)
- 2021_119 - Bluegrass Estates Phase 4 – SWMandFS Report - Stamped - October 2025
- 2021_119 - Bluegrass Estates Phase 4 - Traffic Study - Phases 3 and 4 (from 2021)
- 2021_119 - Bluegrass Estates Phase 4 - Archaeological Study (Stage 1 and 2)
- 2021_119 - Bluegrass Estates Phase 4- Archaeological Study (Stage 1 and 2) P379-0756-2025 -Ministry Letter
- 2021_119 - Bluegrass Estates Phase 4-Geotechnical Investigation Report - Phases 3 and 4 – Stamped

- 2021_119 - Bluegrass Estates Phase 4 - Preliminary Grading Plan1 – Stamped
- 2021_119 - Bluegrass Estates Phase 4 - Preliminary Grading Plan2 – Stamped
- 2021_119 - Bluegrass Estates Phase 4 - Preliminary Servicing Plan – Stamped
- 2021_119 - Bluegrass Estates Phase 4 - Outlet Structure Detail – Stamped
- 2021_119 - Bluegrass Estates Phase 4 - Street A - Plan and Profile - 1 – Stamped
- 2021_119 - Bluegrass Estates Phase 4 - Street A - Plan and Profile - 2 – Stamped
- 2021_119 - Bluegrass Estates Phase 4 - Street A - Plan and Profile - 3 – Stamped
- 2021_119 - Bluegrass Estates Phase 4-Street Signage and Traffic Control Plan
- 2021_119 - Bluegrass Estates Phase 4-Street Tree Planting Plan

We trust that the enclosed information is sufficient to process the request for an Official Plan Amendment and Zoning By-Law Amendment. Should you have any further questions, please do not hesitate to contact the undersigned.

Regards,
TAG – The Angrish Group



Ruchika Angrish, MPlan, B.Tech, MCIP, RPP
Co-Founder

Cc/ Joe Jeles (Owner)
Benjamin Jeles (Owner)
Bob Phillips (Project Engineer, J.H. Cohoon Engineering)

Development Application for Official Plan Amendment

Complete Application

The application must be completed by the owner or authorized agent. If the application is being submitted by an agent, the owner's written authorization is required. If the lands subject to this application are owned by more than one owner, the authorization of all owners is required. Submission of this application constitutes consent for authorized municipal staff to inspect the subject lands.

It is the responsibility of the applicant to research and evaluate the site and the proposal to ensure that the development will conform to the interests of the health, safety and welfare of future residents. Sufficient studies for the completion of the application should be carried out prior to submission and should be reflected in the application form.

Online Application Process

All applications must be submitted online via the County's CityView Portal. The portal can be accessed here: Welcome - CityView Portal. The applicant will submit the materials required as part of a complete application. Once the County confirms receipt of a complete submission, the applicant will be contacted and provided further directions for payment options.

Pre-Consultation Meeting:

Pre-Consultation is highly recommended for Official Plan Amendment applications. The purpose of a Pre-Consultation meeting is to provide the applicant with an opportunity to present the proposed development, discuss potential issues, and for the Norfolk County and external agencies to identify the application requirements. The requirements, as detailed in the Pre-Consultation meeting comments, are valid for one year after the meeting date.

User Fees:

The planning application fee will be determined when the application can be deemed complete according to Norfolk County Community Planning user fees: User Fees | Norfolk County

Additional agency plan review fees may apply. Please see below for more information and forward fees directly to the applicable agency, as required:

Grand River Conservation Authority
Plan Review fees | Grand River Conservation Authority

Long Point Region Conservation Authority
Planning Fees - Long Point Region Conservation Authority

Cash, debit, credit or cheque payable to Norfolk County in the amount set out in the User Fees By-Law that will be accepted and deposited once the application has been deemed complete.

Development Application Process

Norfolk County staff will circulate the complete application to adjacent landowners, public agencies, and internal departments for comment. Planning Act decision timeframes will apply in accordance with the provisions of Section 17 of the Act.

Norfolk County collects personal information submitted through this form under the authority of the Municipal Freedom of Information and Protection Act. Norfolk County will use this information for the purposes indicated by this form.

Additional studies required for a complete application and any required peer reviews that may be necessary shall be provided at the applicant's sole expense. In these cases, Norfolk County staff will select the company to complete the peer review.

Norfolk County will refund the original fee if applicants withdraw their applications before circulation. If Norfolk County must recirculate your drawings, there will be an additional fee. If Norfolk County must do more than three reviews of engineering drawings due to revisions by the owner or failure to revise engineering drawings as requested, Norfolk County will charge an additional fee.

Contact Us

For additional information or assistance completing this application, please contact a Planner at 519-426-5870 or planning@norfolkcounty.ca.

Notification Sign Requirements

For public notification, Norfolk County will provide you with a sign to indicate the intent and purpose of the development application. It is your responsibility to:

1. Post one sign per frontage in a conspicuous location on the subject lands.
2. Ensure one sign is posted at the front of the subject lands at least three feet above ground level and not on a tree.
3. Notify the Planner when the sign is in place.
4. Maintain the sign until the development application is finalized and, after that, remove it.

Norfolk COUNTY

For Office Use Only:

File Number		Public Notice Sign	
Related File Number		Application Fee	
Pre-consultation Meeting		Conservation Authority Fee	
Application Submitted		Well & Septic Info Provided	
Complete Application		Planner	

Check the type of planning application(s) you are submitting.

☐ Official Plan Amendment - Regular

■ Official Plan Amendment - Major

Property Assessment Roll Number: 331049102445011

A. Applicant Information

Note: It is the responsibility of the owner to notify the Planner of any changes in ownership or authorized applicant within 30 days of such a change

Name of Owner	1064928 ONTARIO LTD. (Joe Jeles & Ben Jeles)
Address	36 Paris Road
Town and Postal Code	Paris, ON N3L 3H8
Phone Number	519-442-7214 (Joe)
Cell Number	
Email	joe.jeles@rogers.com / benjeles@gmail.com
Name of Authorized Applicant	same as Owner
Address	
Town and Postal Code	
Phone Number	
Cell Number	
Email	
Name of Authorized Agent	The Angrish Group / 2745438 Ontario Inc. - Ruchika Angrish

Norfolk COUNTY

Address	32 Charing Cross Street
Town and Postal Code	Brantford, ON N3R 2H2
Phone Number	519-770-0200
Cell Number	
Email	theangrishgroup@gmail.com

Unless otherwise directed, Norfolk County will forward all correspondence and notices regarding this application to both owner and agent noted above.

■ Owner ■ Agent ■ Applicant

Names and addresses of any holder of any mortgagees, charges or other encumbrances on the subject lands:
N/A

B. Location, Legal Description and Property Information

1. Legal Description (include Geographic Township, Concession Number, Lot Number, Block Number and Urban Area or Hamlet):
"Bluegrass Estates Phase 4"
Legal Description is noted at the bottom of this page.

Municipal Civic Address: Not at this time

Land acquisition date (if known): Approximately September 2021

Present Official Plan Designation(s): Protected Industrial

Present Zoning: D and D(H)

2. Is there a site-specific provision on the subject lands?

☐ Yes ■ No

If yes, please specify the corresponding number:

3. Present use of the subject lands:
Agriculture - being farmed

Legal Description:
LOTS 33 TO 46, 58 TO 61, 70 TO 73, PLAN 334 (DELHI); PART OF LOTS 32, 47, 57, 62, 69 & 74, PLAN 334 (DELHI) ALL OF BALDWIN STREET, PART OF DUCHESS DRIVE, PART OF MCINTOSH DRIVE, PART OF RUSSET DRIVE (ALL CLOSED BY BY-LAW 2021-129 AS IN NK146925) PLAN 334 (DELHI) AND PART OF LOT 22 CON 12 TOWNSHIP OF WINDHAM PARTS 1, 2 AND 3 PLAN 37R11632; SAVE AND EXCEPT 37M101 SUBJECT TO AN EASEMENT OVER PART 2, 37R11632 AS IN NR184564 SUBJECT TO AN EASEMENT OVER PART 2, 37R11632 AS IN NR196930 SUBJECT TO AN EASEMENT OVER PART 2, 37R11632 AS IN NR196931 NORFOLK COUNTY

4. Please describe **all existing** buildings or structures on the subject lands and whether they will be retained, demolished or removed.
No buildings or structures

5. If an addition to an existing building is being proposed, please explain the proposed use.
N/A

6. Please describe **all proposed** buildings or structures/additions on the subject lands.
N/A

7. Are any existing buildings on the subject lands designated under the *Ontario Heritage Act* as being of cultural heritage value or interest?
☐Yes No ■

If yes, identify and provide details:
N/A

8. If known, the length of time the existing uses have continued on the subject lands:
At least 2 generations, or more, of farming the agricultural land.

9. Existing use of abutting properties:

Residential to the north, Employment to the south and west, Agricultural to the north

10. Are there any easements or restrictive covenants affecting the subject lands?
Yes ☐ No ■

If yes, describe the easement or restrictive covenant and its effect:

C. Purpose of Development Application

Note: Please complete all that apply.

1. Please describe the proposed development on the subject lands:
Proposed draft Plan of Subdivision containing residential, commercial and indu
Also included are stormwater management and a landscaping block.

2. Please explain why it is not possible to conform to the policies of the Official Plan:
Currently designated Protected Industrial which does not allow proposed Res as proposed Neighbourhood Commercial (NC) and blocks for Light Industrial

3. What land uses would the requested official plan amendment authorize?
Residential, commercial and Light Industrial

4. Are any Official Plan schedules or maps proposed to be changed or replaced

■ Yes ☐ No

If yes, please provide a proposed key land use schedule map.

5. Have the subject land or lands within 120 metres ever been and/or currently are the subject of a Planning Act application:
   - Plan of Subdivision ■ Yes ☐ No
   - Official Plan Amendment ■ Yes ☐ No
   - Zoning Bylaw, or Zoning Order Amendment ■ Yes ☐ No
   - Site Plan ☐ Yes ☐ No
   - Consent/Minor Variance ■ Yes ☐ No

   If yes, indicate the application file number and the status of the application Approved

6. Does the requested amendment alter all or any part of the boundary of an area of settlement in the municipality or establish a new area of settlement in the municipality?

☐Yes ■No

If yes, describe its effect:

7. Does the requested amendment remove the subject land from an area of employment?

☐Yes ☐No

If yes, describe its effect:

8. Does the requested amendment alter, replace, or delete a policy of the Official Plan?

■ Yes ☐ No

If yes, identify the policy, and also include a proposed text of the policy amendment (if additional space is required, please attach a separate sheet):

Draft bylaw included with the submission

D. Previous Use of the Property

1. Has there been an industrial or commercial use on the subject lands or adjacent lands?

■ Yes ☐ No ☐ Unknown

If yes, specify the uses (for example: gas station or petroleum storage):

public works yard on the west side of the proeprty

2. Is there reason to believe the subject lands may have been contaminated by former uses on the site or adjacent sites?

☐ Yes ■ No ☐ Unknown

3. Provide the information you used to determine the answers to the above questions:

4. If you answered yes to any of the above questions in Section D, a previous land use inventory showing all known former uses of the subject lands, and/or when applicable, the adjacent lands, is required.

Is the land use inventory of former land uses attached? ■ Yes ☐ No

E. Provincial Planning Statement

1. Is the requested amendment consistent with the Provincial Planning Statement issued under subsection 3(1) of the *Planning Act, R.S.O. 1990, c. P. 13*?

■ Yes ☐No

If no, please explain:

2. It is the owner's responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals, including

the Endangered Species Act, 2007. Have the subject lands been screened to ensure that development or site alteration will not have any impact on the habitat for endangered or threatened species further to the Provincial Planning Statement?

■ Yes ☐ No

If no, please explain:

_____

_____

3. Have the subject lands been screened to ensure that development or site alteration will not have any impact on source water protection?

■ Yes ☐ No

If no, please explain:

_____

_____

Note: If in an area of source water Wellhead Protection Area (WHPA) A, B or C, Intake Protection Zone (IP-Z), Issue Contributing Area (ICA), please attach relevant information and approved mitigation measures from the Risk Management Official.

4. Are any of the following uses or features on the subject lands or within 500 metres of the subject lands, unless otherwise specified? Please check boxes, if applicable.

Livestock facility or stockyard

☐ On the subject lands or ☐ within 500 meters – distance no

Significant Woodland

☐ On the subject lands or ☐ within 500 meters – distance no

Municipal Landfill

☐ On the subject lands or ☐ within 500 meters – distance no

Sewage treatment plant or waste stabilization plant

☐ On the subject lands or ☐ within 500 meters – distance no

Provincially significant wetland or other environmental feature

☐ On the subject lands or ☐ within 500 meters – distance no

Floodplain

☐ On the subject lands or ☐ within 500 meters – distance no

Rehabilitated mine site

☐ On the subject lands or ☐ within 500 meters – distance no

Non-operating mine site within one kilometre

☐ On the subject lands or ☐ within 500 meters – distance no

Active mine site within one kilometre

☐ On the subject lands or ☐ within 500 meters – distance no

Industrial or commercial use (specify the use(s))

☐ On the subject lands or ■ within 500 meters – distance yes

Active railway line

☐ On the subject lands or ☐ within 500 meters – distance no

Seasonal wetness of lands

☐ On the subject lands or ☐ within 500 meters – distance no

Erosion

☐ On the subject lands or ☐ within 500 meters – distance no

Abandoned gas wells

☐ On the subject lands or ☐ within 500 meters – distance no

F. Servicing and Access

1. Indicate what services are available or proposed:

Water Supply

Municipal piped water	☑
Individual wells	☐
Communal wells	☐
Other (describe below):	☐

Storm Drain

Storm sewers	☑
Open ditches	☐
Other (describe below):	☐

Sewage Treatment

Municipal sewers	☑
Communal system	☐
Septic tank and tile bed in good working order	☐
Other (describe below):	☐

Existing or proposed access to subject lands

Municipal road	☑
Provincial highway	☐
Unopened road	☐

Name of road/street: south side of Aryle

Other (describe below): ☐

2. Does the application require development on privately owned and operated individual or communal septic systems, and more than 4500 litres of effluent produced per day as a result of the development being completed?

☐ Yes ■ No

If yes, provide (i) Servicing Options Report and (ii) Hydrogeological Report with the submission.

G. Other Information

1. Does the application involve a local business? ☐ Yes ■ No

If yes, how many people are employed on the subject lands?

_____

2. Please provide a proposed strategy for consulting with the public with respect to this application:

_____

_____

_____

H. Supporting Material to be submitted by Applicant

i. Concept sketch

A sketch drawn to scale showing in metric units, the following;

1) the boundaries and dimensions of the subject lands and where applicable, total land holdings owned by the applicant and encompassing the lands for which the application is being made;

2) the distribution of the proposed land uses, including the location, size and use of all proposed building and structures, landscaping and parking areas on the subject land. In the case of a plan of subdivision, a lotting plan shall be submitted.

ii. Additional plans, studies and reports

The following additional plans, studies and reports, including but not limited to, **may** also be required as part of the complete application submission:

☐ On-Site Sewage Disposal System Evaluation Form (to verify location and condition)

☐ Cut and Fill Plan

☐ Erosion and Sediment Control Plan

- ☐ Grading and Drainage Control Plan (around perimeter and within site) (existing and proposed)
- ☐ Plan and Profile Drawings
- ☐ Site Servicing Plan
- ☐ Storm water Management Plan
- ☐ Street Sign and Traffic Plan
- ☐ Street Tree Planting Plan
- ☐ Tree Preservation Plan
- ☐ Archaeological Assessment
- ☐ Environmental Impact Study
- ☐ Functional Servicing Report
- ☐ Agricultural Impact Assessment
- ☐ Geotechnical Study / Hydrogeological Review
- ☐ Minimum Distance Separation Calculations
- ☐ Noise or Vibration Study
- ☐ Record of Site Condition
- ☐ Stormwater Management Report
- ☐ Traffic Impact Study – please contact the Planner to verify the scope required

The approval of the proposed development might be subject to additional federal or provincial legislation, municipal by-laws or other agency approvals.

I. Transfers, Easements and Postponement of Interest

The owner acknowledges and agrees that if required, it is their solicitor's responsibility on behalf of the owner to disclose the registration of all transfer(s) of land and/or easement in favour of the County and/or utilities. Also, the owner further acknowledges and agrees that it is their solicitor's responsibility on behalf of the owner to undertake the registration of postponements of any charges in favour of the County.

J. Permission to Enter Subject Lands

Permission is hereby granted to Norfolk County officers, employees or agents, to enter the premises subject to this application for the purpose of making inspections associated with this application, during normal and reasonable working hours.

K. Freedom of Information

For the purposes of the *Municipal Freedom of Information and Protection of Privacy Act*, I authorize and consent to the use by or the disclosure to any person or public body any information that is collected under the authority of the *Planning Act, R.S.O. 1990, c. P. 13* for the purpose of processing this application.

Owner/Authorized Applicant Signature — Date: NOVEMBER 17, 2025

L. Owner's Authorization

If the authorized applicant/agent is not the registered owner of the lands that is the subject of this application, the owner(s) must complete the authorization set out below.

I/We DELEES FOR 1064928 ONT. LTD. am/are the registered and authorized owner(s) of the lands that is the subject of this application.

I/We authorize _____ to make this application on my/our behalf and to provide any of my/our personal information necessary for the processing of this application. Moreover, this shall be your good and sufficient authorization for so doing.

Owner — Date: NOVEMBER 17, 2025

Owner — Date: NOVEMBER 17, 2025

Note: If property is owned by an Ontario Ltd. Corporation, Articles of Incorporation are required to be attached to the application.

Ruchika Angrish

The City of Brantford

The City of Brantford

Sumil Kumar Angrish,
a Commissioner, etc.,
Province of Ontario,
for The Angrish Group.
Expires March 15, 2027.

The Province of Ontario

21st November

25

Development Application for Zoning By-law Amendment

Complete Application

The application must be completed by the owner or authorized agent. If the application is being submitted by an agent, the owner's written authorization is required. If the lands subject to this application are owned by more than one owner, the authorization of all owners is required. Submission of this application constitutes consent for authorized municipal staff to inspect the subject lands.

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User Fees:

The planning application fee will be determined when the application can be deemed complete according to Norfolk County Community Planning user fees: User Fees | Norfolk County

Additional agency plan review fees may apply. Please see below for more information and forward fees directly to the applicable agency, as required:

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Plan Review fees | Grand River Conservation Authority
Long Point Region Conservation Authority
Planning Fees - Long Point Region Conservation Authority

Cash, debit, credit or cheque payable to Norfolk County in the amount set out in the User Fees By-Law that will be accepted and deposited once the application has been deemed complete.

Development Application Process

Norfolk County staff will circulate the complete application to adjacent landowners, public agencies, and internal departments. Planning Act decision timeframes will apply in accordance with the provisions of Section 34 of the Planning Act Norfolk County collects personal information submitted through this form under the authority of the Municipal Freedom of Information and Protection Act. Norfolk County will use this information for the purposes indicated by this form. Questions about collecting personal information can be directed to Norfolk GIS Services at NorfolkGIS@norfolkcounty.ca.

Additional studies required for a complete application along with peer reviews may be required and shall be provided at the applicant's sole expense. In these cases, Norfolk County staff will select the company to complete the peer review.

Norfolk County will refund the original fee if applicants withdraw their applications before circulation. If Norfolk County must recirculate your drawings, there will be an additional fee. If Norfolk County must do more than three reviews of engineering drawings due to revisions by the owner or failure to revise engineering drawings as requested, Norfolk County will charge an additional fee.

Contact Us

For additional information or assistance completing this application, please contact a Planner at 519-426-5870 or planning@norfolkcounty.ca.

Notification Sign Requirements

For public notification, Norfolk County will provide you with a sign to indicate the intent and purpose of the development application. It is your responsibility to:

1. Post one sign per frontage in a conspicuous location on the subject lands.
2. Ensure one sign is posted at the front of the subject lands at least three feet above ground level and not on a tree.
3. Notify the Planner when the sign is in place.
4. Maintain the sign until the development application is finalized and, after that, remove it.

Norfolk COUNTY

For Office Use Only:

File Number		Public Notice Sign	
Related File Number		Application Fee	
Pre-consultation Meeting		Conservation Authority Fee	
Application Submitted		Well & Septic Info Provided	
Complete Application		Planner	

Check the type of planning application(s) you are submitting.

- ■ Zoning By-Law Amendment – Regular
- ■ Zoning By-Law Amendment - Major
- ☐ Zoning By-Law Amendment - Minor
- ☐ Temporary Use By-law

Property Assessment Roll Number: 331049102445011

A. Applicant Information

Note: It is the responsibility of the owner to notify the Planner of any changes in ownership or authorized applicant within 30 days of such a change

Name of Owner	1064928 ONTARIO LTD. (Joe Jeles & Ben Jeles)
Address	36 Paris Road
Town and Postal Code	Paris, ON N3L 3H8
Phone Number	519-442-7214 (Joe)
Cell Number	
Email	joe.jeles@rogers.com / benjeles@gmail.com

Name of Authorized Applicant	same as Owner
Address	
Town and Postal Code	
Phone Number	
Cell Number	

Email

Name of Authorized Agent The Angrish Group / 2745438 Ontario Inc. - Ruchika Angrish

Address 32 Charing Cross Street

Town and Postal Code Brantford, ON N3R 2H2

Phone Number 519-770-0200

Cell Number

Email theangrishgroup@gmail.com

Unless otherwise directed, Norfolk County will forward all correspondence and notices regarding this application to both owner and agent noted above.

■ Owner ■ Agent ■ Applicant

Names and addresses of any holder of any mortgagees, charges or other encumbrances on the subject lands:

No

B. Location, Legal Description and Property Information

1. Legal Description (include Geographic Township, Concession Number, Lot Number, Block Number and Urban Area or Hamlet):

"Bluegrass Estates Phase 4"

Legal Description is noted at the bottom of this page.

Municipal Civic Address: Not available at this time

Land acquisition date (if known): Approximately September 2021

Present Official Plan Designation(s): Protected Industrial

Present Zoning: D and D(H)

2. Is there a site-specific provision on the subject lands?

Yes ■ No If yes, please specify the corresponding number:

Legal Description:
LOTS 33 TO 46, 58 TO 61, 70 TO 73, PLAN 334 (DELHI); PART OF LOTS 32, 47, 57, 62, 69 & 74, PLAN 334 (DELHI) ALL OF BALDWIN STREET, PART OF DUCHESS DRIVE, PART OF MCINTOSH DRIVE, PART OF RUSSET DRIVE (ALL CLOSED BY BY-LAW 2021-129 AS IN NK146925) PLAN 334 (DELHI) AND PART OF LOT 22 CON 12 TOWNSHIP OF WINDHAM PARTS 1, 2 AND 3 PLAN 37R11632; SAVE AND EXCEPT 37M101 SUBJECT TO AN EASEMENT OVER PART 2, 37R11632 AS IN NR184564 SUBJECT TO AN EASEMENT OVER PART 2, 37R11632 AS IN NR196930 SUBJECT TO AN EASEMENT OVER PART 2, 37R11632 AS IN NR196931 NORFOLK COUNTY

3. Present use of the subject lands:
Agriculture - being farmed

4. Please describe **all existing** buildings or structures on the subject lands and whether they will be retained, demolished or removed.
No buildings or structures

5. If an addition to an existing building is being proposed, please explain the proposed use.
N/A

6. Please describe **all proposed** buildings or structures/additions on the subject lands.
N/A

7. Are any existing buildings on the subject lands designated under the *Ontario Heritage Act* as being of cultural heritage value or interest?

☐ Yes ■ No

If yes, identify and provide details:
N/A

8. If known, the length of time the existing uses have continued on the subject lands:
At least 2 generations, or more of farming the agricultural land.

9. Existing use of abutting properties:
Residential to the north, Employment to the south and west, Agricultural to the north and east

10. Are there any easements or restrictive covenants affecting the subject lands?

☐ Yes ■ No

If yes, describe the easement or restrictive covenant and its effect:

C. Purpose of Development Application

Note: Please complete all that apply.

1. Please describe the proposed development on the subject lands:
   Proposed Residential lots as well as proposed commercial blocks for Light Industri

2. Please explain why it is not possible to comply with the provisions of the Zoning By-law :
   Development (D) Zone does not allow
   Proposed Urban Residential Type 2 (R2), Neighbourhood Commercial (CN) and

3. Have the subject land or lands within 120 metres ever been and/or currently are the subject of a Planning Act application:
   - Plan of Subdivision ☐ Yes ■ No
   - Official Plan Amendment ■ Yes ☐ No
   - Zoning Bylaw, or Zoning Order Amendment ■ Yes ☐ No
   - Site Plan ☐ Yes ■ No
   - Consent/Minor Variance ☐ Yes ■ No

   If yes, indicate the application file number and the status of the application
   currently BNPL2020223

D. Previous Use of the Property

1. Has there been an industrial or commercial use on the subject lands or adjacent lands?

   ■ Yes ☐ No ☐ Unknown

   If yes, specify the uses (for example: gas station or petroleum storage): ____

   The County Public Works Yard and a former landfill site, are adjacent, located to the west of the subject lands.

2. Is there reason to believe the subject lands may have been contaminated by former

uses on the site or adjacent sites?

☐ Yes X No ☐ Unknown

3. Provide the information you used to determine the answers to the above questions:
The lands have been utilized for agricultural uses for many decades.

4. If you answered yes to any of the above questions in Section D, a previous land use inventory showing all known former uses of the subject lands, and/or when applicable, the adjacent lands, is required.

Is the land use inventory of former land uses attached? ☐ Yes ☐ No

E. Provincial Planning Statement

1. Is the requested amendment consistent with the Provincial Planning Statement issued under subsection 3(1) of the *Planning Act, R.S.O. 1990, c. P. 13*?

■ Yes ☐ No

If no, please explain: **Please see attached Planning Justification Report.**

–

2. It is owner's responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals, including the Endangered Species Act, 2007. Have the subject lands been screened to ensure that development or site alteration will not have any impact on the habitat for endangered or threatened species further to the Provincial Planning Statement?

■ Yes ☐ No

If no, please explain:

3. Have the subject lands been screened to ensure that development or site alteration will not have any impact on source water protection?

■ Yes ☐ No

If no, please explain:

The subject lands are not located within any Source Water Protection Zones.

Note: If in an area of source water Wellhead Protection Area (WHPA) A, B or C, Intake Protection Zone (IP-Z), Issue Contributing Area (ICA), please attach relevant information and approved mitigation measures from the Risk Management Official.

4. Are any of the following uses or features on the subject lands or within 500 metres of the subject lands, unless otherwise specified? Please check boxes, if applicable.

Livestock facility or stockyard
☐ On the subject lands or ☐ within 500 meters – distance no _____

Significant Woodland
☐ On the subject lands or ☐ within 500 meters – distance no _____

Municipal Landfill
☐ On the subject lands or ☐ within 500 meters – distance no _____

Sewage treatment plant or waste stabilization plant
☐ On the subject lands or ☐ within 500 meters – distance no _____

Provincially significant wetland or other environmental feature
☐ On the subject lands or ☐ within 500 meters – distance no _____

Floodplain
☐ On the subject lands or ☐ within 500 meters – distance no _____

Rehabilitated mine site
☐ On the subject lands or ☐ within 500 meters – distance no _____

Non-operating mine site within one kilometre
☐ On the subject lands or ☐ within 500 meters – distance no _____

Active mine site within one kilometre
☐ On the subject lands or ☐ within 500 meters – distance no _____

Industrial or commercial use (specify the use(s))
☐ On the subject lands or ■ within 500 meters – distance yes _____

Active railway line
☐ On the subject lands or ☐ within 500 meters – distance no _____

Seasonal wetness of lands
☐ On the subject lands or ☐ within 500 meters – distance no _____

Erosion
☐ On the subject lands or ☐ within 500 meters – distance no _____

Abandoned gas wells
☐ On the subject lands or ☐ within 500 meters – distance no _____

F. Servicing and Access

1. Indicate what services are available or proposed:

Water Supply

Municipal piped water	☑
Individual wells	☐
Communal wells	☐
Other (describe below):	☐

Storm Drain

Storm sewers	☑
Open ditches	☐
Other (describe below):	☐

Sewage Treatment

Municipal sewers	☑
Communal system	☐
Septic tank and tile bed in good working order	☐
Other (describe below):	☐

Existing or proposed access to subject lands

Municipal road	☑
Provincial highway	☐
Unopened road	☐
Other (describe below):	☐

Name of road/street: south side of Argyle

2. Does the application require development on privately owned and operated individual or communal septic systems, and more than 4500 litres of effluent produced per day as a result of the development being completed?

☐ Yes ■ No

If yes, provide (i) Servicing Options Report and (ii) hydrogeological report with submission.

G. Other Information

1. Does the application involve a local business?

☐ Yes ■ No If yes, how many people are employed on the subject lands?

2. Indicate below or on a separate attachment, the applicant's proposed strategy for consulting with the public on the request for a zoning by-law amendment.

3. Is there any other information that you think may be useful in the review of this application? If so, explain below or attach on a separate page.
Please see attached Planning Justification Report

H. Supporting Material to be submitted by Applicant

In order for your application to be considered complete, folded hard copies and an electronic version of the site plan drawings, additional plans, studies and reports will be required in addition to a sketch plan in accordance with Ontario Regulation 545/06.

A sketch showing, in metric units:

a) the boundaries and dimensions of the subject land;

b) the location, size and type of all existing and proposed buildings and structures on the subject land, indicating their distance from the front lot line, rear lot line and side lot lines;

c) the approximate location of all natural and artificial features (*for example, buildings, railways, roads, watercourses, drainage ditches, banks of rivers or streams, wetlands, wooded areas, wells and septic tanks*) that,

   i. are located on the subject land and on land that is adjacent to it, and

   ii. in the applicant's opinion, may affect the application;

d) the current uses of land that is adjacent to the subject land;

e) the location, width and name of any roads within or abutting the subject land, indicating whether it is an unopened road allowance, a public travelled road, a private road or a right of way;

f) if access to the subject land will be by water only, the location of the parking and docking facilities to be used; and

g) the location and nature of any easement affecting the subject land

The following additional plans, studies and reports, including but not limited to, **may** be required as part of a complete application submission:

- ☐ On-Site Sewage Disposal System Evaluation Form (to verify location and condition)
- ☐ Cut and Fill Plan
- ☐ Erosion and Sediment Control Plan
- ☐ Grading and Drainage Control Plan (around perimeter and within site) (existing and proposed)
- ☐ Plan and Profile Drawings
- ☐ Site Servicing Plan
- ☐ Storm water Management Plan
- ☐ Street Sign and Traffic Plan
- ☐ Street Tree Planting Plan
- ☐ Tree Preservation Plan
- ☐ Archaeological Assessment
- ☐ Environmental Impact Study
- ☐ Functional Servicing Report
- ☐ Agricultural Impact Assessment
- ☐ Geotechnical Study / Hydrogeological Review
- ☐ Minimum Distance Separation Calculations
- ☐ Noise or Vibration Study
- ☐ Record of Site Condition
- ☐ Stormwater Management Report
- ☐ Traffic Impact Study

The approval of the proposed development might be subject to additional federal or provincial legislation, municipal by-laws or other agency approvals.

I. Transfers, Easements and Postponement of Interest

The owner acknowledges and agrees that if required, it is their solicitor's responsibility on behalf of the owner to disclose the registration of all transfer(s) of land and/or easement in favour of the County and/or utilities. Also, the owner further acknowledges and agrees that it is their solicitor's responsibility on behalf of the owner to undertake the registration of postponements of any charges in favour of the County.

J. Permission to Enter Subject Lands

Permission is hereby granted to Norfolk County officers, employees or agents, to enter the premises subject to this application for the purpose of making inspections associated with this application, during normal and reasonable working hours.

K. Freedom of Information

For the purposes of the *Municipal Freedom of Information and Protection of Privacy Act*, I authorize and consent to the use by or the disclosure to any person or public body any information that is collected under the authority of the *Planning Act, R.S.O. 1990, c. P. 13* for the purpose of processing this application.

NOVEMBER 17, 2025

Owner/Authorized Applicant Signature — Date

L. Owner's Authorization

If the authorized applicant/agent is not the registered owner of the lands that is the subject of this application, the owner(s) must complete the authorization set out below.

I/We JOE JELES FOR 1064928 ONT. LTD am/are the registered and authorized owner(s) of the lands that is the subject of this application.

I/We authorize _____ to make this application on my/our behalf and to provide any of my/our personal information necessary for the processing of this application. Moreover, this shall be your good and sufficient authorization for so doing.

Owner — Date

NOVEMBER 17, 2025

Owner — Date

Ruchika Angrish

The City of Brantford

Sumil Kumar Angrish,
a Commissioner, etc.,
Province of Ontario,
for The Angrish Group.
Expires March 15, 2027.

The Province of Ontario

21 November

25

Norfolk County Pre-Consultation Checklist

Please select the type of application required:

☒ Official Plan Amendment

☒ Zoning By-law Amendment

☒ Draft Plan of Subdivision

☐ Draft Plan of Condominium

☒ Site Plan

Please read all the information in this document on the requirements for future development planning applications. As a result of the information shared at the pre-consultation meeting dated February 12, 2025, the following applications and qualified professional documents/reports are required as part of a complete application. Please include all listed items with the application to ensure a complete application. The County reserves the right to change, reduce or add requirements for a complete application, particularly if the submission does not match the proposal as reviewed during the pre-submission consultation meeting.

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, more information is made public, additional applications, studies, reports, etc., may be required**. The information in this document is applicable for a maximum of one (1) year from the meeting date.**

Before you submit your application, please contact the assigned Planner to confirm submission requirements and the applicable fee. Fees will not be accepted until the submission has been reviewed and confirmed by the Planning Department.

1. Property Information and Proposal Summary

Registered owner: Joe Jeles
Applicant/agent (if different than owner): Ruchika Angrish (the angrish the group)
Roll Number: 49102445011 (blue grass estates phase 4)
Current Official Plan designation and Zoning: Protected Industrial (OP) and Zoned Development (D) and Light Industrial (MG)
Proposal: Development of a Draft Plan of Subdivision with both residential and industrial uses.

2. Assigned File Planner

Name and Title: Fabian Serra, Planner

Phone Number: 519-426-5870 ext. 8046

E-mail: fabian.serra@norfolkcounty.ca

3. Required Studies and Plans for Complete Application

Submission Materials	Required?	Notes:
Planning Requirements		
Completed Application Form	☑	
Concept Plan	☑	
Draft Plan of Subdivision	☑	
Building Elevations	☐	
Building Floor Plans and Roof Plans	☐	
Landscaping Plan	☑	
Minimum Distance Separation Schedule	☐	
Photometrics (Lighting) Plan	☑	
Site Plan and Site Plan Details	☑	
Survey/Legal Plan	☑	
Topographical Survey	☑	
Agricultural Impact Assessment	☐	
Air Treatment Control Study	☐	
Archeological Assessment	☑	Stage 1 at minimum
D4 Guideline Analysis	☑	
Marine Archeological Assessment	☐	
Draft Official Plan Amendment	☑	
Draft Zoning By-law Amendment	☑	

Submission Materials	Required?	Notes:
Dust, Noise and Vibration Study	☐	Note for Applicants: This report shall be peer reviewed at the owner's expense.
Environmental Impact Study	☐	Note for Applicants: This report shall be peer reviewed at the owner's expense.
Environmental Site Assessment and Record of Site Condition	☐	RSC not required for first submission for a draft plan of subdivision but will be required as a condition of approval
Farm Business Registration		
Heritage Impact Assessment	☐	
Land Use Compatibility Study	☑	Note for Applicants: This report shall be peer reviewed at the owner's expense.
Market Impact Analysis	☐	Note for Applicants: This report shall be peer reviewed at the owner's expense.
On-Site Sewage Evaluation	☐	
On- Street Parking Plan	☑	
Planning Justification Report (PPS 2024)	☑	Not Required for site plan applications or standard draft plan of condominium
Planning Justification Brief/Letter		For minor applications.
Restricted Land Use Screening Form	☐	
Shadow Study	☐	
Urban Design Brief	☐	
Other:	☐	
Engineering Requirements		
	☑	***Please see Section iv. below for Development Engineering requirements**

4. Detailed Comments Pertinent to the Application:

i. Norfolk County Planning and Agreement

Contact Name(s) and Title(s): Fabian Serra, Planner
Email: fabian.serra@norfolkcounty.ca
Comments:

The Subject Lands are designated Protected Industrial In the Norfolk County Official Plan and are Zoned Development Zone (D) in the Norfolk County Zoning By-Law 1-Z-2014.

The proposal is to create a residential plan of subdivision consisting of approximately 35 lots that contains a mixture of semi detached and single family dwellings. There is also a commercial block and 5 separate blocks for light industrial uses proposed.

The proposal will require an Official Plan Amendment, a Zoning By-Law Amendment, and a Draft Plan of Subdivision.

Per the package received and reviewed, it is understood that County Council approved a request to redesignate a portion of the lands (6 acres) for residential uses through Grow Norfolk Municipal Comprehensive Review study.

The County is awaiting further information in regards to the Comprehensive Review study that was completed. At of this pre-con and since consolidating the comments, no further comments have been received from the Ministry at this time.

Agreement Services
Annette Helmig, Agreement and Development Coordinator
Email: Annette.helmig@norfolkcounty.ca

I am excited to be working with you and Ben on Phase 4 of Bluegrass Estates.

I will include a few conditions of draft approval as part of your draft plan of subdivision application including Final Plan Approval and registration of a Subdivision Agreement on title. Performance securities for public works infrastructure will also be collected and held until after the maintenance period and assumption of the works. The owner will also be required to submit and keep in good standing an insurance certificate with required coverages until the securities have been released at the completion of your project. Please note that our insurance requirements have changed for 2025.

As well I will recommend a Holding (H) provision be placed on your land zoning until draft plan conditions have been cleared and the development agreement has been executed.

All the best.

ii. Norfolk County Building
Contact Name(s) and Title(s): Lisa Jennings, Building Inspector II
Email: lisa.jennings@norfolkcounty.ca
Comments:

No Comments at this time. No Building Code review has been completed.
If you have any questions on the building permit process or plans required,

please check out our website www.norfolkcounty.ca/business/building

iii. Norfolk County Zoning

Contact Name and Title: Troy Scriven, Zoning Administrator
Email: troy.scriven@norfolkcounty.ca
Comments:

The proposal shall meet all relevant sections and provisions of the Norfolk County Zoning by-law including but not limited to, Section 3.0 General Provisions, Section 4.0 – Off Street Parking, Section 5.2 – R2 zone, Section 6.5 – Neighbourhood Commercial zone and Section 7.2 – Light Industrial Zone

Zoning compliance tables shall be provided on the drawings for each zone as part of the application. The zoning tables needs to indicate all relevant zoning provisions and must clearly indicate any zoning deficiencies if there are any.

Additional zoning review for any proposed buildings will be done during the site plan or building permit application stage.

iv. Norfolk County Engineering and Infrastructure Services

Contact Name and Title: Stephen Gradish, Development Technologist
Email: Stephen.gradish@norfolkcounty.ca
Comments:

5. Development Engineering – Bluegrass Phase 4, Delhi

Development Engineering requirements to proceed The below requirements are to be submitted as part of the Formal Development Planning	**Required at OPA/ ZBA Stage**	**Required at Draft Plan Stage**	**Required at Detailed Engineering Stage**	**Potentially Required (See Notes Section)**
General Requirements				
Concept Plan	X	X	X	
Draft Plan		X[18]	X	
Area Rough Grading Plan			X[27]	
Master Grading Plan			X[28]	
Lot Grading Plan			X[29]	
Siltation and Erosion Control			X[29]	
General Plan of Services	X[11]	X	X[29]	
Plan and Profile Drawings			X[30]	

Composite Utility Plan			X[31]	
Geotechnical Report			X[32]	
Functional Servicing Report	X[11, 12]	X	X	
Consolidated Linear Infrastructure approval for Sanitary and/or Storm sewer Extension or Alteration			X[33]	
Form 1 Approval for Watermain extension or Alteration.			X[33]	
Ministry of Environment, Conservation and Parks Permit (Sanitary PS exceeding 30L/s.)				X
Water Servicing Requirements– Section 10.0 Norfolk County Design Criteria and ISMP Section 4.0				
Extension of Watermain			X	
Water main Looping			X[34]	
Water Modelling (County Consultant)	X[11]	X	X	
Water Allocation	X[9]	X	X	
Sanitary Servicing Requirements – Section 9.0 Norfolk County Design Criteria and ISMP Section 4.0				
Sanitary Drainage Plan			X[35]	
Sanitary Design Sheet			X[36]	
Pumping Station Design (above or below 30L/s determines who approves)				X
Sanitary Modelling (County Consultant)	X[11]	X	X	
Storm Water Servicing Requirements – Section 7.0 and Section 8 Norfolk County Design Criteria and ISMP Section 4.0				
Storm Water Management Design Report (including	X[13, 14]	X	X[38]	
Storm Water Drainage Plan			X[39]	
Storm Sewer Design Sheet			X[40]	
Establish/Confirm Legal and Adequate Outlet	X[15]	X[19]	X[41]	
Anticipated Flow/Analysis to Receiving Collection System			X	
Extension of Storm Water Mainline			X	
Easement and/or Block Registration			X	

Municipal Drainage	X	X[20]	X	
Transportation Requirements – Section 6.0 Norfolk County Design Criteria, ISMP Section 5.0, Section 6.0 and Appendix J				
Traffic Impact Study	X[16]	X	X	
Street Signage/Traffic Control Plan			X	

As stated at the Pre-Consultation meeting, Development Engineering feels that considering the current Official Plan designation of these lands and the current Zoning it is the opinion of Development Engineering that the Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) should be dealt with prior to a submission for Draft Plan of Subdivision. The notes below reflect 2 separate stages for OPA/ZBA and Draft Plan of Subdivision.

General Notes:

1. Securities in the amount of 100% will be required in the form of a Security Schedule 'H' Template. 100% security will be required at the time of registration. A copy of this template is available upon request.
2. All reports and drawings are to be signed and stamped by a Professional Engineer (P. Eng) and adhere to Norfolk County's Design Criteria and Integrated Sustainable Master Plan (ISMP). A copy of these criteria is available on request.
3. Recommendations from all reports (FSR, SWM, TIS, Modelling, etc.) must be incorporated into the design and is to adhere to Norfolk County's Design Criteria
4. Recommendations from all reports (FSR, SWM, TIS, Modelling, etc.) must be incorporated into the design and be constructed at the developer's expense.
5. All applicable permits and inspections to be issued by Environmental and Infrastructure Services department.
6. As per Norfolk County By-Law 2013-65, only one domestic water service pipe and one water meter shall be installed per lot.
7. As per Norfolk County By-Law 2016-32, only one entrance is permitted per residential lot.
8. Sidewalks are to be installed as per the latest version of the Norfolk County Sidewalk Policy.
9. Water / Wastewater allocation will not be issued as part of the Zoning By-law Amendment.

   Water Allocation will not be issued until the end of the registration of Draft Plan process. The applicant is to confirm capacities at the time of Draft Plan approval. At the time registration of agreement\approval allocation will be provided for the development, if available.

Required at Official Plan Amendment / Zoning By-Law Amendment Application Stage:

All reports and studies are to be signed and sealed by a Professional Engineer and are to adhere to Norfolk County Design Criteria.

All reports and studies are to support the Land-Use Compatibility requirements of the Planning Department (D-1, D-4, D-6)

10. The following reports/studies will be required at the time of Official Plan Amendment and/or Zoning By-law Amendment Submission:

    a. Concept Plan;
    b. Functional Servicing Report (as per Norfolk County Design Criteria);
    c. Water / Sanitary Modelling.
    d. Storm Water Management (SWM) Report.
    e. Traffic Impact Study (as per ISMP Appendix J – TIS Guidelines);

11. 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 the latest version of the Norfolk County Design Criteria

    The Functional Servicing Report must include water /sanitary servicing and fire flow calculations.

    Once the quote has been received, approval from the applicant will be required before proceeding.

12. The FSR must identify Sanitary Servicing of the entire proposed development. Norfolk County's Official Plan states all properties within an urban boundary are to be fully serviced. According to the draft design of Maria Lane submitted with the Bluegrass Phase 3 Engineering drawings, the gravity Sanitary sewer runs out of grade partially through Phase 4. Several of the proposed Industrial Lots cannot be serviced by Gravity Sanitary sewer. The current practice of Norfolk County is that private forcemains are not permitted in a Municipal ROW. Confirmation of how each lot in this development will be serviced will be required prior to approval of the OPA and ZBA.

If a pumping station and forcemains are required, this must be clearly identified in the FSR and the location identified on a General Plan of Services.

13. Stormwater Management Report; to be completed as per Norfolk County Design Criteria, Section 7.0 and 8.0, as well as Section 4.0 of Norfolk County's ISMP. This will also require confirmation of a legal and adequate outlet Storm water outlet for this development.

    A Hydrogeological study will be required to support the SWM report for Water Balances and any Infiltration designs.

14. Approval of Phase 3 included the design and construction of a Temporary SWM pond located on the lands designated for Phase 4. Prior to OPA and ZBA approval the developer must determine the ultimate SWM outlet for both Phase 3 and 4. This will be identified in a new comprehensive Stormwater Management Report. The SWM report must identify the Legal and Adequate SWM outlet.
    a. Environmental and Infrastructure Services (EIS) staff had an internal meeting in Jan 2025 to discuss the proposal for Phase 4 and review previous phases and existing conditions in this area. At that meeting it was determined that NO future connection will be permitted to the previously considered SWM facility which lies on the lands of a former landfill. In addition to the existing pond on the Landfill site not being utilized and further, Norfolk County wishes to explore options to abandon it. There is a remaining block of land owned by the Developer at fertilizer road which should be considered with respect to the servicing area. It is recommended that the Developer and his Engineer meet with EIS staff prior to any future application submissions.

    b. It should also be noted that in previous phases of the Bluegrass development, the approved SWM does not have any Quality control. In the new CLI ECA approval process which Norfolk County is mandated to adhere to, Quality is required.

15. Confirmation of Legal and Adequate outlet – As shown in previous Stages of the Bluegrass Development the Legal outlet has been identified as the "Argyle Ave Municipal Drain". However, through the various Phases a comprehensive assessment of available capacity in the Drain has not been completed. In various phases additional tributary areas have been included to the drain.

    In Phase 4 proposal a portion of the Drain is located in the future Maria Lane ROW. The Norfolk County Drainage Department requires consultation prior to a determination of Legal and Adequate outlet to confirm any requirements of updating the existing Argyle Ave Municipal Drainage report.

    Prior to OPA / ZBA approval, confirmation that all downstream sewers / Drains have adequate capacity to convey the ultimate flow will be required.

16. A full Traffic Impact Study (TIS) will be required. The TIS is to be completed to Norfolk County's ISMP – Appendix J: TIS Guidelines.

    It is recognized that the previous TIS for Phase 3 included Phase 4. The 2025 concept for Phase 4 now differs from the 2021 TIS. For this application the TIS is to be updated per the new concept and updated for existing traffic counts as the study is approaching the 5yr time limit.

    Please note that a Terms of Reference is to be submitted to Norfolk County Development Engineering department before any work commences on revisions OR a new study.

Required at Draft Plan of Subdivision Application Stage:

Everything listed above as required for the Official Plan Amendment and Zoning By-law Amendment will need to be resubmitted as part of the Draft Plan of Subdivision Application. In addition, the following is required as part of a complete submission for Draft Plan of Subdivision.

At the Draft Plan of Subdivision review stage Development Engineering will be seeking confirmation that the Archaeological study is inclusive of Maria Lane.

17. A Draft Plan is required

18. All proposed Easements and/or Blocks are to be identified on the Draft Plan. It is recommended by Development Engineering that a 0.3m reserve be placed along Maria Lane as it crosses the existing Fertilizer Plant to restrict access.

19. Confirmation of Legal and Adequate outlet – This may impact the location and sizing of the future SWM Block. Ideally it would all be determined prior to the approval of the OPA and ZBA, however given some of the latest challenges with changes to the Planning Act final resolution of the SWM may be delayed to the Draft Plan stage.

20. Municipal Drain Compliance – It is assumed after the OPA and ZBA applications are made that there will be outstanding issues related to the existing Municipal Drain. At the time of Draft Plan of Subdivision application these must be finalized and clearly identified in the Draft Plan Conditions.

21. Any Cost sharing arrangements between Developer and the County must be confirmed at the time of Draft Plan approval. These arrangements are to be clearly identified in the Draft Plan Conditions and to be inserted into the Subdivision Agreement. It is recommended that the Developer have advanced meetings with

Norfolk County Engineering Department to confirm all anticipated cost sharing. Currently there is a capital project associated with the extension of a Collector Road connection through Maria Lane to Fertilizer Road in Norfolk County's 2026 Capital Plan. Development Engineering was not able to confirm at this time any proposed cost sharing which contributes to the transmission Watermain looping from Fertilizer Road to the existing Argyle Ave. If the Developer has additional information, they are encouraged to forward that to Norfolk County Engineering for review.

Any Financial Assessment pertaining to Maria Lane is to compare to DC study costing for this work.

Required at Engineering Review Stage:

While it seems a bit premature to provide wholesome comments as they would relate to a Detailed Engineering submission, Development Engineering is providing the list below as preliminary guidance based on the submission for this pre con. It is recommended that the Developer consider a separate pre consultation meeting once the OPA and ZBA are approved, and a better understanding of the future development is known.

22. As per Norfolk County Design Criteria, Section 4.1.01(A) – Submission of Engineering Drawings for Draft Plan of Subdivision is to be adhered to.
23. All reports, studies and Engineering drawings are to be signed and sealed by a Professional Engineer and are to adhere to Norfolk County Design Criteria.
24. Recommendations from all reports and studies must be incorporated into the Engineering design at the applicant's expense.
25. A Concept Plan will be required.
26. A Draft Plan will be required.
27. An Area Rough grading plan is required when cuts or fills are proposed to exceed 0.5m.
28. A Master Grading Plan will be required. This plan shows the proposed grading for the overall development including any external areas that are tributary to the site.
29. Lot Grading Plan, Siltation and Erosion Control Plan, and General Plan of Services drawing can be shown on one engineering plan as long as it's legible for review.
30. Plan and Profile drawings will be required as per Section 4.4.03.
31. Composite Utility Plan -This plan will identify the proposed Hydro servicing design as well as all criteria in Section 4.4.07 of Norfolk County Design Criteria. At Detailed Engineering review Norfolk County will be looking for a resolution on how to handle the existing Hydro One Easement that will lay inside of the Future Maria Lane. Ideally the Hydro Easement would be dissolved once the Draft Plan is approved, and any Hydro One access requirements would be met through the Subdivision agreement and eventual transfer of ROW to Norfolk County.
    The Composite Utility Plan must also be accompanied by a Streetlight Illumination plan.

32. A Geotechnical Report will be required as per Section 3.01 (e). In review staff recognized that the Phase 3 Geotechnical report included portions of Phase 4. It is the responsibility of the Engineer/Developer to confirm that any previous report is adequate to meet Norfolk County standards for this future phase. Norfolk County did not pre-approve the previous report in relation to Phase 4.
33. Prior to Development Engineering approval and/or any site alteration, the developer must provide a copy of the appropriate Norfolk County Consolidated Linear Infrastructure - Environmental Compliance Approval (CLI-ECA) relating to the municipal Sanitary and Storm sewer extensions or alterations. For all Watermain Extensions and Alterations a Form 1 must also be approved.
34. Watermains must be looped as per Section 10.3.0 - “New subdivisions shall be designed in such a manner that there are two separate watermain feeds into the subdivision and shall be interconnected to existing watermains adjacent to the site in order to promote overall water quality within the water distribution system.”
35. Sanitary Drainage Plans are required and must follow Section 4.4.06 of Design Criteria
36. Sanitary Design Sheets can be shown on the drawings but should also be submitted in an Excel format for review of appropriate calculations.
37. Please note - only one sanitary lateral is permitted on each property. Current practice is that Norfolk County does not permit private Sanitary forcemains to be installed within an existing or future ROW.
38. A Stormwater Management Report (SWM) is to be completed as per Norfolk County Design Criteria Section 7.0 and comply with Section 4.0 of the ISMP. During detailed Engineering review of the SWM Pond the County will require a detailed look at the landscaping plan and overall design to ensure the facility is not only functional and easy to maintain but that it is also aesthetically acceptable for the surrounding development.
39. Storm Drainage Areas are required and must follow Section 4.4.06 of Design Criteria
40. Storm Design Sheets can be shown on the drawings but should also be submitted in an Excel format for review of appropriate calculations.
41. The overall SWM shall include confirmation of Legal and Adequate outlet.
42. Norfolk County will require installation of new sidewalks along Maria Lane in accordance with the most current version of the “Sidewalk Installation Policy.”
43. A streetlight illumination plan is required.

v. Norfolk County Realty Services

Contact Name and Title: Alisha O’Brien, Corporate Services Generalist
Email: realty.services@norfolkcounty.ca
Comments:

The County will require Postponements of any charges/mortgages (if any) on title to the County’s Development Agreement. We recommend that you connect with your Lender(s) (if any) and/or your solicitors as early in the process as possible to avoid any delays.

vi. Norfolk County Fire Services

Contact Name and Title: Katie BALLANTYNE, Community Safety Officer
Email: katie.ballantyne@norfolkcounty.ca
Comments:

NCFD has the folllowing comment(s) for this proposal:

- Ensure adequate access for fire department apparatus, particularly in relation to street width, turning radius, and on-street parking configuration
- Adequate flow and number of fire hydrants to be provided

vii. Ministry of Transportation

Contact Name and Title: Michael Kilgore, Corridor Management Planner
Email: michael.kilgore@ontario.ca
Comments:

Thank you for providing the MTO with the opportunity to review and provide comments.

The proposed work within Norfolk County is not located adjacent to a provincial highway or within MTO's Permit Control Area, and as such, does not require MTO review, approval or permits.

As a result of this, please be advised that I will not be in attendance for the pre-con meeting being held on February 12th, 2025, If you have any question or concerns please feel free to contact me.

viii. Mississaugas of the Credit First Nation

Contact Name and Title: Abby Lee LaForme, Consultation Coordinator
Email: abby.laforme@mncfn.ca
Comments:

The Mississaugas of the Credit First Nation (MCFN) are the Treaty Holders of the land on which the project will take place – specifically, the Between the Lakes Treaty No. of 1792. The MCFN holds Indigenous and Treaty Rights specific to the project location and its environs, which may be adversely impacted by it. The Department of Consultation and Accommodation (DOCA) is designated by the MCFN to handle consultation matters on its behalf.

The DOCA consultation team has filed the project-related correspondence identified above. Upon our review, we have determined that **the project should be proceeded by, at minimum, a Stage 1 archaeological assessment** to determine the location's archaeological potential. DOCA must be notified of, invited to participate in, and provided the opportunity to review

this archaeological assessment, as well as any environmental assessments. At its discretion, DOCA may request capacity funding from the proponent for its consultation and engagement activities relating to the project.

DOCA expects to be notified of any and all future project updates and/or changes.

If you have any questions for the DOCA consultation team, please feel free to contact us.

Thank you.

ix. **Six Nations of the Grand River**
Contact Name and Title: Tierra Henhawk, Archaeology Community Monitor Administrative Assistant
Email: acmaa@sixnations.ca
Comments:

With to the site having archaeological potential, we will require a minimum stage 1 archaeological assessment. SNGR Archaeological Supervisor Tanya Hill-Montour will require the stage 1 Archaeological Assessment Reports for the project.

Any archaeology that would proceed after the stage 1 assessment we request Six Nations archaeological monitor participation.

Nya:weh / Thank You!

6. Notes and Clauses:

1. The purpose of this document is to identify the information required to commence processing a complete application as set out in the Planning Act, R.S.O. 1990, CHAPTER P.13, as amended and the County's Official Plan.
2. Pre-consultation does not imply or suggest any decision whatsoever on behalf of staff or the County to either support or refuse the application.
3. The application should be aware that the information provided is accurate as of the date of the pre-consultation meeting. Should an application not be submitted within a year, and should other policies, by-laws or procedures be approved by the Province, County, or other agencies prior to the submission of a formal application, the applicant will be subject to any new policies, by-laws or procedures that are in effect at the time of the submission of a formal application. **If an application is not submitted within one (1) year, another**

pre-consultation meeting shall be required, unless an exception is granted in writing by the Director of Planning

4. It is hereby understood that during the review of the application additional studies or information may be required as a result of issues arising during the processing of the application or the review of the submitted studies.
5. If the County does not have sufficient expertise to review and determine that a study is acceptable, the County may require a peer review. The terms of reference for a peer review is determined by the County and paid for by the applicant.
6. Please note if performance securities are required by the County to secure any internal and external development works, a recommended condition for your planning application approval will be to enter into a development agreement with the County. The agreement will be registered on title to the subject lands, at the owner's expense. The additional requirements for an agreement could include, but are not limited to the following:
    - Engineering drawing review
    - Engineer's schedule of costs for the works
    - Clearance letter and supporting documentation to support condition clearance
    - User fees and performance securities
    - Current property identification number (PIN printout)
    - Owner's commercial general liability insurance certificate
    - Professional liability insurance certificate
    - Postponement of interest
    - Transfers and / or transfer easements along with registered reference plan

7. Signatures

Staff Signatures

County Planning Staff : Date:

Planning Staff Signature:

Applicant/Owner Signature

Owner Name (print): Owner Signature:

Date: Applicant Signature:

Applicant Name (Print):

Appendix A: Planning Reference Materials
Following is a summary of some land use planning reference materials. It is the requirement of the applicant to ensure compliance with applicable legislation, policies, and regulations.

Provincial Policy Statement, 2020
https://www.ontario.ca/page/provincial-policy-statement-2020

Norfolk County Official Plan
https://www.norfolkcounty.ca/government/planning/official-plan/

Section 9.6.1 outlines requirements in relation to requests to amend the Official Plan. Section 9.6.2 outlines requirements in relation to requests to amend the Zoning By-law.

It is the responsibility of the proponent to review and ensure relevant Official Plan policies are addressed in any future development application.

Norfolk County Zoning By-Law 1-Z-2014
https://www.norfolkcounty.ca/government/planning/new-zoning-by-law/

The provisions of the Norfolk County Zoning By-Law shall apply to all lands within the boundaries of Norfolk County. No land, building or structure shall be used, erected, or altered in whole or in part except in conformity with the provisions of this By-Law. No land, building or structure shall be used or occupied except for uses that are specifically identified in the By-Law as permitted uses by the relevant zoning category.

It is the responsibility of the proponent to review and ensure relevant Zoning By- law provisions are addressed in any future development application.

Endangered and Threatened Species:
Endangered and threatened species and their habitat are protected under the provinces Endangered Species Act, 2007 (ESA), O. Reg. 242/08 and O. Reg. 830/21. The Act prohibits development or site alteration within areas of significant habitat for endangered or threatened species without demonstrating that no negative impacts will occur. The Ministry of the Environment, Conservation and Parks (“MECP”) provides the service of responding to species at risk information requests and project screenings. The proponent is responsible for discussing the proposed activity and having their project screened with MECP (Ministry of Environment, Conservation and Parks).

Please be advised that it is the owner’s responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws, or other agency approvals.

Summary of Fees, Forms, and other information pertaining to the planning process can found by visiting https://www.norfolkcounty.ca/government/planning/

Norfolk County Engineering Design Standards

All applicants must adhere to Norfolk County’s Design Criteria when undertaking a development project. Please contact Engineering and Infrastructure Services directly for a copy of Norfolk County’s Design Criteria .

REQUIRED INFORMATION

Subdivision Name and Phase_____

Property Legal Description_____

Subdivision Number **28TPL**_____

Roll Number **3310**_____

PIN Number_____

Unit Type and Number

- Single Detached_____
- Semi-Detached_____
- Duplex_____
- Triplex_____
- Fourplex_____
- Street Townhouse_____
- Stacked Townhouse_____
- Apartment_____
- Affordable_____
- Accessible_____
- Rental_____

Existing and Proposed Street Names_____

Transfer Easements Block Number and Purpose_____

Transfer Block Number and Purpose_____

Geotechnical Report prepared for Lands	YES	NO	UNKNOWN
Lands are Within the Source Water Protection Area	YES	NO	UNKNOWN
Lands Contain any Contaminated or Impacted Soil	YES	NO	UNKNOWN
Lands Contain any Natural Watercourse	YES	NO	UNKNOWN
Lands Contain any Wetlands	YES	NO	UNKNOWN
Lands Contain any Archaeological Sites	YES	NO	UNKNOWN
Lands Contain an Existing Well and or Septic Field	YES	NO	UNKNOWN
Species at Risk Branch MECP Screening	YES	NO	UNKNOWN
Lands Contain any Endangered Species	YES	NO	UNKNOWN

OWNER

OWNER NAME (PIN)_____

CONTACT NAME_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL _____

AGENT

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL _____

ENGINEER

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL _____

SURVEYOR

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL _____

LAWYER / SOLICITOR

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL _____

INSURANCE PROVIDER

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL_____

FINANCIAL INSTITUTION

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL_____

MORTGAGEE (IF APPLICABLE)

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL _____

SPECIES AT RISK SCREENING

The Ontario Endangered Species Act inquiries and Species at Risk screening are handled by the Ministry of the Environment, Conservation and Parks, specifically the "Species at Risk Branch" and the e-mail address for handling these inquiries is SAROntario@ontario.ca.

TRANSFERS, EASEMENTS AND POSTPONEMENT OF INTEREST

The owner acknowledges and agrees that, it is their solicitor's responsibility on behalf of the owner for the registration of all transfer(s) of land to the County, free and clear of any charges or encumbrances, and/or transfer(s) of easement in favour of the County and/or utilities at no cost to the County. In addition, the owner further acknowledges and agrees that it is their solicitor's responsibility on behalf of the owner for the registration of postponements of any charges to the County's agreements.

INSURANCE CERTIFICATES

Prior to the execution of the development agreement, the owner shall, at their expense, obtain and keep in force, during the term of this development agreement, commercial general liability insurance coverage satisfactory to the County. The owner further agrees and authorizes the County to discuss with their insurance provider the specific insurance requirements of the County for agreement purposes only. In addition, the County will require any professionals hired such as an engineer, surveyor or architect to carry professional liability insurance to provide coverage for acts, errors and omissions arising from their professional services performed.

OWNER'S AUTHORIZATION

I/We am/are the registered owner(s) of the lands that is the subject of this development agreement.

I/We authorize our agent to provide information on my/our behalf and to provide any of my/our personal information necessary for the processing of this agreement. Moreover, this shall be your good and sufficient authorization for so doing.

I/We authorize the Agreement Administrator to provide and receive information on my/our behalf in connection to the insurance coverage, letter of credit and agreement registration of my/our development.

I/We acknowledge that if there are any new charges or mortgage holders on the property they will be required to postpone their interest on the property to the County's development agreement for site plan approval.

Owner Signature Date

APPLICATION AND FEES

To start your agreement please apply on our **CityView Portal** **https://permits.norfolkcounty.ca/CityViewPortal/** Don't forget to fill out, sign and upload the first three pages of this document as part of a complete application. A payment slip will be provided to you identifying the user fees that will be applicable for your development. If paying by credit card, please contact ServiceNorfolk at 226-667-3655 extension 0 or you can visit ServiceNorfolk customer service desk at the County Administration Building at 50 Colborne Street South in Simcoe. The doors on Talbot Street South will be open for customers to enter during business hours Monday to Friday from 8:30 am to 4:30 pm. Please make your cheque payable to the Corporation of Norfolk County. You may also make payment by mail or courier to my contact information below. If you anticipate registration within four weeks please provide a certified cheque.

CONTACT FOR FURTHER INFORMATION AND QUESTIONS

Annette Helmig, Agreement and Development Coordinator
Norfolk County, Community Development Division, Planning Department, Agreement Services
12 Gilbertson Drive, Simcoe Ontario, N3Y 4L1
annette.helmig@norfolkcounty.ca

The information submitted on this form is collected under the authority of the *Freedom of Information and Protection of Privacy Act* (FIPPA) and *Municipal Freedom of Information and Protection of Privacy Act* (MFIPPA) for Norfolk County employees to use for the purpose of preparing and registering a development agreement. Questions about the collection of personal information through this form may be directed to the Agreement and Development Coordinator or Information and Privacy Coordinator, Corporation of Norfolk County, 50 Colborne Street South, Simcoe ON N3Y 4H3.

KICK OFF MEETING TO DISCUSS YOUR DEVELOPMENT IS ENCOURAGED

Appropriate internal and external agencies will be invited to discuss relevant draft plan of subdivision conditions

- [ ] Complete set of preliminary engineering drawings for review prior to meeting

DOCUMENTATION AND FEES REQUIRED FOR SUBDIVISION AGREEMENT EXECUTION

- [ ] Owner's agreement authorization (page 3 of this document)
- [ ] Complete set of engineering drawings for detailed design review and acceptance including cost estimate, supporting reports, studies and Ministry approvals (1st review has eight week time frame for comments, 2nd and subsequent reviews have four week time frame for comments). Please note that a resubmission fee is required after second submission
- [ ] Phasing plan
- [ ] Street tree planting plan
- [ ] Hydro One approval to proceed
- [ ] Current parcel register (property identifier or PIN printout)
- [ ] Owner's commercial general liability certificate of insurance
- [ ] Reference plan for any transfers or easements
- [ ] Preapproved 37M Subdivision Plan
- [ ] Clearance letter matrix and supporting documentation demonstrating clearance
- [ ] Postponement of interest from mortgagee / chargee to agreement (if applicable)
- [ ] Construction estimates (100% for external and uncompleted works and 10% for completed works)
- [ ] Letter of credit, surety bond or certified cheque for performance securities
- [ ] Property taxes up to date
- [ ] User fees (according to the By-Law in effect at the time that payment is made)
  (if time is of the essence a certified cheque is requested)
  - $5,074 for preparation of the subdivision agreement
  - $487 for financial administration of this agreement
  - $590 per tree cash-in-lieu of trees
  - $1,882 recirculation - engineering review for second and subsequent submission
  - 5% land appraisal cash-in-lieu of parkland as per consolidated by-law 2016-126 (if applicable)
  - 3% of developers cost for inspection / acceptance / assumption

Development Approval Milestones



1. Prepare Plan Reports Studies Preconsultation
2. Planning Application Review
3. Council Decision
4. Detailed Engineering Review
   Condition Clearance
   Agreement Execution and Registration
5. Preliminary Acceptance and Permits
6. Construction and Maintenance
7. Securities Release and Assumption

SURETY BOND

BOND NUMBER: _____ AMOUNT: $_____

KNOW ALL PERSONS BY THESE PRESENTS, that

_____,

as Principal, hereinafter called the "Principal", and

_____,

as Surety, hereinafter called the "Surety", are held and firmly bound unto _____, as Obligee, hereinafter called the "Obligee", in the amount of _____ Dollars ($_____) lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal and Obligee have entered into, or will enter into, an agreement with reference number _____ with respect to lands known as _____ in Norfolk County (said agreement is by reference made a part hereof and is hereinafter referred to as the “Development Agreement”).

NOW THEREFORE, the condition of this obligation is such that if the Principal shall, in the opinion of the Obligee do and perform all of the stipulations, conditions, covenants and terms of the Development Agreement, then this obligation shall be void and of no effect; otherwise, it shall remain in full force and effect.

PROVIDED, however, the foregoing obligation is subject to the following terms and conditions:

1. Whenever the Principal shall be declared in writing by the Obligee to be in default under the Development Agreement, and the Obligee intends to make a claim under this bond, the Obligee shall promptly notify the Principal and the Surety in writing of such default in the form of a Demand, the form of which is attached to this Bond as Schedule “A”.

2. On determination by the Obligee, in its sole and absolute discretion, that the Principal is in default of its obligations under the Development Agreement, the Surety and Principal agree that the Surety will make payments to the Obligee for amounts demanded by the Obligee, up to an aggregate of the Bond Amount, within ten (10) business days after the Surety’s receipt of a Demand from the Obligee at the address noted herein by hand or courier.

3. This Bond is irrevocable and payment will be made notwithstanding any objection by the Principal. Where a Demand in the prescribed form has been delivered to the Surety, it shall be accepted by the Surety as conclusive evidence of its obligation to make payment to the Obligee, and the Surety shall not assert any defence or grounds of any nature or description for not making payment to the Obligee, in whole or in part, pursuant to such Demand, including but not limited to any of the following reasons: that

a Default has not occurred, that the Principal committed any fraud or misrepresentation in its application for the Bond, or that the amount set out in the Demand is not appropriate, warranted or otherwise not in accordance with the Development Agreement. The Surety's liability under this Bond is unconditional and shall not be discharged or released or affected by any arrangements made between the Obligee and the Principal or by any dispute between the Surety and Principal, or the taking or receiving of security by the Obligee from the Principal, or by any alteration, change, addition, modification, or variation in the Principal's obligation under the Development Agreement, or by the exercise of the Obligee or any of the rights or remedies reserved to it under the Development Agreement or by any forbearance to exercise any such rights or remedies whether as to payment, time, performance or otherwise (whether or not by any arrangement, alteration or forbearance is made without the Surety's knowledge or consent). All payments by the Surety shall be made free and clear without deduction, set-off or withholding.

4. The Obligee may make multiple Demands under this bond.

5. The amount of the Bond may be reduced from time to time as advised by notice in writing by the Obligee to the Surety.

6. Each payment made by the Surety under this Bond shall reduce the amount of this Bond.

7. In no event shall the Surety be liable for a greater sum than the amount of this Bond.

8. No right of action shall accrue upon or by reason hereof to or for the use or benefit of any person other than the Obligee.

9. When the Principal has completed all works required by the Development Agreement to the Obligee's satisfaction, all maintenance and rectification periods contained within the Development Agreement have expired, and the Obligee has finally assumed all works in writing, the Obligee shall return this Bond to the Surety for termination or advise the Surety in writing that this Bond is terminated, in accordance with the terms of the Development Agreement.

10. If the Surety at any time delivers at least ninety (90) days prior written notice to the Obligee and to the Principal of its intention to terminate this obligation, the Principal shall deliver to the Obligee, not less than thirty (30) days prior to the termination of this Bond, financial security in the amount of this Bond in a form acceptable to the Obligee. If the replacement financial security is not provided by the Principal or is not accepted by the Obligee, this Bond shall remain in effect.

11. Nothing in this bond shall limit the Principal's liability to the Obligee under the Development Agreement.

12. This Bond shall be governed by and construed in accordance with the laws of the Province of Ontario and the laws of Canada applicable thereto and shall be treated, in all respects, as a contract entered into in the Province of Ontario without regard to conflict of laws principles. The Principal and Surety hereby irrevocably and unconditionally attorn to the jurisdiction of the courts of the Province of Ontario.

13. All Demands and notices under this Bond shall be delivered by hand, registered mail or courier to the Surety, with a copy to the Principal at the addresses set out below, subject to any change of address in accordance with this Section. All other correspondence may be delivered by regular mail, registered mail, courier, or email. A change of address for the Surety is publicly available on the Financial Services Regulatory Authority of Ontario website. The address for the Principal may be changed by giving notice to the other parties setting out the new address in accordance with this Section.

The Surety:	The Principal:	The Obligee:
Name	Name	Name
Address	Address	Address
Email	Email	Email
Phone	Phone	Phone

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority.

SIGNED AND SEALED this day _____ of _____, 20____, in the presence of:

Per:	_____	Per:	_____
Name:	_____	Name:	_____
Title:	_____	Title:	_____

I / We have the authority to bind the Corporation.

_____
Attorney in Fact

DEMAND – NOTICE OF DEFAULT

Date:

Surety:

Address:

Attention:

Re: Development Agreement Bond Number _____ (the "Bond")

Principal: _____ (the "Principal")

Obligee: _____ (the "Obligee")

Agreement: _____ (the "Development Agreement")

Dear_____

Pursuant to the above referenced Bond, Norfolk County hereby declares a default under the Development Agreement.

We hereby demand that the Surety honour its ten (10) day payment obligation as per the terms of the Bond and we hereby certify that we are entitled to draw on the Bond pursuant to the terms of the Development Agreement and demand payment of $_____ under the terms of the Bond.

Payment Instructions:

Yours truly
Norfolk County

Planning Department – Agreement Services
Community Development Division
12 Gilbertson Drive, Simcoe Ontario, N3Y 4L1

INSURANCE REQUIREMENTS

For the Owner Entering Into a Development Agreement

Prior to the execution of the Development Agreement, the Owner shall purchase, at its expense, obtain and keep in force, during the term of the Agreement, until the end of the maintenance / guarantee period and return of all securities, insurance coverage. The insurance policy or policies shall be in the Owner's name as shown on the property identification number.

The issuance of such insurance policy or policies shall not be construed as relieving the Owner from responsibility for any other or larger claims in excess of such policy or policies, if any, for which the Owner may be held responsible. Such insurance policy or policies shall be in a form acceptable to Norfolk County and, without limiting the generality of the foregoing, shall provide:

1. **Commercial General Liability** insurance policy with and including the following coverages:

    a. a limit of liability of not less than five million dollars ($5,000,000) per occurrence;

    b. The Corporation of Norfolk County 50 Colborne Street South, Simcoe ON N3Y 4H3 named as an additional insured

    c. Non-owned automobile coverage with a limit of at least two million dollars ($2,000,000) per occurrence including contractual non-owned coverage

    d. Cross liability and severability of interest in respect of the named insured

    e. Products and completed operations

    f. Premises and operations liability

    g. Contingent employers liability

    h. Contractual liability

    i. Thirty (30) days prior written notice of any alteration, cancellation or change in policy terms, which reduces coverage, and any such notice of cancellation shall be given in writing to Norfolk County

2. **Environmental Impairment Liability** insurance with a limit of not less than two million dollars ($2,000,000) per claim

3. **Automobile Liability** insurance with a limit of not less than two million dollars ($2,000,000) per occurrence

If the Agreement is regarding a **Cannabis** development we request under the Description of Operations, the verbiage must specifically refer to a Cannabis Facility.

Norfolk County reserves the right to request such higher limits of insurance or other types of policies appropriate to the Agreement as Norfolk County may reasonably require from time to time.

Proof of Insurance

The Owner shall provide the certificate of insurance or certified copies of the above referred to policies, satisfactory to Norfolk County. Provided that if a certificate is provided, all requirements as above set forth must be shown on the said certificate and notwithstanding the provision of any certificate, Norfolk County may require that the Owner provide a certified copy of the policy, if required. Such certificates or policies shall be provided prior to the commencement of any work.

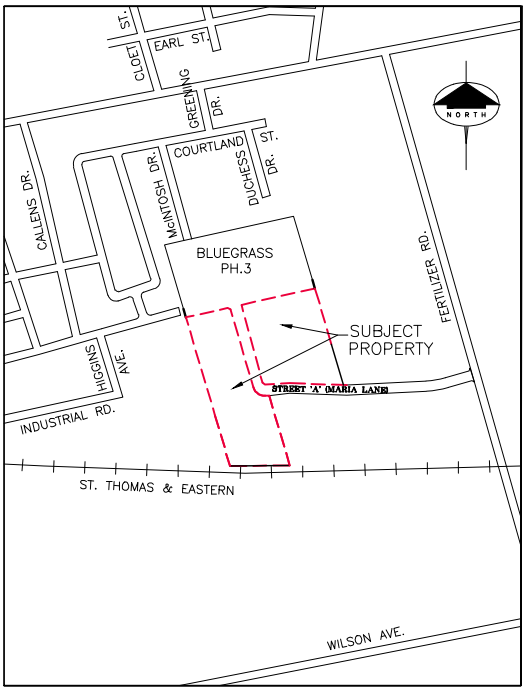
The Owner shall further provide evidence of the continuance of said insurance be filed at each policy renewal date for the duration of the Agreement until the end of maintenance period. In the event any renewal premium is not paid, Norfolk County, in order to prevent the lapse of such policy, may pay the renewal premium or premiums, and the Owner agrees to reimburse Norfolk County for the cost of such renewals within ten (10) days of the account therefore being rendered by Norfolk County. Further, prior to the commencement of the Agreement, the Owner shall cause its insurance broker to confirm in writing that it will accept any request from Norfolk County to renew such insurance and will extend the term of any such insurance policy held by the Owner in accordance with such request upon payment of the renewal premium(s) by Norfolk County.

Notice

Every party to the Agreement agrees to immediately notify all other parties of any occurrence, incident, or event, which may reasonably be expected to expose any of the parties to liability of any kind in relation to the development of the Lands.

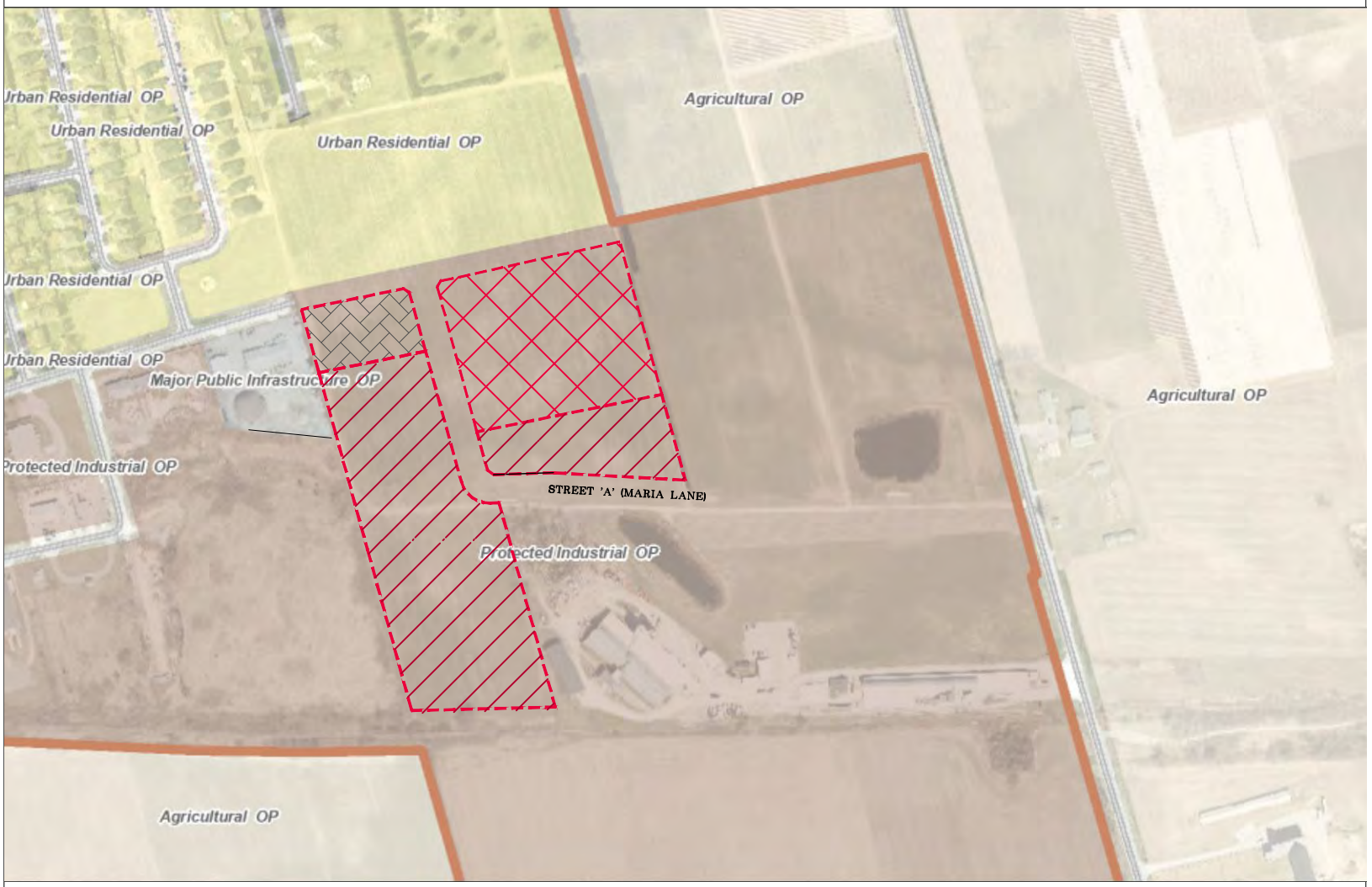
AMENDMENT No. xx

TO THE
OFFICIAL PLAN
FOR
NORFOLK COUNTY



KEY MAP *N.T.S.*

NORTH



OFFICIAL PLAN

N.T.S.

LEGEND:

PROTECTED INDUSTRIAL TO INDUSTRIAL

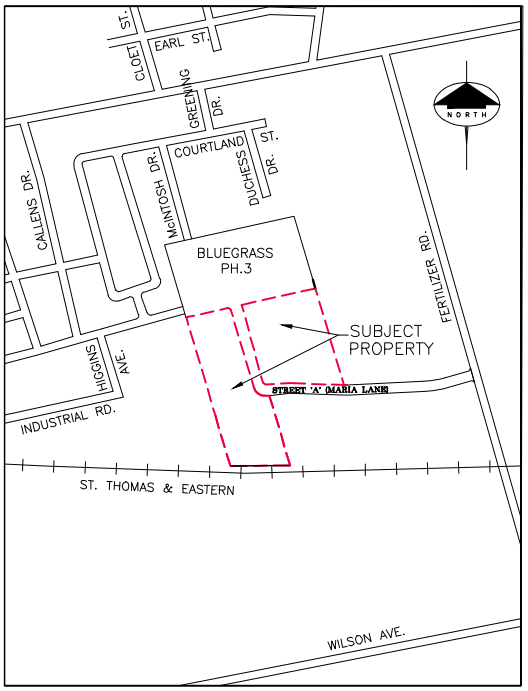
PROTECTED INDUSTRIAL TO RESIDENTIAL

PROTECTED INDUSTRIAL TO COMMERCIAL

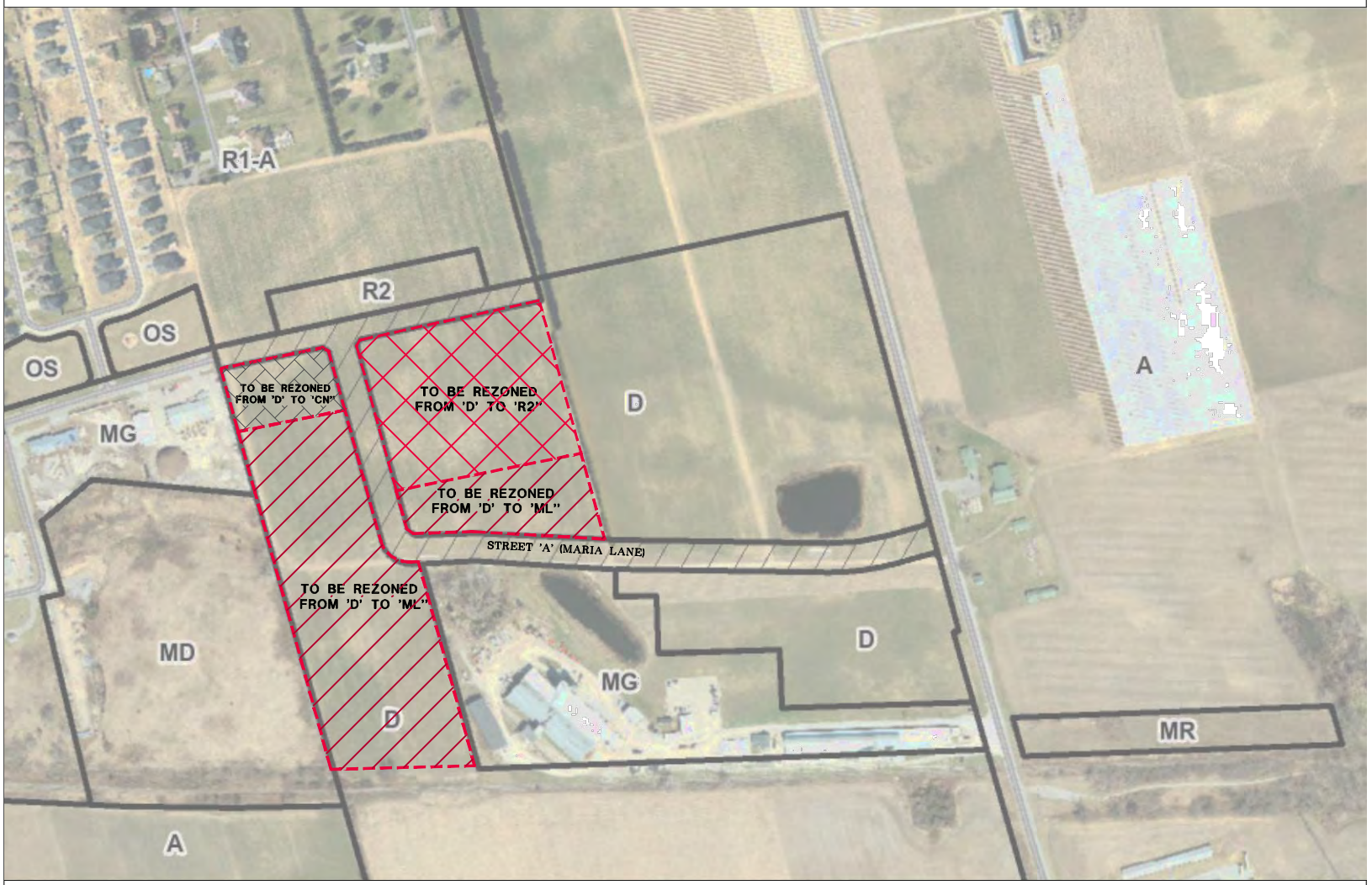
AMENDMENT No. xx

TO THE
ZONING BYLAW
FOR
NORFOLK COUNTY

NORTH



KEY MAP *N.T.S.*



ZONING MAP
N.T.S.

LEGEND:

SUBJECT PROPERTY 'D' TO 'CN'

SUBJECT PROPERTY 'D' TO 'R2'

SUBJECT PROPERTY 'D' TO 'ML'



LEGEND:

SUBJECT PROPERTY

NORTH

NO.	REVISION	DATE (MM/DD/YY)	BY

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
440 HARDY ROAD , UNIT #1 , BRANTFORD – ONTARIO , N3T 5L8
TEL. (519) 753-2656 FAX. (519) 753-4263 www.cohooneng.com

PROJECT:

BLUEGRASS ESTATES SUBDIVISION (PHASE 4)

ARGYLE AVENUE
NORFOLK COUNTY

CLIENT: JELES DESIGN & CONSTRUCTION LTD.

SITE PLAN

DESIGN:	R.W.P.	SCALE:	N.T.S.
DRAWN:	S.L.M.	JOB No:	13227
CHECKED:	R.W.P.		
SHEET:	1 of 1	DWG. No:	13227–SITE
DATE:	NOV. 4/25		

Ministry of Citizenship and Multiculturalism (MCM)

Archaeology Program Unit
Heritage Branch
Citizenship, Inclusion and Heritage Division
5th Floor, 400 University Ave.
Toronto ON M7A 2R9
Tel.: (705) 492-1395
Email: Rebecca.Gray@Ontario.ca

Ministère des Affaires civiques et du Multiculturalisme (MCM)

Unité des programme d'archéologie
Direction du patrimoine
Division de la citoyenneté, de l'inclusion et du patrimoine
5e étage, 400 ave. University
Toronto ON M7A 2R9
Tél. : (705) 492-1395
Email: Rebecca.Gray@Ontario.ca

Jul 25, 2025

Thomas Irvin (P379)
Irvin Heritage, Inc.
7 - 355 Harry Walker Newmarket ON L3Y 1A1

RE: Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "Stage 1 &2 Archaeological Assessment Report Part of Lot 22, Concession 12 Delhi Norfolk County Historic Township of Windham Historic County of Norfolk", Dated May 15, 2025, Filed with MCM on N/A, MCM Project Information Form Number P379-0756-2025, MCM File Number 0023435

Dear Thomas Irvin (P379):

The above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18, has been entered into the Ontario Public Register of Archaeological Reports without technical review.[1]

Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require further information, please do not hesitate to send your inquiry to Archaeology@Ontario.ca

cc. Archaeology Licensing Officer
Benjamin Jeles,1064928 Ontario Inc.
None Provided,County of Nofolk

1*In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.*

IRVIN HERITAGE INC.

Stage 1 & 2
Archaeological Assessment Report

Part Lot 22
Part of Lot 22, Concession 12
Delhi
Norfolk County
Historic Township of Windham
Historic County of Norfolk

May 15, 2025
Prepared for: The Proponent
Prepared by: Irvin Heritage Inc.
Archaeological Licensee: Thomas Irvin, P379
PIF#: P379-0756-2025
Related PIF#(s): NA
Version: Original

contact@irvinheritage.com
Office: 647-799-4418 Cell: 647-656-4810
355 Harry Walker Parkway North, Unit 7, Newmarket ON L3Y 7B8
www.irvinheritage.com

EXECUTIVE SUMMARY

Irvin Heritage Inc. was contracted by the proponent to conduct a Stage 1 & 2 Archaeological Assessment in support of a development application for a Study Area which is approximately 8.18 Ha in size. The Stage 1 & 2 Archaeological Assessment report on herein was completed to facilitate the proposed construction of residential units.

The Stage 1 Archaeological Assessment indicated that the Study Area retained archaeological potential. As such, a Stage 2 Archaeological Assessment consisting of a 5 m Transect Pedestrian Survey was conducted. The Stage 2 Archaeological Assessment identified no archaeological resources within the Study Area.

Given the results and conclusions of the completed Stage 1 & 2 Archaeological Assessment, the following recommendations are made:

- It is the professional opinion of the archaeological licensee, Thomas Irvin (P379) that the Study Area subject to a Stage 2 Archaeological Assessment Survey did not identify any archaeological sites requiring further assessment or mitigation of impacts, as such, no further archaeological assessment of the property be required.

- Notwithstanding the above recommendations, the provided Advice On Compliance With Legislation shall take precedent over any recommendations of this report should deeply buried archaeological resources or human remains be found during any future earthworks within the Study Area.

EXECUTIVE SUMMARY 2
1. ASSESSMENT CONTEXT 6
1.1. DEVELOPMENT CONTEXT 6
1.2. ENVIRONMENTAL SETTING 6
2. INDIGENOUS CONTEXT 7
2.1. INDIGENOUS PEOPLES ARCHAEOLOGICAL CONTEXT 7
3. INDIGENOUS PEOPLES CULTURAL HISTORIES 9
3.1. MISSISSAUGAS OF THE CREDIT FIRST NATION 9
4. HISTORICAL CONTEXT 10
4.1.TREATY HISTORY 10
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Project Personnel

Professional Licensee:	Thomas Irvin, MA (P379)
Project Manager:	Thomas Irvin, MA (P379)
Field Director(s):	Thomas Irvin, MA (P379)
Assistant Field Director(s):	Patrick Keenan, MA
Field Archaeologist(s):	Liam Andrews, Hon. BA (R1400) Samuel Kelly, Hon. BA
Historic Research:	Kathleen McGowan, Hon. BA (R1299)
Report Author(s):	Kathleen McGowan, Hon. BA (R1299)
Laboratory Processing & Analysis:	Thomas Irvin, MA (P379)
GIS Mapping:	Sajeev Bhagowtee, BA
Internal Review:	Michelle Pandith, BA

Archaeological Resources Reported On Herein (Bordenized & Non-Bordenized)

Resource Name	Borden	Affinity	Type	CHVI	Notes
-	-	-	-	-	-

1. ASSESSMENT CONTEXT

1.1. Development Context

Irvin Heritage Inc. was retained by the proponent to conduct a Stage 1 & 2 Archaeological Assessment of their property (the Study Area) located within part of Part of Lot 22, Part of Lot 22, Concession 12, Delhi, Norfolk County, Historic Township of Windham in the Historic County of Norfolk (Map 1).

The requirement for an Archaeological Assessment was triggered by the Approval Authority in response to a Development Application under the Planning Act for the construction of a residential development. The assessment reported on herein was undertaken after direction by the Approval Authority and before formal application submission.

The Archaeological Assessment reported on was undertaken for the entirety of the approximately 8.18 Ha Study Area.

1.2. Environmental Setting

The Study Area is irregular in shape, approximately 8.18 Ha in size, and is predominantly active agricultural lands (Map 2 & 3).

The Study Area is situated within the Teeterville Dam — Big Creek Watershed which drains into the Big Creek (OMNRF 2025). The soils within the Study Area are predominantly coarse-textured glaciolacustrine deposits consisting of sand, gravel, minor silt and clay.

There are no known watercourses within or within a 300 m buffer of the Study Area. There are three ponds located within 300 m of the Study Area.

The Study Area is situated within the Horseshoe Moraines (5) physiographic region of Southern Ontario (Chapman & Putnam 1984).

2. INDIGENOUS CONTEXT

2.1. Indigenous Peoples Archaeological Context

A search was conducted on April 11, 2025 within the Sites Module of the provincial PastPort System for all pre-contact registered archaeological sites within a 5 km radius of the Study Area. The Sites Module is the online registry of all known and registered archaeological sites and is maintained by the Archaeology Program Unit of the Ontario Ministry of Citizenship and Multiculturalism (MCM). This determined that a total of 53 such sites have been registered as of the date noted above.

This baseline review was conducted to place the specific Study Area within the known archaeological landscape of the surrounding area, in specific relation to inferred land use patterns by Indigenous peoples. A 5 km radius was chosen, by the licensee, to sample the registered archaeological landscape in which the Study Area is situated by reviewing sites identified as 'Pre-Contact' and/or 'Indigenous'. It should be noted that low numbers, or an absence of registered archaeological sites, is directly tied to the degree of archaeological survey conducted within the search area. Further, absence or productivity of sites may not accurately reflect the land use patterns of Indigenous peoples within the landscape.

The data reviewed within this sample presented evidence of Indigenous landscape interaction from a large range of time periods both Pre-Contact and Post-Contact. Within the dataset, 4 sites of the 53 sites were provided within an attributed cultural period with 2 dating to the Late Archaic period, 1 dating to the Early Woodland period, and 1 dating to the Late Woodland period.

To infer the nature of interaction with the landscape, sites that implied land use such as occupation and resource procurement were examined. Sites that represented occupation such Camp / Campsite (n=3). The balance of the sites in this sample were of minimal, vague, or no contextual specificity such as findspot, scatter, and unknown.

Altogether, the sample illustrates a need for more testing and dissemination of detailed information regarding land use, culture, and time period contexts. Additionally, it is known that Indigenous Peoples were present in Southern Ontario from the Paleo and period and thus a lack of sites reflecting this reflect a lack testing and available archaeological information not a lack of existence. The information available within this sample adequately represents that

Indigenous Peoples traversed, inhabited, and utilized this landscape through a wide range of time periods.

TABLE X: REGISTERED INDIGENOUS SITES WITHIN 5 KM RADIUS OF STUDY AREA

Site Periods & Types	# of Registered Sites
Pre-Contact	**45**
Aboriginal	45
scatter	43
camp / campsite	1
findspot	1
Post-Contact, Pre-Contact	**4**
Aboriginal, Euro-Canadian	3
homestead, scatter	2
camp / campsite, farmstead	1
OtherAboriginal, Euro-Canadian	1
(blank)	1
Archaic, Late	**1**
Aboriginal	1
findspot	1
Archaic, Late, Post-Contact	**1**
Aboriginal, Euro-Canadian	1
camp / campsite, homestead	1
Post-Contact, Woodland, Early	**1**
Aboriginal, Euro-Canadian	1
Unknown, homestead	1
Woodland, Late	**1**
Aboriginal	1
findspot, scatter	1

It should be noted that this list contains site types and designations created in the 20th/21st century and may not accurately reflect the true nature or purpose of the identified sites.

3. INDIGENOUS PEOPLES CULTURAL HISTORIES

3.1. Mississaugas of the Credit First Nation

The following Indigenous history was written and provided by the Mississaugas of the Credit First Nation:

> *Prior to European contact, the ancestors of the Mississaugas of the New Credit First Nation occupied the lands north of Lake Superior and the area around Georgian Bay. The Mississaugas lived lightly on the lands they occupied and purposefully moved about the landscape harvesting resources as they became available.*
>
> *Mississauga Territory*
> *The ancestors of the Mississaugas of the Credit migrated into Southern Ontario by means of military conquest. After the Iroquois had expelled the Huron from Southern Ontario in 1649-50, they continued their attacks northward into the territories occupied by the Mississaugas and their allies. By the end of the 17th century, the Mississaugas and their allies had succeeded in driving the Iroquois back into their homelands south of Lake Ontario. At the conclusion of the conflict, many Mississaugas settled at the eastern end of Lake Ontario; other Mississaugas settled at the western end of the lake with their primary location at the mouth of the Credit River. The Mississaugas of the Credit occupied, controlled and exercised stewardship over approximately 3.9 million acres of lands, waters, and resources in Southern Ontario. Their territory extended from the Rouge River Valley westward across to the headwaters of the Thames River, down to Long Point on Lake Erie and then followed the shoreline of Lake Erie, the Niagara River, and Lake Ontario until arriving back at the Rouge River Valley. From the time of the conquest of New France in 1760, the British Crown recognized the inherent rights of First Nations and their ownership of the lands they occupied. The Royal Proclamation of 1763 confirmed First Nations' sovereignty over their lands and prevented anyone, other than the Crown, from purchasing that land. The Crown, needing First Nations' land for military purposes or for settlement, would first have to purchase it from its Indigenous* occupants. (MCFN 2023)

4. HISTORICAL CONTEXT

4.1. Treaty History

4.1.1. Between the Lakes - Treaty No. 3

The following Treaty No. 3 information is provided by the Mississaugas of the Credit First Nation:

> *The arrival of Loyalists during and after the American Revolutionary War placed pressure on the British Crown to find lands on which to settle the newcomers. Among the Loyalists were approximately 2000 members of the Six Nations who had lost their homes fighting on behalf of the Crown. Seeking to reward his First Nation allies for their loyalty during the war, Governor Haldimand offered homes to the Six Nations refugees in the remaining British colonies. One group of the Six Nations Loyalists settled at the eastern end of Lake Ontario, while another group, under the leadership of Mohawk Chief Joseph Brant, selected the Grand River Valley as an area for settlement. Recognizing that under the terms of the Royal Proclamation of 1763 the land needed to be purchased from its owners before the resettlement of the Grand River Valley could begin, Col. John Butler was sent to negotiate with the Mississaugas at the western end of Lake Ontario. On May 22, 1784, for the sum of £1180 worth of trade goods, the Mississaugas of the Credit ceded to the Crown approximately 3 000 000 acres of land located between Lakes Huron, Ontario, and Erie. Of those lands, some 550 000 acres were granted to the Six Nations in the Haldimand Proclamation of October 25, 1784, with the remainder to be utilized for the settlement of other Loyalists. The land grant to the Six Nations was to extend six miles on both sides of the Grand River from its mouth to its source. When it was later discovered that the upper limits of the Between the Lakes Treaty were in error due to faulty geographical assumptions, actual boundaries were defined and a confirming document signed by the Mississaugas and the Crown in 1792. Major population centres found within the boundaries of the Between the Lakes Treaty include Hamilton, Cambridge, Waterloo, Guelph, Brantford, and St. Catharines. The present location of the Mississaugas of the New Credit First Nation Reserve is located on Between the Lakes Treaty lands.*
> (MCFN 2023)

The Study Area is located within the limits of the Between the Lakes Treaty No. 3. This treaty was signed on December 7, 1792 by Chiefs and Principle Women of the Mississauga Nation and John Graves Simcoe on behalf of the British Crown. The treaty includes over 3 million acres between Lake Ontario and Lake Erie. It extends along the northeastern shore of Lake Erie

to outside of Port Bruce where it shares its western border with the McKee Purchase, London Township Purchase, and Huron Tract Purchase. It extends north to approximately Arthur and then southeast to Indian Point, Burlington. On the east its bordered by the Ajetance Purchase, the Head of the Lake Purchase, and the Brant Tract. The Between the Lakes Treaty is split into two sections with the Haldimand Tract running directly down the middle of the treaty lands just shy of 10km on either side the Grand River (MIA 2023).

4.2. County History

Norfolk County is a municipality in southwestern Ontario located along the north shore of central east Lake Erie around and including Long Point Peninsula. Long Point Peninsula is a 40km stretch of sandy loam land that projects from the shore into Lake Erie. Due to Norfolk's advantageous location on Lake Erie, the availability of natural resources such as edible plants, wild game, fish, and fertile land for agriculture made it a well frequented area for early Indigenous communities (H.R. Page & Co 1877). Archaeologically, the Princess Point culture is a distinct part of Long Point Peninsula's Indigenous history however, the landscape lended itself to a variety of cultures from a large range of time periods (Dakin & Skibicki 1994).

Prior to formal settlement by Europeans, Norfolk County was a point of contact for early French Fur traders and Jesuits beginning in the 1580s but more frequent in the mid 1600s (Dakin & Skabicki 1994). These French explorers provided some of the only written records of Indigenous peoples' activity and inferred cultural affiliation. In Norfolk County, it was observed in the 1600s to be mainly inhabited by a culture the French called the "Neutrals" (Brown 2009) (Coakley & Charlton 2021).

European settlement began as early as the 1780s with United Empire Loyalists building lives for themselves primarily along the north shore of Lake Erie and up inland by way of the numerous river systems (Brown 2009)(Sutherland & Co 1867). Before Norfolk County was established, the lands were originally placed into the 1788 administrative district of Hesse, renamed the Western District in 1792. Norfolk County was also established in 1792 and then further reduced in 1798 and again in 1826 (MOPBSD 2024). Widespread settlement of Norfolk sped up after the completion of the Talbot Colonization Road in 1824 (Mika & Mika 1983). The early industries of the Norfolk centred around farming and milling with lumber being vastly popular along Long Point. In the mid 1800s, the lumber industry employed over 600 people but as the trees disappeared residents moved to mixed farming focussed on fruit, dairy and poultry (Mika & Mika 1977). However, the loss of forests came with the loss of soil fertility which cause many

farmers to abandon their once prosperous farms, now reduced to fields of blowing sand. A reforestation effort was introduced in 1908 and by the early 1920s farmers realized these desert like conditions were ideal for growing tobacco (Hodgins 1938) (H.R. Page & Co 1877). Ironically, tobacco was a crop noted by the French to be grown by the “Neutrals” in the 1600s (Brown 2009). Tobacco farming became a defining industry of Norfolk that persisted into the modern era. As well as large farming operations, 19th century Norfolk County supported a strong iron ore smelting industry (Sutherland & Co 1867). By 1861, the population was 28 490, made predominantly of; English, Welsh, Scottish, and Irish (Sutherland & Co 1867). The completion of the railway in 1870 bolstered the farming industry as Delhi could now ship its products more readily (Brown 2009)(H.R. Page & Co 1877).

Norfolk County went through number of restructurings over its administrative lifespan. In 1974 the County of Norfolk was dissolved and united with the former Haldimand County to create the Regional Municipality of Haldimand-Norfolk which included the City of Nanticoke; the Towns of Dunnville, Haldimand, and Simcoe; and the Townships of Delhi and Norfolk (Mika & Mika 1983)(MOPBSD 2024). The Regional Municipality of Haldimand-Norfolk was dissolved in 2001 and the County of Norfolk was established roughly in the boundaries of the historic Norfolk County. Modern Norfolk County is composed of the, "Townships of Norfolk and Delhi, the Town of Simcoe, and the westerly portion of the City of Nanticoke. Norfolk County forms part of the southern coast of Ontario on Lake Erie, and abuts the Six Nations of the Grand River Territory and Haldimand County to the east, Brant and Oxford Counties to the north and Elgin County to the west” (Norfolk County 2021). Norfolk’s economy hangs onto its farming roots with Tobacco and small grain farming taking the forefront. Many residents also commute to nearby Haldimand County’s heavy industrial parks (MacDonald 2015). The County has a large tourism component that is composed of cottaging along Lake Erie, the Long Point Biosphere Reserve, and Backus Heritage Conservation Area which is home to Ontario’s oldest continually running mill (MacDonald 2015).

4.3. Township History

The former Township of Windham was located in the central north portion of Norfolk County, bordering both Brant and Oxford Counties. The Township was watered by Big Creek which ran from the central north to Fredericksburgh or Delhi in the southwest and Patterson’s Creek with sprang centrally and ran south east to the community of Simcoe (H.R. Page & Co 1877). Windham Township was opened for settlement in 1792, named for William Windham, reporting 48 households with a population of 293 residents by 1817 (Middleton & Landon 1927).

Settlement began in the southeastern portion of Windham Township around the area modernly occupied by the community of Colborne (H.R. Page & Co 1879). These settlers were primarily United Empire Loyalists who were able to access the inland Township via the available waterways connecting it to Lake Erie (Brown 2009)(Sutherland & Co 1867). As access to Norfolk County in general increased through the building of plank roads such as the Talbot Road the rest of the Windham Township was settled. In 1846, the centre and southwest of the Township were settled primarily by Roman Catholic German and Irish immigrants. At one time the only Roman Catholic priest in Norfolk County was in the southwestern part of Windham Township (H.R. Page & Co 1877).

Windham Township benefited from a number of rail lines including the Michigan Central Railroad which ran east-west through its centre connecting Waterford in neighbouring Townsend Township through Windham centre through La SaLette in the western extent of Windham where it met with the Port Dover and Lake Huron Railway which travelled southeast through the community of Simcoe in Windham Township's southeastern extremity. Simcoe at the intersection of 4 Norfolk Townships and 4 historic rail ways became a manufacturing and trade hub (Mika & Mika 1983)(Norfolk County 2025). Additionally, the Great Western Railway — Airline Railway ran from Simcoe northwest through Delhi greatly increasing the trade ability of the communities it passed through (Norfolk County 2025).

In 1974, Norfolk County and its Townships were reorganized with the County of Haldimand to form the Regional Municipality of Haldimand-Norfolk which included the Townships of Delhi and Norfolk as well as the Towns of Dunnville, Haldimand, and Simcoe and the City of Nanticoke (Mika & Mika 1983). In 2001, this municipality was dissolved and the single tier municipality of the County of Norfolk was established within roughly its historic boundaries without separate municipal Towns or Townships (Norfolk County 2021). The area that once was Windham Township is still primarily agricultural with the unincorporated communities of Delhi and Simcoe holding the highest populations.

4.4. Local or Community History

The Study Area is located nearest the unincorporated community of Delhi. Delhi is located in Norfolk County at the western extremity of the former Township of Windham and the eastern extremity of the former Township of Middleton. Delhi or Fredericksburgh as it was also called grew on the banks of the Big Creek. The community was originally named Fredericksburg after Frederick Sovereen who surveyed the area prior to settlement and built the first hotel in the fledgling community (Mika & Mika 1977). In 1854, when the first post office was established it

was named Delhi in honour of the City of the same name in India (Mika & Mika 1977). The name did not hold with the residents and Fredericksburg was the name reported in directories. In 1865 it was described as a a post village with a population of 400 (O.L. Fuller 1865). The population persisted in calling the community Fredericksburg until the Canadian Airline Railroad was built through the community in 1872 (Mika & Mika 1977). At the time the lumber industry that built the early economy of the area was dwindling and being replaced by fruit and tobacco farming. Delhi was home to a canning factory to manage the abundance of fruit the sandy soils were able to produce (Mika & Mika 1977). However, this industry was soon overshadowed by the tobacco farming industry. By 1935 tobacco farming spurred the building of a massive tobacco processing plant which attracted a new wave of settlement from Europe. Delhi is home to a number of cultural centres celebrating its German, Belgian, Hungarian, Ukranian, and Polish routes (Mika & Mika 1977). In 1955, Delhi was incorporated as a Town and in 1974 it became a Township including much of the former Townships of Windham and Charlottesville (Mika & Mika 1983). In 2001, Delhi was absorbed into the County of Norfolk as an unincorporated community (Norfolk 2021). Modernly, Tobacco has declined in prominence but still holds a strong presence in the agricultural industry of Delhi alongside Ginseng. Manufacturing also makes up a large sector of Delhi's economy followed by healthcare and retail (Statistics Canada 2023).

4.5. Study Area History

A review of historical resources resulted in the following data relevant to the Study Area:

Map 5: *Map of the County of Norfolk, Canada West* (Tremaine 1856)

The Study Area is situated within Part of Lot 22, Concession 12. The land containing the Study Area is listed under the ownership of W.L. Sovereen. There are no structures within or directly adjacent to the Study Area. There are no transportation routes noted within 100 m of the Study Area. There are no watercourses noted within 300 m of the Study Area.

Map 6: "Township of Windham" (H.R. Page & Co 1877)

The Study Area is situated within Part of Lot 22, Concession 12. The land containing the Study Area is listed under the ownerships of Eli Smith and Nathan J. Boughner. There are no structures within or directly adjacent to the Study Area. The Great Western Rail Line - Air Line is noted running through the Study Area. There are no watercourses noted within 300 m of the Study Area.

The following should be noted in regard to the review of historic maps:

- Study Area placement within historic maps is only approximate
- Many historic maps were subscriber based, meaning only individuals who paid a fee would have their property details mapped

5. ARCHAEOLOGICAL CONTEXT

5.1. Registered Archaeological Sites

A search of the Ontario Sites Database conducted on April 11, 2025 using a Study Area centroid of 17T E 542873 N 4744323 indicated that there are 9 registered archaeological sites within a 1 km radius of the Study Area. None of the registered archaeological sites are within the Study Area nor are any within a 50 m buffer which would suggest encroachment of archaeological resources into the Study Area.

TABLE 2: SITES WITHIN 1 KM

Borden #	Site Name	Time Period	Affinity	Site Type
AfHc-75	*None Provided*	Pre-Contact	Aboriginal	scatter
AfHc-74	*None Provided*	Pre-Contact	Aboriginal	scatter
AfHc-73	*None Provided*	Pre-Contact	Aboriginal	scatter
AfHc-72	*None Provided*	Pre-Contact	Aboriginal	scatter
AfHc-71	*None Provided*	Pre-Contact	Aboriginal	scatter
AfHc-70	*None Provided*	Pre-Contact	Aboriginal	scatter
AfHc-69	*None Provided*	Pre-Contact	Aboriginal	scatter
AfHc-59	*None Provided*	Pre-Contact	Aboriginal	scatter
AfHc-58	*None Provided*	Pre-Contact	Aboriginal	findspot

5.2. Related and/or Adjacent Archaeological Assessments

A review of Archaeological Assessment reports currently accepted into the provincial register of archaeological reports that have been completed within a 50 m buffer of the Study Area resulted in no such reports being identified.

5.3. Cemeteries & Burials

As per a cursory search conducted on April 11, 2025, there are no known or registered cemeteries or burials within or directly adjacent to the Study Area.

5.4. Archaeological Management/Master Plan

The Study Area is not situated within limits of a known Archaeological Management/Master Plan.

5.5. Heritage Properties

There are no Heritage Properties Listed or Designated on the property.

5.6. Historic Plaques

There are no historic plaques within a 100 m radius of the Study Area (Ontario Heritage Trust 2021).

5.7. Study Area Archaeological Potential

The Study Area retains the following criteria of indicating archaeological potential:

- Historic transportation routes within 100 m of the Study Area
- The Study Area is situated within a landscape suitable for resource procurement, transit and habitation by both pre and post-contact Indigenous Peoples.

The Study Area is situated within a landscape that would have been appropriate for both resource procurement and habitation by both Indigenous and Euro-Canadian peoples.

The Study Area is situated within an overall historic landscape that would have been appropriate for both resource procurement and habitation by both Indigenous and Euro-Canadian peoples.

6. STAGE 1 ANALYSIS & CONCLUSIONS

It is clear that the Study Area retains archaeological potential owing to the presence of one or more indicators of archaeological potential. Based on this analysis, it is concluded that a Stage 2 Archaeological Assessment is required of the Study Area.

7. STAGE 1 ARCHAEOLOGICAL ASSESSMENT RECOMMENDATIONS

Given the results of the completed Stage 1 Analysis & Conclusions the Study Area retains archaeological potential and should be subject to a Stage 2 Archaeological Assessment Survey and should conform to the following:

- Lands which can be subject to agricultural ploughing must be prepared via ploughing to ensure a minimum 80% of soil visibility; the objective being to invert the soil column and ensure the exposed soils has minimal chaff. The use of chisel ploughs, harrow, or tined equipment are not archaeologically acceptable means of field preparation. Prepared lands must be allowed to weather under a significant rainfall event, or several lighter rains. A Pedestrian Survey must be undertaken along transects not greater than 5 m.

- Lands which are not viable to plough must be subject to a Test Pit Survey with the following conditions:
  - All test pits are to be excavated by hand at 5 m intervals along 5 m transects
  - Test pits must be excavated to within 1 m of all extant and/or ruined structures when present
  - All test pits must be 30 cm in diameter and be excavated into the first 5 cm of subsoil
  - All test pits must be examined for evidence of fill, stratigraphy or cultural features
  - All excavated soils must be screened through 6 mm wire mesh to facilitate artifact recovery
  - All artifacts recovered must be retained via their associated test pit
  - All test pits are to be backfilled unless instructed otherwise by the landowner

8. STAGE 2 ARCHAEOLOGICAL ASSESSMENT SURVEY

8.1. Archaeological Survey Methodology

Prior to the initiation of fieldwork, the Field Director reviewed the existing Stage 1 Archaeological Assessments analysis and recommendations; all field staff were then briefed on the archaeological potential of the Study Area. Fieldwork was conducted in April 2025. The weather conditions encountered during the completed archaeological survey are presented below. At all times the assessment was conducted under appropriate weather and lighting conditions. The limits of the Study Area were defined in the field by the use of a geo-referenced Study Area overly on a GPS system accurate to 1 m.

TABLE 3: DATES & DIRECTORS OF ASSESSMENT

Date	Weather	Field Director(s)	Assistant Field Directors
Apr-22-2025	15°C, light cloud cover	Irvin (P379)	Keenan

The assessment began with a visual review of the Study Area conditions.

The Study Area was found to contain well ploughed and weathered agricultural fields with a minimum soil visibility of 80%. The agricultural fields were subject to a 5 m transect Pedestrian Survey (Images 1-4).

The completed Pedestrian Survey of the agricultural fields resulted in the discovery of no archaeological resources.

The Study Area contained lands determined to be of low archaeological potential. These lands consisted of extant deep disturbance from stormwater infrastructure and deep soil movement (Images 5-8). These lands were reviewed and documented by the Archaeological Field Director and determined to be of low archaeological potential.

The completed archaeological assessment resulted in the creation of various documentary records.

TABLE 4: INVENTORY OF STAGE 2 HOLDINGS

Record Type or Item	Details	# of Boxes	Location
Field Notes: P379-0756-2025	Digital Files	-	IHI Server
Photos: P379-0756-2025	Digital Files	-	IHI Server

9. STAGE 2 ANALYSIS & CONCLUSIONS

The Study Area subject to Stage 2 Archaeological Assessment survey, measuring approximately 8.18 Ha in size was subject to a complete archaeological assessment.

No archaeological resources were identified in the completed Stage 2 Archaeological Assessment Survey.

TABLE 5: SUMMARY OF STAGE 2 ASSESSMENT METHODOLOGIES & FINDINGS

Assessment Method	Findings	Ha	% of Study Area
Archaeological Potential: 5 m Pedestrian Survey	1x Euro-Canadian Scatter	7.41	90.6%
Low Potential: Deep Soil Disturbance	-	0.77	9.4%
Total		**8.18**	**100**

10. STAGE 2 ARCHAEOLOGICAL ASSESSMENT RECOMMENDATIONS

Given the results and conclusions of the completed Stage 2 Archaeological Assessment Survey, the following recommendations are made:

- It is the professional opinion of the archaeological licensee, Thomas Irvin (P379) that the Study Area has been sufficiently assessed and no further archaeological assessments are recommended.

- Notwithstanding the above recommendations, the provided Advice On Compliance With Legislation shall take precedent over any recommendations of this report should deeply buried archaeological resources or human remains be found during any future earthworks within the Study Area.

11. IMAGES



Image 1: Study Area subject to a 5 m transect Pedestrian Survey.



Image 2: Field Archaeologists conducting a 5 m transect Test Pit Survey.



Image 3: Field Archaeologists conducting a 5 m transect Test Pit Survey.



Image 4: Field Archaeologists conducting a 5 m transect Test Pit Survey. Green Area on left is graded slope to artificial stormwater infrastructure channel.



Image 5: Example of stormwater infrastructure within the Study Area. Artificial channel in the background.



Image 6: Example of stormwater infrastructure within the Study Area within road bedding.



Image 7: Example of Deep Soil Disturbance & Grading.



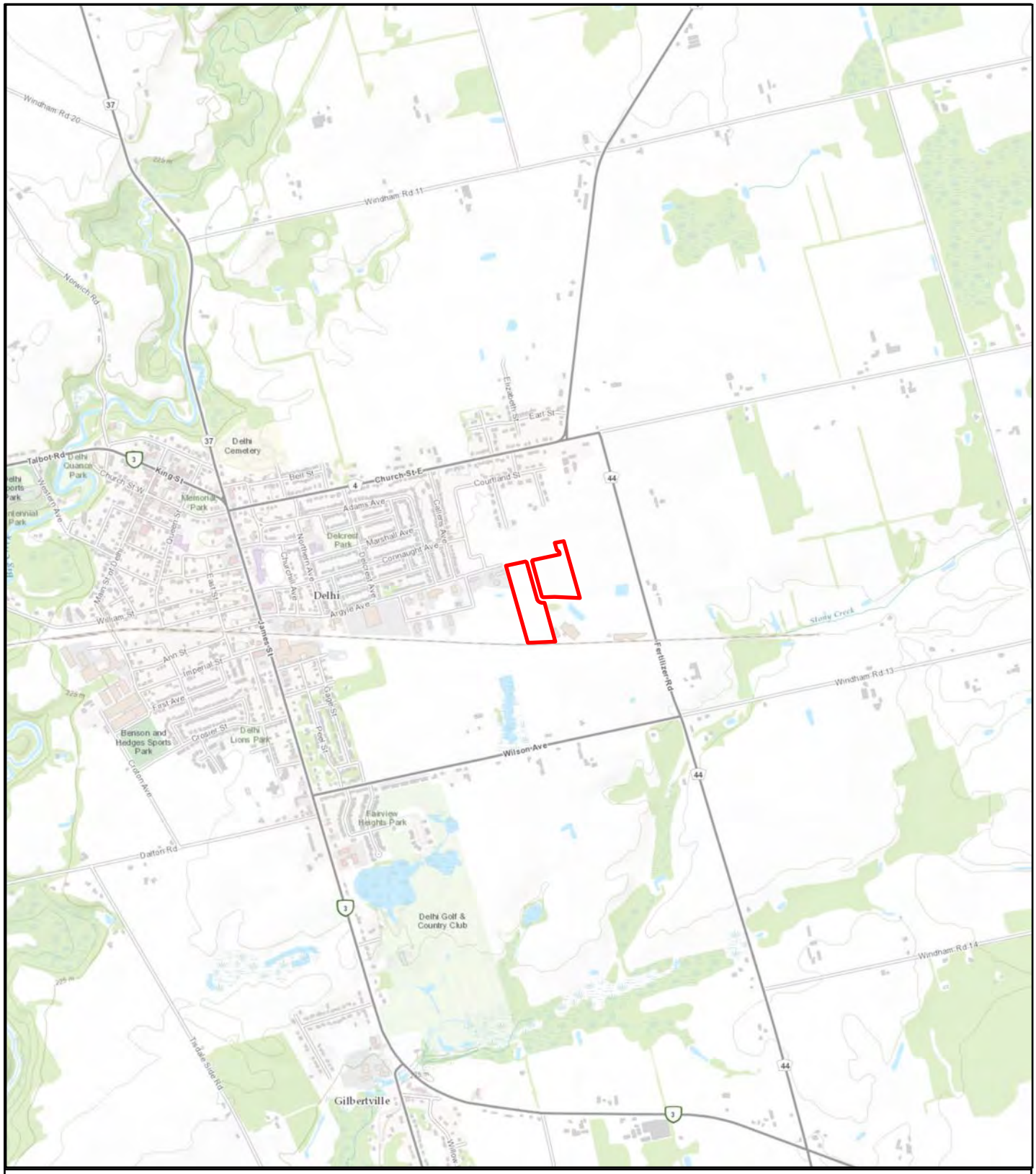
Image 8: Example of Deep Soil Disturbance & Grading.

12. ADVICE ON COMPLIANCE WITH LEGISLATION

The Standards and Guidelines for Consultant Archaeologists requires that the following standard statements be provided within all archaeological reports for the benefit of the proponent and approval authority in the land use planning and development process (MTC 2011:126):

> This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the Ontario Heritage Act, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the MTCS, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.
>
> It is an offence under Sections 48 and 69 of the Ontario Heritage Act for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the Ontario Heritage Act.
>
> Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the Ontario Heritage Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the Ontario Heritage Act.
>
> Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the Ontario Heritage Act and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.
>
> The Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Service.

13. MAPS



N

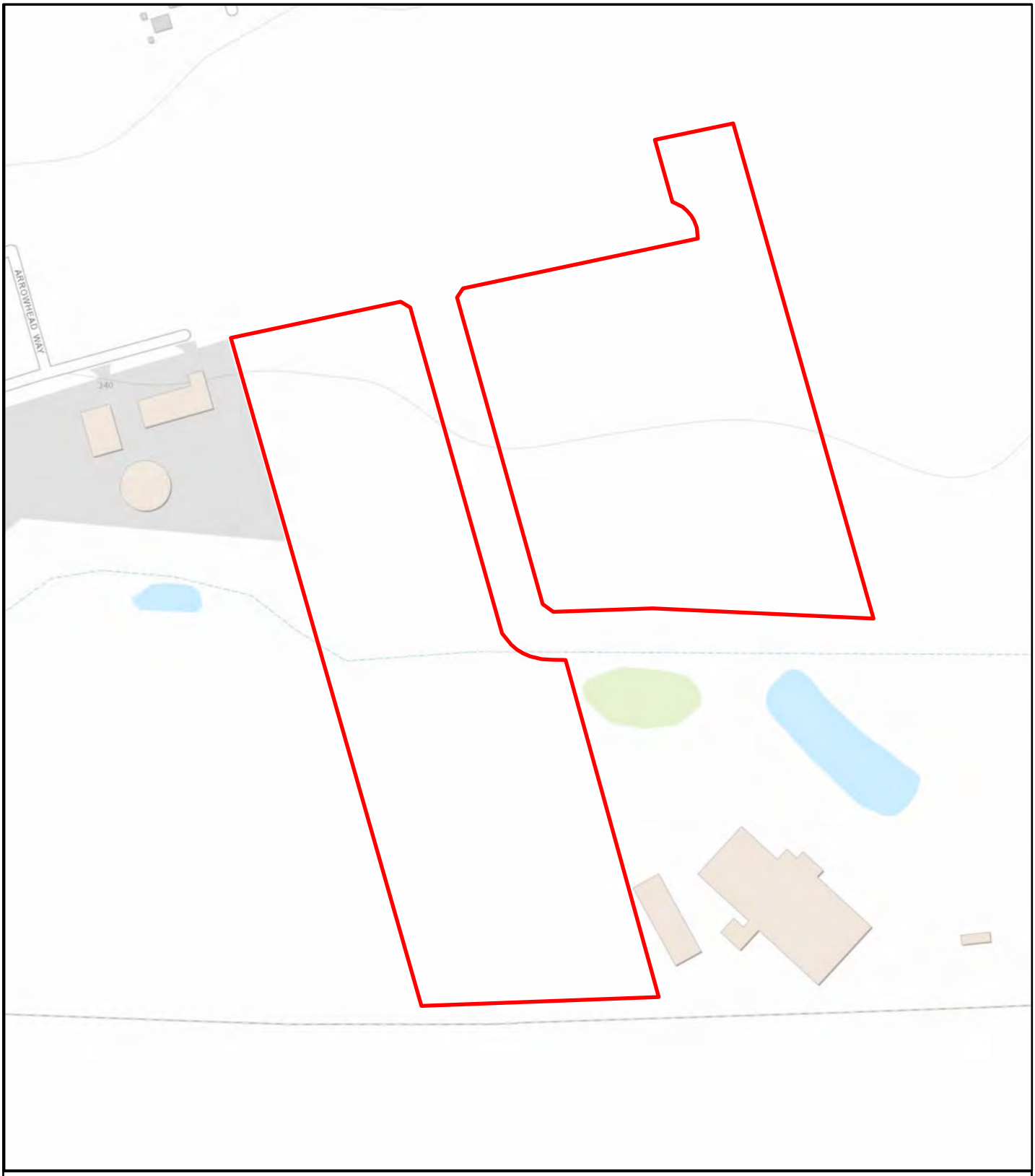
Meters

0 330 660 990 1,320

Study Area

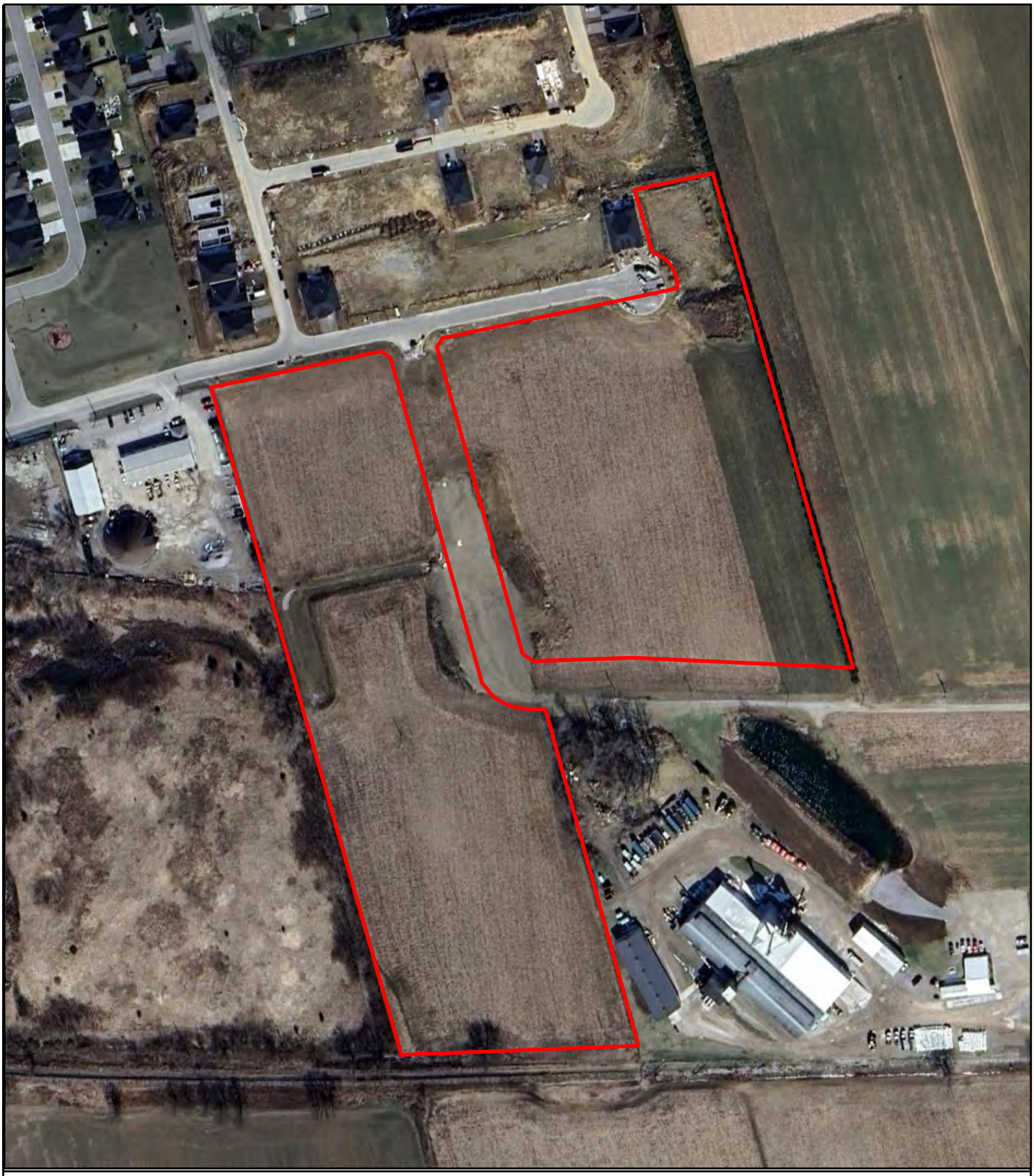
Source: Norfolk County, Oxford County, Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan

Map 1: Study Area Location



Source: Norfolk County, Oxford County, Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA, AAFC, NRCan

Map 2: Study Area Topographic Detail



Source: © OpenStreetMap (and) contributors, CC-BY-SA

Map 3: Study Area Environmental Detail



Source: Tremaine, 1856

Map 4: Study Area Atop 1856 Map



Source: H.R. Page, 1877

Map 5: Study Area Atop 1877 Map



Source: © OpenStreetMap (and) contributors, CC-BY-SA

Map 6: Stage 1 Results & Recommendations



N

Meters

0 30 60 90 120

Source: © OpenStreetMap (and) contributors, CC-BY-SA

Study Area

Low Potential: Deep Soil Disturbance & Grading

5m Pedestrian Survey: No Archaeological Resources Identified

Photo # & Direction

Map 7: Stage 2 Results of Assessment

14. REFERENCES

Brown, Ron
2009 The Lake Erie Shore: Ontario's Forgotten Southern Coast, Natural Heritage Books: Toronto.

Chapman, L.J., and Putnam, D.F.
1984 "Physiography of Southern Ontario; Ontario Geological Survey", Map P.2715 (coloured). Scale 1:600 00.

Coakley, J.p. & M.n. Charlton
2021 "Lake Erie." *The Canadian Encyclopedia*. Historica Canada: Accessed Online.

Dakin, Susan & Andrew Skibicki
1994 *Human history of the Long Point Area*, Heritage Resources Center - University of Waterloo: Accessed Online.

H.R. Page & Co.
1879 Illustrated Historical Atlas of the County of Norfolk, Ont. H.R. Page & Co: Toronto [reprint Ed. University of Western Library: Undated]

Hudgins, Bert
1938 "Tobacco Growing in Southwestern Ontario" *Economic Geography* 14, no. 3: 223-32. Taylor & Francis Ltd: Accessed Online via JSTOR.

MacDonald, Cheryl
2015 "Norfolk County" *The Canadian Encyclopedia*. Historica Canada: Accessed Online.

Mika, Nick & Helma Mika
1977 Places in Ontario: Part I A-E, Mika Publishing Company: Belleville.
1983 Places in Ontario: Part III N-Z, Mika Publishing Company: Belleville.

Ministry of Public and Business Service Delivery (MOPBSD)
2024 "Early Districts and Counties 1788-1899" The Changing Shape of Ontario. Government of Ontario: Accessed online.

Ministry of Tourism and Culture (MTC)
2011 *Standards and Guidelines for Consultant Archaeologists* [pdf file], Ministry of Tourism and Culture: Accessed Online.

Mississaugas of the Credit First Nation (MCFN)
2023 *MCFN Treaties Booklet (2).* Mississaugas of the Credit First Nation: Pdf document.

Norfolk County

2021 *Norfolk County Official Plan*, Norfolk County: Accessed Online.
2025 "Heritage Railways" *Media* [pdf map], Norfolk County: Accessed Online.

O.L. Fuller
1865 Counties of Elgin & Norfolk Directory for 1865 & 1866, O.L. Fuller: Toronto.

Ontario Heritage Trust (OHT)
2021 "An Inventory of Provincial Plaques Across Ontario", Ontario Heritage Trust: Accessed Online.

Ontario Ministry of Citizenship and Multiculturalism
2025 "Site Data Search" *Ontario's Past Portal*, King's Printer for Ontario: Accessed Online.

Ontario Ministry of Indigenous Affairs (MIA)
2024 *Map of Ontario Treaties and Reserves*, King's Printer for Ontario: Accessed Online.

Ontario Ministry of Natural Resources and Forestry (OMNRF)
2025 *Ontario Watershed Information Tool (OWIT)*. King's Printer for Ontario: Accessed Online.

Statistics Canada
2023 *Census Profile*. 2021 Census of Population [table]. Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released November 15, 2023.

Sutherland & Co
1867 *Oxford and Norfolk Gazetteer and General Business Directory: 1867*, Sutherland & Co.: Woodstock.

Tremaine, George C.
1856 *Map of the County of Norfolk, Canada* West, George C. Tremaine: Kingston

Englobe
Soils Materials Environment

1064928 Ontario Inc.

PHASE 3 AND 4, BLUE GRASS ESTATES
ARGYLE AVENUE
DELHI, ONTARIO

MAY 2020

Geotechnical Investigation Report

160-P-0021310-0-01-100-GE-R-0001-00

Englobe



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1 Introduction

Englobe Corp. (Englobe) was retained by 1064928 Ontario Inc. to carry out a geotechnical investigation for the proposed Phase 3 and 4 of the Blue Grass Estates residential development at Argyle Avenue in Delhi, Ontario as shown on Drawing 1 in Appendix A.

2 General Information

The project involves the proposed construction of fifty single family lots north of Argyle Avenue (Phase 3) and thirteen single family lots and nine blocks south of Argyle Avenue (Phase 4). The residential units will have basements. Access to the site will be off Argyle Avenue, Mcintosh Drive, and Duchess Drive. The development will be serviced with full municipal services. The existing sanitary invert level at Argyle Avenue (outlet for Phase 3) is at Elevation 238.57 m as provided on J.H. Cohoon Engineering Limited Drawing 13227, SAN-1 dated April 13, 2020. No servicing information was available for Phase 4 at the time of this report. The site generally slopes down from north to south with the borehole locations varying in elevation by 4.0 m.

The purpose of this investigation was to explore the subsurface soil and groundwater conditions at the subject site and prepare a geotechnical report. The geotechnical report includes recommendations on building design and construction, site servicing, infiltration, pavements, and construction and inspection testing.

3 Field and Laboratory Investigation

3.1 Field Program

The fieldwork for this investigation was completed on March 16 and 17, 2020 and involved the drilling of fifteen boreholes (Boreholes BH-01-20 to BH-15-20) to depths ranging from approximately 4.6 to 5.0 m. The borehole locations are shown on Drawing 2 in Appendix A. The field investigation was carried out in general conformance with the professional standards set out in the Canadian Foundation Engineering Manual (CFEM 2006, 4th Edition), applicable Ontario Regulations and the ASTM International. The following is a summary of field investigation tasks:

- Local utility companies were contacted prior to the start of drilling activities in order to demarcate underground utilities on the site.
- The boreholes were advanced using a Geoprobe 7822DT drillrig equipped with continuous flight hollow stem augers supplied and operated by Direct Environmental Drilling Inc. under the supervision of an Englobe drilling supervisor. The boreholes were logged by our geotechnical supervisor.

- Soil samples were recovered from the boreholes at regular depth intervals using a 50 mm outside diameter split spoon sampler in accordance with ASTM D1586 Standard Penetration Test (SPT). The recorded SPT N-values are provided on the borehole logs (Appendix B).
- Samples of the cohesive soils were tested using a hand held pocket penetrometer to determine approximate shear strengths. The pocket penetrometer results are plotted on the borehole logs (Appendix B).
- Monitoring wells were installed in Boreholes BH-06-20 and BH-15-20 in accordance with Ontario Regulation 903 as amended, to allow measurement of groundwater levels. The monitoring wells were constructed using flush threaded 50 mm diameter Trilock pipe with 1.5 m long 10-slot well screens.
- Groundwater measurements were taken on April 17, 2020 and the results are provided on the borehole logs and summarized in Section 4.2.
- Groundwater observations and measurements were carried out in the open boreholes during and upon completion of drilling and they are noted on the borehole logs.
- The borehole locations and ground surface elevations were surveyed by J.H. Cohoon Engineering Limited and the data was supplied to Englobe in CAD format. It is understood that the elevations are related to a geodetic datum.
- The boreholes without monitoring wells were backfilled with soil cuttings and bentonite in accordance with Ontario Regulation 903 as amended, under the Ontario Water Resources Act.

3.2 Geotechnical Laboratory Testing

The soil samples secured during this investigation were returned to our laboratory for visual examination, as well as moisture content testing. A total of 76 moisture content tests were performed and these results are plotted on the borehole logs (Appendix B).

Four particle size analyses were conducted on selected samples, and the results are summarized in Section 4.1 (Subsurface Conditions) and plotted on Figure 1 in Appendix C.

It is important to note that as per the standard policy of Englobe, the soil samples will be stored for a period of three months from the date of sampling. These soils samples will be discarded after the three-month period unless prior arrangements have been made for longer storage.

4 Subsurface Conditions

This section presents a brief summary of the subsurface soil and groundwater conditions encountered during the geotechnical investigation. The full details of the subsoil and groundwater conditions are presented on the borehole logs in Appendix B.

4.1 Subsoil Conditions

Based on the results of the geotechnical field investigation, the subsurface soils consist of topsoil underlain by native deposits of sand, sand and gravel, and silt. Locally, fill was encountered in Borehole BH-14-20.

Fill was encountered surficially in Borehole BH-14-20 and is 1.7 m thick. The fill is comprised of a surficial layer of damp to moist, silt with trace sand and gravel overlying silty sand with some organics. Plastic and paper were observed in the fill. An SPT N-value of 4 blows per 300 mm indicates a very loose relative density.

Topsoil was encountered surficially in all the boreholes except Borehole BH-14-20. The topsoil comprises moist brown silt with some sand, and trace to some gravel. Cobbles were encountered at select boreholes. The topsoil ranges in thickness between 0.2 and 0.6 m at the borehole locations.

Sand was encountered underlying the topsoil or fill at Boreholes BH-01-20, BH-02-20, BH-05-20 to BH-15-20 and within the silt in Borehole BH-03-20. The sand ranges in composition from silty sand, to silty sand with trace to some gravel to gravelly sand to sand and silt. SPT-N values in the sand deposit range from 2 to 36 blows per 300 mm penetration of the split spoon sampler. The SPT-N values typically increase with depth.

The results of two particle size analyses carried out on samples of the sand are provided on Figure 1 in Appendix C and indicate the samples contain 0 to 8% gravel, 38 to 89% sand, 6 to 40% silt, and 5 to 15% clay.

Silt was encountered below the topsoil in Boreholes BH-03-20 and BH-04-20, and below the sand or within the sand deposit in Boreholes BH-05-20, BH-07-20, BH-08-20, BH-09-20, BH-10-20, BH-13-20, BH-14-20, and BH-15-20. The silt is comprised of silt with some clay and sand with trace gravel to sandy silt with some to trace clay to silt and sand to clayey silt with trace sand. The non-cohesive silt has a very loose to dense relative density based on SPT N-values of 3 to 33 blows per 300 mm. The cohesive silt has a very stiff to hard consistency based on approximate shear strength results of 100 to 200 kPa.

The results of two particle size analyses carried out on samples of the silt deposit are provided on Figure 1 in Appendix C and indicate the samples contain 0 to 1% gravel, 2 to 18% sand, 63 to 77% silt and 19 to 21% clay.

Sand and gravel was encountered in Boreholes BH-04-20, BH-06-20, and BH-09-20. The sand and gravel is comprised of silty sand and gravel to sand and gravel with some silt and occasional cobbles. SPT N-values in the sand and gravel range from 31 to 38 blows per 300 mm indicating a dense relative density.

4.2 Groundwater

Groundwater observations and measurements carried out in the open boreholes are summarized on the appended borehole logs. Wet to saturated granular deposits were encountered in all the boreholes except Boreholes BH-04-20 and BH-05-20 at depths ranging from 0.5 to 4.9 m (Elevation 236.2 to 238.9 m) below ground surface.

Groundwater measurements taken on April 17, 2020 are summarized in the following table:

Table 1 Groundwater Measurements

Borehole No.	Ground Surface Elevation (m)	Groundwater Depth (m)	Groundwater Elevation (m)
BH-06-20	239.86	0.76	239.10
BH-15-20	239.09	0.86	238.23

It is important to note that the groundwater conditions described in this report refer only to those observed at the place and time of observation noted in the report. These elevations and conditions may vary locally due to seasonal fluctuations, groundwater regimes encountered at the site or because of construction activities on the site or adjacent sites.

5 Discussion and Recommendations

This project involves the proposed construction of fifty single family homes north of Argyle Avenue and thirteen single family lots and nine blocks south of Argyle Avenue, and associated roadways as shown on Drawing 2 in Appendix A.

5.1 Site Preparation

Existing grades as measured at the borehole locations range from Elevation 238.92 to 242.92 m. Top of foundation elevations for Phase 3 (north of Argyle Avenue) will be constructed between Elevation 243.05 and 243.80 m as indicated on Drawing No. 13227-GPI, dated April 13, 2020 by J.H. Cohoon Engineering Limited. Based on the proposed top of foundation elevations, footings will be constructed between Elevation 240.85 and 241.60 m. Prior to placing fill all topsoil, pre-existing fill and loose soils must be removed. Table 2 below summarizes the depth and elevation of compact sand or silt at the borehole locations. Proposed grades for Phase 4, south of Argyle Avenue was not available at the time of this report.

Table 2 Depth and Elevation of Compact Soil

Borehole No.	Ground Surface Elevation (m)	Depth/Elevation to Compact Granular Soil (m)
BH-01-20	242.62	0.60 / 242.01
BH-02-20	242.92	2.29 / 240.63
BH-03-20	241.29	1.52 / 239.77
BH-04-20	241.37	2.44 / 238.93
BH-05-20	241.86	1.52 / 240.34
BH-06-20	239.86	0.91 / 238.95
BH-07-20	239.77	1.52 / 238.25
BH-08-20	240.79	1.52 / 239.27
BH-09-20	241.17	0.76 / 240.41
BH-10-20	240.07	1.52 / 238.55
BH-11-20	238.92	3.05 / 235.87
BH-12-20	239.12	0.76 / 238.36
BH-13-20	239.36	0.76 / 238.60
BH-14-20	239.04	1.68 / 237.36
BH-15-20	239.09	0.46 / 238.63

Structural fill used for raising the grades beneath foundations should consist of on site sand or imported clean granular material such as OPSS Type 1 Granular B. Subgrade fill beneath the proposed pavements should meet the requirements of OPSS Select Subgrade Material. Any imported fill material shall be tested and approved by a geotechnical engineer prior to use.

Recommendations for structural fill and pavement subgrade fill are provided in Sections 5.2 and 5.5.

5.2 Foundations

Conventional spread footings founded on the approved native materials at the elevations noted in Table 2, may be designed for soil bearing resistance at Serviceability Limit States of 100 kPa, and a factored geotechnical resistance at Ultimate Limit States of 175 kPa, where the resistance factor is equal to 0.5.

The following construction recommendations are given based on results of the geotechnical investigation:

- Where required, the approved native subgrade can be raised to a higher founding level by placing engineered fill consisting of approved on-site sand or imported sand and gravel. The above recommended soil bearing pressures may be also used for the design of footings founded on engineered fill.
- Prior to construction of the foundations any unsuitable material including surficial vegetation, topsoil, fill, and loose soils shall be excavated from within the building footprint. The subgrade should be inspected and approved by an experienced geotechnical engineer/technician upon excavation.
- Fill material within the building must be placed on approved subgrades as structural fill under full time geotechnical supervision. The structural fill should comprise granular material such as OPSS.MUNI 1010 Granular B or equivalent, placed in 200 mm thick lifts and compacted to 100% SPMDD.
- Full-time compaction testing by experienced geotechnical personnel should be carried out in order to examine and approve structural fill materials, and to verify that the specified degree of compaction has been achieved.
- Structural fill shall extend at least 1.0 m beyond the edge of the building and outwards and downwards to the subgrade level at a slope of 1 horizontal to 1 vertical, if embedded. For the exposed structural fill, slope of 3 horizontal to 1 vertical is recommended.
- The footing areas must be inspected by a qualified geotechnical engineer/technician at the time of construction to confirm soil conditions encountered and recommended bearing capacity.
- All exterior footings and those exposed to freezing should be provided with minimum of 1.2 m of soil cover to provide protection from freezing. If construction extends into the winter months, all founding soil must be protected from freezing during construction.
- The materials excavated from the foundation trench areas may be suitable for reuse as exterior foundation wall backfill. The backfill should be placed in 200 mm thick lifts and compacted to 95% SPMDD on the exterior of the building and 100% SPMDD on the interior of the building. The backfill should be placed evenly on both sides of walls that are not designed to resist lateral earth pressure. Over-compaction must be avoided since this could cause excessive lateral earth pressure.

5.3 Basements

The basements must be provided with perimeter weeping tile systems as per the Ontario Building Code (Subsection 9.14). The drain tile or pipe should be laid on undisturbed or well-compacted soil so that the top of the tile or pipe (minimum 100 mm diameter) is below the bottom of the crawl space floor slab. The top and sides of the drain tile or pipe shall be covered with not less than 150 mm of crushed stone or other clean coarse granular material containing no more than 10% of material that will pass the 4 mm sieve. The weeping tile must drain to a suitable frost-free outlet or sump. The sump shall be equipped with an automatic pump that will discharge the water into a sewer, or drainage ditch.

The portion of the exterior basement below finished ground level must be damp-proofed as per Section 9.13.2 of the Ontario Building Code (2012). The basement wall backfill should be graded to prevent drainage towards the foundation after settling as per OBC 9.12.3.

The basement should be designed to resist the lateral earth pressure. For calculating the lateral earth pressure, the coefficient of earth pressure (K) may be assumed as 0.50 for cohesionless sandy soils. The bulk unit weight of the retained backfill may be taken as 21 kN/m^3 for well-compacted soil. An appropriate factor of safety should be employed.

Foundations and basements shall conform to Sections 9.15 and 9.18 of Ontario Building Code (2012). Drainage and ground cover in basements shall be as per Subsections 9.18.5 and 9.18.6 of the Ontario Building Code (2012).

The subgrade for the basement floor slab should comprise undisturbed native soil or well-compacted fill. A minimum 100 mm thick layer of coarse clean granular material containing not more than 10% material that will pass a 4 mm sieve shall be placed beneath slabs in houses as per Subsection 9.16.2 of the Ontario Building Code.

5.4 Concrete Slab-on-Grade

It is understood that some of the proposed blocks in Phase 4, south of Argyle Avenue may comprise slab-on-grade buildings. The floor of the buildings may be constructed using conventional slab-on-grade techniques following removal of the surficial topsoil, loose soil or pre-existing fill, and inspection of the subgrade to evaluate the subgrade soils. Fill required to raise the grades beneath the slab-on-grade floor should comprise native sand or imported sand and gravel similar to OPSS.MUNI 1010 Granular B placed in 200 mm thick lifts and compacted to 100% standard Proctor maximum dry density (SPMDD).

A minimum 150 mm thick layer of OPSS.MUNI 1010 Granular A material compacted to 100% SPMDD should be provided directly beneath the slab for levelling and uniform support purposes.

A modulus of subgrade reaction (k) of 35 MPa/m may be used for the design of the floor slabs on approved and suitably compacted structural fill material. No special underfloor drains are required provided the exterior grades are at least 300 mm lower than the finished floor slab and positively sloped away from the building.

To prevent the migration of moisture vapour into the building from beneath ground floor slabs, particularly where moisture sensitive floor coverings are placed, a vapour retarder shall be placed directly beneath the floor slab that meets the requirements of the designer and flooring

manufacturer. Prior to installing moisture sensitive floor coverings, the moisture content of the concrete slab must be determined at operational conditions by internal relative humidity testing to ensure an acceptable slab moisture level. It should be noted that it typically takes more than 90 days at operational conditions to lower the slabs internal relative humidity to 85%. Different flooring systems have different responses to slab moisture (i.e., some systems can tolerate more moisture than others), and the flooring contractor must assess the floor moisture levels with respect to their flooring components.

5.5 Pavement Structure Recommendation

Following sewer and watermain installation, the pavement subgrade will comprise recompacted excavated sand and silt soils.

For pavement design purposes, the new roadways are considered to be local roadways. Measured traffic data was not available for the new roadways. Englobe evaluated two scenarios for traffic, the first assumes no construction traffic on the pavement, the second assumes construction traffic for the first five (5) years. In the no construction traffic scenario, Englobe assumed an Average Annual Daily Traffic (AADT) of 1000 vehicles per day, comprised of 2.0 percent trucks over a 20 year period, see Table 3. For the construction traffic scenario an AADT of 1000 was assumed with 10 percent construction vehicles over the first 5 years, then 2 percent trucks over the remaining 15 years, see Table 4.

To assess if the Norfolk County standard pavement structures would be sufficient for the roadways, the estimated traffic data was interpreted by Englobe in order to estimate the number of Equivalent Single Axle Loads (ESALs). The traffic volumes were estimated using the provided average annual daily traffic (AADT) for a 20-year pavement design life beginning in 2020 in accordance with Norfolk County specifications. As the project roadway is not in an established area, a nominal annual growth rate of 2 percent was assumed. On this basis, the ESAL applications during design life were calculated in accordance with MTO MI-183, Appendix D. A detailed traffic spectrum for the subject roadway was not available, as such the truck factor for the roadway was estimated based on MTO MI-183 Table 8-1 FHWA typical truck factors. Articulated buses were not considered in the analysis.

The total estimated design ESALs anticipated over the 20-year design life period are presented in Table 3 and Table 4 for each scenario.

Table 3 Traffic Data and Estimated ESALs – No Construction Traffic

Blue Grass Estates
No Construction Traffic

Year	Average Annual Daily Traffic	No. of Lanes	Estimated Cumulative Annual ESALs
2020	1,000	2	-
2021	1,020	2	2,800
2022	1,040	2	5,600
2023	1,061	2	8,500
2024	1,082	2	11,400
2025	1,104	2	14,400
2026	1,126	2	17,400
2027	1,149	2	20,500
2028	1,172	2	23,700
2029	1,195	2	26,900
2030	1,219	2	30,200
2031	1,243	2	33,600
2032	1,268	2	37,000
2033	1,294	2	40,500
2034	1,319	2	44,100
2035	1,346	2	47,700
2036	1,373	2	51,400
2037	1,400	2	55,200
2038	1,428	2	59,100
2039	1,457	2	63,000
2040	1,486	2	67,000
2041	1,516	2	71,100
Directional Factor (DF) =			0.50
Lane Distribution Factor (LDF) =			1.0
Combined Truck Factor (CTF) =			0.74
Percent Trucks =			2.0%
Traffic Growth Rate =			2.0%
Days Per Year For Truck Traffic =			365
Number of Lanes in one Direction =			1

Table 4 Traffic Data and Estimated ESALs – With Construction Traffic Years 0-5

Blue Grass Estates
With Construction Traffic Years 0-5

Year	Average Annual Daily Traffic	No. of Lanes	Estimated Cumulative Annual ESALs
2020	1,000	2	-
2021	1,020	2	74,500
2022	1,040	2	150,400
2023	1,061	2	227,900
2024	1,082	2	306,900
2025	1,104	2	387,500
2026	1,126	2	390,500
2027	1,149	2	393,600
2028	1,172	2	396,800
2029	1,195	2	400,000
2030	1,219	2	403,300
2031	1,243	2	406,700
2032	1,268	2	410,100
2033	1,294	2	413,600
2034	1,319	2	417,200
2035	1,346	2	420,800
2036	1,373	2	424,500
2037	1,400	2	428,300
2038	1,428	2	432,200
2039	1,457	2	436,100
2040	1,486	2	440,100
2041	1,516	2	444,200
Directional Factor (DF) =			0.50
Lane Distribution Factor (LDF) =			1.0
Combined Truck Factor (CTF) = (Year 0-5 / Year 5-20)			4.0 / 0.74
Percent Trucks = (Year 0-5 / Year 5-20)			10% / 2%
Traffic Growth Rate =			2.0%
Days Per Year For Truck Traffic =			365
Number of Lanes in one Direction =			1

*Note: 2025 is end of construction traffic on pavement.

The minimum required pavement component thicknesses as provided in The Corporation of Norfolk County Design Criteria (August 2017) are provided in Table 5.

Table 5 Norfolk County Minimum Pavement Component Thicknesses

Pavement Component	Structural Layer Coefficient	Drainage Coefficient	Local Road Thickness (mm)
Hot-Mix Asphalt	0.42	1.0	90
Granular A Base Course	0.14	1.0	150
Granular B Subbase Course	0.09	1.0	300
Structural Number (SN)			86 mm

For the purpose of assessing pavement construction using the AASHTO 1993 *Guide for the Design of Pavement* Structures methodology, the average resilient modulus of the subgrade has been assumed to be 30 MPa, based on MTO MI-183 Table D-8 recommendations for the native sandy silts (ML, MI – silts and sandy silts).

Following installation of the services, the roadways will be constructed. Any existing organic soil and loose soils should be removed from below the pavement areas and if required, grades should be raised with approved on-site inorganic soils or imported granular materials. Subgrade fill for the roadways should be placed in 200 mm thick lifts and compacted to 98% SPMDD, if greater than 1 m below the top of subgrade, and 100% SPMDD within the top 1 m of the subgrade.

The two scenarios have significantly different ESALs over the design life and consideration for the construction traffic will have a large impact on the pavement design. If feasible, it is recommended that the construction traffic be diverted off the pavement as much as possible. With no construction traffic the minimum pavement component thickness required by The Corporation of Norfolk County shown in Table 5 is adequate.

If Construction traffic cannot be diverted off the pavement then staged construction is not recommended. The options are:

Option 1: Supply and Place 90 mm of Hot mixed Asphalt at Initial Construction (Assumes construction traffic for the first five years)

- Construct the pavement subbase with 300 mm of OPSS.MUNI 1010 Granular B and compact to 100% SPMDD;
- Construct the pavement base with 150 mm of OPSS.MUNI 1010 Granular A and compact to 100% SPMDD; and
- Place two lifts of hot-mix asphalt (one lift of 50 mm of OPSS 1150 HL 8 hot-mix asphalt binder and one lift of 40 mm of OPSS 1150 HL 3 surface course hot-mix asphalt), and compact in conformance with OPSS 310 requirements.

Option 2: No Construction Traffic or Staged Construction with Construction Traffic

- Construct the pavement subbase with 300 mm of OPSS.MUNI 1010 Granular B and compact to 100% SPMDD;
- Construct the pavement base with 150 mm of OPSS.MUNI 1010 Granular A and compact to 100% SPMDD; and
- Place two lifts of hot-mix asphalt (one lift of 50 mm of OPSS 1150 HL 8 hot-mix asphalt binder and one lift of 40 mm of OPSS 1150 HL 3 surface course hot-mix asphalt within 1-5 years), and compact in conformance with OPSS 310 requirements.

Option 3: Supply and Place 105 mm of Hot mixed Asphalt at Initial Construction (Assumes construction traffic for the first five years)

- Construct the pavement subbase with 300 mm of OPSS.MUNI 1010 Granular B and compact to 100% SPMDD;

- Construct the pavement base with 150 mm of OPSS.MUNI 1010 Granular A and compact to 100% SPMDD; and
- Place two lifts of hot-mix asphalt (one lift of 55 mm of OPSS 1150 HL 8 hot-mix asphalt binder and one lift of 50 mm of OPSS 1150 HL 3 surface course hot-mix asphalt), and compact in conformance with OPSS 310 requirements.

Each Option provides benefits and drawbacks.

Option 1: If the full 90 mm of Hot Mix Asphalt is placed at time of initial construction, at year 5 approximately 10 to 15 percent of the pavement will be in need of rehabilitation. At year 5, it is recommended that an experienced inspector visually inspect the pavement to delineate the extent of the repairs that will be required.

Option 2: If staged construction is considered with only 50 mm placed at year 0, it is estimated that 20 to 50 percent of the pavement surface area will require repair prior to placement of overlay. At time of overlay it is recommended that visual inspection and falling weight deflectometer (FWD) testing be carried out to optimize the amount of repairs that will be required. This option will provide the lowest initial cost but may require a higher future cost depending on extent of damage that occurs.

Option 3: If construction traffic is considered to minimize repairs at handover, at time of handover only minor repairs will be required.

The recommended pavement designs, as outlined above are provided in Table 6.

Table 6 Recommended Pavement Component Thicknesses

Pavement Component	Local Roadways No Construction Traffic Thickness (mm)	Local Roadways Construction Traffic Year 0-5 Thickness (mm)
Hot-Mix Asphalt	90	105
Granular A Base Course	150	150
Granular B Subbase Course	300	300

Prior to undertaking any pavement construction work, the roadway drainage and sub-drainage should be carefully assessed, noting that provision of proper drainage is fundamental to the performance of the roadway to mitigate frost-related movements and minimize seasonal loss of subgrade support (subgrade softening in spring). Pavements should be provided with a continuous centre-to-edge cross fall of 3 percent at top of subgrade and 2 percent for granular layers. As per Norfolk County Design Criteria, August 2017, subdrains shall be provided.

Following construction of the services and preparation of the subgrade, the pavement construction should be carried out in general accordance with Norfolk County, as follows:

- Remove/excavate any underlying subgrade materials to the design subgrade elevation;
- The prepared subgrade should be proof-rolled in the presence of a qualified representative of a geotechnical engineering firm to check for weak spots and any soft or wet spots or other obviously objectionable materials (such as organic material, construction debris, etc.) should be sub-excavated and properly replaced with suitable, approved material; and

- Construct per the selected pavement option selected above.

It is recommended that PG 58-28 be used in both the OPSS 1150 HL 8 binder course, and HL 3 surface course hot-mix asphalt layers for this project. Performance graded asphalt cement (PGAC) PG 58-28 should conform to OPSS 1101 requirements.

A tack coat is recommended between all hot mixed asphalt layers.

Appropriate quality control/quality assurance laboratory and field testing of the pavement structure components (granular base and subbase and hot-mix asphalt) should be conducted. Compaction testing of the hot-mix asphalt should be carried out at the time of placement.

Englobe recommends that the surface course hot-mix asphalt should be placed as soon as possible following placement of the binder course to ensure that the full pavement strength is available before regular traffic is allowed on the newly constructed roadway.

A joint transition treatment will be necessary where old and new pavement layers abut. Provided the existing pavement is 100 mm thick or greater, the recommended transition treatment consists of milling the old surface layer approximately 300 mm wide and 50 mm deep to provide better pavement tie-in to adjacent new asphalt pavement structure.

It is recommended that all construction joints at the ends of the pavement be cleaned with stiff bristle brooms and compressed air to remove all dust, dirt and other foreign matter. A tack coat should be applied to all construction joints prior to the placement of hot-mix asphalt to ensure an adequate bond between the old and new pavements.

Systematic routine preventative maintenance is strongly recommended for all newly reconstructed or rehabilitated pavements. Crack routing and sealing will generally be required within 2 to 3 years of rehabilitation/construction. As the pavements ages, it will also be necessary to patch areas of medium to high severity distresses (i.e. potholes, ravelling). In some cases, routine maintenance may be considered to extend the life of an existing section by several years. For example, spray patching may be carried out to retard water infiltration at edge crack locations.

All pavement construction, rehabilitation and maintenance work should only be completed during periods of favourable weather. The Englobe pavement design recommendations are contingent upon provision of a consistently competent, stable subgrade that is properly drained and free of soft spots and objectionable materials (such as organic material) and is capable of supporting the design traffic loads.

5.6 Infiltration

The hydraulic conductivity of the grain size distribution samples was assessed using those of the 15 available methods implemented in the spreadsheet “HydrogeoSieveXL ver. 2.2”, J.F. Devlin, University of Kansas, 2015, for which the samples in question met acceptance criteria. The calculated hydraulic conductivity and corresponding factored infiltration rate are provided in the following Table 7.

Table 7 Preliminary Infiltration Rates

Borehole No.	Sample No.	Hydraulic Conductivity m/sec	Infiltration Rate mm/hr
BH-02-20	SS2	3.1×10^{-8}	3
BH-04-20	SS3	6.0×10^{-9}	0.2
BH-12-20	SS1	2.7×10^{-5}	3.5

The estimated design infiltration rates are based on recommendations found in "Low Impact Development Stormwater Management Planning and Design Guide, Appendix C" published by the Toronto and Region Conservation Authority (TRCA) and the Credit Valley Conservation Authority (CVC), and the approximate relationship between hydraulic conductivity and infiltration rate. It should be noted that hydraulic conductivity and infiltration rate are distinct concepts and such, unit conversion does not apply.

However, Appendix C of TRCA/CVC, 2010 requires that the infiltration rates used to design an infiltration facility must incorporate a safety correction factor that compensates for potential reductions in soil permeability due to compaction or smearing during construction, gradual accumulation of fine sediments over the lifespan of the facility and uncertainty in measured values when less permeable soil horizons exist within 1.5 metres below the proposed bottom elevation of the infiltration facility. The minimum safety factor of 2.5 may be applied in uniform soil or if the hydraulic conductivity at the base of the proposed infiltration facility is less than or equal to the lowest hydraulic conductivity within 1.5 m of the proposed base of the facility. In any other situation, a safety factor must be selected from Table C 3 of TRCA/CVC, 2010. A safety factor of 2.5 was used for preliminary discussion.

It is recommended that additional field work and lab testing be carried out once the infiltration areas are identified.

5.7 Excavations and Dewatering

All trench excavations and excavations for foundations must comply with Ontario Regulation 213/91 (Construction Projects) under the Occupational Health and Safety Act. The predominant granular soils contacted in the boreholes would be classified as Type 3 soils (O.Reg. 213/91, s. 226(4)). Temporary cut slopes within Type 3 soil should be at a slope of 1:1 (H:V) or flatter from the bottom of the excavation as per O.Reg. 213/91, s. 234(2). The wet to saturated granular layers encountered shall be classified as Type 4 soil. Excavation side slopes within Type 4 soils must be cut from the excavation bottom at gradients of 3:1 (H:V) or flatter as per O.Reg. 213/91, s234(2). If the above-mentioned slopes are not achievable, shoring and dewatering will be required to ensure stability.

Based on the results of the geotechnical investigation, it is anticipated that groundwater will be encountered in the open excavations for the sanitary sewers at the east end of the Argyle Avenue extension. Minor to moderate inflow is expected where excavations extend up to 0.5 m below the stabilized groundwater level. It is believed that this groundwater can be controlled using a gravity dewatering system with perimeter interceptor ditches and high capacity pumps.

Excavations below 0.5 m below the stabilized groundwater may require a positive dewatering system installed by a specialist dewatering contractor to lower the groundwater level prior to excavating to maintain a safe and adequately dry excavation. An Environmental Activity and Sector Registry (EASR) or a Permit to Take Water (PTTW) is required by the MECP in the event that the daily taking of groundwater exceeds 50,000 L or 400,000 L per day, respectively.

It is recommended that several test pits be dug during the tendering stage of the project in order that prospective contractors may familiarize themselves with the soil and groundwater conditions to be contacted at the site.

It is recommended that Englobe review the final invert elevations during design to check that the recommendations provided are sufficient for the proposed works.

5.8 Pipe Bedding

The subgrade soils beneath the service pipes should comprise native soils. No support problems are anticipated for flexible or rigid pipes indirectly supported on the native soils.

Prior to installation of the services, the subgrade should be inspected by an experienced geotechnical engineer/technician. If any organic soils, loose or soft areas are encountered during inspection they should be excavated and replaced with compacted granular material such as OPSS.MUNI 1010 Granular A.

The pipe bedding for the services should be conventional Class B pipe bedding comprising a minimum 150 mm thick layer of OPSS.MUNI 1010 Granular A aggregate below the pipe invert. The bedding course may be thickened if portions of the subgrade become wet during excavation. OPSS.MUNI 1010 Granular A type aggregate should be provided around the pipe to at least 300 mm above the top, and the bedding should be compacted to 95% SPMDD. Service lines installed outside of heated areas should be provided with a minimum 1.2 m of soil cover or equivalent insulation for frost protection.

5.9 Trench Backfill

The trenches above the specified pipe bedding should be backfilled with inorganic soils that are not excessively wet placed in 200 mm thick lifts and compacted to at least 98% SPMDD. Where the service trenches enter the building, the trench backfill must be compacted as structural fill to a minimum of 100% SPMDD. Any trench backfill below a pavement structure should be compacted to 100% SPMDD within 1 m from the top of subgrade level. Based on the results of insitu moisture content tests carried out on the native overburden deposits, the materials are considered suitable for reuse as trench backfill. Organic material (topsoil) is not considered suitable for reuse as trench backfill and if encountered, shall be separated.

To minimize potential problems, backfilling operations should follow closely after excavation so that only a minimal length of trench is exposed. Care should be taken to direct surface runoff away from the excavations. Should construction extend into the winter season then backfilling operations should be planned to ensure that backfill material is kept to a minimum and ensured that frozen material is not used as backfill.

Frequent inspection and compaction testing by experienced geotechnical personnel should be carried out to examine and approve backfill material, and to verify that the specified degree of compaction has been achieved.

5.10 Construction Inspection and Testing

During construction of the new buildings, testing should be carried out for quality assurance. Soils testing for the project would include engineering site visits to confirm bearing capacity for footings for the new building. Compaction testing shall be carried out on structural fill beneath the building, foundation wall backfill, sub-slab granular fill, and service pipe bedding and trench backfill.

During the placement of concrete at the construction site, testing should be performed to determine the slump and air content of the concrete, and concrete cylinders should be cast for compressive strength testing in accordance with the requirements of CSA A23.1 and A23.2. Field sampling and testing of concrete shall be according to OPSS 904. Preparation of the test cylinders, curing, and testing should be carried out by Englobe.

Englobe maintains CCIL certified concrete laboratories in Kitchener and London, and can provide concrete sampling and testing services for the project as required. Englobe staff also provide quality testing services for building envelope, structural steel, reinforcing steel, and roofing.

6 Statement of Limitations

The geotechnical recommendations provided in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known at the time of report preparation, we recommend that we be retained during the final design stage to verify that the geotechnical recommendations have been correctly interpreted in the design. Also, if any further clarification and/or elaboration are needed concerning the geotechnical aspects of the project, Englobe should be contacted. We recommend that we be retained during construction to confirm that the subsurface conditions do not deviate materially from those encountered in the test holes and to ensure that our recommendations are properly understood.

The geotechnical recommendations provided in this report are intended for the use of the owner and its retained designer. They are not intended as specifications or instructions to contractors. Any use which a contractor makes of this report, or decisions made based on it, are the responsibility of the contractor. The contractor must also accept the responsibility for means and methods of construction, seek additional information if required, and draw their own conclusions as to how the subsurface conditions may affect their work. Englobe accepts no responsibility and denies any liability whatsoever for any damages arising from improper or unauthorized use of the report or parts thereof.

It is important to note that the geotechnical investigation involves a limited sampling of the site gathered at specific test hole locations and the conclusions in this report are based on this information gathered. The subsurface geotechnical, hydrogeological, environmental and geologic conditions between and beyond the test holes will differ from those encountered at the test holes. Also, such conditions are not uniform and can vary over time. Should subsurface conditions be encountered which differ materially from those indicated at the test holes, we request that we be notified in order to assess the additional information and determine whether or not changes should be made as a result of the conditions.

Appendix A Drawings

Drawing 1: Location Plan
Drawing 2: Site Plan



NOTES:

1-REFERENCE: © OpenStreetMap contributors (2020).

2-Drawing scale may be distorted due to file conversion and/or copying. Measurements taken from the drawing must be verified in the field.

0 100 200 300 400 500 m

SCALE 1:15000

Project

Geotechnical Investigation
Phase 3 and 4
Blue Grass Estates

Argyle Avenue, Brantford, Ontario

Title

LOCATION PLAN

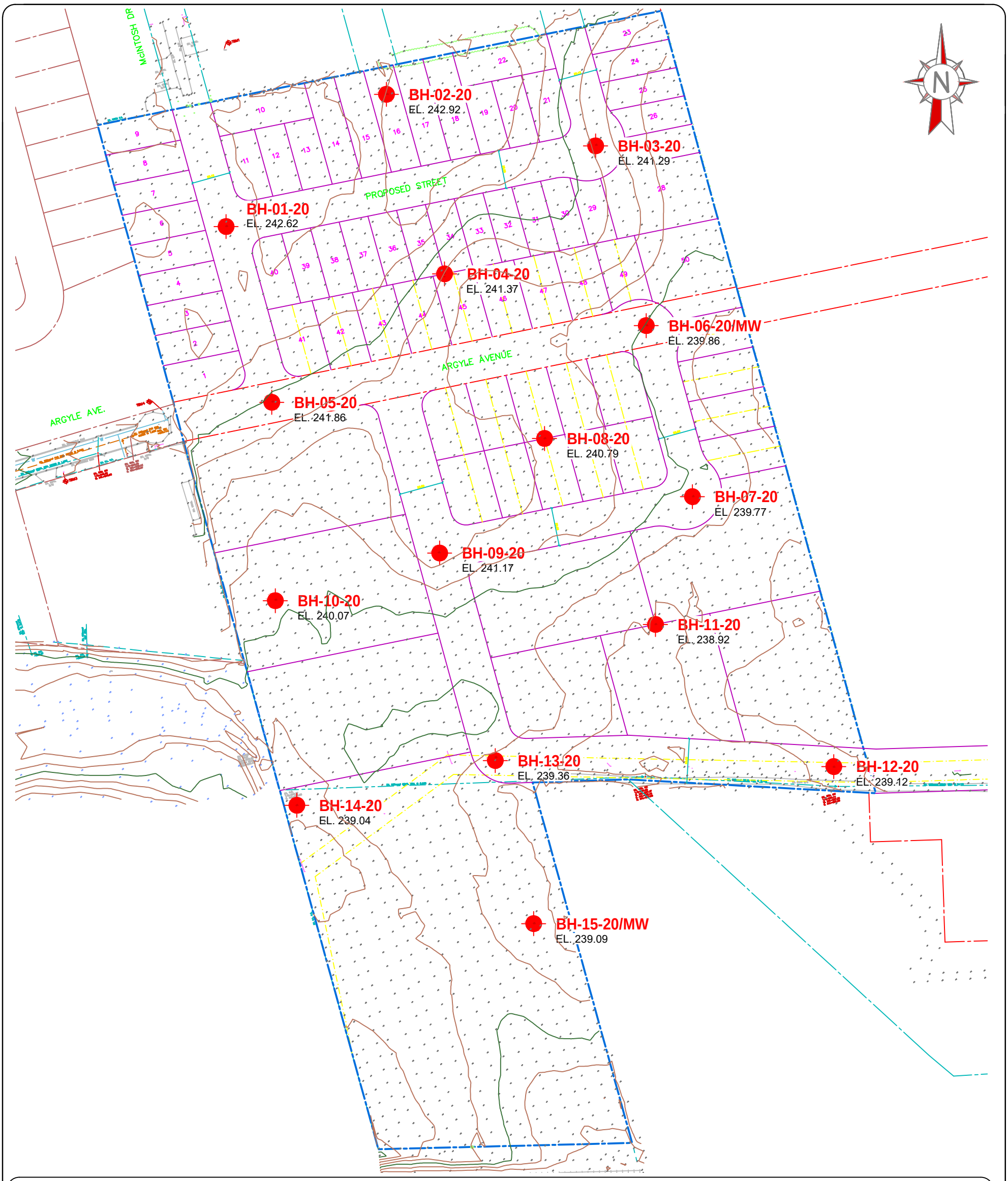
Englobe

25, Market Place
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Prepared	E.Ciochon	Discipline	GEOTECHNICAL	Project manager	T.Staples
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Checked	T.Staples	Date	2020-03-19		

M. dept.	Project	Disc.	Dwg no.	Rev.
160	P-0021310-0-01-100	GE	001	00

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LEGEND :

SITE BOUNDARY LINE

BOREHOLE LOCATION

EL. 238.39 GROUND SURFACE ELEVATION (m)

NOTES :

1-REFERENCES: J. H. Cohoon Engineering Ltd.

2-Elevations were provide by J. H. Cohoon Engineering Ltd.

3-Drawing scale may be distorted due to file conversion and/or copying. Measurements taken from the drawing must be verified in the field.

4-MW refers to monitoring well installed at borehole location.

0 20 40 60 80 100 m

SCALE 1:2000

Project

Geotechnical Investigation
Phase 3 and 4
Blue Grass Estates

Argyle Avenue, Brantford, Ontario

Title

SITE PLAN

Englobe

1821, Albion Road, Unit 7
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Prepared	E.Ciochon	Discipline	GEOTECHNICAL	Project manager	T.Staples
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Checked	T.Staples	Date	2020-03-19		

M. dept.	Project	Disc.	Dwg no.	Rev.
160	P-0021310-0-01-100	GE	002	00

10 cm 5 4 3 2 1 0

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Appendix B Borehole Logs

List of Abbreviations
Boreholes BH-01-20 to BH-15-20

LIST OF ABBREVIATIONS

The abbreviations commonly employed on the borehole logs, on the figures, and in the text of the report, are as follows:

Sample Types		Soil Tests and Properties	
AS	Auger Sample	SPT	Standard Penetration Test
CS	Core Sample	UC	Unconfined Compression
RC	Rock Core	FV	Field Vane Test
SS	Split Spoon	ø	Angle of internal friction
TW	Thinwall, Open	γ	Unit weight
WS	Wash Sample	w_p	Plastic limit
BS	Bulk Sample	w	Water content
GS	Grab Sample	w_L	Liquid limit
WC	Water Content Sample	I_L	Liquidity index
TP	Thinwall, Piston	I_p	Plasticity index
		PP	Pocket penetrometer

Penetration Resistances	
Dynamic Penetration Resistance	The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) diameter 60º cone a distance 300 mm (12 in.). The cone is attached to 'A' size drill rods and casing is not used.
Standard Penetration Resistance, N (ASTM D1586)	The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) required to drive a standard split spoon sampler 300 mm (12 in.)
WH	sampler advanced by static weight of hammer
PH	sampler advanced by hydraulic pressure
PM	sampler advanced by manual pressure

Soil Description		
Cohesionless Soils	**SPT N-Value**	**Relative Density (D_r)**
Compactness Condition	(blows per 0.3 m)	(%)
Very Loose	0 to 4	0 to 20
Loose	4 to 10	20 to 40
Compact	10 to 30	40 to 60
Dense	30 to 50	60 to 80
Very Dense	over 50	80 to 100
Cohesive Soils	**Undrained Shear Strength (C_u)**	
Consistency	**kPa**	**psf**
Very Soft	less than 12	less than 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1000
Stiff	50 to 100	1000 to 2000
Very Stiff	100 to 200	2000 to 4000
Hard	over 200	over 4000
DTPL	Drier than plastic limit	Low Plasticity, W_L <30
APL	About plastic limit	Medium Plasticity, 30 < W_L < 50
WTPL	Wetter than plastic limit	High Plasticity, W_L > 50

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Ground Elevation: *242.62 m*

Borehole Number: **BH-01-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		242.62			
	TOPSOIL: brown silt, some sand, trace gravel, moist		0.00 / 242.01			
	SAND: compact brown silty sand, trace gravel, moist		0.61 / 241.10	SS-1	8-8 10	18
	some gravel		1.52 / 240.33	SS-2	7-10 12	22
	trace gravel		2.29 / 239.57	SS-3	5-6 8	14
	sand, some silt		3.05 / 237.74	SS-4	7-9 10	19
	wet		4.88 / 237.59	SS-5	10-10 9	19
	Borehole terminated at 5.03 m		5.03			

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial / Remold

WP WL — Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 3.05 m.

Vertical Scale = 1 : 50.0

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Z:\Style_LVM_OntarioLog Borehole_Log_LVM_Ontario.sty - Printed : 2020-04-23 08 h

EQ-09-Ge-72 R.1 18.02.2011

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Ground Elevation: *242.92 m*

Borehole Number: **BH-02-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		242.92			
	TOPSOIL: brown silt, some sand, trace gravel, moist		0.00 / 242.72			
			0.20			
	SAND: brown silty sand, trace gravel, moist		242.16			
1	loose, very moist		0.76	SS-1	1-2 2	4
			241.40			
	SAND AND SILT: loose brown sand and silt, some clay, trace gravel, moist		1.52	SS-2	3-4 4	8
2			240.63			
	SAND: compact silty sand, some gravel, moist		2.29	SS-3	6-7 7	14
3			239.87			
	occasional cobbles, very moist		3.05	SS-4	11-15 13	28
4			238.35			
	trace gravel, very moist: wet layers		4.57	SS-5	9-10 11	21
5	Borehole terminated at 5.03 m		237.89 5.03			
6						
7						
8						

Dynamic Cone: 20 40 60 80
Std Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Initial
Remold
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 2.74 m.

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

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Ground Elevation: *241.29 m*

Borehole Number: **BH-03-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		241.29			
	TOPSOIL: brown silt, some sand, trace gravel, moist		0.00 / 240.98			
	SILT: loose brown silt, some sand, trace clay and gravel, very moist		0.30 / 239.77	SS-1	2-3 3	6
	SAND: compact brown silty sand, trace gravel, very moist		1.52 / 239.00	SS-2	5-8 10	18
	SILT: compact brown silt, some sand and clay, trace gravel, moist		2.29 / 238.24	SS-3	5-6 8	14
	dense		3.05 / 236.72	SS-4	9-13 20	33
	SAND: compact brown silty sand, wet to saturated		4.57 / 236.26	SS-5	6-7 10	17
	Borehole terminated at 5.03 m		5.03			

Dynamic Cone — Std Penetration — 20 40 60 80

Shear Strength (PP) kPa — Initial — Remold — Shear Strength (FV) kPa — 50 100 150 200

WP WL — Water Content (%) — 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 3.96 m.

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

Englobe

Ground Elevation: *241.37 m*

Borehole Number: **BH-04-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		241.37			
	TOPSOIL: brown silt, some sand, trace gravel, moist		0.00 241.17 0.20			
	SILT: very loose brown sandy silt, trace gravel and topsoil, moist			SS-1	2-2 2	4
	sandy silt, wet		239.85 1.52	SS-2	2-1 2	3
	compact, some sand and clay, trace gravel, moist		238.93 2.44	SS-3	4-8 9	17
				SS-4	7-9 10	19
	cobbles or boulder		237.10 4.27			
	SAND AND GRAVEL: dense brown sand and gravel, some silt, moist		236.80 4.57	SS-5	50 /25 mm	
	Borehole terminated at 4.60 m		236.77 4.60			

Dynamic Cone: 20 40 60 80
Std Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Initial
Remold
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 3.96 m.

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Z:\Style_LVM_OntarioLog Borehole_Log_LVM_Ontario.sty - Printed : 2020-04-23 08 h

Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

Englobe

Ground Elevation: *241.86 m*

Borehole Number: **BH-05-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

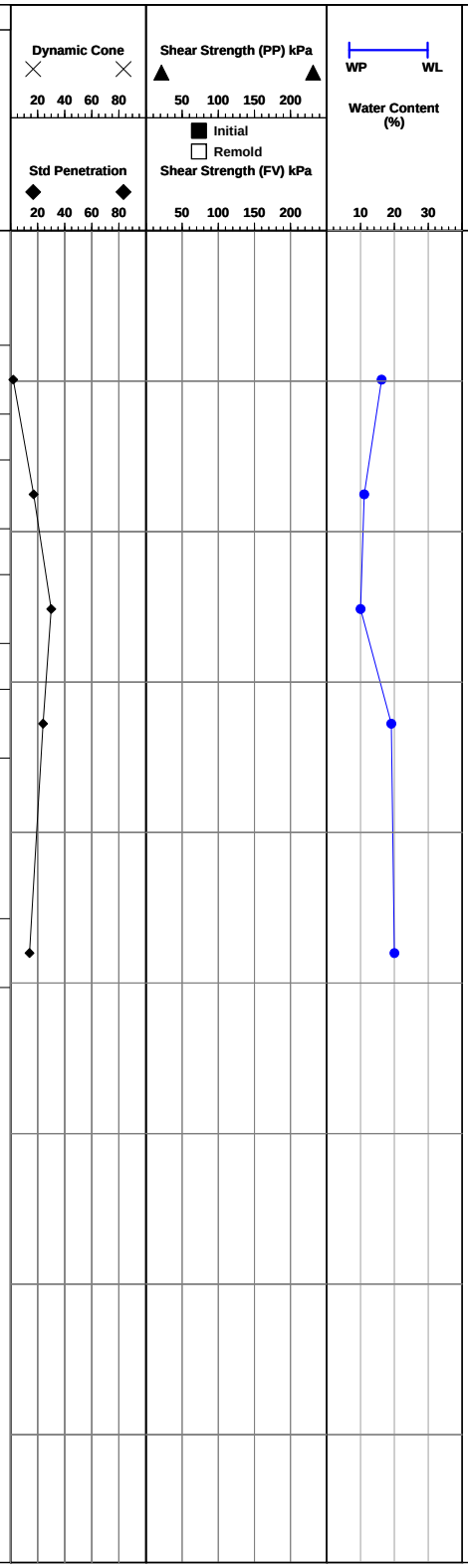
Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		241.86			
	TOPSOIL: brown silt, some sand, trace gravel, moist		0.00 / 241.66			
			0.20			
	SAND: brown silty sand, moist		241.10			
	very loose, very moist to wet		0.76	SS-1	1-1 1	2
1			240.34			
	compact, some gravel, moist		1.52	SS-2	5-7 10	17
2			239.57			
	dense, occasional cobbles, moist		2.29	SS-3	12-13 17	30
3			238.81			
	SILT: compact brown silt, some clay and sand, trace gravel, very moist		3.05	SS-4	6-12 12	24
4			237.29			
	very stiff grey/brown clayey silt, trace sand, APL		4.57	SS-5	8-6 8	14
5			236.83			
	Borehole terminated at 5.03 m		5.03			
6						
7						
8						



Groundwater Observations and Standpipe Details

native backfill

native cave

At drilling completion, dry cave at 1.83 m.

Vertical Scale = 1 : 50.0

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Z:\Style_LVM_OntarioLog Borehole_Log_LVM_Ontario.sty - Printed : 2020-04-23 08 h

Englobe

Ground Elevation: *239.86 m*

Borehole Number: **BH-06-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

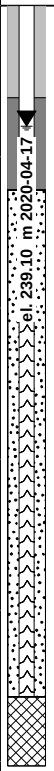
Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		239.86			
	TOPSOIL: brown silt, trace sand and gravel, moist		0.00 / 239.56			
	SAND: loose brown silty sand, trace gravel, wet		0.30 / 238.95			
1	compact, moist		0.91 / 238.34	SS-1	2-6 10	16
	some gravel, occasional cobbles		1.52 / 237.57	SS-2	9-11 13	24
2						
	gravelly sand, some silt, saturated		2.29 / 236.81	SS-3	9-15 12	27
3	***SAND AND GRAVEL:*** dense brown silty sand and gravel, saturated		3.05 / 235.29	SS-4	11-17 21	38
4						
	SAND: dense brown silty sand, some gravel, saturated		4.57 / 234.83	SS-5	13-17 19	36
5	Borehole terminated at 5.03 m		5.03			
6						
7						
8						

Dynamic Cone: 20 40 60 80
Std Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Initial
Remold
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details



Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

Englobe

Ground Elevation: *239.77 m*

Borehole Number: **BH-07-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		239.77			
	TOPSOIL: brown silt, some sand, trace gravel, moist		0.00 / 239.41			
	SAND: loose brown silty sand, moist		0.36	SS-1	4-3 3	6
1			238.25			
	compact sand, some silt, wet		1.52	SS-2	2-4 6	10
2			237.48			
	compact, saturated		2.29	SS-3	6-7 8	15
3			236.72			
	silty sand, wet to saturated		3.05	SS-4	4-10 11	21
4			235.20			
	SILT AND SAND: compact brown silt and sand, wet		4.57	SS-5	5-10 10	20
5	Borehole terminated at 5.03 m		234.74 / 5.03			
6						
7						
8						

Dynamic Cone: 20 40 60 80

Std Penetration: 20 40 60 80

Shear Strength (PP) kPa: 50 100 150 200

Initial

Remold

Shear Strength (FV) kPa: 50 100 150 200

WP WL

Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

native cvae

At drilling completion, wet cave at 1.52 m.

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

Englobe

Ground Elevation: *240.79 m*

Borehole Number: **BH-08-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		240.79			
	TOPSOIL: brown silt, some sand, trace gravel, moist		0.00 / 240.41			
	SAND: brown silty sand, some gravel, occasional cobbles, moist		0.38 / 240.03			
1	loose, very moist		0.76 / 239.27	SS-1	1-2 2	4
	compact, moist		1.52	SS-2	7-10 10	20
2				SS-3	11-11 18	29
3			237.74			
	SILT: compact brown sandy silt, some gravel, moist		3.05	SS-4	8-10 16	26
4			236.22			
	SAND: compact brown silty sand, some gravel, saturated		4.57	SS-5	7-10 10	20
5	Borehole terminated at 5.03 m		235.76 / 5.03			
6						
7						
8						

Dynamic Cone: 20 40 60 80
Std Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Initial
Remold
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, dry cave at 4.11 m.

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

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Englobe

Ground Elevation: *241.17 m*

Borehole Number: **BH-09-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		241.17			
	TOPSOIL: brown silt, some sand and gravel, occasional cobbles, moist		0.00 240.79			
	SAND: brown silty sand, some gravel, trace topsoil, very moist		0.38 240.41			
1	compact, moist		0.76	SS-1	4-5 8	13
	dense gravelly sand, some silt, moist		1.52 239.65	SS-2	10-16 20	36
2			238.88			
	SAND AND GRAVEL: dense brown sand and gravel, some silt, occasional cobbles, wet to saturated		2.29	SS-3	12-15 16	31
3						
			237.82	SS-4	22-20 16	36
	SILT: hard brown clayey silt, APL		3.35 236.60			
4						
	compact silt, some clay and sand, very moist to wet		4.57 236.14	SS-5	9-9 9	18
5	Borehole terminated at 5.03 m		5.03			
6						
7						
8						

Dynamic Cone / Std Penetration: 20 40 60 80

Shear Strength (PP) kPa / Shear Strength (FV) kPa: 50 100 150 200 — Initial / Remold

Water Content (%): WP WL — 10 20 30

Groundwater Observations and Standpipe Details

- native backfill
- bentonite seal
- native cave
- At drilling completion, wet cave 2.44 m.

Vertical Scale = 1 : 50.0

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

Englobe

Ground Elevation: *240.07 m*

Borehole Number: **BH-10-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		240.07			
	TOPSOIL: brown silt, some sand, trace gravel, very moist		0.00 / 239.82			
	SAND: loose brown silty sand, moist		0.25 / 239.31			
	very moist to wet		0.76 / 238.55	SS-1	1-2 4	6
	compact, wet to saturated		1.52 / 236.87	SS-2	3-5 6	11
				SS-3	5-8 10	18
	SILT: compact brown silt, some sand and clay, very moist		3.20 / 235.04	SS-4	6-7 10	17
				SS-5	7-8 9	17
	Borehole terminated at 5.03 m		5.03			

Dynamic Cone — Std Penetration — 20 40 60 80

Shear Strength (PP) kPa — Initial / Remold — Shear Strength (FV) kPa — 50 100 150 200

WP WL — Water Content (%) — 10 20 30

Groundwater Observations and Standpipe Details

native backfill

native cave

At drilling completion, wet cave at 1.52 m.

Vertical Scale = 1 : 50.0

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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EQ-09-Ge-72 R.1 18.02.2011

Englobe

Ground Elevation: *238.92 m*

Borehole Number: **BH-11-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		238.92			
	TOPSOIL: brown silt, some sand and gravel, occasional cobbles, moist		0.00 238.51			
	SAND: loose brown silty sand, wet		0.41 238.16			
	trace gravel, very moist		0.76	SS-1	4-5 5	10
			237.40			
	very moist to wet		1.52	SS-2	3-6 3	9
			236.48			
	very loose grey/dark brown organic silty sand, wet		2.44	SS-3	1-1 1	2
			235.87			
	compact grey silty sand, saturated		3.05	SS-4	4-8 8	16
			234.35			
	dense		4.57	SS-5	9-16 17	33
			233.89			
	Borehole terminated at 5.03 m		5.03			

Dynamic Cone — Std Penetration — 20 40 60 80

Shear Strength (PP) kPa — Initial — Remold — Shear Strength (FV) kPa — 50 100 150 200

WP — WL — Water Content (%) — 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, wet cave at 2.29 m.

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

Englobe

Ground Elevation: *239.12 m*

Borehole Number: **BH-12-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-16*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		239.12			
	TOPSOIL: brown silt, some sand, trace gravel, moist		0.00 238.92 0.20			
	SAND: brown sand, some silt, moist compact, trace silt and clay		238.36 0.76	SS-1	4-5 5	10
1	loose		237.60 1.52	SS-2	4-4 4	8
2	very moist to wet		237.29 1.83			
	silty sand, saturated		236.83 2.29	SS-3	3-2 5	7
3	compact		236.07 3.05	SS-4	10-11 12	23
4						
5			234.09	SS-5	6-11 13	24
	Borehole terminated at 5.03 m		5.03			
6						
7						
8						

Dynamic Cone: 20 40 60 80
Std Penetration: 20 40 60 80
Shear Strength (PP) kPa: 50 100 150 200
Initial
Remold
Shear Strength (FV) kPa: 50 100 150 200
WP WL
Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, wet cave at 1.98 m.

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

Englobe

Ground Elevation: *239.36 m*

Borehole Number: **BH-13-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-17*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		239.36			
	TOPSOIL: brown silt, some sand and gravel, moist		0.00 / 239.16			
			0.20 / 238.60			
	SAND: brown silty sand, some topsoil, trace gravel, moist					
1	compact sand, some silt, trace gravel, moist		0.76 / 237.84	SS-1	5-6 7	13
	silty sand, wet		1.52 / 237.07	SS-2	7-9 10	19
2	***SILT:*** compact brown sandy silt, trace clay, wet; saturated sand layers		2.29 / 234.79	SS-3	6-8 8	16
3				SS-4	3-6 7	13
4						
	SAND: compact brown sand, some silt, saturated		4.57 / 234.33	SS-5	9-11 13	24
5	Borehole treminated at 5.03 m		5.03			
6						
7						
8						

Dynamic Cone — 20 40 60 80

Std Penetration — 20 40 60 80

Shear Strength (PP) kPa — 50 100 150 200

Initial

Remold

Shear Strength (FV) kPa — 50 100 150 200

WP WL

Water Content (%) — 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, wet cave at 1.98 m.

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

Englobe

Ground Elevation: *239.04 m*

Borehole Number: **BH-14-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-17*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		239.04			
	FILL: brown silt, some sand, trace gravel and plastic, moist		0.00 / 238.79 / 0.25			
	very loose grey silty sand, some organics, plastic and paper, very moist			SS-1	2-3 1	4
				SS-2	4-5 5	10
	SAND: loose to compact grey silty sand, trace organics, very moist		237.36 / 1.68			
	compact grey/brown, wet		236.75 / 2.29	SS-3	5-6 6	12
	brown silty sand, saturated		235.99 / 3.05	SS-4	5-6 6	12
	SILT: compact brown/grey silt, some clay and sand, very moist		234.32 / 4.72	SS-5	8-8 8	16
	Borehole terminated at 5.03 m		234.01 / 5.03			

Dynamic Cone: 20 40 60 80

Std Penetration: 20 40 60 80

Shear Strength (PP) kPa: 50 100 150 200

Initial / Remold

Shear Strength (FV) kPa: 50 100 150 200

WP WL

Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

native backfill

bentonite seal

native cave

At drilling completion, wet cave at 2.44 m.

Vertical Scale = 1 : 50.0

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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EQ-09-Ge-72 R.1 18.02.2011

Englobe

Ground Elevation: *239.09 m*

Borehole Number: **BH-15-20**

Job N°: *P-0021310-0-01-100*

Drill Date: *2020-03-17*

Project: *Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates*

Field Tech: *D.Souter*

Location: *Argyle Avenue, Delhi, Ontario*

Drill Method: *Hollow Stem Auger*

Depth (m)	Description	Symbol	Elevation (m) / Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value
	Ground Elevation		239.09			
	TOPSOIL: brown silt, some sand and gravel, moist		0.00 / 238.63			
	SAND: compact brown silty sand, trace gravel, wet		0.46 / 237.57	SS-1	5-6 7	13
	saturated		1.52 / 236.80	SS-2	7-9 10	19
	SILT: compact brown sandy silt, trace clay, wet		2.29 / 236.04	SS-3	7-8 5	13
	some clay, very moist to wet		3.05 / 235.28	SS-4	5-6 8	14
	SAND: compact brown sand, some silt, saturated		3.81 / 234.06	SS-5	7-10 7	17
				SS-6	6-8 7	15
	Borehole terminated at 5.03 m		5.03			

Dynamic Cone: 20 40 60 80

Std Penetration: 20 40 60 80

Shear Strength (PP) kPa: 50 100 150 200

Initial / Remold

Shear Strength (FV) kPa: 50 100 150 200

WP WL

Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details

protective cover and concrete

bentonite seal

el. 238.23 m 2020-04-17

sand pack

30 mm pipe
3.05 m slotted screen

native cave

Reviewed by: *T.Staples*

Drafted by: *E.Ciochon*

Sheet: *1 of 1*

Notes:

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

Appendix C Laboratory Test Results

Figure 1: Particle Size Distribution

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PARTICLE SIZE ANALYSIS

Project: **Geotechnical Investigation Phase 3 and 4 - Blue Grass Estates**

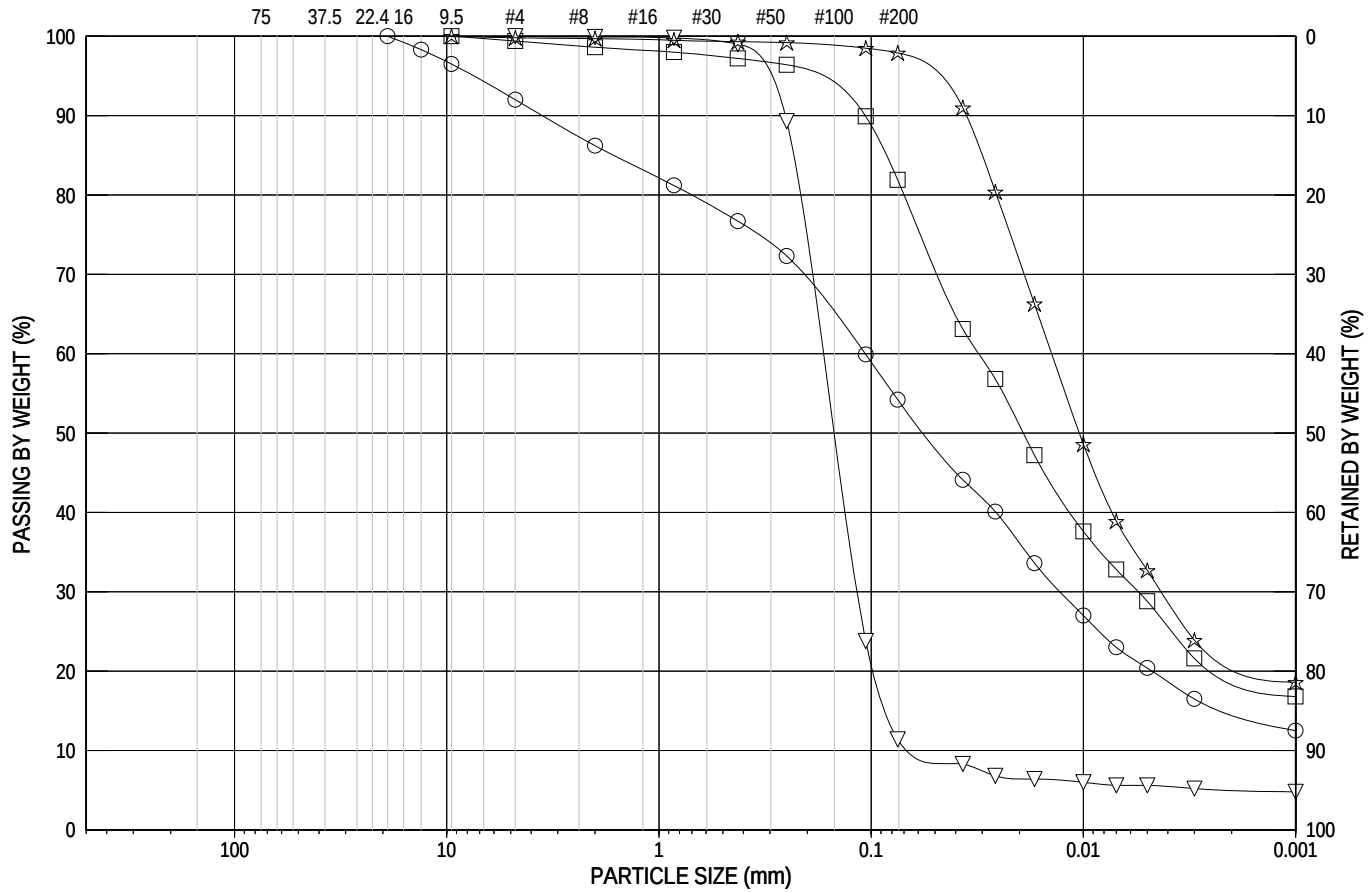
Figure No : **1**

Location: **Argyle Avenue, Delhi, Ontario**

File No : **P-0021310-0-01-100**

UNIFIED SOIL CLASSIFICATION

COBBLES	*GRAVEL*		*SAND*			*SILT OR CLAY*
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN MILLIMETRES			*U.S. STANDARD SIEVE No.*			*HYDROMETER*



Symbol	Borehole n°	Sample n°	Depth (m)	Description
○	BH-02-20	SS-2	1.52 - 1.98	SAND and SILT, some Clay, trace Gravel
□	BH-04-20	SS-3	2.29 - 2.74	SILT, some Sand and Clay, trace Gravel
▽	BH-12-20	SS-1	0.76 - 1.22	SAND, trace Silt and Clay
☆	BH-15-20	SS-4	3.05 - 3.51	Clayey SILT, trace Sand

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
440 Hardy Road, Unit #1, Brantford, ON N3T 5L8
Tel: (519) 753-2656 Fax: (519) 753-4263
www.cohooneng.com

13227

December 30, 2021

The Angrish Group
156 Charing Cross
Brantford, Ontario
N3R 2J4

Attention: Ms. R. Angrish, MPlan, B.Tech, MCIP, RPP
Co-Founder

Re: Bluegrass Estates Phase IV
Internal Investigation of Existing Fertilizer Plant
MN 1161 Fertilizer Road
Delhi, Ontario
Norfolk County

Dear Ms. Angrish:

In response to your request, our staff in conjunction with the developer (Mr. J. Jeles) has carried out a visual investigation of the operation of the existing fertilizer plant located at MN 1161 Fertilizer Road, in Delhi, Ontario as it relates to the proposed development of Bluegrass Estates Subdivision Phase IV.

The site is located south of the lands that have been acquired by Mr. J. Jeles of Jeles Design and Construction Ltd, for the purposes of a mixed-use plan of subdivision. The attached key plan prepared by our office illustrates the location of the Fertilizer Plant in relation to the proposed development. As indicated the purpose of this report is to establish the current operations of the fertilizer plant for characterization within you planning justification analysis.

The observations that were established are as follows:

Description on Factory Area / Land:
The site is approximately 5.4 hectares in size and located to the south of the proposed development. The site shown in the attached aerial photograph of the site included within this report. A portion of the site is utilized with an outdoor storage yard (Refer to Photo No. 1 below). The area is utilized for the storage of vehicles and equipment with no outside storage of product observed. (That is, the area is used for the parking of the sprayer trucks, trailers, dump truck, etc.) During our various site visits, the activities that were observed was the movement of

a small forklift and some miscellaneous vehicle noises. During the visit no noise sources from the facility were identified. The activity on the site seemed to be limited to trucks entering or leaving the property approximately every 2 hours and the movements of a small forklift moving some skids/ items around the lot. The activities related to the low noise levels of an engine running in conjunction with the standard safety back up noises. In addition, we did observe some employee (approximately 2 t o3 employees) movement on the outside of the facility with some maintenance operations occurring (light work, with no machinery or power tools being utilized) Otherwise, there are no visual or audio signs that the fertilizer plant is doing any production. No emissions from the plant were identified during the visits. Again, no evidence of obnoxious odors or equipment produced dust was identified.



Photo No. 1 – Exterior Area

Office Area:
The office building associated with the fertilizer plant operation appears to be well kept and is generally in a clean condition. The activities of the office seem to be consistent with the typical office operation with little or no noise being observed. A picture of the office area has been included within Photo No. 2 below. The traffic activities to this area of the plant seem to be restricted to light passenger vehicles and pickup trucks (likely those associated with the employees) and a single truck observed during the time of the observation. In addition, a small

Purolator truck came to the office to make a delivery. There are 14 vehicles parked around the office. Half of these were F/S work trucks.



Photo No. 2 – Office Area associated with Plant Operation

Storage Building

In addition to the plant and associated office building, a large storage building is located near Fertilizer Road. During our site visit and observations, no activities seem to be occurring around this building. Again, no visible signs of noise sources or production work were identified. No obnoxious odors were identified near or associated with this building. The storage building is identified in Photo No. 3.



Photo No. 3 – Storage Building

During the visit and subsequent to the observations the local farmer was contacted to characterize the operation at the fertilizer plant. Mr. David Van de Velde originally owned the lands of the proposed development and continues to own and operate the farm located directly north of the fertilizer plant. The farmer also lives on the property. In the conversation with Mr. Van De Velde, he indicated that there was some noise relating to the activity of the fertilizer plant but would consider it to be minimal and not a nuisance to him within his residence. The most audible noise that occurs relates to the safety reversing beeper noise on some of the equipment. The site is not operated during the nighttime period as the facility seems to be unoccupied / closed by 5:00pm. The farmer went on to indicate that during the spring, some of the sprayer machines return after dark. The noise activities for the fertilizer plant were characterized to be similar to the Municipal Yard (Norfolk County Yard) that is located at the west end of Argyle Avenue.

Mr. Van De Velde indicated that the operation of the fertilizer plant was not a nuisance to him (or other area residents) but could be mitigated with the planting of some cedar trees along the common property line.

I trust that this report will assist in your evaluation of the type of activities that are occurring on the Fertilizer Plant lands and establish the limitation of the proposed mixed-use development that is being proposed by Mr. J. Jeles on the lands that were originally owned by the Van De Velde's.

If you require any additional information, please do not hesitate to contact our office.

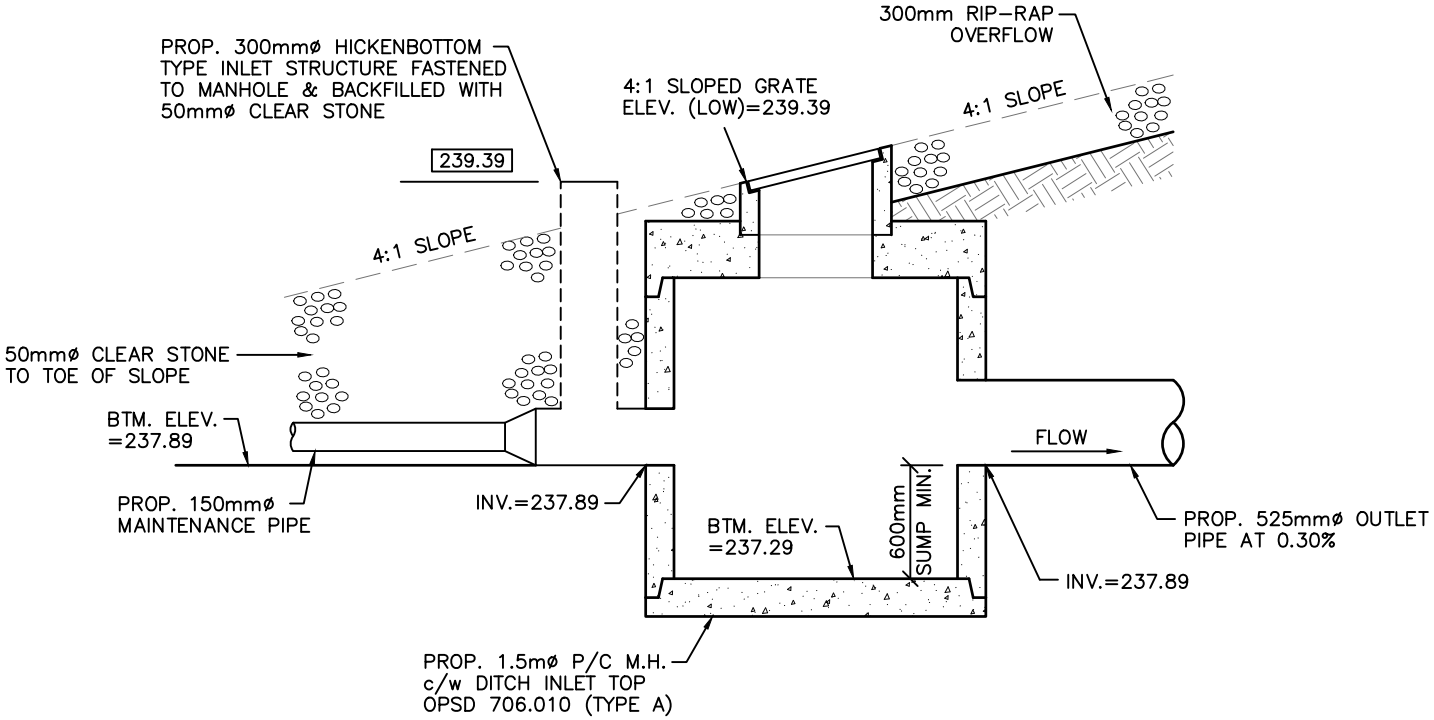
Yours truly,

J H COHOON ENGINEERING LIMITED

R. W. Phillips, P.Eng.

c.c. J. Jeles

Professional Engineers
Ontario



OUTLET STRUCTURE DETAIL

SCALE: 1:40



THE ANGRISH GROUP

32 Charing Cross Street, Brantford, ON N3R 2H2

Planning Justification Report
And
Land Use Compatibility Analysis
(D-6 and D-4 Analysis)

Official Plan Amendment and Zoning By-law Amendment

Bluegrass Estates Phase 4, Norfolk County

Prepared For: 1064928 Ontario Inc.

Prepared By: The Angrish Group

Date: November 10, 2025

File: 2021_119

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1. Introduction

The Planning Justification Report (PJR) has been prepared by The Angrish Group, on behalf of 1064928 Ontario Inc., in support of Official Plan and Zoning By-law Amendment applications required for the development of lands located south of Argyle Avenue in Delhi, Norfolk County ("Subject Lands" or "Property"), also known as Bluegrass Estates Phase 4. A Draft Plan of Subdivision will be submitted for the development pending approval of the Official Plan and Zoning By-law Amendment applications.

The Subject Lands are located within the Urban Area Boundary of the community of Delhi and are currently being farmed. No buildings or structures are located on the lands. It is proposed to develop the lands for residential, commercial and industrial use, contributing to a complete community.

The Planning Justification Report will provide an analysis of the provincial and municipal planning framework as well as a professional planning opinion related to the proposed Official Plan and Zoning By-law Amendment applications.

2. Location and Description of Subject Lands

The Subject Lands are legally described as Part Lot 22 Concession 12; South & East Part 1 37R10348; S/T easement over Part 12 on 37R5545 in the former Geographic Township of Windham, municipally known as Argyle Avenue, Norfolk County. The Subject Lands are approximately 8.2 hectares (20 acres) in size with frontage of approximately 300 metres (985 ft) along Argyle Avenue.

The Subject Lands are located at the south-eastern edge of the Urban Area Boundary of the community of Delhi, west of Simcoe and south-east of Tillsonburg, in Norfolk County. The Property is located on the south side of Argyle Avenue, west of Fertilizer Road and east of Arrowhead Way. The Property is currently being farmed, and no buildings or structures are located on the land.

There are no natural hazard or natural heritage features identified on, or adjacent to, the Subject Lands. The lands are outside the source water protection area.

The Property is adjacent to a recently approved residential subdivision to the north (Bluegrass Phase 3), employment uses to the south and west and agricultural uses to the east.

The Subject Lands are located on Argyle Avenue, which is classified as a Collector Road in Schedule E-4 Transportation in the Official Plan (2018).

Figure 1 shows the location of the Subject Lands.

Figure 1: Location of Subject Lands



The surrounding land uses are described as follows:

North – Urban Residential uses exist on the north side of Argyle Avenue, including Phase 3 of Bluegrass Estates. The housing types are predominately single-family residential.

South –Delhi Agronomy Centre Fertilizer Plant. Further south, beyond the former rail line, the use transitions to agriculture.

East - Large tracts of agricultural lands.

West – Major Public Infrastructure and industrial lands are situated west of the Subject Lands. The Major Public Infrastructure is comprised of the Delhi Roads Department Garage. Located on a portion of the industrial lands are Heidelberg Cement and the former Municipal Landfill site. The remainder of the lands are vacant.

The urban center of Delhi includes: a community arena, pharmacies, a soccer club, multiple fast-food chains and restaurants, Delhi Public School, and Delhi District Secondary School.

These uses provide various services and facilities to residents.

Figure 2 depicts the land uses surrounding the Subject Lands.

Figure 2: Surrounding Land Uses



Figure 3 shows the frontage of the Property from Argyle Avenue.

Figure 3: Street View from Argyle Avenue Looking South-East



Street View from Argyle Avenue Looking South



Proposed Maria Lane at Fertilizer Road



3. History of Project

A request for redesignation of the Subject Lands was submitted for County staff's consideration in January 2022. The request involved changing the land use designation of approximately 2.47 hectares (6.1 acres) of employment designated lands (Protected Industrial) to Urban Residential. This would allow a wide range of residential uses to cater to the increasing housing demand in the community and offer a gentle transition between the existing industrial and residential uses. The remaining 5.73 hectares (14.2 acres) was proposed to be redesignated from Protected Industrial to General Industrial to continue a range of employment uses. **Figure 4** shows the proposed request.

The owners of Bluegrass Estates have been long standing community members and have contributed immensely to Norfolk County's growth and development. Recently approved Bluegrass Phase 3 residential plan of subdivision, located immediately north of the Subject Lands, has been a huge success, providing housing options in the community, while enhancing the infrastructure in the surrounding area. As part of the Phase 3 subdivision, the owners negotiated an extension of Argyle Avenue with County staff and the new proposed road ("Maria Lane") is to be extended through the Subject Lands.

Figure 4: January 2022 Redesignation Request



The reasons for the request are outlined below:

- Changes to Employment Designations no longer require Municipal Comprehensive Reviews under the Provincial Planning Statement, 2024. Future changes to Norfolk County Official Plan will be required to implement the new PPS that came in effect on October 20, 2024.
- County Council approved a request to redesignate a portion of the lands (2.47 ha/6.1 ac) for residential uses through Grow Norfolk Municipal Comprehensive Review study.
- Strong housing demand in the community, and provincial directions to provide housing in shovel-ready communities. During Bluegrass Phase 3, services were extended to cater to the existing and future needs of the area, including the Subject Lands.

- The Subject Lands are located on a Collector Road and approximately 40KM from the closest interchange to Provincial Highway 403. The Subject Lands are not adjacent to major goods transportation corridors, hence are not considered significant industrial protected areas in accordance with provincial directions.
- Land use conflict is present due to the existing residential area (**Figure 5**), creating compatibility issues in providing heavy industrial uses across from a residential neighbourhood. The General Industrial designation will allow softer transitions from sensitive land uses, while protecting future employment uses in the area.
- Further, Argyle Avenue consists of a wide range of commercial, light industrial and residential uses. Heavy truck traffic resulting from currently permitted uses within the Protected Industrial designation such as manufacturing, transportation terminals, research and development, pharmaceutical industries or warehousing will create land use compatibility issues, and will not be able to meet the Land Use Compatibility Guidelines established by the Ministry of Environment, Conservation and Parks ("D-6 Guidelines"), hence leaving the parcel of land undeveloped due to these challenges.

Figure 5: Residential Subdivisions in the surroundings



The proposed development does not remove the entirety of the lands from employment use; however, it provides an opportunity for balanced land uses in the area given the existing context. The development will provide appropriate buffers between sensitive and more intense land uses, and it will provide for the extension of municipal infrastructure through the Phase 4 lands.

The request for the redesignation of 2.47 ha (6.1 ac) from Protected Industrial to Residential was approved by Council in the new proposed Official Plan, 2024. The Ministry of Municipal Affairs and Housing provided a decision on the new Official Plan, 2024 on September 5, 2025 and withheld decision on this parcel, amongst others. As such, the proposed development will require an Official Plan Amendment to allow residential uses and a redesignation from Protected Industrial to Industrial. A Zoning By-law Amendment will also be required. Pending the approval of the Official Plan and Zoning By-law Amendment applications, a Draft Plan of Subdivision will be submitted in association with the proposed development.

4. Proposal

The purpose of this Planning Justification Report is to provide policy analysis to support the proposed Official Plan and Zoning By-law Amendments to allow the development of the Subject Lands. Pending the approval of the Official Plan and Zoning By-law Amendment applications, a Draft Plan of Subdivision will be submitted for the development.

The Official Plan and Zoning By-law Amendment applications propose to redesignate and rezone the Subject Lands to Residential, Commercial and Industrial. The design goal of the development is to create an opportunity for more homes and growth within Delhi, while sensitively transitioning between the General Industrial use south of the Property to residential use at the northern extent of the proposal and beyond. Housing demand is strong in the community and during approvals for Bluegrass Phase 3, just north of the Subject Lands, provisions were made to extend services to address the existing and future needs of the area.

The proposal provides an opportunity for balanced land use in the area given the existing off-site uses, providing appropriate buffers, and extending the municipal infrastructure through the Bluegrass Phase 4 lands. The proposal is within the existing Urban Area Boundary of Delhi.

4.1. Pre-Consultation Meeting

As required by the Norfolk County Official Plan, a pre-consultation meeting with Norfolk County staff was held on February 12, 2025, to discuss the proposed development. The following items were requested by County staff for a complete application submission for the Official Plan and Zoning By-law Amendments:

- Applications for Official Plan Amendment and Zoning By-Law Amendment
- Draft Official Plan Amendment by-law and schedule
- Draft Zoning By-law Amendment by-law and schedule
- Survey/Legal Plan
- Site Plan
- Archeological Assessment
- Planning Justification Report
- Land Use Compatibility Study (included as part of the Planning Justification Report)
- Functional Servicing Report
- Water Modelling
- Sanitary Modelling
- Storm Water Management Design Report
- Traffic Impact Study

The requested information has been included in this submission. Furthermore, a preliminary Landscaping Plan and an On-Street Parking Plan have also been included.

Additional technical information will be provided during the Draft Plan of Subdivision and detailed design process.

4.2. Proposed Development

The Subject Lands are located adjoining the built-up area and within the Urban Area Boundary of Delhi. There are a range of small-scale commercial, employment, institutional and recreational uses located within the immediate surroundings.

The proposal involves an Official Plan Amendment to redesignate the lands from Protected Industrial to Urban Residential, Commercial and Industrial as well as a Zoning By-law Amendment to rezone the lands from Development (D) zone to Urban Residential Type 2 (R2), Neighbourhood Commercial (CN) and Light Industrial (ML) zone. Future road connections have been depicted to ensure the lands to the east and south of the Subject Lands have an opportunity to connect during future applications. The proposed development connects to the adjoining existing neighbourhood and provides logical extension of the infrastructure (roads, water and wastewater services and stormwater management pond).

The Subject Lands are designated Protected Industrial in the Norfolk County Official Plan (2018). As part of the Official Plan update exercise being undertaken by the County, the

designation of 2.47 hectares (6.1 acres) of the Subject Lands was changed from Protection Industrial to Urban Residential in the Adopted Official Plan. The Official Plan update was approved by the Ministry of Municipal Affairs and Housing on September 5, 2025, though the Ministry withheld decisions on a few parcels, including the Subject Lands. As such, the current proposal requires an Official Plan Amendment to redesignate the Subject Lands from Protected Industrial to Residential, Commercial and Industrial. This would result in approximately 2.47 hectares (6.1 acres) of Residential lands, 0.61 ha (1.5 acres) Commercial, 0.91 ha (2.25 acres) of Stormwater Management Block and 3.84 hectares (9.5 acres) Industrial. A commercial block is being proposed to provide softer land use transitions between the existing residential uses to the north of Argyle Avenue and the employment uses that exist on the west side of the subject lands. A 6.0 metre landscaping buffer is also proposed between the proposed residential and industrial blocks to provide additional buffers. The proposed amending by-law is attached to this Report as **Appendix A**.

The Property is currently zoned Development (D) and Development – Holding (D(H)) in the Norfolk County Zoning By-Law 1-Z-2014. The Holding (H) provision shown on the site applies to a future road connection to Fertilizer Road. The Development (D) zone does not permit the proposed development; hence a Zoning By-law Amendment application is required. The proposed amendment would place the lands in three (3) distinct zones: an Urban Residential Type 2 (R2) Zone, a Neighbourhood Commercial (CN) Zone and a Light Industrial (ML) Zone. Stormwater management services are permitted in all zones as per Section 3.33 of the County Zoning By-Law. The proposed zones will facilitate transition of the local landscape between industrial uses at the south and existing residential subdivisions at the north. The proposed amendment by-law is attached to this Report as **Appendix B**.

As illustrated on the conceptual plan (**Figure 6**), 10 semi-detached dwellings and 28 single-detached dwellings are proposed on municipal services. Further, one (1) neighbourhood commercial block, one (1) stormwater management block and three (3) light industrial blocks are proposed along with new streets that will be designed in accordance with the County's standards. Further information regarding the Draft Plan of Subdivision will be submitted pending approval of the Official Plan and Zoning By-law Amendment applications.

The proposed development supports a complete community by providing housing, supporting services, infrastructure and employment for the Urban Area of Delhi.

Figure 6: Conceptual Plan



The site is located south of Argyle Avenue, which is classified as a Collector Road on the Official Plan Schedule 'E-4-Transportation'. The potential extension of Argyle Avenue, as depicted on Schedule 'E-4', has been negotiated by the landowner and the County and will traverse the Phase 4 lands. The road identified as Street 'A' (named Maria Lane) in **Figure 6** above, will connect the lands through to Fertilizer Road at the east. The registration of Phase 3 of the subdivision is dependent on the construction of Maria Lane, including extension of municipal infrastructure through these Phase 4 lands. The County has budgeted for the improvements within the current capital budget which is intended to assist with construction.

Two new public road connections are proposed on Argyle Avenue to service the Subject Lands. The road network is designed to accommodate future development of the adjoining lands (owned by others) to the east and to the south. The extension of Maria Lane is designed to allow for a future extension of the street to Fertilizer Road at the east. The extension of Maria Lane will connect future development lands within the Urban Area Boundary of Delhi. Temporary turning circles are proposed until the extension of street

pattern is constructed by others. The proposed internal roadways are 20.0 metres in width, in keeping with the Official Plan (2018) criteria for Local Roads. A Traffic Impact Study has been completed to support the location of new streets, and the width of streets which are in accordance with the County's Development and Engineering Standards.

Resident parking will be provided on each residential lot in private garages and driveways. The lot layout will allow for more than two parking spaces in the driveways, between private garages and the roadways. Additional on-street parking measures and traffic calming options will be provided throughout the development, further details of which will be included in the Draft Plan of Subdivision and detailed design.

On-site parking will also be provided on the Commercial and Industrial lands in accordance with the parking requirements associated with the proposed use. Additional details will be provided through a future Draft Plan of Subdivision and site plan control applications.

Stormwater will be directed to the south-west corner of the site to a stormwater management pond, which is adjoining an existing County owned stormwater infrastructure, to ensure comprehensive use and efficient expansions of municipal infrastructure.

The lands are located within the Delhi Urban Area, providing necessary amenities and facilities to the future residents. These amenities include parks, community center, elementary and secondary schools, local grocery store and fire station. Additionally, a neighbourhood commercial block and light industrial blocks are proposed to enhance the job opportunities in the Urban Area while providing necessary amenities and services. The proposed commercial and light industrial lots are situated along the western and southern edges of the residential component to provide a transition from the existing, more intense, off-site industrial development. Further details of the proposed lotting of the Subject Lands will be included as part of a future Draft Plan of Subdivision application.

The development will be serviced via municipal water and sanitary systems, which will be extended to this area during Phase 3 of Bluegrass. The extension of services contemplated the development of the Subject Lands and thus were designed with sufficient capacity for the proposed development. The County has budgeted for the improvements within the current capital budget which is intended to assist with the construction.

The applications are supported by civil engineering drawings and technical reports which provide specific servicing, stormwater management and grading details to demonstrate the viability of the development.

An Archaeological Assessment has been completed to ensure there is no impact on cultural resources.

The development provides housing, commercial and light industrial opportunities within a designated area of the County. Further, the land use transition proposed in the development

provides a scaling down of the more intense off-site uses to the existing sensitive residential neighbourhoods to the north.

The technical analysis requested during pre-consultation meeting has been included with the applications.

5. The Policy Context

The applications are subject to the provisions of the Planning Act, as amended. All Planning Act applications are evaluated to ensure the proposed development is consistent with the Provincial Planning Statement (2024) and is in conformity with the municipal Official Plan. This section demonstrates the proposed Official Plan Amendment and Zoning By-Law Amendment applications are consistent with, and conform to, the applicable provincial and local planning policy framework.

5.1. Planning Act (1990)

The Planning Act, R.S.O. 1990 sets out the legislative framework for land use planning in Ontario and provides the authority for the Minister of Municipal Affairs and Housing to issue policy statements and plans to guide land use planning and redevelopment in the province. The Act also sets out the legislative framework for local land use planning tools and plans, including Official Plans, Zoning By-laws and Site Plan Approvals.

Section 2 of the Planning Act sets out various Matters of Provincial Interest which the Minister, the council of a municipality, a local board, a planning board and the Tribunal, in carrying out their responsibilities under this Act, shall have regard to. These matters are:

a) the protection of ecological systems, including natural areas, features and functions;
b) the protection of the agricultural resources of the Province;
c) the conservation and management of natural resources and the mineral resource base;
d) the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest;
e) the supply, efficient use and conservation of energy and water;
f) the adequate provision and efficient use of communication, transportation, sewage and water services and waste management systems;
g) the minimization of waste;
h) the orderly development of safe and healthy communities;

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

i) the adequate provision and distribution of educational, health, social, cultural and

recreational facilities;

j) the adequate provision of a full range of housing, including affordable housing;
k) the adequate provision of employment opportunities;
l) the protection of the financial and economic well-being of the province and its municipalities;
m) the co-ordination of planning activities of public bodies;
n) the resolution of planning conflicts involving public and private interests;
o) the protection of public health and safety;
p) the appropriate location of growth and development;
q) the promotion of development that is designed to be sustainable, to support public transit and to be oriented to pedestrians;
r) the promotion of built form that,

(i) is well-designed,

(ii) encourages a sense of place, and

(iii) provides for public spaces that are of high quality, safe, accessible, attractive and vibrant;

s) the mitigation of greenhouse gas emissions and adaptation to a changing climate.

The proposed Official Plan and Zoning By-law Amendments have regard to the matters of provincial interests by promoting new developments on a currently undeveloped site. The site is located in an Urban Area of Norfolk County, making it ideal for growth. The development is well designed and in accordance with the surrounding lands, encouraging a sense of place and contributing to a safe and healthy community.

The proposal has regard to matters of Provincial Interest under the Planning Act for the following reasons:

- ***The proposal directs growth to an Urban Area, promotes a built-form that is well designed and in accordance with the developments surrounding the lands, encourages a sense of place and promotes a safe and healthy community;***

- ***The proposal protects the natural environment and creates an open space stormwater management block for future enjoyment of natural systems for residents;***

- ***The proposal makes efficient use of existing and proposed infrastructure;***

- ***Archaeological assessments have been completed ensuring no impact on cultural resources;***

- ***The development proposes a range of uses including residential, industrial and commercial. The proposed roads and blocks will subsequently be dedicated to the County of Norfolk as part of the registration of a future subdivision on the Subject Lands;***

- ***The proposal provides road connections for the future development lands to the south and east, and is compatible with existing lots adjacent to the Subject Lands;***

- ***The proposal makes efficient use of land, infrastructure and services as well as providing a measured transition between the existing industrial use to the south and west and the existing residential use to the north.***

Section 3 requires that, in exercising any authority that affects a planning matter, planning authorities "shall be consistent with the policy statement" issued under the Act and "shall conform with the provincial plans that are in effect on that date, or shall not conflict with them, as the case may be."

The proposed development aligns with the matters of Provincial Interest as depicted throughout this Report.

Section 22 and 34 sets legislative requirements for Official Plans and Zoning By-laws and amendments respectively.

The proposed Official Plan and Zoning By-law Amendment applications align with the framework and interest of the Planning Act by promoting the orderly development of safe and healthy communities, the appropriate location of growth and development as well as the adequate provision of a full range of housing.

The proposal is located within the Urban Area Boundary that is identified for growth in the County's Official Plan.

The proposal is in an appropriate location for growth and development as it is located on an undeveloped site within the Urban Area Boundary of Delhi. The site is a natural progression of growth within this area as infrastructure has recently been extended in association with the adjacent development to the north. The Subject Lands do not contain, nor are they adjacent to, identified natural heritage features.

A stormwater management (SWM) pond is proposed in the development to meet the servicing needs of the neighbourhood.

High-quality architectural design will be incorporated in the development to complement and enhance the existing character of the surrounding neighbourhood.

The proposal conforms to the policy direction in the Norfolk County Official Plan as well as the intent of the Zoning By-law and is efficient use of land, existing municipal infrastructure and services located in and around the Subject Lands.

It is my professional opinion that the proposed development has regard for the "Matters of Provincial Interest" as required by the Planning Act, 1990.

5.2. Provincial Planning Statement (2024)

The Provincial Planning Statement, 2024 (PPS) is issued in accordance with Section 3 of the Planning Act and came into effect on October 20, 2024. Section 3 of the Planning Act requires that decisions affecting planning matters "shall be consistent with" the PPS.

The PPS provides policy direction on matters of provincial interest related to land use planning and development in Ontario and sets the policy foundation for regulating the development and use of land. The PPS encourages efficient development patterns that support sustainability by promoting strong, livable, healthy, and resilient communities, protecting the environment and public health and safety, and facilitating economic growth. The wise use and management of natural heritage resources, water resources, agricultural resources, mineral resources, and cultural heritage and archaeological resources over the long term are key provincial interests.

Ontario will increase the supply and mix of housing options, addressing the full range of housing affordability needs. Every community will build homes that respond to changing market needs and local demand. Providing a sufficient supply with the necessary mix of housing options will support a diverse and growing population and workforce, now and for many years to come.

Chapter 2: Building Homes, Sustaining Strong and Competitive Communities promotes a mix of housing options and densities to meet projected needs of current and future residents. This includes all types of residential intensifications, promoting densities for new housing which efficiently use land, resources, infrastructure and public service facilities, and support the use of active transportation. Further, planning authorities shall promote economic development and competitiveness by providing a mix and range of employment uses to meet long-term needs as well as mixed-use development to support the achievement of complete communities.

The Subject Lands are located within the Urban Area Boundary for the community of Delhi, in Norfolk County. Delhi is recognized as an important urban community, employment, cultural and agricultural support centre for the County. A full range of housing types is promoted in the Delhi Urban Area.

The Subject Lands are designated Protected Industrial in the Norfolk County Official Plan (2018). As part of the Grow Norfolk Municipal Comprehensive Review Study (Official Plan update) being undertaken by the County, the designation of 2.47 hectares (6.1 acres) of the Subject Lands was proposed to be changed from Protected Industrial to Urban Residential. The designation of the remainder of the lands, approximately 5.73 hectares (14.2 acres), was proposed to be changed from Protected Industrial to General Industrial. The Ministry of Municipal Affairs and Housing provided a decision on the new Official Plan, 2024 on September 5, 2025 and withheld decision on the Subject Lands, amongst others. As such, the proposed development requires an Official Plan and Zoning By-law Amendment.

The proposed Urban Residential Designation is expected to accommodate attractive neighbourhoods which will provide for a variety of residential forms as well as neighbourhood facilities. A variety of housing types are needed to meet the needs of a diverse population.

The proposal will provide for efficient use of land, compatible and in keeping with the character of the surrounding developments. The surrounding area predominantly consists of single-detached and semi-detached dwellings, with a similar mix proposed for the residential component of the development. The residential component of this development will allow for additional housing options and complements the current surroundings. The development of the Subject Lands is compatible with the area.

The Property is well situated to a variety of daily uses including Delhi Public School (2.1 km), Saint Frances Cabrini School (1.3 km) and Delhi District Secondary School (1.4 km), Norfolk County Public Library (2.1 km) and a grocery store (2.2 km). Delhi Community Area is 2.8 km from the Subject Lands and a variety of commercial businesses are located 1.3 km west of the site.

The proximity to existing employment and commercial areas, as well as the inclusion of light industrial and a commercial block, provides job opportunities for future residents as well as decreased reliance on automobiles. The inclusion of a variety of uses in the proposed development supports the creation of a complete community.

The variety of land uses in the local landscape culminates in the successful transition of heavier to more sensitive land uses as achieved in the proposed development. South of the Subject Lands is the Delhi Agronomy Centre, west is the Delhi Roads Department Garage and the Heidelberg Materials Concrete Supplier and north is a residential neighbourhood. The mix of uses proposed in the development provides much needed land uses in the Delhi community while also evolving across the local area to create a cohesive tapestry of mixed-uses that speaks to the varied land use context in which the site is located.

Chapter 2.8: Employment promotes economic development and competitiveness.

The Provincial Planning Statement (2024) no longer require a Municipal Comprehensive Review be undertaken in association with changes to lands designated Employment as was required in the Provincial Policy Statement (2020). As such, the proposed redesignation of the Subject Lands from Protected Industrial to Urban Residential, Commercial and General Industrial is appropriate through an Official Plan Amendment application.

The Subject Lands are located on a Collector Road and approximately 40 kilometres from the closest interchange to Provincial Highway 403. The Subject Lands are not adjacent to major goods transportation corridors and hence are not considered significant industrial protected areas in accordance with provincial direction.

The proposed development addresses inherent land use compatibility issues adjacent to existing employment uses by providing an appropriate transition to sensitive land uses. The proposed Commercial and Industrial designations will allow for a softer transition to the existing residential area to the north of the Subject Lands, while protecting future employment uses and buffering existing employment uses in the area.

Through the Ministry of Municipal Affairs and Housing review of Norfolk County Official Plan Amendment 163 (OPA 163), 11 modifications were made to ensure consistency with the policies of the PPS, 2024. Removal of reference to the requirement for comprehensive reviews was one such modification to bring OPA 163 in line with the policies contained in PPS, 2024.

Chapter 3: Infrastructure and Facilities promotes the efficient use and optimization of existing municipal sewage services and municipal water services.

Previous extensions of municipal infrastructure, including municipal water and sanitary, were designed with the servicing of the Subject Lands in mind. As such,

the proposed development will promote efficient use and optimization of municipal services.

Chapter 4: Wise Use and Management of Resources details protection of natural features and areas for the long term.

No natural heritage or natural resources exist on the Subject Lands. As such, the proposed development will not interfere with the wise use and management of resources.

Chapter 5: Protecting Public Health and Safety directs development away from areas of natural or human-made hazards where there is an unacceptable risk to public health or safety or of property damage, and not create new or aggravate existing hazards.

The proposed development will not cause environmental or public health and safety concerns. The proposal will conform to the requirements of the Ontario Building Code and Fire Code, details of which will be provided at the time of the Building Permit process. Further, no natural hazards exist on, or adjacent to, the Subject Lands.

The proposal is within the intensification policies of the Official Plan and is able to be supported by existing and anticipated future extension of municipal services.

It is my professional opinion that the proposed Official Plan Amendment and Zoning By-Law Amendment applications are consistent with the Provincial Planning Statement (2024).

5.3. Land Use Compatibility Guidelines (1995)

The Ministry of Environment, Conservation and Parks (MECP) produced guidelines (D-Series) in the 1990s to guide and direct municipalities when they are assessing land use compatibility during the development of Official Plan policies and for establishing setback distances in Zoning By-laws.

5.3.1. D-6 Analysis

The objective of the Guideline D-6 (the 'D-6 Guideline') - Compatibility between Industrial Facilities and Sensitive Land Uses to prevent or minimize the encroachment of sensitive land use upon industrial land use and vice versa.

The Subject Lands are located in the Urban Boundary of Delhi. The surrounding land uses comprise of:

North – Urban Residential uses exist on the north side of Argyle Avenue, including Phase 3 of Bluegrass Estates. The housing types are predominately single-family residential.

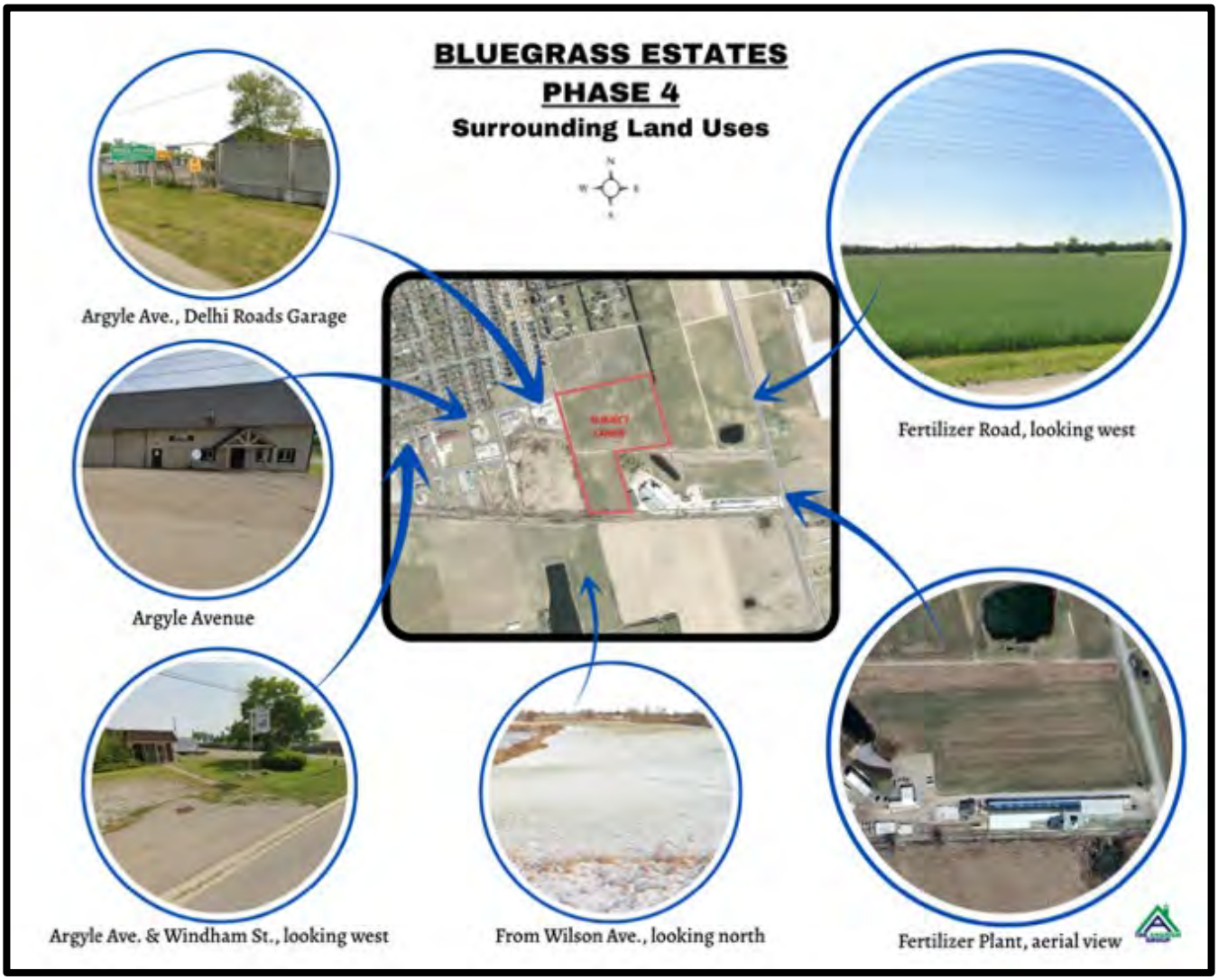
South –Delhi Agronomy Centre Fertilizer Plant. Further south, beyond the former rail line, the use transitions to agriculture.

East - Large tracts of agricultural lands.

West – Major Public Infrastructure and industrial lands are situated west of the Subject Lands. The Major Public Infrastructure is comprised of the Delhi Roads Department Garage. Located on a portion of the industrial lands are Heidelberg Cement and the former Municipal Landfill site. The remainder of the lands are vacant.

Figure 7 depicts the land use surrounding the Subject Lands.

Figure 7: Surrounding Land Uses



The proposal involves an Official Plan Amendment to redesignate the lands from Protected Industrial to Urban Residential, Commercial and Industrial as well as a Zoning By-law Amendment to rezone the lands from Development (D) zone to Urban Residential Type 2 (R2), Neighbourhood Commercial (CN) and Light Industrial (ML) zone.

The proposed development addresses inherent land use compatibility issues adjacent to existing employment uses by providing an appropriate transition to sensitive land uses. The proposed Commercial and Industrial designations will allow for a softer transition to the existing residential area to the north of the Subject Lands, while protecting future employment uses and buffering existing employment uses in the area. A 6-meter landscaping strip has also been included between the proposed residential and industrial blocks to provide additional transition and buffers between these land uses.

The D-6 Guideline categorizes industrial facilities into three (3) classes according to their size, volume of operations, and nature of their emissions and defines sensitive land use. The D-6 Guideline provides definitions and examples to illustrate the three (3) Industrial Classes as:

- Class I Industrial Facility

A place of business for a small-scale, self-contained plant or building which produces/stores a product which is contained in a package and has low probability of fugitive emissions. Outputs are infrequent and could be point source or fugitive emissions for any of the following: noise, odour, dust and/or vibration. There are daytime operations only, with infrequent movement of products and/or heavy trucks and no outside storage.

- Class II Industrial Facility

A place of business for medium-scale processing and manufacturing with outdoor storage of wastes or materials (i.e. it has an open process) and/or there are periodic outputs of minor annoyance. There are occasional outputs of either point source or fugitive emissions for any of the following: noise, odour, dust and/or vibration, and low probability of fugitive emissions. Shift operations are permitted and there is frequent movement of products and/or heavy trucks during daytime hours.

- Class III Industrial Facility

A place of business for large scale manufacturing or processing, characterized by: large physical size, outside storage of raw and finished products, large production volumes and continuous movement of products and employees during daily shift operations. It has frequent outputs of major annoyance and there is high probability of fugitive emissions.

Investigation of existing industrial uses adjacent to the Subject Property, including the County Works Yard and former municipal disposal site to the west and the Fertilizer Plant to the south, have determined the uses are Class I Industrial Use as defined in the D-6 Guidelines. The former landfill site has not been operational for many years however an analysis needs to be completed to ensure no negative impact on the sensitive residential uses.

The uses are deemed Class I as there is no open storage on site, no machinery is present outside creating noise concerns, and a very low number of vehicle movements (3-4 trucks per day) were observed. There are no operations at either facility after 5 PM on a daily basis. No manufacturing occurs on any of these lands.

The D-6 Guideline defines a recommended minimum separation distance and potential influence area between industrial facilities and sensitive land uses for each class.

Table 3 below provides the distance requirements for the variety of uses.

Table 3 - Recommended Minimum Separation Distance and Potential Influence Areas for Industrial Land Uses

INDUSTRIAL CLASSIFICATION	RECOMMENDED MINIMUM SEPERATION DISTANCE (m)	POTENTIAL INFLUENCE AREA (m)
Class I – Light Industrial	20	70
Class II – Medium Industrial	70	300
Class III – Heavy Industrial	300	1,000

As shown on Map 8 below, a large number of properties surrounding the site are zoned Residential, Open Space, General Industrial, Disposal Industrial, and Future Development Zone.

Figure 8: Zoning By-Law Excerpt



MG is a General Industrial Zone. This category allows the following permitted uses:

- ***a) ambulance service***
- ***b) animal hospital***
- ***c) auction centre***
- ***d) bus terminal***
- ***e) call centre***
- ***f) Cannabis Production and Processing***
- ***g) construction shop***
- ***h) contractor's yard***
- ***i) crematorium***

j) fire hall

k) food processing, excluding abattoir

l) general material manufacturing

m) graphics and design

n) industrial supply

o) material processing, excluding asphalt plant, cement works and concrete batching

p) merchandise service shop

q) office, industrial, accessory to a permitted use

r) personal & health services for employees, accessory to an industry on the same lot

s) research and development facility

t) retail sales accessory to an industry on the same lot

u) storage

v) taxi terminal

w) telecommunications and data processing

x) trade school

y) transportation

z) vehicle services & repair, including automobile body shop & industrial garage

aa) wholesale outlet.

In addition to the uses permitted in the MG Zone, a place of assembly including such uses as trade shows and exhibitions shall also be permitted.

MD Zone is a Disposal Industrial Zone that allows municipal disposal area including incineration, baling, compacting and separation, municipal sanitary land fill site, public utility yard, salvage yard and waste recycling facility.

D is a Development Zone which is for future development of the lands and only allows current and existing land uses.

R2 and R1A are residential zone categories that allow range of dwelling types including single detached, semi-detached and duplex dwellings. Further, home child care centres are also allowed.

A Zone is agricultural zone category that permits wide range of agricultural, agricultural-related and on-farm diversified uses.

OS Zone is Open Space Zone and permits recreational land uses.

Based on the review of this area, majority of the area is surrounded by residential zoned properties. Agricultural area surrounds the site to the east and further south. Industrial zoned properties are located adjacent to the Subject Lands to the west. A review of these industrial uses currently existing in the neighbourhood or zoned for future uses conclude that these can be classified as Class 1 Industrial Uses as these do not include medium to heavy manufacturing.

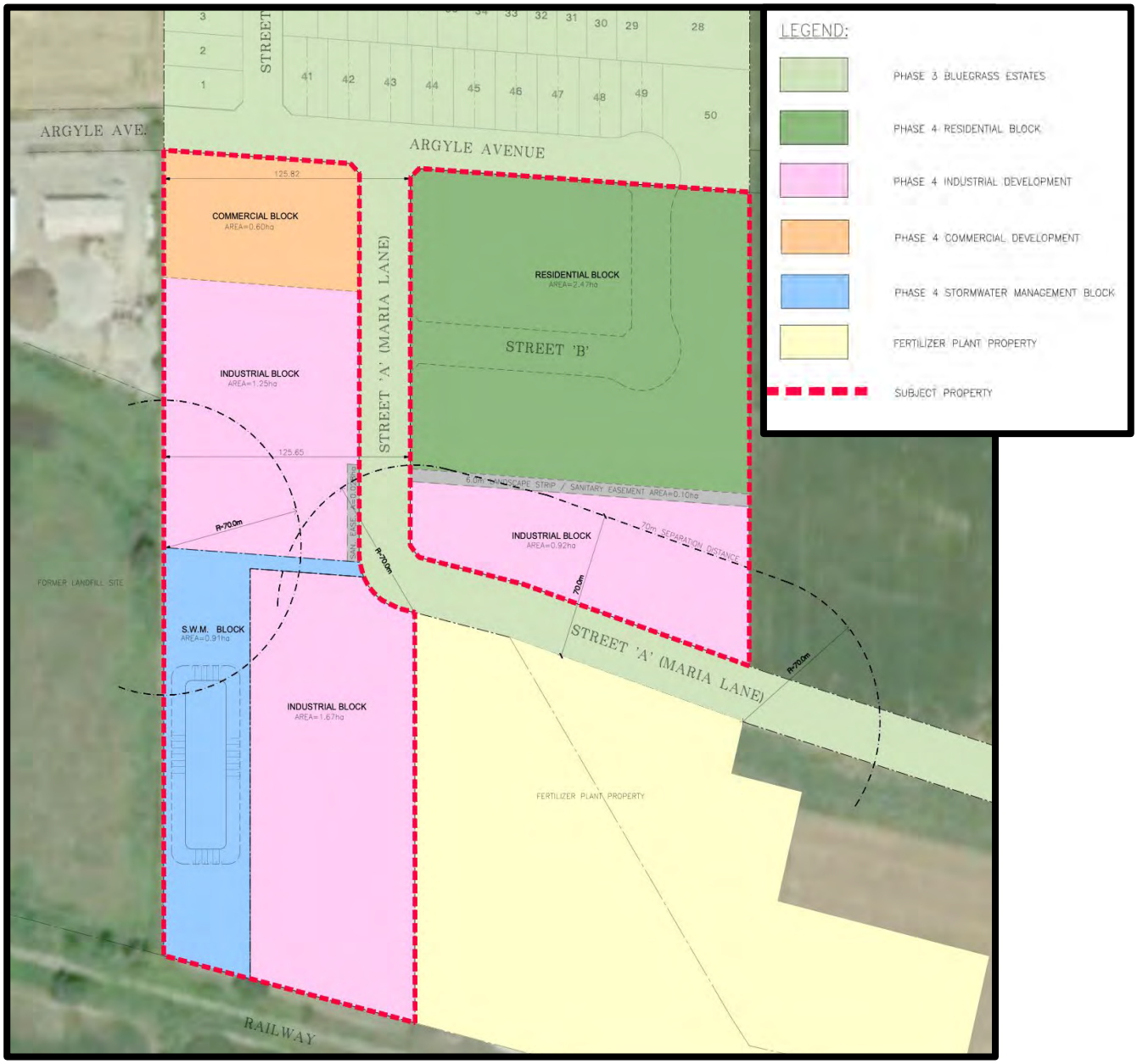
Sensitive land uses exist in the neighbourhood creating conflicts with the historic employment uses and new residential subdivisions.

Based on the analysis, the proposed area to be developed as residential meets the setback for the potential influence area of 70 metres established in the D-6 Guidelines (Figure 9).

The residential uses are approximately 125 meters from the property boundaries of the County Works Yard and former municipal disposal site to the west and 70 meters from the Fertilizer Plant site to the south.

Figure 9 below delineates the 70-metre setback from the industrial land use to the proposed residential lands.

Figure 9: Separation Distance Analysis



The Industrial designation and the Light Industrial (ML) Zone proposed for the employment uses to the south and west of the proposed residential uses are not offensive in nature based on the zoning provisions contained in the Norfolk County Zoning By-Law.

Table 4 below provides the permitted uses and the definitions for Light Industrial Zone (ML) category.

Table 4: Light Industrial (ML) Zone – Permitted uses with definitions	
Ambulance service	Not defined
Animal hospital	shall mean the premises of a veterinarian where animals are treated or kept for treatment.
Auction centre	shall mean land and buildings on or within which goods, wares, merchandise, substances, articles and things are sold to the highest bidder.
Cannabis Production and Processing, subject to General Provisions 3.21 [25- Z-2018]	shall mean lands, buildings or structures used for the production, processing, testing, destroying, packaging and/or shipping of cannabis authorized by an issued license or registration by the federal Minister of Health, pursuant to the Access to Cannabis for Medical Purposes Regulations, SOR/2016-230, to the Controlled Drugs and Substances Act, SC 1996, c 19, and the Cannabis Act,
Dry cleaning establishment	shall mean a building or part of a building where dry cleaning, dry dyeing, cleaning or pressing of articles of clothing, goods or fabric is carried on and may include a dry cleaning distribution station.
Farm implement sales and service establishment	shall mean an establishment having as its main use the storage and display of farm implements for sale and which may include facilities for the repair of or maintenance of farm equipment.
Fire hall	Not defined
Food processing	Not defined
Garage, industrial	shall mean a building, structure or lot where commercial

Table 4: Light Industrial (ML) Zone – Permitted uses with definitions	
	and industrial vehicles and equipment such as, without limitation, buses, trucks and construction and industrial vehicles and equipment are stored, repaired, maintained, leased and/or sold.
Graphics and design	Not defined
Indoor Storage	Not defined
Light Material Manufacturing	Not defined
Lumber Yard and building supply establishment	shall mean a place, building or structure or part thereof used for the retail sale of lumber and/or building supplies including, without limitation, roofing, masonry, plumbing, heating, electrical, paint and similar items. The sale of tools and equipment used in the building trades may be permitted as accessory to the main retail use.
office, industrial, accessory to a permitted use	shall mean a building or part of a building used by a manufacturing, industrial, warehousing or similar business to manage, administer, direct or conduct the affairs of the industrial operation for the business.
personal and health services for employees, accessory to an industry on the same lot	Not defined
research and development facility	Not defined
telecommunications and data processing	Not defined
vehicle sales or rental establishment	shall mean an establishment having as its main use the storage and display of vehicles for sale, rent or lease. Accessory uses may include facilities for the repair or maintenance of vehicles. A vehicle sales or rental establishment shall not include an industrial garage

5.3.2. D-4 Analysis

In accordance with the Ministry of Environment, Conservation and Parks (MECP) Land Use Compatibility Guidelines, land development or land use changes on or near (within 500 m) operating or non-operating landfills requires that a Guideline D-4 Assessment be completed for the subject lands that could be potentially impacted by the waste disposal site.

> ***The Subject Lands are abutting the closed former landfill site. The uses adjoining the former landfill will be comprised of industrial land uses which are not considered sensitive land uses. It should be noted that the residential development is approximately 125m from the former landfill boundary, having no impact from the adjoining land use.***

In my professional opinion the proposed residential use on the Subject Lands meets the intent of the MECP Land Use Compatibility Guidelines.

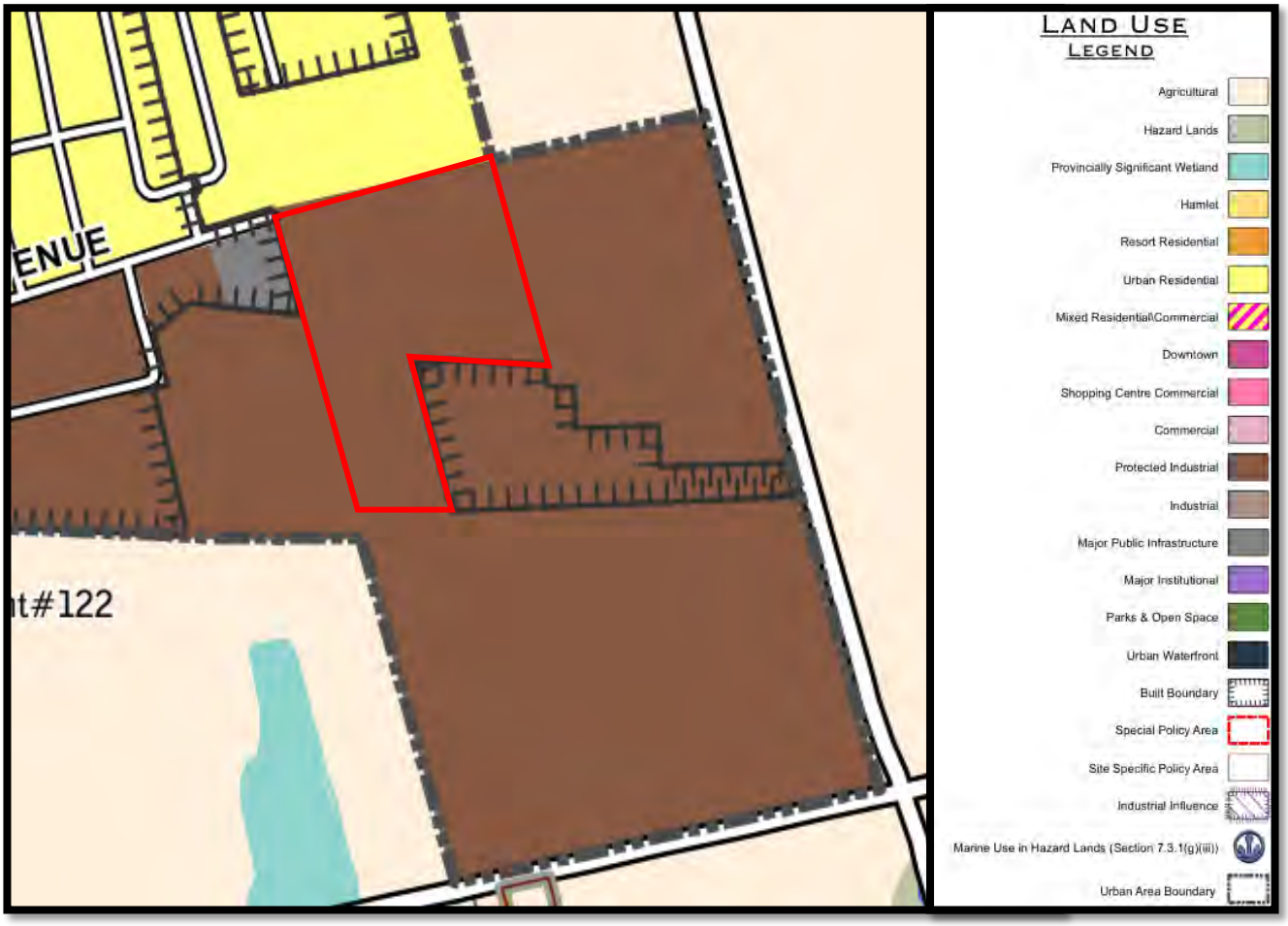
5.4. Norfolk County Official Plan (2018)

The Norfolk County Official Plan was adopted by the County Council in 2006 with a five-year review completed in 2018. A new Official Plan dealing with only urban areas as phase 1 of the project was prepared by Norfolk County in 2024 and submitted to the Ministry of Municipal Affairs and Housing for review and approval. The Official Plan did not align policies from the Provincial Planning Statement, 2024 and requires a further update. On September 5, 2025, the Ministry approved, in part, Norfolk County Official Plan Amendment 163 with modifications. A decision was withheld on nine (9) matters that are inconsistent with the settlement area boundary expansion policies of the PPS, including the Subject Lands. As such, Norfolk County Official Plan (2018) remains relevant for the Subject Lands.

The Official Plan provides a framework of objectives and strategies, land use designations and policies intended to guide the future growth and development in the County which will result in strong, balanced, sustainable, and complete communities.

> ***The lands are located within the Urban Boundary of Delhi and are currently designated as Protected Industrial in Norfolk County Official Plan. The Protected Industrial Designation is comprised of a variety of industrial, employment and accessory commercial uses including offices, and related uses. Protected Industrial areas are characterized by their high visual profile and accessibility and are located along Provincial Highways, and County arterial and collector roads.***
>
> ***An excerpt from Schedule B-17 Land Use is included as Figure 10 below.***

Figure 10: Official Plan Excerpt



In January 2022, a request for redesignation of the Subject Lands was submitted for County staff's consideration through the County's Growth Management Study. The Growth Management Study is intended to provide guidance on where to direct growth within the County to accommodate the projected population and economic growth over the next 25-to-30-year planning horizon. Further, the Growth Management Study is intended to evaluate the land use designations and establish long-term principles for efficient growth and development in the County.

The requested redesignation included approximately 2.47 hectares (6.1 acres) of employment designated lands (Protection Industrial) to Urban Residential and the remaining 5.73 hectares (14.2 acres) redesignated from Protection Industrial to Industrial. The Urban Residential designation would allow a range of residential uses, offering much needed housing in the Delhi community. The Industrial

designation would continue to allow for a broad range of employment uses. The request for the redesignation was approved by Norfolk County Council in the new proposed Official Plan, 2024. The Ministry of Municipal Affairs and Housing provided a decision on the new Official Plan, 2024 on September 5, 2025 and withheld decision on this parcel, amongst others.

The proposed development, hence, requires an Official Plan Amendment to change approximately 2.47 hectares (6.1 acres) of lands to Residential designation and approximately 0.61 hectares (1.5 acres) of land to a Commercial to allow a range of neighbourhood type commercial uses. A 0.91 ha (2.25 acres) of Stormwater Management Block is also included in the design. The remaining lands would be designated for Industrial uses.

Section 5.3 of the Official Plan states that housing is an essential part of planning in Norfolk County.

The proposed residential component of the development contains ten (10) semi-detached dwelling units. This helps the County achieve their target of 15 percent of new housing built in Norfolk County be semi-detached and townhouse dwellings.

Further, the County shall encourage that housing be considered when opportunities for redevelopment become available. This includes the redevelopment of existing single-use and underutilized areas with full municipal services, such as shopping plazas, business and employment sites and older commercial and residential areas, especially where the land is in close proximity to human services.

The Subject Lands are underutilized and will have full municipal services. The site is within close proximity to James Street (Highway 3), which offers many of the commercial and retail services within the community of Delhi.

In accordance with Section 6.4, the development is proposed in the Delhi Urban Area, a focal point for growth and development activity in the County.

The proposed development is on vacant land within the Urban Area boundary, on the edge of the existing built-up portions of the Urban Area, and shall include the efficient provision of water supply, sanitary sewers, roads, parks, schools, and other public, community and municipal services. Development is proposed in a staged and sequential manner, considering the existing pattern of the Urban Area.

Section 7.12 details the existing Protected Industrial Designation, characterized by their high visual profile and accessibility, and generally comprised of industrial, employment, accessory commercial and related uses.

In section 7.12.2.k, the County recognizes that the historic location of employment land, as designated in the Official Plan, may not satisfy the contemporary or future economic needs of the County. Consequently, the County shall consider applications to amend this Plan to re-designate land designated Protected Industrial through a comprehensive review, consistent with the requirements of the Provincial Policy Statement, demonstrating that the land is not required for Protected Industrial purposes over the long-term and that there is a need for the conversion.

Changes to the Provincial Policy Statement, 2020 (now known as the Provincial Planning Statement, 2024) have occurred since the Norfolk County Official Plan, 2018 was implemented. The Provincial Planning Statement, 2024 allows changes to Employment Designations in the absence of Municipal Comprehensive Reviews. Future changes to Norfolk County Official Plan will be required to implement the new PPS that came in effect on October 20, 2024. Given this policy update, the current proposal for land use change is requested through an Official Plan Amendment.

i. the total amount of land designated Protected Industrial in the County shall not substantially decrease, in total, as a result of a re-designation. Consequently, to re-designate Protected Industrial land, a Protected Industrial Designation should be transferred to another appropriate location, subject to the policies of Section 4.7 (Employment Activity) of this Plan;

The request involves removal of approximately 2.47 hectares (6.1 acres) of employment lands which will not adversely impact the existing employment designated resources for the County. A portion of the lands will remain for light industrial uses and will act as buffer between the residential and employment uses.

ii. the land proposed for re-designation should be on the periphery of a Protected Industrial area;

The lands proposed for redesignation are on the periphery of the Protected Industrial area. The lands are directly adjacent to residential uses to the north and agricultural uses to the east. Phase 3 of the Bluegrass Subdivision located immediately to the north of the site has been recently approved by the County Council. The Official Plan, 2018 designations provide a stark transition from the Protected Industrial designation to the Residential designation. The current proposal allows for a softer transition in an effort to achieve a gradation of uses from more intense industrial to the sensitive use of ground oriented residential.

iii. the proposed re-designation shall not jeopardize the planned role and function of other land use designations nor set a precedent for further re- designation;

A portion of the lands will remain for industrial use and will act as buffer between the residential and employment uses.

iv. there shall be a demonstrated need for the proposed use(s);

Strong housing demand exists in the Delhi community, and provincial direction is to provide housing in shovel-ready communities. The proposed residential lands will further contribute towards the intensification targets and will be compatible with the existing residential uses in the vicinity.

v. the new land use(s) shall not negatively impact the viability and stability of the remaining Protected Industrial land in the long-term;

Industrial lands are proposed to remain on the southern portion of the Subject Lands. The Industrial lands will be developed with light intensity industrial uses which will create appropriate transition between the residential and existing Protected Industrial uses.

vi. the boundaries to be changed shall be logical and appropriate for the area, shall provide opportunities to minimize incompatibility between land uses, and shall create a defined edge which will be stable over the long-term;

The redesignation of a portion of the Protected Industrial land to Industrial, Commercial and Residential will act as a transition between the existing industrial uses to the south and the sensitive residential use to the north. North of the Subject Lands is a recently approved residential subdivision and thus the redesignation of a portion of the Subject Lands to Residential will be in keeping with the character of the neighbourhood. The remaining lands will be used for light intensity employment uses such as mixed use, commercial or light industrial uses.

vii. the new development shall be compatible within the context of the surrounding existing development in scale, height and built form;

The proposed residential use will be in keeping with the surrounding low-density uses to the north of the site. Further, the future Industrial uses will create a compatible transition between the more robust Protected Industrial use at the south, the Delhi Agronomy Centre Fertilizer Plant, and the existing and proposed residential lands to the north. Additional details will be included in future subdivision and site plan control applications.

viii. the density and massing of new development should complement the existing built form context;

The proposed residential uses will be in keeping with the surrounding low-density uses. The design elements in terms of buffers, height, scale, fencing and setbacks will adhere to the Urban Residential Type 2 (R2) zone requirements. The Industrial use will similarly adhere to the zone requirements for the Light Industrial (ML) zone. Further details regarding the design elements will be provided as part of the Site Plan Control application as required for the development of these lands.

ix. the new development can be integrated and linked into the fabric of the surrounding community, where appropriate, such as through the provision of public streets, pedestrian walkways and the location of public parks;

The proposed residential development will be an extension of the recently approved Bluegrass Subdivision to the north of the site. Pedestrian connections and parks have been located in the recently built subdivision and are within walking distance of this site.

The industrial component of the development is linked to the fabric of the surrounding community through the thoughtful use of these lands as a gradation of uses between the existing Fertilizer Plant to the south and the residential development to the north. This proposed redesignation is well considered in an effort to ensure compatibility of uses across the local landscape.

x. the continued operation of existing Protected Industrial uses which remain in the area of a redevelopment can be encouraged through measures such as the phasing of development, the provision of on-site building setbacks, landscaped areas, intervening facilities, building and fencing, and the protection of trucking routes and driveways;

Appropriate building setbacks, buffers, landscaped areas, fencing, trucking routes and driveways have been incorporated in the site design. Further details regarding these site design features will be provided during the detailed design for draft Plan of Subdivision application.

xi. that adequate parkland, amenities, community facilities and social services can be provided for future residents;

The proposed development will be an extension of the recently approved Bluegrass Subdivision to the north of the site. Pedestrian connections and parks have been located in the recently built subdivision and are within walking distance of the Subject Lands.

xii. that sufficient sewage treatment, water and transportation capacity can be provided to meet the needs of the redevelopment area; and

The registration of Bluegrass Estates Phase 3 is dependent on the construction of Maria Lane, including extension of municipal infrastructure through the Subject Lands. The County has budgeted for improvements within the current capital budget which is intended to assist with the construction.

The existing municipal services will be sufficient for the development of the lands. Additional technical analysis has been provided with this submission.

xiii. subject to the other policies of the Plan in this regard, the environmental conditions of the development area shall be suitable for the proposed land use(s).

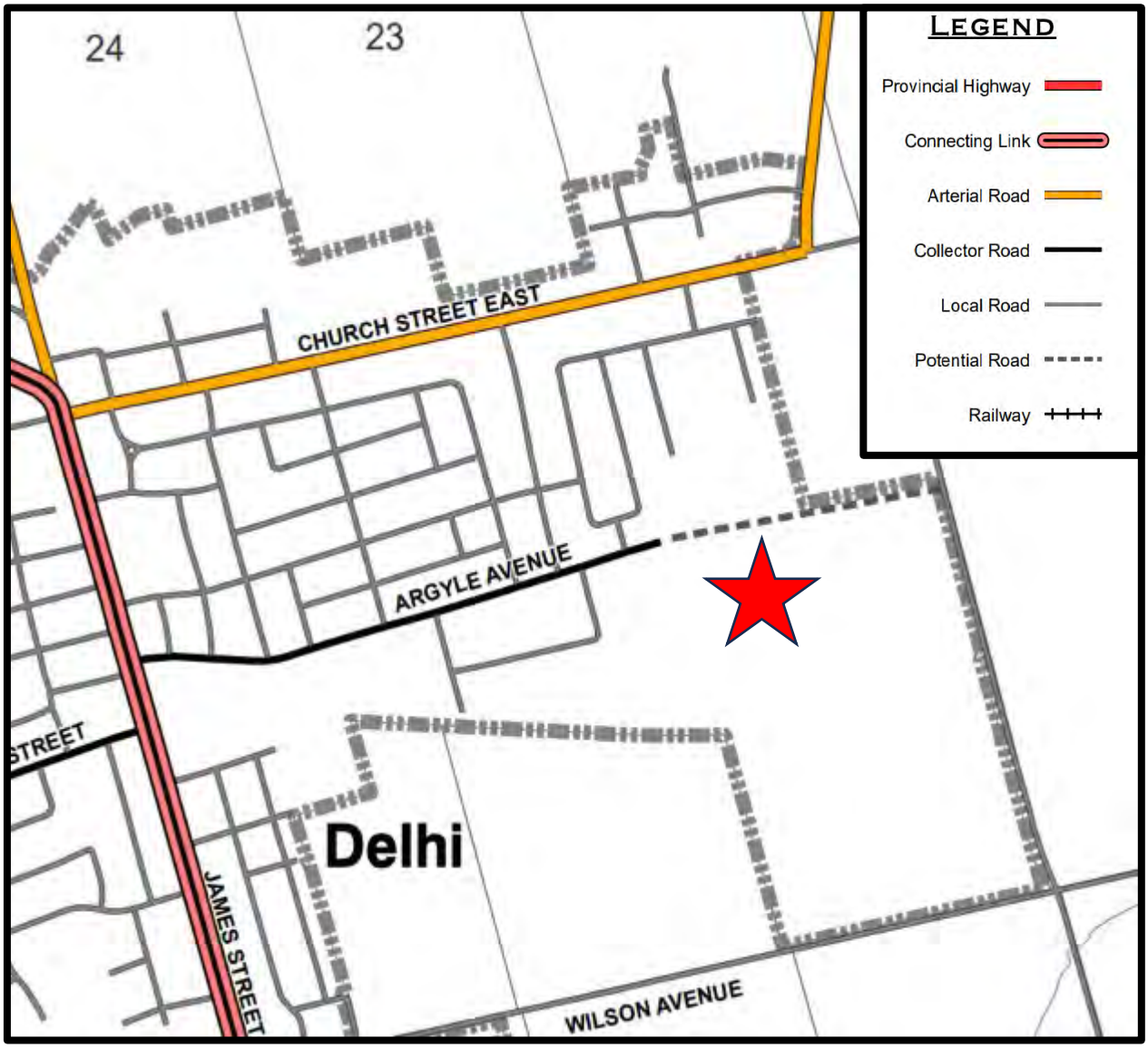
Technical analysis undertaken, such as archaeological assessment, hydrogeological analysis, geotechnical study, and traffic study, indicate the lands are suitable for the proposed land use. Further information regarding the technical undertaking can be found in the reports accompanying this submission.

Section 8.2 details the Transportation Network in the County. The network is intended to promote the development pattern in the County and be supportive of economic activity.

Argyle Avenue is classified as a Collector Road on the Official Plan Schedule E-4-Transportion, as can be seen in Figure 11.

The potential extension of Argyle Avenue as depicted on Schedule E-4 has been negotiated by the landowner and the County and has now been relocated through the Phase 4 lands (named Maria Lane). The registration of Phase 3 of the subdivision is dependent on the construction of Maria Lane, including the extension of municipal infrastructure through the Phase 4 lands. The County has budgeted for improvements within the current capital budget which is intended to assist with the construction.

Figure 11: Official Plan Excerpt Transportation Schedule "E-4"



Section 8.9 details water and wastewater services. Municipal water and wastewater systems exist in Delhi. The County shall ensure that cost-effective and adequate systems for water supply and wastewater treatment are provided to support, enhance and sustain existing and future residents and businesses in the County.

> ***During the approvals for Bluegrass Phase 3, the residential subdivision to the north, services were extended to accommodate the existing and future needs of the area.***

Section 9.6 of the County Official Plan details Development Controls, including Official Plan Amendments, Zoning By-law Amendments and Draft Plan of Subdivision and Condominium Approval.

> ***In accordance with this section, a planning rationale report and supporting technical studies have been submitted in support of the Official Plan and Zoning By-law Amendment applications. Further details will be provided in association with a future Draft Plan of Subdivision submission.***
>
> ***The proposed development complies with land use designations and policies as contained in the Official Plan. The proposed development has been designed to be an extension of current surrounding developments and will be adding additional streetlights to maintain high standards of design and a safe, sustainable community.***
>
> ***The proposal acknowledges that an assessment of existing road conditions is required through the Traffic Impact Study, to ensure the safety of the community and roads. A Traffic Impact Analysis has been accompanied with the submission.***
>
> ***A Stormwater Management Report, a Geotechnical Assessment and an Archaeological Assessment have been completed for the development. Technical assessments note no impact of the proposed development on municipal infrastructure or surrounding areas.***
>
> ***A future Draft Plan of Subdivision submission, and associated conditions of approval, will address provincial and municipal matters of providing parkland dedication, design of the stormwater management features, and any other technical aspects to be determined during detailed design of the subdivision.***

It is my professional opinion that the proposed Official Plan and Zoning By-Law Amendment applications conform to the intent of the policies of the Norfolk County Official Plan (2018).

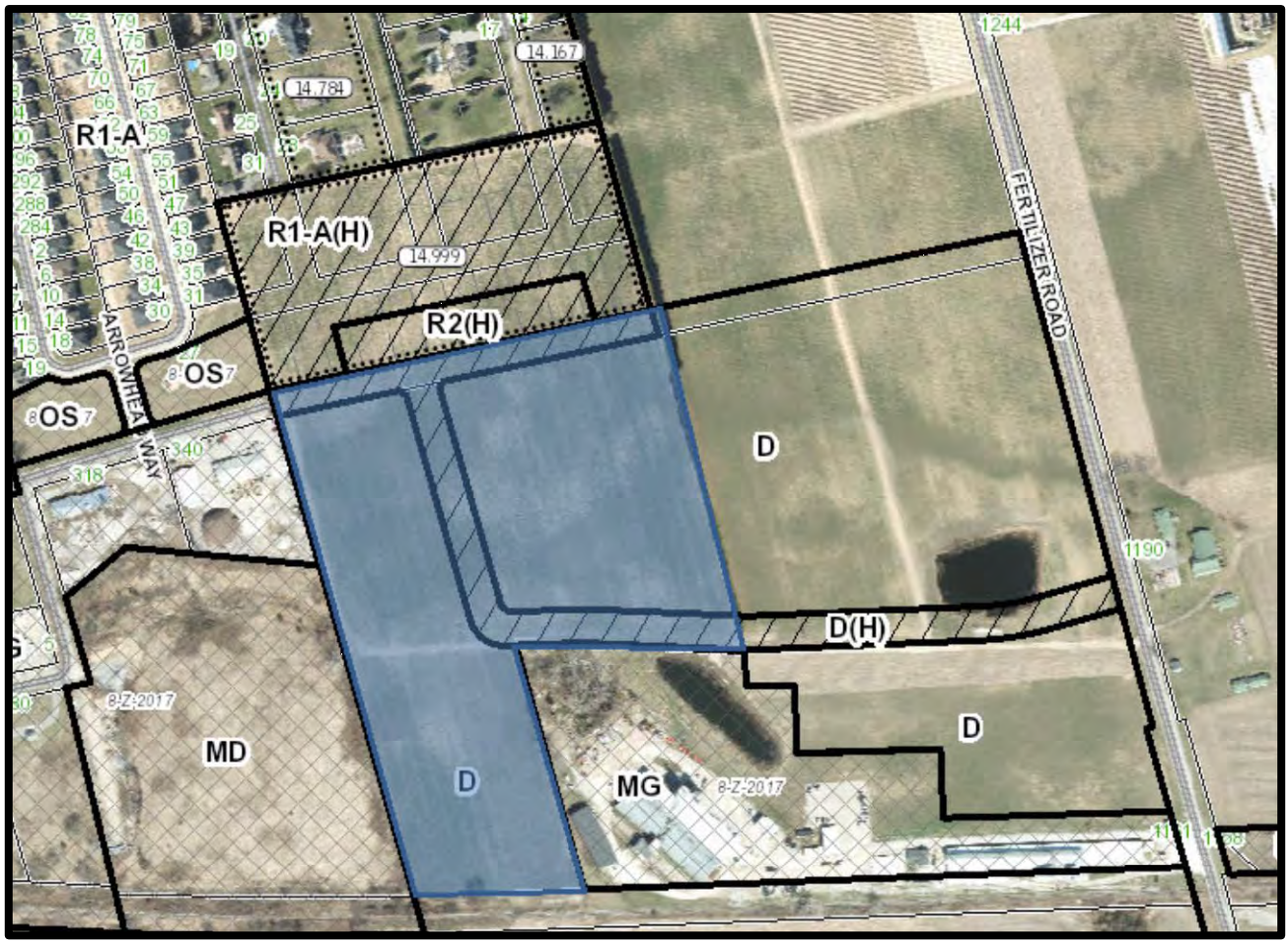
5.5. Zoning By-Law (1-Z-2014)

The site is zoned Development (D), as depicted in **Figure 12** below, in the Norfolk County Zoning By-law 1-Z-2014. The zone category allows for single detached dwellings, farm uses with some exceptions, farm produce outlet as an accessory to the farm, home industry and home occupation uses. A Holding (H) provision shown on the site applies to a future road connection to Fertilizer Road.

Development (D) Zone does not allow for the uses contemplated on the Subject Lands; hence a Zoning By-law Amendment application is submitted for the development of these lands for Urban Residential Type 2 (R2), Neighbourhood Commercial (CN) and Light Industrial (ML) uses. Stormwater management services are permitted in all zones as per

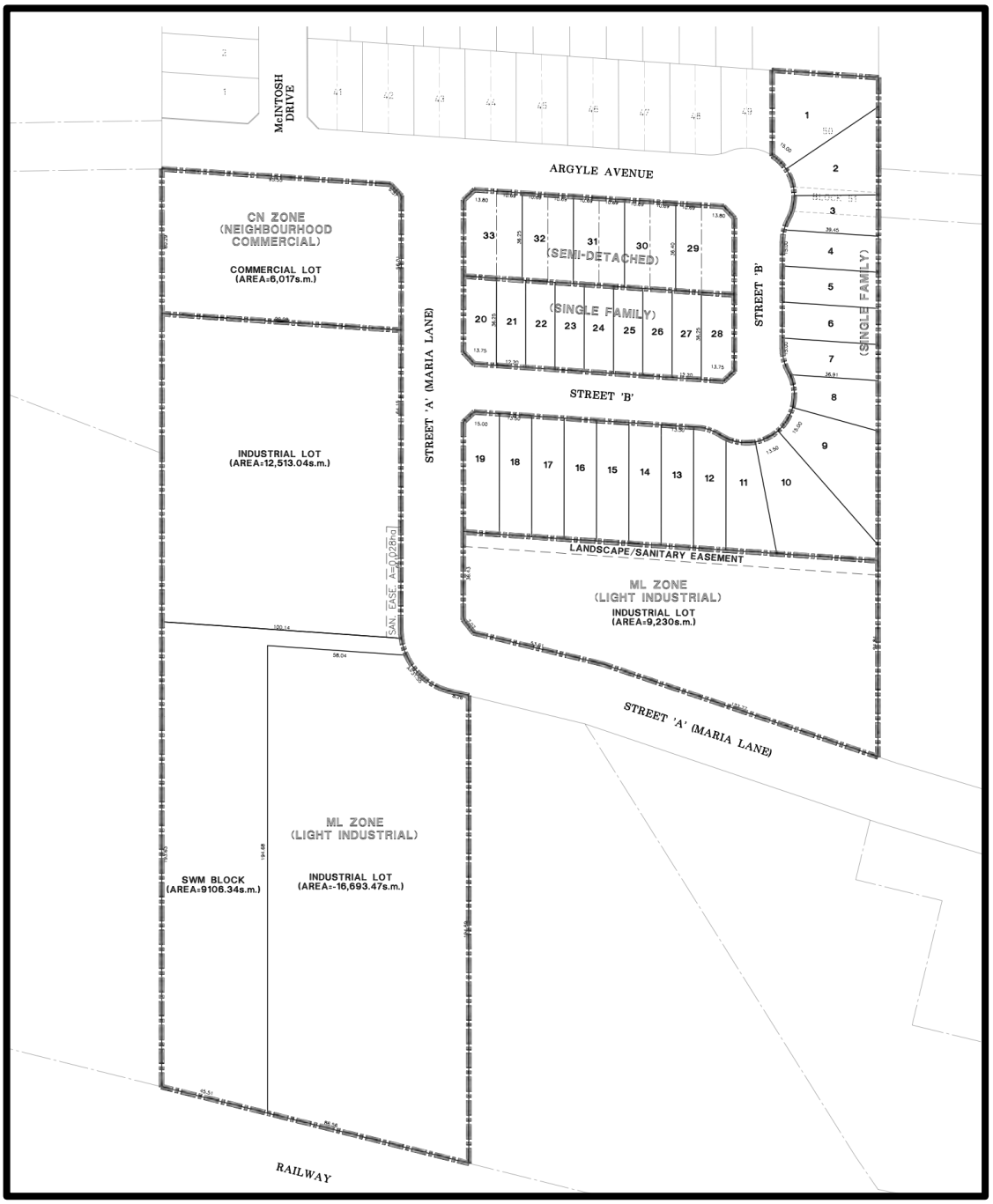
Section 3.33 of the County Zoning By-Law, and hence it will remain as ML Zone.

Figure 12: Zoning By-Law Excerpt



The proposed zoning of the Subject Lands is shown in **Figure 13** below.

Figure 13: Proposed Zoning



All other provisions of the by-law are complied with. A draft by-law is included with the submission.

6. Summary and Recommendations

The proposed applications for Official Plan Amendment and Zoning By-Law Amendment allow for development of an underutilized parcel within the Urban Area of Delhi located within the settlement area of the County. The Official Plan Amendment does not remove entirety of lands from employment uses, however provide an opportunity for balanced land uses in the area given the current existing sensitive uses surrounding the site, providing appropriate buffers, and provides for extension of the municipal infrastructure through the Phase 4 lands.

The lands will be developed to offer a transition of uses across the local landscape, from industrial uses off site at the west and south, to residential at the north. Various landscaping and buffer elements have been included to mitigate any conflicts.

Maria Lane – a new road extension coordinated with County staff through Phase 3 of Bluegrass subdivision has been included to run through Phase 4 lands. Further a stormwater management pond has been included on the subject lands to provide relocation and expansion of the existing County infrastructure in conjunction with this development.

Various technical studies assessing traffic, soil conditions, cultural and archaeological, and servicing have been completed for the development. The technical information completed in support of the submission indicates the proposed development will not create any negative impacts on the environment, road infrastructure or create any public safety issues. Further detailed assessments will be completed during the draft plan of subdivision application, and conditions of approval related to the same.

It is my professional opinion that the proposed applications for Official Plan Amendment and Zoning By-Law Amendment are:

- consistent with the Provincial Planning Statement (2024);
- conform with the policies of the Norfolk County Official Plan (2018); and
- comply with the regulations of the Norfolk County Zoning By-law 1-Z-2014.

The proposed applications represent good planning, and it is requested to the Council of Norfolk County that the applications be approved.

Respectfully Submitted,

The Angrish Group



Ruchika Angrish, MPlan, B.Tech, MCIP, RPP
Co-Founder

Cc: Ben Jeles and Joe Jeles, Owners

I hereby certify that this Planning Justification Report was prepared by a Registered Professional Planner, within the meaning of the Ontario Professional Planners' Institute Act, 1994.



November 10, 2025

I hereby certify that this plan/report was prepared by a Registered Professional Planner, within the meaning of the Ontario Professional Planners Institute Act,1994.

November 10, 2025
Date

Ruchika Angrish
Registered Professional Planner

Appendix A – Draft Official Plan By-law

DRAFT Norfolk County Official Plan

Amendment No. X

The following text, together with Appendix "A" attached hereto, constitutes Official Plan Amendment No. "X" to the Norfolk County Official Plan.

1.0 Purpose and Effect:

The purpose and effect of this Amendment is to redesignate a portion of the lands to Urban Residential, Commercial and General Industrial to permit the development of a plan of subdivision on municipal services for the development of the subject lands.

2.0 Location:

The lands affected by this Amendment are known legally as Part Lot 22 Concession 12; South & East Part 1 37R10348; S/T easement over Part 12 on 37R5545 in the former Geographic Township of Windham, Norfolk County.

3.0 Basis:

The basis for permitting this Amendment is:

- The proposed Amendment maintains the general intent of the policies of the Norfolk County Official Plan, as it contributes to the housing stock in Delhi, creates a gentle transition between intense and sensitive lands uses and makes efficient use of land;
- The amendment is consistent with the Provincial Planning Statement (2024), as amended.

4.0 Actual Changes:

Maps

That Schedule "B-17" – Norfolk County: Land Use be amended by:

i. Identifying the subject lands as Urban Residential, Commercial and Industrial, as shown on Appendix "A", attached to this Amendment.

5.0 Implementation

An implementing Zoning By-law Amendment will give effect to the intended uses on the subject lands.

This Official Plan Amendment is Schedule “1” to By-law No…….passed on this day of ……., 2025.

READ a first and second time, this …….

READ a third time and finally passed in Council, ……..

THE CORPORATION OF NORFOLK COUNTY

MAYOR

CLERK

Appendix B – Draft Zoning By-Law

BY-LAW NUMBER_____

-of-

THE CORPORATION OF NORFOLK COUNTY

To amend By-law No. 1-Z-2014, the Zoning By-law for Norfolk County, as amended, to regulate the use of lands and the location and use of buildings and structures in Norfolk County.

WHEREAS an application was received from 1064928 Ontario Inc., Owner with respect to lands described as Part Lot 22 Concession 12; South & East Part 1 37R10348; S/T easement over Part 12 on 37R5545 in the former Geographic Township of Windham, Norfolk County to amend By-law 1-Z-2014, to change the current Development (D) zone to an Urban Residential Type 2 (R2), Neighbourhood Commercial (CN) and Light Industrial (ML) zone to allow a draft plan of subdivision containing residential, commercial and light industrial uses on full municipal services;

AND WHEREAS the *Planning Act* empowers a municipality to pass by-laws prohibiting the use of land and the erection, location and use of buildings or structures, except as set out in the by-law'

AND WHEREAS this by-law is in conformity with the Official Plan for Norfolk County;

AND WHEREAS the Council for Norfolk County deems it to be desirable for the future development and use of the lands described above;

NOW THEREFORE THE MUNICIPAL COUNCIL OF THE CORPORATION OF NORFOLK COUNTY UNDER THE PROVISIONS OF SECTION 34 OF THE PLANNING ACT R.S.O. 1990 HEREBY ENACTS AS FOLLOWS:

1. **THAT** Schedule 'A' of By-law 1-Z-2014 is hereby amended by changing the zoning on the subject lands from Prestige Industrial to Urban Residential Type 2 (R2), Neighbourhood Commercial (CN) and Light Industrial (ML) uses.

2. **THAT** this By-Law shall come into force on the day it is passed by the Council of the Corporation of Norfolk County.

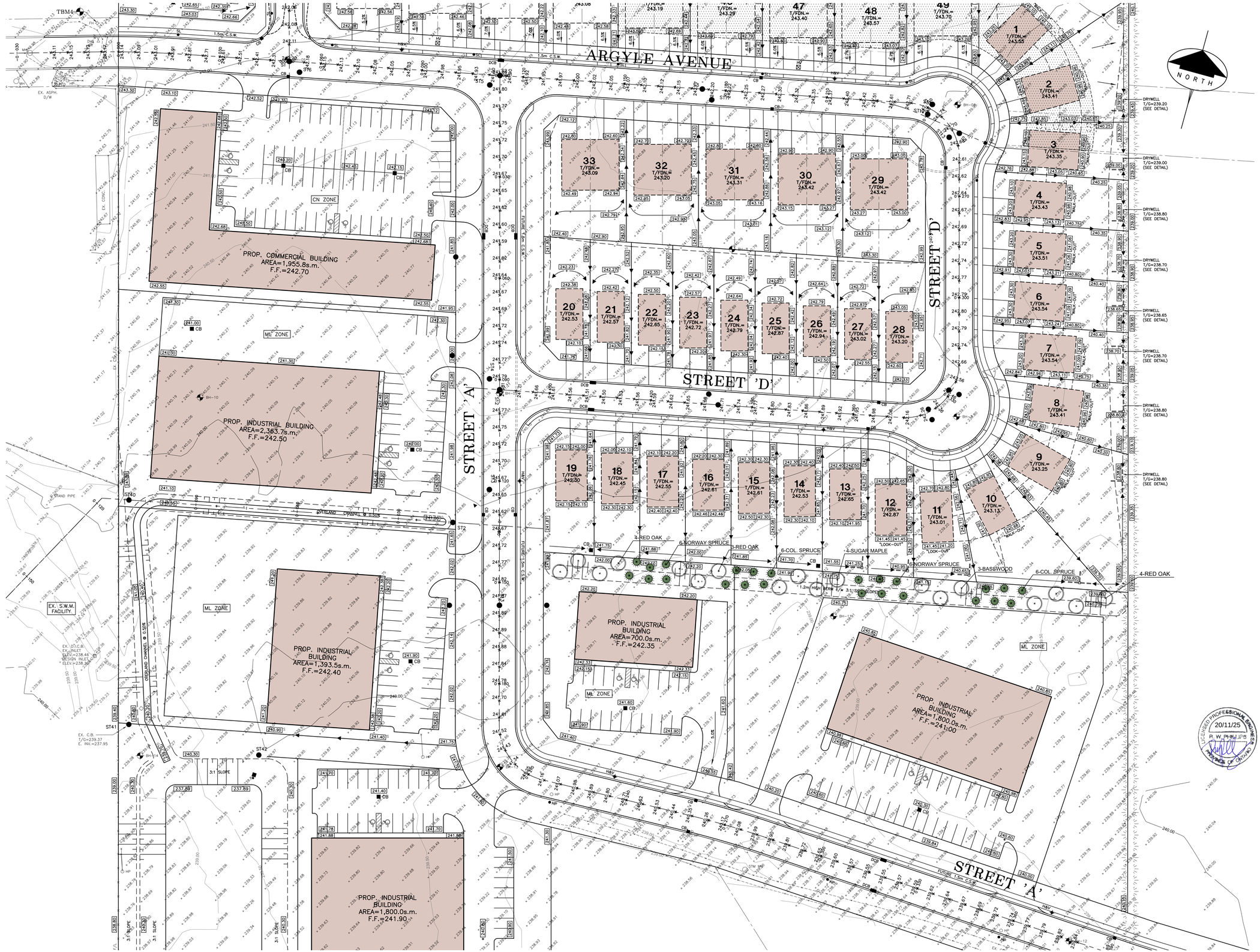
READ a first and second time, this …….

READ a third time and finally passed in Council, ……..

THE CORPORATION OF NORFOLK COUNTY

MAYOR

CLERK



THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL FAMILIARIZE HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

LEGEND:

- EXISTING ELEVATIONS
- 200.00 PROPOSED ELEVATIONS
- 200.00 S PROPOSED SWALE ELEVATIONS
- (200.00) PROPOSED ELEVATIONS (BY OTHERS)
- 242.00 × PROPOSED CENTERLINE OF ROAD ELEVATIONS
- PROPOSED SWALE
- GENERAL DRAINAGE

NOTES:

1. ALL ELEVATIONS SHOWN ARE METRIC.
2. ELEVATIONS MAY VARY PENDING ENGINEERS APPROVAL.
3. WHERE ONLY ONE ELEVATION IS SHOWN, EXISTING AND PROPOSED ELEVATIONS ARE THE SAME.
4. REFER TO DRAWING 13227-4 FOR GENERAL LEGEND.

T.B.M. No. 1 ELEV. = 243.12m (GEO)
TOP OF DRILLED WELL ON THE EAST SIDE OF McINTOSH DRIVE IN FRONT OF M.N. 28 AS SHOWN.

T.B.M. No. 2 ELEV. = 242.97m (GEO)
NAIL IN HYDRO POLE ON THE EAST SIDE OF DUCHESS DRIVE IN FRONT OF M.N. 14 AS SHOWN.

T.B.M. No. 3 ELEV. = 242.88m (GEO)
NAIL IN HYDRO POLE ON THE SOUTH SIDE OF ARGYLE AVENUE (NOT SHOWN).

T.B.M. No. 4 ELEV. = 244.04m (GEO)
TOP NUT OF FIRE HYDRANT AT THE EAST END OF ARGYLE AVENUE AS SHOWN.

NO.	REVISION	DATE (MM/DD/YY)	BY

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
440 HARDY ROAD , UNIT #1 , BRANTFORD – ONTARIO , N3T 5L8
TEL. (519) 753-2656 FAX. (519) 753-4263 www.cohooneng.com

LICENSED PROFESSIONAL ENGINEER 20/11/25 R. W. PHILP PROVINCE OF ONTARIO

PROJECT:

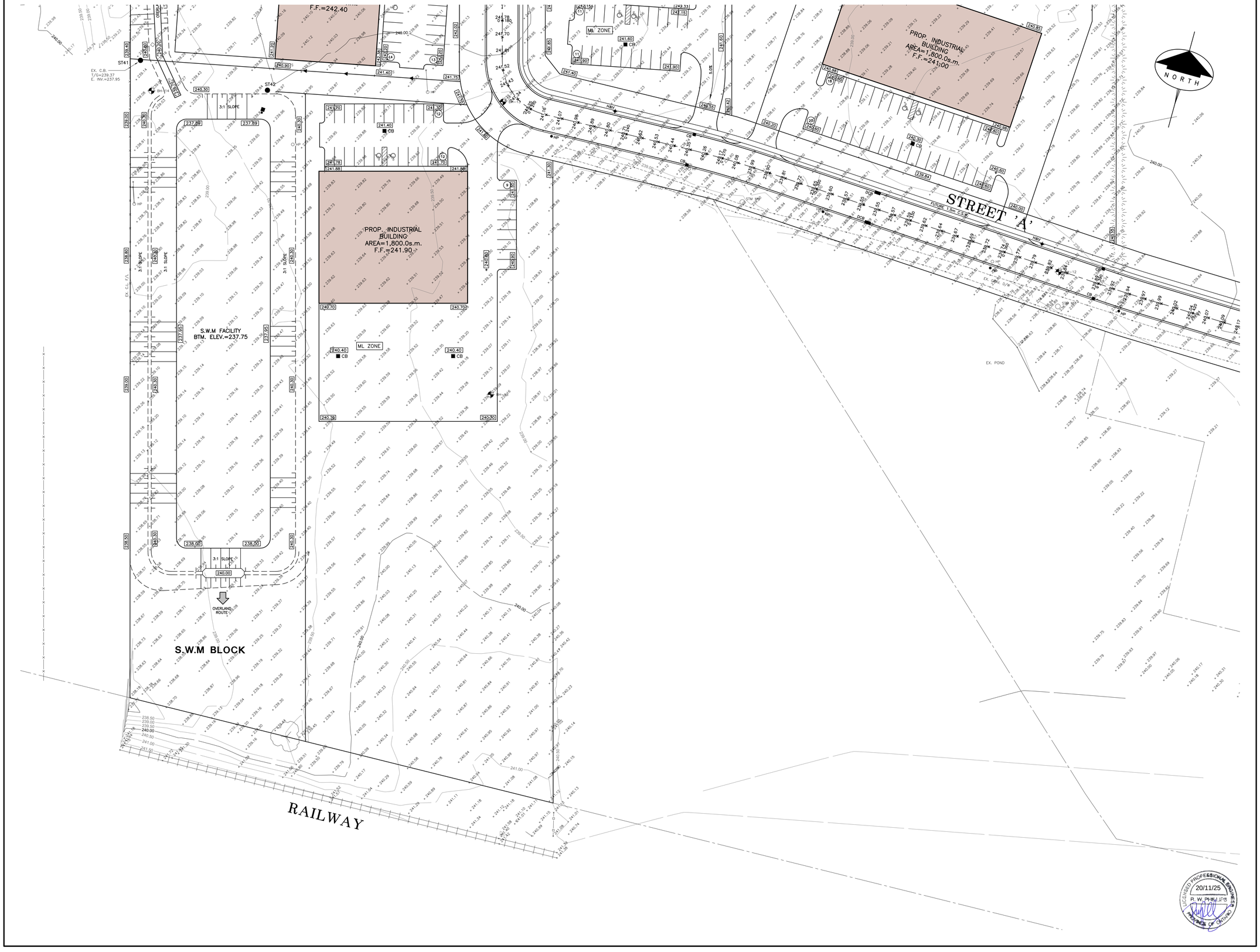
BLUEGRASS ESTATES SUBDIVISION (PHASE 3)

ARGYLE AVENUE
NORFOLK COUNTY

CLIENT: JELES DESIGN & CONSTRUCTION LTD.

PRELIMINARY GRADING PLAN

DESIGN:	R.W.P.	SCALE:	1:500
DRAWN:	K.P.B.	JOB No:	13227
CHECKED:	R.W.P.		
SHEET:	1 of 6	DWG. No:	P1
DATE:	NOV. 19/25		



THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL FAMILIARIZE HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

LEGEND:

200.00	EXISTING ELEVATIONS
[200.00]	PROPOSED ELEVATIONS
[200.00]S	PROPOSED SWALE ELEVATIONS
(200.00)	PROPOSED ELEVATIONS (BY OTHERS)
242.00 ×	PROPOSED CENTERLINE OF ROAD ELEVATIONS
→	PROPOSED SWALE
⌒→	GENERAL DRAINAGE

NOTES:

1. ALL ELEVATIONS SHOWN ARE METRIC.
2. ELEVATIONS MAY VARY PENDING ENGINEERS APPROVAL.
3. WHERE ONLY ONE ELEVATION IS SHOWN, EXISTING AND PROPOSED ELEVATIONS ARE THE SAME.
4. REFER TO DRAWING 13227-4 FOR GENERAL LEGEND.

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PROJECT:

BLUEGRASS ESTATES SUBDIVISION (PHASE 3)
ARGYLE AVENUE
NORFOLK COUNTY

CLIENT: JELES DESIGN & CONSTRUCTION LTD.

PRELIMINARY GRADING PLAN

DESIGN:	R.W.P.	SCALE:	1:500
DRAWN:	K.P.B.	JOB No:	13227
CHECKED:	R.W.P.		
SHEET:	2 of 6	DWG. No:	P2
DATE:	NOV. 19/25		

LICENSED PROFESSIONAL ENGINEER
20/11/25
R. W. PHILLIPS
PROVINCE OF ONTARIO

ARGYLE AVENUE

STREET 'D'

STREET 'A'

CN ZONE

ML ZONE

EX. S.W.M. FACILITY

EX. ASPH. D/W

EX. CONC.

EX. CL. F/A

STAND PIPE

1.5m C.S.W.

250x250x150 TEE

250x150 REDUCER

150mm PVC W/M

76.13m–250mm SAN. @ 0.39%

62.44m–250mm SAN. @ 0.32%

56.41m–675mm STM. @ 0.37%

65.81m–375mm STM. @ 0.26%

60.00m–200mm SAN. @ 0.42%

68.20m–200mm SAN. @ 0.41%

64.02m–375mm STM. @ 0.32%

14.50m–250mm SAN. @ 0.69%
STUB, INV.=239.82

13.30m–300mm STM. @ 0.80%
STUB, INV.=240.30

TEMP. PLUG & BLOW-OFF

150mm PVC W/M

62.5m–SAN. @ 0.60%

61.0m–STM. @ 0.50%

FUTURE 15.50m–300mm STM. @ 0.40%
STUB, INV.=240.11

FUTURE 12.50m–250mm SAN. @ 0.40%
STUB, INV.=239.61

52.30m–STM. @ 0.40%

52.2m–SAN. @ 0.40%

90.10m–STM. @ 0.40%

63.4m–SAN. @ 0.40%

150mm PVC W/M

250mm PVC W/M

FUTURE 1.5m C.S.W.

86.87m–750mm STM. @ 0.30%

77.20m–250mm SAN. @ 0.40%

FUTURE 250mm PVC W/M

15.00m–250mm SAN. @ 0.40%

STUB, PLUG & BLOW-OFF

FUTURE 1.5m C.S.W.

32.7m–1050mm STM. @ 0.10%

44.4m–1050mm STM. @ 0.30%

89.0m–1050mm STM. @ 0.30%

41.7m–300mm STM. @ 0.50%

FUTURE 63.8m–250mm SAN. @ 0.40%

67.5m–300mm STM. @ 0.30%

PROP. SANITARY EASEMENT

PROP. 300mm SAN. CONTAIN

PROP. 50mm SAN. CONTAIN

65.9m–1050mm STM. @ 0.30%

OVERLAND CHANNEL @ 0.50%

EX. D.I.C.B.
EX. INLET
ELEV.=238.46
DESIGN INLET
ELEV.=238.10

EX. 600mmø STM @ 0.50%

EX. PROP. POND OUTLET STRUCTURE & LEAD (TO BE REMOVED)

EX. 6.0m–450mmø STM. SEWER @ 0.50% ST41

EX. C.B.
T/G=239.37
E. INV.=237.95

PROP. 21.0m–1050mm STM. @ 0.30%

PORTION OF EX. 900mmø CONC. STM. TO BE REMOVED

PROP. 6.0m–525mmø STM. @ 0.30%

3:1 SLOPE

S.W.M. POND OUTLET STRUCT. (SEE DETAIL)

EX. 900mmø CONC. STM. @ 0.26%

EX. STM. MH
T/G=239.30
W. INV.=237.47
E. INV.=237.44
N. INV.=237.98

FUTURE 1.5m C.S.W.

250mm PVC W/M

45°

PROP. SAN. SERV.

PROP. WA. SERV.

PROP. SAN. SERV.

PROP. WA. SERV.

PROP. SAN. SERV.

PROP. WA. SERV.

PROP. SAN. SERV.

PROP. WA. SERV.

EX. 250mmø WM

EX. 300mmø WM

EX. 150mmø WM

EX. 200mmø WM

EX. 250

PLAN OF SURVEY

OF ALL OF

LOTS 33 TO 46, BOTH INCLUSIVE,
LOTS 58 TO 61, BOTH INCLUSIVE,
LOTS 70 TO 73, BOTH INCLUSIVE,
& LOTS 81 AND 82,
REGISTERED PLAN 334 (DELHI)

AND ALL OF

BALDWIN STREET
REGISTERED PLAN 334 (DELHI)

AND PART OF

LOTS 32, 47, 57, 62, 69 & 74
REGISTERED PLAN 334 (DELHI)

AND PART OF

DUCHESS DRIVE, MCINTOSH DRIVE
& RUSSET DRIVE
REGISTERED PLAN 334 (DELHI)

AND PART OF

LOT 22, CONCESSION 12

IN THE GEOGRAPHIC

TOWNSHIP OF WINDHAM

IN

NORFOLK COUNTY

SCALE: 1 : 1000

10 0 40 METRES

JEWITT AND DIXON LTD.

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATED AUGUST 9, 2021

R. C. DIXON
ONTARIO LAND SURVEYOR

PLAN 37R-11444

RECEIVED AND DEPOSITED

DATED 2021/08/17

REPRESENTATIVE FOR THE LAND REGISTRAR FOR THE LAND TITLES DIVISION OF NORFOLK (No. 37)

SCHEDULE

PART	LOT/STREET	CON/PLAN	PIN No.	AREA
1	ALL OF LOT 33 & PART LOT 32	REGISTERED PLAN 334	ALL OF PIN 50169-0351 (LT)	2908.388 sq.m
2	PART OF MCINTOSH DRIVE	REGISTERED PLAN 334	PART OF PIN 50169-0352 (LT)	1471.138 sq.m
3	ALL OF LOTS 70, 71, 72 & 73 AND PART OF LOTS 69 & 74	REGISTERED PLAN 334	PART OF PIN 50169-0354 (LT)	5753.290 sq.m
4	PART OF RUSSET DRIVE	REGISTERED PLAN 334	PART OF PIN 50169-0357 (LT)	1465.083 sq.m
5	ALL OF LOTS 58, 59, 60 & 61 AND PART OF LOTS 57 & 62	REGISTERED PLAN 334	ALL OF PIN 50169-0359 (LT)	5742.492 sq.m
6	PART OF DUCHESS DRIVE	REGISTERED PLAN 334	PART OF PIN 50169-0360 (LT)	1459.008 sq.m
7	ALL OF LOT 46 & PART LOT 47	REGISTERED PLAN 334	PART OF PIN 50169-0377 (LT)	2924.379 sq.m
8	ALL OF LOT 81 (0.305m RESERVE)	REGISTERED PLAN 334	ALL OF PIN 50169-0355 (LT)	12.271 sq.m
9	ALL OF BALDWIN STREET	REGISTERED PLAN 334	ALL OF PIN 50169-0366 (LT)	5995.126 sq.m
10	ALL OF LOT 82 (0.305m RESERVE)	REGISTERED PLAN 334	ALL OF PIN 50169-0357 (LT)	12.272 sq.m
11	ALL OF LOTS 34 TO 45 BOTH INCLUSIVE	REGISTERED PLAN 334	PART OF PIN 50169-0377 (LT)	15849.741 sq.m
12	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0375 (LT)	5300.449 sq.m
13	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0375 (LT)	5786.819 sq.m
14	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0384 (LT)	20527.384 sq.m
15	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0384 (LT)	8494.177 sq.m
16	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0384 (LT)	34986.870 sq.m
17	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0384 (LT)	4124.442 sq.m
18	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0384 (LT)	1058.677 sq.m
19	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0384 (LT)	2512.421 sq.m
20	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0384 (LT)	5092.380 sq.m
21	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0384 (LT)	1376.595 sq.m
22	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0384 (LT)	22698.526 sq.m
23	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0384 (LT)	29373.554 sq.m
24	PART OF LOT 22	CONCESSION 12	PART OF PIN 50169-0384 (LT)	59435.335 sq.m

PARTS 7 & 11 COMPRISE PART OF PIN 50169-0377 (LT)
PARTS 12 & 13 COMPRISE ALL OF PIN 50169-0375 (LT)
PARTS 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 & 24 COMPRISE ALL OF PIN 50169-0384 (LT)

PARTS 17, 18 AND 21 ARE SUBJECT TO AN EASEMENT OVER PART 12 PLAN 37R-5545 AS IN NR184554, NR196930 AND NR196931

CHORD TABLE

CURVE BETWEEN LOTS	RADIUS	ARC DISTANCE	CHORD DISTANCE	CHORD BEARING
LOTS 14 & 15	R=26.500	A=5.558	C=5.548	N20°44'49"W
LOTS 17 & 18	R=187.000	A=13.130	C=13.128	N89°40'12"E
LOTS 17 & 21	R=26.500	A=14.074	C=13.909	N41°58'15"W
LOTS 19 & 20	R=187.000	A=40.225	C=40.148	N81°29'46"E
LOTS 20 & 22	R=26.500	A=15.735	C=15.505	N74°11'47"W
LOTS 15 & 24	R=187.000	A=0.715	C=0.715	N88°12'32"W

NOTE:

BEARINGS ARE ASTRONOMIC AND ARE REFFERED TO THE EASTERLY LIMIT OF REGISTERED PLAN 37M-85 AND AS SHOWN ON PLAN 37M-85, HAVING A BEARING OF N14°35'00"W, AND CAN BE CONVERTED TO GRID BY APPLYING A ROTATION OF 0°57'04" COUNTER CLOCKWISE.
DISTANCES AND COORDINATES ARE METRIC GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.999569065 THEN DIVIDING BY 0.3048 TO CONVERT TO IMPERIAL.
RESULTANT BEARINGS FROM COORDINATE TABLE ARE UTM GRID, DERIVED FROM SIMULTANEOUS GPS OBSERVATIONS ON MONUMENT A TO B, HAVING A BEARING OF N15°01'34"W, UTM ZONE 17, (81° WEST LONGITUDE) NAD83 (CSRS) (2010)

OBSERVED REFERENCE POINTS (ORPs): DERIVED FROM GPS OBSERVATIONS USING THE CAN-NET NETWORK, UTM ZONE 17 (81° WEST LONGITUDE) NAD83 (CSRS) (2010) COORDINATES ARE TO A RURAL ACCURACY AS PER SEC. 14 (2) OF O.REG. 216/10

POINT ID	NORTHING	EASTING
ORP A	4744587.350	543273.822
ORP B	4745026.595	543150.543

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, AND THE LAND TITLES ACT, AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 2ND DAY OF JULY, 2021

DATED: AUGUST 9, 2021

R. C. DIXON
ONTARIO LAND SURVEYOR

LEGEND

2.5cm X 2.5cm X 1.2m STANDARD IRON BARS	SHOWN	SIB	
1.6cm X 1.6cm X 0.6m IRON BARS	SHOWN	IB	
1.6cm ROUND X 0.6m IRON BARS	SHOWN	IB Ø	
LOT LINES	SHOWN		
DEED LINES	SHOWN		
FENCE LINES	SHOWN		
CENTRE LINES	SHOWN		
ROAD LINES	SHOWN		
FOUND IRON BARS	SHOWN	PLANTED IRON BARS SHOWN	

JEWITT AND DIXON LTD.
J. F. WESTON, O.L.S.
J. B. DODD, O.L.S.
K.S. HUSTED, O.L.S.
WITNESS MONUMENT
ORIGIN UNKNOWN

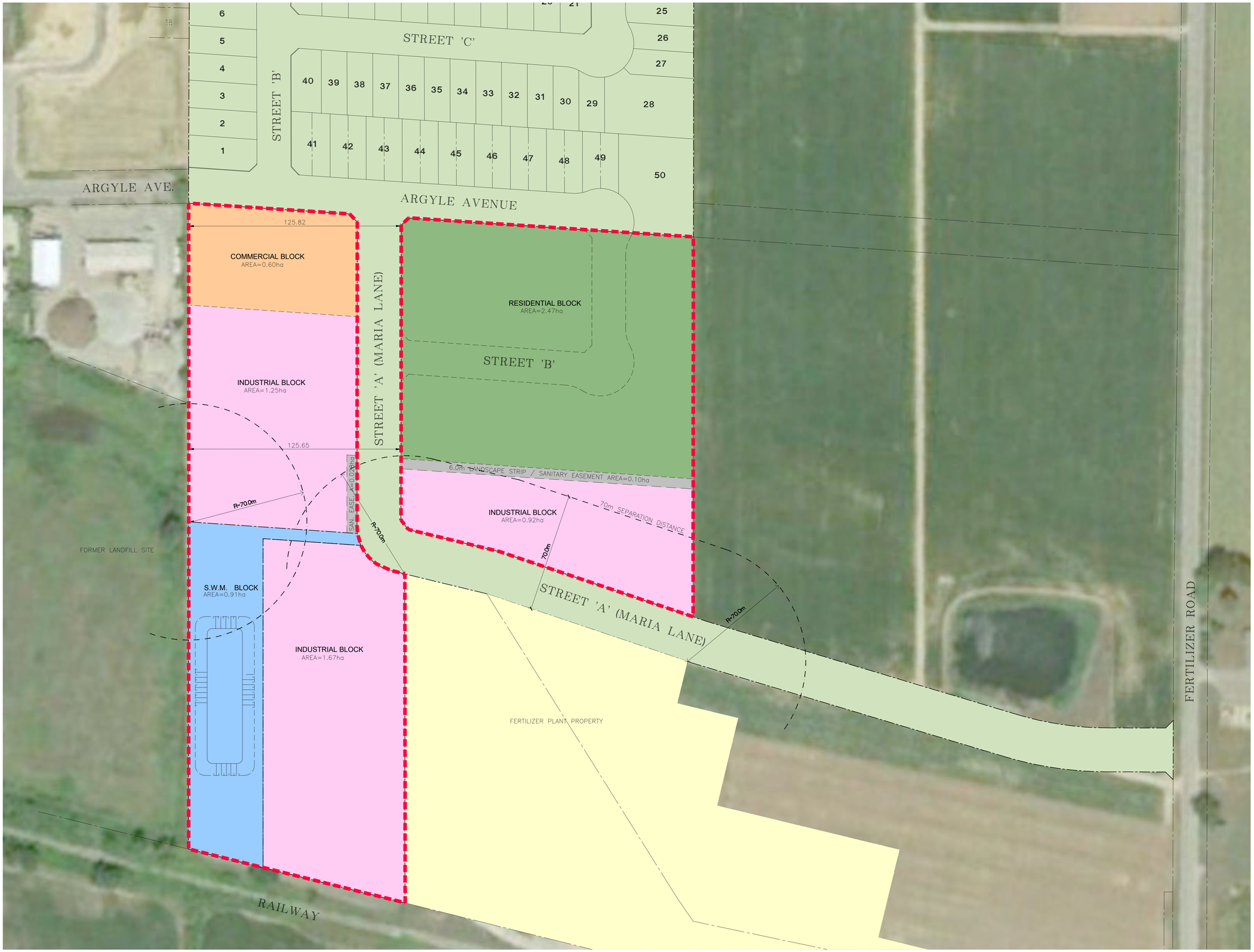
SHOWN	(700)	REGISTERED PLAN 37M-85
SHOWN	(727)	PLAN 37R-5545
SHOWN	(996)	PLAN 37R-10164
SHOWN	(1582)	PLAN 37R-10348
SHOWN	(WIT)	PLAN 37R-10526
SHOWN	(OU)	PLAN 37R-11286
		REGISTERED PLAN 334

SHOWN	(P1)
SHOWN	(P2)
SHOWN	(P3)
SHOWN	(P4)
SHOWN	(P5)
SHOWN	(P6)
SHOWN	(P7)

JEWITT AND DIXON LTD.
ONTARIO LAND SURVEYORS
R.R.1, SIMCOE, ONTARIO, N3Y 4J9
(51 PARK ROAD)
PHONE: (519) 426-0842 FAX (519) 426-1034
E-mail: surveyors@amtelecom.net

F.W.	J.P.H.
BOOK	LL-FILE
CALC.	J.L.M.
PLAN	J.L.M.
CHECK	K.H.
CLIENT	JELES
JOB No.	19-2428

19-2428-RP



LEGEND:

- PHASE 3 BLUEGRASS ESTATES
- PHASE 4 RESIDENTIAL BLOCK
- PHASE 4 INDUSTRIAL DEVELOPMENT
- PHASE 4 COMMERCIAL DEVELOPMENT
- PHASE 4 STORMWATER MANAGEMENT BLOCK
- FERTILIZER PLANT PROPERTY
- SUBJECT PROPERTY

NORTH

NO.	REVISION	DATE (MM/DD/YY)	BY
1	AS PER ANGRISH GROUP COMMENTS	10/28/25	S.L.M.

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
440 HARDY ROAD , UNIT #1 , BRANTFORD - ONTARIO , N3T 5L8
TEL. (519) 753-2656 FAX. (519) 753-4263 www.cohooneng.com

PROJECT:

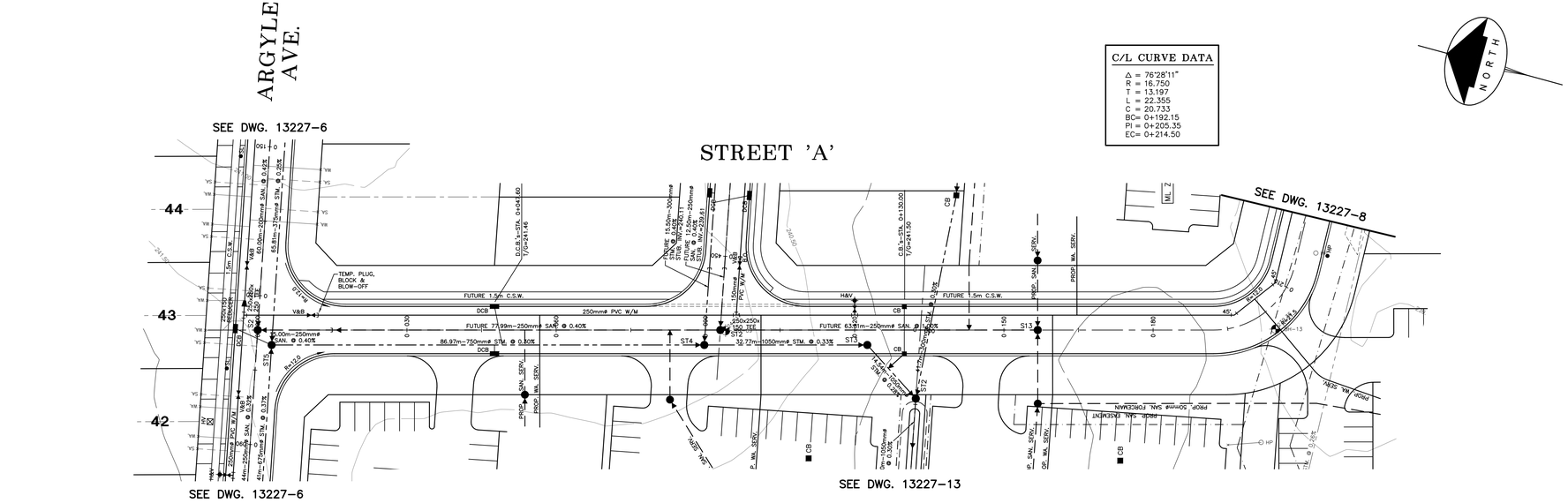
BLUEGRASS ESTATES SUBDIVISION (PHASE 4)

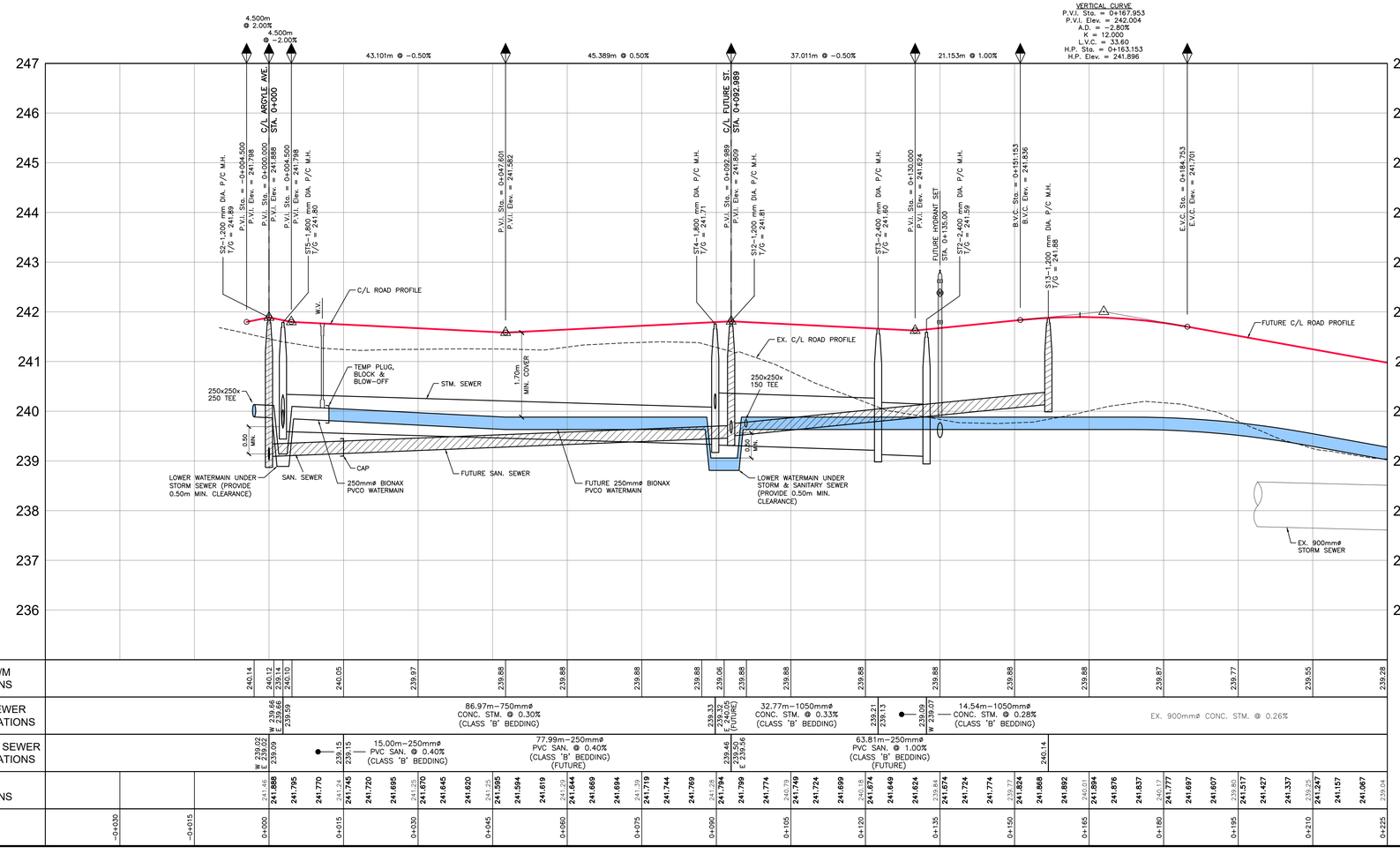
ARGYLE AVENUE
NORFOLK COUNTY

CLIENT: JELES DESIGN & CONSTRUCTION LTD.

SEPARATION DISTANCE

DESIGN:	R.W.P.	SCALE:	N.T.S.
DRAWN:	K.P.B.	JOB No:	13227
CHECKED:	R.W.P.		
SHEET:	1 of 1	DWG. No:	13227-SD1
DATE:	NOV. 12/21		


ARGYLE AVE.
SEE DWG. 13227-6
STREET 'A'
C/L CURVE DATA
△ = 76°28'11"
R = 16.750
T = 13.197
L = 22.355
C = 20.733
BC= 0+192.15
PI = 0+205.35
EC= 0+214.50
NORTH
SEE DWG. 13227-8
SEE DWG. 13227-6
SEE DWG. 13227-13
44
43
42
TEMP. PLUG, BLOCK & BLOW-OFF
FUTURE 1.5m C.S.W.
250mmø PVC W/M
FUTURE 77.99m-250mmø SAN. @ 0.40%
86.97m-750mmø STM. @ 0.30%
FUTURE 63.81m-250mmø SAN. @ 1.00%
32.77m-1050mmø STM. @ 0.33%
PROP. SAN. SERV.
PROP. WA. SERV.
PROP. 50mmø SAN. FORCEMAIN
PROP. SAN. PASSENT
ST1
ST2
ST3
ST4
ST5
S1
S2
S3
S4
S5
CB
DCB
MH
HYD.
V&B


4.500m @ 2.00%
4.500m @ -2.00%
43.101m @ -0.50%
45.389m @ 0.50%
37.011m @ -0.50%
21.153m @ 1.00%
VERTICAL CURVE
P.V.I. Sta. = 0+167.953
P.V.I. Elev. = 242.004
A.D. = -2.80%
K = 12.000
L.V.C. = 33.60
H.P. Sta. = 0+163.153
H.P. Elev. = 241.896
C/L ARGYLE AVE. STA. 0+000
C/L FUTURE ST STA. 0+092.989
S2-1,200 mm DIA. P/C M.H. I/O = 241.48
P.V.I. Sta. = 0+004.500
P.V.I. Elev. = 241.798
P.V.I. Sta. = 0+000.000
P.V.I. Elev. = 241.888
P.V.I. Sta. = 0+004.500
P.V.I. Elev. = 241.798
S75-1,800 mm DIA. P/C M.H. I/O = 241.60
P.V.I. Sta. = 0+047.601
P.V.I. Elev. = 241.382
S74-1,800 mm DIA. P/C M.H. I/O = 241.71
P.V.I. Sta. = 0+092.989
P.V.I. Elev. = 241.809
S12-1,200 mm DIA. P/C M.H. I/O = 241.81
S73-2,400 mm DIA. P/C M.H. I/O = 241.60
P.V.I. Sta. = 0+130.000
P.V.I. Elev. = 241.624
FUTURE HYDRANT SET STA. 0+130.00
S72-2,400 mm DIA. P/C M.H. I/O = 241.59
B.V.C. Sta. = 0+151.153
B.V.C. Elev. = 241.836
S13-1,200 mm DIA. P/C M.H. I/O = 241.88
E.V.C. Sta. = 0+184.753
E.V.C. Elev. = 241.701
C/L ROAD PROFILE
W.V.
TEMP PLUG, BLOCK & BLOW-OFF
250x250x 250 TEE
0.50 MIN.
1.70m MIN. COVER
STM. SEWER
SAN. SEWER
CAP
250mmø BIONAX PVCO WATERMAIN
LOWER WATERMAIN UNDER STORM SEWER (PROVIDE 0.50m MIN. CLEARANCE)
FUTURE SAN. SEWER
FUTURE 250mmø BIONAX PVCO WATERMAIN
EX. C/L ROAD PROFILE
250x250x 150 TEE
LOWER WATERMAIN UNDER STORM & SANITARY SEWER (PROVIDE 0.50m MIN. CLEARANCE)
FUTURE C/L ROAD PROFILE
EX. 900mmø STORM SEWER
247
246
245
244
243
242
241
240
239
238
237
236

| | | |

C/L CURVE DATA

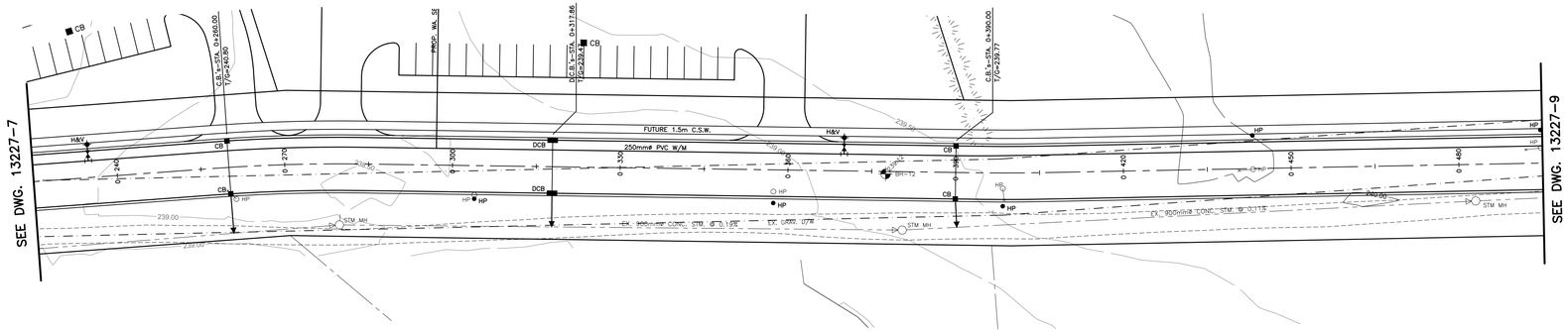
Δ = 5°01'19"
R = 300.000
T = 13.156
L = 26.296
C = 26.287
BC= 0+257.48
PI = 0+270.64
EC= 0+283.78

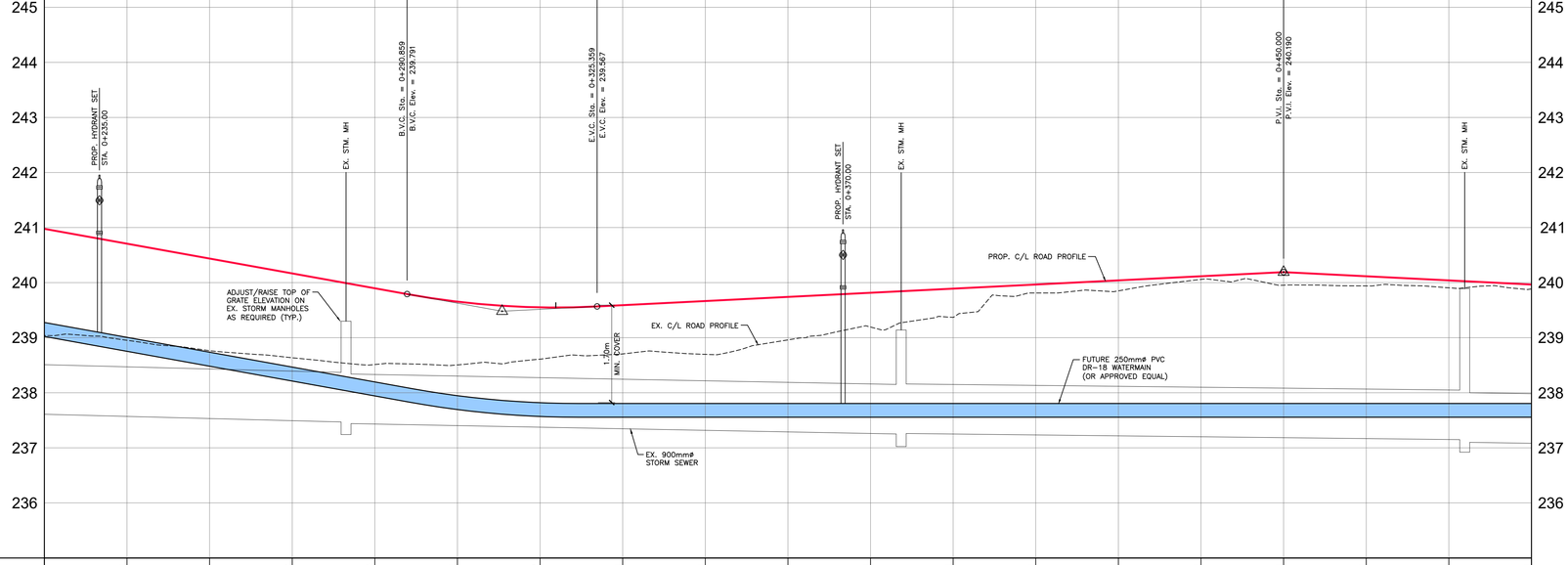
C/L CURVE DATA

Δ = 1°54'49"
R = 300.000
T = 5.010
L = 10.020
C = 10.019
BC= 0+394.93
PI = 0+399.94
EC= 0+404.95

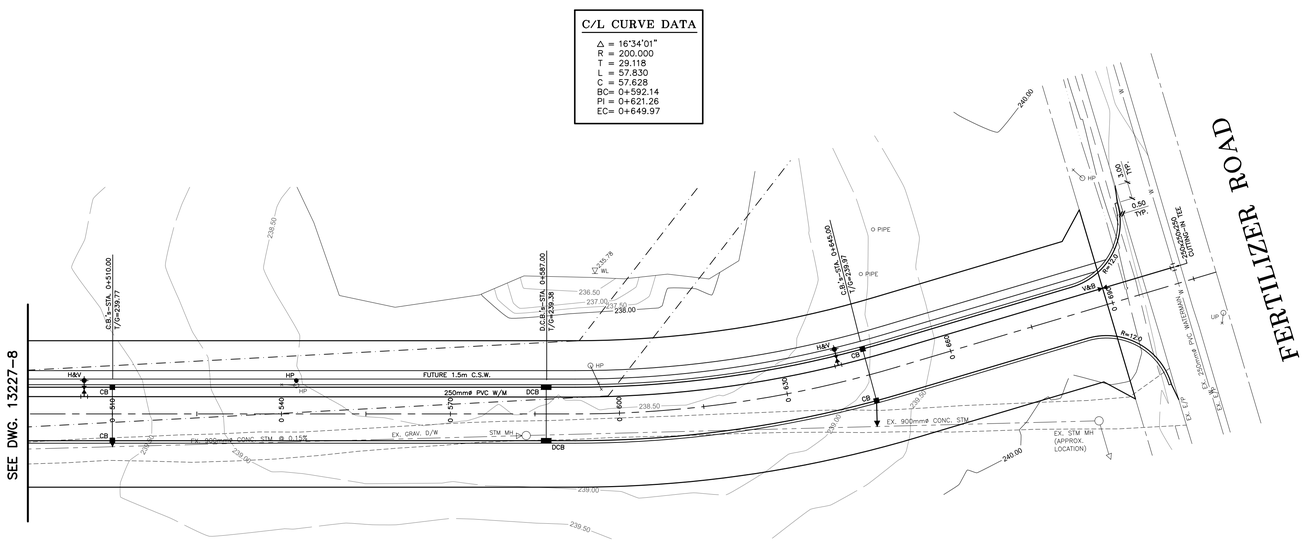
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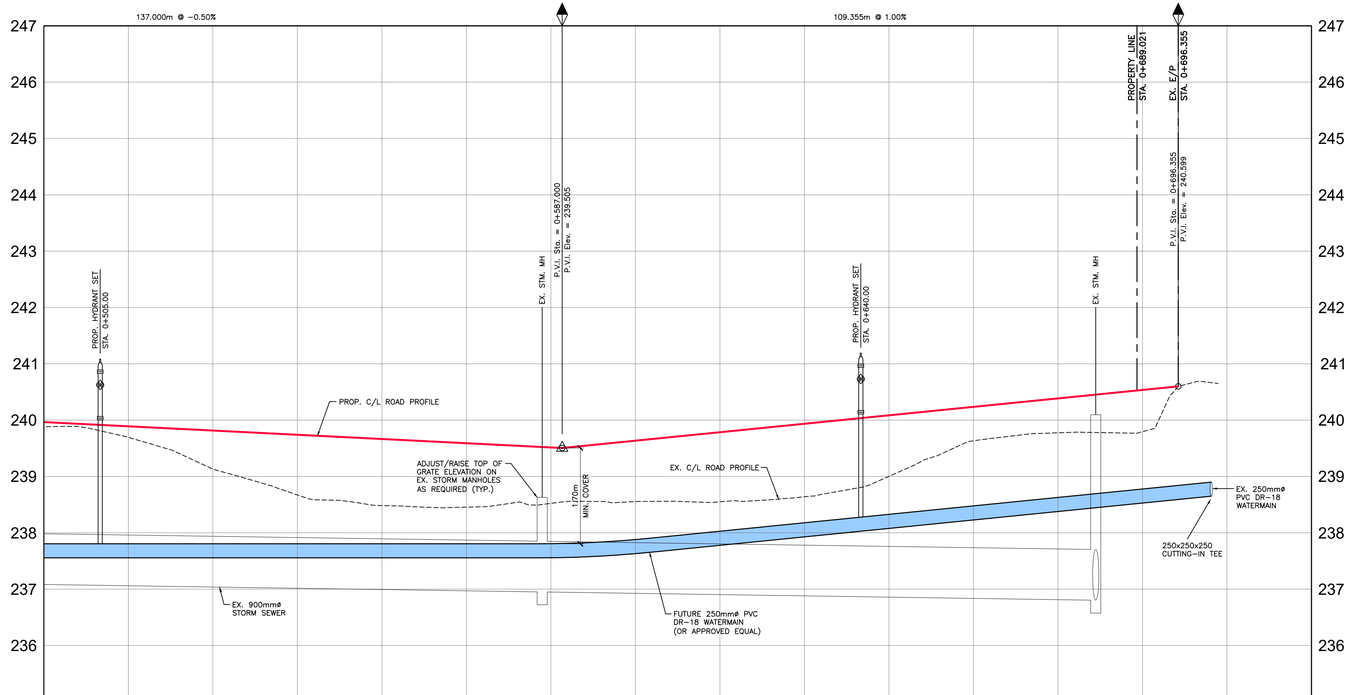
STREET 'A'



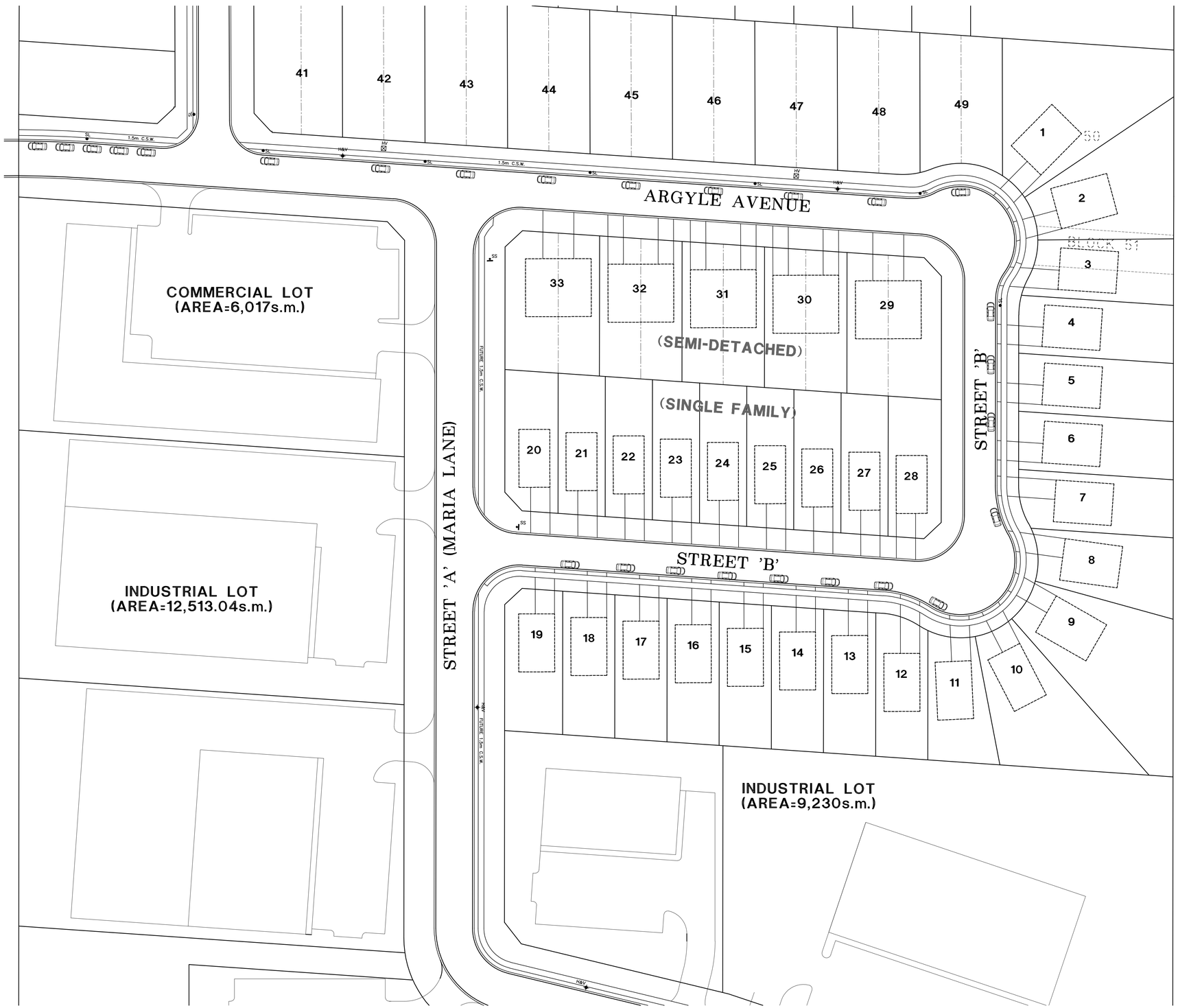


| | | |


C/L CURVE DATA
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T = 29.118
L = 57.830
C = 57.628
BC= 0+592.14
PI = 0+621.26
EC= 0+649.97
SEE DWG. 13227-8
FERTILIZER ROAD
STREET 'A'
FUTURE 1.5m C.S.W.
250mmø PVC W/M
EX. 900mmø CONC. STM.
EX. GRAV. D/W
STM. MH
EX. STM MH (APPROX. LOCATION)
EX. 250mmø PVC DR-18 WATERMAIN
C.B.'s-STA. 0+510.00
C.B.'s-STA. 0+587.00
C.B.'s-STA. 0+649.97
D.C.B.'s-STA. 0+539.38
H&V
HP
CB
DCB
Q HP
O PIPE
W
E
N
S


137.000m @ -0.50%
109.355m @ 1.00%
PROP. HYDRANT SET STA. 0+505.00
EX. STM. MH
P.V.I. Sta. = 0+587.000
P.V.I. Elev. = 239.505
PROP. HYDRANT SET STA. 0+640.00
EX. STM. MH
PROPERTY LINE STA. 0+689.021
EX. E/P STA. 0+696.355
P.V.I. Sta. = 0+696.355
P.V.I. Elev. = 240.599
PROP. C/L ROAD PROFILE
ADJUST/RAISE TOP OF GRATE ELEVATION ON EX. STORM MANHOLES AS REQUIRED (TYP.)
170m MIN. COVER
EX. C/L ROAD PROFILE
EX. 250mmø PVC DR-18 WATERMAIN
250x250x250 CUTTING-IN TEE
EX. 900mmø STORM SEWER
FUTURE 250mmø PVC DR-18 WATERMAIN (OR APPROVED EQUAL)

| | | |



N O R T H

STOP

'STOP' SIGN
(Ra-1)
N.T.S.

LEGEND:

SS PROPOSED "STOP" SIGN

NO.	REVISION	DATE (MM/DD/YY)	BY

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
440 HARDY ROAD , UNIT #1 , BRANTFORD – ONTARIO , N3T 5L8
TEL. (519) 753-2656 FAX. (519) 753-4263 www.cohooneng.com

PROJECT:

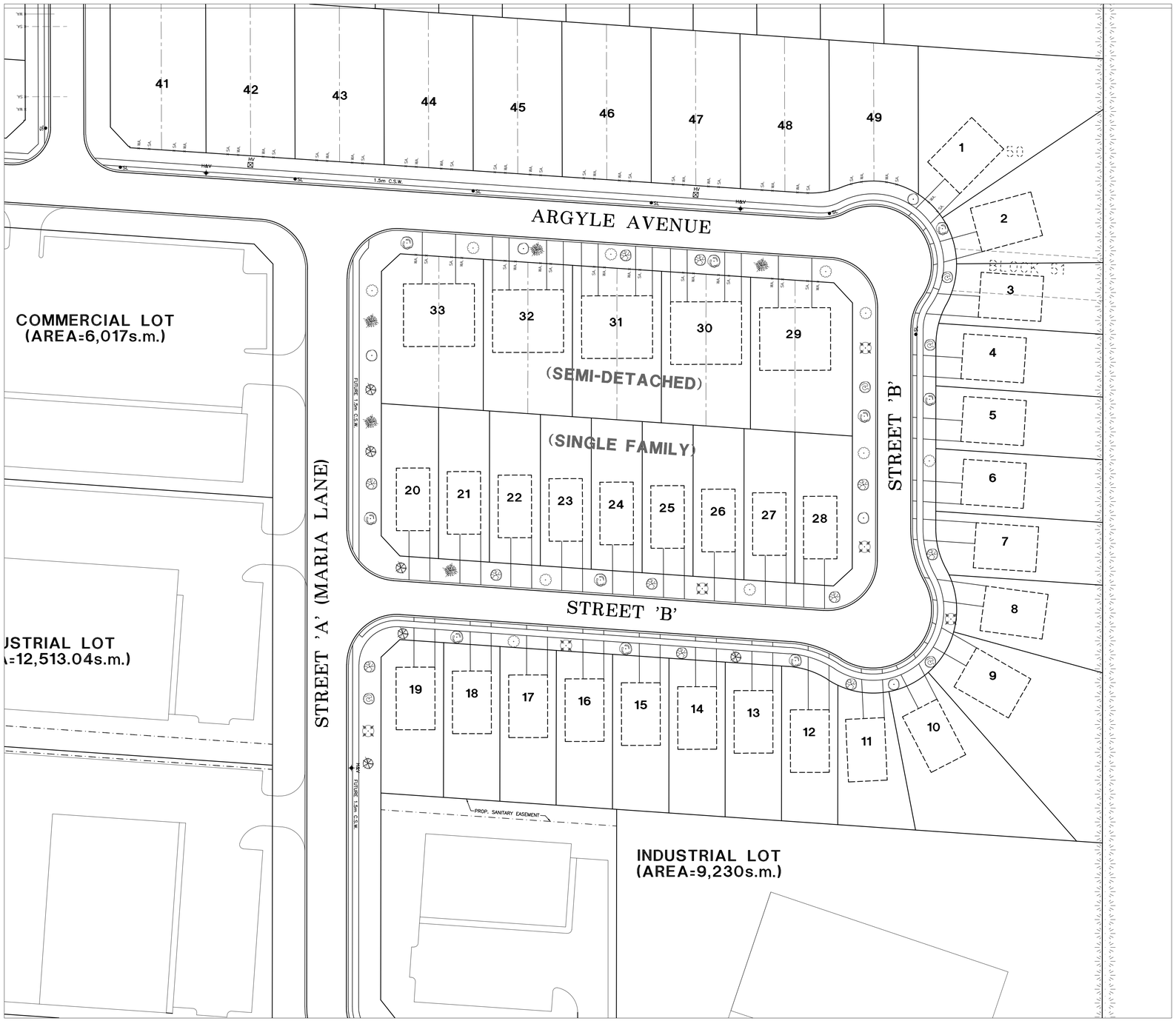
BLUEGRASS
ESTATES SUBDIVISION
(PHASE 4)
ARGYLE AVENUE
COUNTY OF NORFOLK

CLIENT: JELES DESIGN & CONSTRUCTION LTD.

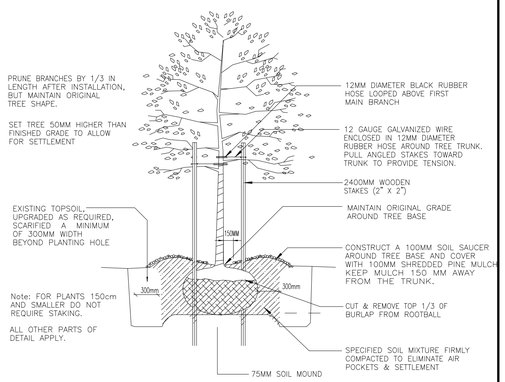
STREET SIGNAGE & TRAFFIC CONTROL PLAN

DESIGN:	R.W.P.	SCALE:	1:500
DRAWN:	S.L.M.	JOB No:	13227
CHECKED:	R.W.P.		
SHEET:	–	DWG. No:	13227–TR
DATE:	NOV. 18/25		

LICENSED PROFESSIONAL ENGINEER
21/11/25
R. W. PHILLIPS
PROVINCE OF ONTARIO







TYPICAL DECIDUOUS TREE PLANTING
NTS ALL DIMENSIONS IN MILLIMETRES

TREE SCHEDULE				
TYPE	BOTANICAL NAME	COMMON NAME	SIZE	QTY.
A	ACER X FREEMANII 'JEFFERSRED'	MAPLE AUTUMN BLAZE	60mm	6
B	AMELANCHIER LAEVIS TREEFORM	SERVICEBERRY STD.	50mm	10
C	CELTIS OCCIDENTALIS	HACKBERRY	60mm	11
D	GINGKO BILOBA	GINGKO	60mm	5
E	PLATANUS X ACERIFOLIA 'BLOODGOOD'	LONDON PLANE	60mm	5
F	QUERCUS RUBRA	RED OAK	60mm	5
G	TILIA TOMENTOSA 'STERLING SILVER'	SILVER LINDEN	60mm	6
H	LIRIODENDRON TULIPIFERA	TULIP TREE	60mm	10

NOTES:

1. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH BY-LAWS AND CODES HAVING JURISDICTION OVER SITE LOCATION.
2. COMPLETE ALL WORK TO THE SATISFACTION OF THE ENGINEER AND/OR COUNTY OF NORFOLK.
3. THE LANDSCAPE CONTRACTOR SHALL VERIFY ALL CONDITIONS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE EXISTING SERVICE LOCATIONS.
5. EXACT LOCATION OF PLANT MATERIAL WILL BE DETERMINED BY PLACEMENT OF SITE SERVICES SUCH AS HYDRO VAULTS, METERS, UTILITIES, ROOF RAIN WATER LEADERS, DRIVEWAYS, LIGHT STANDARDS ETC.
6. ALL PLANT MATERIAL LOCATIONS TO BE STAKED OR MARKED OUT AND APPROVED BY THE ENGINEER PRIOR TO INSTALLATION. SHOULD THE FINAL LOCATION OF DRIVEWAYS AND SITE SERVICES PREVENT THE INSLALATION OF ALL PLANT MATERIALS AS SHOWN FOR THAT LOT, THE REMAINING TREE(s) MAY BE PROVIDED TO THE HOMEOWNER UPON APPROVAL OF THE COUNTY.
7. INSTALL PLANT MATERIAL ACCORDING TO DETAILS SHOWN AND ONTARIO LANDSCAPE CONTRACTOR'S STANDARDS
8. DISTURBED SOIL AREAS AROUND TREES ARE TO BE COVERED WITH SHREDDED CONIFER BARK MULCH SUCH AS 'CANADA RED' OR 'GRO-BARK' SPM MULCH, OR APPROVED EQUAL. ALTERNATIVE MULCHES MUST BE APPROVED BY THE ENGINEER AND/OR COUNTY OF NORFOLK.
9. ALL SUPPORT SYSTEMS MUST BE REMOVED TO THE SATISFACTION OF THE ENGINEER AND/OR COUNTY OF NORFOLK ONCE THE TREE IS ESTABLISHED.
10. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE NOTED.
11. CONTRACTOR TO PROVIDE MIN. 1 YEAR WARRANTY FROM DATE ACCEPTED ON ALL WORK UNLESS OTHERWISE SPECIFIED.
12. ANY AREAS OUTSIDE THE LIMIT OF WORK DAMAGED BY THE CONTRACTOR SHALL BE RESTORED BY THE CONTRACTOR TO COUNTY OF NORFOLK STANDARDS AT NO ADDITIONAL COST.
13. ALL PLANT MATERIAL TO BE No. 1 GRADE, NURSERY GROWN IN ACCORDANCE WITH THE CANADIAN NURSERY TRADES ASSOCIATION.
14. AS PER COUNTY OF NORFOLK DEVELOPMENT AND ENGINEERING STANDARDS NO TREE SHALL BE PLANTED CLOSER THAN 17.5m TO THE FACE OF ANY TRAFFIC CONTROL SIGN (e.g. STOP, YIELD SPEED LIMIT, ETC.) AND FOR INTERSECTIONS WITHOUT SIGNS, NOT CLOSER THAN 15m TO THE INTERSECTION MEASURED FROM THE EDGE OF PAVEMENT OF THE INTERSECTING STREET.
15. ALL SIGNS TO BE MOUNTED ON GALVANIZED STEEL 'U' CHANNEL POSTS.
16. ALL TRAFFIC SIGNS AND PAVEMENT MARKINGS ARE TO BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE ONTARIO TRAFFIC MANUALS.

NO.	REVISION	DATE (MM/DD/YY)	BY

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
440 HARDY ROAD , UNIT #1 , BRANTFORD – ONTARIO , N3T 5L8
TEL. (519) 753-2656 FAX. (519) 753-4263 www.cohooneng.com

PROJECT:

BLUEGRASS ESTATES SUBDIVISION (PHASE 4)
ARGYLE AVENUE
NORFOLK COUNTY

CLIENT: JELES DESIGN & CONSTRUCTION LTD.

STREET TREE PLANTING PLAN

DESIGN:	R.W.P.	SCALE:	1:500
DRAWN:	S.L.M.	JOB No:	13227
CHECKED:	R.W.P.		
SHEET:	_	DWG. No:	13227–TP
DATE:	NOV. 18/25		



STORMWATER MANAGEMENT CONSIDERATIONS
PROPOSED MIXED USE DEVELOPMENT
BLUEGRASS ESTATES SUBDIVISION
Phase IV
Delhi, Ontario
Norfolk County

Prepared By:

J.H. Cohoon Engineering Limited
440 Hardy Road, Unit 1
Brantford, Ontario
N3T 5L8
Phone (519) 753-2656
Fax (519) 753-4263

Job: 13227

October 31, 2025

INTRODUCTION

The following Functional Servicing Report was prepared by J.H. Cohoon Engineering Limited for Mr. J. Jeles, and Mr. B. Jeles, of Jeles Design and Construction Ltd., in support of future planning applications relating to the site located at the north end of Argyle Street in the Town of Delhi, in Norfolk County. This report was prepared to demonstrate the servicing scheme for the proposed mixed use development that is to occur on the subject lands.

The development approach is to develop the site in a single-phase mixed use development that will consist of a mix of twenty eight (28) single family residential homes, five (5) semi-detached residential buildings and five (5) industrial buildings and a single (1) commercial building on the site which is illustrated on the concept plan of subdivision within Appendix 'A' of this report.

The legal description of the subject lands is Part of Lots 32, 47, 57, 62, 69 & 74, Lots 33 to 46 both inclusive, Lots 58 to 61 both inclusive, Lots 70 to 73 both inclusive Baldwin Street and Parts of Duchess & McIntosh Drives, Registered Plan 334, Geographic Township of Windham, Township of Delhi, Norfolk County. As noted, a preliminary Concept plan of subdivision is located within Appendix 'A' of this report. The overall size of the development is 9.73 Ha. in size.

The site is presently an existing agricultural land use that is currently planted with a variety of crops, with the proposal to develop a series of lots for both single family, semi-detached residential dwellings and industrial buildings, and commercial buildings.

The objective of this report is to document the servicing strategy to be utilized for the site in a proposed initial development. Full services will be installed (i.e., sanitary, storm and water) within the development and connected to the existing municipal system in the existing municipal road allowances or abutting the subject lot. The owner will assume full responsibility for the installation and maintenance of the services on the property.

PROPOSED DEVELOPMENT CONCEPT

The proposed development is to be constructed on the east side of Argyle Street within the Town of Delhi, in Norfolk County. As indicated the parcel of land is some 9.73 hectares in size. A key map illustrating the site location is provided in Figure 1.

The anticipated development is intended to be a series of single family homes, semidetached homes, industrial buildings and a commercial building. The following summarizes the proposed development

Single Family Homes	– 28 units	
Semi-detached Homes	– 10 Units	
Total Residential Units	- 38 Units	
Industrial Buildings		
Building No. 1	=	2,363.7 sq.m.
Building No. 2	=	1,393.5 sq.m.
Building No. 3	=	1,800.0 sq.m.
Building No. 4	=	700.0 sq.m.
Building No. 5	=	1,800.0 sq.m.
Commercial Building	=	1.955.8 sq.m.
Total Industrial Commercial Area		
	=	10,013.0 sq.m.

The development is illustrated on the plans prepared by J H Cohoon Engineering Limited being drawings which have been included within Appendix 'A' of this report

Site Location – Key Plan
Figure No. 1

SANITARY SEWERS & APPURTENANCES

3.1 Design Flows

This particular site is proposed to be fully connected to the municipal sanitary sewer system that is located on Argyle Avenue, just north of the proposed development. This site is an extension of Bluegrass Estates Subdivision Phase 3 which is presently under construction. This is the second and final phase of that development. The proposed buildings and the applicable services are illustrated on the attached grading and servicing plan as prepared by J H Cohoon Engineering Limited (Drawing SP1 and GP1 which have been included within Appendix 'C' of this report). In accordance with the current Norfolk County requirements, the design flows have been submitted to the Norfolk County Development Services Department for the review of the conveyance systems within the Town of Delhi (Norfolk County). The following information was provided to the Norfolk County for their use and consideration.

Sanitary Design Flows

Residential Component

38 Units Consists of

28 single family units

10 semi-detached units

3.0 person per unit
As per the requirements of the Norfolk County, the average daily flow is based upon 450 litres per person per day

450 x 3.0 x 38	=	51,300 litres per day
	=	0.594 litres per second
Total Average Design Flow	=	0.594 litres per second.

The industrial commercial component consists of the following:

Industrial Buildings		
Building No. 1	=	2,363.7 sq.m.
Building No. 2	=	1,393.5 sq.m.
Building No. 3	=	1,800.0 sq.m.
Building No. 4	=	700.0 sq.m.
Building No. 5	=	1,800.0 sq.m.
Commercial Building	=	1.955.8 sq.m.
Total Industrial Commercial Area	=	10,013.0 sq.m.

In accordance with the requirements of the Ontario Building Code, the industrial component defines the sanitary effluent on the basis of the number of employees whereas the following occupant loads are anticipated for this development

Industrial Buildings		
Building No. 1	=	25 persons
Building No. 2	=	15 persons
Building No. 3	=	20 persons
Building No. 4	=	10 persons
Building No. 5	=	20 persons
Total	=	90 persons

The anticipated flow associated with the industrial use if 75 litres per person per day (assuming no showers are present)

As per the requirements of the Ontario Building Code, the average daily flow is as follows:

90 persons x 75 litres per person per day

	=	6,750.0 litres per day
	=	0.078 litres per second

Total Average Design Industrial Flow = 0.078 litres per second.

The following occupant load is anticipated for this commercial component of this development

Commercial Building = 25 persons
The anticipated flow associated with the commercial use is 5 liters per sq.m. per day

On the basis of the floor area the following is the average daily flow rate for the commercial component

1.955.8 sq.m. x 5 liters per sq.m. per day
= 9,779 litres per day
= 0.113 litres per second

Total Average Design Industrial Flow = 0.113 litres per second.

Total Average Daily Flow
- Residential 0.594 litres per second.
- Industrial 0.078 litres per second.
- Commercial 0.113 litres per second.

Total 0.785 litres per second

On the basis of the Harmon Peaking Factor, and the total population for this site being 229 persons, the peaking factor of 4.126 (Max 4.0) was applied resulting in a peak design flow for this building being 3.140 litres per second.

With the consideration of Infiltration on this site as follows:

Site Area = 9.73 hectares
Infiltration Rate = 0.26 litres per second per hectare
Infiltration Allowance
= 2.530 litres per second

Summary of Results

Average Flow Rate (including Infiltration) = 3.315 litres per sec
Peak Flow Rate (including infiltration) = 5.670 litres per sec

The proposed and existing service connections have been illustrated on the preliminary servicing and grading plan as submitted being J H Cohoon Engineering Ltd drawing SP1 (Attached within Appendix 'C').

3.2 Sanitary Outlet

The sanitary sewer system for the subject development will be connected into the existing sanitary sewers on Argyle Avenue adjacent to the development. The analysis relating to the overall impact of this development on the receiving sanitary sewer system is being reviewed by Norfolk County Development Services Department.

WATERMAINS & APPURTENANCES

4.1 Design Flows

The peak design flow rate from the proposed development using current Norfolk County design standards. As with the wastewater, the estimated average flows have been detailed with the Sanitary Sewer Section of this report. (Section 3.1 above).

However, in this case the peaking factor of 2 has been utilized. The water demands have been updated to utilize a demand of 450 litres per person per day for the residential component)

The summary of the water system demands can be summarized as follows:

Average Daily Flow Rate (Litres per second)	Peak Daily Flow Rate* (Litres per second)
0.785	1.570

As per the Norfolk County design criteria, a peaking factor of 2 was used for the calculation of the peak flow rate. The peak hourly flow rate is 2.355 litres per second on the basis of a peaking factor of 3.

The proposed fire protection to this development will be handled by the proposed fire hydrants to be installed on the property.

The typical fie demand for single family and semi-detached units is 30 litres per second. However, the following sections detail the fire demands associated with the industrial commercial components of the proposed development.

In this application, we are proposing the installation of series of additional fire hydrants on the property. This section of the report details the fire protection requirements for the proposed industrial and commercial buildings as proposed on this site.

The proposed buildings include the following:

Industrial Buildings		
Building No. 1	=	2,363.7 sq.m.
Building No. 2	=	1,393.5 sq.m.
Building No. 3	=	1,800.0 sq.m.
Building No. 4	=	700.0 sq.m.
Building No. 5	=	1,800.0 sq.m.
Commercial Building	=	1.955.8 sq.m.
Total Industrial Commercial Area	=	10,013.0 sq.m.

In this case, the worst case scenario, relating to the required fire demand relates to Building 1 – Industrial Bldg. which have a building area of 2,363.7 sq.m. and being single storey in height.

The proposed fire protection to this development will be handled by the fire hydrants on or adjacent to the property.

The proposed building is anticipated to be a sprinklered building.

However, utilizing the requirements of the Fire Underwriters Survey 2020, the following outlines the water demand for the proposed building.

This building is approximately 2,363.7 sq. m. in size. With the building being 1 storey in height, the provisions of the Fire Underwriters Survey Document indicates that the as the building is of non-combustible construction with all vertical openings protected in accordance with the Ontario Building Code, the building area utilized in the calculation should be the building areas of the complete building and as such, in this case would be 2,363.7 sq.m.

Utilizing the Fire Underwriters Survey Document, our estimation of the required fire demand is as follows:

Estimate of Fire Flow Required	=	220 * C * SQRT (A)
Where C	=	Coefficient related to type of Construction
Fire Resistive Construction	=	1.0 (Normal Construction) In this case, a non-combustible construction

A = Total Area of the Building (As outlined above)
2,363.7 sq. m.

= 220 x 1.0 * SQRT (2,363.7)
= 10,695.9 litres per min
Rounded
= 11,000 litres per min

Modifications
Occupancy = Low Hazard Occupancy
= -15%
= -1,650 litres per min

Net Fire Demand = 9,350 litres per min

Further Modifications Automatic Sprinkler System = 50%
Reduction = 4,675 litres per min

Spatial Exposure (Estimated) – Building A

North	Street +/-	+ 0%
East	> 30m	+ 0%
West	> 30m +/-	+ 0%
South	18m +/-	+ 15%
Total		+ 15%
Increase		1,402.5 litres per min.

Total Fire Demand 6,077.5 litres per min
= 6,000 litres per min (Rounded)
= 100.0 litres per sec.

A similar situation occurs with respect to the commercial building. The required fire protection for the development would be in the order of 100.00 litres per second.

STORM SEWERS & APPURTENANCES

5.0 Storm Sewers / Stormwater Management

The site is intended to be serviced through the municipal drain located on the site that presently services the existing development (Bluegrass Estates Phase 3) and the abutting municipally owned stormwater management facility that is located on the adjacent property. The proposal is to relocate the existing stormwater management facility with the municipality contributing to the cost of the ultimate stormwater management facility. The site is intended to provide its own

stormwater management controls on the property to reduce the impact of the site on the existing drainage system. The overflow from this site will be directed in the pre-development direction. Infiltration techniques are being proposed on this site to reduce the discharge from the property.

Pre-development Condition

The external area associated with the pond is such that area drains into the existing stormwater management facility that is located on the Norfolk County property which is adjacent to the proposed development. The site presently drains in a southerly direction towards the existing CNR right-of-way that is located to the south of the development. We have included the overall plan as provided by Norfolk County with respect to the existing contributing external area which is considered in our analysis. The contributing drainage area from the existing municipal drain is in the order of 37.90 ha which contributes to the existing pond. The development portion of the site is some 12.886 ha in size.

The runoff characteristics of this site are determined utilizing the "MIDUSS" stormwater management computer simulation program. In accordance with the Norfolk County Standards, the following design storms are being utilized within this proposed development.

Design Storm

Chicago Storm – 3 Hour Duration
Design Storms

$I = A / (t + B) ** C$

Where: Design Storm Event	A	B	C
5 Year Storm	583.017	3.007	0.703
100 Year Storm	801.041	1.501	0.657

The runoff characteristics of the various storm events and input parameters are included in Appendix "A".

The results of the stormwater management analysis can be summarized as follows:

Design Storm Event	Peak Discharge Rate (cms)		
	Existing Contribution of External Area (37.90 Ha)	Existing Development Site (12.886 Ha)	Total
5	0.834	0.239	1.073
100	5.353	1.537	6.890

As indicated, the proposed scheme is intended to reduce the rate of runoff to below the pre-development rate for all storm events up to and including the 100-year storm event. The proposed storm water management pond is intended to replace the existing stormwater management facility that is located on the Norfolk County property complete with controls for the proposed development.

Post-Development Condition

In this application, the proposed drainage scheme involves the grading of the property to direct the runoff into a proposed stormwater management facility whereas both quality and quality controls are to be in place. The existing temporary stormwater management facility is to be abandoned with only a major overland flow route being constructed in its location

The proposed development is anticipated to increase the percentage of impervious surfaces to approximately 45.0%. Individual stormwater management controls are anticipated to be implemented on the industrial commercial lots within the subdivision.

In this application, we have determined that the following is representative of this particular site.

Residential Component		
Smallest Lot Area (including associated road)	=	540 sq.m.
Total Area	=	540 sq.m.

Impervious Surfaces		
House	=	120 sq.m
Driveway (10m x 4m)	=	40 sq.m
Roadway (12m x 4.25m)	=	51 sq.m.
Sidewalk (12m x 1.5m)	=	18 sq.m.
Total Impervious Surfaces	=	229 sq.m.

This result is an impervious area of approximately 42.4%. We note that this relates to the smallest lot within the subdivision. Other lots within the subdivision exceed the amount indicated above, which would result in the % impervious being even lower. However, for the purposes of this analysis, the % impervious was taken at 45% for the residential lots. In addition,

we have assumed that an industrial lot can control on site the discharge rate to the flow associated with 45 % impervious surface.

The overland flow from this site is directed towards the stormwater management facility and then an overland flow in the pre-development drainage area.

The runoff characteristics of the developed site were determined utilizing the "MIDUSS" stormwater management computer simulation program. The runoff characteristics of the post development condition is shown within "Appendix B" of this report.

The sizing of the infiltration galleries for the residential lots was completed as follows:

Anticipated Size of Residential Home
Volume of Water to be Stored (100 sq.m. home x 25mm infiltration)
= 2.5 cu.m. per lot

Size of Infiltration Gallery based upon two (2) infiltration galleries per lot
= 1.0m x 2.1 x 1.5m = 3.15 cu.m.
Void Ration = 0.4
Volume Stored in Gallery
= 1.0m x 2.1 x 1.5m x 0.4m = 1.26 cu.m.
(No allowance for infiltration has been included in the stormwater management analysis).

Post Development Runoff Results

Design Storm Event	Pre-Development Peak Discharge Rate (cms)	Post Development Peak Discharge Rate (cms)	
		W/o SWM	W/ SWM
5	1.073	6.464	0.355
100	6.890	13.098	5.009

The site is intended to be serviced through the municipal drain located on the site. The site is intended to provide its own stormwater management controls on the property to reduce the impact of the site on the existing drainage system. Infiltration techniques are being proposed on this site to reduce the discharge from the property. The results indicate that the overall discharge rates are being reduced as part of the analysis

GRADING

Road grades will be established for the proposed development and are illustrated on the plans appended to the report. Minimum (0.50%) and maximum (6.0%) grades have been used in accordance with City of Welland design criteria.

UTILITIES

Coordination of these services will be required with Union Gas, the hydro utility, Bell, and the local cable tv provider (if available)

CONCLUSIONS

The preceding sections of this report outline the servicing and grading requirements for the proposed residential development on this site. Based on the work completed to date, it may be concluded that the proposed development may be developed with full municipal services.

Report Prepared By:

J.H. COHOON ENGINEERING LIMITED



R. W. Phillips, P.Eng.

Appendix 'A'
Pre-Development Drainage Area Plan
MIDUSS Stormwater Analysis Output Files

```
"                MIDUSS Output ------------------------------------------------>"
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"                MIDUSS created                                      February-07-10"
"           10   Units used:                                             ie METRIC"
"                Job folder:                                       C:\swm\13227 4"
"                Output filename:                                          pre5.out"
"                Licensee name:                                                Bob"
"                Company                                                        "
"                Date & Time last used:                  23/03/2025 at 10:37:21 AM"
" 31          TIME PARAMETERS"
"       10.000   Time Step"
"      180.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      583.017   Coefficient A"
"        3.007   Constant B"
"        0.703   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity            92.454    mm/hr"
"             Total depth                  44.904    mm"
"            6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            2   Rectangular"
"            1   Equal length"
"            2   Horton equation"
"          101   No description"
"        0.000   % Impervious"
"       37.600   Total Area"
"      126.030   Flow length"
"        1.000   Overland Slope"
"       37.600   Pervious Area"
"      126.030   Pervious length"
"        1.000   Pervious slope"
"        0.000   Impervious Area"
"      126.030   Impervious length"
"        1.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       40.000   Pervious Max.infiltration"
"        7.000   Pervious Min.infiltration"
"        0.500   Pervious Lag constant (hours)"
"        7.500   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.500   Impervious Lag constant (hours)"
"        2.000   Impervious Depression storage"
"                    0.834     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           37.600     0.000      37.600     hectare"
"             Time of concentration  52.283     6.668      52.283     minutes"
"             Time to Centroid       109.834    0.000      109.834    minutes"
"             Rainfall depth         44.904     44.904     44.904     mm"
"             Rainfall volume        1.6884     0.0000     1.6884     ha-m"
"             Rainfall losses        37.132     44.904     37.132     mm"
"             Runoff depth           7.772      0.000      7.772      mm"
"             Runoff volume          2922.21    0.00       2922.21    c.m"
"             Runoff coefficient     0.173      0.000      0.173      "
```

```
"              Maximum flow            0.834      0.000      0.834      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.834     0.834     0.000     0.000"
" 51           PIPE DESIGN"
"          0.834   Current peak flow    c.m/sec"
"          0.013   Manning 'n'"
"          1.000   Diameter    metre"
"          1.000   Gradient   %"
"               Depth of flow                 0.407    metre"
"               Velocity                      2.777    m/sec"
"               Pipe capacity                 2.398    c.m/sec"
"               Critical depth                0.521    metre"
" 53           ROUTE Zero Route"
"           0.00   Zero Route Reach length   ( metre)"
"                    0.834     0.834     0.834     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    99"
"             6   Combine "
"            99   Node #"
"                 "
"               Maximum flow                  0.834    c.m/sec"
"               Hydrograph volume          2922.210    c.m"
"                    0.834     0.834     0.834     0.834"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    0.834     0.000     0.834     0.834"
" 33           CATCHMENT 102"
"             2   Rectangular"
"             1   Equal length"
"             2   Horton equation"
"           102   No description"
"         0.000   % Impervious"
"        12.886   Total Area"
"       169.370   Flow length"
"         1.000   Overland Slope"
"        12.886   Pervious Area"
"       169.370   Pervious length"
"         1.000   Pervious slope"
"         0.000   Impervious Area"
"       169.370   Impervious length"
"         1.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        40.000   Pervious Max.infiltration"
"         7.000   Pervious Min.infiltration"
"         0.500   Pervious Lag constant (hours)"
"         7.500   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.500   Impervious Lag constant (hours)"
"         2.000   Impervious Depression storage"
"                    0.239     0.000     0.834     0.834 c.m/sec"
"              Catchment 102          Pervious   Impervious Total Area "
"              Surface Area           12.886     0.000      12.886     hectare"
"              Time of concentration  62.428     7.962      62.428     minutes"
"              Time to Centroid       116.049    92.314     116.049    minutes"
"              Rainfall depth         44.904     44.904     44.904     mm"
"              Rainfall volume        5786.36    0.01       5786.36    c.m"
"              Rainfall losses        37.132     2.000      37.132     mm"
"              Runoff depth           7.772      42.904     7.772      mm"
```

```
"              Runoff volume          1001.48    0.01       1001.48    c.m"
"              Runoff coefficient     0.173      0.000      0.173      "
"              Maximum flow           0.239      0.000      0.239      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.239     0.239     0.834     0.834"
" 51           PIPE DESIGN"
"          0.239   Current peak flow    c.m/sec"
"          0.013   Manning 'n'"
"          1.000   Diameter    metre"
"          1.000   Gradient    %"
"               Depth of flow                0.213    metre"
"               Velocity                     1.951    m/sec"
"               Pipe capacity                2.398    c.m/sec"
"               Critical depth               0.272    metre"
" 53           ROUTE Zero Route"
"           0.00   Zero Route Reach length   ( metre)"
"                    0.239     0.239     0.239     0.834 c.m/sec"
" 40           HYDROGRAPH Undo"
"             1   Undo"
"                    0.239     0.239     0.239     0.834"
" 40           HYDROGRAPH   Combine    99"
"             6   Combine "
"            99   Node #"
"                 "
"               Maximum flow                 1.073    c.m/sec"
"               Hydrograph volume         3923.697    c.m"
"                    0.239     0.239      0.239     1.073"
" 40           HYDROGRAPH   Confluence    99"
"             7   Confluence "
"            99   Node #"
"                 "
"               Maximum flow                 1.073    c.m/sec"
"               Hydrograph volume         3923.696    c.m"
"                    0.239     1.073      0.239     0.000"
" 38           START/RE-START TOTALS 99"
"             3   Runoff Totals on EXIT"
"               Total Catchment area                    50.486    hectare"
"               Total Impervious area                    0.000    hectare"
"               Total % impervious                       0.000"
" 19           EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                              Version 2.25  rev. 473"
"                MIDUSS created                                      February-07-10"
"           10   Units used:                                             ie METRIC"
"                Job folder:                                        C:\swm\13227 4"
"                Output filename:                                       pre100.out"
"                Licensee name:                                                Bob"
"                Company                                                        "
"                Date & Time last used:                  23/03/2025 at 10:44:04 AM"
" 31          TIME PARAMETERS"
"       10.000   Time Step"
"      180.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      801.041   Coefficient A"
"        1.501   Constant B"
"        0.657   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          155.782    mm/hr"
"             Total depth                 78.830    mm"
"            6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            2   Rectangular"
"            1   Equal length"
"            2   Horton equation"
"          101   No description"
"        0.000   % Impervious"
"       37.600   Total Area"
"      126.030   Flow length"
"        1.000   Overland Slope"
"       37.600   Pervious Area"
"      126.030   Pervious length"
"        1.000   Pervious slope"
"        0.000   Impervious Area"
"      126.030   Impervious length"
"        1.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       40.000   Pervious Max.infiltration"
"        7.000   Pervious Min.infiltration"
"        0.500   Pervious Lag constant (hours)"
"        7.500   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.500   Impervious Lag constant (hours)"
"        2.000   Impervious Depression storage"
"                    5.353     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           37.600     0.000      37.600     hectare"
"             Time of concentration  30.869     5.412      30.869     minutes"
"             Time to Centroid       114.368    89.989     114.368    minutes"
"             Rainfall depth         78.830     78.830     78.830     mm"
"             Rainfall volume        2.9640     0.0000     2.9640     ha-m"
"             Rainfall losses        41.520     2.000      41.520     mm"
"             Runoff depth           37.310     76.830     37.310     mm"
"             Runoff volume          1.4029     0.0000     1.4029     ha-m"
"             Runoff coefficient     0.473      0.000      0.473      "
```

```
"              Maximum flow          5.353      0.000      5.353      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    5.353     5.353     0.000     0.000"
" 51           PIPE DESIGN"
"         5.353   Current peak flow    c.m/sec"
"         0.013   Manning 'n'"
"         1.000   Diameter    metre"
"         1.000   Gradient   %"
"              Surcharged HGL               4.985    %"
"              Velocity                     6.816    m/sec"
"              Pipe capacity                2.398    c.m/sec"
"              Critical depth               0.000    metre"
" 53           ROUTE Zero Route"
"          0.00   Zero Route Reach length   ( metre)"
"                    5.353     5.353     5.353     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    99"
"             6   Combine "
"            99   Node #"
"                 "
"              Maximum flow                 5.353    c.m/sec"
"              Hydrograph volume        14028.654    c.m"
"                    5.353     5.353     5.353     5.353"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    5.353     0.000     5.353     5.353"
" 33           CATCHMENT 102"
"             2   Rectangular"
"             1   Equal length"
"             2   Horton equation"
"           102   No description"
"         0.000   % Impervious"
"        12.886   Total Area"
"       169.370   Flow length"
"         1.000   Overland Slope"
"        12.886   Pervious Area"
"       169.370   Pervious length"
"         1.000   Pervious slope"
"         0.000   Impervious Area"
"       169.370   Impervious length"
"         1.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        40.000   Pervious Max.infiltration"
"         7.000   Pervious Min.infiltration"
"         0.500   Pervious Lag constant (hours)"
"         7.500   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.500   Impervious Lag constant (hours)"
"         2.000   Impervious Depression storage"
"                    1.537     0.000     5.353     5.353 c.m/sec"
"              Catchment 102          Pervious   Impervious Total Area "
"              Surface Area           12.886     0.000      12.886     hectare"
"              Time of concentration  36.859     6.462      36.859     minutes"
"              Time to Centroid       119.525    90.643     119.525    minutes"
"              Rainfall depth         78.830     78.830     78.830     mm"
"              Rainfall volume        1.0158     0.0000     1.0158     ha-m"
"              Rainfall losses        41.520     2.000      41.520     mm"
"              Runoff depth           37.310     76.830     37.310     mm"
```

```
"              Runoff volume          4807.79    0.01       4807.80    c.m"
"              Runoff coefficient     0.473      0.000      0.473      "
"              Maximum flow           1.537      0.000      1.537      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    1.537     1.537     5.353     5.353"
" 51           PIPE DESIGN"
"          1.537   Current peak flow    c.m/sec"
"          0.013   Manning 'n'"
"          1.000   Diameter    metre"
"          1.000   Gradient    %"
"               Depth of flow                 0.582    metre"
"               Velocity                      3.240    m/sec"
"               Pipe capacity                 2.398    c.m/sec"
"               Critical depth                0.715    metre"
" 53           ROUTE Zero Route"
"           0.00   Zero Route Reach length   ( metre)"
"                    1.537     1.537     1.537     5.353 c.m/sec"
" 40           HYDROGRAPH   Combine    99"
"             6   Combine "
"            99   Node #"
"                 "
"               Maximum flow                  6.890    c.m/sec"
"               Hydrograph volume         18836.453    c.m"
"                    1.537     1.537     1.537     6.890"
" 40           HYDROGRAPH   Confluence    99"
"             7   Confluence "
"            99   Node #"
"                 "
"               Maximum flow                  6.890    c.m/sec"
"               Hydrograph volume         18836.455    c.m"
"                    1.537     6.890     1.537     0.000"
" 38           START/RE-START TOTALS 99"
"             3   Runoff Totals on EXIT"
"              Total Catchment area                    50.486    hectare"
"              Total Impervious area                    0.000    hectare"
"              Total % impervious                       0.000"
" 19           EXIT"
```

Appendix 'B'
Post-Development Drainage Area Plan
MIDUSS Stormwater Analysis Output Files

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                              Version 2.25  rev. 473"
"                MIDUSS created                                      February-07-10"
"           10   Units used:                                             ie METRIC"
"                Job folder:                                        C:\swm\13227 4"
"                Output filename:                                        pst52.out"
"                Licensee name:                                                Bob"
"                Company                                                         "
"                Date & Time last used:                  23/03/2025 at 11:33:08 AM"
" 31          TIME PARAMETERS"
"       10.000   Time Step"
"      180.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      583.017   Coefficient A"
"        3.007   Constant B"
"        0.703   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity            92.454    mm/hr"
"             Total depth                  44.904    mm"
"            6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            2   Rectangular"
"            1   Equal length"
"            2   Horton equation"
"          101   No description"
"       45.000   % Impervious"
"       37.600   Total Area"
"      126.030   Flow length"
"        1.000   Overland Slope"
"       20.680   Pervious Area"
"      126.030   Pervious length"
"        1.000   Pervious slope"
"       16.920   Impervious Area"
"      126.030   Impervious length"
"        1.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       40.000   Pervious Max.infiltration"
"        7.000   Pervious Min.infiltration"
"        0.500   Pervious Lag constant (hours)"
"        7.500   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.500   Impervious Lag constant (hours)"
"        2.000   Impervious Depression storage"
"                    4.760     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           20.680     16.920     37.600     hectare"
"             Time of concentration  52.283     6.668      14.936     minutes"
"             Time to Centroid       109.834    91.339     94.692     minutes"
"             Rainfall depth         44.904     44.904     44.904     mm"
"             Rainfall volume        0.9286     0.7598     1.6884     ha-m"
"             Rainfall losses        37.132     2.000      21.323     mm"
"             Runoff depth           7.772      42.904     23.581     mm"
"             Runoff volume          1607.22    7259.40    8866.62    c.m"
"             Runoff coefficient     0.173      0.955      0.525      "
```

```
"              Maximum flow            0.458      4.358      4.760      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     4.760     4.760     0.000     0.000"
" 51           PIPE DESIGN"
"         4.760   Current peak flow    c.m/sec"
"         0.013   Manning 'n'"
"         1.000   Diameter    metre"
"         1.000   Gradient   %"
"              Surcharged HGL                3.941    %"
"              Velocity                      6.060    m/sec"
"              Pipe capacity                 2.398    c.m/sec"
"              Critical depth                0.000    metre"
" 53           ROUTE Zero Route"
"          0.00   Zero Route Reach length   ( metre)"
"                     4.760     4.760     4.760     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    99"
"             6   Combine "
"            99   Node #"
"                 "
"              Maximum flow                  4.760    c.m/sec"
"              Hydrograph volume          8866.619    c.m"
"                     4.760     4.760     4.760     4.760"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                     4.760     0.000     4.760     4.760"
" 33           CATCHMENT 102"
"             2   Rectangular"
"             1   Equal length"
"             2   Horton equation"
"           102   No description"
"        45.000   % Impervious"
"        12.886   Total Area"
"       169.370   Flow length"
"         1.000   Overland Slope"
"         7.087   Pervious Area"
"       169.370   Pervious length"
"         1.000   Pervious slope"
"         5.799   Impervious Area"
"       169.370   Impervious length"
"         1.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        40.000   Pervious Max.infiltration"
"         7.000   Pervious Min.infiltration"
"         0.500   Pervious Lag constant (hours)"
"         7.500   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.500   Impervious Lag constant (hours)"
"         2.000   Impervious Depression storage"
"                     1.694     0.000     4.760     4.760 c.m/sec"
"              Catchment 102          Pervious   Impervious Total Area "
"              Surface Area           7.087      5.799      12.886     hectare"
"              Time of concentration  62.428     7.962      17.835     minutes"
"              Time to Centroid       116.049    92.314     96.616     minutes"
"              Rainfall depth         44.904     44.904     44.904     mm"
"              Rainfall volume        3182.50    2603.86    5786.36    c.m"
"              Rainfall losses        37.132     2.000      21.323     mm"
"              Runoff depth           7.772      42.904     23.581     mm"
```

```
"             Runoff volume          550.81     2487.89    3038.71    c.m"
"             Runoff coefficient     0.173      0.955      0.525      "
"             Maximum flow           0.132      1.579      1.694      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   1.694     1.694     4.760     4.760"
" 51          PIPE DESIGN"
"         1.694   Current peak flow    c.m/sec"
"         0.013   Manning 'n'"
"         1.000   Diameter    metre"
"         1.000   Gradient    %"
"              Depth of flow                 0.620    metre"
"              Velocity                      3.310    m/sec"
"              Pipe capacity                 2.398    c.m/sec"
"              Critical depth                0.751    metre"
" 53          ROUTE Zero Route"
"          0.00   Zero Route Reach length   ( metre)"
"                   1.694     1.694     1.694     4.760 c.m/sec"
" 40          HYDROGRAPH   Combine    99"
"            6   Combine "
"           99   Node #"
"                "
"             Maximum flow                  6.454    c.m/sec"
"             Hydrograph volume         11905.326    c.m"
"                   1.694     1.694     1.694     6.454"
" 40          HYDROGRAPH   Confluence    99"
"            7   Confluence "
"           99   Node #"
"                "
"             Maximum flow                  6.454    c.m/sec"
"             Hydrograph volume         11905.325    c.m"
"                   1.694     6.454     1.694     0.000"
" 56          DIVERSION"
"           99   Node number"
"         9.000   Overflow threshold"
"         1.000   Required diverted fraction"
"             0   Conduit type; 1=Pipe;2=Channel"
"              Peak of diverted flow         0.000    c.m/sec"
"              Volume of diverted flow       0.000    c.m"
"              DIV00099.005hyd"
"              No Flow Diverted"
"                   1.694     6.454     6.454     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                   1.694     6.454     6.454     0.000"
" 56          DIVERSION"
"          102   Node number"
"         9.500   Overflow threshold"
"         1.000   Required diverted fraction"
"             0   Conduit type; 1=Pipe;2=Channel"
"              Peak of diverted flow         0.000    c.m/sec"
"              Volume of diverted flow       0.000    c.m"
"              DIV00102.005hyd"
"              No Flow Diverted"
"                   1.694     6.454     6.454     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                   1.694     6.454     6.454     0.000"
" 54          POND DESIGN"
"         6.454   Current peak flow    c.m/sec"
```

```
"        1.100   Target outflow    c.m/sec"
"      11905.3   Hydrograph volume    c.m"
"           5.   Number of stages"
"      237.750   Minimum water level    metre"
"      240.000   Maximum water level    metre"
"      237.750   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                237.750   0.03060  1.00E-06"
"                238.313    0.1016  3957.030"
"                238.875    0.1404  8391.300"
"                239.438    0.8105  13446.03"
"                240.000    0.9161  19185.08"
"              Peak outflow                  0.355    c.m/sec"
"              Maximum level               239.056    metre"
"              Maximum storage           10013.728    c.m"
"              Centroidal lag               12.889   hours"
"                   1.694     6.454     0.355     0.000 c.m/sec"
" 40           HYDROGRAPH Next link "
"             5   Next link "
"                       1.694     0.355     0.355     0.000"
" 51           PIPE DESIGN"
"         0.355   Current peak flow    c.m/sec"
"         0.013   Manning 'n'"
"         0.600   Diameter    metre"
"         0.500   Gradient   %"
"              Depth of flow                 0.413    metre"
"              Velocity                      1.713    m/sec"
"              Pipe capacity                 0.434    c.m/sec"
"              Critical depth                0.390    metre"
" 53           ROUTE    Pipe Route 56"
"         55.50      Pipe Route 56 Reach length   ( metre)"
"         0.000   X-factor <= 0.5"
"        24.299   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.531   Beta weighting factor"
"        50.000   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.355    c.m/sec"
"                     1.694     0.355     0.355     0.000 c.m/sec"
" 38           START/RE-START TOTALS 102"
"             3   Runoff Totals on EXIT"
"              Total Catchment area                      50.486    hectare"
"              Total Impervious area                     22.719    hectare"
"              Total % impervious                        45.000"
" 19           EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                              Version 2.25  rev. 473"
"                MIDUSS created                                      February-07-10"
"           10   Units used:                                            ie METRIC"
"                Job folder:                                       C:\swm\13227 4"
"                Output filename:                                     pst1002.out"
"                Licensee name:                                              Bob"
"                Company                                                       "
"                Date & Time last used:                  23/03/2025 at 11:23:05 AM"
" 31          TIME PARAMETERS"
"       10.000   Time Step"
"      180.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      801.041   Coefficient A"
"        1.501   Constant B"
"        0.657   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity           155.782    mm/hr"
"             Total depth                  78.830    mm"
"            6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            2   Rectangular"
"            1   Equal length"
"            2   Horton equation"
"          101   No description"
"       45.000   % Impervious"
"       37.600   Total Area"
"      126.030   Flow length"
"        1.000   Overland Slope"
"       20.680   Pervious Area"
"      126.030   Pervious length"
"        1.000   Pervious slope"
"       16.920   Impervious Area"
"      126.030   Impervious length"
"        1.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       40.000   Pervious Max.infiltration"
"        7.000   Pervious Min.infiltration"
"        0.500   Pervious Lag constant (hours)"
"        7.500   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.500   Impervious Lag constant (hours)"
"        2.000   Impervious Depression storage"
"                    9.860     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           20.680     16.920     37.600     hectare"
"             Time of concentration  30.869     5.412      14.894     minutes"
"             Time to Centroid       114.368    89.989     99.069     minutes"
"             Rainfall depth         78.830     78.830     78.830     mm"
"             Rainfall volume        1.6302     1.3338     2.9640     ha-m"
"             Rainfall losses        41.520     2.000      23.736     mm"
"             Runoff depth           37.310     76.830     55.094     mm"
"             Runoff volume          0.7716     1.3000     2.0715     ha-m"
"             Runoff coefficient     0.473      0.975      0.699      "
```

```
"              Maximum flow            2.944      7.322      9.860      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     9.860     9.860     0.000     0.000"
" 51           PIPE DESIGN"
"         9.860   Current peak flow    c.m/sec"
"         0.013   Manning 'n'"
"         1.000   Diameter    metre"
"         1.000   Gradient   %"
"              Surcharged HGL               16.913    %"
"              Velocity                     12.554    m/sec"
"              Pipe capacity                 2.398    c.m/sec"
"              Critical depth                0.000    metre"
" 53           ROUTE Zero Route"
"          0.00   Zero Route Reach length   ( metre)"
"                     9.860     9.860     9.860     0.000 c.m/sec"
" 40           HYDROGRAPH   Combine    99"
"             6   Combine "
"            99   Node #"
"                 "
"              Maximum flow                  9.860    c.m/sec"
"              Hydrograph volume         20715.416    c.m"
"                     9.860     9.860     9.860     9.860"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                     9.860     0.000     9.860     9.860"
" 33           CATCHMENT 102"
"             2   Rectangular"
"             1   Equal length"
"             2   Horton equation"
"           102   No description"
"        45.000   % Impervious"
"        12.886   Total Area"
"       169.370   Flow length"
"         1.000   Overland Slope"
"         7.087   Pervious Area"
"       169.370   Pervious length"
"         1.000   Pervious slope"
"         5.799   Impervious Area"
"       169.370   Impervious length"
"         1.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        40.000   Pervious Max.infiltration"
"         7.000   Pervious Min.infiltration"
"         0.500   Pervious Lag constant (hours)"
"         7.500   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.500   Impervious Lag constant (hours)"
"         2.000   Impervious Depression storage"
"                     3.238     0.000     9.860     9.860 c.m/sec"
"              Catchment 102          Pervious   Impervious Total Area "
"              Surface Area           7.087      5.799      12.886     hectare"
"              Time of concentration  36.859     6.462      17.784     minutes"
"              Time to Centroid       119.525    90.643     101.401    minutes"
"              Rainfall depth         78.830     78.830     78.830     mm"
"              Rainfall volume        0.5587     0.4571     1.0158     ha-m"
"              Rainfall losses        41.520     2.000      23.736     mm"
"              Runoff depth           37.310     76.830     55.094     mm"
```

```
"            Runoff volume          2644.29    4455.15    7099.44    c.m"
"            Runoff coefficient     0.473      0.975      0.699      "
"            Maximum flow           0.845      2.509      3.238      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  3.238     3.238     9.860     9.860"
" 51         PIPE DESIGN"
"       3.238   Current peak flow    c.m/sec"
"       0.013   Manning 'n'"
"       1.000   Diameter    metre"
"       1.000   Gradient   %"
"            Surcharged HGL                1.824    %"
"            Velocity                      4.123    m/sec"
"            Pipe capacity                 2.398    c.m/sec"
"            Critical depth                0.000    metre"
" 53         ROUTE Zero Route"
"        0.00   Zero Route Reach length   ( metre)"
"                  3.238     3.238     3.238     9.860 c.m/sec"
" 40         HYDROGRAPH   Combine    99"
"           6   Combine "
"          99   Node #"
"               "
"            Maximum flow                 13.098    c.m/sec"
"            Hydrograph volume         27814.854    c.m"
"                  3.238     3.238     3.238    13.098"
" 40         HYDROGRAPH   Confluence    99"
"           7   Confluence "
"          99   Node #"
"               "
"            Maximum flow                 13.098    c.m/sec"
"            Hydrograph volume         27814.852    c.m"
"                  3.238    13.098     3.238     0.000"
" 56         DIVERSION"
"          99   Node number"
"       9.000   Overflow threshold"
"       1.000   Required diverted fraction"
"           0   Conduit type; 1=Pipe;2=Channel"
"            Peak of diverted flow         4.098    c.m/sec"
"            Volume of diverted flow    2458.830    c.m"
"            DIV00099.005hyd"
"            Divert to Overland Flow 4.098 cms"
"                  3.238    13.098     9.000     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  3.238     9.000     9.000     0.000"
" 56         DIVERSION"
"         102   Node number"
"       9.500   Overflow threshold"
"       1.000   Required diverted fraction"
"           0   Conduit type; 1=Pipe;2=Channel"
"            Peak of diverted flow         0.000    c.m/sec"
"            Volume of diverted flow       0.000    c.m"
"            DIV00102.005hyd"
"            No Flow Diverted"
"                  3.238     9.000     9.000     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  3.238     9.000     9.000     0.000"
" 54         POND DESIGN"
"       9.000   Current peak flow    c.m/sec"
```

```
"        1.100   Target outflow    c.m/sec"
"       25356.0   Hydrograph volume    c.m"
"           5.   Number of stages"
"      237.750   Minimum water level    metre"
"      240.000   Maximum water level    metre"
"      237.750   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                237.750   0.03060  1.00E-06"
"                238.313    0.1016  3957.030"
"                238.875    0.1404  8391.300"
"                239.438    0.8105  13446.03"
"                240.000    0.9161  19185.08"
"              Peak outflow                  0.911    c.m/sec"
"              Maximum level               239.972    metre"
"              Maximum storage           18901.488    c.m"
"              Centroidal lag                9.587   hours"
"                   3.238     9.000     0.911     0.000 c.m/sec"
" 40           HYDROGRAPH Next link "
"             5   Next link "
"                      3.238     0.911     0.911     0.000"
" 51           PIPE DESIGN"
"         0.911   Current peak flow    c.m/sec"
"         0.013   Manning 'n'"
"         0.600   Diameter    metre"
"         0.500   Gradient   %"
"              Surcharged HGL               2.201    %"
"              Velocity                     3.222    m/sec"
"              Pipe capacity                0.434    c.m/sec"
"              Critical depth               0.000    metre"
" 53           ROUTE    Pipe Route 56"
"         55.50      Pipe Route 56 Reach length   ( metre)"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"         0.000   Routing time step   ( seconds)"
"             0   No. of sub-reaches"
"              Peak outflow                  0.911    c.m/sec"
"                     3.238     0.911     0.911     0.000 c.m/sec"
" 38           START/RE-START TOTALS 102"
"             3   Runoff Totals on EXIT"
"              Total Catchment area                      50.486    hectare"
"              Total Impervious area                     22.719    hectare"
"              Total % impervious                        45.000"
" 19           EXIT"
```

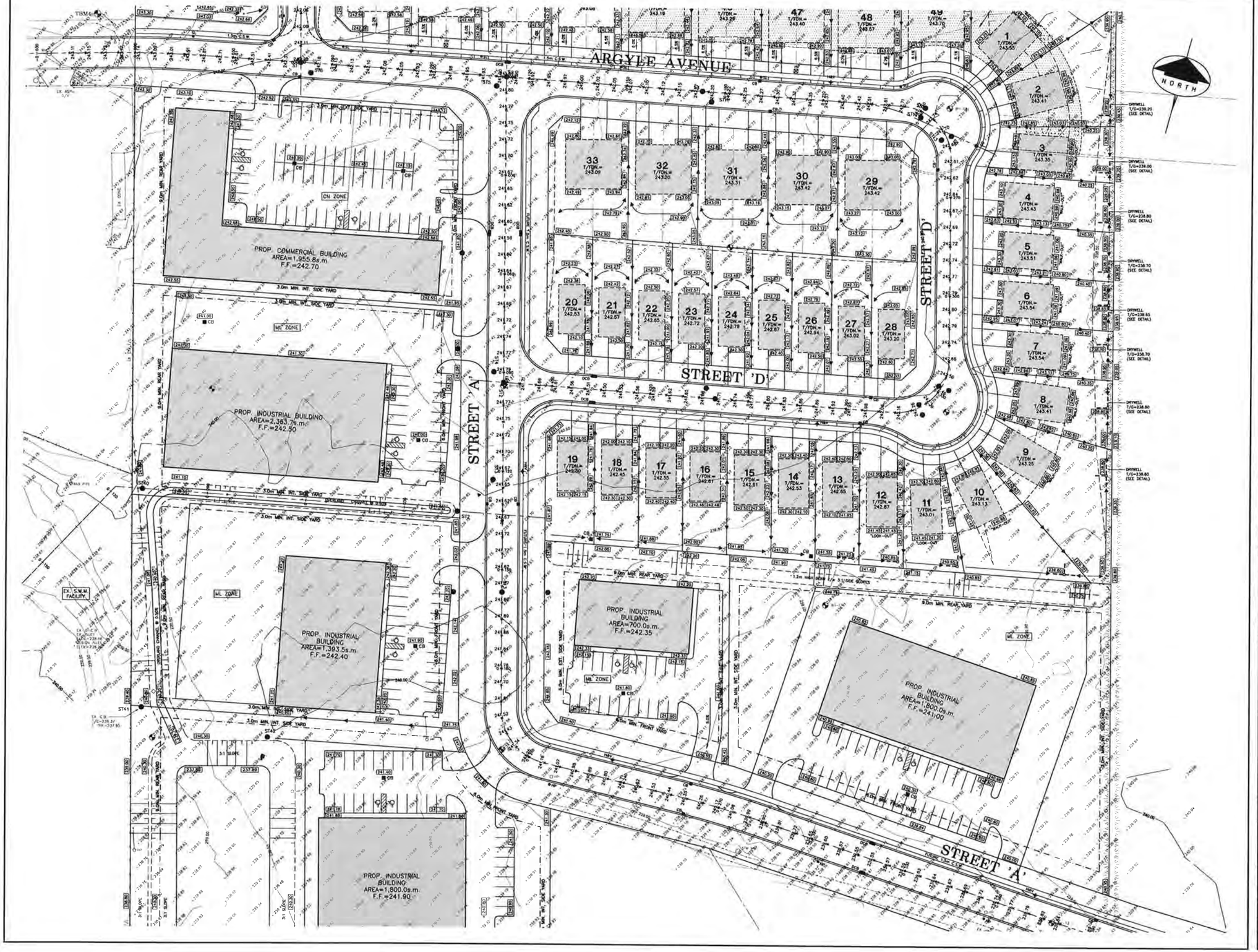
Appendix 'C'
Preliminary Design Drawings

Orifice Plate Calculations
Bluegrass Estates Phase 4
Delhi ... Ontario

POND NO. 1

Stage (m)	Depth (m)	Storage (cu.m.)		Discharge (cms)	h (m)	2gh	=(2gh)**0.5	C
237.90	0.00	0.00	0.00	0.0306	0.2	3.924	1.9809	0.63
238.25	0.35	3,957.65	3,957.65	0.1016	0.55	10.791	3.2850	0.63
238.75	0.85	8,391.30	8,391.30	0.1404	1.05	20.601	4.5388	0.63
239.50	1.60	13,446.03	13,446.03	0.8105	1.8	35.316	5.9427	0.63
240.00	2.10	19,185.08	19,185.08	0.9161	2.3	45.126	6.7176	0.63

Invert of Outlet/Orifice Plate	237.70		
Orifice Plate Diameter	525 mm	Area of Orifice	0.2165 sq.m.
Centreline of Orifice Plate	237.70	Structure Storage	0 cu.m.
Invert of Outlet/Orifice Plate	237.70		
Orifice Plate Diameter	250 mm	Area of Orifice	0.0491 sq.m.
Centreline of Orifice Plate	237.70	Structure Storage	0 cu.m.



THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL FAMILIARIZE HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM

LEGEND:

- 200.00 — EXISTING ELEVATIONS
- [200.00] — PROPOSED ELEVATIONS
- [200.00]^{S} — PROPOSED SWALE ELEVATIONS
- (200.00) — PROPOSED ELEVATIONS (BY OTHERS)
- 242.00 / A — PROPOSED CENTERLINE OF ROAD ELEVATIONS
- → PROPOSED SWALE
- GENERAL DRAINAGE

NOTES:

1. ALL ELEVATIONS SHOWN ARE METRIC
2. ELEVATIONS MAY VARY PENDING ENGINEERS APPROVAL
3. WHERE ONLY ONE ELEVATION IS SHOWN, EXISTING AND PROPOSED ELEVATIONS ARE THE SAME.
4. REFER TO DRAWING 13227-4 FOR GENERAL LEGEND

T.B.M. No. 1 ELEV. = 243.12m (GEO)
TOP OF DRILLED WELL ON THE EAST SIDE OF McINTOSH DRIVE IN FRONT OF M.H. 38 AS SHOWN.

T.B.M. No. 2 ELEV. = 242.97m (GEO)
NAIL IN HYDRO POLE ON THE EAST SIDE OF DUCHESS DRIVE IN FRONT OF M.H. 14 AS SHOWN

T.B.M. No. 3 ELEV. = 242.88m (GEO)
NAIL IN HYDRO POLE ON THE SOUTH SIDE OF ARGYLE AVENUE (NOT SHOWN)

T.B.M. No. 4 ELEV. = 244.04m (GEO)
TOP NUT OF FIRE HYDRANT AT THE EAST END OF ARGYLE AVENUE AS SHOWN.

NO.	REVISION	DATE (MM/DD/YY)	BY

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
440 HARDY ROAD , UNIT #1 , BRANTFORD – ONTARIO , N3T 5L8
TEL. (519) 753-2656 FAX. (519) 753-4263 www.cohoonsng.com

PROJECT:

BLUEGRASS ESTATES SUBDIVISION (PHASE 3)
ARGYLE AVENUE
NORFOLK COUNTY

OWNER:

JELES DESIGN & CONSTRUCTION LTD.

PRELIMINARY GRADING PLAN

DESIGN:	R.W.P.	SCALE:	1:500
DRAWN:	K.P.B.	JOB No:	13227
CHECKED:	R.W.P.		
SHEET:	1 of 6	DRG No:	P1
DATE:	NOV. 19/25		



THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL FAMILIARIZE HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

LEGEND:

- 239.00 — EXISTING ELEVATIONS
- 200.00 — PROPOSED ELEVATIONS
- 200.00 — PROPOSED SWALE ELEVATIONS
- 200.00 — PROPOSED ELEVATIONS (BY OTHERS)
- 242.00 — PROPOSED CENTERLINE OF ROAD ELEVATIONS
- PROPOSED SWALE
- GENERAL DRAINAGE

NOTES:

1. ALL ELEVATIONS SHOWN ARE METRIC.
2. ELEVATIONS MAY VARY PENDING ENGINEERS APPROVAL.
3. WHERE ONLY ONE ELEVATION IS SHOWN, EXISTING AND PROPOSED ELEVATIONS ARE THE SAME.
4. REFER TO DRAWING 13227-4 FOR GENERAL LEGEND.

T.B.M. No. 1 ELEV. = 243.12m (GEO)
TOP OF DRILLED WELL ON THE EAST SIDE OF McINTOSH DRIVE IN FRONT OF M.H. 2B AS SHOWN.

T.B.M. No. 2 ELEV. = 242.97m (GEO)
NAIL IN HYDRO POLE ON THE EAST SIDE OF DUCHESS DRIVE IN FRONT OF M.H. 1A AS SHOWN.

T.B.M. No. 3 ELEV. = 242.88m (GEO)
NAIL IN HYDRO POLE ON THE SOUTH SIDE OF ARGYLE AVENUE (NOT SHOWN)

T.B.M. No. 4 ELEV. = 244.04m (GEO)
TOP NUT OF FIRE HYDRANT AT THE EAST END OF ARGYLE AVENUE AS SHOWN

NO.	REVISION	DATE (MM/DD/YY)	BY

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
440 HARDY ROAD, UNIT #1, BRANTFORD - ONTARIO, N3T 5L8
TEL. (519) 753-2656 FAX. (519) 753-4263 www.cohooneng.com

PROJECT:

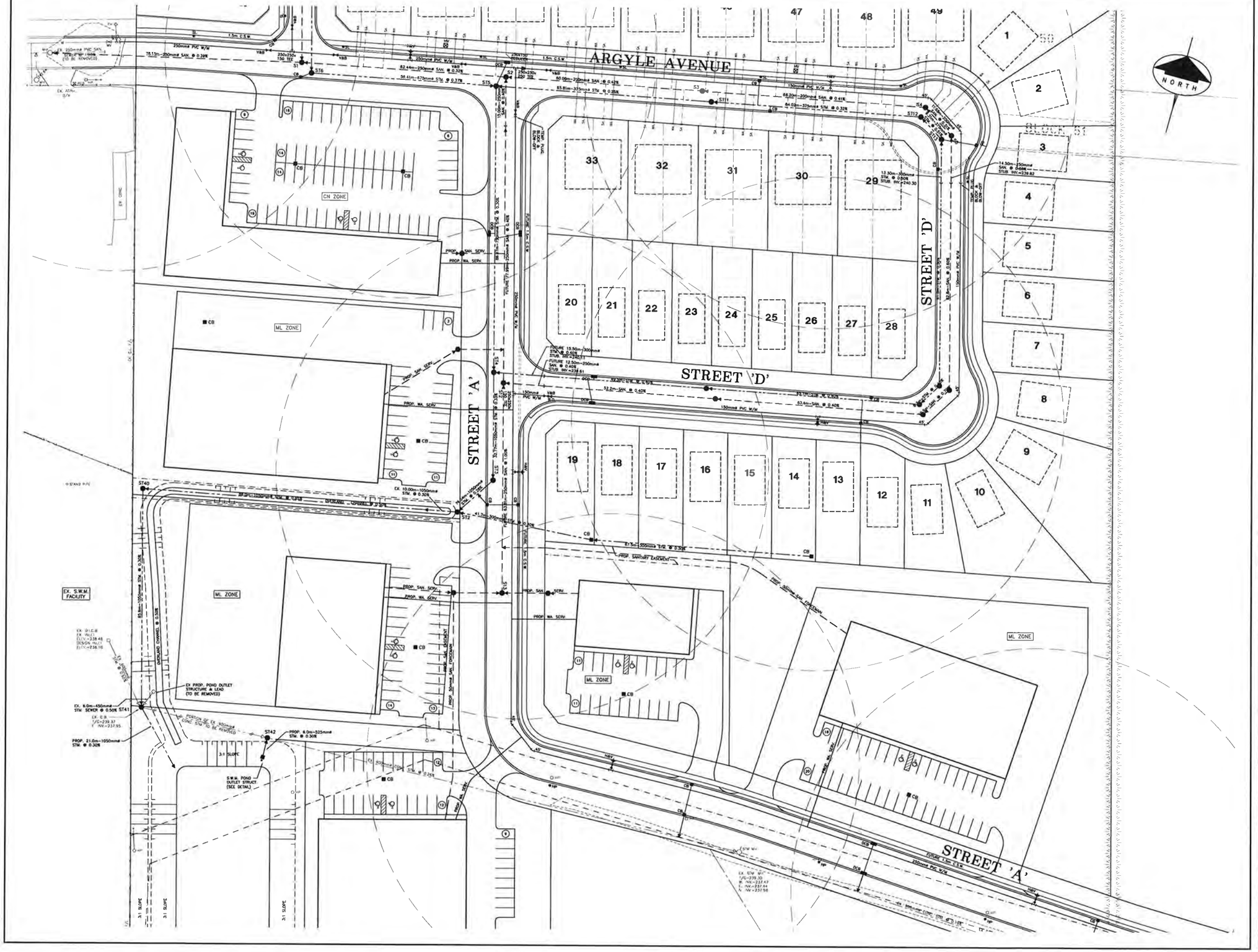
BLUEGRASS ESTATES SUBDIVISION (PHASE 3)

ARGYLE AVENUE
NORFOLK COUNTY

CLIENT: JELES DESIGN & CONSTRUCTION LTD.

PRELIMINARY GRADING PLAN

DESIGN: R.W.P.	SCALE: 1:500
DRAWN: K.P.B.	JOB No: 13227
CHECKED: R.W.P.	
SHEET: 2 of 6	DWG. No. P2
DATE: NOV. 19/25	



LEGEND:

- PROP. STORM SEWER SYSTEM
- PROP. SANITARY SEWER SYSTEM
- EXIST. STORM SEWER SYSTEM
- EXIST. SANITARY SEWER SYSTEM
- PROP. VALVE & BOX
- PROP. HYDRANT & VALVE
- EXIST VALVE & BOX
- EXIST. HYDRANT & VALVE
- 75m FIRE HYDRANT COVERAGE
- DENOTES PHASE 3 LIMIT

NO.	REVISION	DATE (MM/DD/YY)	BY

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
140 HARDY ROAD , UNIT #1 , BRANTFORD – ONTARIO , N3T 5L8
TEL. (519) 753-2658 FAX (519) 753-4263 www.cohoonenq.com

PROJECT:

BLUEGRASS ESTATES SUBDIVISION (PHASE 3)

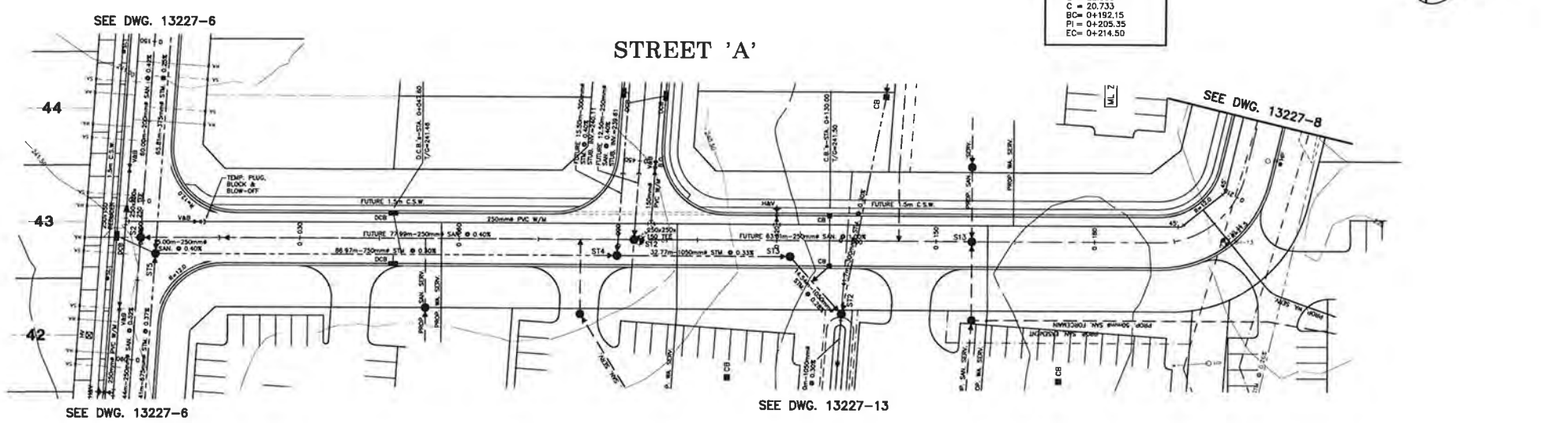
ARGYLE AVENUE
COUNTY OF NORFOLK

CLIENT: JELES DESIGN & CONSTRUCTION LTD.

PRELIMINARY SERVICING PLAN

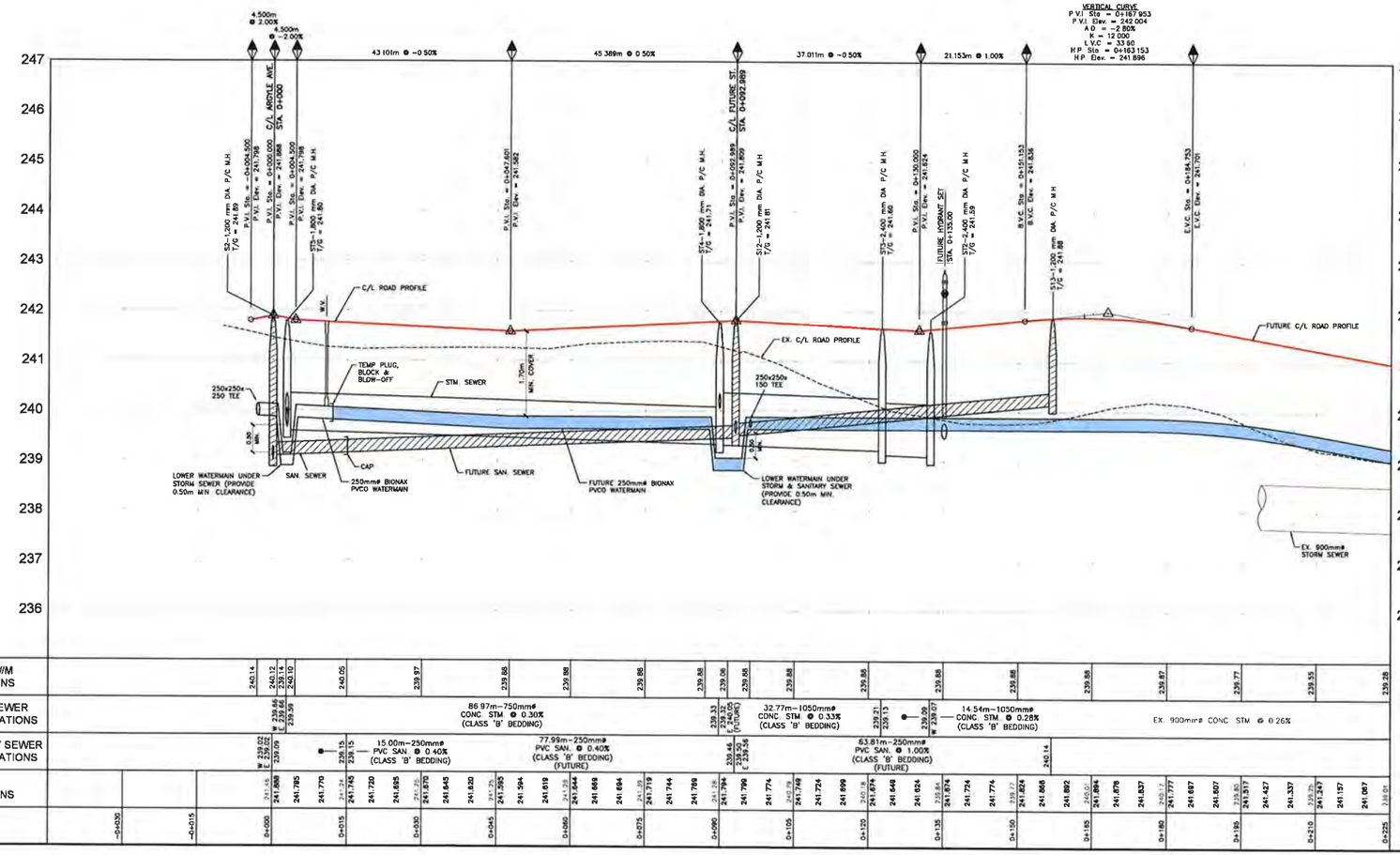
DESIGN:	R.W.P.	SCALE:	1:500
DRAWN:	K.P.B.	JOB No:	13227
CHECKED:	R.W.P.		
SHEET	3 of 6	DWG No	P3
DATE	NOV. 19/25		

ARGYLE AVE.



C/L CURVE DATA
Δ = 76°28'11"
R = 16.750
T = 13.197
L = 22.355
C = 20.733
BC= 0+192.15
PI = 0+205.35
EC= 0+214.50

NORTH



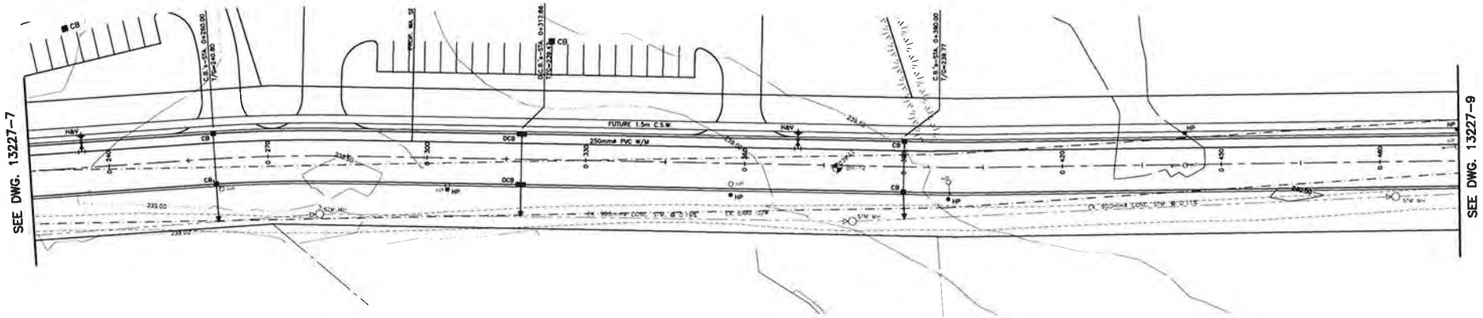
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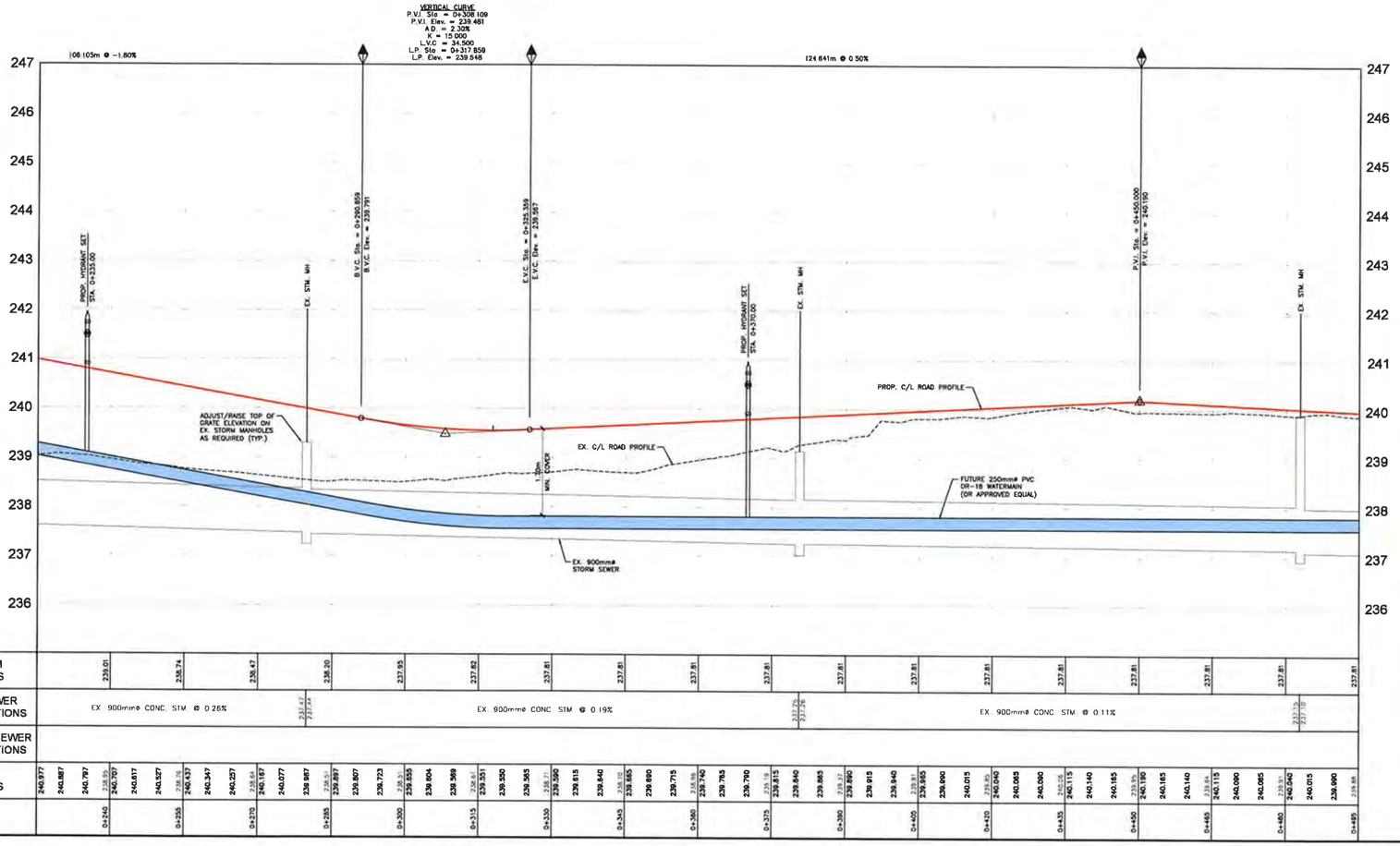
C/L CURVE DATA
Δ = 5°01'19"
R = 300.000
T = 13.156
L = 26.298
C = 26.287
BC= 0+257.48
PI = 0+270.64
EC= 0+283.78

C/L CURVE DATA
Δ = 1°54'48"
R = 300.000
T = 5.010
L = 10.020
C = 10.019
BC= 0+394.93
PI = 0+399.94
EC= 0+404.95

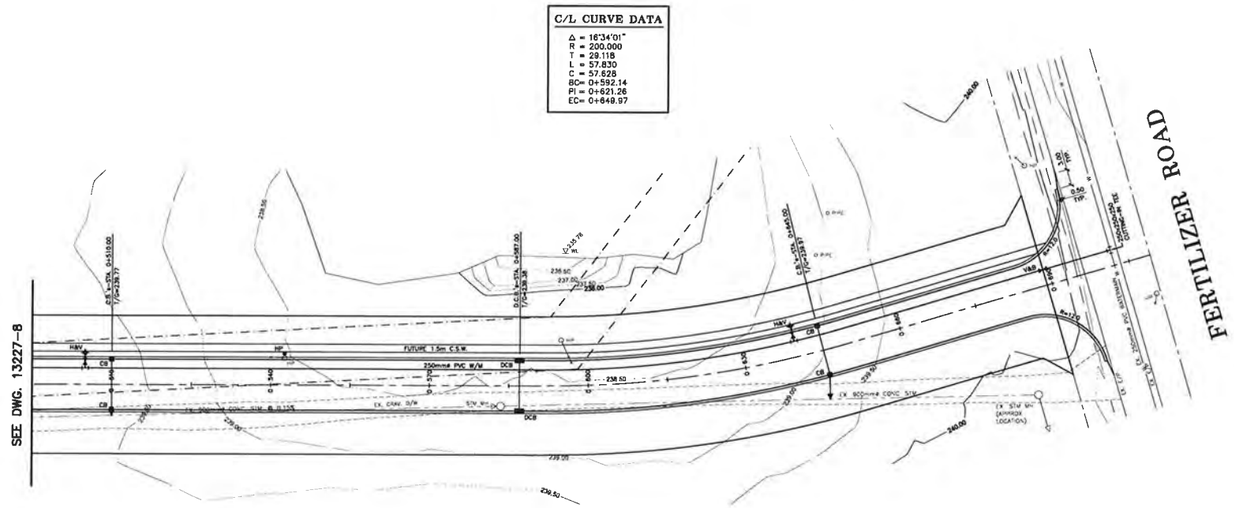
NORTH

STREET 'A'

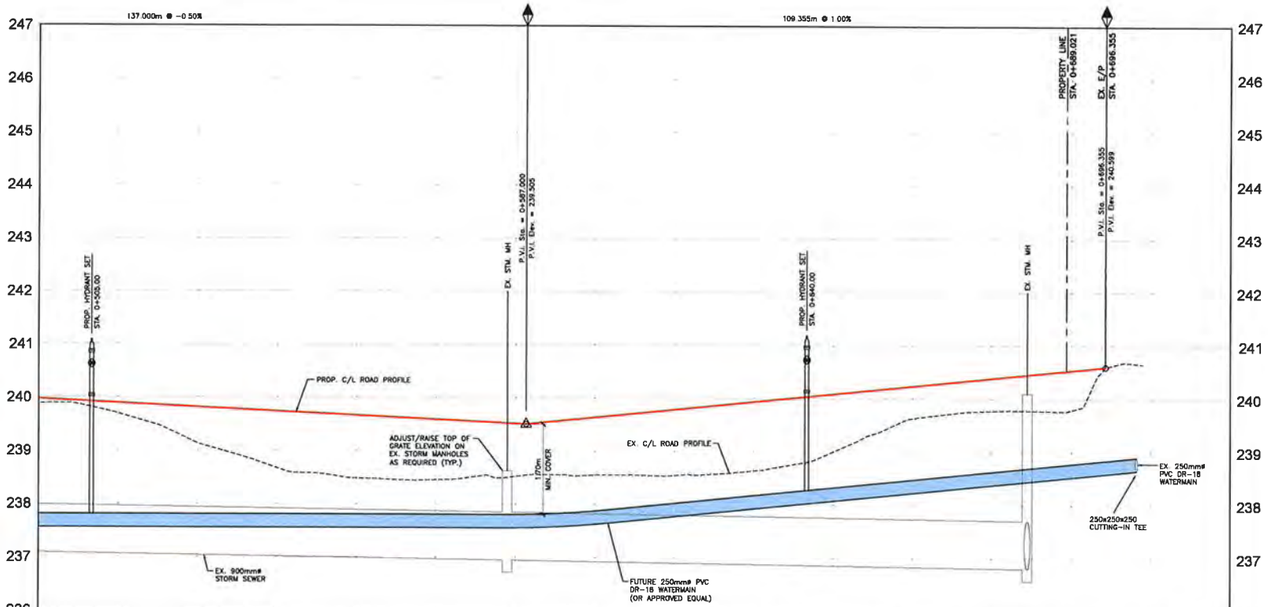




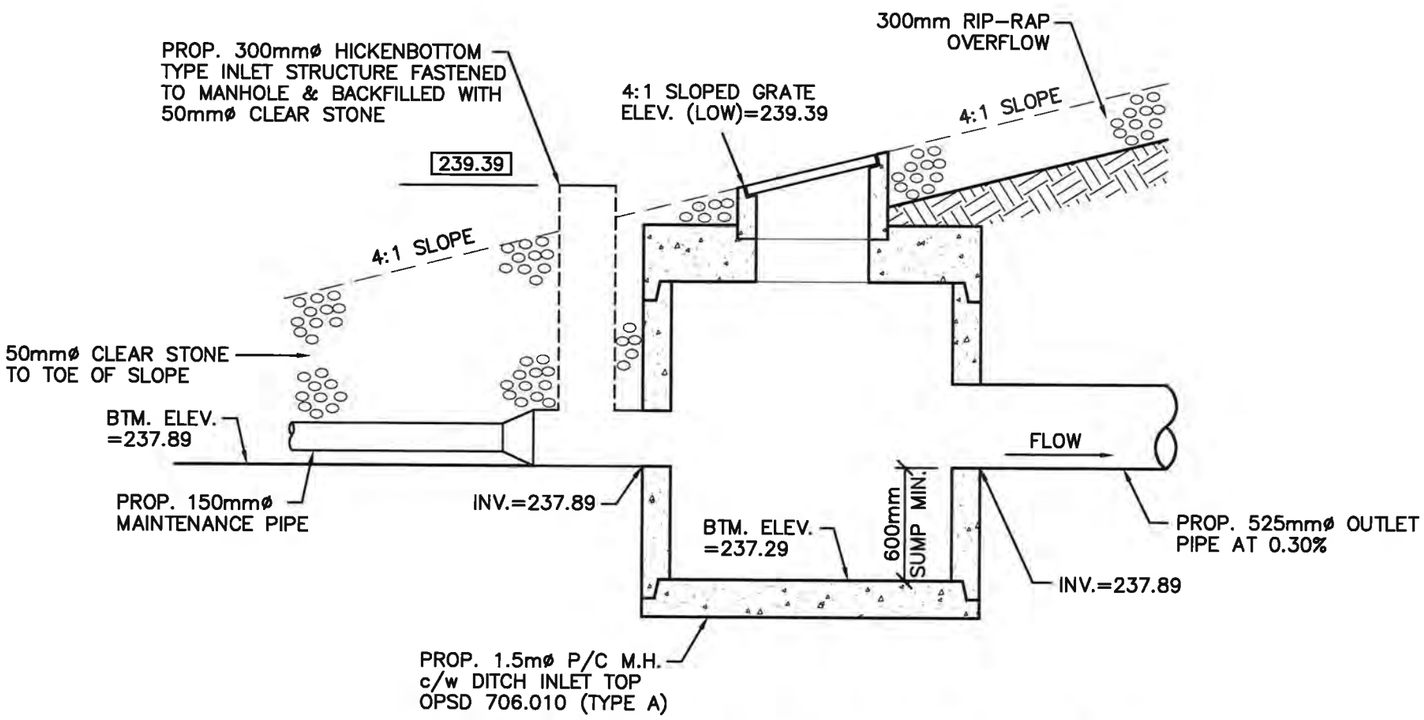
| | | |


C/L CURVE DATA
Δ = 16°34'01"
R = 200.000
T = 29.118
L = 57.830
C = 57.628
BC= 0+592.14
PI = 0+621.26
EC= 0+649.97
SEE DWG. 13227-8
FUTURE 1.5m C.S.W.
250mmø PVC W/M
DCB
CB
HBV
HP
EX. CONC. C.S.W.
EX. CONC. STM. @ 0.15%
EX. 900mmø CONC. STM.
EX. STM MH (APPROX LOCATION)
EX. 250mmø PVC WATERMAIN
FERTILIZER ROAD

STREET 'A'


137.000m @ -0.50%
109.355m @ 1.00%
PROP. C/L ROAD PROFILE
EX. C/L ROAD PROFILE
ADJUST/RAISE TOP OF GRATE ELEVATION ON EX. STORM MANHOLES AS REQUIRED (TYP.)
170m MIN. COVER
EX. 250mmø PVC DR-18 WATERMAIN
250x250x250 CUTTING-IN TEE
EX. 900mmø STORM SEWER
FUTURE 250mmø PVC DR-18 WATERMAIN (OR APPROVED EQUAL)
PROP. HYDRANT STA. 0+505.00
EX. STM MH P.V.I. Sta. = 0+567.000 P.V.I. Elev. = 239.305
PROP. HYDRANT STA. 0+640.00
PROPERTY LINE STA. 0+669.021
EX. E/P STA. 0+696.355
P.V.I. Sta. = 0+696.355 P.V.I. Elev. = 240.599

| | | |



OUTLET STRUCTURE DETAIL

SCALE: 1:40


ADAMS AVE
NEIL ST
FREDRICK ST
RIDGEWOOD CR
BRANTFORD RD.
COURTLAND
TOLMAN
MARSHALL AVE.
CONNAUGHT AVE.
DELCREST AVE.
SPODEL ST.
ADAMS AVE.
CALLENS AVE.
COURTLAND STREET
BLUEGRASS BLVD.
ARBOURHEAD WAY
MCINTOSH DR.
RUSSET DR.
DUCHESS DR.
PROPOSED STREET
ARGYLE AVENUE
HARRIS ST.
ARGYLE AVE.
HUGGINS AVE.
WINDHAM ST.
INDUSTRIAL DR.
PROPOSED STORMWATER DETENTION POND
LIMIT OF DRAIN
SWALE
PROPOSED 900 mm Ø DRAIN OUTLET
PHASE 4
EXTERNAL
FERTILIZER ROAD
6-200-10
6-200-20
43.672 Ac
6-200-30
2.52 Ac
6-200-50
1.89 Ac
6-200
2.26 Ac
6-201
2.0 Ac
6-226
1.5 Ac
6-225
2.14 Ac
6-227
(1.4 Ac)
6-228
6-230
6-231
6-250
13.5 Ac
5-173
5-190
37.60
300mm Ø
400mm Ø
900 mm Ø
24-600
24-625
24-626
24-627
24-615
24-614
24-629
24-760
24-610
24-465
0.466
0.45
0.110
0.380
0.541
0.353
0.545
0.905
0.505
0.263
0.148
0.648
0.842
0.842
0.842

Gmail Benjamin <benjeles@gmail.com>

RE: Traffic Study - Bluegrass Phase 4

1 message

Jacob Columbus <Jacob.Columbus@norfolkcounty.ca> Mon, Sep 8, 2025 at 3:18 PM

To: Benjamin <benjeles@gmail.com>
Cc: Dad <joe.jeles@rogers.com>, "Bob W. Phillips" <rphillips@cohooneng.com>

Hi Ben,

Sorry for the long delay in getting back to you.

I am in agreement that the 2021 TIS is still applicable, noting that your development will have a significant reduction in units.

Regards,

Jacob

Jacob Columbus, C.E.T.
Project Manager, Development Engineering
Gilbertson Administration Building
Engineering and Asset Management
Public Works
12 Gilbertson Drive, Simcoe, Ontario, N3Y 4N5
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Norfolk COUNTY

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From: Benjamin <benjeles@gmail.com>
Sent: Wednesday, August 20, 2025 9:41 AM
To: Jacob Columbus <Jacob.Columbus@norfolkcounty.ca>
Cc: Dad <joe.jeles@rogers.com>; Bob W. Phillips <rphillips@cohooneng.com>
Subject: Traffic Study - Bluegrass Phase 4

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Jacob,

In our last meeting with Darnell, we inquired about the need to do a full new traffic study for Phase 4. He told us to reach out to you.

Can we schedule a zoom meeting to discuss the options to do less than a full new study?

For the reasons that;

-The previous traffic study for Phase 3 & 4 is less than 5 years old (March 2021)

- Our new design has decreased density - from 95 residential units to 38 units.

- There are no new major roadways/ intersections in Delhi or near our site.

Please let us know your availability for a meeting next week, or your earliest availability. Thank you.

Sincerely,

Benjamin Jeles

Bluegrass Estates

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TRANSPORTATION SOLUTIONS LIMITED

Bluegrass Estates
Phase 3 and 4
Delhi ON
Transportation Impact Study

Paradigm Transportation Solutions Limited

March 2021
200005

ptsl.com

Project Summary

Project Number
200005

March 2021

Client
JH Cohoon Engineering Limited
440 Hardy Road, Unit 1
Brantford ON N3T 5L8

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Bob Phillips

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Bluegrass Estates Phase 3 and 4
Delhi ON
Transportation Impact Study



Signing Licence/Engineer, P.Eng.

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Version 1.0.0

Executive Summary

Content

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation Impact Study (TIS) for Phase 3 and 4 of the Bluegrass Estates mixed-use development located on Argyle Avenue in Delhi, County of Norfolk.

This Transportation Impact Study (TIS) includes an analysis of existing traffic conditions, a description of the proposed development, traffic forecasts for full build-out (2024), five-years (2029) and ten-years (2034) post build-out, and outlines recommendations to improve future traffic conditions.

Development Concept

The subject lands are located in the southwest corner of Fertilizer Road and Church Street. The property is bounded by Fertilizer Road to the east and the CN rail line to the south. The proposed development consists of 50 single-family dwellings, 29 semi-detached units, 66 apartment units and 55,763 square metres (600,228 square feet) of industrial uses.

Vehicular access is proposed via the easterly extension of Argyle Avenue and the construction of a new connection to Fertilizer Road.

The build-out of the subject site is anticipated to occur by 2024.

Conclusions

Based on the investigations carried out, it is concluded that:

- **Existing Traffic Conditions:** The study area intersections are currently operating within acceptable levels of service.
- **Development Trip Generation:** The development is forecast to generate 163 and 169 trips during the AM and PM peak hours, respectively.
- **2024 Background Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under existing traffic conditions. The westbound shared movement at the intersection of James Street/King Street and Church Street is forecast to operate with LOS E and v/c ratio greater than 0.85 during the PM peak hour.

- **2024 Total Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under 2024 background traffic conditions.
- **2029 Background Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under existing traffic conditions. The westbound shared movement at the intersection of James Street/King Street and Church Street is forecast to operate with LOS F and v/c ratio greater than 1.00 during the PM peak hour.
- **2029 Total Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under 2029 background traffic conditions.
- **2034 Background Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under existing traffic conditions, except for the following movements at James Street/King Street and Church Street:
  - The northbound left-turn movement is forecast to operate with 95th percentile queues exceeding the available storage of 30 metres by one metre during the AM peak hour;
  - The westbound shared movement is forecast to operate with LOS F and v/c ratio greater than 1.00 during the PM peak hour; and
  - The eastbound shared movement is forecast to operate with LOS D and v/c ratio greater than 0.85 during the PM peak hour.
- **2034 Total Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under 2034 background traffic conditions. The westbound shared movement at the intersection of James Street/King Street and Church Street is forecast to operate with LOS D and v/c ratio of 0.85 during the AM peak hour. It is noted that the v/c ratio has only increased by 0.02 between the 2034 background and total traffic conditions for this movement, the LOS remains the same between scenarios.
- **Remedial Measures:** A northbound left-turn lane is not warranted on Fertilizer Road at the proposed street under forecast 2034 total traffic volumes.
- **Intersection Improvements:** The eastbound and westbound movements at the intersection of James Street/King Street and Church Street are forecast to operate with poor levels of service under 2034 background and total traffic conditions.

The operations for these movements can be improved by signal optimization during the AM and PM peak hours and the introduction of a westbound left-turn advance phase during the PM peak hour.

The northbound left-turn queues are forecast to exceed the available storage length of 30 metres by less than a car length and is therefore not expected to impact the operations of the roadway.

Recommendations

Based on the findings of this study, it is recommended that:

- The County of Norfolk monitor the intersection of James Street/King Street and Church Street for:
  - Signal optimization and the introduction of a westbound left-turn advance phase; and
  - Northbound left-turn queues exceeding the existing storage and increase the storage as part of the 2021 James Street reconstruction if necessary.
- The development be approved as proposed.



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1 Introduction

1.1 Overview

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation Impact Study (TIS) for Phase 3 and 4 of the Bluegrass Estates mixed-use development located on Argyle Avenue in Delhi, County of Norfolk. **Figure 1.1** details the subject development location.

1.2 Purpose and Scope

The purpose of this report is to identify and assess the potential traffic impact resulting from the proposed development. The scope of the study, developed in consultation with County of Norfolk staff via e-mail in January 2021, includes:

- Assessment of the current traffic and site conditions within the study area;
- Estimates of background traffic growth for full build-out (2024), five-years (2029) and ten-years (2034) post build-out;
- Estimates of additional traffic generated by the subject site;
- Analyses of the impact of the future traffic on the surrounding road network; and
- Recommendations necessary to mitigate the site generated traffic in a satisfactory manner.

Based on the pre-study consultation, the following intersections were identified for investigation in this study:

- Argyle Avenue/Ann Street and James Street (signalized);
- Callens Avenue and Church Street East (unsignalized);
- Callens Avenue and Argyle Avenue (unsignalized);
- Fertilizer Road and Church Street East/Windham Road 12 (unsignalized);
- Fertilizer Road and Wilson Avenue/Windham Road 13 (unsignalized);
- James Street and Wilson Avenue (unsignalized);
- James Street/King Street and Church Street (signalized); and
- Proposed Street and Fertilizer Road (unsignalized).

Appendix A contains the pre-study consultation material and responses from the County of Norfolk.

This study has been prepared in accordance with the requirements detailed by the County of Norfolk Transportation Impact Study Guidelines[1].

[1] *Norfolk County Integrated Sustainable Master Plan (ISMP) Appendix J: TIS Guidelines*. Prepared by MMM Group Limited, September 2016.



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Location of Subject Site

2 Existing Conditions

2.1 Existing Roadways

The main roadways near the subject site considered in assessing the traffic impacts of the development include:

- **James Street / King Street (Highway 3)** is a north-south provincial highway operating under a connecting link in the County's Official Plan (OP)[2]. This roadway has a four-lane cross section and a posted speed limit of 50 km/h north of Wilson Avenue and 60 km/h south of Wilson Avenue. Between Lansdowne Avenue and Sovereen Street, James Street has a posted speed limit of 40 km/h. Sidewalks are provided along both sides of the roadway north of Waverly Street, and on the east side between Waverly Street and Brock Avenue. South of Brock Street, paved shoulders are provided.
- **Church Street (County Road 4)** is an east-west arterial road with a two-lane cross section and a posted speed limit of 50 km/h. Sidewalks are provided along both sides of the roadway west of Herbert Avenue and on the south side between Herbert Avenue and Greening Drive. No sidewalks are provided east of Greening Drive.

  Windham Road 12 is an east-west local road with a two-lane cross section and a posted speed limit of 80 km/h.
- **Argyle Avenue** is an east-west collector road with a posted speed limit of 50 km/h within the study area. No sidewalks are provided on either side of this roadway.

  Ann Street is an east-west local road with a two-lane cross section and an assumed speed limit of 50 km/h. No sidewalks are provided on either side of this roadway.
- **Callens Avenue** is a north-south local road with a two-lane cross section and a posted speed limit of 50 km/h. No sidewalks are provided on either side of the roadway.
- **Fertilizer Road** is a north-south local road with a two-lane cross section and an assumed speed limit of 80 km/h. No sidewalks are provided on either side of this roadway.
- **Wilson Avenue / Windham Road 13** is an east-west local road with a two-lane cross section. This roadway has a posted speed limit of 50 km/h east of James Street. The posted speed limit increases to 60 km/h midway between James Street and

[2] Norfolk County Official Plan Schedule "E-4", October 2018.

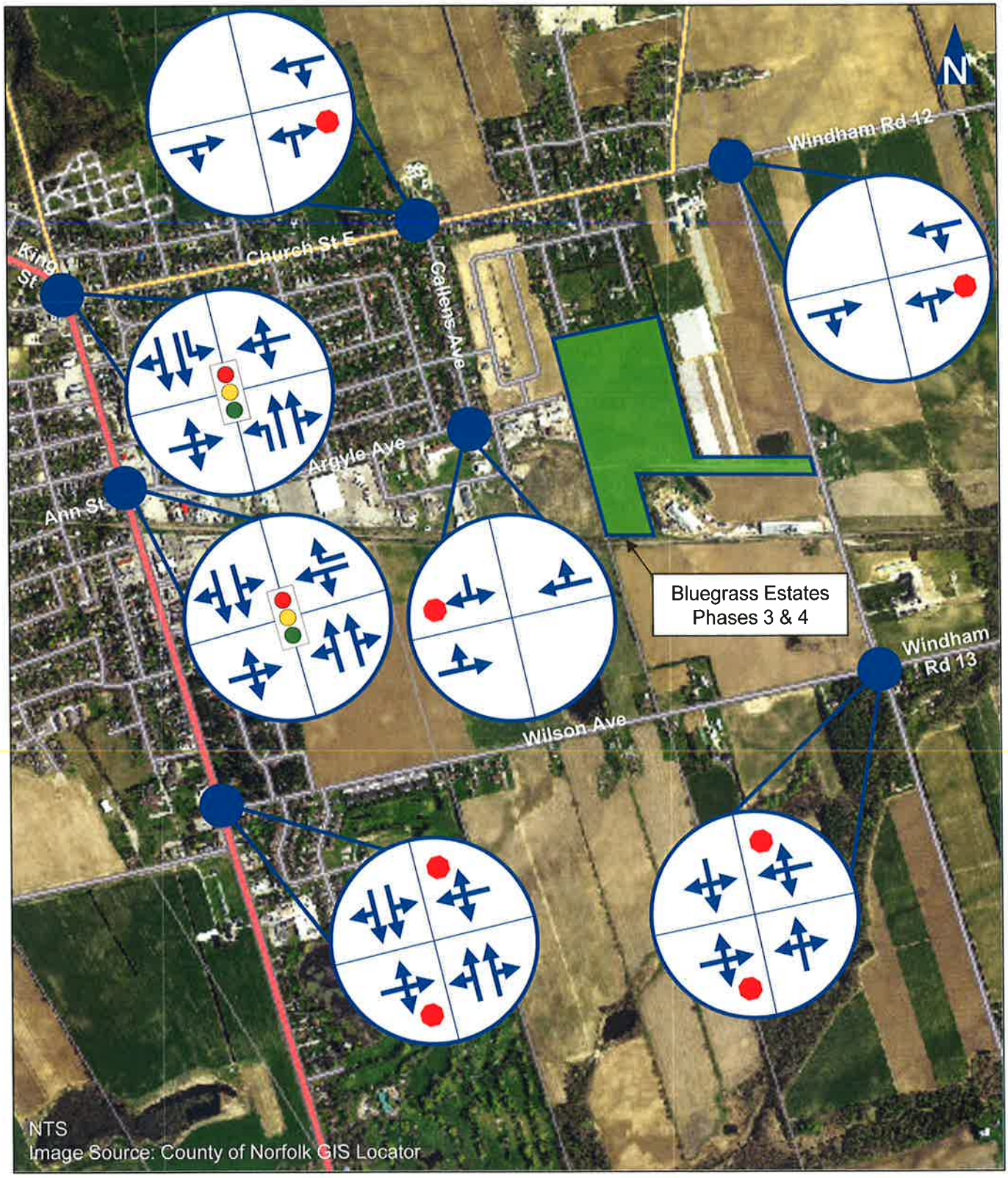
Fertilizer Road and increases to 80 km/h east of Fertilizer Road. No sidewalks are provided on either side of this roadway.

No dedicated cycling facilities are provided in the study area.

The surrounding area is comprised of low-density residential to the north and northwest, industrial/commercial uses to the west and agricultural to the south and east.

Figure 2.1 illustrates the traffic control and lane configuration at the study area intersections.

James Street from south of Church Street to south of Argyle Avenue is planned for reconstruction in 2021, however no changes to the existing lane configurations are anticipated.



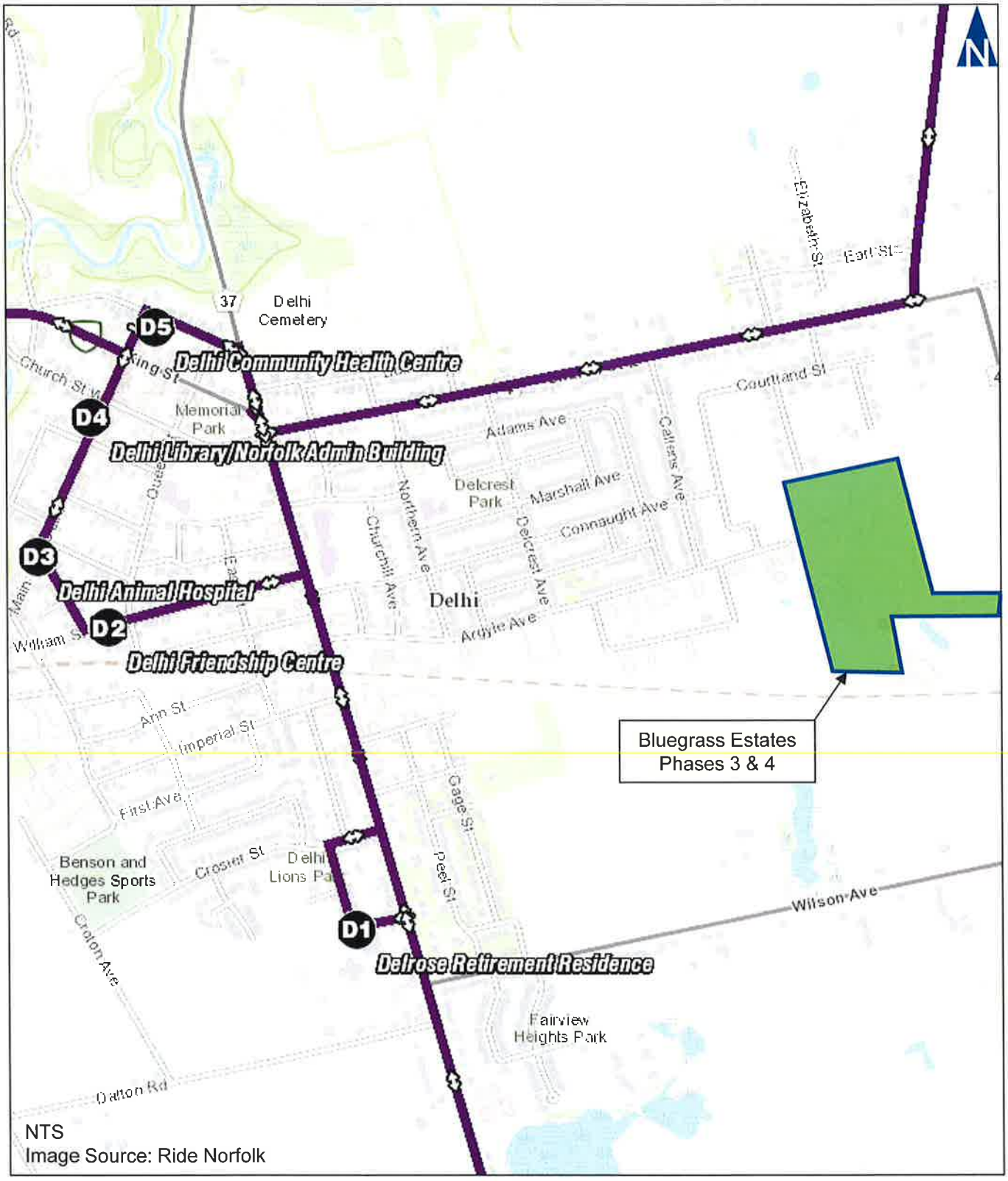
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Existing Lane Configuration and Traffic Control

2.2 Transit Service

Norfolk County operates Ride Norfolk Transit which provides transit service in Delhi on Mondays, Wednesdays, and Thursdays. The service travels between different communities in Norfolk County including Delhi, Tillsonburg, Port Dover and Simcoe. Within Delhi the route operates along James Street and Church Street with a total of five stops including Delhi Friendship Centre, Delhi Animal Hospital and Delhi Community Health Centre. The nearest stop is located at Delhi Friendship Centre at William Street and Queen Street (approximately 1.70 kilometres from the subject site).

Figure 2.2 illustrates the existing transit network.



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Existing Transit Network

2.3 Traffic Volumes

Turning Movement Count (TMC) data were collected by Paradigm in October 2019 on James Street at both Church Street and Argyle Avenue. TMC data for the remaining intersections were collected in February 2021. **Table 2.1** summarizes the data collection date and peak hour start times for each study area intersection.

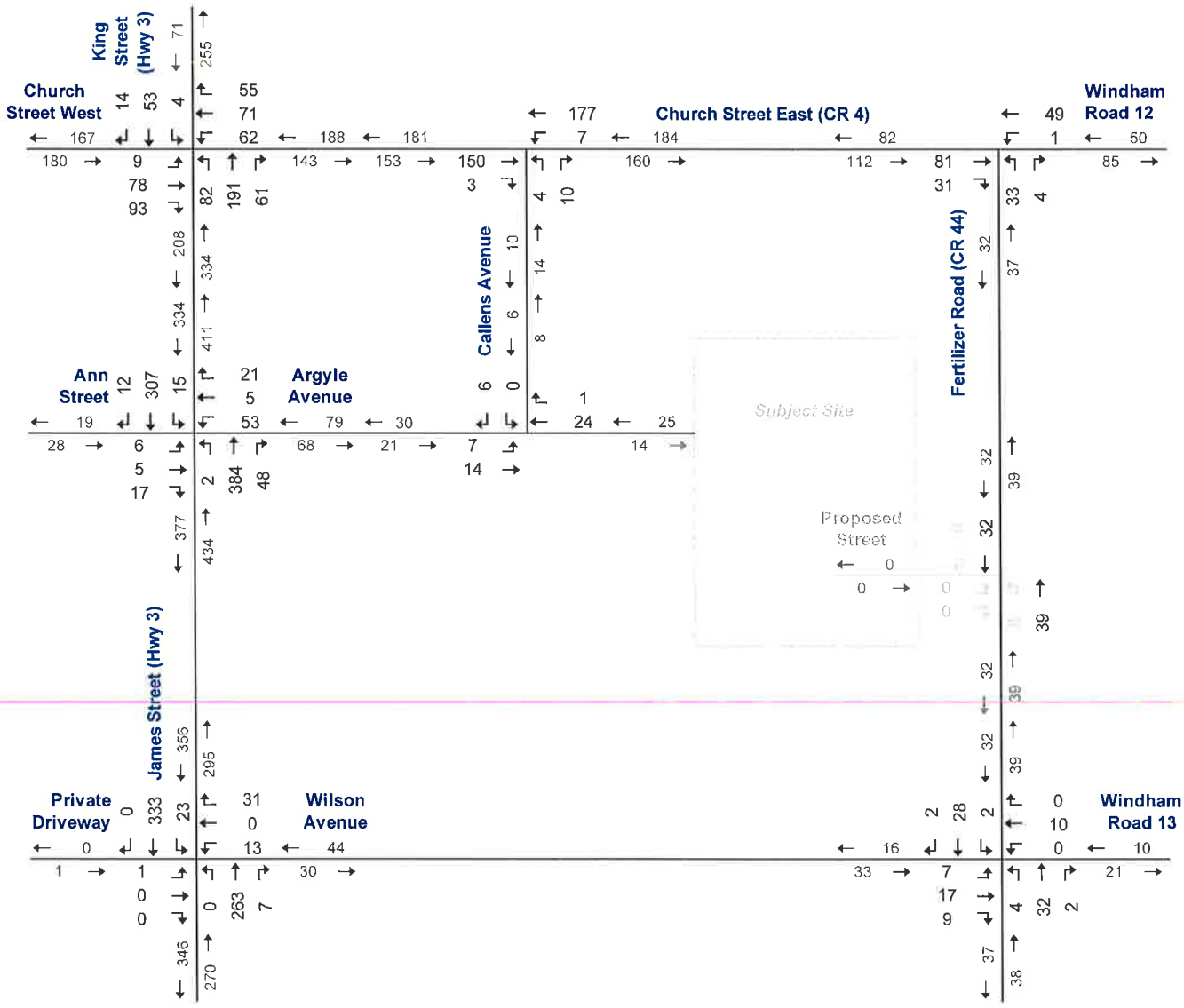
TABLE 2.1: TURNING MOVEMENT COUNT SUMMARY

Intersection	Count Date	AM Peak Hour	PM Peak Hour
James St/King St and Church St	October 29, 2019	8:15AM	4:15PM
James St and Argyle Ave/Ann St	October 29, 2019	8:00AM	4:15PM
James St and Wilson Ave	February 11, 2021	7:45AM	3:45PM
Wilson Ave/Windham Rd 12 and Fertilizer Rd	February 11, 2021	7:30AM	3:30PM
Fertilizer Rd and Church St E/Windham Rd 13	February 11, 2021	7:45AM	3:30PM
Church St E and Callens Ave	February 11, 2021	8:00AM	4:15PM
Callens Ave and Argyle Ave	February 11, 2021	7:30AM	3:00PM

The 2019 traffic volumes have been forecasted to 2021 using a growth rate of 2.0% per annum, as confirmed with the County during pre-study consultation.

Figure 2.3a and **Figure 2.3b** illustrate the existing (2021) AM and PM weekday peak hour turning movement traffic volumes, respectively.

Appendix B contains the detailed traffic data for the study area intersections.

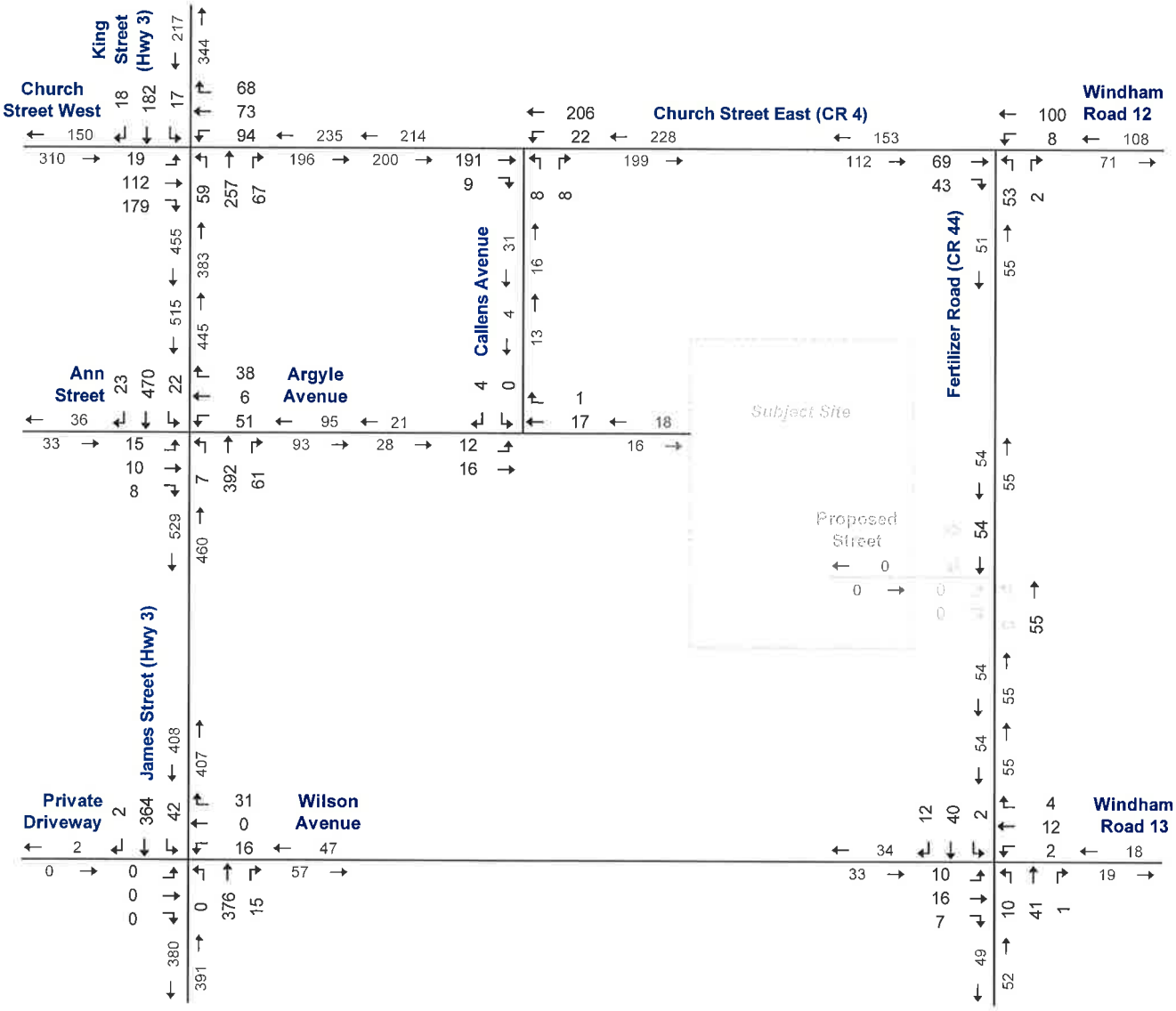


NTS

Existing (2021) Traffic Volumes – AM Peak Hour

Bluegrass Estates Phase 3 and 4, Delhi TIS
200005

Figure 2.3a



NTS

Existing (2021) Traffic Volumes – PM Peak Hour

Bluegrass Estates Phase 3 and 4, Delhi TIS
200005

Figure 2.3b

2.4 Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the average delay experienced by drivers at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles intending to make a particular movement, compared to the estimated capacity for that movement. The capacity is based on a number of criteria related to the opposing traffic flows and intersection geometry.

The highest possible rating is LOS A, under which the average total delay is equal or less than 10.0 seconds per vehicle. When the average delay exceeds 80 seconds for signalized intersections, 50 seconds for unsignalized intersections or when the volume to capacity ratio is greater than 1.0, the movement is classed as LOS F and remedial measures are usually implemented if they are feasible. LOS E is usually used as a guideline for the determination of road improvement needs on through lanes, while LOS F may be acceptable for left-turn movements at peak times, depending on delays.

The level of service conditions on the existing road network have been assessed using Synchro 10. As per the County's TIS guidelines, movements at signalized intersections with a volume to capacity (v/c) ratio greater than 0.85 are deemed critical. As the TIS guidelines do not specify a threshold for unsignalized intersections, it is assumed that movements with Level of Service (LOS) 'F' are deemed critical.

Table 2.2a and **Table 2.2b** summarize the results of the intersection operational analysis under existing conditions, including the AM and PM peak hour level of service (LOS), volume to capacity ratios (V/C), and 95th percentile queues experienced.

The results indicate that the study area intersections are operating with acceptable levels of service during the AM and PM peak hours.

Appendix C contains the detailed Synchro 10 reports.

TABLE 2.2A: EXISTING TRAFFIC OPERATIONS – AM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**					
			Delay		0	>	**0**	<	8		**0**	10		>	**10**					
			V/C		0.00	>		<	0.01			0.02		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**					
			Delay		0	>	**0**	<	9		**0**	10		>	**10**					
			V/C		0.00	>		<	0.00			0.05		>						
			95th		0	>		<	0			0		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	9	>	**9**	<	10	>	**10**	<	8	>	**1**	<	7	>	**1**	
			V/C	<	0.04	>		<	0.01	>		<	0.00	>		<	0.00	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**2**		0	>	**0**					8		>	**8**	
			V/C	<	0.01				0.00	>						0.01		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	B	>	**B**	<	C	A	**B**	<	A	>	**A**	<	A	>	**A**	**A**
			Delay	<	20	>	**20**	<	27	0	**20**	<	8	>	**8**	<	8	>	**8**	**9.1**
			V/C	<	0.16	>		<	0.26	0.06		<	0.22	>		<	0.17	>		**0.26**
			95th	<	8	>		<	17	0		<	27	>		<	21	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	B	>	**B**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	14	>	**14**	<	11	>	**11**	<	0	>	**0**	<	8	>	**1**	
			V/C	<	0.00	>		<	0.08	>		<	0.00	>		<	0.02	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	C	>	**C**	C	A	>	**B**	C	B	>	**B**	**B**
			Delay	<	21	>	**21**	<	32	>	**32**	34	7	>	**14**	33	13	>	**14**	**20**
			V/C	<	0.50	>		<	0.65	>		0.39	0.16	>		0.03	0.05	>		**0.65**
			95th	<	34	>		<	43	>		24	17	>		3	7	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		6	-	>		12	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

TABLE 2.2B: EXISTING TRAFFIC OPERATIONS – PM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	11		>	**11**					
			V/C		0.00	>		<	0.02			0.03		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	10		>	**10**					
			V/C		0.00	>		<	0.01			0.08		>						
			95th		0	>		<	0			0		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	10	>	**10**	<	10	>	**10**	<	7	>	**1**	<	7	>	**0**	
			V/C	<	0.04	>		<	0.03	>		<	0.01	>		<	0.00	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**3**		0	>	**0**					8		>	**8**	
			V/C	<	0.01				0.00	>						0.00		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	C	>	**C**	<	C	A	**B**	<	A	>	**A**	<	A	>	**A**	**A**
			Delay	<	24	>	**24**	<	27	1	**17**	<	8	>	**8**	<	9	>	**9**	**9.6**
			V/C	<	0.19	>		<	0.24	0.12		<	0.25	>		<	0.28	>		**0.28**
			95th	<	11	>		<	16	0		<	28	>		<	33	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	A	>	**A**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	0	>	**0**	<	13	>	**13**	<	0	>	**0**	<	8	>	**1**	
			V/C	<	0.00	>		<	0.10	>		<	-	>		<	0.04	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	D	>	**D**	C	B	>	**B**	C	B	>	**B**	**C**
			Delay	<	24	>	**24**	<	40	>	**40**	33	10	>	**14**	33	14	>	**16**	**22.3**
			V/C	<	0.65	>		<	0.77	>		0.31	0.22	>		0.12	0.16	>		**0.77**
			95th	<	60	>		<	68	>		19	24	>		8	17	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		11	-	>		7	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

3 Development Concept

3.1 Development Description

The subject lands are located in the southwest corner of Fertilizer Road and Church Street on the east side of Delhi, ON. The property is bounded by Fertilizer Road to the east and the CN rail line to the south. The proposed development consists of 50 single-family dwellings, 29 semi-detached units, 66 apartment units and 55,763 square metres (600,228 square feet) of industrial uses.

A lot coverage of 40% was used for the industrial lands as identified by the owner, resulting in a GFA of 22,305 square metres (240,089 square feet).

Vehicular access is proposed via the easterly extension of Argyle Avenue and the construction of a new connection to Fertilizer Road.

The build-out of the subject site is anticipated to occur by 2024.

Figure 3.1 shows the development concept.

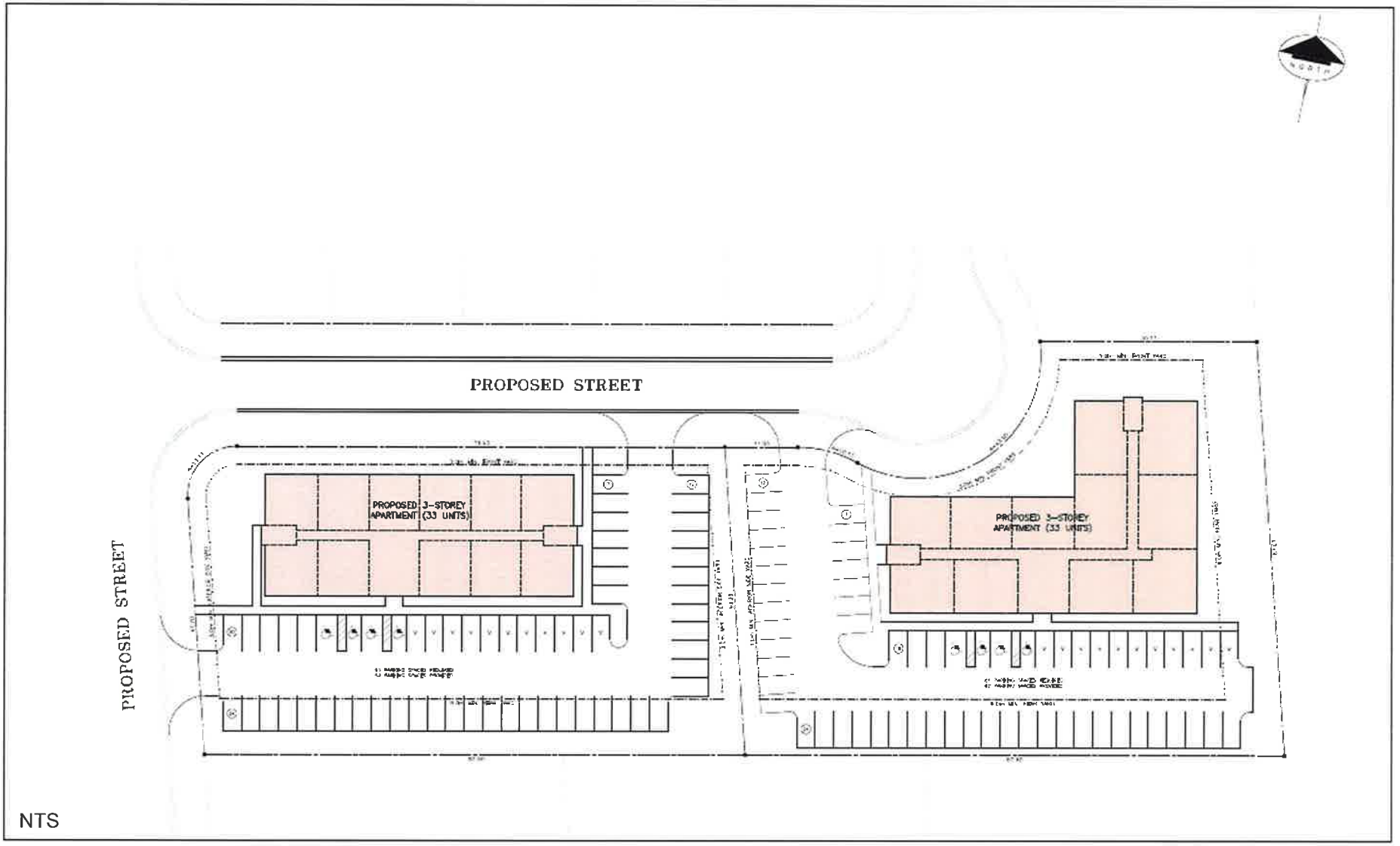


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Subdivision Plan

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Figure 3.1



Site Plan
High Density Residential Blocks

Figure 3.2

3.2 Development Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual[3] provides rates and equations used to estimate the peak hour traffic volumes generated by the Land Use Codes (LUC) of this development:

- LUC 110 (General Light Industrial);
- LUC 210 (Single-Family Detached Housing);
- LUC 220 (Multifamily Housing, Low Rise); and
- LUC 221 (Multifamily Housing, Mid-Rise).

To be conservative, no internal capture reductions have been applied.

Table 3.1 summarizes the forecast number of net new trips generated by the proposed development.

TABLE 3.1: TRIP GENERATION

Land Use	Number of Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
LUC 110 - General Light Industrial (1000 sq.ft.)	240	Eq	75	10	**85**	Eq	8	59	**67**
LUC 210 - Single-Family Detached Housing	50	Eq	10	30	**40**	Eq	33	19	**52**
LUC 220 - Multifamily Housing (Low Rise)	29	Eq	3	12	**15**	Eq	13	7	**20**
LUC 221 - Multifamily Housing (Mid Rise)	66	Eq	6	17	**23**	Eq	18	12	**30**
Total Trip Generation			**94**	**69**	**163**		**72**	**97**	**169**

LUC 110 - AM: Ln(T) = 0.74(X) + 0.39 | PM: Ln(T) = 0.69Ln(X) + 0.43
LUC 210 - AM: T = 0.71(X) + 4.80 | PM: Ln(T) = 0.96Ln(X) + 0.20
LUC 220 - AM: Ln(T) = 0.95Ln(X) - 0.51 | PM: Ln(T) = 0.89Ln(X) - 0.02
LUC 221 - AM: Ln(T) = 0.98Ln(X) - 0.98 | PM: Ln(T) = 0.96Ln(X) - 0.63

3.3 Development Trip Distribution and Assignment

As the lands north of Argyle Avenue are mainly residential and the lands south of Argyle Avenue are employment/industrial, the travel patterns within the study area are indicative of the land uses within the subject development.

As such, the trip distribution was determined based on existing travel patterns within the study area and logical routing. In addition to trips within Delhi, it is expected that most trips will travel to/from Tillsonburg to the west, Simcoe to the southeast and Brantford to the northeast.

Table 3.2 displays the breakdown of trip distributions used in this study.

[3] Institute of Transportation Engineers Trip Generation Manual 10th Edition, 2017.

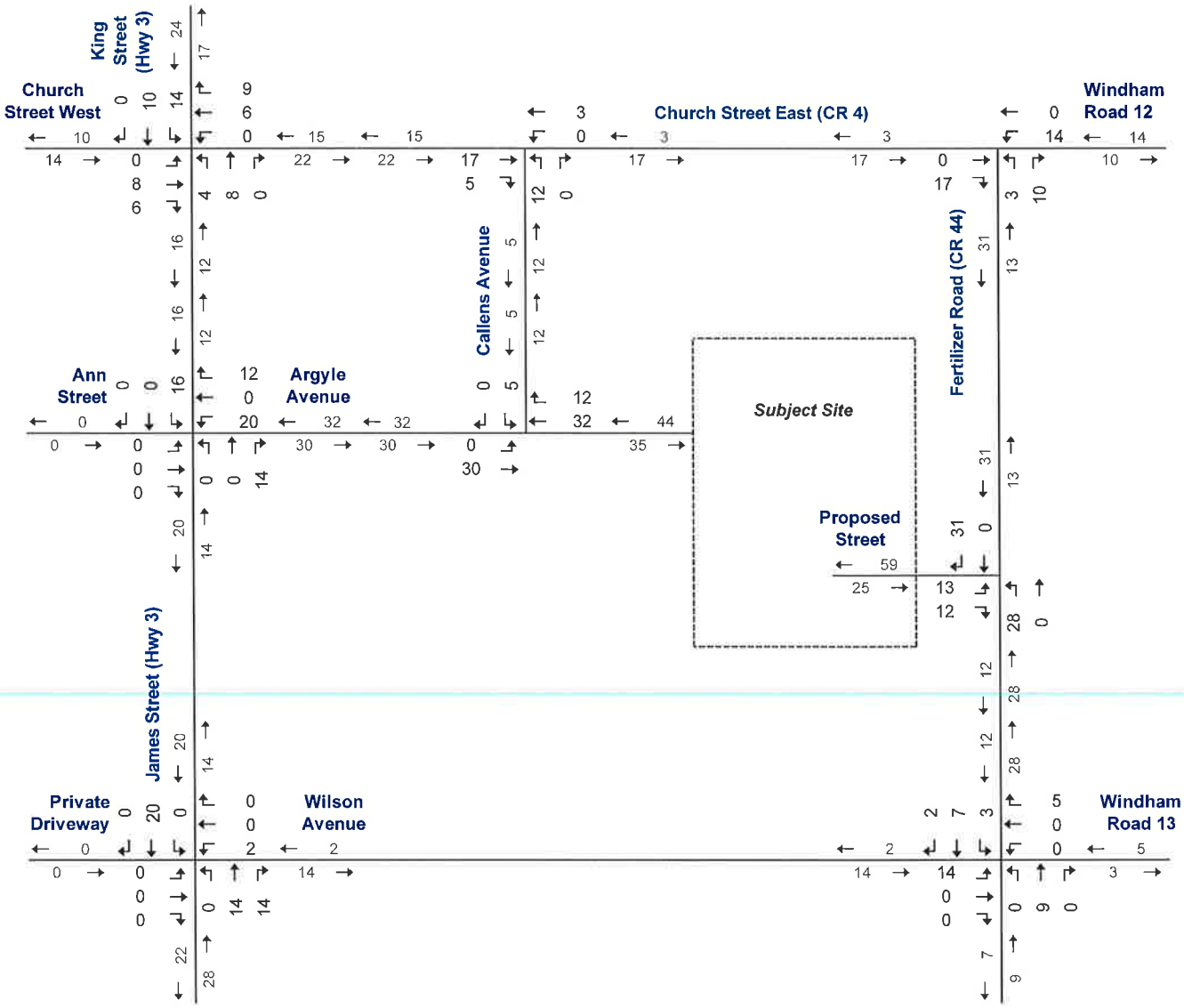
TABLE 3.2: ESTIMATED TRIP DISTRIBUTION

Origin/Destination	Distribution
North via King St	25%
South via Fertilizer Rd	10%
South via James St	30%
East via WR 12	15%
East via WR 13	5%
West via Ann St	0%
West via Church St	15%
Total	**100%**

The trips generated by the subject development were assigned based on the land use and location of the block within the subdivision. It is expected that the residential trips travelling north via King Street, west via Church Street and south via James Street will use the Argyle Avenue connection. The residential trips travelling south via Fertilizer Road, east via Windham Road 12 and Windham Road 13 will us the proposed street connection to Fertilizer Road.

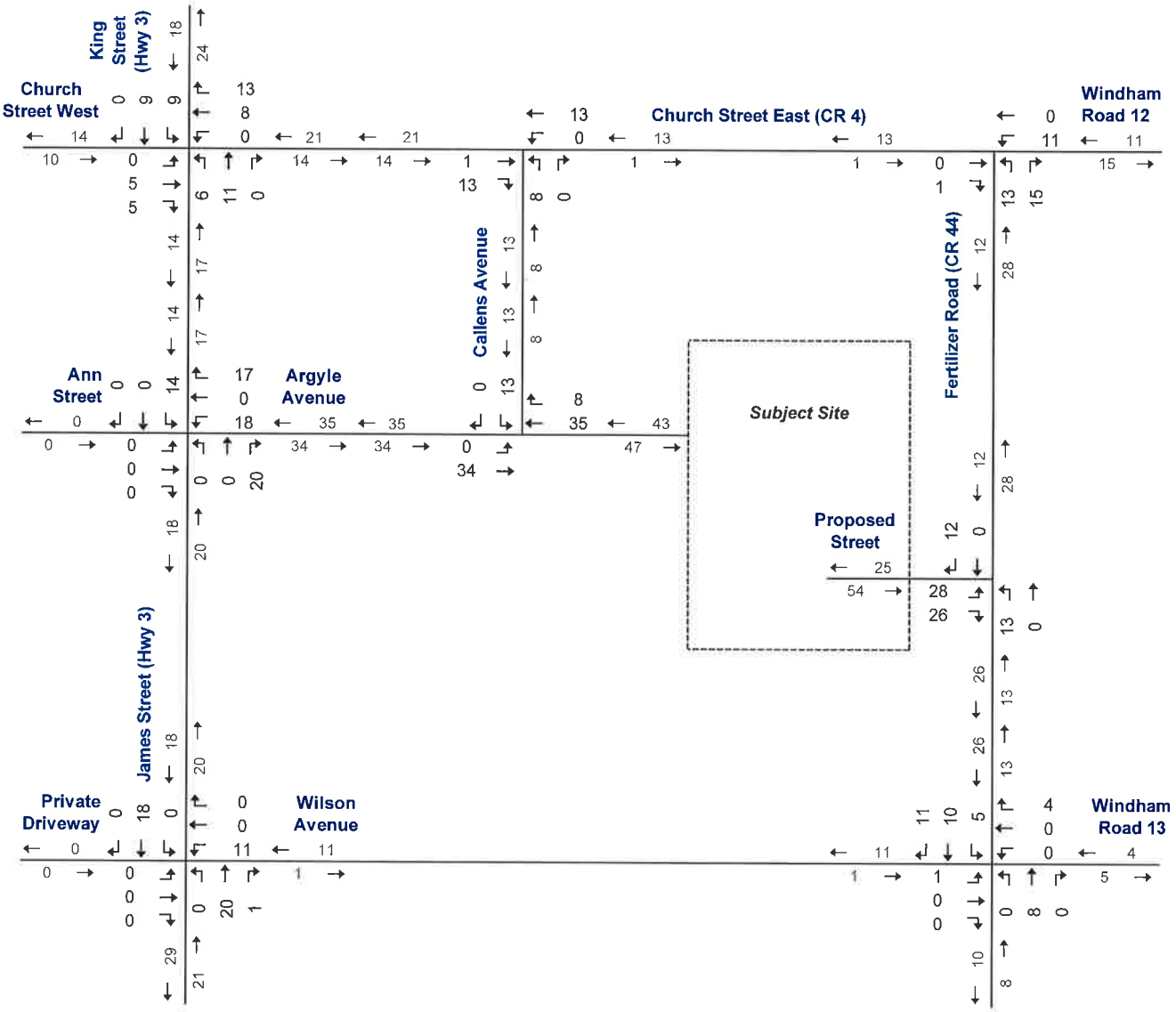
For the industrial uses, it is anticipated that the four most southerly lots (60% of the industrial land area) will use Fertilizer Road, even to travel north via King Street, west via Church Street or south via James Street. The remainder (40%) will use the Argyle Avenue connection. The industrial trips travelling south via Fertilizer Road, east via Windham Road 12 and Windham Road 13 will us the proposed street connection to Fertilizer Road.

Figure 3.3a and **Figure 3.3b** illustrate the site-generated traffic volumes for the AM and PM peak hours, respectively.



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Site Generated Traffic Volumes – AM Peak Hour



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Site Generated Traffic Volumes – PM Peak Hour

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Figure 3.3b

4 Evaluation of Future Traffic Conditions

The assessment of future traffic conditions contained in this section includes estimates of future background and total traffic volumes, and the analyses for the 2024, 2029 and 2034 horizons.

4.1 Background Traffic Forecasts

To derive the 2024, 2029 and 2034 generalized background traffic volumes, a growth rate of 2% per annum was applied to the existing traffic volumes at each intersection. This growth plan was confirmed with the County during the pre-study consultation.

4.1.1 Other Area Developments

During pre-study consultation, the County indicated that the development at 360 James Street should be include in the background traffic volumes.

The development at 360 James Street is located on the west side of James Street between Pine Street and Park Avenue. **Figure 4.1** illustrates the location of the background development.

The development is proposed to consist of a 262.25 square metre (2,823 square foot) Gas/Service Station with 8 fueling stations and 153.3 square metre (1,650 square foot) fast food restaurant with drive-through and is expected to be completed by 2021.

Table 4.1 summarizes the forecast number of trips generated by the development.

TABLE 4.1: 360 JAMES STREET TRIP GENERATION

Land Use	Number of Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
LUC 944 - Gasoline/Service Station (Fuel Stations)	8	10.28	41	41	**82**	14.03	56	56	**112**
Pass-By		*58%*	*24*	*24*	*48*	*42%*	*24*	*24*	*48*
LUC 934 - Fast Food Restaurant with Drive Through (1000 sq.ft.)	1.65	40.19	34	32	**66**	32.67	28	26	**54**
Pass-By		*49%*	*17*	*17*	*34*	*50%*	*14*	*14*	*28*
Total Trip Generation			**75**	**73**	**148**		**84**	**82**	**166**
Total Pass-By			*41*	*41*	*82*		*38*	*38*	*76*
Net Trip Generation			**34**	**32**	**66**		**46**	**44**	**90**

The trips generated by 360 James Street were distributed to the network based on existing travel patterns and is consistent with the trip distribution outlined in **Section 3.3**. Approximately 25% of trips are forecast to travel north via King Street, 45% south via James Street, 15% via Windham Road 12 and 15% west via Church Street.

Due to the location of the development on James Street, Fertilizer Road and Wilson Avenue are not expected to be used. Instead, the trips have been assigned to Windham Road 12 and James Street and are reflected in the distribution percentages above.

Appendix D contains the traffic volumes for 360 James Street.



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Background Development Location

4.2 2024 Background Traffic Operations

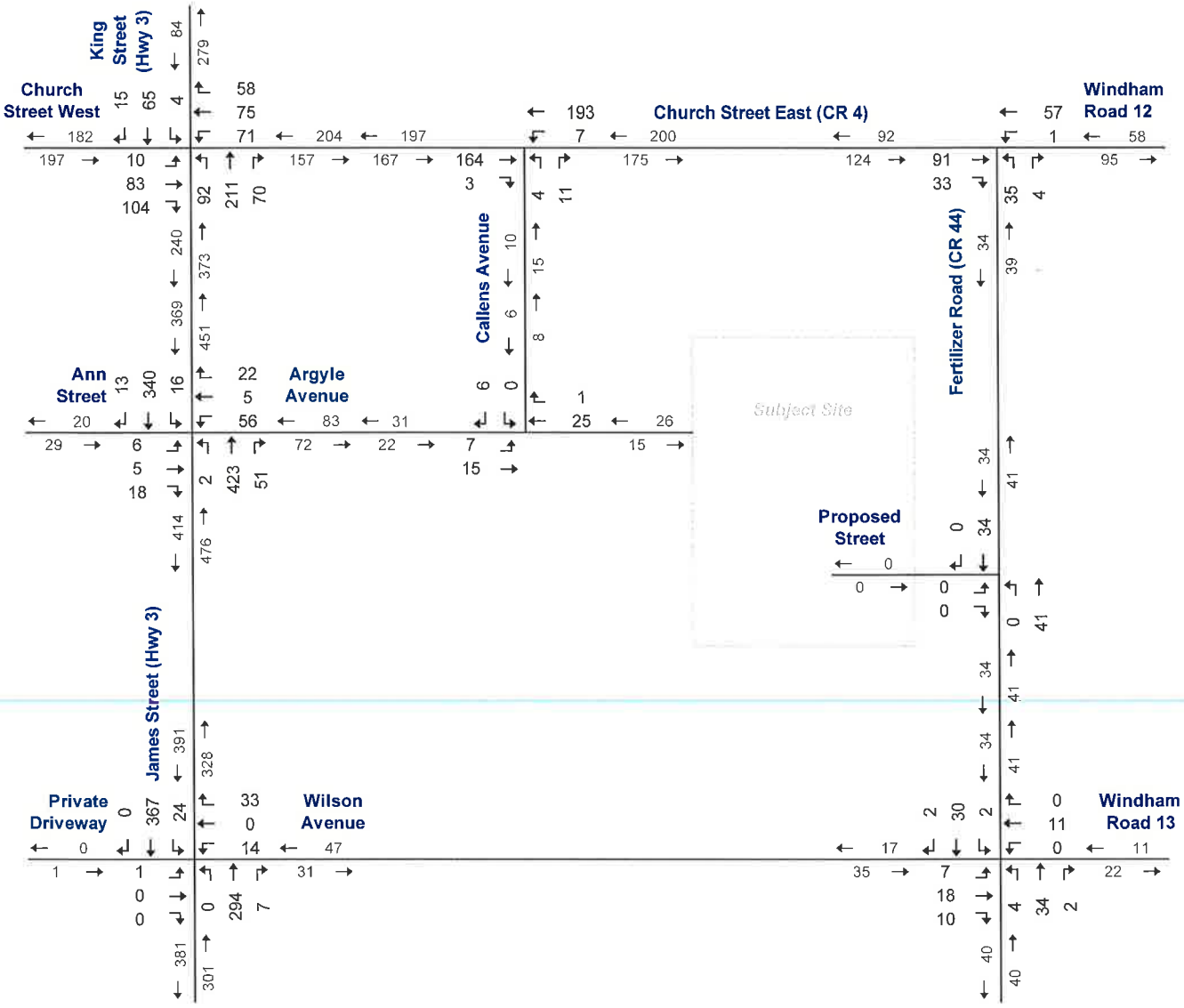
Figure 4.2a and **Figure 4.2b** illustrate the 2024 background traffic volumes, including traffic growth and background development traffic.

The 2024 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions.

Table 4.2a and **Table 4.2b** summarize the results of the 2024 background traffic operations.

The results indicate that the study area intersections are forecast to operate with similar levels of service as under existing traffic conditions, except for the westbound shared movement at the intersection of James Street/King Street and Church Street which is forecast to operate with LOS E and v/c ratio greater than 0.85 during the PM peak hour.

Appendix E contains the supporting detailed Synchro 10 reports.

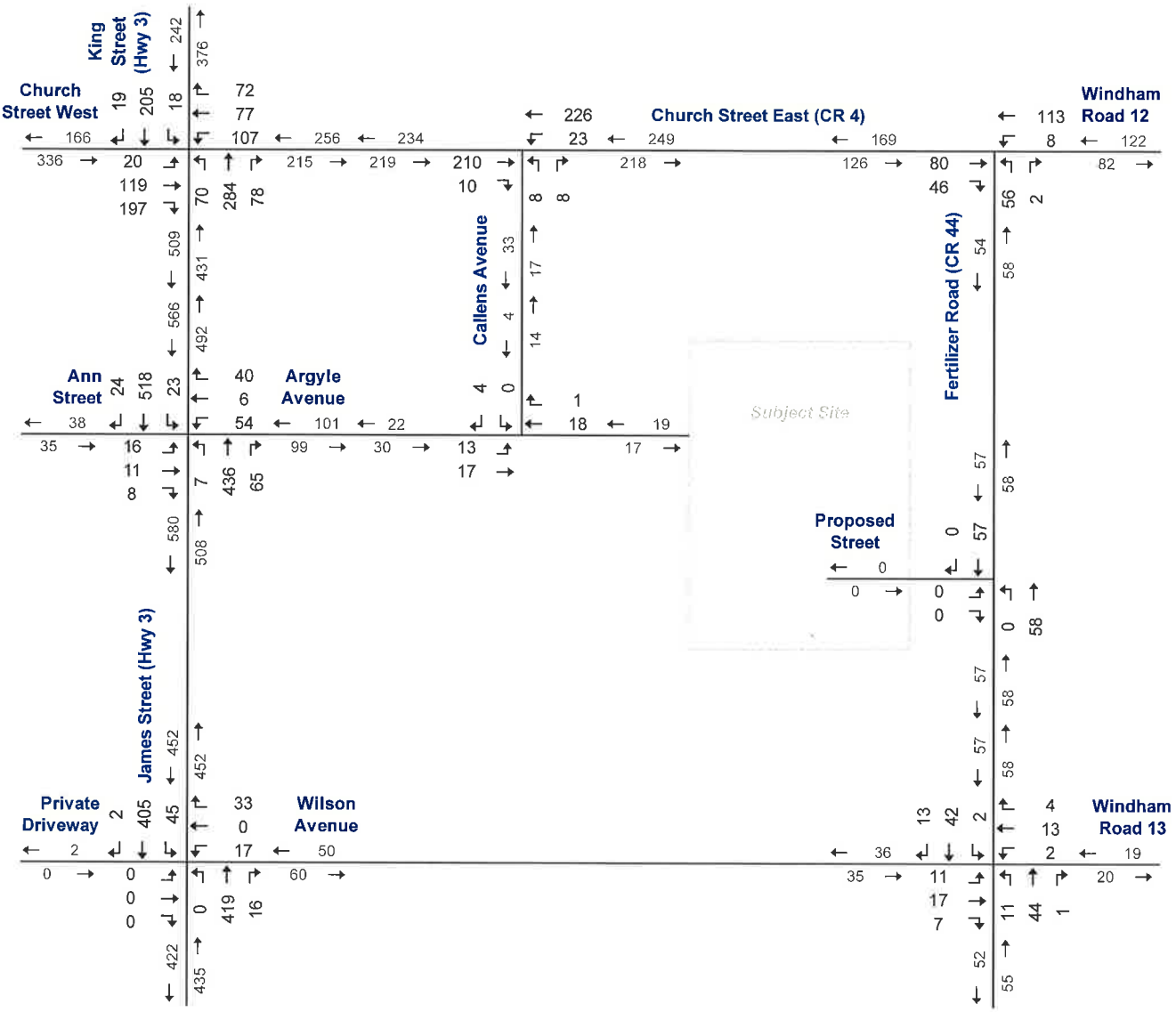


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2024 Background Traffic Volumes - AM Peak Hour

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Figure 4.2a



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2024 Background Traffic Volumes - PM Peak Hour

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Figure 4.2b

TABLE 4.2A: 2024 BACKGROUND TRAFFIC OPERATIONS – AM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**					
			Delay		0	>	**0**	<	8		**0**	10		>	**10**					
			V/C		0.00	>		<	0.01			0.02		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**					
			Delay		0	>	**0**	<	9		**0**	10		>	**10**					
			V/C		0.00	>		<	0.00			0.05		>						
			95th		0	>		<	0			0		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	9	>	**9**	<	10	>	**10**	<	8	>	**1**	<	7	>	**0**	
			V/C	<	0.04	>		<	0.02	>		<	0.00	>		<	0.00	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**2**		0	>	**0**					8		>	**8**	
			V/C	<	0.01				0.00	>						0.01		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	B	>	**B**	<	C	A	**C**	<	A	>	**A**	<	A	>	**A**	**A**
			Delay	<	19	>	**19**	<	27	0	**20**	<	8	>	**8**	<	8	>	**8**	**9.1**
			V/C	<	0.17	>		<	0.28	0.07		<	0.24	>		<	0.19	>		**0.28**
			95th	<	8	>		<	17	0		<	30	>		<	24	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	C	>	**C**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	15	>	**15**	<	12	>	**12**	<	0	>	**0**	<	8	>	**1**	
			V/C	<	0.00	>		<	0.09	>		<	0.00	>		<	0.02	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	D	>	**D**	C	A	>	**B**	C	B	>	**B**	**C**
			Delay	<	22	>	**22**	<	36	>	**36**	35	8	>	**14**	33	14	>	**15**	**21.2**
			V/C	<	0.53	>		<	0.70	>		0.43	0.18	>		0.03	0.06	>		**0.70**
			95th	<	37	>		<	48	>		26	19	>		3	8	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		4	-	>		12	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

TABLE 4.2B: 2024 BACKGROUND TRAFFIC OPERATIONS – PM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	OVERALL
PM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	11		>	**11**					
			V/C		0.00	>		<	0.02			0.03		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	11		>	**11**					
			V/C		0.00	>		<	0.01			0.09		>						
			95th		0	>		<	0			0		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	10	>	**10**	<	10	>	**10**	<	7	>	**1**	<	7	>	**0**	
			V/C	<	0.05	>		<	0.03	>		<	0.01	>		<	0.00	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**3**		0	>	**0**					8		>	**8**	
			V/C	<	0.01				0.00	>						0.00		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	C	>	**C**	<	C	A	**B**	<	A	>	**A**	<	A	>	**A**	**A**
			Delay	<	25	>	**25**	<	27	1	**17**	<	8	>	**8**	<	9	>	**9**	**9.8**
			V/C	<	0.20	>		<	0.26	0.12		<	0.27	>		<	0.31	>		**0.31**
			95th	<	11	>		<	17	0		<	31	>		<	36	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	A	>	**A**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	0	>	**0**	<	14	>	**14**	<	0	>	**0**	<	9	>	**1**	
			V/C	<	-	>		<	0.12	>		<	-	>		<	0.05	>		
			95th	<	-	>		<	0	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	E	>	**E**	C	B	>	**B**	C	B	>	**B**	**C**
			Delay	<	28	>	**28**	<	63	>	**63**	35	10	>	**14**	34	16	>	**17**	**28.1**
			V/C	<	0.71	>		<	0.92	>		0.37	0.24	>		0.14	0.19	>		**0.92**
			95th	<	75	>		<	83	>		21	27	>		9	20	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		9	-	>		7	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

4.3 2024 Total Traffic Operations

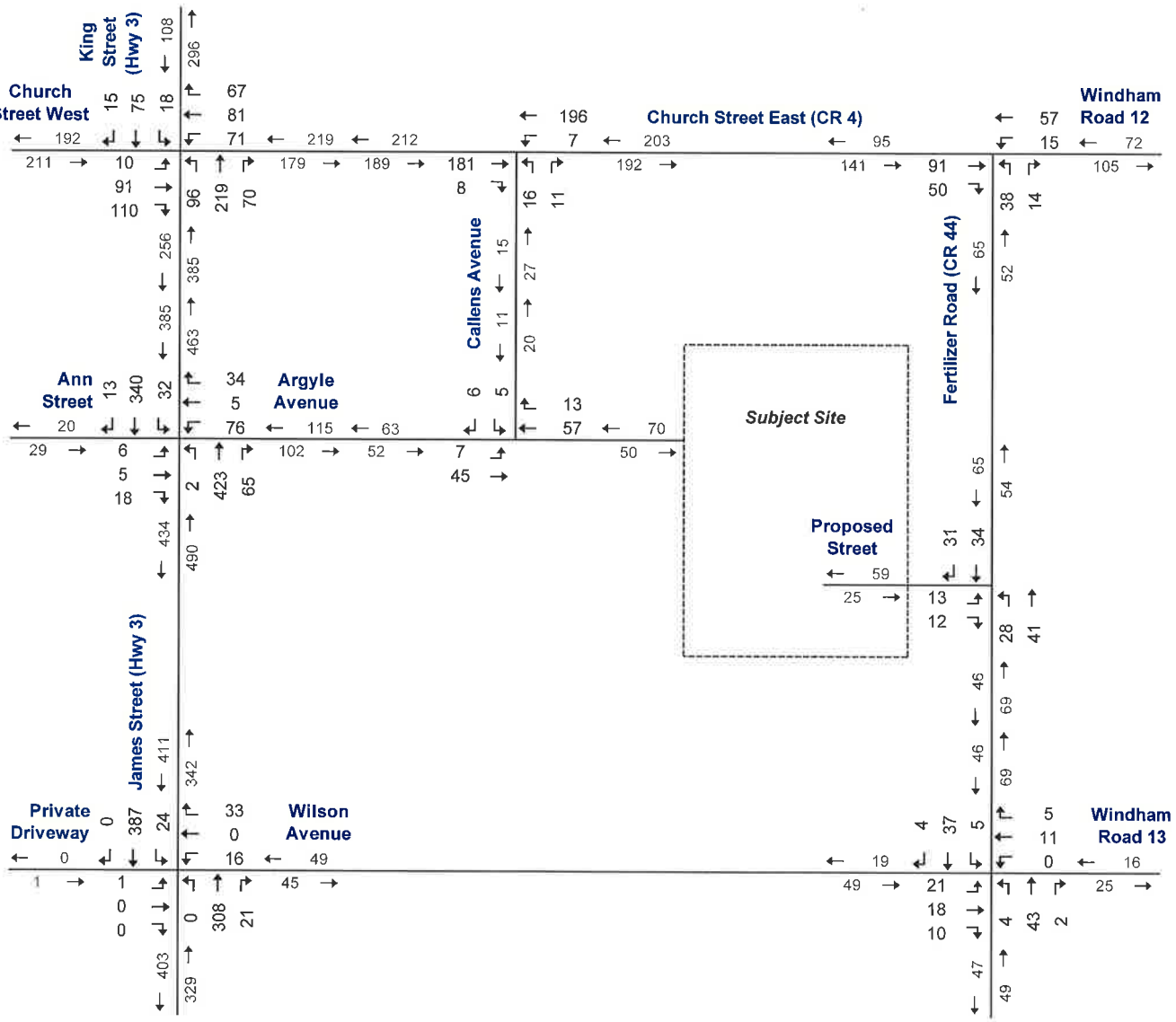
Figure 4.3a and **Figure 4.3b** illustrate the 2024 total traffic volumes, including trips generated by the subject development.

The 2024 total traffic volumes have been analyzed using the same methodology as under background traffic conditions. **Table 4.3a** and **Table 4.3b** summarize the results of the 2024 total traffic operations.

The results indicate that the study area intersections are forecast to operate with similar levels of service as under 2024 background traffic conditions during the AM and PM peak hours.

It is noted that the proposed street connection to Fertilizer Road is forecast to operate with LOS A during the AM and PM peak hours.

Appendix F contains the supporting detailed Synchro 10 reports.

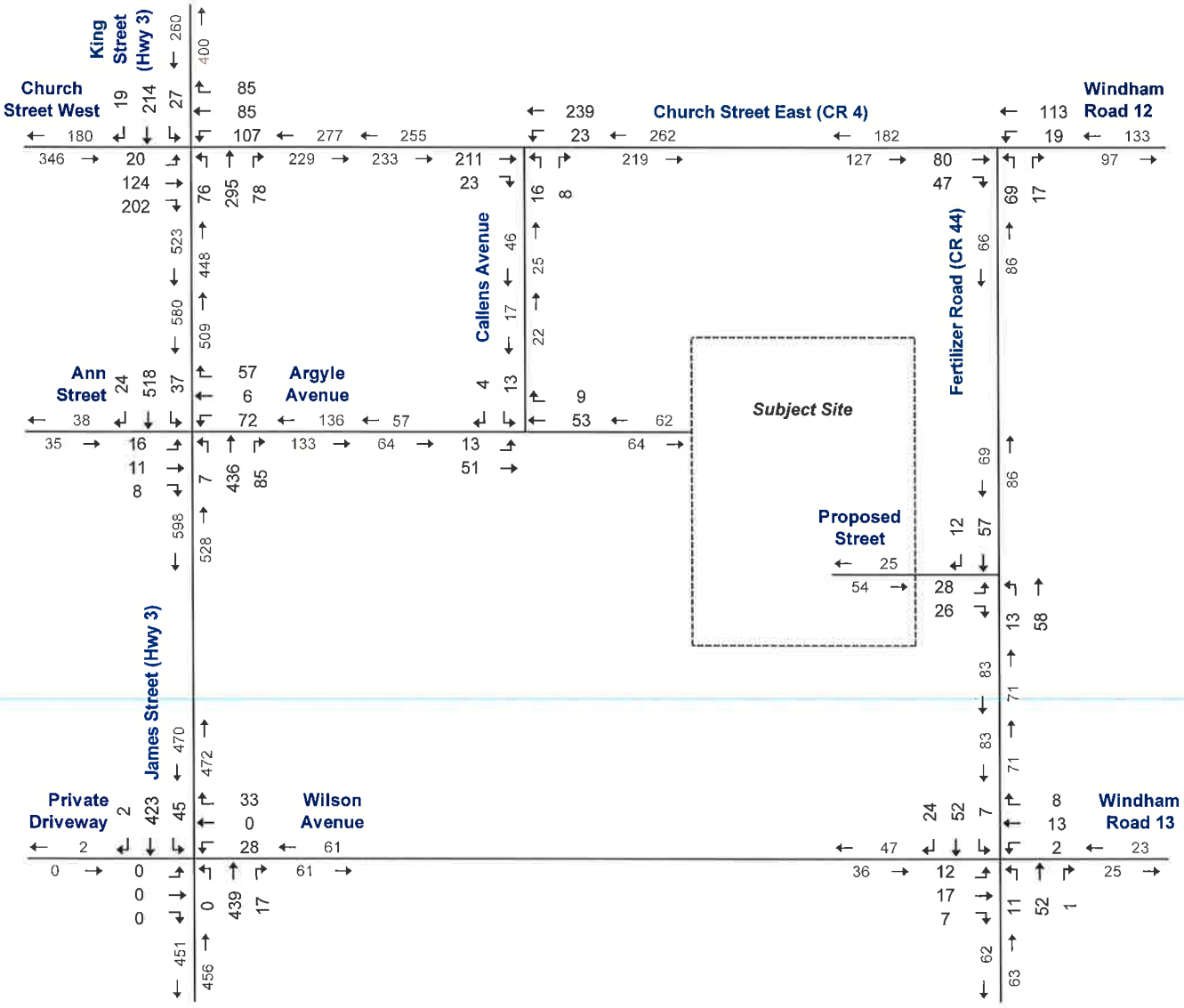


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2024 Total Traffic Volumes – AM Peak Hour

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Figure 4.3a



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2024 Total Traffic Volumes – PM Peak Hour

Bluegrass Estates Phase 3 and 4, Delhi TIS
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Figure 4.3b

TABLE 4.3A: 2024 TOTAL TRAFFIC OPERATIONS – AM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	OVERALL
AM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**0**	11		>	**11**					
			V/C		0.00	>		<	0.01			0.04		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**					
			Delay		0	>	**0**	<	9		**2**	10		>	**10**					
			V/C		0.00	>		<	0.02			0.07		>						
			95th		0	>		<	0			0		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	10	>	**10**	<	9	>	**9**	<	8	>	**1**	<	7	>	**1**	
			V/C	<	0.06	>		<	0.02	>		<	0.00	>		<	0.00	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**1**		0	>	**0**					9		>	**9**	
			V/C	<	0.01				0.00	>						0.01		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	B	>	**B**	<	C	A	**C**	<	A	>	**A**	<	A	>	**A**	**B**
			Delay	<	19	>	**19**	<	28	1	**20**	<	9	>	**9**	<	9	>	**9**	**10.5**
			V/C	<	0.17	>		<	0.35	0.10		<	0.28	>		<	0.23	>		**0.35**
			95th	<	9	>		<	22	0		<	33	>		<	26	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	C	>	**C**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	16	>	**16**	<	12	>	**12**	<	0	>	**0**	<	8	>	**1**	
			V/C	<	0.00	>		<	0.10	>		<	0.00	>		<	0.02	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	D	>	**D**	D	A	>	**B**	C	B	>	**B**	**C**
			Delay	<	23	>	**23**	<	38	>	**38**	35	10	>	**16**	34	14	>	**18**	**22.9**
			V/C	<	0.55	>		<	0.74	>		0.44	0.19	>		0.12	0.07	>		**0.74**
			95th	<	41	>		<	57	>		27	20	>		9	9	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		3	-	>		6	-	>		
	Fertilizer Road & Proposed Street	TWSC	LOS	A		>	**A**					<	A		**A**		A	>	**A**	
			Delay	9		>	**9**					<	7		**3**		0	>	**0**	
			V/C	0.03		>						<	0.02				0.00	>		
			95th	0		>						<	0				0	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

TABLE 4.3B: 2024 TOTAL TRAFFIC OPERATIONS – PM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	12		>	**12**					
			V/C		0.00	>		<	0.02			0.05		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	11		>	**11**					
			V/C		0.00	>		<	0.01			0.13		>						
			95th		0	>		<	0			1		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	10	>	**10**	<	10	>	**10**	<	7	>	**1**	<	7	>	**1**	
			V/C	<	0.05	>		<	0.03	>		<	0.01	>		<	0.01	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**2**		0	>	**0**					9		>	**9**	
			V/C	<	0.01				0.00	>						0.02		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	C	>	**C**	<	C	A	**B**	<	A	>	**A**	<	A	>	**A**	**B**
			Delay	<	25	>	**25**	<	27	1	**16**	<	9	>	**9**	<	10	>	**10**	**10.3**
			V/C	<	0.19	>		<	0.31	0.17		<	0.29	>		<	0.33	>		**0.33**
			95th	<	11	>		<	21	0		<	33	>		<	39	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	A	>	**A**	<	C	>	**C**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	0	>	**0**	<	16	>	**16**	<	0	>	**0**	<	9	>	**1**	
			V/C	<	0.00	>		<	0.17	>		<	0.00	>		<	0.05	>		
			95th	<	0	>		<	1	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	E	>	**E**	D	B	>	**B**	C	B	>	**B**	**C**
			Delay	<	30	>	**30**	<	75	>	**75**	35	12	>	**16**	34	16	>	**18**	**32.1**
			V/C	<	0.73	>		<	0.98	>		0.39	0.26	>		0.20	0.20	>		**0.98**
			95th	<	80	>		<	91	>		23	28	>		11	21	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		7	-	>		4	-	>		
	Fertilizer Road & Proposed Street	TWSC	LOS	A		>	**A**					<	A		**A**		F	>	**A**	
			Delay	9		>	**9**					<	7		**1**		-	>	**0**	
			V/C	0.07		>						<	0.01				-	>		
			95th	0		>						<	0				-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio

95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal

TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

4.4 2029 Background Traffic Operations

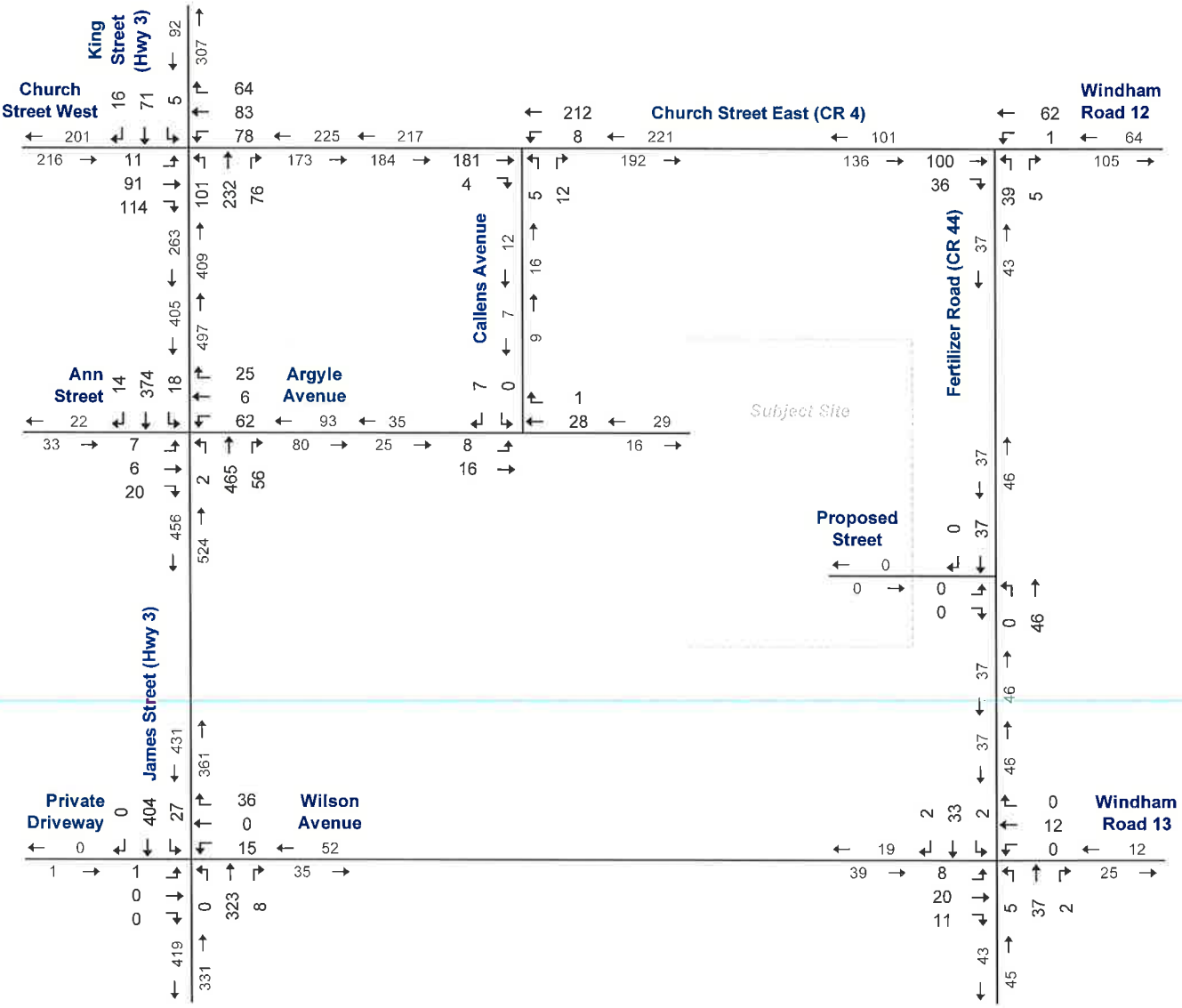
Figure 4.4a and **Figure 4.4b** illustrate the 2029 background traffic volumes, including traffic growth and background development traffic.

The 2029 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions. **Table 4.4a** and **Table 4.4b** summarize the results of the 2029 background traffic operations.

The results indicate that the study area intersections are forecast to operate with similar levels of service as under existing traffic conditions, except for the westbound shared movement at the intersection of James Street/King Street and Church Street which is forecast to operate with LOS F and v/c ratio greater than 1.00 during the PM peak hour.

Appendix G contains the supporting detailed Synchro 10 reports.



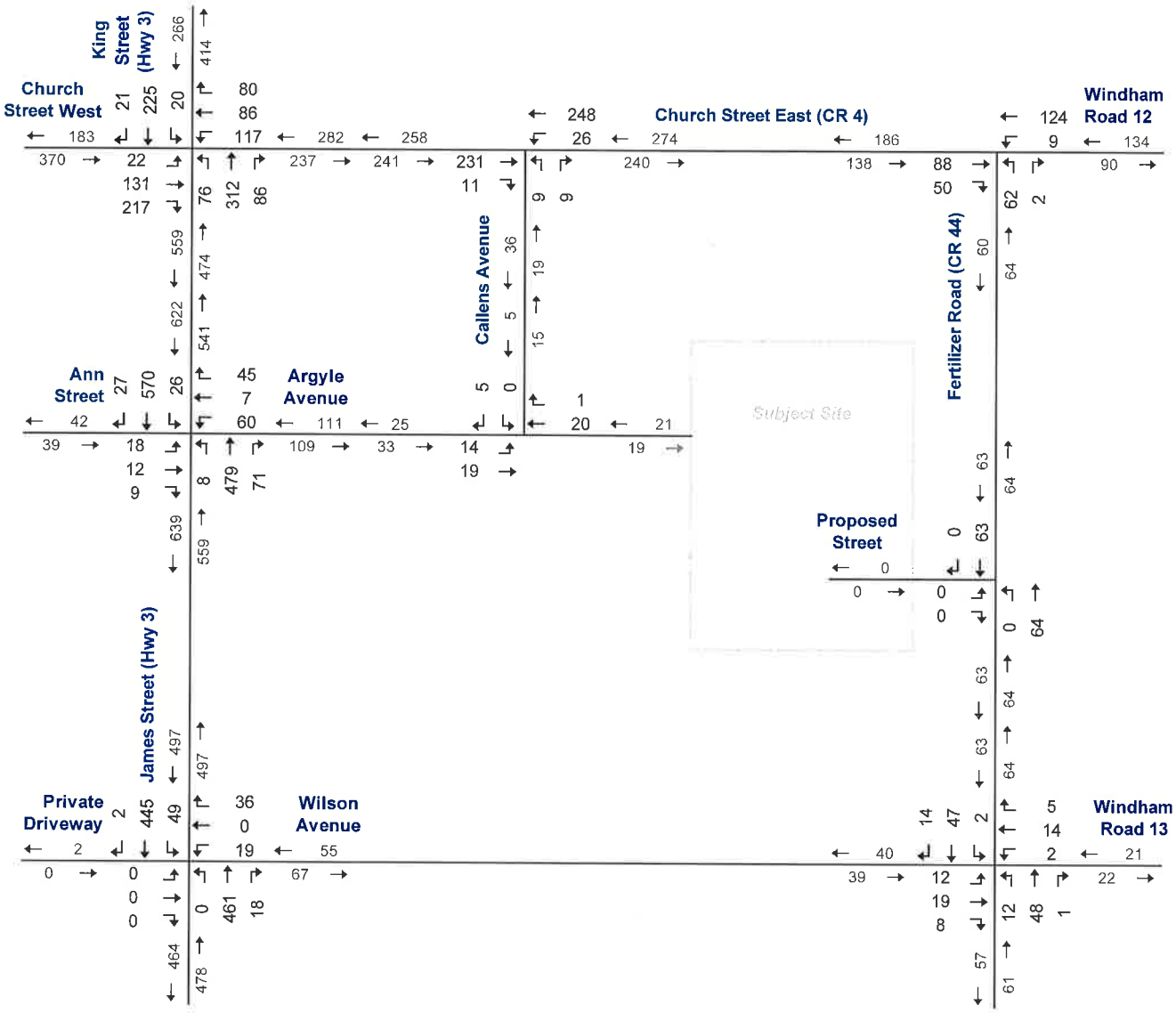


NTS

2029 Background Traffic Volumes - AM Peak Hour

Bluegrass Estates Phase 3 and 4, Delhi TIS
200005

Figure 4.4a



NTS

2029 Background Traffic Volumes - PM Peak Hour

Bluegrass Estates Phase 3 and 4, Delhi TIS
200005

Figure 4.4b

TABLE 4.4A: 2029 BACKGROUND TRAFFIC OPERATIONS – AM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**					
			Delay		0	>	**0**	<	8		**0**	10		>	**10**					
			V/C		0.00	>		<	0.01			0.03		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**					
			Delay		0	>	**0**	<	9		**0**	10		>	**10**					
			V/C		0.00	>		<	0.00			0.06		>						
			95th		0	>		<	0			0		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	9	>	**9**	<	10	>	**10**	<	8	>	**1**	<	7	>	**0**	
			V/C	<	0.05	>		<	0.02	>		<	0.00	>		<	0.00	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**2**		0	>	**0**					9		>	**9**	
			V/C	<	0.01				0.00	>						0.01		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	B	>	**B**	<	C	A	**C**	<	A	>	**A**	<	A	>	**A**	**B**
			Delay	<	20	>	**20**	<	28	0	**21**	<	9	>	**9**	<	9	>	**9**	**10.2**
			V/C	<	0.20	>		<	0.31	0.07		<	0.30	>		<	0.23	>		**0.31**
			95th	<	9	>		<	19	0		<	34	>		<	27	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	C	>	**C**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	16	>	**16**	<	12	>	**12**	<	0	>	**0**	<	8	>	**1**	
			V/C	<	0.00	>		<	0.10	>		<	0.00	>		<	0.02	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	D	>	**D**	D	A	>	**B**	C	B	>	**B**	**C**
			Delay	<	23	>	**23**	<	41	>	**41**	36	8	>	**15**	34	14	>	**15**	**23.1**
			V/C	<	0.56	>		<	0.77	>		0.46	0.20	>		0.03	0.07	>		**0.77**
			95th	<	42	>		<	62	>		28	21	>		4	9	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		2	-	>		11	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

TABLE 4.4B: 2029 BACKGROUND TRAFFIC OPERATIONS – PM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	OVERALL
PM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	11		>	**11**					
			V/C		0.00	>		<	0.02			0.03		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	11		>	**11**					
			V/C		0.00	>		<	0.01			0.10		>						
			95th		0	>		<	0			0		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	10	>	**10**	<	10	>	**10**	<	7	>	**1**	<	7	>	**0**	
			V/C	<	0.05	>		<	0.03	>		<	0.01	>		<	0.00	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**3**		0	>	**0**					8		>	**8**	
			V/C	<	0.01				0.00	>						0.01		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	C	>	**C**	<	C	A	**B**	<	A	>	**A**	<	B	>	**B**	**B**
			Delay	<	26	>	**26**	<	29	1	**17**	<	10	>	**10**	<	11	>	**11**	**11.4**
			V/C	<	0.23	>		<	0.29	0.14		<	0.32	>		<	0.36	>		**0.36**
			95th	<	12	>		<	18	0		<	36	>		<	42	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	A	>	**A**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	0	>	**0**	<	15	>	**15**	<	0	>	**0**	<	9	>	**1**	
			V/C	<	0.00	>		<	0.14	>		<	0.00	>		<	0.05	>		
			95th	<	0	>		<	1	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	F	>	**F**	D	B	>	**B**	C	B	>	**B**	**D**
			Delay	<	33	>	**33**	<	105	>	**105**	35	12	>	**16**	34	16	>	**17**	**38.7**
			V/C	<	0.78	>		<	1.08	>		0.39	0.27	>		0.16	0.21	>		**1.08**
			95th	<	89	>		<	97	>		23	29	>		9	22	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		7	-	>		6	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

4.5 2029 Total Traffic Operations

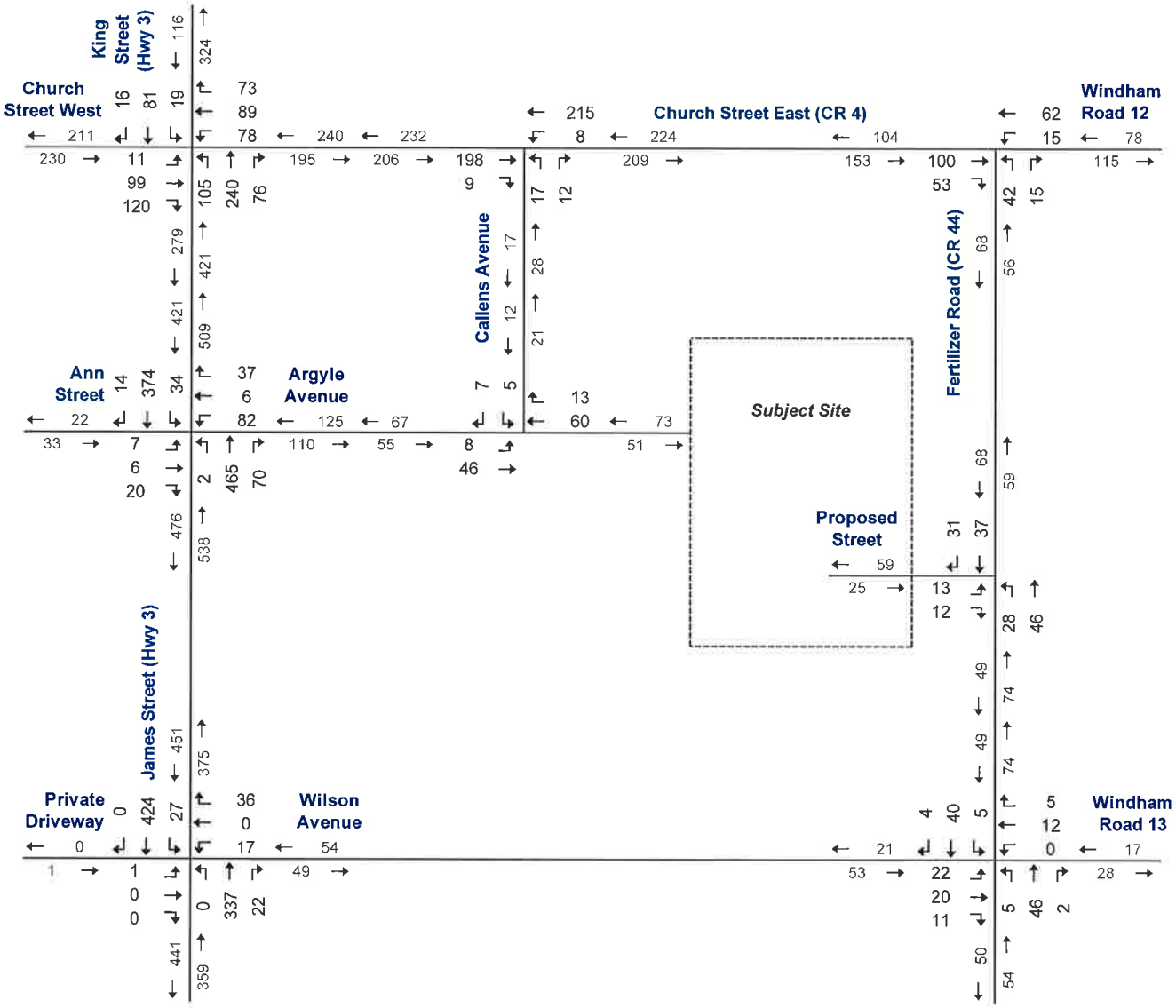
Figure 4.5a and **Figure 4.5b** illustrate the 2029 total traffic volumes, including trips generated by the subject development.

The 2029 total traffic volumes have been analyzed using the same methodology as under background traffic conditions. **Table 4.5a** and **Table 4.5b** summarize the results of the 2029 total traffic operations.

The results indicate that the study area intersections are forecast to operate with similar levels of service as under 2029 background traffic conditions during the AM and PM peak hours.

It is noted that the proposed street connection to Fertilizer Road is forecast to operate with LOS A during the AM and PM peak hours.

Appendix H contains the supporting detailed Synchro 10 reports.

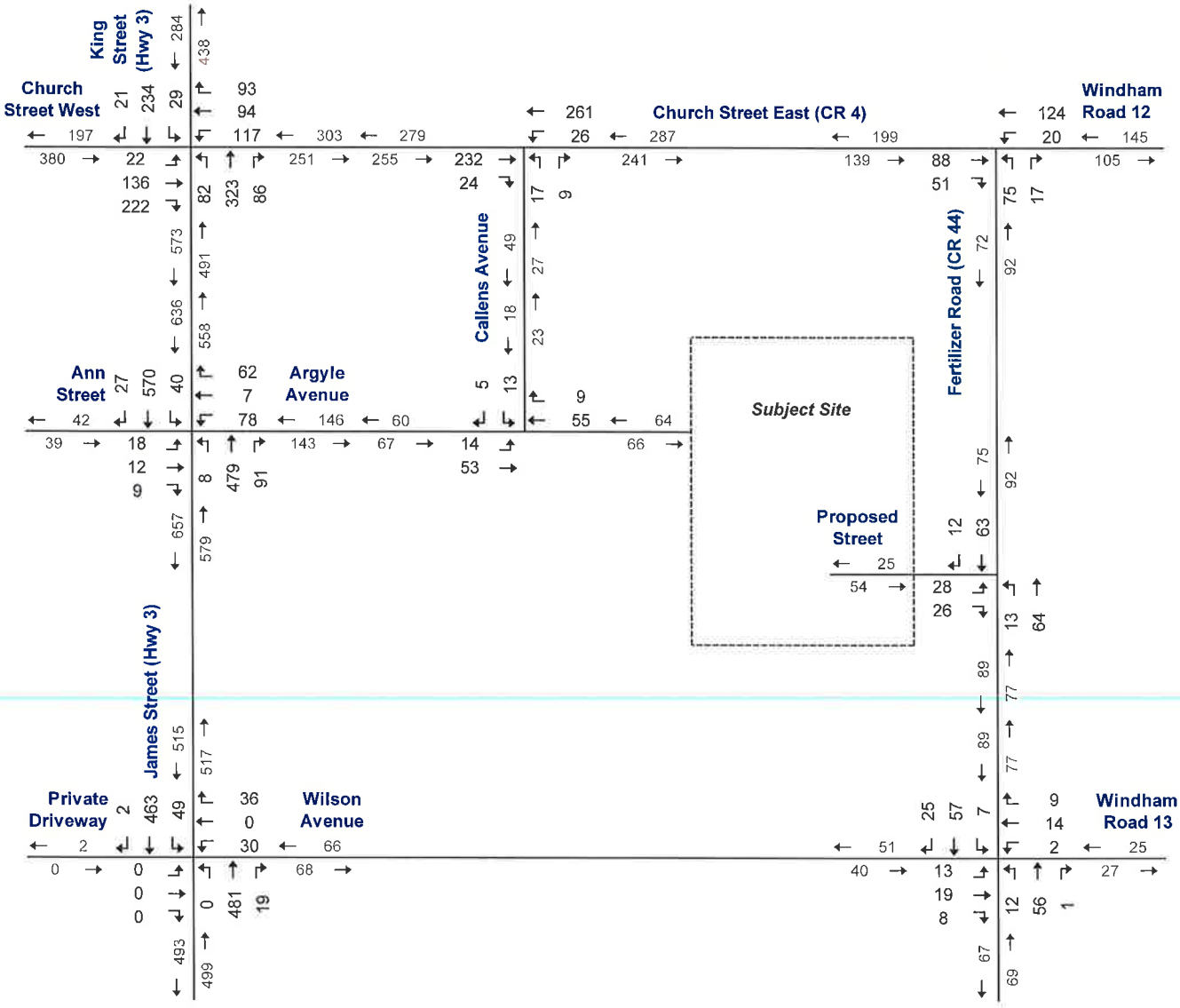


NTS

2029 Total Traffic Volumes – AM Peak Hour

Bluegrass Estates Phase 3 and 4, Delhi TIS
200005

Figure 4.5a



NTS

2029 Total Traffic Volumes – PM Peak Hour

Bluegrass Estates Phase 3 and 4, Delhi TIS
200005

Figure 4.5b

TABLE 4.5A: 2029 TOTAL TRAFFIC OPERATIONS – AM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**0**	11		>	**11**					
			V/C		0.00	>		<	0.01			0.05		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**					
			Delay		0	>	**0**	<	9		**2**	10		>	**10**					
			V/C		0.00	>		<	0.02			0.08		>						
			95th		0	>		<	0			0		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	10	>	**10**	<	10	>	**10**	<	8	>	**1**	<	7	>	**1**	
			V/C	<	0.07	>		<	0.02	>		<	0.00	>		<	0.00	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**1**		0	>	**0**					9		>	**9**	
			V/C	<	0.01				0.00	>						0.01		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	B	>	**B**	<	C	A	**C**	<	A	>	**A**	<	A	>	**A**	**B**
			Delay	<	20	>	**20**	<	29	1	**20**	<	9	>	**9**	<	9	>	**9**	**10.9**
			V/C	<	0.19	>		<	0.38	0.10		<	0.31	>		<	0.26	>		**0.38**
			95th	<	9	>		<	23	0		<	37	>		<	30	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	C	>	**C**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	17	>	**17**	<	13	>	**13**	<	0	>	**0**	<	8	>	**1**	
			V/C	<	0.00	>		<	0.11	>		<	0.00	>		<	0.03	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	D	>	**D**	D	B	>	**B**	C	B	>	**B**	**C**
			Delay	<	24	>	**24**	<	44	>	**44**	36	10	>	**17**	34	15	>	**18**	**25**
			V/C	<	0.58	>		<	0.80	>		0.47	0.21	>		0.13	0.08	>		**0.80**
			95th	<	46	>		<	69	>		29	22	>		9	10	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		1	-	>		6	-	>		
	Fertilizer Road & Proposed Street	TWSC	LOS	A		>	**A**					<	A		**A**		A	>	**A**	
			Delay	9		>	**9**					<	7		**3**		0	>	**0**	
			V/C	0.03		>						<	0.02				0.00	>		
			95th	0		>						<	0				0	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio

95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal

TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

TABLE 4.5B: 2029 TOTAL TRAFFIC OPERATIONS – PM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	12		>	**12**					
			V/C		0.00	>		<	0.02			0.05		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	11		>	**11**					
			V/C		0.00	>		<	0.02			0.15		>						
			95th		0	>		<	0			1		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	10	>	**10**	<	10	>	**10**	<	7	>	**1**	<	7	>	**1**	
			V/C	<	0.06	>		<	0.04	>		<	0.01	>		<	0.01	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**2**		0	>	**0**					9		>	**9**	
			V/C	<	0.01				0.00	>						0.02		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	C	>	**C**	<	C	A	**B**	<	B	>	**B**	<	B	>	**B**	**B**
			Delay	<	27	>	**27**	<	29	1	**18**	<	10	>	**10**	<	11	>	**11**	**11.9**
			V/C	<	0.23	>		<	0.35	0.19		<	0.33	>		<	0.38	>		**0.38**
			95th	<	12	>		<	22	0		<	38	>		<	45	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	A	>	**A**	<	C	>	**C**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	0	>	**0**	<	18	>	**18**	<	0	>	**0**	<	9	>	**1**	
			V/C	<	0.00	>		<	0.20	>		<	0.00	>		<	0.05	>		
			95th	<	0	>		<	1	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	F	>	**F**	D	B	>	**B**	C	B	>	**B**	**D**
			Delay	<	35	>	**35**	<	131	>	**131**	36	12	>	**16**	35	16	>	**18**	**45.4**
			V/C	<	0.81	>		<	1.16	>		0.40	0.28	>		0.21	0.22	>		**1.16**
			95th	<	94	>		<	106	>		24	31	>		12	22	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		6	-	>		3	-	>		
	Fertilizer Road & Proposed Street	TWSC	LOS	A		>	**A**					<	A		**A**		A	>	**A**	
			Delay	9		>	**9**					<	7		**1**		0	>	**0**	
			V/C	0.07		>						<	0.01				0.00	>		
			95th	0		>						<	0				0	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

4.6 2034 Background Traffic Operations

Figure 4.6a and **Figure 4.6b** illustrate the 2034 background traffic volumes, including traffic growth and background development traffic.

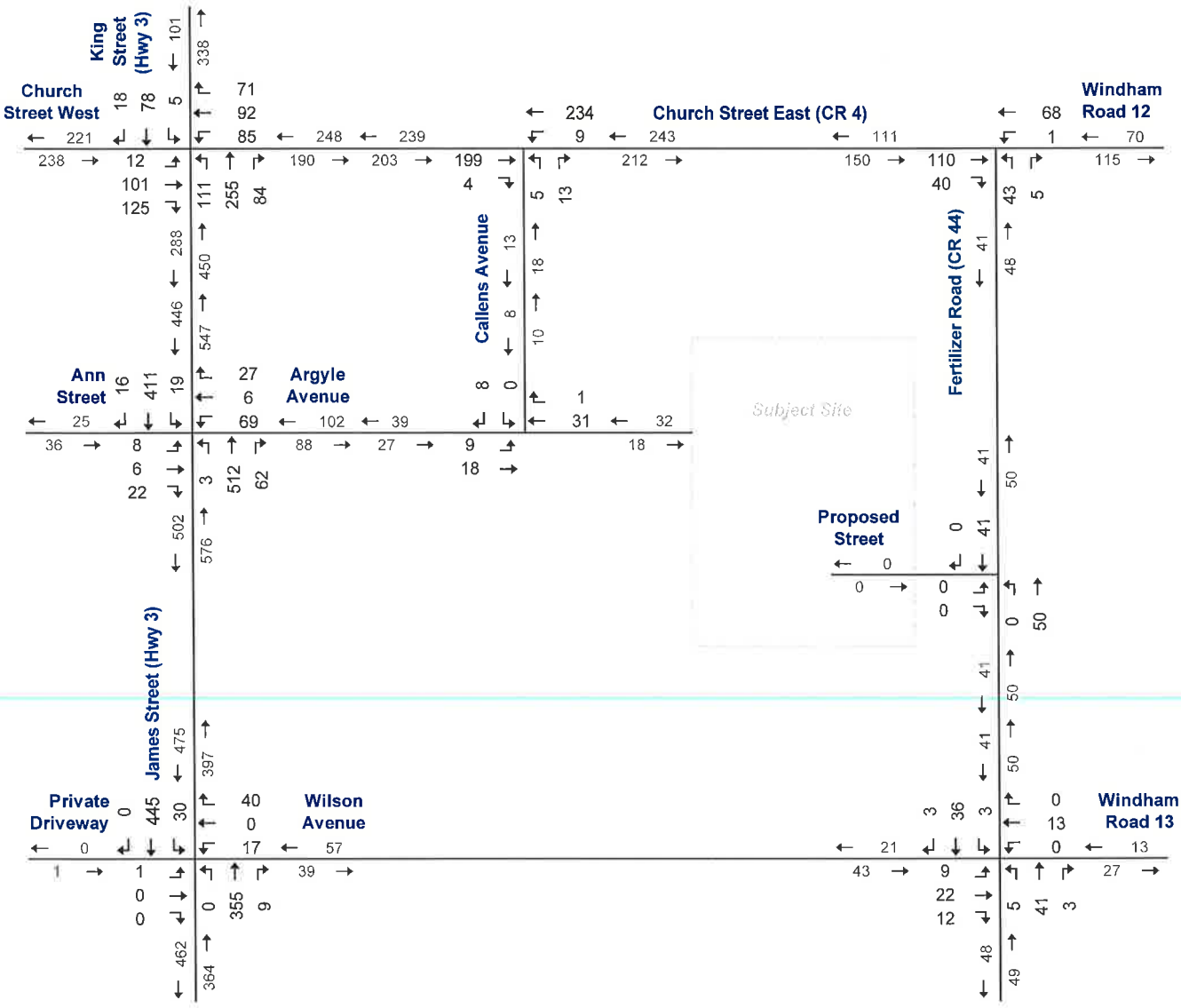
The 2034 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions. **Table 4.6a** and **Table 4.6b** summarize the results of the 2034 background traffic operations.

The results indicate that the study area intersections are forecast to operate with similar levels of service as under existing traffic conditions, except for the following movements at James Street/King Street and Church Street:

- The northbound left-turn movement is forecast to operate with 95th percentile queues exceeding the available storage of 30 metres by one metre during the AM peak hour;
- The westbound shared movement is forecast to operate with LOS F and v/c ratio greater than 1.00 during the PM peak hour; and
- The eastbound shared movement is forecast to operate with LOS D and v/c ratio greater than 0.85 during the PM peak hour.

Appendix I contains the supporting detailed Synchro 10 reports.



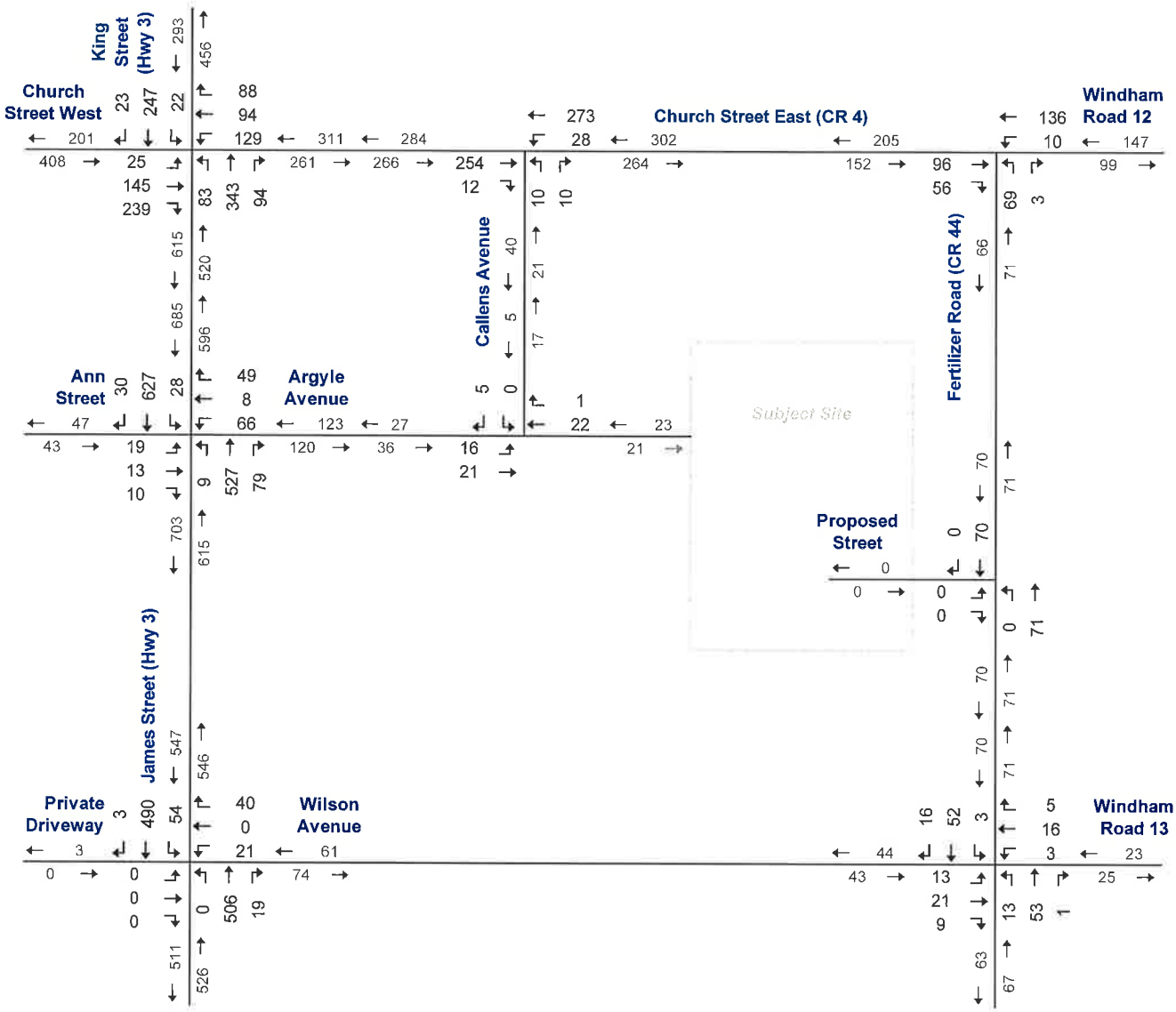


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2034 Background Traffic Volumes - AM Peak Hour

Bluegrass Estates Phase 3 and 4, Delhi TIS
200005

Figure 4.6a



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2034 Background Traffic Volumes - PM Peak Hour

Bluegrass Estates Phase 3 and 4, Delhi TIS
200005

Figure 4.6b

TABLE 4.6A: 2034 BACKGROUND TRAFFIC OPERATIONS – AM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**0**	10		>	**10**					
			V/C		0.00	>		<	0.01			0.03		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	A		>	**A**					
			Delay		0	>	**0**	<	9		**0**	10		>	**10**					
			V/C		0.00	>		<	0.00			0.07		>						
			95th		0	>		<	0			0		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	10	>	**10**	<	10	>	**10**	<	8	>	**1**	<	7	>	**1**	
			V/C	<	0.06	>		<	0.02	>		<	0.00	>		<	0.00	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**2**		0	>	**0**					9		>	**9**	
			V/C	<	0.01				0.00	>						0.01		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	B	>	**B**	<	C	A	**C**	<	A	>	**A**	<	A	>	**A**	**B**
			Delay	<	20	>	**20**	<	28	0	**21**	<	9	>	**9**	<	9	>	**9**	**10.6**
			V/C	<	0.21	>		<	0.34	0.08		<	0.33	>		<	0.26	>		**0.34**
			95th	<	10	>		<	20	0		<	39	>		<	30	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	C	>	**C**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	18	>	**18**	<	13	>	**13**	<	0	>	**0**	<	8	>	**1**	
			V/C	<	0.00	>		<	0.12	>		<	0.00	>		<	0.03	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	D	>	**D**	D	A	>	**B**	C	B	>	**B**	**C**
			Delay	<	24	>	**24**	<	47	>	**47**	37	9	>	**16**	34	15	>	**15**	**25.2**
			V/C	<	0.58	>		<	0.83	>		0.49	0.22	>		0.03	0.08	>		**0.83**
			95th	<	48	>		<	75	>		31	23	>		4	10	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		-1	-	>		11	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

TABLE 4.6B: 2034 BACKGROUND TRAFFIC OPERATIONS – PM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	12		>	**12**					
			V/C		0.00	>		<	0.02			0.04		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	11		>	**11**					
			V/C		0.00	>		<	0.01			0.12		>						
			95th		0	>		<	0			0		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	10	>	**10**	<	10	>	**10**	<	7	>	**1**	<	7	>	**0**	
			V/C	<	0.06	>		<	0.04	>		<	0.01	>		<	0.00	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**3**		0	>	**0**					9		>	**9**	
			V/C	<	0.01				0.00	>						0.01		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	C	>	**C**	<	C	A	**B**	<	B	>	**B**	<	B	>	**B**	**B**
			Delay	<	26	>	**26**	<	29	1	**18**	<	10	>	**10**	<	11	>	**11**	**11.8**
			V/C	<	0.24	>		<	0.31	0.15		<	0.35	>		<	0.40	>		**0.40**
			95th	<	13	>		<	20	0		<	40	>		<	47	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	A	>	**A**	<	C	>	**C**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	0	>	**0**	<	17	>	**17**	<	0	>	**0**	<	9	>	**1**	
			V/C	<	0.00	>		<	0.18	>		<	0.00	>		<	0.06	>		
			95th	<	-	>		<	1	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	D	>	**D**	<	F	>	**F**	D	B	>	**B**	C	B	>	**B**	**E**
			Delay	<	42	>	**42**	<	188	>	**188**	36	12	>	**16**	34	16	>	**18**	**58.3**
			V/C	<	0.87	>		<	1.31	>		0.41	0.30	>		0.17	0.23	>		**1.31**
			95th	<	106	>		<	113	>		24	33	>		10	24	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		6	-	>		5	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

4.7 2034 Total Traffic Operations

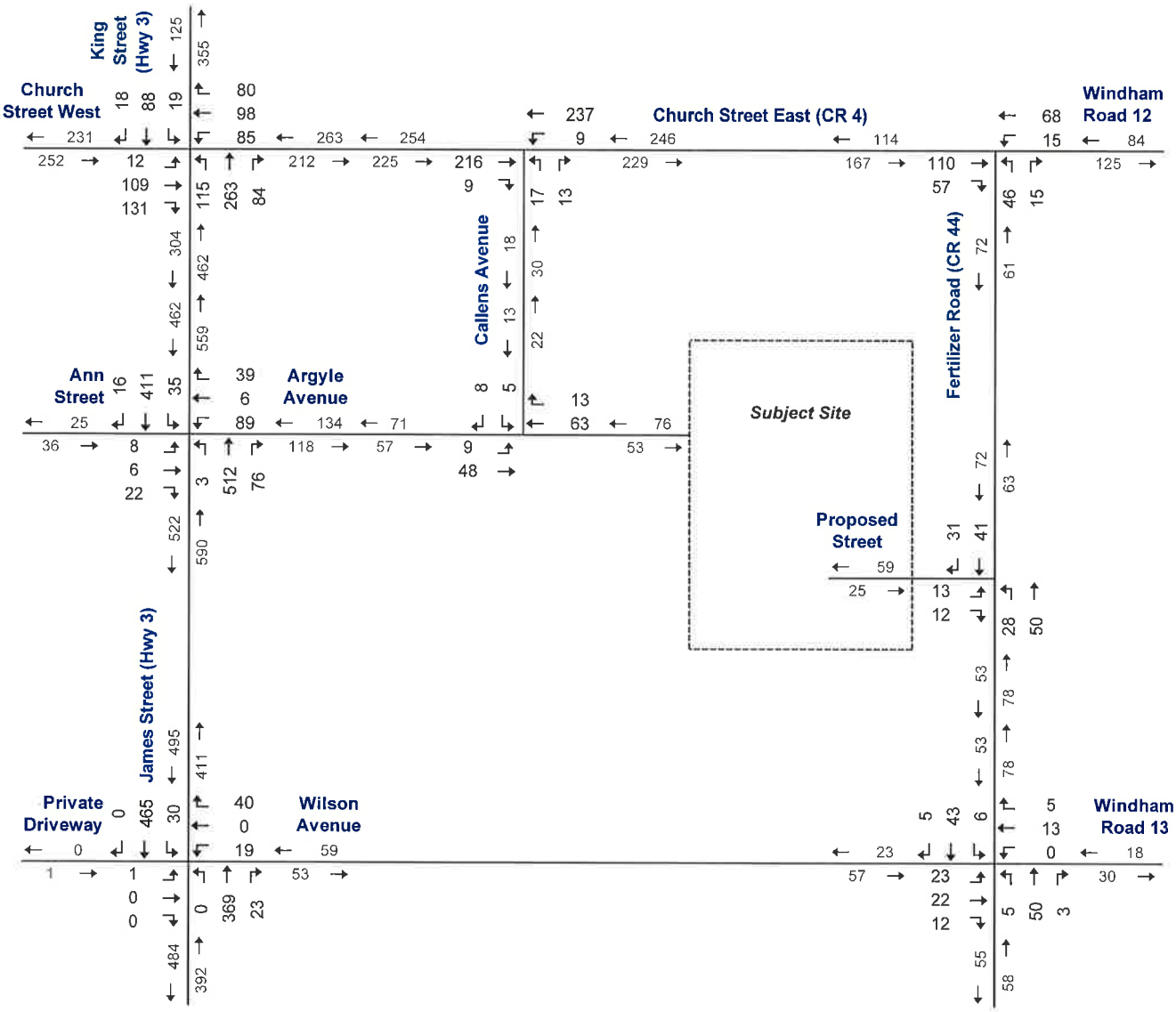
Figure 4.7a and **Figure 4.7b** illustrate the 2034 total traffic volumes, including trips generated by the subject development.

The 2034 total traffic volumes have been analyzed using the same methodology as under background traffic conditions. **Table 4.7a** and **Table 4.7b** summarize the results of the 2034 total traffic operations.

The results indicate that the study area intersections are forecast to operate with similar levels of service as under 2034 background traffic conditions, except for the westbound shared movement at the intersection of James Street/King Street and Church Street which is forecast to operate with LOS D and v/c ratio of 0.85 during the AM peak hour. It is noted that the v/c ratio has only increased by 0.02 between the 2034 background and total traffic conditions for this movement, the LOS remains the same between scenarios.

The proposed street connection to Fertilizer Road is forecast to operate with LOS A during the AM and PM peak hours.

Appendix J contains the supporting detailed Synchro 10 reports.

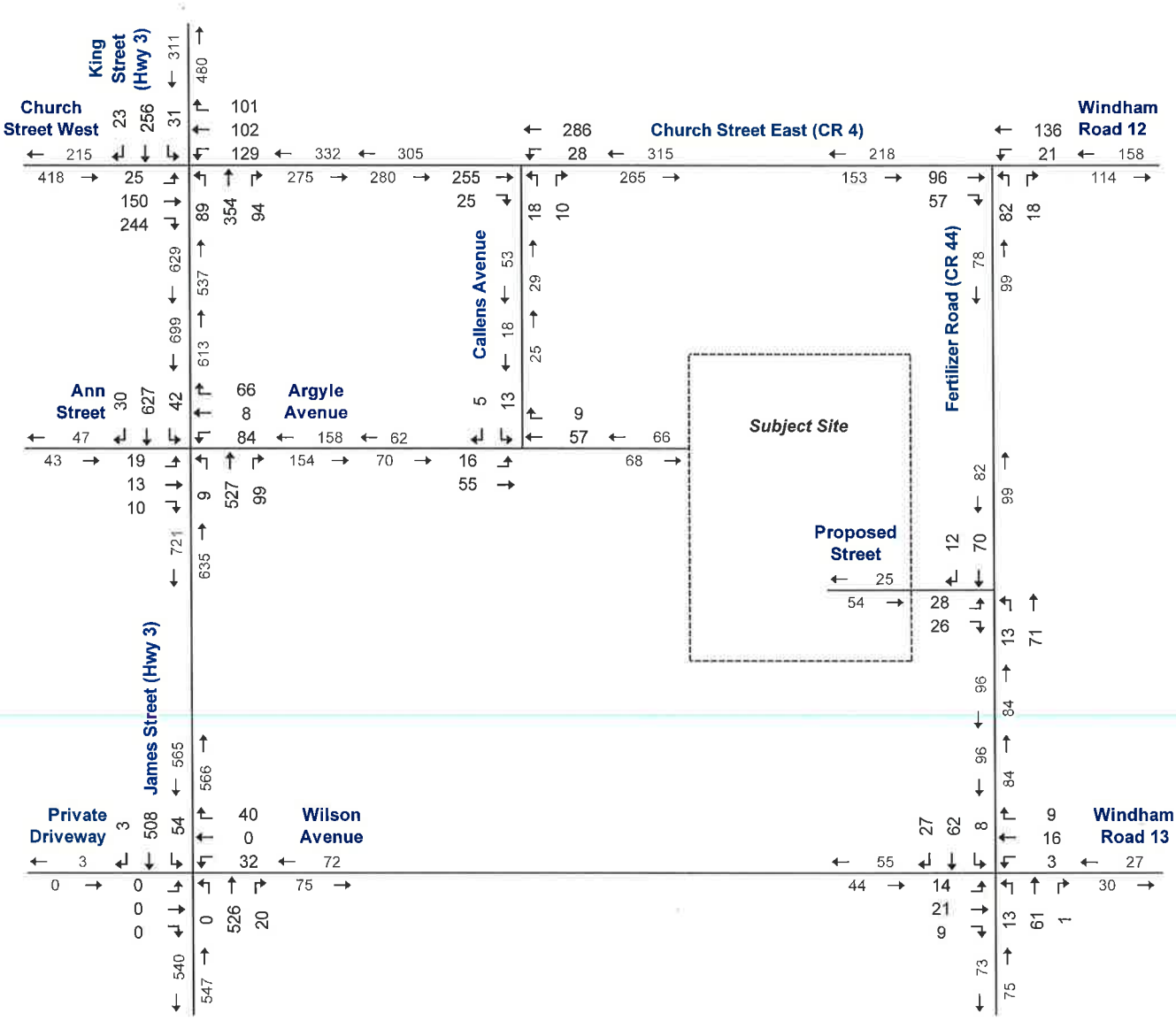


NTS

2034 Total Traffic Volumes – AM Peak Hour

Bluegrass Estates Phase 3 and 4, Delhi TIS
200005

Figure 4.7a



NTS

2034 Total Traffic Volumes – PM Peak Hour

Bluegrass Estates Phase 3 and 4, Delhi TIS
200005

Figure 4.7b

TABLE 4.7A: 2034 TOTAL TRAFFIC OPERATIONS – AM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**0**	11		>	**11**					
			V/C		0.00	>		<	0.01			0.05		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	9		**2**	10		>	**10**					
			V/C		0.00	>		<	0.02			0.09		>						
			95th		0	>		<	0			0		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	10	>	**10**	<	10	>	**10**	<	8	>	**1**	<	7	>	**1**	
			V/C	<	0.08	>		<	0.03	>		<	0.00	>		<	0.00	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**1**		0	>	**0**					9		>	**9**	
			V/C	<	0.01				0.00	>						0.02		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	B	>	**B**	<	C	A	**C**	<	A	>	**A**	<	A	>	**A**	**B**
			Delay	<	20	>	**20**	<	29	1	**21**	<	10	>	**10**	<	10	>	**10**	**11.3**
			V/C	<	0.21	>		<	0.40	0.11		<	0.35	>		<	0.29	>		**0.40**
			95th	<	10	>		<	25	0		<	42	>		<	33	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	C	>	**C**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	19	>	**19**	<	14	>	**14**	<	0	>	**0**	<	8	>	**1**	
			V/C	<	0.00	>		<	0.13	>		<	0.00	>		<	0.03	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	D	>	**D**	D	B	>	**B**	C	B	>	**B**	**C**
			Delay	<	25	>	**25**	<	50	>	**50**	37	11	>	**17**	35	15	>	**18**	**26.8**
			V/C	<	0.60	>		<	0.85	>		0.50	0.24	>		0.13	0.09	>		**0.85**
			95th	<	51	>		<	81	>		32	25	>		9	10	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		-2	-	>		6	-	>		
	Fertilizer Road & Proposed Street	TWSC	LOS	A		>	**A**					<	A		**A**		A	>	**A**	
			Delay	9		>	**9**					<	7		**3**		0	>	**0**	
			V/C	0.03		>						<	0.02				0.00	>		
			95th	0		>						<	0				0	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

TABLE 4.7B: 2034 TOTAL TRAFFIC OPERATIONS – PM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	Callens Avenue & Church Street East	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	13		>	**13**					
			V/C		0.00	>		<	0.02			0.06		>						
			95th		0	>		<	0			0		>						
	Windham Road 12/Church Street East & Fertilizer Road	TWSC	LOS		A	>	**A**	<	A		**A**	B		>	**B**					
			Delay		0	>	**0**	<	8		**1**	12		>	**12**					
			V/C		0.00	>		<	0.02			0.17		>						
			95th		0	>		<	0			1		>						
	Windham Road 13/ Wilson Avenue & Fertilizer Road	TWSC	LOS	<	B	>	**B**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	10	>	**10**	<	10	>	**10**	<	7	>	**1**	<	7	>	**1**	
			V/C	<	0.07	>		<	0.04	>		<	0.01	>		<	0.01	>		
			95th	<	0	>		<	0	>		<	0	>		<	0	>		
	Callens Avenue & Argyle Avenue	TWSC	LOS	<	A		**A**		A	>	**A**					A		>	**A**	
			Delay	<	7		**2**		0	>	**0**					9		>	**9**	
			V/C	<	0.01				0.00	>						0.02		>		
			95th	<	0				0	>						0		>		
	James Street & Argyle Avenue/Ann Street	TCS	LOS	<	C	>	**C**	<	C	A	**B**	<	B	>	**B**	<	B	>	**B**	**B**
			Delay	<	27	>	**27**	<	30	1	**18**	<	11	>	**11**	<	12	>	**12**	**12.3**
			V/C	<	0.24	>		<	0.37	0.20		<	0.37	>		<	0.43	>		**0.43**
			95th	<	13	>		<	24	0		<	43	>		<	51	>		
			Storage	<	-	>		<	-	40		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	40		<	-	>		<	-	>		
	James Street & Wilson Avenue	TWSC	LOS	<	A	>	**A**	<	C	>	**C**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	0	>	**0**	<	20	>	**20**	<	0	>	**0**	<	9	>	**1**	
			V/C	<	0.00	>		<	0.25	>		<	0.00	>		<	0.06	>		
			95th	<	0	>		<	1	>		<	0	>		<	0	>		
	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	D	>	**D**	<	F	>	**F**	D	B	>	**B**	C	B	>	**B**	**E**
			Delay	<	46	>	**46**	<	221	>	**221**	36	13	>	**17**	35	17	>	**19**	**67**
			V/C	<	0.90	>		<	1.38	>		0.43	0.31	>		0.23	0.24	>		**1.38**
			95th	<	111	>		<	121	>		26	35	>		12	25	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		4	-	>		3	-	>		
	Fertilizer Road & Proposed Street	TWSC	LOS	A		>	**A**					<	A		**A**		A	>	**A**	
			Delay	9		>	**9**					<	7		**1**		0	>	**0**	
			V/C	0.07		>						<	0.01				0.00	>		
			95th	0		>						<	0				0	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

5 Remedial Measures

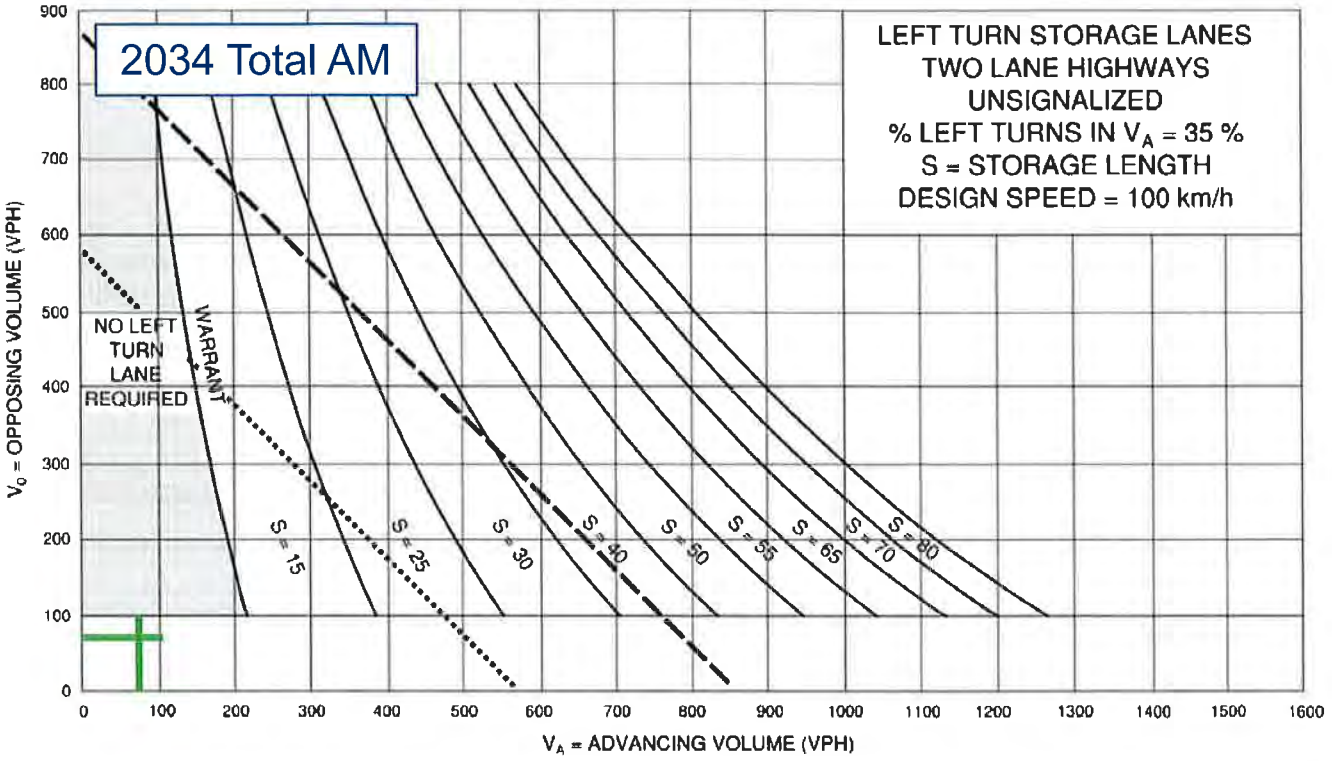
5.1 Left-Turn Lanes

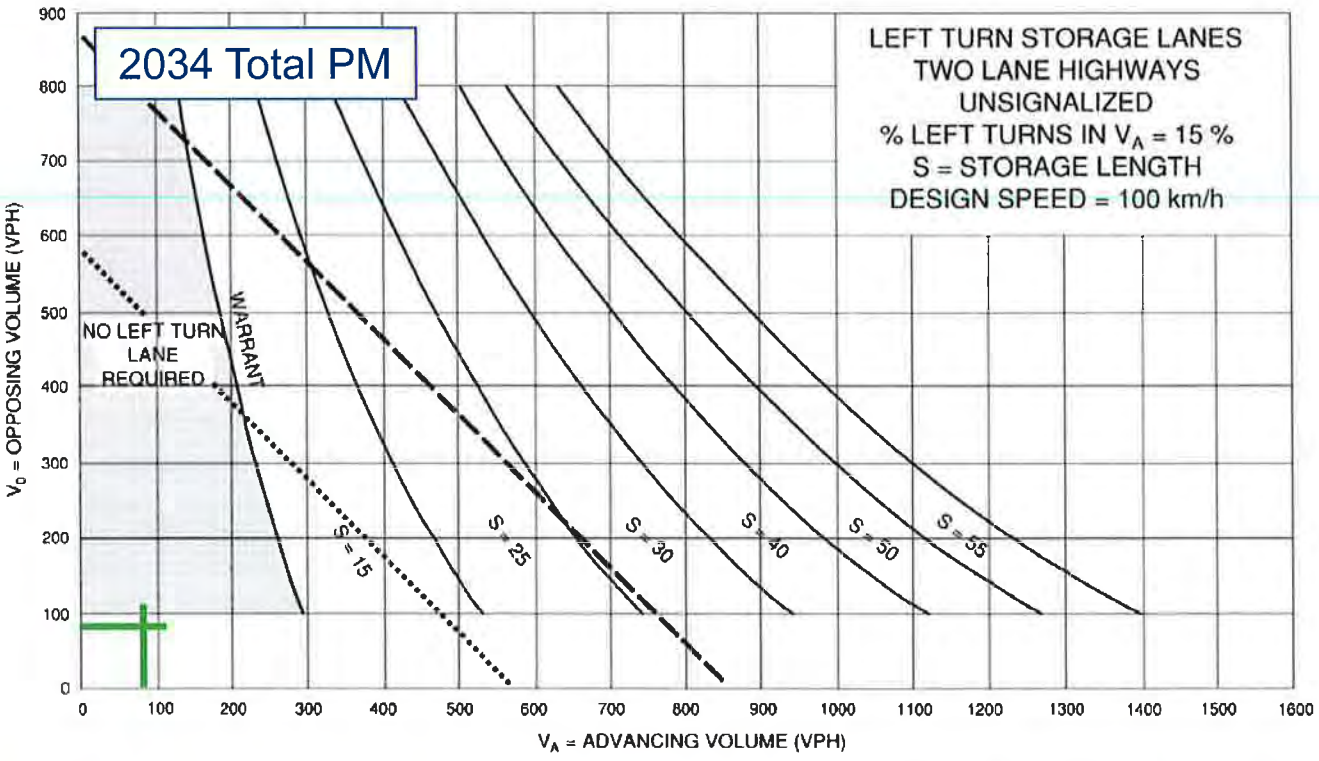
The Ministry of Transportation Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads[4] provides guidance on the assessment and/or need for auxiliary left-turn lanes.

Warrants have been calculated for northbound left-turns at Fertilizer Road and the proposed street. The warrant was calculated using the nomographs for left-turn lanes on a two-lane undivided highway at an unsignalized intersection with a design speed of 100 km/h (20 kilometres per hour over the posted speed limit). Based on this criterion, a northbound left-turn lane at the proposed street connection to Fertilizer Road is not warranted under 2034 total traffic volumes.

Figure 5.1 illustrates the warrant nomographs.

[4] *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads*, June 2017.





paradigm TRANSPORTATION SOLUTIONS LIMITED

Northbound Left-Turn Lane Warrants
Fertilizer Road & Proposed Street

5.2 Intersection Improvements

As outlined in **Section 4**, the eastbound and westbound movements are forecast to operate with poor levels of service under 2034 background and total traffic conditions.

The problem movements can be improved by signal optimization during the AM and PM peak hours and the introduction of a westbound left-turn advance phase during the PM peak hour.

It is noted that the northbound left-turn queues that are forecast to exceed the available storage length of 30 metres are less than a car length and is therefore not expected to impact the operations of the roadway. It is recommended that the County monitor the northbound left-turn queues and increase the storage length as part of the 2021 James Street reconstruction if necessary.

Table 5.1 summarizes the results of the 2034 total traffic operations with the improvements identified above.

Appendix K contains the supporting detailed Synchro 10.



TABLE 5.1: 2034 TOTAL TRAFFIC OPERATIONS – INTERSECTION IMPROVEMENTS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																OVERALL
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	D	>	**D**	D	B	>	**B**	D	B	>	**C**	**C**
			Delay	<	23	>	**23**	<	41	>	**41**	41	13	>	**20**	38	17	>	**20**	**26**
			V/C	<	0.57	>		<	0.80	>		0.52	0.24	>		0.13	0.09	>		**0.80**
			95th	<	49	>		<	64	>		36	31	>		10	12	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		-6	-	>		5	-	>		
PM Peak Hour	James Street/King Street & Church Street West/Church Street East	TCS	LOS	<	C	>	**C**	<	C	>	**C**	D	C	>	**C**	D	C	>	**C**	**C**
			Delay	<	22	>	**22**	<	34	>	**34**	53	25	>	**30**	48	27	>	**29**	**29**
			V/C	<	0.63	>		<	0.77	>		0.53	0.41	>		0.27	0.29	>		**0.77**
			95th	<	86	>		<	92	>		34	54	>		15	35	>		
			Storage	<	-	>		<	-	>		30	-	>		15	-	>		
			Avail.	<	-	>		<	-	>		-4	-	>		0	-	>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

6 Conclusions and Recommendations

6.1 Conclusions

Based on the investigations carried out, it is concluded that:

- **Existing Traffic Conditions:** The study area intersections are currently operating within acceptable levels of service.
- **Development Trip Generation:** The development is forecast to generate 163 and 169 trips during the AM and PM peak hours, respectively.
- **2024 Background Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under existing traffic conditions. The westbound shared movement at the intersection of James Street/King Street and Church Street is forecast to operate with LOS E and v/c ratio greater than 0.85 during the PM peak hour.
- **2024 Total Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under 2024 background traffic conditions.
- **2029 Background Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under existing traffic conditions. The westbound shared movement at the intersection of James Street/King Street and Church Street is forecast to operate with LOS F and v/c ratio greater than 1.00 during the PM peak hour.
- **2029 Total Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under 2029 background traffic conditions.
- **2034 Background Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under existing traffic conditions, except for the following movements at James Street/King Street and Church Street:
  - The northbound left-turn movement is forecast to operate with 95th percentile queues exceeding the available storage of 30 metres by one metre during the AM peak hour;
  - The westbound shared movement is forecast to operate with LOS F and v/c ratio greater than 1.00 during the PM peak hour; and



  - The eastbound shared movement is forecast to operate with LOS D and v/c ratio greater than 0.85 during the PM peak hour.

- **2034 Total Traffic Conditions:** The study area intersections are forecast to operate with similar levels of service as under 2034 background traffic conditions. The westbound shared movement at the intersection of James Street/King Street and Church Street is forecast to operate with LOS D and v/c ratio of 0.85 during the AM peak hour. It is noted that the v/c ratio has only increased by 0.02 between the 2034 background and total traffic conditions for this movement, the LOS remains the same between scenarios.
- **Remedial Measures:** A northbound left-turn lane is not warranted on Fertilizer Road at the proposed street under forecast 2034 total traffic volumes.
- **Intersection Improvements:** The eastbound and westbound movements at the intersection of James Street/King Street and Church Street are forecast to operate with poor levels of service under 2034 background and total traffic conditions.

  The operations for these movements can be improved by signal optimization during the AM and PM peak hours and the introduction of a westbound left-turn advance phase during the PM peak hour.

  The northbound left-turn queues are forecast to exceed the available storage length of 30 metres by less than a car length and is therefore not expected to impact the operations of the roadway.

6.2 Recommendations

Based on the findings of this study, it is recommended that:

- The County of Norfolk monitor the intersection of James Street/King Street and Church Street for:
  - Signal optimization and the introduction of a westbound left-turn advance phase; and
  - Northbound left-turn queues exceeding the existing storage and increase the storage as part of the 2021 James Street reconstruction if necessary.
- The development be approved as proposed.



Appendix A

Pre-Study Consultation

Maddison Murch

From: Nate Xuereb <Nate.Xuereb@norfolkcounty.ca>
Sent: February 4, 2021 11:13 AM
To: Maddison Murch
Cc: Erica Bayley; Chris Skelton; Mike King; Stephen Gradish; Mohammad Alam
Subject: RE: (200005) Bluegrass Estates Ph 3/4, Delhi Pre-Study Consultation

Good morning Maddison,

I apologize for the delayed response.

Please see below in **RED.**

Best Regards,

Nate

From: Maddison Murch [mailto:mmurch@ptsl.com]
Sent: Thursday, February 4, 2021 10:23 AM
To: Nate Xuereb <Nate.Xuereb@norfolkcounty.ca>
Cc: Erica Bayley <ebayley@ptsl.com>; Chris Skelton <cskelton@ptsl.com>; Mike King <Mike.King@norfolkcounty.ca>; Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>; Mohammad Alam <Mohammad.Alam@norfolkcounty.ca>
Subject: RE: (200005) Bluegrass Estates Ph 3/4, Delhi Pre-Study Consultation

Hi Nate,

Sorry to follow up again but it was announced that schools in the Grand Erie DSB would be returning to in-person learning next week. We will be collecting data next week and will use the counts we collected in 2019 at James/Church and James/Argyle to make any necessary adjustments to the new data collected.

Please let us know if you have any objections. No objections.

If you could also still send us the number of pumps for the gas station in the background development, and the GFA breakdown in building 1. 8 Fueling Stations. Building #1 was recently revised to a Gas Station/Service station with a GFA of 262.25m2.

Regards,

Maddison Murch, EIT
Transportation Consultant

Paradigm Transportation Solutions Limited
p: 519.896.3163 x205
e: mmurch@ptsl.com

From: Maddison Murch
Sent: February 2, 2021 3:04 PM

To: Nate Xuereb <Nate.Xuereb@norfolkcounty.ca>
Cc: Erica Bayley <ebayley@ptsl.com>; Chris Skelton <cskelton@ptsl.com>; Mike King <Mike.King@norfolkcounty.ca>; Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>; Mohammad Alam <Mohammad.Alam@norfolkcounty.ca>
Subject: RE: (200005) Bluegrass Estates Ph 3/4, Delhi Pre-Study Consultation

Hi Nate,

As a follow up to my email earlier, would you also be able to confirm our data collection proposal as included in my January 28 email:

"If we are not able to obtain historic counts, would it be acceptable to collect turning movement counts once the schools in Delhi open (Grand Erie District School Board)?"

Regards,

Maddison Murch, EIT
Transportation Consultant

Paradigm Transportation Solutions Limited
p: 519.896.3163 x205
e: mmurch@ptsl.com

From: Maddison Murch
Sent: February 2, 2021 1:40 PM
To: Nate Xuereb <Nate.Xuereb@norfolkcounty.ca>
Cc: Erica Bayley <ebayley@ptsl.com>; Chris Skelton <cskelton@ptsl.com>; Mike King <Mike.King@norfolkcounty.ca>; Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>; Mohammad Alam <Mohammad.Alam@norfolkcounty.ca>
Subject: RE: (200005) Bluegrass Estates Ph 3/4, Delhi Pre-Study Consultation

Hi Nate,

Thank you for the information. We have counts at Church/James and James/Argyle from 2019 which were collected as part of the TIS you are speaking of. No need to send us the TIS.

As we will have to calculate the trip generation for the background development, is there information on the number of pumps for the gas station? Would you also be able to provide us with the GFA breakdown between the fast food restaurant and the Gas station/convenience store in Building 1?

Regards,

Maddison Murch, EIT
Transportation Consultant

Paradigm Transportation Solutions Limited
p: 519.896.3163 x205
e: mmurch@ptsl.com

From: Nate Xuereb <Nate.Xuereb@norfolkcounty.ca>
Sent: February 2, 2021 1:25 PM
To: Maddison Murch <mmurch@ptsl.com>
Cc: Erica Bayley <ebayley@ptsl.com>; Chris Skelton <cskelton@ptsl.com>; Mike King <Mike.King@norfolkcounty.ca>; Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>; Mohammad Alam <Mohammad.Alam@norfolkcounty.ca>
Subject: RE: (200005) Bluegrass Estates Ph 3/4, Delhi Pre-Study Consultation

Good morning Maddison,

Please see below screenshot on Site Statistics for 360 James Street, as well as below in **BLUE.**

SITE STATISTICS

	ZONING REQUIREMENTS	PROPOSED
ZONING CATEGORY	SERVICE COMMERCIAL (CS)	
REQUIREMENTS		
MINIMUM LOT AREA	495.0m²	7177.7m²
MINIMUM LOT FRONTAGE	16.5m	88.55m
MAXIMUM LOT COVERAGE	35.0%	5.8%
C STORE, GAS STATION & COMMERCIAL USE	262.25m²	
A&W	154m²	
BUFFERING	3.0m	3.0m
MAXIMUM BUILDING HEIGHT	11.0m	1 STOREY
FRONT YARD SETBACK PINE ST.	3.0m	19.6m
REAR YARD SETBACK	9.0m	9.0m
SIDE YARD		
JAMES STREET	3.0m	11.4m
INTERIOR	3.0m	19.4m
SECTION 3.12 GAS PUMP ISLAND		
ISLAND TO LOT LINE	5.0m	14.7m
ISLAND TO SIGHT TRIANGLE	3.0m	12.9m
CANOPY TO LOT LINE	1.0m	11.9m

SITE STATISTICS

	ZONING REQUIREMENTS	PROPOSED
PARKING REQUIREMENTS		
RETAIL STORE	1 PER 30m² USABLE FLOOR SPACE	
SERVICE SHOP	1 PER 30m² USABLE FLOOR SPACE	
RESTAURANT WITH DRIVE THRU	1 PER 10m² USABLE FLOOR SPACE	
ACCESSIBLE SPACE	26 TO 50 REQUIRES 2 SPACES	3 ACCESSIBLE SPACES
TOTAL = 38	A&W = 15	TOTAL PARKING SPACES 38
	C STORE = 9	
PARKING SPACE	3.0m X 6.0m	
ABUTTING A WALL	3.3m X 6.0m	
AISLE WIDTH	7.3m	
ACC. PARKING SPACE DIM. A	3.4m X 6.0m	
ACC. PARKING SPACE DIM. B	2.4m X 6.0m	
ACC. AISLE	1.5m X 6.0m	
LOADING SPACE DIMENSIONS	3.0m X 10.0m	
STACKING	SECTION 4.8	

If you have any additional questions, please don't hesitate to ask.

Best Regards,

Nate

From: Maddison Murch [mailto:mmurch@ptsl.com]
Sent: Thursday, January 28, 2021 4:14 PM
To: Nate Xuereb <Nate.Xuereb@norfolkcounty.ca>
Cc: Erica Bayley <ebayley@ptsl.com>; Chris Skelton <cskelton@ptsl.com>; Mike King <Mike.King@norfolkcounty.ca>; Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>; Mohammad Alam <Mohammad.Alam@norfolkcounty.ca>
Subject: RE: (200005) Bluegrass Estates Ph 3/4, Delhi Pre-Study Consultation

Hi Nate,

Thank you for the response. I have the following questions/comments:

- **Data Collection:** You mention that the traffic counts are out of date, I would be curious to know what years the counts were completed? Beyond intersection counts, does the county have any ATR or speed counts for any of the study area roads? Any data would be helpful. Have there been any TIS reports completed in the surrounding areas that may have counts? **Traffic counts in the area are minimal. I have one count from 2016 and one count from 2010 in different locations. Although, I was in contact with other staff in PW and they've mentioned Paradigm completed a Traffic Impact Study recently for the James Street Road Reconstruction project in Delhi. I'll have to see what the process is for releasing Traffic Impact Studies but thought I would mention that to you in case you can locate it within the office/Paradigm.**
    - If we are not able to obtain historic counts, would it be acceptable to collect turning movement counts once the schools in Delhi open (Grand Erie District School Board)?
- **Background Developments:** If you are not able to provide us with the TIS report, could you at least provide us with the site generated traffic volumes from the TIS or site statistics/GFA for each of the land uses listed, as well as the estimated build-out date?
    - **360 James Street, Delhi – Estimated Build-Out Date: 2021**
        - **Building # 1 – 262.25m2**
            - **Gasoline/Service Station**
            - **Fast Food Restaurant without Drive-Thru Window**
        - **Building # 2 – 153.3m2**
            - **Fast Food Restaurant with Drive-Thru Window**
- **Roadway Improvements:** Would you be able to provide us with construction drawings or lane configuration/cross section for the improvements? The capital plan also notes reconstruction on James Street from Argyle Avenue to Wilson Avenue scheduled for 2025-2026, would you be able to provide us with drawings or lane configuration/cross section for that as well? **The drawings are currently being finalized and won't be available until the tender drawings are complete. I can confirm the current 4 lane cross-section will be maintained, with a slight widening.**

Regards,

Maddison Murch, EIT
Transportation Consultant

Paradigm Transportation Solutions Limited
p: 519.896.3163 x205
e: mmurch@ptsl.com

From: Nate Xuereb <Nate.Xuereb@norfolkcounty.ca>
Sent: January 28, 2021 9:01 AM
To: Maddison Murch <mmurch@ptsl.com>
Cc: Erica Bayley <ebayley@ptsl.com>; Chris Skelton <cskelton@ptsl.com>; Mike King <Mike.King@norfolkcounty.ca>; Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>; Mohammad Alam <Mohammad.Alam@norfolkcounty.ca>
Subject: RE: (200005) Bluegrass Estates Ph 3/4, Delhi Pre-Study Consultation

Good morning Maddison,

Please find attached Norfolk County's ISMP which has Norfolk County's Transportation Strategy and Appendix J: TIS Guidelines.

Also, please see below in **RED.**

Best Regards,

Nate

Nate Xuereb, C.Tech
Development Technologist
Robinson Administration Building
Engineering
Public Works Division
185 Robinson Street, Suite 200, Simcoe, Ontario, Canada, N3Y 5L6
519-426-5870 x. 1701



Working together with our community
http://www.norfolkcounty.ca

From: Maddison Murch [mailto:mmurch@ptsl.com]
Sent: Wednesday, January 27, 2021 10:04 AM
To: Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>; Mike King <Mike.King@norfolkcounty.ca>; Nate Xuereb <Nate.Xuereb@norfolkcounty.ca>; DCS Planning General Email <planning@norfolkcounty.ca>
Cc: Erica Bayley <ebayley@ptsl.com>; Chris Skelton <cskelton@ptsl.com>
Subject: RE: (200005) Bluegrass Estates Ph 3/4, Delhi Pre-Study Consultation

Hi All,

I am just following up regarding the scope of work sent on January 20 (see below). If you could please confirm receipt of this email and let us know if you have any comments or questions.

Regards,

Maddison Murch, EIT
Transportation Consultant

Paradigm Transportation Solutions Limited
p: 519.896.3163 x205
e: mmurch@ptsl.com

From: Maddison Murch
Sent: January 20, 2021 2:32 PM
To: Devin Hunter <Devin.Hunter@norfolkcounty.ca>
Cc: Erica Bayley <ebayley@ptsl.com>; Chris Skelton <cskelton@ptsl.com>; Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>; Mike King <Mike.King@norfolkcounty.ca>; Nate Xuereb <Nate.Xuereb@norfolkcounty.ca>; planning@norfolkcounty.ca
Subject: RE: (200005) Bluegrass Estates Ph 3/4, Delhi Pre-Study Consultation

Thanks Devin, I received an automated message from Mat but thank you for the follow up. I also contacted the Planning department, cc'd on this email.

Regards,

Maddison Murch, EIT
Transportation Consultant

Paradigm Transportation Solutions Limited
p: 519.896.3163 x205
e: mmurch@ptsl.com

From: Devin Hunter <Devin.Hunter@norfolkcounty.ca>
Sent: January 20, 2021 2:29 PM
To: Maddison Murch <mmurch@ptsl.com>
Cc: Erica Bayley <ebayley@ptsl.com>; Chris Skelton <cskelton@ptsl.com>; Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>; Mike King <Mike.King@norfolkcounty.ca>; Nate Xuereb <Nate.Xuereb@norfolkcounty.ca>
Subject: RE: (200005) Bluegrass Estates Ph 3/4, Delhi Pre-Study Consultation

Hi Maddison,

Mat is no longer employed by Norfolk County and I have taken a new role that does not deal with new development.

I have copied the 2 Development Technologists and the Director of Engineering on this response. They should be able to provide you with proper direction.

Thank you

Devin Hunter, C.E.T., CMM III
Director, Roads
Roads
Public Works Division
183 Main Street of Delhi, Delhi, Ontario, Canada, N4B 2M3
519-582-2100 x. 1110

Working together with our community

From: Maddison Murch <mmurch@ptsl.com>
Sent: Wednesday, January 20, 2021 1:19 PM
To: Mat Vaughan <Mat.Vaughan@norfolkcounty.ca>; Devin Hunter <Devin.Hunter@norfolkcounty.ca>
Cc: Erica Bayley <ebayley@ptsl.com>; Chris Skelton <cskelton@ptsl.com>
Subject: (200005) Bluegrass Estates Ph 3/4, Delhi Pre-Study Consultation

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Mat/Devin,

We have been retained to complete a Transportation Impact Study (TIS) for the proposed mixed-use development on Argyle Ave in Delhi. The proposed Bluegrass Estates Phase 3 & 4 consists of 50 single-family units, 29 semi-detached units, two apartment/multi-unit blocks and seven employment blocks. The development plan is subject to change. Vehicular access is proposed via the extensions of Argyle Avenue, Duchess Drive and McIntosh Drive, and new connection to Fertilizer Road. A preliminary plan is attached.

Based on the above information, we have prepared the following scope of work, for your approval/review:

- Weekday AM and PM peak hours of adjacent roads for analysis.
- Study area intersections include:
  - Argyle Avenue and James Street (signalized);
  - Callens Avenue and Church Street (unsignalized);
  - Callens Avenue and Argyle Avenue (unsignalized);
  - Fertilizer Road and Church Street (unsignalized);
  - Proposed Street and Fertilizer Road (unsignalized);
  - Fertilizer Road and Wilson Avenue (unsignalized);
  - **Wilson Avenue and James Street (signalized); and**
  - **James Street and Church Street (signalized)**

  Please let us know if the County has traffic counts for any of the study area intersections. Otherwise, Paradigm will collect counts after the provincial lockdown and adjust based on counts collected by Paradigm in 2019 at the James Street/Argyle Avenue and James Street/Church Street intersections. NC Traffic Count data out of date. Please collect traffic counts as proposed.
- Horizon Year: opening year (2024), five years from opening year (2029), **ten years from opening year (2034).**
- Background Growth Rate: 2 percent per annum, **please confirm**. **Confirm.**
- Background Developments: **please confirm and provide corresponding TIS reports or site statistics**:

  As TIS reports were not completed by Norfolk County, NC cannot provide reports. Below is a list of background development(s);
  - **360 James Street, Delhi**
    - **Gasoline/Service Station**
    - **Fast Food Restaurant with Drive-Thru Window**
    - **Fast Food Restaurant without Drive-Thru Window**
- Roadway Improvements: **please confirm and provide relevant reports/build-out date**.
  - **James Street Road Reconstruction (2021) – Church Street to Ann Street/Argyle Avenue;**
  - **Church Street Road Reconstruction (2028) – Cloet Avenue to James Street.**
- Trip Generation: ITE Trip Generation Manual 10th Edition.
- Trip Distribution: Existing travel patterns.

Please note: Section A1.6 – Study Horizons: each major phase in a multi-phased development should be assessed separately for the 5 and 10 year horizons beyond full build-out.

Please let us know if you have any comments/questions.

Regards,

Maddison Murch, EIT
Transportation Consultant

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Appendix B

Existing Traffic Data

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 mmurch@ptsl.com

Count Name: James Street & Argyle Avenue/Ann Street
Site Code:
Start Date: 10/29/2019

Turning Movement Data

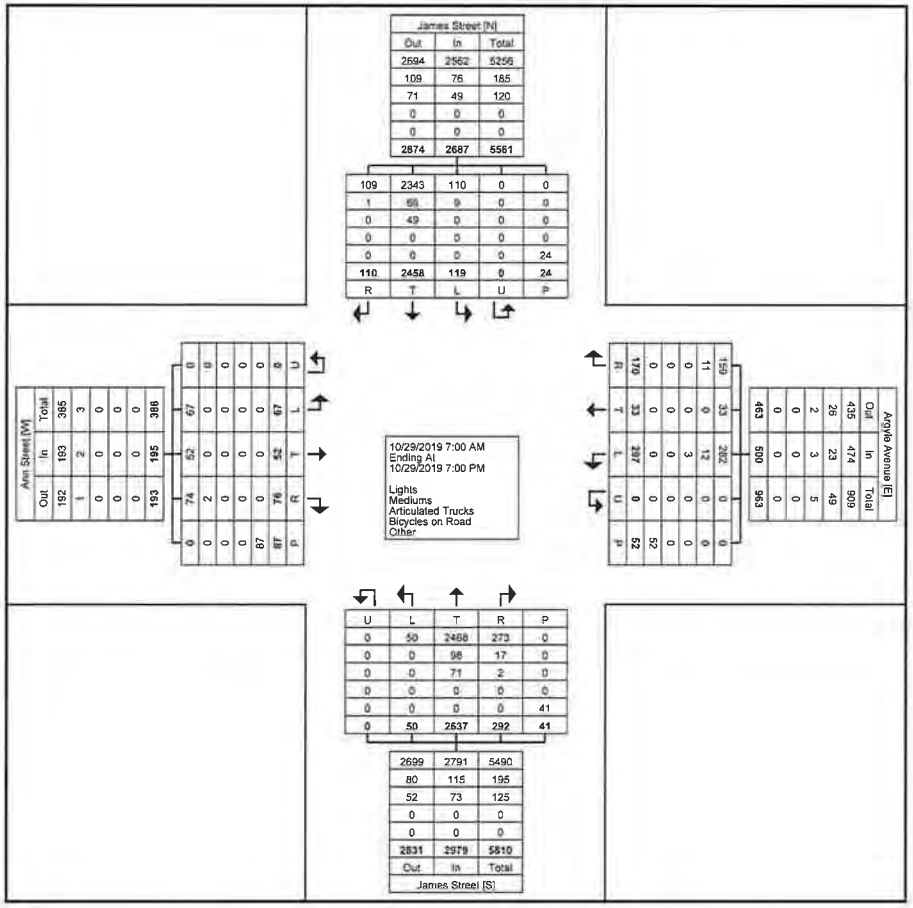
Start Time	Ann Street Eastbound						Argyle Avenue Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	0	2	0	2	2	7	0	0	0	0	7	0	63	1	0	0	64	1	59	3	0	0	63	136
7:15 AM	2	0	2	0	0	4	6	0	1	0	0	7	3	70	5	0	0	78	2	65	3	0	0	70	159
7:30 AM	3	2	5	0	0	10	6	3	3	0	0	12	1	62	3	0	0	66	4	70	3	0	0	77	165
7:45 AM	2	2	1	0	1	5	12	0	2	0	1	14	0	70	9	0	1	79	0	51	2	0	0	53	151
Hourly Total	7	4	10	0	3	21	31	3	6	0	1	40	4	265	18	0	1	287	7	245	11	0	0	263	611
8:00 AM	3	1	3	0	2	7	10	2	1	0	0	13	0	78	11	0	1	89	3	55	0	0	0	58	167
8:15 AM	0	2	4	0	3	6	10	0	6	0	5	16	1	78	7	0	1	86	2	82	3	0	1	87	195
8:30 AM	1	1	7	0	3	9	18	1	5	0	6	24	0	103	16	0	0	119	6	91	7	0	2	104	256
8:45 AM	2	1	2	0	2	5	13	2	8	0	1	23	1	110	12	0	2	123	3	67	2	0	3	72	223
Hourly Total	6	5	16	0	10	27	51	5	20	0	12	76	2	369	46	0	4	417	14	295	12	0	6	321	841
9:00 AM	2	0	0	0	1	2	6	1	3	0	1	10	2	70	10	0	3	82	2	58	3	0	0	63	157
9:15 AM	3	4	0	0	0	7	5	1	2	0	0	8	1	76	5	0	0	82	4	64	4	0	0	72	169
9:30 AM	3	3	0	0	0	6	12	1	5	0	3	18	3	67	6	0	0	76	2	57	2	0	0	61	161
9:45 AM	2	3	2	0	2	7	5	1	7	0	1	13	0	94	9	0	1	103	2	66	6	0	0	74	197
Hourly Total	10	10	2	0	3	22	28	4	17	0	5	49	6	307	30	0	4	343	10	245	15	0	0	270	684
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	3	1	1	0	7	5	6	1	10	0	12	17	4	91	8	0	10	103	4	71	1	0	3	76	201
11:45 AM	3	1	0	0	16	4	10	2	7	0	0	19	2	64	17	0	0	83	5	61	2	0	4	68	174
Hourly Total	6	2	1	0	23	9	16	3	17	0	12	36	6	155	25	0	10	186	9	132	3	0	7	144	375
12:00 PM	4	2	3	0	7	9	13	2	11	0	3	26	4	100	14	0	3	118	5	59	4	0	4	68	221
12:15 PM	0	1	1	0	3	2	6	0	9	0	0	15	1	87	5	0	0	93	7	83	4	0	0	94	204
12:30 PM	0	1	2	0	5	3	9	2	4	0	6	15	1	80	14	0	0	95	7	88	2	0	0	97	210
12:45 PM	1	1	5	0	0	7	19	1	5	0	0	25	2	72	3	0	0	77	4	70	2	0	0	76	185
Hourly Total	5	5	11	0	15	21	47	5	29	0	9	81	8	339	36	0	3	383	23	300	12	0	4	335	820
1:00 PM	1	1	5	0	0	7	6	1	5	0	0	12	0	85	9	0	0	94	4	76	4	0	1	84	197
1:15 PM	1	5	4	0	1	10	10	1	6	0	2	17	3	80	9	0	1	92	2	84	5	0	1	91	210
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	2	6	9	0	1	17	16	2	11	0	2	29	3	165	18	0	1	186	6	160	9	0	2	175	407
4:00 PM	1	0	2	0	6	3	10	2	5	0	0	17	2	77	12	0	0	91	8	94	5	0	2	107	218
4:15 PM	2	3	2	0	1	7	17	2	9	0	0	28	1	96	12	0	1	109	3	106	2	0	0	111	255
4:30 PM	5	4	0	0	7	9	10	2	4	0	5	16	3	99	13	0	4	115	5	116	6	0	0	127	267
4:45 PM	4	3	1	0	3	8	13	2	15	0	0	30	2	94	16	0	0	112	5	118	4	0	0	127	277
Hourly Total	12	10	5	0	17	27	50	8	33	0	5	91	8	366	53	0	5	427	21	434	17	0	2	472	1017
5:00 PM	3	0	5	0	1	8	9	0	9	0	3	18	1	88	18	0	1	107	8	112	10	0	1	130	263
5:15 PM	3	3	0	0	1	6	13	0	11	0	1	24	3	115	7	0	0	125	1	95	2	0	0	98	253

5:30 PM	2	1	3	0	6	6	6	0	3	0	1	9	1	88	3	0	6	92	4	89	4	0	0	97	204
5:45 PM	1	1	3	0	5	5	7	0	5	0	0	12	1	91	9	0	0	101	1	86	4	0	2	91	209
Hourly Total	9	5	11	0	13	25	35	0	28	0	5	63	6	382	37	0	7	425	14	382	20	0	3	416	929
6:00 PM	2	2	1	0	2	5	7	1	5	0	1	13	1	82	3	0	1	86	2	70	1	0	0	73	177
6:15 PM	0	0	3	0	0	3	4	1	1	0	0	6	0	82	8	0	1	90	2	75	3	0	0	80	179
6:30 PM	7	2	4	0	0	13	7	0	3	0	0	10	2	67	8	0	0	77	7	65	5	0	0	77	177
6:45 PM	1	1	3	0	0	5	5	1	0	0	0	6	4	58	10	0	4	72	4	55	2	0	0	61	144
Hourly Total	10	5	11	0	2	26	23	3	9	0	1	35	7	289	29	0	6	325	15	265	11	0	0	291	677
Grand Total	67	52	76	0	87	195	297	33	170	0	52	500	50	2637	292	0	41	2979	119	2458	110	0	24	2687	6361
Approach %	34.4	26.7	39.0	0.0	-	-	59.4	6.6	34.0	0.0	-	-	1.7	88.5	9.8	0.0	-	-	4.4	91.5	4.1	0.0	-	-	-
Total %	1.1	0.8	1.2	0.0	-	3.1	4.7	0.5	2.7	0.0	-	7.9	0.8	41.5	4.6	0.0	-	46.8	1.9	38.6	1.7	0.0	-	42.2	-
Lights	67	52	74	0	-	193	282	33	159	0	-	474	50	2468	273	0	-	2791	110	2343	109	0	-	2562	6020
% Lights	100.0	100.0	97.4	-	-	99.0	94.9	100.0	93.5	-	-	94.8	100.0	93.6	93.5	-	-	93.7	92.4	95.3	99.1	-	-	95.3	94.6
Mediums	0	0	2	0	-	2	12	0	11	0	-	23	0	98	17	0	-	115	9	66	1	0	-	76	216
% Mediums	0.0	0.0	2.6	-	-	1.0	4.0	0.0	6.5	-	-	4.6	0.0	3.7	5.8	-	-	3.9	7.6	2.7	0.9	-	-	2.8	3.4
Articulated Trucks	0	0	0	0	-	0	3	0	0	0	-	3	0	71	2	0	-	73	0	49	0	0	-	49	125
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	1.0	0.0	0.0	-	-	0.6	0.0	2.7	0.7	-	-	2.5	0.0	2.0	0.0	-	-	1.8	2.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	7	-	-	-	-	-	4	-	-	-	-	-	5	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	8.0	-	-	-	-	-	7.7	-	-	-	-	-	12.2	-	-	-	-	-	4.2	-	-
Pedestrians	-	-	-	-	80	-	-	-	-	-	48	-	-	-	-	-	36	-	-	-	-	-	23	-	-
% Pedestrians	-	-	-	-	92.0	-	-	-	-	-	92.3	-	-	-	-	-	87.8	-	-	-	-	-	95.8	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 mmurch@ptsl.com

Count Name: James Street & Argyle Avenue/Ann Street
Site Code:
Start Date: 10/29/2019



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 mmurch@ptsl.com

Count Name: James Street & Argyle Avenue/Ann Street
Site Code:
Start Date: 10/29/2019

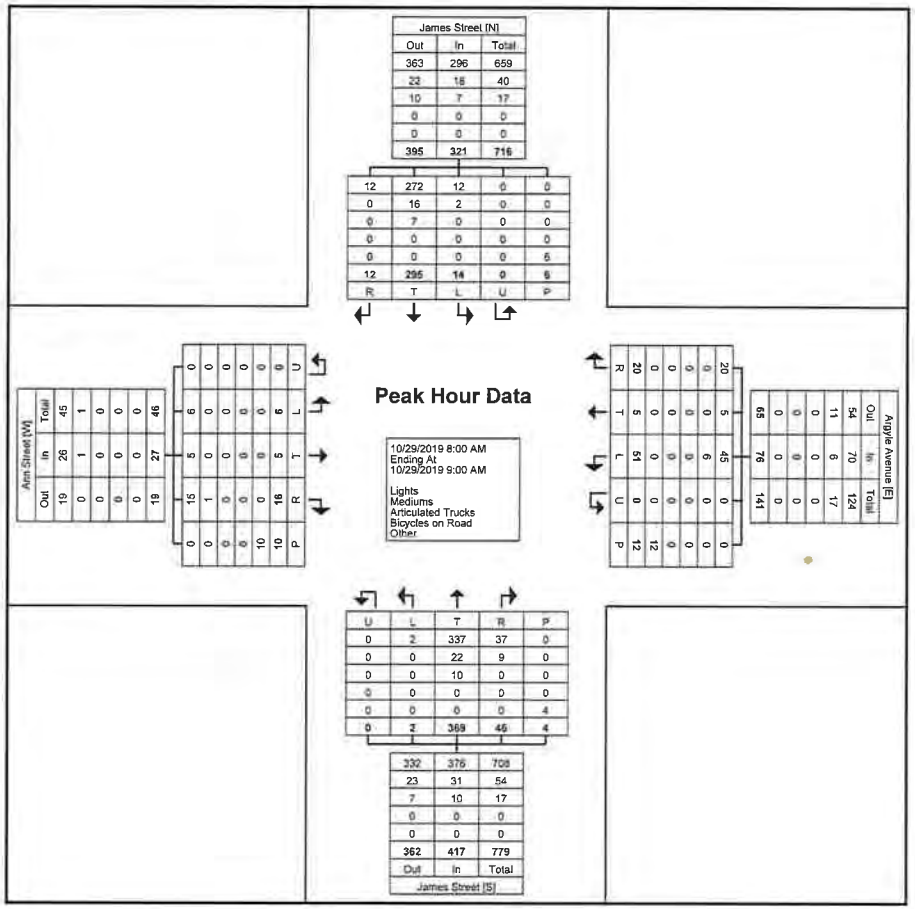
Turning Movement Peak Hour Data (8:00 AM)

Start Time	Ann Street Eastbound						Argyle Avenue Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	3	1	3	0	2	7	10	2	1	0	0	13	0	78	11	0	1	89	3	55	0	0	0	58	167
8:15 AM	0	2	4	0	3	6	10	0	6	0	5	16	1	78	7	0	1	86	2	82	3	0	1	87	195
8:30 AM	1	1	7	0	3	9	18	1	5	0	6	24	0	103	16	0	0	119	6	91	7	0	2	104	256
8:45 AM	2	1	2	0	2	5	13	2	8	0	1	23	1	110	12	0	2	123	3	67	2	0	3	72	223
Total	6	5	16	0	10	27	51	5	20	0	12	76	2	369	46	0	4	417	14	295	12	0	6	321	841
Approach %	22.2	18.5	59.3	0.0	-	-	67.1	6.6	26.3	0.0	-	-	0.5	88.5	11.0	0.0	-	-	4.4	91.9	3.7	0.0	-	-	-
Total %	0.7	0.6	1.9	0.0	-	3.2	6.1	0.6	2.4	0.0	-	9.0	0.2	43.9	5.5	0.0	-	49.6	1.7	35.1	1.4	0.0	-	38.2	-
PHF	0.500	0.625	0.571	0.000	-	0.750	0.708	0.625	0.625	0.000	-	0.792	0.500	0.839	0.719	0.000	-	0.848	0.583	0.810	0.429	0.000	-	0.772	0.821
Lights	6	5	15	0	-	26	45	5	20	0	-	70	2	337	37	0	-	376	12	272	12	0	-	296	768
% Lights	100.0	100.0	93.8	-	-	96.3	88.2	100.0	100.0	-	-	92.1	100.0	91.3	80.4	-	-	90.2	85.7	92.2	100.0	-	-	92.2	91.3
Mediums	0	0	1	0	-	1	6	0	0	0	-	6	0	22	9	0	-	31	2	16	0	0	-	18	56
% Mediums	0.0	0.0	6.3	-	-	3.7	11.8	0.0	0.0	-	-	7.9	0.0	6.0	19.6	-	-	7.4	14.3	5.4	0.0	-	-	5.6	6.7
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	10	0	0	-	10	0	7	0	0	-	7	17
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	2.7	0.0	-	-	2.4	0.0	2.4	0.0	-	-	2.2	2.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	8.3	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	10	-	-	-	-	-	11	-	-	-	-	-	4	-	-	-	-	-	6	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	91.7	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: James Street & Argyle Avenue/Ann Street
Site Code:
Start Date: 10/29/2019
Page No: 5



Turning Movement Peak Hour Data Plot (8:00 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 mmurch@ptsl.com

Count Name: James Street & Argyle Avenue/Ann Street
Site Code:
Start Date: 10/29/2019

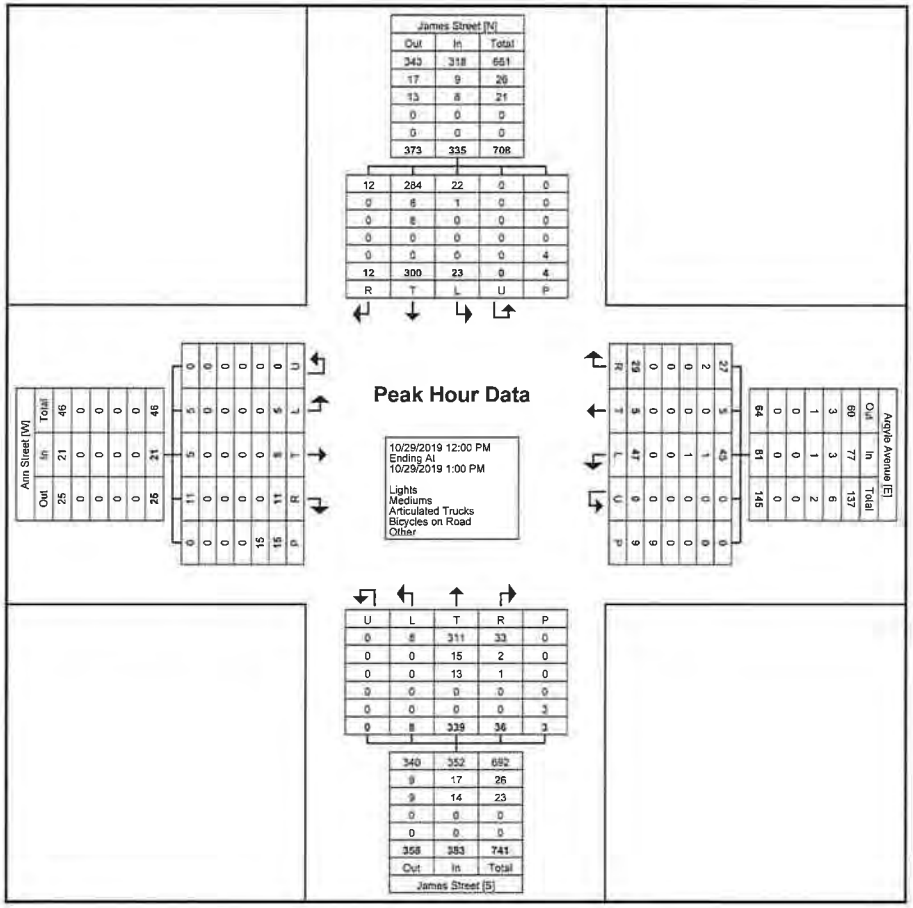
Turning Movement Peak Hour Data (12:00 PM)

Start Time	Ann Street Eastbound						Argyle Avenue Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:00 PM	4	2	3	0	7	9	13	2	11	0	3	26	4	100	14	0	3	118	5	59	4	0	4	68	221
12:15 PM	0	1	1	0	3	2	6	0	9	0	0	15	1	87	5	0	0	93	7	83	4	0	0	94	204
12:30 PM	0	1	2	0	5	3	9	2	4	0	6	15	1	80	14	0	0	95	7	88	2	0	0	97	210
12:45 PM	1	1	5	0	0	7	19	1	5	0	0	25	2	72	3	0	0	77	4	70	2	0	0	76	185
Total	5	5	11	0	15	21	47	5	29	0	9	81	8	339	36	0	3	383	23	300	12	0	4	335	820
Approach %	23.8	23.8	52.4	0.0	-	-	58.0	6.2	35.8	0.0	-	-	2.1	88.5	9.4	0.0	-	-	6.9	89.6	3.6	0.0	-	-	-
Total %	0.6	0.6	1.3	0.0	-	2.6	5.7	0.6	3.5	0.0	-	9.9	1.0	41.3	4.4	0.0	-	46.7	2.8	36.6	1.5	0.0	-	40.9	-
PHF	0.313	0.625	0.550	0.000	-	0.583	0.618	0.625	0.659	0.000	-	0.779	0.500	0.848	0.643	0.000	-	0.811	0.821	0.852	0.750	0.000	-	0.863	0.928
Lights	5	5	11	0	-	21	45	5	27	0	-	77	8	311	33	0	-	352	22	284	12	0	-	318	768
% Lights	100.0	100.0	100.0	-	-	100.0	95.7	100.0	93.1	-	-	95.1	100.0	91.7	91.7	-	-	91.9	95.7	94.7	100.0	-	-	94.9	93.7
Mediums	0	0	0	0	-	0	1	0	2	0	-	3	0	15	2	0	-	17	1	8	0	0	-	9	29
% Mediums	0.0	0.0	0.0	-	-	0.0	2.1	0.0	6.9	-	-	3.7	0.0	4.4	5.6	-	-	4.4	4.3	2.7	0.0	-	-	2.7	3.5
Articulated Trucks	0	0	0	0	-	0	1	0	0	0	-	1	0	13	1	0	-	14	0	8	0	0	-	8	23
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	2.1	0.0	0.0	-	-	1.2	0.0	3.8	2.8	-	-	3.7	0.0	2.7	0.0	-	-	2.4	2.8
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	6.7	-	-	-	-	-	11.1	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	14	-	-	-	-	-	8	-	-	-	-	-	3	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	93.3	-	-	-	-	-	88.9	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 mmurch@ptsl.com

Count Name: James Street & Argyle Avenue/Ann Street
Site Code:
Start Date: 10/29/2019



Turning Movement Peak Hour Data Plot (12:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 mmurch@ptsl.com

Count Name: James Street & Argyle Avenue/Ann Street
Site Code:
Start Date: 10/29/2019

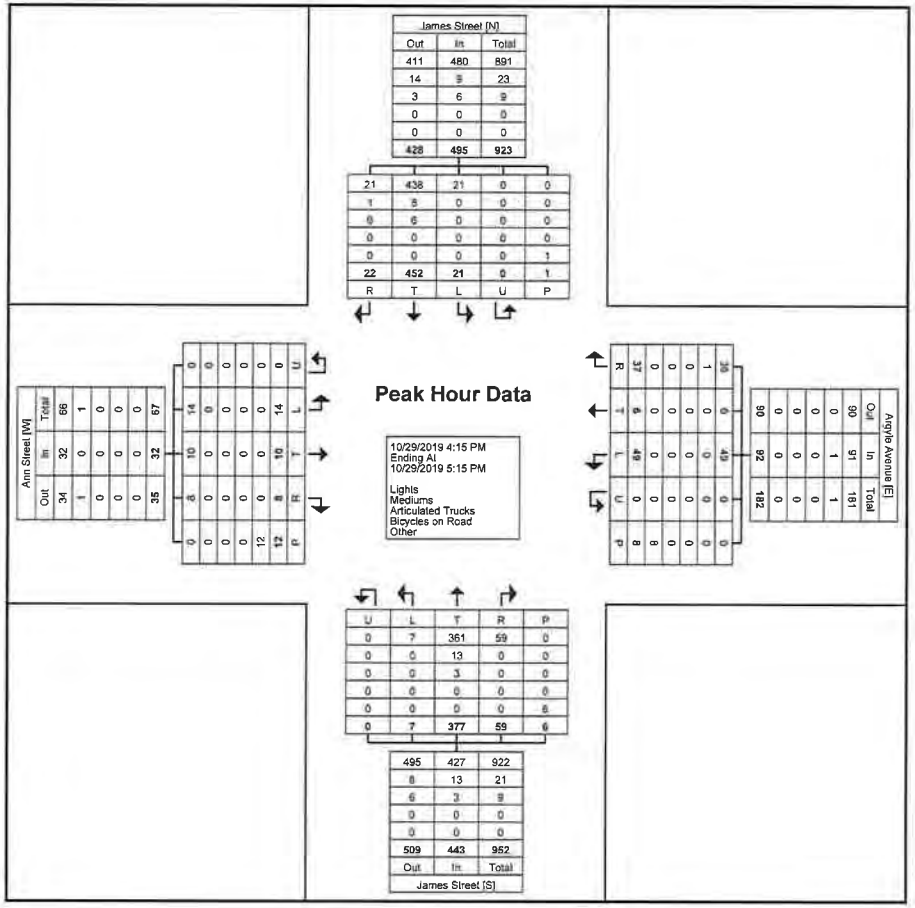
Turning Movement Peak Hour Data (4:15 PM)

Start Time	Ann Street Eastbound						Argyle Avenue Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:15 PM	2	3	2	0	1	7	17	2	9	0	0	28	1	96	12	0	1	109	3	106	2	0	0	111	255
4:30 PM	5	4	0	0	7	9	10	2	4	0	5	16	3	99	13	0	4	115	5	116	6	0	0	127	267
4:45 PM	4	3	1	0	3	8	13	2	15	0	0	30	2	94	16	0	0	112	5	118	4	0	0	127	277
5:00 PM	3	0	5	0	1	8	9	0	9	0	3	18	1	88	18	0	1	107	8	112	10	0	1	130	263
Total	14	10	8	0	12	32	49	6	37	0	8	92	7	377	59	0	6	443	21	452	22	0	1	495	1062
Approach %	43.8	31.3	25.0	0.0	-	-	53.3	6.5	40.2	0.0	-	-	1.6	85.1	13.3	0.0	-	-	4.2	91.3	4.4	0.0	-	-	-
Total %	1.3	0.9	0.8	0.0	-	3.0	4.6	0.6	3.5	0.0	-	8.7	0.7	35.5	5.6	0.0	-	41.7	2.0	42.6	2.1	0.0	-	46.6	-
PHF	0.700	0.625	0.400	0.000	-	0.889	0.721	0.750	0.617	0.000	-	0.767	0.583	0.952	0.819	0.000	-	0.963	0.656	0.958	0.550	0.000	-	0.952	0.958
Lights	14	10	8	0	-	32	49	6	36	0	-	91	7	361	59	0	-	427	21	438	21	0	-	480	1030
% Lights	100.0	100.0	100.0	-	-	100.0	100.0	100.0	97.3	-	-	98.9	100.0	95.8	100.0	-	-	96.4	100.0	96.9	95.5	-	-	97.0	97.0
Mediums	0	0	0	0	-	0	0	0	1	0	-	1	0	13	0	0	-	13	0	8	1	0	-	9	23
% Mediums	0.0	0.0	0.0	-	-	0.0	0.0	0.0	2.7	-	-	1.1	0.0	3.4	0.0	-	-	2.9	0.0	1.8	4.5	-	-	1.8	2.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	3	0	0	-	3	0	6	0	0	-	6	9
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.8	0.0	-	-	0.7	0.0	1.3	0.0	-	-	1.2	0.8
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	12	-	-	-	-	-	8	-	-	-	-	-	6	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
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Count Name: James Street & Argyle Avenue/Ann Street
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Start Date: 10/29/2019



Turning Movement Peak Hour Data Plot (4:15 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 mmurch@ptsl.com

Count Name: James Street & Church Street
Site Code:
Start Date: 10/29/2019

Turning Movement Data

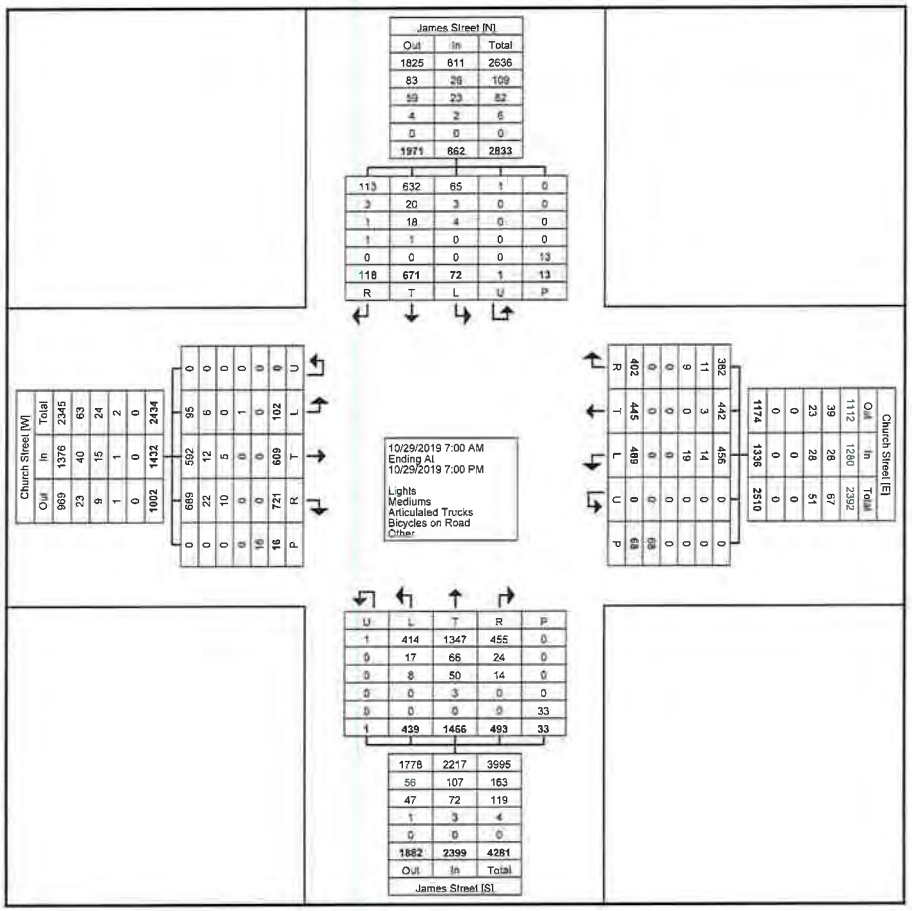
Start Time	Church Street Eastbound						Church Street Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	8	13	0	0	21	6	4	9	0	0	19	2	29	21	0	0	52	0	7	0	0	0	7	99
7:15 AM	1	15	14	0	0	30	20	9	14	0	0	43	3	33	22	0	0	58	0	6	1	0	0	7	138
7:30 AM	2	19	18	0	0	39	14	8	9	0	0	31	5	35	19	0	0	59	1	12	2	0	0	15	144
7:45 AM	2	19	10	0	0	31	18	10	17	0	0	45	7	37	19	0	0	63	4	0	1	0	0	5	144
Hourly Total	5	61	55	0	0	121	58	31	49	0	0	138	17	134	81	0	0	232	5	25	4	0	0	34	525
8:00 AM	1	20	9	0	1	30	9	14	17	0	2	40	15	29	13	0	0	57	2	8	1	0	0	11	138
8:15 AM	1	20	22	0	0	43	14	20	16	0	0	50	14	35	11	0	7	60	1	13	4	0	1	18	171
8:30 AM	4	23	34	0	1	61	18	21	13	0	2	52	18	55	16	0	4	89	1	17	1	0	1	19	221
8:45 AM	2	22	24	0	0	48	15	14	12	0	2	41	27	61	17	0	1	105	1	8	5	0	0	14	208
Hourly Total	8	85	89	0	2	182	56	69	58	0	6	183	74	180	57	0	12	311	5	46	11	0	2	62	738
9:00 AM	2	10	9	0	0	21	13	13	12	0	0	38	20	33	15	0	0	68	1	13	3	0	0	17	144
9:15 AM	1	16	18	0	0	35	14	20	9	0	2	43	13	37	14	0	0	64	1	12	1	0	0	14	156
9:30 AM	3	14	21	0	0	38	12	10	13	0	0	35	10	39	21	0	0	70	2	9	3	0	1	14	157
9:45 AM	2	15	23	0	0	40	9	13	8	0	0	30	11	58	15	0	1	84	0	14	3	0	0	17	171
Hourly Total	8	55	71	0	0	134	48	56	42	0	2	146	54	167	65	0	1	286	4	48	10	0	1	62	628
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	2	27	17	0	1	46	12	9	9	0	16	30	10	49	6	0	1	65	0	23	3	0	1	26	167
11:45 AM	5	11	21	0	2	37	2	11	6	0	6	19	19	47	18	0	1	84	1	18	3	0	1	22	162
Hourly Total	7	38	38	0	3	83	14	20	15	0	22	49	29	96	24	0	2	149	1	41	6	0	2	48	329
12:00 PM	8	25	22	0	1	55	15	19	11	0	10	45	25	47	14	0	0	86	2	20	7	0	1	29	215
12:15 PM	4	21	19	0	0	44	16	10	11	0	4	37	20	46	17	0	2	83	1	14	11	0	0	26	190
12:30 PM	1	25	29	0	0	55	14	15	17	0	3	46	17	38	11	0	1	66	0	13	3	0	0	16	183
12:45 PM	3	17	22	0	1	42	13	12	9	0	1	34	20	43	12	0	2	75	3	17	6	0	0	26	177
Hourly Total	16	88	92	0	2	196	58	56	48	0	18	162	82	174	54	0	5	310	6	64	27	0	1	97	765
1:00 PM	6	11	19	0	0	36	18	15	19	0	1	52	9	42	22	0	2	73	1	11	6	0	0	18	179
1:15 PM	4	16	24	0	0	44	12	8	12	0	1	32	22	44	11	0	0	77	1	18	4	0	0	23	176
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	10	27	43	0	0	80	30	23	31	0	2	84	31	86	33	0	2	150	2	29	10	0	0	41	355
4:00 PM	6	28	31	0	0	65	26	25	20	0	0	71	15	50	15	1	0	81	4	32	2	0	0	38	255
4:15 PM	6	31	40	0	3	77	23	20	14	0	0	57	12	65	12	0	0	89	3	34	7	0	0	44	267
4:30 PM	4	30	45	0	1	79	22	14	10	0	0	46	20	67	18	0	0	105	8	44	1	0	4	53	283
4:45 PM	7	29	46	0	1	82	22	21	21	0	2	64	11	65	14	0	0	90	2	44	4	1	2	51	287
Hourly Total	23	118	162	0	5	303	93	80	65	0	2	238	58	247	59	1	0	365	17	154	14	1	6	186	1092
5:00 PM	1	18	41	0	0	60	23	15	20	0	2	58	14	50	20	0	1	84	3	53	5	0	0	61	263
5:15 PM	8	22	22	0	1	52	9	17	18	0	1	44	14	80	19	0	1	113	4	39	5	0	1	48	257

5:30 PM	4	23	26	0	1	53	20	18	10	0	4	48	27	48	14	0	2	89	6	35	7	0	0	48	238
5:45 PM	5	20	19	0	1	44	15	17	7	0	4	39	11	54	13	0	1	78	4	37	7	0	0	48	209
Hourly Total	18	83	108	0	3	209	67	67	55	0	11	189	66	232	66	0	5	364	17	164	24	0	1	205	967
6:00 PM	0	19	8	0	1	27	20	4	6	0	0	30	9	47	23	0	1	79	2	28	2	0	0	32	168
6:15 PM	4	13	20	0	0	37	16	19	13	0	0	48	14	45	12	0	2	71	4	37	3	0	0	44	200
6:30 PM	2	8	18	0	0	28	17	7	9	0	2	33	0	29	12	0	1	41	3	15	2	0	0	20	122
6:45 PM	1	14	17	0	0	32	12	13	11	0	3	36	5	29	7	0	2	41	6	20	5	0	0	31	140
Hourly Total	7	54	63	0	1	124	65	43	39	0	5	147	28	150	54	0	6	232	15	100	12	0	0	127	630
Grand Total	102	609	721	0	16	1432	489	445	402	0	68	1336	439	1466	493	1	33	2399	72	671	118	1	13	862	6029
Approach %	7.1	42.5	50.3	0.0	-	-	36.6	33.3	30.1	0.0	-	-	18.3	61.1	20.6	0.0	-	-	8.4	77.8	13.7	0.1	-	-	-
Total %	1.7	10.1	12.0	0.0	-	23.8	8.1	7.4	6.7	0.0	-	22.2	7.3	24.3	8.2	0.0	-	39.8	1.2	11.1	2.0	0.0	-	14.3	-
Lights	95	592	689	0	-	1376	456	442	382	0	-	1280	414	1347	455	1	-	2217	65	632	113	1	-	811	5684
% Lights	93.1	97.2	95.6	-	-	96.1	93.3	99.3	95.0	-	-	95.8	94.3	91.9	92.3	100.0	-	92.4	90.3	94.2	95.8	100.0	-	94.1	94.3
Mediums	6	12	22	0	-	40	14	3	11	0	-	28	17	66	24	0	-	107	3	20	3	0	-	26	201
% Mediums	5.9	2.0	3.1	-	-	2.8	2.9	0.7	2.7	-	-	2.1	3.9	4.5	4.9	0.0	-	4.5	4.2	3.0	2.5	0.0	-	3.0	3.3
Articulated Trucks	0	5	10	0	-	15	19	0	9	0	-	28	8	50	14	0	-	72	4	18	1	0	-	23	138
% Articulated Trucks	0.0	0.8	1.4	-	-	1.0	3.9	0.0	2.2	-	-	2.1	1.8	3.4	2.8	0.0	-	3.0	5.6	2.7	0.8	0.0	-	2.7	2.3
Bicycles on Road	1	0	0	0	-	1	0	0	0	0	-	0	0	3	0	0	-	3	0	1	1	0	-	2	6
% Bicycles on Road	1.0	0.0	0.0	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	0.0	-	0.1	0.0	0.1	0.8	0.0	-	0.2	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	7	-	-	-	-	-	6	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	10.3	-	-	-	-	-	18.2	-	-	-	-	-	15.4	-	-
Pedestrians	-	-	-	-	16	-	-	-	-	-	61	-	-	-	-	-	27	-	-	-	-	-	11	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	89.7	-	-	-	-	-	81.8	-	-	-	-	-	84.6	-	-

Paradigm Transportation Solutions Limited
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Count Name: James Street & Church Street
Site Code:
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Turning Movement Data Plot

Paradigm Transportation Solutions Limited
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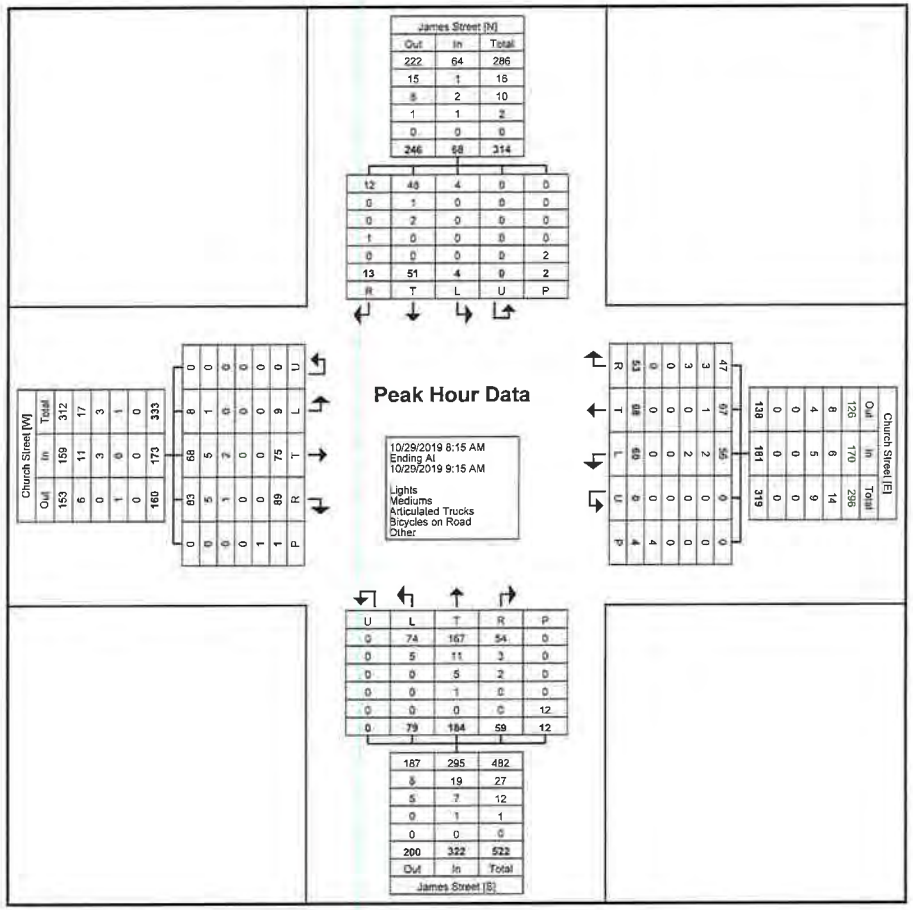
Turning Movement Peak Hour Data (8:15 AM)

Start Time	Church Street Eastbound						Church Street Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:15 AM	1	20	22	0	0	43	14	20	16	0	0	50	14	35	11	0	7	60	1	13	4	0	1	18	171
8:30 AM	4	23	34	0	1	61	18	21	13	0	2	52	18	55	16	0	4	89	1	17	1	0	1	19	221
8:45 AM	2	22	24	0	0	48	15	14	12	0	2	41	27	61	17	0	1	105	1	8	5	0	0	14	208
9:00 AM	2	10	9	0	0	21	13	13	12	0	0	38	20	33	15	0	0	68	1	13	3	0	0	17	144
Total	9	75	89	0	1	173	60	68	53	0	4	181	79	184	59	0	12	322	4	51	13	0	2	68	744
Approach %	5.2	43.4	51.4	0.0	-	-	33.1	37.6	29.3	0.0	-	-	24.5	57.1	18.3	0.0	-	-	5.9	75.0	19.1	0.0	-	-	-
Total %	1.2	10.1	12.0	0.0	-	23.3	8.1	9.1	7.1	0.0	-	24.3	10.6	24.7	7.9	0.0	-	43.3	0.5	6.9	1.7	0.0	-	9.1	-
PHF	0.563	0.815	0.654	0.000	-	0.709	0.833	0.810	0.828	0.000	-	0.870	0.731	0.754	0.868	0.000	-	0.767	1.000	0.750	0.650	0.000	-	0.895	0.842
Lights	8	68	83	0	-	159	56	67	47	0	-	170	74	167	54	0	-	295	4	48	12	0	-	64	688
% Lights	88.9	90.7	93.3	-	-	91.9	93.3	98.5	88.7	-	-	93.9	93.7	90.8	91.5	-	-	91.6	100.0	94.1	92.3	-	-	94.1	92.5
Mediums	1	5	5	0	-	11	2	1	3	0	-	6	5	11	3	0	-	19	0	1	0	0	-	1	37
% Mediums	11.1	6.7	5.6	-	-	6.4	3.3	1.5	5.7	-	-	3.3	6.3	6.0	5.1	-	-	5.9	0.0	2.0	0.0	-	-	1.5	5.0
Articulated Trucks	0	2	1	0	-	3	2	0	3	0	-	5	0	5	2	0	-	7	0	2	0	0	-	2	17
% Articulated Trucks	0.0	2.7	1.1	-	-	1.7	3.3	0.0	5.7	-	-	2.8	0.0	2.7	3.4	-	-	2.2	0.0	3.9	0.0	-	-	2.9	2.3
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	0	1	0	-	1	2
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.3	0.0	0.0	7.7	-	-	1.5	0.3
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	50.0	-	-	-	-	-	8.3	-	-	-	-	-	50.0	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	11	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	50.0	-	-	-	-	-	91.7	-	-	-	-	-	50.0	-	-

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Turning Movement Peak Hour Data Plot (8:15 AM)

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Site Code:
Start Date: 10/29/2019

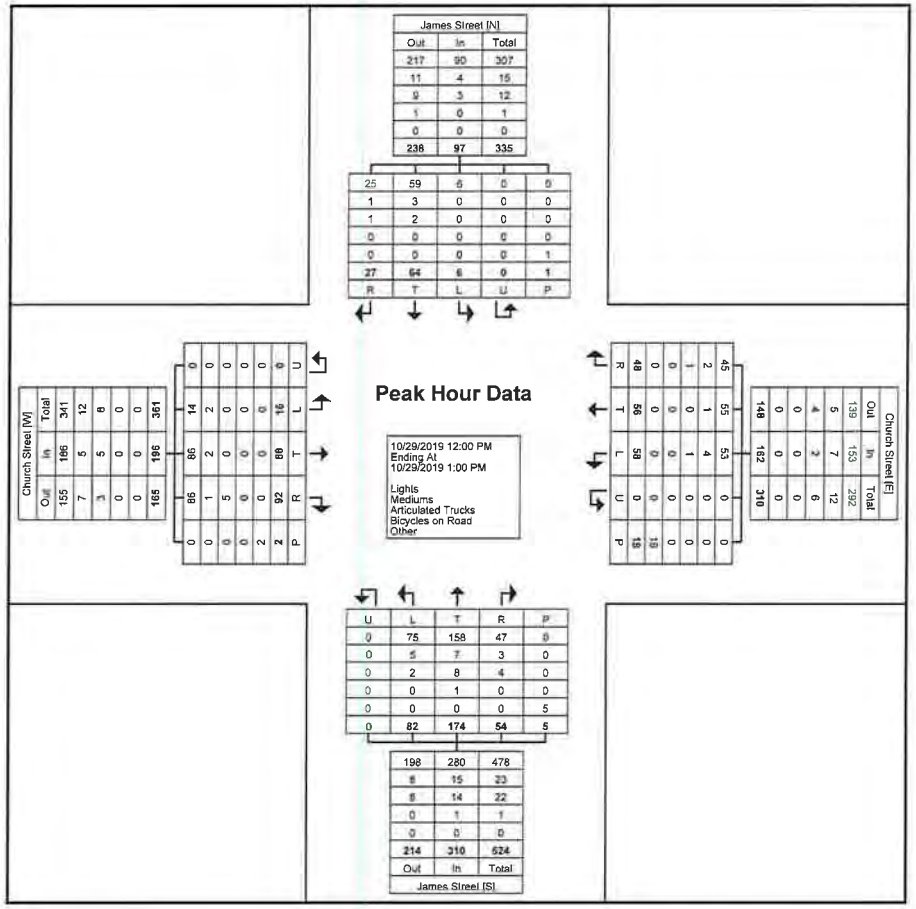
Turning Movement Peak Hour Data (12:00 PM)

Start Time	Church Street Eastbound						Church Street Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:00 PM	8	25	22	0	1	55	15	19	11	0	10	45	25	47	14	0	0	86	2	20	7	0	1	29	215
12:15 PM	4	21	19	0	0	44	16	10	11	0	4	37	20	46	17	0	2	83	1	14	11	0	0	26	190
12:30 PM	1	25	29	0	0	55	14	15	17	0	3	46	17	38	11	0	1	66	0	13	3	0	0	16	183
12:45 PM	3	17	22	0	1	42	13	12	9	0	1	34	20	43	12	0	2	75	3	17	6	0	0	26	177
Total	16	88	92	0	2	196	58	56	48	0	18	162	82	174	54	0	5	310	6	64	27	0	1	97	765
Approach %	8.2	44.9	46.9	0.0	-	-	35.8	34.6	29.6	0.0	-	-	26.5	56.1	17.4	0.0	-	-	6.2	66.0	27.8	0.0	-	-	-
Total %	2.1	11.5	12.0	0.0	-	25.6	7.6	7.3	6.3	0.0	-	21.2	10.7	22.7	7.1	0.0	-	40.5	0.8	8.4	3.5	0.0	-	12.7	-
PHF	0.500	0.880	0.793	0.000	-	0.891	0.906	0.737	0.706	0.000	-	0.880	0.820	0.926	0.794	0.000	-	0.901	0.500	0.800	0.614	0.000	-	0.836	0.890
Lights	14	86	86	0	-	186	53	55	45	0	-	153	75	158	47	0	-	280	6	59	25	0	-	90	709
% Lights	87.5	97.7	93.5	-	-	94.9	91.4	98.2	93.8	-	-	94.4	91.5	90.8	87.0	-	-	90.3	100.0	92.2	92.6	-	-	92.8	92.7
Mediums	2	2	1	0	-	5	4	1	2	0	-	7	5	7	3	0	-	15	0	3	1	0	-	4	31
% Mediums	12.5	2.3	1.1	-	-	2.6	6.9	1.8	4.2	-	-	4.3	6.1	4.0	5.6	-	-	4.8	0.0	4.7	3.7	-	-	4.1	4.1
Articulated Trucks	0	0	5	0	-	5	1	0	1	0	-	2	2	8	4	0	-	14	0	2	1	0	-	3	24
% Articulated Trucks	0.0	0.0	5.4	-	-	2.6	1.7	0.0	2.1	-	-	1.2	2.4	4.6	7.4	-	-	4.5	0.0	3.1	3.7	-	-	3.1	3.1
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.6	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	5.6	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	17	-	-	-	-	-	5	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	94.4	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 mmurch@ptsl.com

Count Name: James Street & Church Street
Site Code:
Start Date: 10/29/2019



Turning Movement Peak Hour Data Plot (12:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 mmurch@ptsl.com

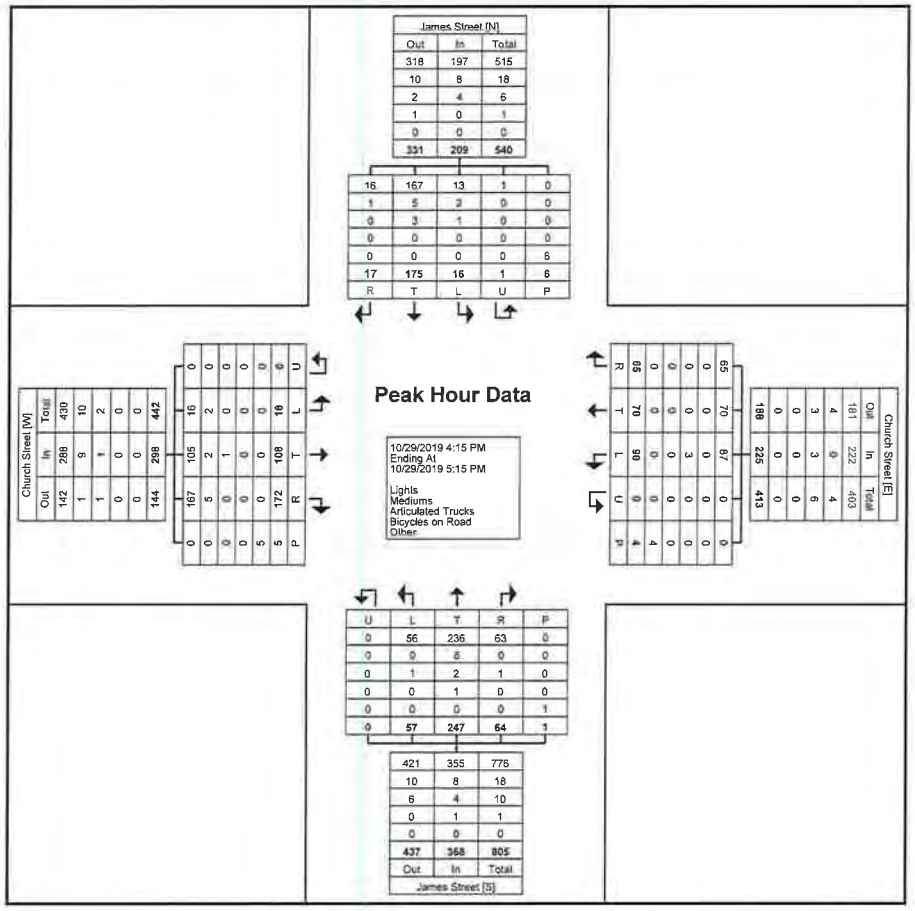
Count Name: James Street & Church Street
Site Code:
Start Date: 10/29/2019

Turning Movement Peak Hour Data (4:15 PM)

Start Time	Church Street Eastbound						Church Street Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:15 PM	6	31	40	0	3	77	23	20	14	0	0	57	12	65	12	0	0	89	3	34	7	0	0	44	267
4:30 PM	4	30	45	0	1	79	22	14	10	0	0	46	20	67	18	0	0	105	8	44	1	0	4	53	283
4:45 PM	7	29	46	0	1	82	22	21	21	0	2	64	11	65	14	0	0	90	2	44	4	1	2	51	287
5:00 PM	1	18	41	0	0	60	23	15	20	0	2	58	14	50	20	0	1	84	3	53	5	0	0	61	263
Total	18	108	172	0	5	298	90	70	65	0	4	225	57	247	64	0	1	368	16	175	17	1	6	209	1100
Approach %	6.0	36.2	57.7	0.0	-	-	40.0	31.1	28.9	0.0	-	-	15.5	67.1	17.4	0.0	-	-	7.7	83.7	8.1	0.5	-	-	-
Total %	1.6	9.8	15.6	0.0	-	27.1	8.2	6.4	5.9	0.0	-	20.5	5.2	22.5	5.8	0.0	-	33.5	1.5	15.9	1.5	0.1	-	19.0	-
PHF	0.643	0.871	0.935	0.000	-	0.909	0.978	0.833	0.774	0.000	-	0.879	0.713	0.922	0.800	0.000	-	0.876	0.500	0.825	0.607	0.250	-	0.857	0.958
Lights	16	105	167	0	-	288	87	70	65	0	-	222	56	236	63	0	-	355	13	167	16	1	-	197	1062
% Lights	88.9	97.2	97.1	-	-	96.6	96.7	100.0	100.0	-	-	98.7	98.2	95.5	98.4	-	-	96.5	81.3	95.4	94.1	100.0	-	94.3	96.5
Mediums	2	2	5	0	-	9	0	0	0	0	-	0	0	8	0	0	-	8	2	5	1	0	-	8	25
% Mediums	11.1	1.9	2.9	-	-	3.0	0.0	0.0	0.0	-	-	0.0	0.0	3.2	0.0	-	-	2.2	12.5	2.9	5.9	0.0	-	3.8	2.3
Articulated Trucks	0	1	0	0	-	1	3	0	0	0	-	3	1	2	1	0	-	4	1	3	0	0	-	4	12
% Articulated Trucks	0.0	0.9	0.0	-	-	0.3	3.3	0.0	0.0	-	-	1.3	1.8	0.8	1.6	-	-	1.1	6.3	1.7	0.0	0.0	-	1.9	1.1
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.3	0.0	0.0	0.0	0.0	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	100.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	5	-	-	-	-	-	4	-	-	-	-	-	0	-	-	-	-	-	5	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	0.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Turning Movement Peak Hour Data Plot (4:15 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Callens Avenue & Argyle Avenue
Site Code: 200005
Start Date: 02/11/2021

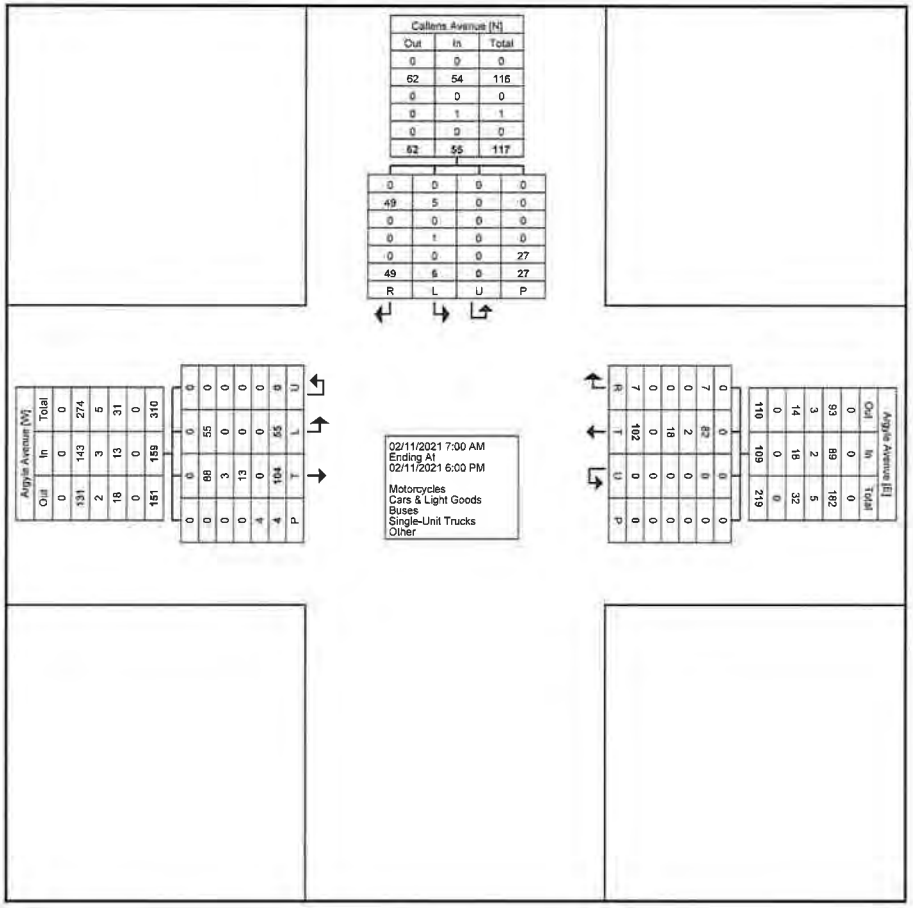
Turning Movement Data

Start Time	Argyle Avenue Eastbound					Argyle Avenue Westbound					Callens Avenue Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
7:00 AM	1	2	0	0	3	1	0	0	0	1	0	2	0	0	2	6
7:15 AM	1	2	0	0	3	2	0	0	0	2	0	2	0	1	2	7
7:30 AM	2	0	0	0	2	6	1	0	0	7	0	1	0	0	1	10
7:45 AM	3	3	0	0	6	8	0	0	0	8	0	1	0	0	1	15
Hourly Total	7	7	0	0	14	17	1	0	0	18	0	6	0	1	6	38
8:00 AM	2	6	0	0	8	4	0	0	0	4	0	2	0	0	2	14
8:15 AM	0	5	0	0	5	6	0	0	0	6	0	2	0	0	2	13
8:30 AM	2	1	0	0	3	3	0	0	0	3	0	1	0	0	1	7
8:45 AM	0	3	0	0	3	4	0	0	0	4	0	2	0	0	2	9
Hourly Total	4	15	0	0	19	17	0	0	0	17	0	7	0	0	7	43
9:00 AM	1	4	0	0	5	6	0	0	0	6	1	0	0	0	1	12
9:15 AM	3	2	0	0	5	4	0	0	0	4	0	2	0	0	2	11
9:30 AM	2	6	0	0	8	0	1	0	0	1	1	0	0	0	1	10
9:45 AM	0	3	0	2	3	3	0	0	0	3	0	0	0	5	0	6
Hourly Total	6	15	0	2	21	13	1	0	0	14	2	2	0	5	4	39
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	2	6	0	0	8	4	0	0	0	4	1	1	0	2	2	14
11:45 AM	1	4	0	0	5	2	1	0	0	3	0	1	0	2	1	9
Hourly Total	3	10	0	0	13	6	1	0	0	7	1	2	0	4	3	23
12:00 PM	3	2	0	0	5	1	0	0	0	1	0	1	0	0	1	7
12:15 PM	0	2	0	0	2	0	0	0	0	0	1	1	0	4	2	4
12:30 PM	2	6	0	0	8	3	0	0	0	3	0	2	0	0	2	13
12:45 PM	2	1	0	0	3	5	0	0	0	5	0	1	0	1	1	9
Hourly Total	7	11	0	0	18	9	0	0	0	9	1	5	0	5	6	33
1:00 PM	0	2	0	0	2	2	0	0	0	2	0	2	0	2	2	6
1:15 PM	2	5	0	1	7	5	1	0	0	6	0	4	0	4	4	17
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	2	7	0	1	9	7	1	0	0	8	0	6	0	6	6	23
3:00 PM	2	10	0	0	12	3	1	0	0	4	0	1	0	2	1	17
3:15 PM	3	1	0	0	4	8	0	0	0	8	0	0	0	2	0	12
3:30 PM	2	1	0	0	3	3	0	0	0	3	0	1	0	0	1	7
3:45 PM	5	4	0	0	9	3	0	0	0	3	0	2	0	0	2	14
Hourly Total	12	16	0	0	28	17	1	0	0	18	0	4	0	4	4	50
4:00 PM	1	7	0	0	8	3	0	0	0	3	0	3	0	0	3	14
4:15 PM	2	2	0	0	4	1	0	0	0	1	0	6	0	2	6	11
4:30 PM	1	2	0	0	3	2	0	0	0	2	1	1	0	0	2	7

4:45 PM	2	1	0	0	3	2	0	0	0	2	0	0	0	0	0	5
Hourly Total	6	12	0	0	18	8	0	0	0	8	1	10	0	2	11	37
5:00 PM	2	3	0	0	5	3	0	0	0	3	1	2	0	0	3	11
5:15 PM	3	5	0	0	8	3	1	0	0	4	0	1	0	0	1	13
5:30 PM	3	0	0	0	3	1	1	0	0	2	0	1	0	0	1	6
5:45 PM	0	3	0	1	3	1	0	0	0	1	0	3	0	0	3	7
Hourly Total	8	11	0	1	19	8	2	0	0	10	1	7	0	0	8	37
Grand Total	55	104	0	4	159	102	7	0	0	109	6	49	0	27	55	323
Approach %	34.6	65.4	0.0	-	-	93.6	6.4	0.0	-	-	10.9	89.1	0.0	-	-	-
Total %	17.0	32.2	0.0	-	49.2	31.6	2.2	0.0	-	33.7	1.9	15.2	0.0	-	17.0	-
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	55	88	0	-	143	82	7	0	-	89	5	49	0	-	54	286
% Cars & Light Goods	100.0	84.6	-	-	89.9	80.4	100.0	-	-	81.7	83.3	100.0	-	-	98.2	88.5
Buses	0	3	0	-	3	2	0	0	-	2	0	0	0	-	0	5
% Buses	0.0	2.9	-	-	1.9	2.0	0.0	-	-	1.8	0.0	0.0	-	-	0.0	1.5
Single-Unit Trucks	0	13	0	-	13	18	0	0	-	18	1	0	0	-	1	32
% Single-Unit Trucks	0.0	12.5	-	-	8.2	17.6	0.0	-	-	16.5	16.7	0.0	-	-	1.8	9.9
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	4	-	-	-	-	0	-	-	-	-	27	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Turning Movement Data Plot

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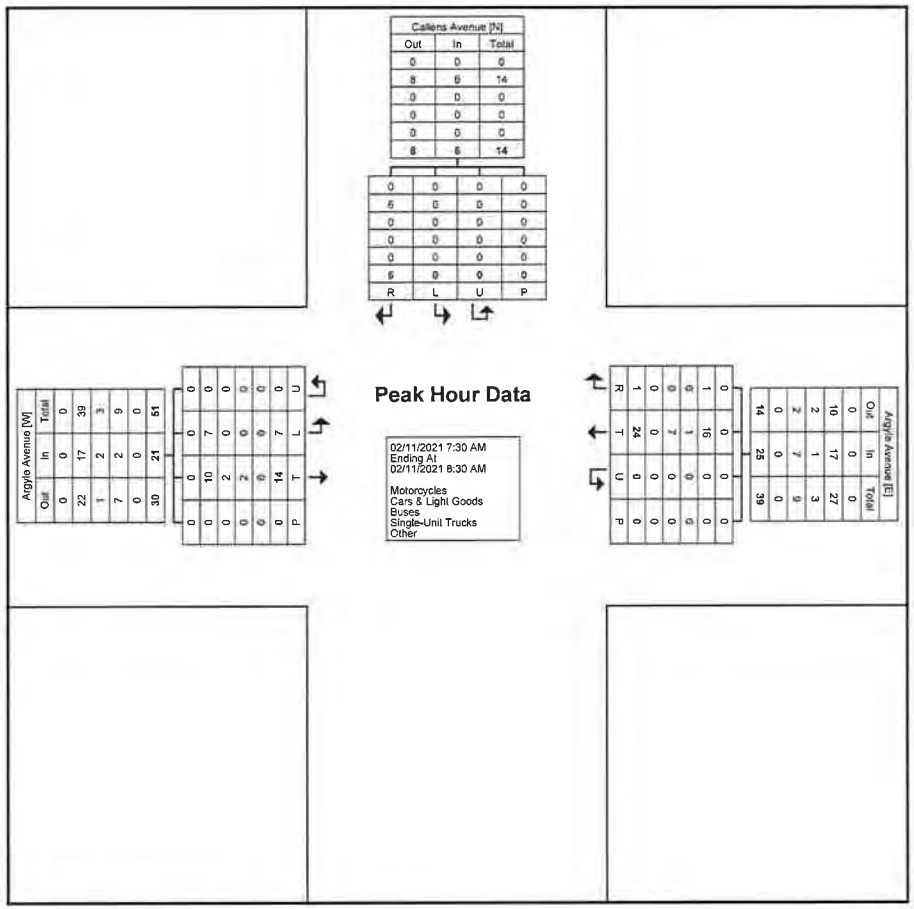
Count Name: Callens Avenue & Argyle Avenue
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Argyle Avenue Eastbound					Argyle Avenue Westbound					Callens Avenue Southbound					
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
7:30 AM	2	0	0	0	2	6	1	0	0	7	0	1	0	0	1	10
7:45 AM	3	3	0	0	6	8	0	0	0	8	0	1	0	0	1	15
8:00 AM	2	6	0	0	8	4	0	0	0	4	0	2	0	0	2	14
8:15 AM	0	5	0	0	5	6	0	0	0	6	0	2	0	0	2	13
Total	7	14	0	0	21	24	1	0	0	25	0	6	0	0	6	52
Approach %	33.3	66.7	0.0	-	-	96.0	4.0	0.0	-	-	0.0	100.0	0.0	-	-	-
Total %	13.5	26.9	0.0	-	40.4	46.2	1.9	0.0	-	48.1	0.0	11.5	0.0	-	11.5	-
PHF	0.583	0.583	0.000	-	0.656	0.750	0.250	0.000	-	0.781	0.000	0.750	0.000	-	0.750	0.867
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Cars & Light Goods	7	10	0	-	17	16	1	0	-	17	0	6	0	-	6	40
% Cars & Light Goods	100.0	71.4	-	-	81.0	66.7	100.0	-	-	68.0	-	100.0	-	-	100.0	76.9
Buses	0	2	0	-	2	1	0	0	-	1	0	0	0	-	0	3
% Buses	0.0	14.3	-	-	9.5	4.2	0.0	-	-	4.0	-	0.0	-	-	0.0	5.8
Single-Unit Trucks	0	2	0	-	2	7	0	0	-	7	0	0	0	-	0	9
% Single-Unit Trucks	0.0	14.3	-	-	9.5	29.2	0.0	-	-	28.0	-	0.0	-	-	0.0	17.3
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Turning Movement Peak Hour Data Plot (7:30 AM)

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5A-150 Pinebush Rd

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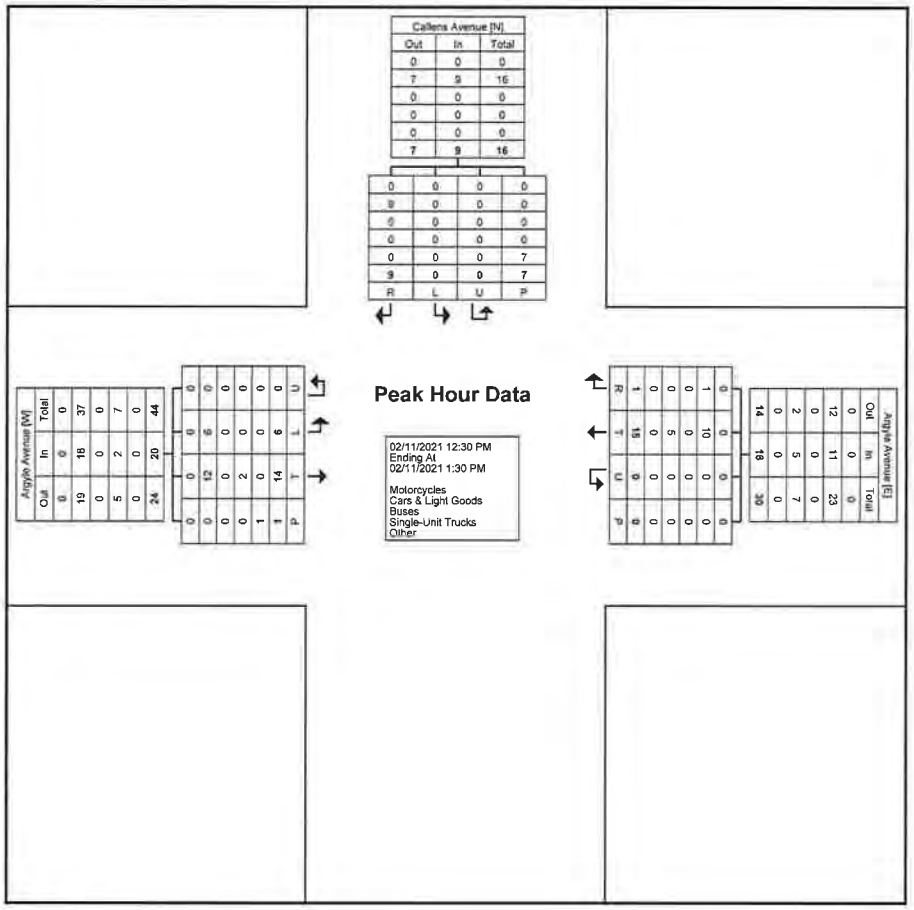
Count Name: Callens Avenue & Argyle Avenue
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Peak Hour Data (12:30 PM)

Start Time	Argyle Avenue Eastbound					Argyle Avenue Westbound					Callens Avenue Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
12:30 PM	2	6	0	0	8	3	0	0	0	3	0	2	0	0	2	13
12:45 PM	2	1	0	0	3	5	0	0	0	5	0	1	0	1	1	9
1:00 PM	0	2	0	0	2	2	0	0	0	2	0	2	0	2	2	6
1:15 PM	2	5	0	1	7	5	1	0	0	6	0	4	0	4	4	17
Total	6	14	0	1	20	15	1	0	0	16	0	9	0	7	9	45
Approach %	30.0	70.0	0.0	-	-	93.8	6.3	0.0	-	-	0.0	100.0	0.0	-	-	-
Total %	13.3	31.1	0.0	-	44.4	33.3	2.2	0.0	-	35.6	0.0	20.0	0.0	-	20.0	-
PHF	0.750	0.583	0.000	-	0.625	0.750	0.250	0.000	-	0.667	0.000	0.563	0.000	-	0.563	0.662
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Cars & Light Goods	6	12	0	-	18	10	1	0	-	11	0	9	0	-	9	38
% Cars & Light Goods	100.0	85.7	-	-	90.0	66.7	100.0	-	-	68.8	-	100.0	-	-	100.0	84.4
Buses	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Buses	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Single-Unit Trucks	0	2	0	-	2	5	0	0	-	5	0	0	0	-	0	7
% Single-Unit Trucks	0.0	14.3	-	-	10.0	33.3	0.0	-	-	31.3	-	0.0	-	-	0.0	15.6
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	1	-	-	-	-	0	-	-	-	-	7	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com



Turning Movement Peak Hour Data Plot (12:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Callens Avenue & Argyle Avenue
Site Code: 200005
Start Date: 02/11/2021

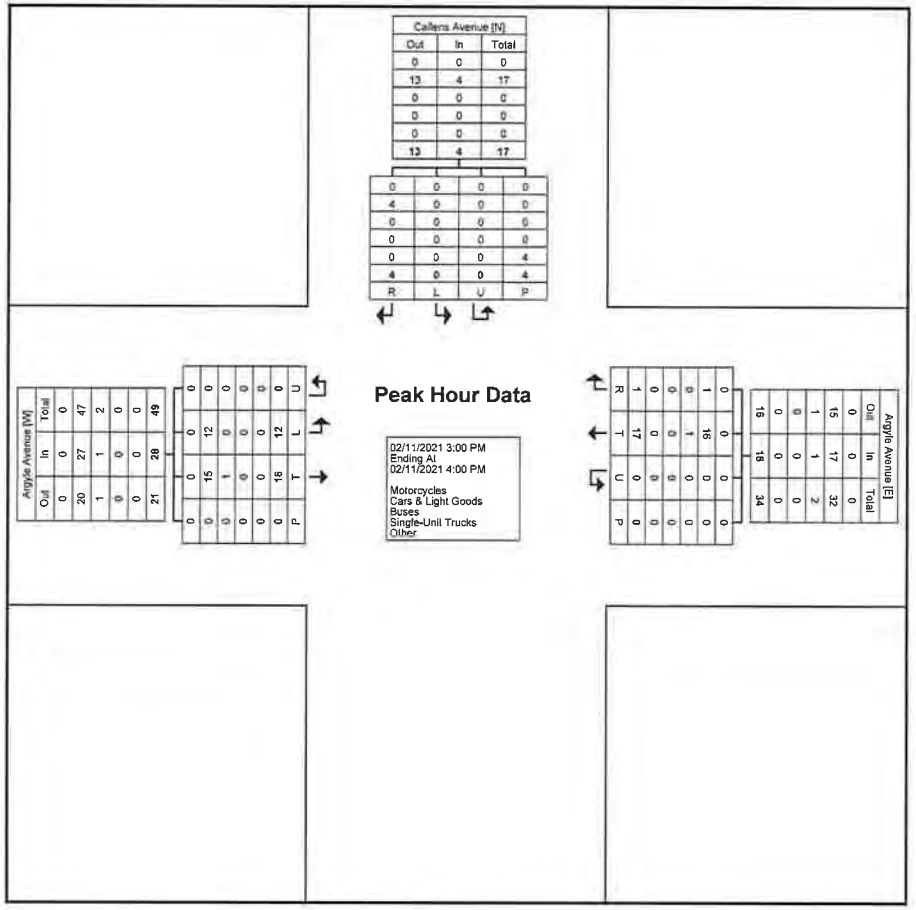
Turning Movement Peak Hour Data (3:00 PM)

Start Time	Argyle Avenue Eastbound					Argyle Avenue Westbound					Callens Avenue Southbound					
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
3:00 PM	2	10	0	0	12	3	1	0	0	4	0	1	0	2	1	17
3:15 PM	3	1	0	0	4	8	0	0	0	8	0	0	0	2	0	12
3:30 PM	2	1	0	0	3	3	0	0	0	3	0	1	0	0	1	7
3:45 PM	5	4	0	0	9	3	0	0	0	3	0	2	0	0	2	14
Total	12	16	0	0	28	17	1	0	0	18	0	4	0	4	4	50
Approach %	42.9	57.1	0.0	-	-	94.4	5.6	0.0	-	-	0.0	100.0	0.0	-	-	-
Total %	24.0	32.0	0.0	-	56.0	34.0	2.0	0.0	-	36.0	0.0	8.0	0.0	-	8.0	-
PHF	0.600	0.400	0.000	-	0.583	0.531	0.250	0.000	-	0.563	0.000	0.500	0.000	-	0.500	0.735
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Cars & Light Goods	12	15	0	-	27	16	1	0	-	17	0	4	0	-	4	48
% Cars & Light Goods	100.0	93.8	-	-	96.4	94.1	100.0	-	-	94.4	-	100.0	-	-	100.0	96.0
Buses	0	1	0	-	1	1	0	0	-	1	0	0	0	-	0	2
% Buses	0.0	6.3	-	-	3.6	5.9	0.0	-	-	5.6	-	0.0	-	-	0.0	4.0
Single-Unit Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Single-Unit Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Callens Avenue & Argyle Avenue
Site Code: 200005
Start Date: 02/11/2021



Turning Movement Peak Hour Data Plot (3:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Callens Avenue & Church Street
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Data

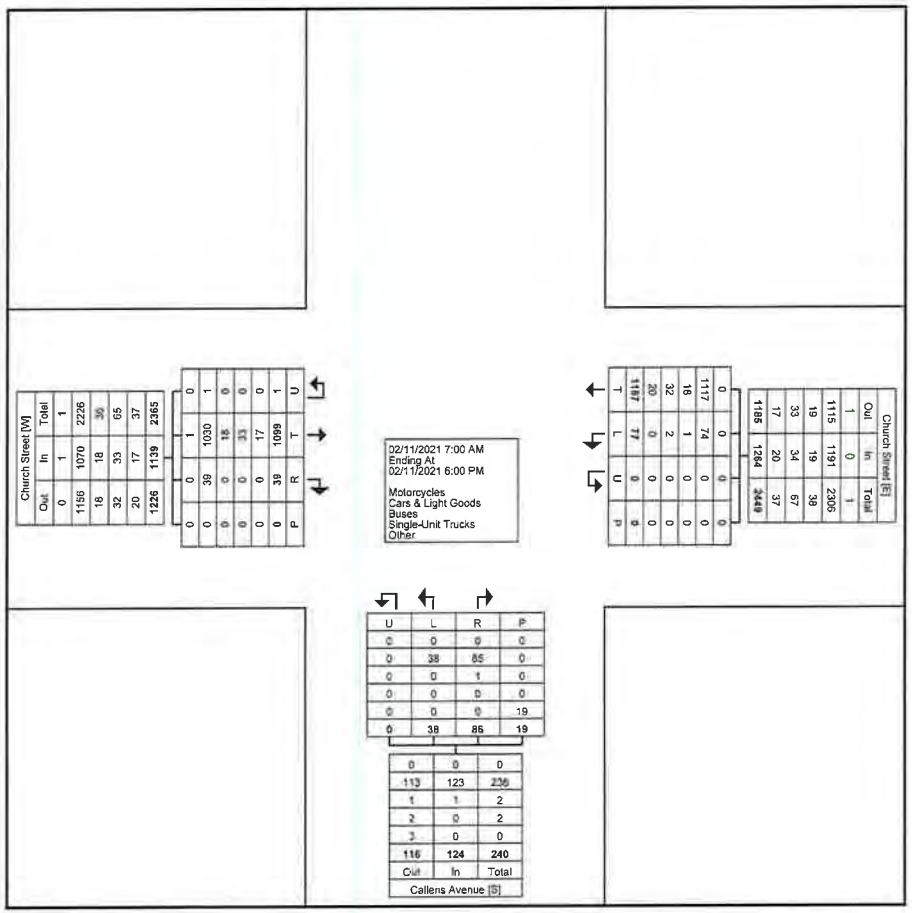
Start Time	Church Street Eastbound					Church Street Westbound					Callens Avenue Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
7:00 AM	43	3	0	0	46	0	21	0	0	21	2	6	0	0	8	75
7:15 AM	23	1	0	0	24	0	17	0	0	17	3	1	0	0	4	45
7:30 AM	44	2	0	0	46	0	36	0	0	36	1	12	0	0	13	95
7:45 AM	30	0	0	0	30	1	32	0	0	33	2	4	0	0	6	69
Hourly Total	140	6	0	0	146	1	106	0	0	107	8	23	0	0	31	284
8:00 AM	27	0	0	0	27	1	51	0	0	52	1	2	0	0	3	82
8:15 AM	39	0	0	0	39	0	40	0	0	40	0	2	0	2	2	81
8:30 AM	59	0	0	0	59	4	46	0	0	50	3	6	0	0	9	118
8:45 AM	25	3	0	0	28	2	40	0	0	42	0	0	0	0	0	70
Hourly Total	150	3	0	0	153	7	177	0	0	184	4	10	0	2	14	351
9:00 AM	24	0	0	0	24	2	26	0	0	28	0	2	0	0	2	54
9:15 AM	28	0	0	0	28	2	18	0	0	20	1	4	0	0	5	53
9:30 AM	20	0	0	0	20	1	22	0	0	23	2	3	0	0	5	48
9:45 AM	24	0	0	0	24	2	27	0	0	29	0	0	0	0	0	53
Hourly Total	96	0	0	0	96	7	93	0	0	100	3	9	0	0	12	208
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	18	1	0	0	19	2	31	0	0	33	0	3	0	0	3	55
11:45 AM	29	0	1	0	30	1	37	0	0	38	0	2	0	0	2	70
Hourly Total	47	1	1	0	49	3	68	0	0	71	0	5	0	0	5	125
12:00 PM	25	1	0	0	26	0	24	0	0	24	3	0	0	0	3	53
12:15 PM	34	0	0	0	34	2	25	0	0	27	2	0	0	2	2	63
12:30 PM	26	0	0	0	26	1	35	0	0	36	0	2	0	0	2	64
12:45 PM	31	2	0	0	33	2	12	0	0	14	0	3	0	1	3	50
Hourly Total	116	3	0	0	119	5	96	0	0	101	5	5	0	3	10	230
1:00 PM	28	1	0	0	29	0	33	0	0	33	1	2	0	0	3	65
1:15 PM	31	2	0	0	33	2	32	0	0	34	1	3	0	1	4	71
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	59	3	0	0	62	2	65	0	0	67	2	5	0	1	7	136
3:00 PM	48	1	0	0	49	1	40	0	0	41	3	3	0	3	6	96
3:15 PM	41	3	0	0	44	2	44	0	0	46	1	5	0	0	6	96
3:30 PM	47	0	0	0	47	7	47	0	0	54	0	2	0	3	2	103
3:45 PM	36	2	0	0	38	6	48	0	0	54	1	3	0	0	4	96
Hourly Total	172	6	0	0	178	16	179	0	0	195	5	13	0	6	18	391
4:00 PM	32	1	0	0	33	6	51	0	0	57	0	2	0	1	2	92
4:15 PM	39	1	0	0	40	11	60	0	0	71	2	2	0	2	4	115
4:30 PM	56	2	0	0	58	4	49	0	0	53	4	2	0	0	6	117

4:45 PM	39	0	0	0	39	3	48	0	0	51	1	2	0	1	3	93
Hourly Total	166	4	0	0	170	24	208	0	0	232	7	8	0	4	15	417
5:00 PM	57	6	0	0	63	4	49	0	0	53	1	2	0	3	3	119
5:15 PM	29	5	0	0	34	3	61	0	0	64	2	3	0	0	5	103
5:30 PM	36	2	0	0	38	2	52	0	0	54	1	3	0	0	4	96
5:45 PM	31	0	0	0	31	3	33	0	0	36	0	0	0	0	0	67
Hourly Total	153	13	0	0	166	12	195	0	0	207	4	8	0	3	12	385
Grand Total	1099	39	1	0	1139	77	1187	0	0	1264	38	86	0	19	124	2527
Approach %	96.5	3.4	0.1	-	-	6.1	93.9	0.0	-	-	30.6	69.4	0.0	-	-	-
Total %	43.5	1.5	0.0	-	45.1	3.0	47.0	0.0	-	50.0	1.5	3.4	0.0	-	4.9	-
Motorcycles	1	0	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Motorcycles	0.1	0.0	0.0	-	0.1	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	1030	39	1	-	1070	74	1117	0	-	1191	38	85	0	-	123	2384
% Cars & Light Goods	93.7	100.0	100.0	-	93.9	96.1	94.1	-	-	94.2	100.0	98.8	-	-	99.2	94.3
Buses	18	0	0	-	18	1	18	0	-	19	0	1	0	-	1	38
% Buses	1.6	0.0	0.0	-	1.6	1.3	1.5	-	-	1.5	0.0	1.2	-	-	0.8	1.5
Single-Unit Trucks	33	0	0	-	33	2	32	0	-	34	0	0	0	-	0	67
% Single-Unit Trucks	3.0	0.0	0.0	-	2.9	2.6	2.7	-	-	2.7	0.0	0.0	-	-	0.0	2.7
Articulated Trucks	17	0	0	-	17	0	20	0	-	20	0	0	0	-	0	37
% Articulated Trucks	1.5	0.0	0.0	-	1.5	0.0	1.7	-	-	1.6	0.0	0.0	-	-	0.0	1.5
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	19	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Callens Avenue & Church Street
Site Code: 200005
Start Date: 02/11/2021



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Count Name: Callens Avenue & Church Street
Site Code: 200005
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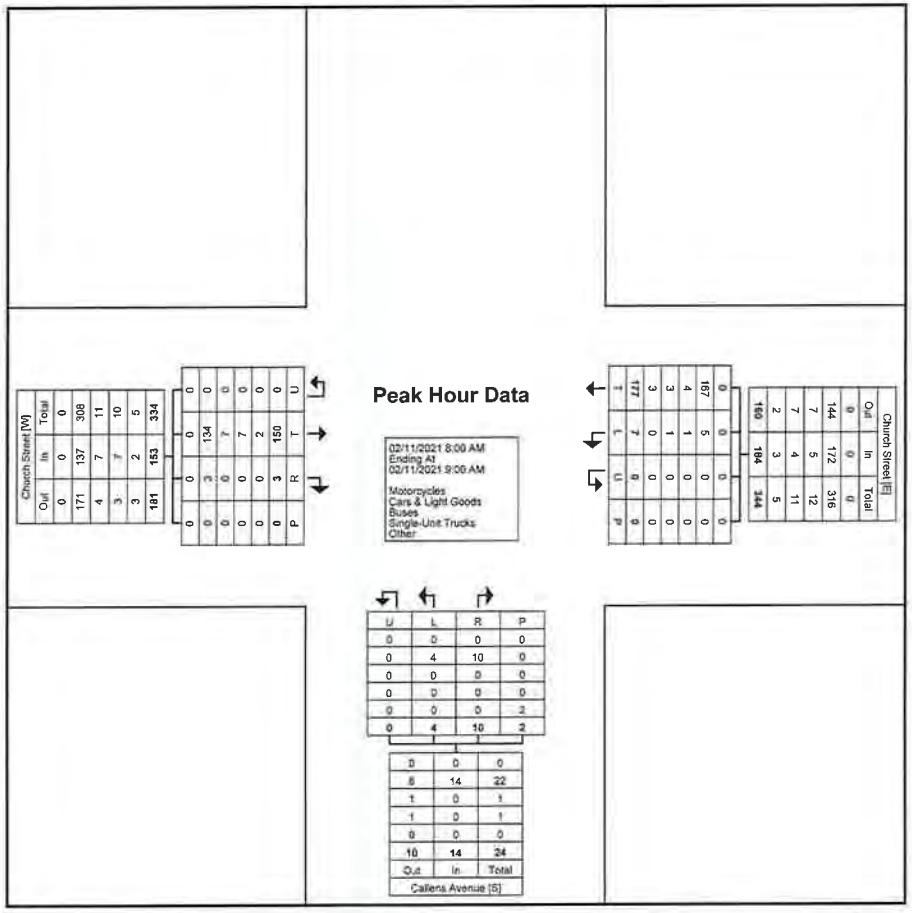
Turning Movement Peak Hour Data (8:00 AM)

Start Time	Church Street Eastbound					Church Street Westbound					Callens Avenue Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
8:00 AM	27	0	0	0	27	1	51	0	0	52	1	2	0	0	3	82
8:15 AM	39	0	0	0	39	0	40	0	0	40	0	2	0	2	2	81
8:30 AM	59	0	0	0	59	4	46	0	0	50	3	6	0	0	9	118
8:45 AM	25	3	0	0	28	2	40	0	0	42	0	0	0	0	0	70
Total	150	3	0	0	153	7	177	0	0	184	4	10	0	2	14	351
Approach %	98.0	2.0	0.0	-	-	3.8	96.2	0.0	-	-	28.6	71.4	0.0	-	-	-
Total %	42.7	0.9	0.0	-	43.6	2.0	50.4	0.0	-	52.4	1.1	2.8	0.0	-	4.0	-
PHF	0.636	0.250	0.000	-	0.648	0.438	0.868	0.000	-	0.885	0.333	0.417	0.000	-	0.389	0.744
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	134	3	0	-	137	5	167	0	-	172	4	10	0	-	14	323
% Cars & Light Goods	89.3	100.0	-	-	89.5	71.4	94.4	-	-	93.5	100.0	100.0	-	-	100.0	92.0
Buses	7	0	0	-	7	1	4	0	-	5	0	0	0	-	0	12
% Buses	4.7	0.0	-	-	4.6	14.3	2.3	-	-	2.7	0.0	0.0	-	-	0.0	3.4
Single-Unit Trucks	7	0	0	-	7	1	3	0	-	4	0	0	0	-	0	11
% Single-Unit Trucks	4.7	0.0	-	-	4.6	14.3	1.7	-	-	2.2	0.0	0.0	-	-	0.0	3.1
Articulated Trucks	2	0	0	-	2	0	3	0	-	3	0	0	0	-	0	5
% Articulated Trucks	1.3	0.0	-	-	1.3	0.0	1.7	-	-	1.6	0.0	0.0	-	-	0.0	1.4
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Callens Avenue & Church Street
Site Code: 200005
Start Date: 02/11/2021



Turning Movement Peak Hour Data Plot (8:00 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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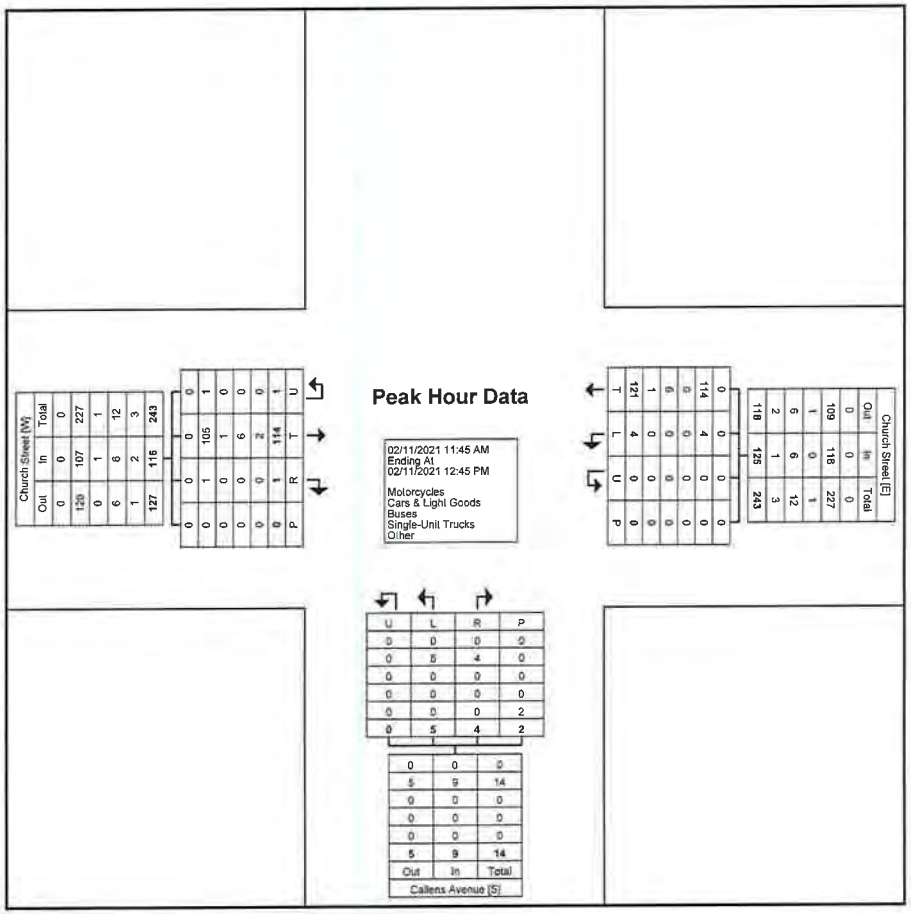
Count Name: Callens Avenue & Church Street
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Peak Hour Data (11:45 AM)

Start Time	Church Street Eastbound					Church Street Westbound					Callens Avenue Northbound					
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
11:45 AM	29	0	1	0	30	1	37	0	0	38	0	2	0	0	2	70
12:00 PM	25	1	0	0	26	0	24	0	0	24	3	0	0	0	3	53
12:15 PM	34	0	0	0	34	2	25	0	0	27	2	0	0	2	2	63
12:30 PM	26	0	0	0	26	1	35	0	0	36	0	2	0	0	2	64
Total	114	1	1	0	116	4	121	0	0	125	5	4	0	2	9	250
Approach %	98.3	0.9	0.9	-	-	3.2	96.8	0.0	-	-	55.6	44.4	0.0	-	-	-
Total %	45.6	0.4	0.4	-	46.4	1.6	48.4	0.0	-	50.0	2.0	1.6	0.0	-	3.6	-
PHF	0.838	0.250	0.250	-	0.853	0.500	0.818	0.000	-	0.822	0.417	0.500	0.000	-	0.750	0.893
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	105	1	1	-	107	4	114	0	-	118	5	4	0	-	9	234
% Cars & Light Goods	92.1	100.0	100.0	-	92.2	100.0	94.2	-	-	94.4	100.0	100.0	-	-	100.0	93.6
Buses	1	0	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Buses	0.9	0.0	0.0	-	0.9	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.4
Single-Unit Trucks	6	0	0	-	6	0	6	0	-	6	0	0	0	-	0	12
% Single-Unit Trucks	5.3	0.0	0.0	-	5.2	0.0	5.0	-	-	4.8	0.0	0.0	-	-	0.0	4.8
Articulated Trucks	2	0	0	-	2	0	1	0	-	1	0	0	0	-	0	3
% Articulated Trucks	1.8	0.0	0.0	-	1.7	0.0	0.8	-	-	0.8	0.0	0.0	-	-	0.0	1.2
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com



Turning Movement Peak Hour Data Plot (11:45 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

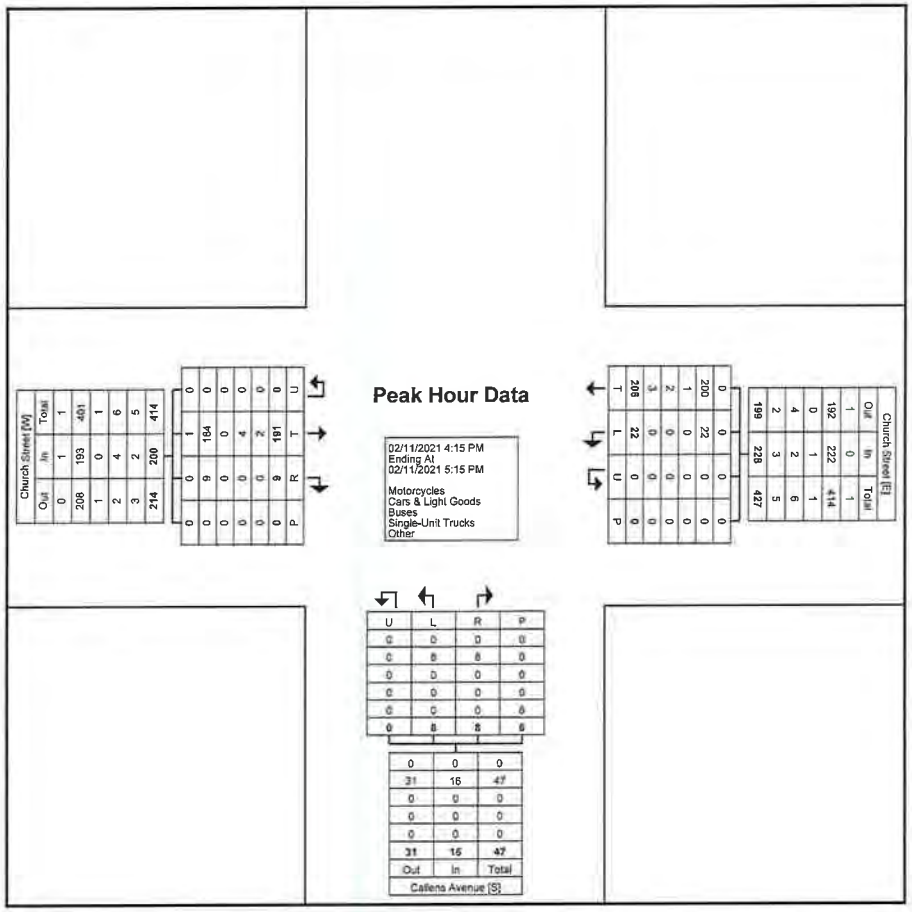
Count Name: Callens Avenue & Church Street
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Peak Hour Data (4:15 PM)

Start Time	Church Street Eastbound					Church Street Westbound					Callens Avenue Northbound					
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
4:15 PM	39	1	0	0	40	11	60	0	0	71	2	2	0	2	4	115
4:30 PM	56	2	0	0	58	4	49	0	0	53	4	2	0	0	6	117
4:45 PM	39	0	0	0	39	3	48	0	0	51	1	2	0	1	3	93
5:00 PM	57	6	0	0	63	4	49	0	0	53	1	2	0	3	3	119
Total	191	9	0	0	200	22	206	0	0	228	8	8	0	6	16	444
Approach %	95.5	4.5	0.0	-	-	9.6	90.4	0.0	-	-	50.0	50.0	0.0	-	-	-
Total %	43.0	2.0	0.0	-	45.0	5.0	46.4	0.0	-	51.4	1.8	1.8	0.0	-	3.6	-
PHF	0.838	0.375	0.000	-	0.794	0.500	0.858	0.000	-	0.803	0.500	1.000	0.000	-	0.667	0.933
Motorcycles	1	0	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Motorcycles	0.5	0.0	-	-	0.5	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.2
Cars & Light Goods	184	9	0	-	193	22	200	0	-	222	8	8	0	-	16	431
% Cars & Light Goods	96.3	100.0	-	-	96.5	100.0	97.1	-	-	97.4	100.0	100.0	-	-	100.0	97.1
Buses	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Buses	0.0	0.0	-	-	0.0	0.0	0.5	-	-	0.4	0.0	0.0	-	-	0.0	0.2
Single-Unit Trucks	4	0	0	-	4	0	2	0	-	2	0	0	0	-	0	6
% Single-Unit Trucks	2.1	0.0	-	-	2.0	0.0	1.0	-	-	0.9	0.0	0.0	-	-	0.0	1.4
Articulated Trucks	2	0	0	-	2	0	3	0	-	3	0	0	0	-	0	5
% Articulated Trucks	1.0	0.0	-	-	1.0	0.0	1.5	-	-	1.3	0.0	0.0	-	-	0.0	1.1
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	6	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com



Turning Movement Peak Hour Data Plot (4:15 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Fertilizer Road & Church Street
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Data

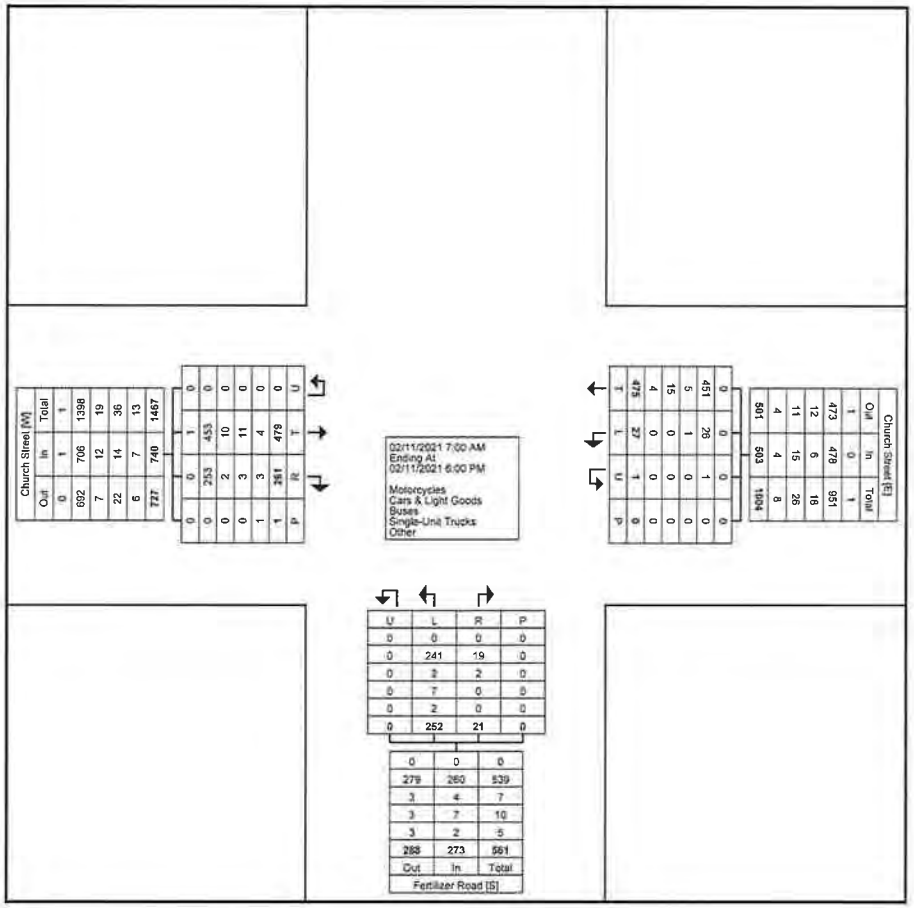
Start Time	Church Street Eastbound					Church Street Westbound					Fertilizer Road Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
7:00 AM	7	4	0	0	11	0	12	0	0	12	7	0	0	0	7	30
7:15 AM	12	5	0	0	17	0	6	0	0	6	8	0	0	0	8	31
7:30 AM	25	10	0	0	35	1	7	0	0	8	4	1	0	0	5	48
7:45 AM	14	8	0	0	22	1	12	0	0	13	8	0	0	0	8	43
Hourly Total	58	27	0	0	85	2	37	0	0	39	27	1	0	0	28	152
8:00 AM	18	11	0	0	29	0	11	0	0	11	10	2	0	0	12	52
8:15 AM	22	4	0	0	26	0	12	0	0	12	9	1	0	0	10	48
8:30 AM	27	8	0	0	35	0	14	0	0	14	6	1	0	0	7	56
8:45 AM	13	2	0	0	15	1	17	0	0	18	5	1	0	0	6	39
Hourly Total	80	25	0	0	105	1	54	0	0	55	30	5	0	0	35	195
9:00 AM	13	4	0	0	17	1	9	1	0	11	8	1	0	0	9	37
9:15 AM	9	5	0	0	14	1	10	0	0	11	5	0	0	0	5	30
9:30 AM	18	5	0	0	23	2	9	0	0	11	6	1	0	0	7	41
9:45 AM	5	6	0	0	11	1	8	0	0	9	7	1	0	0	8	28
Hourly Total	45	20	0	0	65	5	36	1	0	42	26	3	0	0	29	136
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	10	5	0	0	15	1	15	0	0	16	5	1	0	0	6	37
11:45 AM	11	5	0	0	16	0	8	0	0	8	7	0	0	0	7	31
Hourly Total	21	10	0	0	31	1	23	0	0	24	12	1	0	0	13	68
12:00 PM	10	7	0	0	17	1	7	0	0	8	7	0	0	0	7	32
12:15 PM	15	8	0	0	23	1	11	0	0	12	7	1	0	0	8	43
12:30 PM	12	6	0	1	18	1	16	0	0	17	6	0	0	0	6	41
12:45 PM	11	6	0	0	17	1	7	0	0	8	7	0	0	0	7	32
Hourly Total	48	27	0	1	75	4	41	0	0	45	27	1	0	0	28	148
1:00 PM	14	5	0	0	19	0	15	0	0	15	11	1	0	0	12	46
1:15 PM	8	6	0	0	14	0	15	0	0	15	3	0	0	0	3	32
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	22	11	0	0	33	0	30	0	0	30	14	1	0	0	15	78
3:00 PM	16	11	0	0	27	0	20	0	0	20	8	0	0	0	8	55
3:15 PM	18	13	0	0	31	3	21	0	0	24	7	0	0	0	7	62
3:30 PM	24	12	0	0	36	1	21	0	0	22	18	1	0	0	19	77
3:45 PM	18	14	0	0	32	0	27	0	0	27	12	0	0	0	12	71
Hourly Total	76	50	0	0	126	4	89	0	0	93	45	1	0	0	46	265
4:00 PM	14	10	0	0	24	2	20	0	0	22	9	1	0	0	10	56
4:15 PM	13	7	0	0	20	5	32	0	0	37	14	0	0	0	14	71
4:30 PM	20	4	0	0	24	0	17	0	0	17	15	0	0	0	15	56

4:45 PM	21	14	0	0	35	0	18	0	0	18	5	2	0	0	7	60
Hourly Total	68	35	0	0	103	7	87	0	0	94	43	3	0	0	46	243
5:00 PM	22	17	0	0	39	2	19	0	0	21	10	2	0	0	12	72
5:15 PM	13	14	0	0	27	0	32	0	0	32	6	0	0	0	6	65
5:30 PM	13	15	0	0	28	0	15	0	0	15	7	1	0	0	8	51
5:45 PM	13	10	0	0	23	1	12	0	0	13	5	2	0	0	7	43
Hourly Total	61	56	0	0	117	3	78	0	0	81	28	5	0	0	33	231
Grand Total	479	261	0	1	740	27	475	1	0	503	252	21	0	0	273	1516
Approach %	64.7	35.3	0.0	-	-	5.4	94.4	0.2	-	-	92.3	7.7	0.0	-	-	-
Total %	31.6	17.2	0.0	-	48.8	1.8	31.3	0.1	-	33.2	16.6	1.4	0.0	-	18.0	-
Motorcycles	1	0	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Motorcycles	0.2	0.0	-	-	0.1	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.1
Cars & Light Goods	453	253	0	-	706	26	451	1	-	478	241	19	0	-	260	1444
% Cars & Light Goods	94.6	96.9	-	-	95.4	96.3	94.9	100.0	-	95.0	95.6	90.5	-	-	95.2	95.3
Buses	10	2	0	-	12	1	5	0	-	6	2	2	0	-	4	22
% Buses	2.1	0.8	-	-	1.6	3.7	1.1	0.0	-	1.2	0.8	9.5	-	-	1.5	1.5
Single-Unit Trucks	11	3	0	-	14	0	15	0	-	15	7	0	0	-	7	36
% Single-Unit Trucks	2.3	1.1	-	-	1.9	0.0	3.2	0.0	-	3.0	2.8	0.0	-	-	2.6	2.4
Articulated Trucks	4	3	0	-	7	0	4	0	-	4	2	0	0	-	2	13
% Articulated Trucks	0.8	1.1	-	-	0.9	0.0	0.8	0.0	-	0.8	0.8	0.0	-	-	0.7	0.9
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Fertilizer Road & Church Street
Site Code: 200005
Start Date: 02/11/2021



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Fertilizer Road & Church Street
Site Code: 200005
Start Date: 02/11/2021

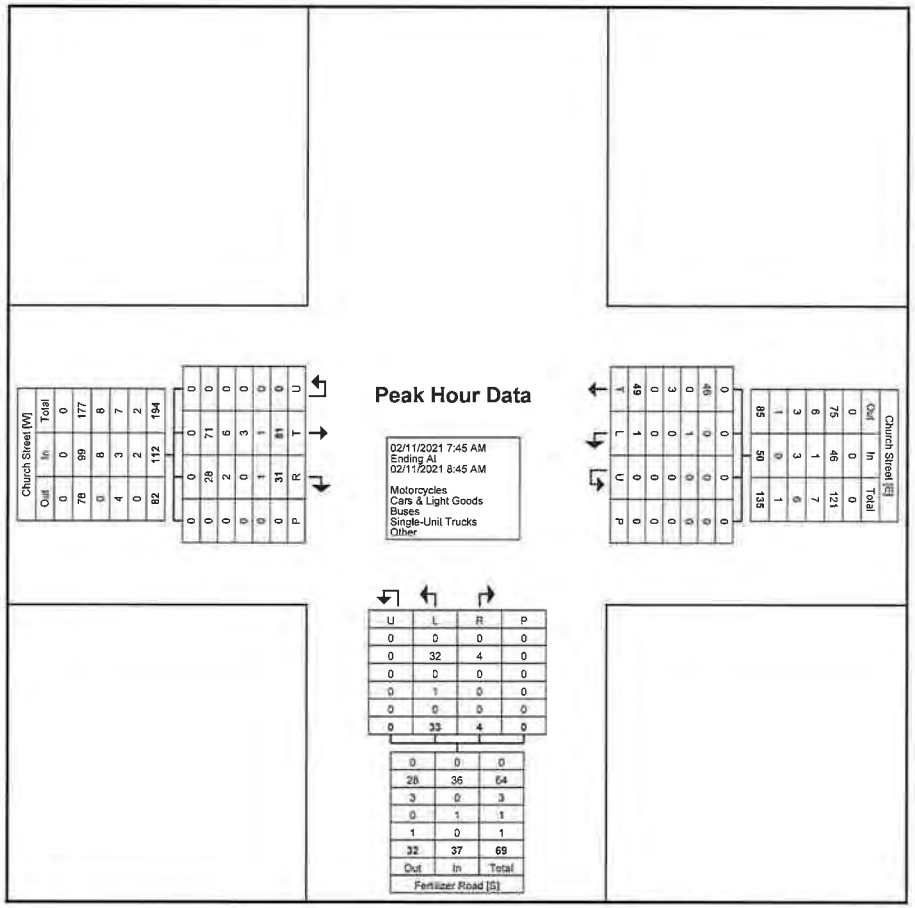
Turning Movement Peak Hour Data (7:45 AM)

Start Time	Church Street Eastbound					Church Street Westbound					Fertilizer Road Northbound					
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
7:45 AM	14	8	0	0	22	1	12	0	0	13	8	0	0	0	8	43
8:00 AM	18	11	0	0	29	0	11	0	0	11	10	2	0	0	12	52
8:15 AM	22	4	0	0	26	0	12	0	0	12	9	1	0	0	10	48
8:30 AM	27	8	0	0	35	0	14	0	0	14	6	1	0	0	7	56
Total	81	31	0	0	112	1	49	0	0	50	33	4	0	0	37	199
Approach %	72.3	27.7	0.0	-	-	2.0	98.0	0.0	-	-	89.2	10.8	0.0	-	-	-
Total %	40.7	15.6	0.0	-	56.3	0.5	24.6	0.0	-	25.1	16.6	2.0	0.0	-	18.6	-
PHF	0.750	0.705	0.000	-	0.800	0.250	0.875	0.000	-	0.893	0.825	0.500	0.000	-	0.771	0.888
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	71	28	0	-	99	0	46	0	-	46	32	4	0	-	36	181
% Cars & Light Goods	87.7	90.3	-	-	88.4	0.0	93.9	-	-	92.0	97.0	100.0	-	-	97.3	91.0
Buses	6	2	0	-	8	1	0	0	-	1	0	0	0	-	0	9
% Buses	7.4	6.5	-	-	7.1	100.0	0.0	-	-	2.0	0.0	0.0	-	-	0.0	4.5
Single-Unit Trucks	3	0	0	-	3	0	3	0	-	3	1	0	0	-	1	7
% Single-Unit Trucks	3.7	0.0	-	-	2.7	0.0	6.1	-	-	6.0	3.0	0.0	-	-	2.7	3.5
Articulated Trucks	1	1	0	-	2	0	0	0	-	0	0	0	0	-	0	2
% Articulated Trucks	1.2	3.2	-	-	1.8	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	1.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Fertilizer Road & Church Street
Site Code: 200005
Start Date: 02/11/2021



Turning Movement Peak Hour Data Plot (7:45 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

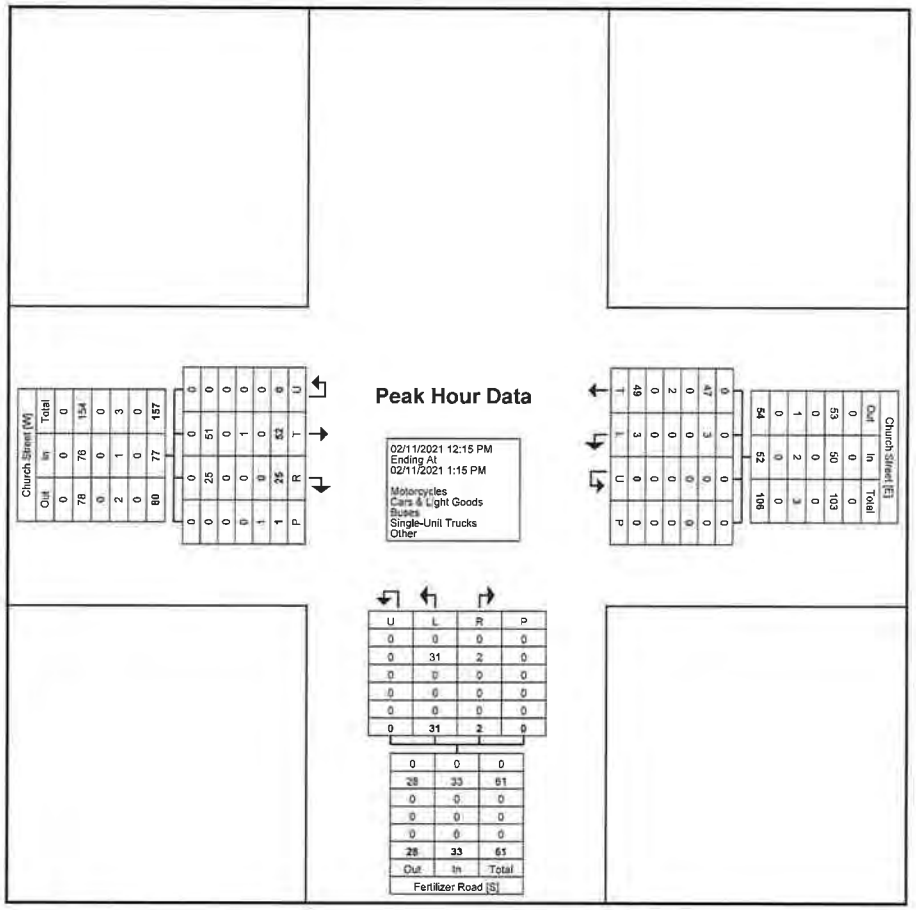
Count Name: Fertilizer Road & Church Street
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Peak Hour Data (12:15 PM)

Start Time	Church Street Eastbound					Church Street Westbound					Fertilizer Road Northbound					
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	Int. Total
12:15 PM	15	8	0	0	23	1	11	0	0	12	7	1	0	0	8	43
12:30 PM	12	6	0	1	18	1	16	0	0	17	6	0	0	0	6	41
12:45 PM	11	6	0	0	17	1	7	0	0	8	7	0	0	0	7	32
1:00 PM	14	5	0	0	19	0	15	0	0	15	11	1	0	0	12	46
Total	52	25	0	1	77	3	49	0	0	52	31	2	0	0	33	162
Approach %	67.5	32.5	0.0	-	-	5.8	94.2	0.0	-	-	93.9	6.1	0.0	-	-	-
Total %	32.1	15.4	0.0	-	47.5	1.9	30.2	0.0	-	32.1	19.1	1.2	0.0	-	20.4	-
PHF	0.867	0.781	0.000	-	0.837	0.750	0.766	0.000	-	0.765	0.705	0.500	0.000	-	0.688	0.880
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	51	25	0	-	76	3	47	0	-	50	31	2	0	-	33	159
% Cars & Light Goods	98.1	100.0	-	-	98.7	100.0	95.9	-	-	96.2	100.0	100.0	-	-	100.0	98.1
Buses	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Buses	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	1	0	0	-	1	0	2	0	-	2	0	0	0	-	0	3
% Single-Unit Trucks	1.9	0.0	-	-	1.3	0.0	4.1	-	-	3.8	0.0	0.0	-	-	0.0	1.9
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Turning Movement Peak Hour Data Plot (12:15 PM)

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Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

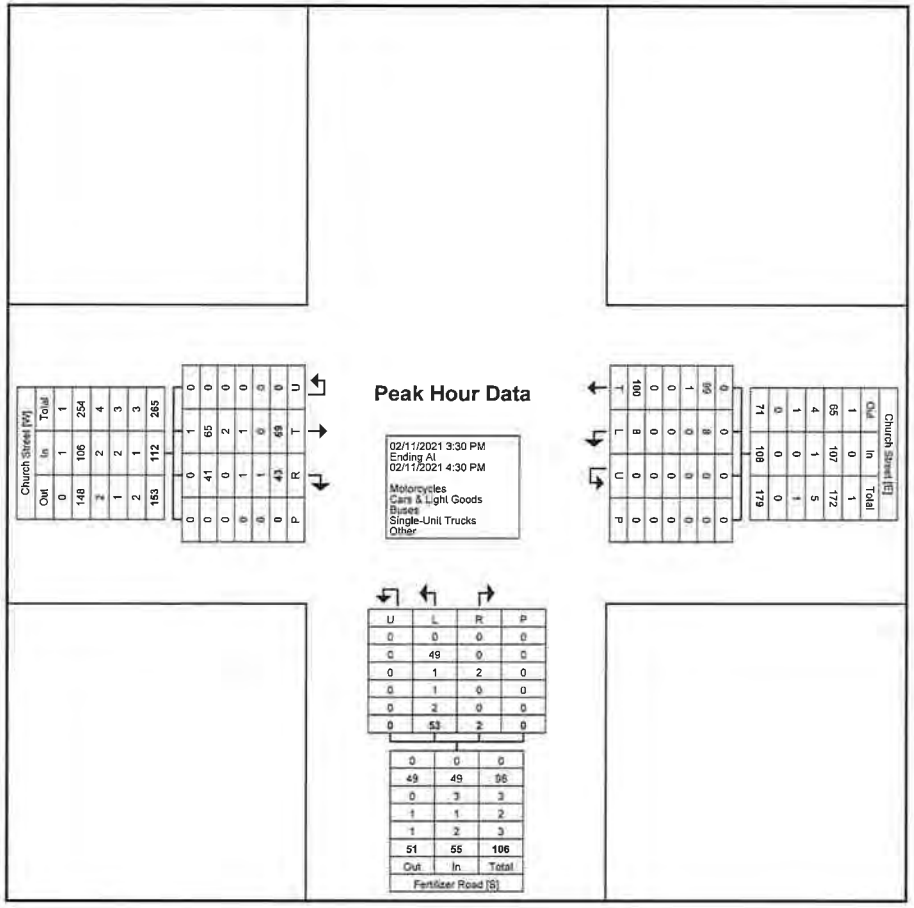
Count Name: Fertilizer Road & Church Street
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Peak Hour Data (3:30 PM)

Start Time	Church Street Eastbound					Church Street Westbound					Fertilizer Road Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
3:30 PM	24	12	0	0	36	1	21	0	0	22	18	1	0	0	19	77
3:45 PM	18	14	0	0	32	0	27	0	0	27	12	0	0	0	12	71
4:00 PM	14	10	0	0	24	2	20	0	0	22	9	1	0	0	10	56
4:15 PM	13	7	0	0	20	5	32	0	0	37	14	0	0	0	14	71
Total	69	43	0	0	112	8	100	0	0	108	53	2	0	0	55	275
Approach %	61.6	38.4	0.0	-	-	7.4	92.6	0.0	-	-	96.4	3.6	0.0	-	-	-
Total %	25.1	15.6	0.0	-	40.7	2.9	36.4	0.0	-	39.3	19.3	0.7	0.0	-	20.0	-
PHF	0.719	0.768	0.000	-	0.778	0.400	0.781	0.000	-	0.730	0.736	0.500	0.000	-	0.724	0.893
Motorcycles	1	0	0	-	1	0	0	0	-	0	0	0	0	-	0	1
% Motorcycles	1.4	0.0	-	-	0.9	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.4
Cars & Light Goods	65	41	0	-	106	8	99	0	-	107	49	0	0	-	49	262
% Cars & Light Goods	94.2	95.3	-	-	94.6	100.0	99.0	-	-	99.1	92.5	0.0	-	-	89.1	95.3
Buses	2	0	0	-	2	0	1	0	-	1	1	2	0	-	3	6
% Buses	2.9	0.0	-	-	1.8	0.0	1.0	-	-	0.9	1.9	100.0	-	-	5.5	2.2
Single-Unit Trucks	1	1	0	-	2	0	0	0	-	0	1	0	0	-	1	3
% Single-Unit Trucks	1.4	2.3	-	-	1.8	0.0	0.0	-	-	0.0	1.9	0.0	-	-	1.8	1.1
Articulated Trucks	0	1	0	-	1	0	0	0	-	0	2	0	0	-	2	3
% Articulated Trucks	0.0	2.3	-	-	0.9	0.0	0.0	-	-	0.0	3.8	0.0	-	-	3.6	1.1
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com



Turning Movement Peak Hour Data Plot (3:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Fertilizer Road & Wilson Avenue
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Data

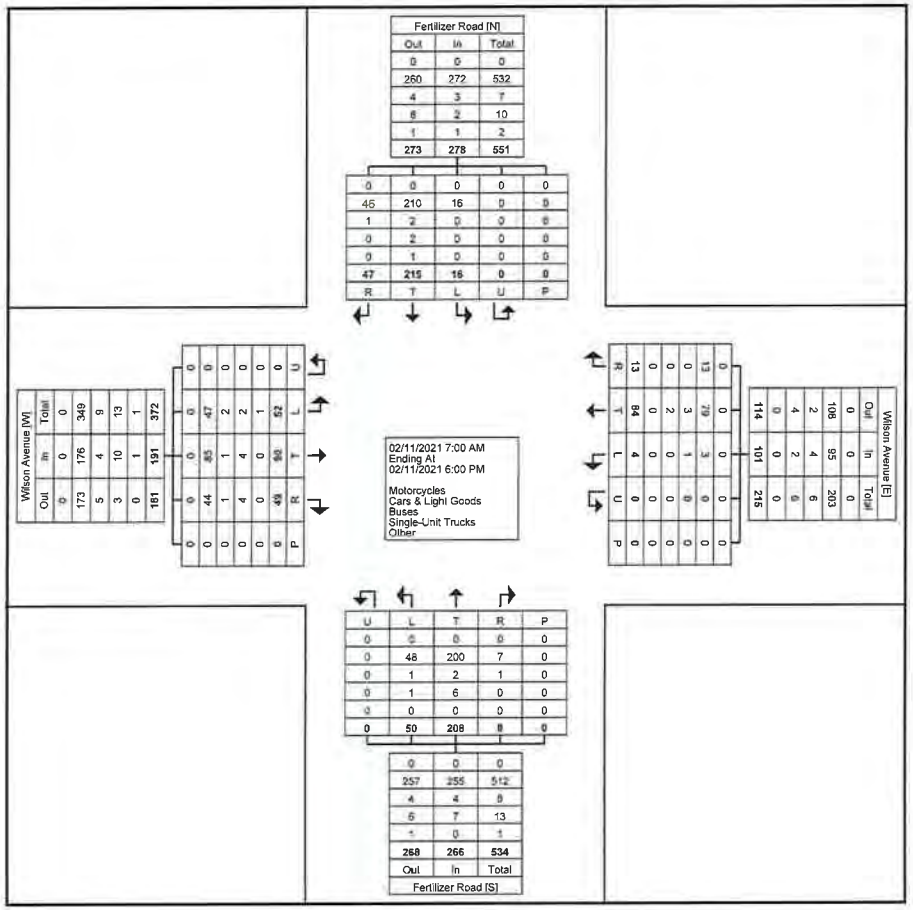
Start Time	Wilson Avenue Eastbound						Wilson Avenue Westbound						Fertilizer Road Northbound						Fertilizer Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	1	0	0	0	1	0	1	0	0	0	1	0	7	0	0	0	7	0	3	2	0	0	5	14
7:15 AM	1	1	0	0	0	2	0	2	0	0	0	2	0	7	0	0	0	7	1	2	0	0	0	3	14
7:30 AM	1	5	2	0	0	8	0	2	0	0	0	2	2	5	1	0	0	8	1	9	1	0	0	11	29
7:45 AM	4	8	0	0	0	12	0	1	0	0	0	1	1	8	0	0	0	9	1	5	1	0	0	7	29
Hourly Total	6	15	2	0	0	23	0	6	0	0	0	6	3	27	1	0	0	31	3	19	4	0	0	26	86
8:00 AM	2	1	6	0	0	9	0	5	0	0	0	5	0	9	1	0	0	10	0	10	0	0	0	10	34
8:15 AM	0	3	1	0	0	4	0	2	0	0	0	2	1	10	0	0	0	11	0	4	0	0	0	4	21
8:30 AM	2	1	1	0	0	4	0	3	1	0	0	4	2	3	0	0	0	5	1	6	2	0	0	9	22
8:45 AM	1	1	4	0	0	6	0	1	2	0	0	3	1	4	0	0	0	5	0	1	2	0	0	3	17
Hourly Total	5	6	12	0	0	23	0	11	3	0	0	14	4	26	1	0	0	31	1	21	4	0	0	26	94
9:00 AM	1	1	1	0	0	3	0	3	0	0	0	3	4	6	0	0	0	10	0	2	3	0	0	5	21
9:15 AM	2	5	2	0	0	9	0	1	0	0	0	1	1	2	0	0	0	3	0	2	1	0	0	3	16
9:30 AM	1	2	2	0	0	5	0	2	0	0	0	2	1	6	0	0	0	7	0	8	0	0	0	8	22
9:45 AM	3	1	0	0	0	4	0	5	0	0	0	5	0	6	0	0	0	6	1	2	0	0	0	3	18
Hourly Total	7	9	5	0	0	21	0	11	0	0	0	11	6	20	0	0	0	26	1	14	4	0	0	19	77
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	1	3	1	0	0	5	0	1	0	0	0	1	0	4	0	0	0	4	0	3	1	0	0	4	14
11:45 AM	2	2	1	0	0	5	0	2	0	0	0	2	0	3	0	0	0	3	0	6	1	0	0	7	17
Hourly Total	3	5	2	0	0	10	0	3	0	0	0	3	0	7	0	0	0	7	0	9	2	0	0	11	31
12:00 PM	0	0	2	0	0	2	0	0	0	0	0	0	1	8	0	0	0	9	1	5	1	0	0	7	18
12:15 PM	1	0	1	0	0	2	0	4	0	0	0	4	1	5	1	0	0	7	1	6	2	0	0	9	22
12:30 PM	2	2	3	0	0	7	0	2	0	0	0	2	1	6	0	0	0	7	0	7	1	0	0	8	24
12:45 PM	1	6	2	0	0	9	0	2	0	0	0	2	2	7	1	0	0	10	0	3	1	0	0	4	25
Hourly Total	4	8	8	0	0	20	0	8	0	0	0	8	5	26	2	0	0	33	2	21	5	0	0	28	89
1:00 PM	2	6	2	0	0	10	0	4	0	0	0	4	1	8	0	0	0	9	0	7	0	0	0	7	30
1:15 PM	1	3	0	0	0	4	0	3	0	0	0	3	3	3	0	0	0	6	0	6	0	0	0	6	19
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	3	9	2	0	0	14	0	7	0	0	0	7	4	11	0	0	0	15	0	13	0	0	0	13	49
3:00 PM	3	4	1	0	0	8	0	3	2	0	0	5	1	4	0	0	0	5	0	7	3	0	0	10	28
3:15 PM	2	3	1	0	0	6	2	4	0	0	0	6	3	6	1	0	0	10	1	6	4	0	0	11	33
3:30 PM	2	7	0	0	0	9	0	5	1	0	0	6	2	16	0	0	0	18	0	15	1	0	0	16	49
3:45 PM	2	5	0	0	0	7	1	4	1	0	0	6	4	9	0	0	0	13	0	9	3	0	0	12	38
Hourly Total	9	19	2	0	0	30	3	16	4	0	0	23	10	35	1	0	0	46	1	37	11	0	0	49	148
4:00 PM	3	0	5	0	0	8	0	1	1	0	0	2	2	7	1	0	0	10	2	8	4	0	0	14	34
4:15 PM	3	4	2	0	0	9	1	2	1	0	0	4	2	9	0	0	0	11	0	8	4	0	0	12	36

4:30 PM	2	2	3	0	0	7	0	5	0	0	0	5	4	8	1	0	0	13	0	7	2	0	0	9	34
4:45 PM	2	6	1	0	0	9	0	4	1	0	0	5	2	5	0	0	0	7	0	10	3	0	0	13	34
Hourly Total	10	12	11	0	0	33	1	12	3	0	0	16	10	29	2	0	0	41	2	33	13	0	0	48	138
5:00 PM	0	1	0	0	0	1	0	3	2	0	0	5	3	11	0	0	0	14	3	14	2	0	0	19	39
5:15 PM	0	1	3	0	0	4	0	5	0	0	0	5	3	4	0	0	0	7	0	14	1	0	0	15	31
5:30 PM	2	3	2	0	0	7	0	0	0	0	0	0	0	5	1	0	0	6	1	10	1	0	0	12	25
5:45 PM	3	2	0	0	0	5	0	2	1	0	0	3	2	7	0	0	0	9	2	10	0	0	0	12	29
Hourly Total	5	7	5	0	0	17	0	10	3	0	0	13	8	27	1	0	0	36	6	48	4	0	0	58	124
Grand Total	52	90	49	0	0	191	4	84	13	0	0	101	50	208	8	0	0	266	16	215	47	0	0	278	836
Approach %	27.2	47.1	25.7	0.0	-	-	4.0	83.2	12.9	0.0	-	-	18.8	78.2	3.0	0.0	-	-	5.8	77.3	16.9	0.0	-	-	-
Total %	6.2	10.8	5.9	0.0	-	22.8	0.5	10.0	1.6	0.0	-	12.1	6.0	24.9	1.0	0.0	-	31.8	1.9	25.7	5.6	0.0	-	33.3	-
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	47	85	44	0	-	176	3	79	13	0	-	95	48	200	7	0	-	255	16	210	46	0	-	272	798
% Cars & Light Goods	90.4	94.4	89.8	-	-	92.1	75.0	94.0	100.0	-	-	94.1	96.0	96.2	87.5	-	-	95.9	100.0	97.7	97.9	-	-	97.8	95.5
Buses	2	1	1	0	-	4	1	3	0	0	-	4	1	2	1	0	-	4	0	2	1	0	-	3	15
% Buses	3.8	1.1	2.0	-	-	2.1	25.0	3.6	0.0	-	-	4.0	2.0	1.0	12.5	-	-	1.5	0.0	0.9	2.1	-	-	1.1	1.8
Single-Unit Trucks	2	4	4	0	-	10	0	2	0	0	-	2	1	6	0	0	-	7	0	2	0	0	-	2	21
% Single-Unit Trucks	3.8	4.4	8.2	-	-	5.2	0.0	2.4	0.0	-	-	2.0	2.0	2.9	0.0	-	-	2.6	0.0	0.9	0.0	-	-	0.7	2.5
Articulated Trucks	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	2
% Articulated Trucks	1.9	0.0	0.0	-	-	0.5	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.4	0.2
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Fertilizer Road & Wilson Avenue
Site Code: 200005
Start Date: 02/11/2021



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

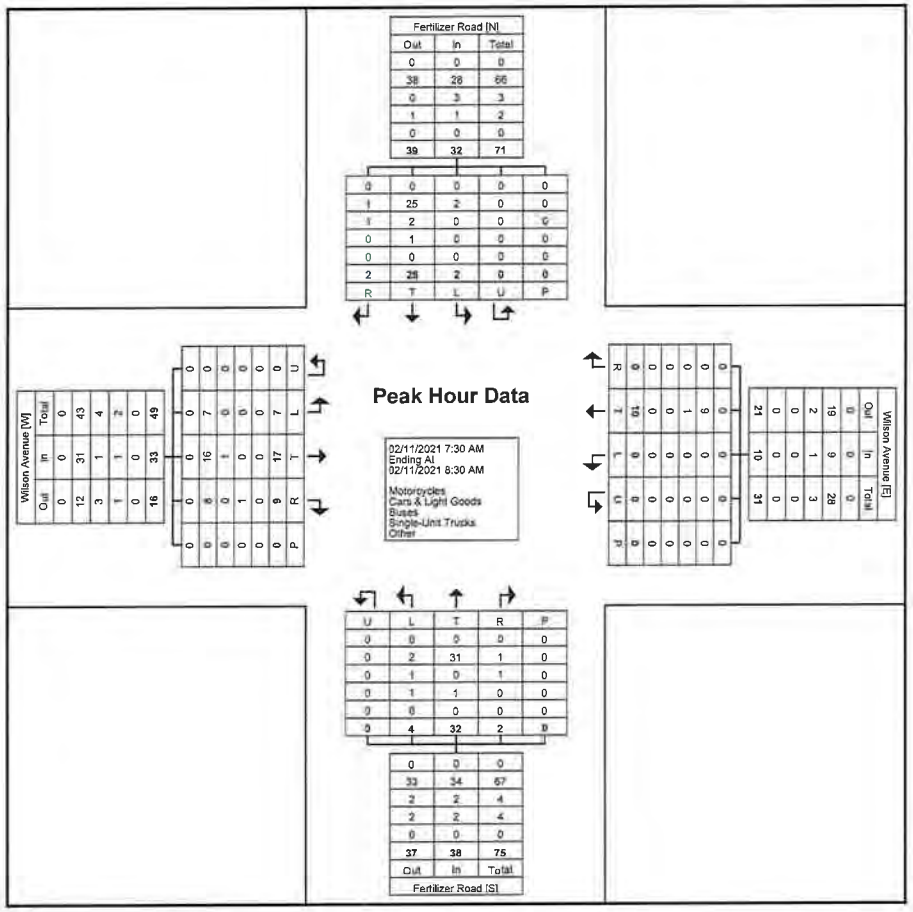
Count Name: Fertilizer Road & Wilson Avenue
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Wilson Avenue Eastbound						Wilson Avenue Westbound						Fertilizer Road Northbound						Fertilizer Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:30 AM	1	5	2	0	0	8	0	2	0	0	0	2	2	5	1	0	0	8	1	9	1	0	0	11	29
7:45 AM	4	8	0	0	0	12	0	1	0	0	0	1	1	8	0	0	0	9	1	5	1	0	0	7	29
8:00 AM	2	1	6	0	0	9	0	5	0	0	0	5	0	9	1	0	0	10	0	10	0	0	0	10	34
8:15 AM	0	3	1	0	0	4	0	2	0	0	0	2	1	10	0	0	0	11	0	4	0	0	0	4	21
Total	7	17	9	0	0	33	0	10	0	0	0	10	4	32	2	0	0	38	2	28	2	0	0	32	113
Approach %	21.2	51.5	27.3	0.0	-	-	0.0	100.0	0.0	0.0	-	-	10.5	84.2	5.3	0.0	-	-	6.3	87.5	6.3	0.0	-	-	-
Total %	6.2	15.0	8.0	0.0	-	29.2	0.0	8.8	0.0	0.0	-	8.8	3.5	28.3	1.8	0.0	-	33.6	1.8	24.8	1.8	0.0	-	28.3	-
PHF	0.438	0.531	0.375	0.000	-	0.688	0.000	0.500	0.000	0.000	-	0.500	0.500	0.800	0.500	0.000	-	0.864	0.500	0.700	0.500	0.000	-	0.727	0.831
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	7	16	8	0	-	31	0	9	0	0	-	9	2	31	1	0	-	34	2	25	1	0	-	28	102
% Cars & Light Goods	100.0	94.1	88.9	-	-	93.9	-	90.0	-	-	-	90.0	50.0	96.9	50.0	-	-	89.5	100.0	89.3	50.0	-	-	87.5	90.3
Buses	0	1	0	0	-	1	0	1	0	0	-	1	1	0	1	0	-	2	0	2	1	0	-	3	7
% Buses	0.0	5.9	0.0	-	-	3.0	-	10.0	-	-	-	10.0	25.0	0.0	50.0	-	-	5.3	0.0	7.1	50.0	-	-	9.4	6.2
Single-Unit Trucks	0	0	1	0	-	1	0	0	0	0	-	0	1	1	0	0	-	2	0	1	0	0	-	1	4
% Single-Unit Trucks	0.0	0.0	11.1	-	-	3.0	-	0.0	-	-	-	0.0	25.0	3.1	0.0	-	-	5.3	0.0	3.6	0.0	-	-	3.1	3.5
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
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Turning Movement Peak Hour Data Plot (7:30 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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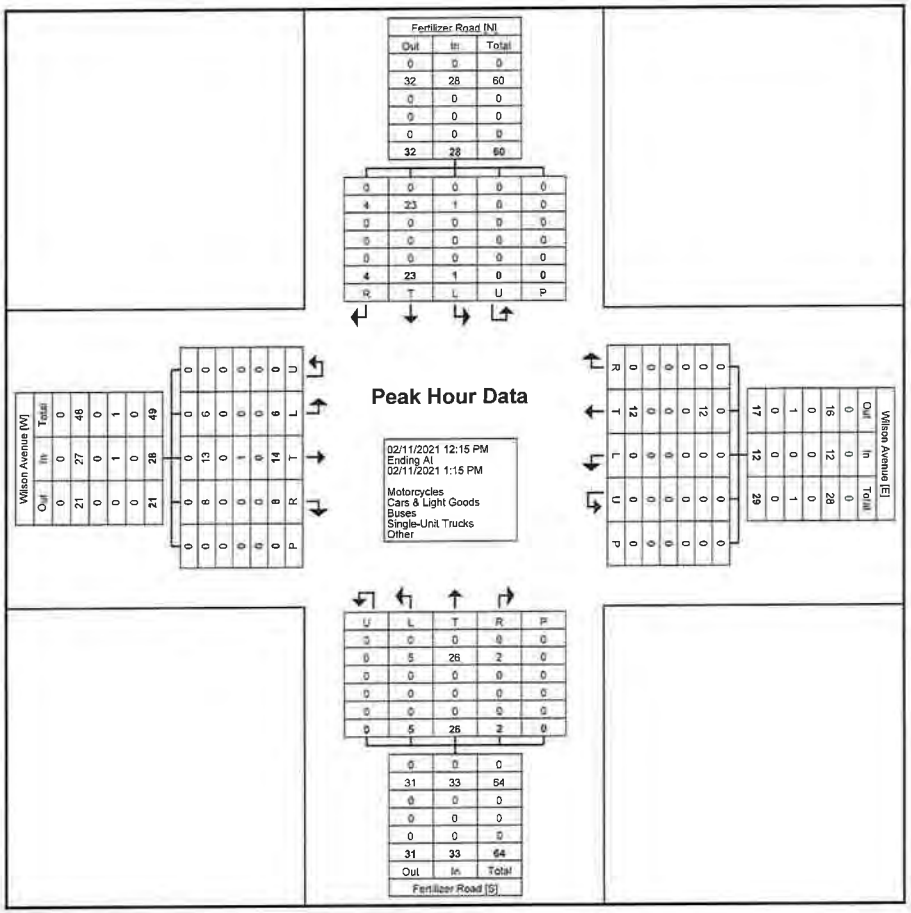
Count Name: Fertilizer Road & Wilson Avenue
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Peak Hour Data (12:15 PM)

Start Time	Wilson Avenue Eastbound						Wilson Avenue Westbound						Fertilizer Road Northbound						Fertilizer Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:15 PM	1	0	1	0	0	2	0	4	0	0	0	4	1	5	1	0	0	7	1	6	2	0	0	9	22
12:30 PM	2	2	3	0	0	7	0	2	0	0	0	2	1	6	0	0	0	7	0	7	1	0	0	8	24
12:45 PM	1	6	2	0	0	9	0	2	0	0	0	2	2	7	1	0	0	10	0	3	1	0	0	4	25
1:00 PM	2	6	2	0	0	10	0	4	0	0	0	4	1	8	0	0	0	9	0	7	0	0	0	7	30
Total	6	14	8	0	0	28	0	12	0	0	0	12	5	26	2	0	0	33	1	23	4	0	0	28	101
Approach %	21.4	50.0	28.6	0.0	-	-	0.0	100.0	0.0	0.0	-	-	15.2	78.8	6.1	0.0	-	-	3.6	82.1	14.3	0.0	-	-	-
Total %	5.9	13.9	7.9	0.0	-	27.7	0.0	11.9	0.0	0.0	-	11.9	5.0	25.7	2.0	0.0	-	32.7	1.0	22.8	4.0	0.0	-	27.7	-
PHF	0.750	0.583	0.667	0.000	-	0.700	0.000	0.750	0.000	0.000	-	0.750	0.625	0.813	0.500	0.000	-	0.825	0.250	0.821	0.500	0.000	-	0.778	0.842
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	6	13	8	0	-	27	0	12	0	0	-	12	5	26	2	0	-	33	1	23	4	0	-	28	100
% Cars & Light Goods	100.0	92.9	100.0	-	-	96.4	-	100.0	-	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	99.0
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Buses	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Single-Unit Trucks	0.0	7.1	0.0	-	-	3.6	-	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	1.0
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	-	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Turning Movement Peak Hour Data Plot (12:15 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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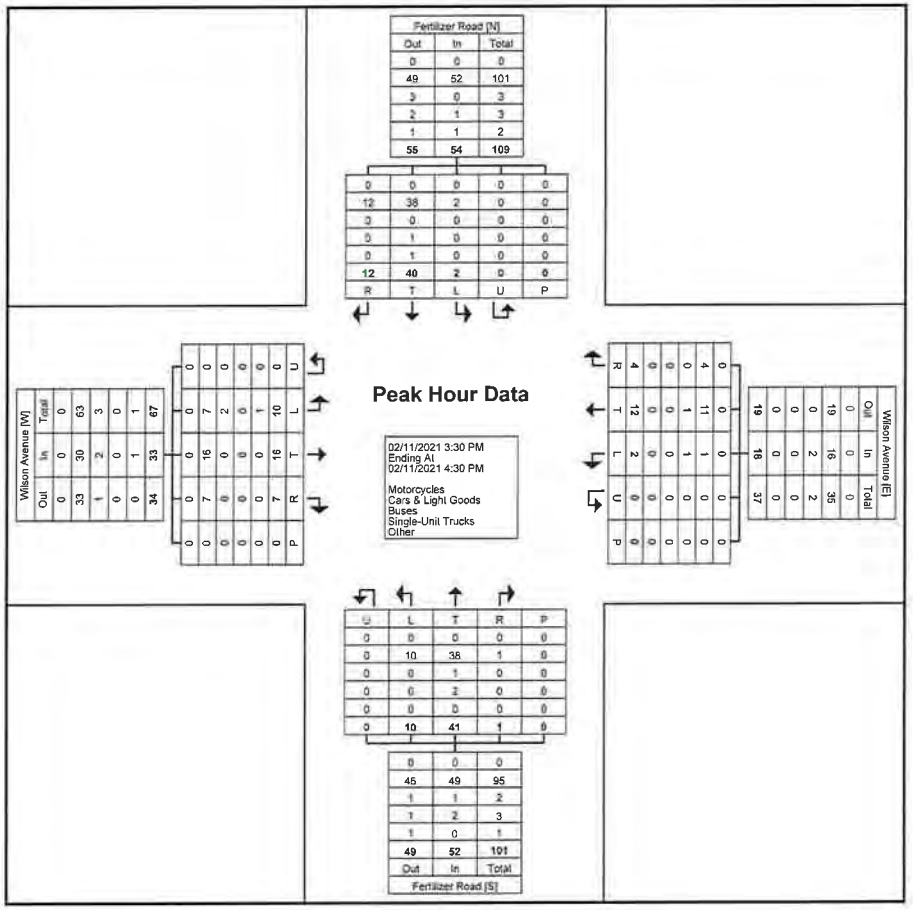
Count Name: Fertilizer Road & Wilson Avenue
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Peak Hour Data (3:30 PM)

Start Time	Wilson Avenue Eastbound						Wilson Avenue Westbound						Fertilizer Road Northbound						Fertilizer Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
3:30 PM	2	7	0	0	0	9	0	5	1	0	0	6	2	16	0	0	0	18	0	15	1	0	0	16	49
3:45 PM	2	5	0	0	0	7	1	4	1	0	0	6	4	9	0	0	0	13	0	9	3	0	0	12	38
4:00 PM	3	0	5	0	0	8	0	1	1	0	0	2	2	7	1	0	0	10	2	8	4	0	0	14	34
4:15 PM	3	4	2	0	0	9	1	2	1	0	0	4	2	9	0	0	0	11	0	8	4	0	0	12	36
Total	10	16	7	0	0	33	2	12	4	0	0	18	10	41	1	0	0	52	2	40	12	0	0	54	157
Approach %	30.3	48.5	21.2	0.0	-	-	11.1	66.7	22.2	0.0	-	-	19.2	78.8	1.9	0.0	-	-	3.7	74.1	22.2	0.0	-	-	-
Total %	6.4	10.2	4.5	0.0	-	21.0	1.3	7.6	2.5	0.0	-	11.5	6.4	26.1	0.6	0.0	-	33.1	1.3	25.5	7.6	0.0	-	34.4	-
PHF	0.833	0.571	0.350	0.000	-	0.917	0.500	0.600	1.000	0.000	-	0.750	0.625	0.641	0.250	0.000	-	0.722	0.250	0.667	0.750	0.000	-	0.844	0.801
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	7	16	7	0	-	30	1	11	4	0	-	16	10	38	1	0	-	49	2	38	12	0	-	52	147
% Cars & Light Goods	70.0	100.0	100.0	-	-	90.9	50.0	91.7	100.0	-	-	88.9	100.0	92.7	100.0	-	-	94.2	100.0	95.0	100.0	-	-	96.3	93.6
Buses	2	0	0	0	-	2	1	1	0	0	-	2	0	1	0	0	-	1	0	0	0	0	-	0	5
% Buses	20.0	0.0	0.0	-	-	6.1	50.0	8.3	0.0	-	-	11.1	0.0	2.4	0.0	-	-	1.9	0.0	0.0	0.0	-	-	0.0	3.2
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	2	0	0	-	2	0	1	0	0	-	1	3
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	4.9	0.0	-	-	3.8	0.0	2.5	0.0	-	-	1.9	1.9
Articulated Trucks	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	2
% Articulated Trucks	10.0	0.0	0.0	-	-	3.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	2.5	0.0	-	-	1.9	1.3
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Turning Movement Peak Hour Data Plot (3:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Wilson Avenue & James Street
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Data

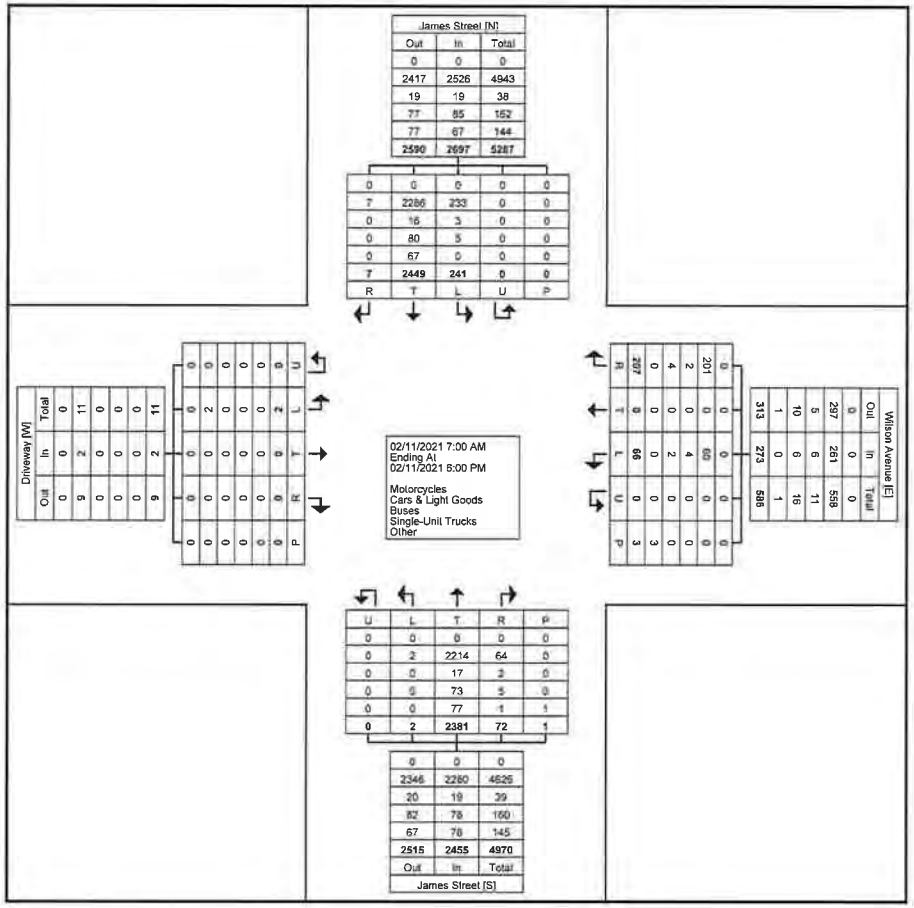
Start Time	Driveway Eastbound						Wilson Avenue Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	0	0	0	0	0	4	0	5	0	0	9	0	56	0	0	0	56	2	53	0	0	0	55	120
7:15 AM	0	0	0	0	0	0	2	0	2	0	0	4	0	47	1	0	0	48	7	67	0	0	0	74	126
7:30 AM	0	0	0	0	0	0	7	0	6	0	0	13	0	51	3	0	0	54	6	97	0	0	0	103	170
7:45 AM	0	0	0	0	0	0	5	0	6	0	1	11	0	61	0	0	0	61	11	78	0	0	0	89	161
Hourly Total	0	0	0	0	0	0	18	0	19	0	1	37	0	215	4	0	0	219	26	295	0	0	0	321	577
8:00 AM	0	0	0	0	0	0	3	0	7	0	1	10	0	55	4	0	1	59	3	74	0	0	0	77	146
8:15 AM	1	0	0	0	0	1	0	0	7	0	0	7	0	70	1	0	0	71	3	88	0	0	0	91	170
8:30 AM	0	0	0	0	0	0	5	0	11	0	0	16	0	77	2	0	0	79	6	93	0	0	0	99	194
8:45 AM	0	0	0	0	0	0	1	0	5	0	0	6	0	72	0	0	0	72	11	71	0	0	0	82	160
Hourly Total	1	0	0	0	0	1	9	0	30	0	1	39	0	274	7	0	1	281	23	326	0	0	0	349	670
9:00 AM	0	0	0	0	0	0	2	0	7	0	0	9	0	70	1	0	0	71	3	62	0	0	0	65	145
9:15 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	47	2	0	0	49	9	54	0	0	0	63	118
9:30 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	53	0	0	0	53	7	61	1	0	0	69	127
9:45 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	56	4	0	0	60	3	63	0	0	0	66	133
Hourly Total	0	0	0	0	0	0	2	0	25	0	0	27	0	226	7	0	0	233	22	240	1	0	0	263	523
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	0	0	0	0	0	0	2	0	6	0	1	8	0	73	2	0	0	75	7	60	0	0	0	67	150
11:45 AM	0	0	0	0	0	0	2	0	4	0	0	6	0	82	5	0	0	87	9	60	0	0	0	69	162
Hourly Total	0	0	0	0	0	0	4	0	10	0	1	14	0	155	7	0	0	162	16	120	0	0	0	136	312
12:00 PM	0	0	0	0	0	0	1	0	5	0	0	6	0	70	0	0	0	70	5	69	0	0	0	74	150
12:15 PM	0	0	0	0	0	0	4	0	11	0	0	15	0	67	2	0	0	69	6	53	0	0	0	59	143
12:30 PM	0	0	0	0	0	0	2	0	2	0	0	4	0	75	2	0	0	77	7	67	0	0	0	74	155
12:45 PM	0	0	0	0	0	0	1	0	5	0	0	6	0	71	0	0	0	71	9	66	0	0	0	75	152
Hourly Total	0	0	0	0	0	0	8	0	23	0	0	31	0	283	4	0	0	287	27	255	0	0	0	282	600
1:00 PM	0	0	0	0	0	0	2	0	8	0	0	10	0	67	4	0	0	71	15	81	0	0	0	96	177
1:15 PM	0	0	0	0	0	0	0	0	9	0	0	9	0	86	2	0	0	88	8	87	0	0	0	95	192
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	2	0	17	0	0	19	0	153	6	0	0	159	23	168	0	0	0	191	369
3:00 PM	0	0	0	0	0	0	1	0	5	0	0	6	0	106	4	0	0	110	10	87	0	0	0	97	213
3:15 PM	0	0	0	0	0	0	0	0	12	0	0	12	0	95	2	0	0	97	13	93	0	0	0	106	215
3:30 PM	0	0	0	0	0	0	2	0	7	0	0	9	0	85	1	0	0	86	8	94	0	0	0	102	197
3:45 PM	0	0	0	0	0	0	2	0	8	0	0	10	0	86	2	0	0	88	14	79	2	0	0	95	193
Hourly Total	0	0	0	0	0	0	5	0	32	0	0	37	0	372	9	0	0	381	45	353	2	0	0	400	818
4:00 PM	0	0	0	0	0	0	3	0	10	0	0	13	0	89	5	0	0	94	8	96	0	0	0	104	211
4:15 PM	0	0	0	0	0	0	3	0	3	0	0	6	0	111	3	0	0	114	10	101	0	0	0	111	231

4:30 PM	0	0	0	0	0	0	8	0	10	0	0	18	0	90	5	0	0	95	10	88	0	0	0	98	211
4:45 PM	1	0	0	0	0	1	2	0	4	0	0	6	0	92	3	0	0	95	11	73	1	0	0	85	187
Hourly Total	1	0	0	0	0	1	16	0	27	0	0	43	0	382	16	0	0	398	39	358	1	0	0	398	840
5:00 PM	0	0	0	0	0	0	1	0	10	0	0	11	1	101	4	0	0	106	8	88	2	0	0	98	215
5:15 PM	0	0	0	0	0	0	1	0	7	0	0	8	1	97	2	0	0	100	2	100	1	0	0	103	211
5:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	56	2	0	0	58	5	79	0	0	0	84	145
5:45 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	67	4	0	0	71	5	67	0	0	0	72	147
Hourly Total	0	0	0	0	0	0	2	0	24	0	0	26	2	321	12	0	0	335	20	334	3	0	0	357	718
Grand Total	2	0	0	0	0	2	66	0	207	0	3	273	2	2381	72	0	1	2455	241	2449	7	0	0	2697	5427
Approach %	100.0	0.0	0.0	0.0	-	-	24.2	0.0	75.8	0.0	-	-	0.1	97.0	2.9	0.0	-	-	8.9	90.8	0.3	0.0	-	-	-
Total %	0.0	0.0	0.0	0.0	-	0.0	1.2	0.0	3.8	0.0	-	5.0	0.0	43.9	1.3	0.0	-	45.2	4.4	45.1	0.1	0.0	-	49.7	-
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	-	-	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	2	0	0	0	-	2	60	0	201	0	-	261	2	2214	64	0	-	2280	233	2286	7	0	-	2526	5069
% Cars & Light Goods	100.0	-	-	-	-	100.0	90.9	-	97.1	-	-	95.6	100.0	93.0	88.9	-	-	92.9	96.7	93.3	100.0	-	-	93.7	93.4
Buses	0	0	0	0	-	0	4	0	2	0	-	6	0	17	2	0	-	19	3	16	0	0	-	19	44
% Buses	0.0	-	-	-	-	0.0	6.1	-	1.0	-	-	2.2	0.0	0.7	2.8	-	-	0.8	1.2	0.7	0.0	-	-	0.7	0.8
Single-Unit Trucks	0	0	0	0	-	0	2	0	4	0	-	6	0	73	5	0	-	78	5	80	0	0	-	85	169
% Single-Unit Trucks	0.0	-	-	-	-	0.0	3.0	-	1.9	-	-	2.2	0.0	3.1	6.9	-	-	3.2	2.1	3.3	0.0	-	-	3.2	3.1
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	77	1	0	-	78	0	67	0	0	-	67	145
% Articulated Trucks	0.0	-	-	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	3.2	1.4	-	-	3.2	0.0	2.7	0.0	-	-	2.5	2.7
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	-	-	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
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Count Name: Wilson Avenue & James Street
Site Code: 200005
Start Date: 02/11/2021



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Wilson Avenue & James Street
Site Code: 200005
Start Date: 02/11/2021

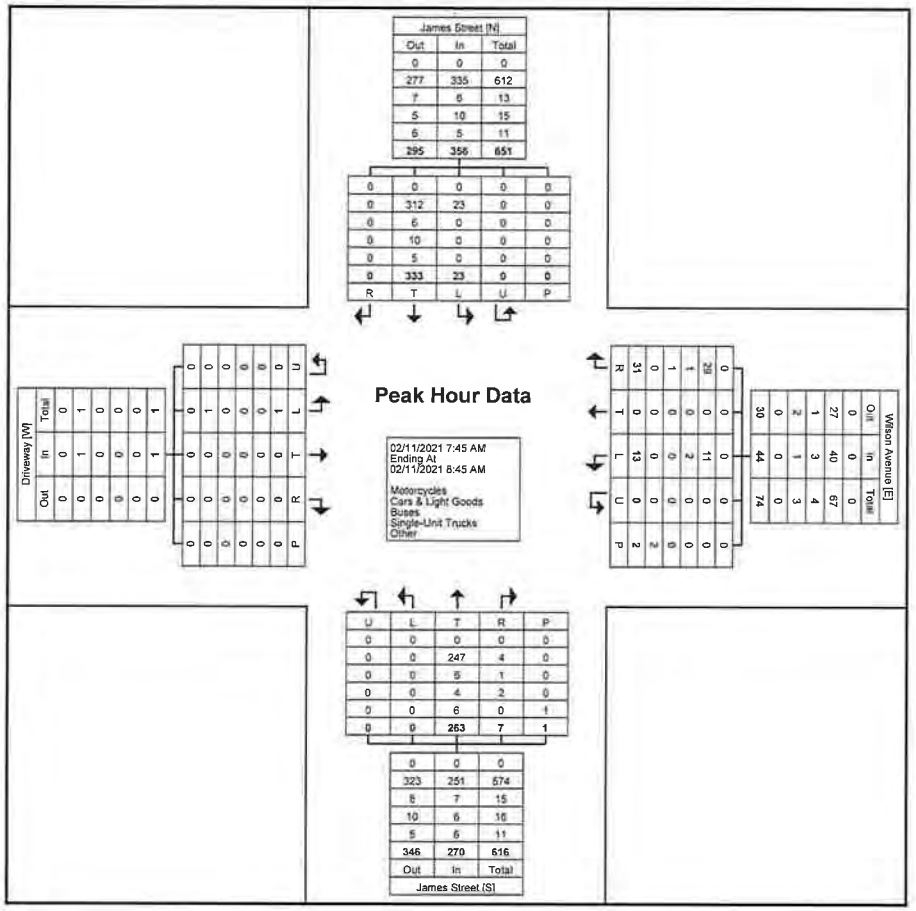
Turning Movement Peak Hour Data (7:45 AM)

Start Time	Driveway Eastbound						Wilson Avenue Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:45 AM	0	0	0	0	0	0	5	0	6	0	1	11	0	61	0	0	0	61	11	78	0	0	0	89	161
8:00 AM	0	0	0	0	0	0	3	0	7	0	1	10	0	55	4	0	1	59	3	74	0	0	0	77	146
8:15 AM	1	0	0	0	0	1	0	0	7	0	0	7	0	70	1	0	0	71	3	88	0	0	0	91	170
8:30 AM	0	0	0	0	0	0	5	0	11	0	0	16	0	77	2	0	0	79	6	93	0	0	0	99	194
Total	1	0	0	0	0	1	13	0	31	0	2	44	0	263	7	0	1	270	23	333	0	0	0	356	671
Approach %	100.0	0.0	0.0	0.0	-	-	29.5	0.0	70.5	0.0	-	-	0.0	97.4	2.6	0.0	-	-	6.5	93.5	0.0	0.0	-	-	-
Total %	0.1	0.0	0.0	0.0	-	0.1	1.9	0.0	4.6	0.0	-	6.6	0.0	39.2	1.0	0.0	-	40.2	3.4	49.6	0.0	0.0	-	53.1	-
PHF	0.250	0.000	0.000	0.000	-	0.250	0.650	0.000	0.705	0.000	-	0.688	0.000	0.854	0.438	0.000	-	0.854	0.523	0.895	0.000	0.000	-	0.899	0.865
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	0.0	-	-	-	-	0.0	0.0	-	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0
Cars & Light Goods	1	0	0	0	-	1	11	0	29	0	-	40	0	247	4	0	-	251	23	312	0	0	-	335	627
% Cars & Light Goods	100.0	-	-	-	-	100.0	84.6	-	93.5	-	-	90.9	-	93.9	57.1	-	-	93.0	100.0	93.7	-	-	-	94.1	93.4
Buses	0	0	0	0	-	0	2	0	1	0	-	3	0	6	1	0	-	7	0	6	0	0	-	6	16
% Buses	0.0	-	-	-	-	0.0	15.4	-	3.2	-	-	6.8	-	2.3	14.3	-	-	2.6	0.0	1.8	-	-	-	1.7	2.4
Single-Unit Trucks	0	0	0	0	-	0	0	0	1	0	-	1	0	4	2	0	-	6	0	10	0	0	-	10	17
% Single-Unit Trucks	0.0	-	-	-	-	0.0	0.0	-	3.2	-	-	2.3	-	1.5	28.6	-	-	2.2	0.0	3.0	-	-	-	2.8	2.5
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	6	0	0	-	6	0	5	0	0	-	5	11
% Articulated Trucks	0.0	-	-	-	-	0.0	0.0	-	0.0	-	-	0.0	-	2.3	0.0	-	-	2.2	0.0	1.5	-	-	-	1.4	1.6
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	-	-	-	-	0.0	0.0	-	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Wilson Avenue & James Street
Site Code: 200005
Start Date: 02/11/2021



Turning Movement Peak Hour Data Plot (7:45 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

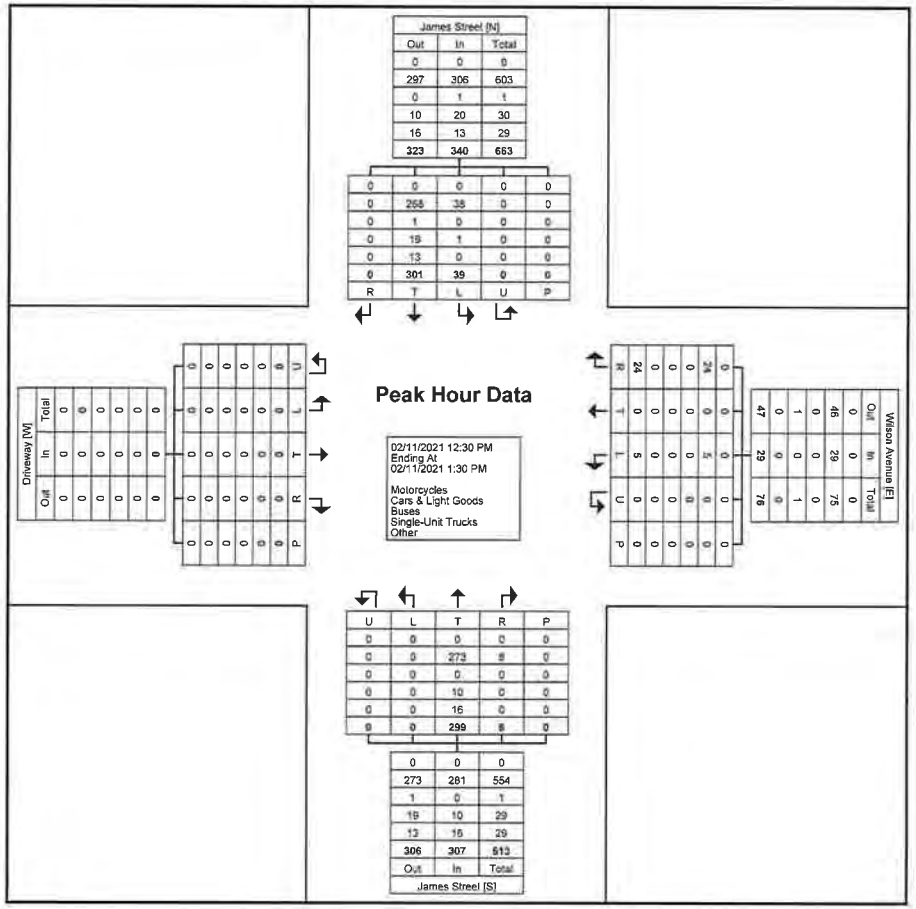
Count Name: Wilson Avenue & James Street
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Peak Hour Data (12:30 PM)

Start Time	Driveway Eastbound						Wilson Avenue Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:30 PM	0	0	0	0	0	0	2	0	2	0	0	4	0	75	2	0	0	77	7	67	0	0	0	74	155
12:45 PM	0	0	0	0	0	0	1	0	5	0	0	6	0	71	0	0	0	71	9	66	0	0	0	75	152
1:00 PM	0	0	0	0	0	0	2	0	8	0	0	10	0	67	4	0	0	71	15	81	0	0	0	96	177
1:15 PM	0	0	0	0	0	0	0	0	9	0	0	9	0	86	2	0	0	88	8	87	0	0	0	95	192
Total	0	0	0	0	0	0	5	0	24	0	0	29	0	299	8	0	0	307	39	301	0	0	0	340	676
Approach %	0.0	0.0	0.0	0.0	-	-	17.2	0.0	82.8	0.0	-	-	0.0	97.4	2.6	0.0	-	-	11.5	88.5	0.0	0.0	-	-	-
Total %	0.0	0.0	0.0	0.0	-	0.0	0.7	0.0	3.6	0.0	-	4.3	0.0	44.2	1.2	0.0	-	45.4	5.8	44.5	0.0	0.0	-	50.3	-
PHF	0.000	0.000	0.000	0.000	-	0.000	0.625	0.000	0.667	0.000	-	0.725	0.000	0.869	0.500	0.000	-	0.872	0.650	0.865	0.000	0.000	-	0.885	0.880
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0
Cars & Light Goods	0	0	0	0	-	0	5	0	24	0	-	29	0	273	8	0	-	281	38	268	0	0	-	306	616
% Cars & Light Goods	-	-	-	-	-	-	100.0	-	100.0	-	-	100.0	-	91.3	100.0	-	-	91.5	97.4	89.0	-	-	-	90.0	91.1
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Buses	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	0.3	-	-	-	0.3	0.1
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	10	0	0	-	10	1	19	0	0	-	20	30
% Single-Unit Trucks	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	-	3.3	0.0	-	-	3.3	2.6	6.3	-	-	-	5.9	4.4
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	16	0	0	-	16	0	13	0	0	-	13	29
% Articulated Trucks	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	-	5.4	0.0	-	-	5.2	0.0	4.3	-	-	-	3.8	4.3
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
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Turning Movement Peak Hour Data Plot (12:30 PM)

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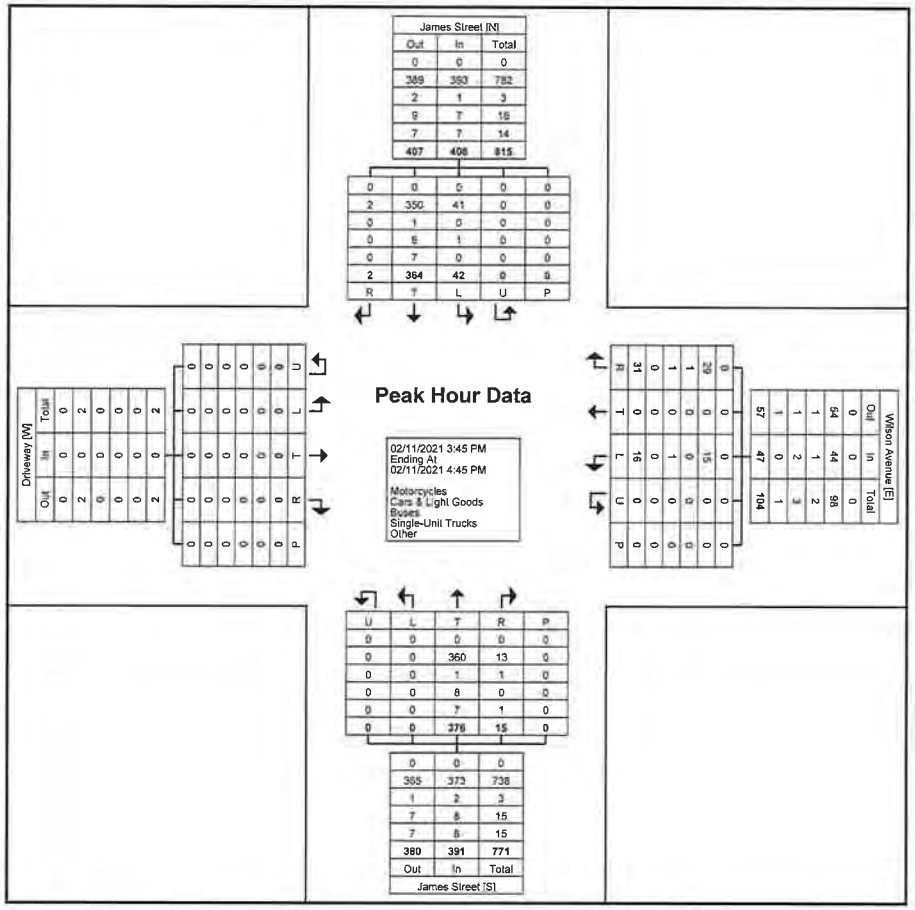
Count Name: Wilson Avenue & James Street
Site Code: 200005
Start Date: 02/11/2021

Turning Movement Peak Hour Data (3:45 PM)

Start Time	Driveway Eastbound						Wilson Avenue Westbound						James Street Northbound						James Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
3:45 PM	0	0	0	0	0	0	2	0	8	0	0	10	0	86	2	0	0	88	14	79	2	0	0	95	193
4:00 PM	0	0	0	0	0	0	3	0	10	0	0	13	0	89	5	0	0	94	8	96	0	0	0	104	211
4:15 PM	0	0	0	0	0	0	3	0	3	0	0	6	0	111	3	0	0	114	10	101	0	0	0	111	231
4:30 PM	0	0	0	0	0	0	8	0	10	0	0	18	0	90	5	0	0	95	10	88	0	0	0	98	211
Total	0	0	0	0	0	0	16	0	31	0	0	47	0	376	15	0	0	391	42	364	2	0	0	408	846
Approach %	0.0	0.0	0.0	0.0	-	-	34.0	0.0	66.0	0.0	-	-	0.0	96.2	3.8	0.0	-	-	10.3	89.2	0.5	0.0	-	-	-
Total %	0.0	0.0	0.0	0.0	-	0.0	1.9	0.0	3.7	0.0	-	5.6	0.0	44.4	1.8	0.0	-	46.2	5.0	43.0	0.2	0.0	-	48.2	-
PHF	0.000	0.000	0.000	0.000	-	0.000	0.500	0.000	0.775	0.000	-	0.653	0.000	0.847	0.750	0.000	-	0.857	0.750	0.901	0.250	0.000	-	0.919	0.916
Motorcycles	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Motorcycles	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	0	0	0	0	-	0	15	0	29	0	-	44	0	360	13	0	-	373	41	350	2	0	-	393	810
% Cars & Light Goods	-	-	-	-	-	-	93.8	-	93.5	-	-	93.6	-	95.7	86.7	-	-	95.4	97.6	96.2	100.0	-	-	96.3	95.7
Buses	0	0	0	0	-	0	0	0	1	0	-	1	0	1	1	0	-	2	0	1	0	0	-	1	4
% Buses	-	-	-	-	-	-	0.0	-	3.2	-	-	2.1	-	0.3	6.7	-	-	0.5	0.0	0.3	0.0	-	-	0.2	0.5
Single-Unit Trucks	0	0	0	0	-	0	1	0	1	0	-	2	0	8	0	0	-	8	1	6	0	0	-	7	17
% Single-Unit Trucks	-	-	-	-	-	-	6.3	-	3.2	-	-	4.3	-	2.1	0.0	-	-	2.0	2.4	1.6	0.0	-	-	1.7	2.0
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	7	1	0	-	8	0	7	0	0	-	7	15
% Articulated Trucks	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	-	1.9	6.7	-	-	2.0	0.0	1.9	0.0	-	-	1.7	1.8
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	-	-	-	-	-	-	0.0	-	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Turning Movement Peak Hour Data Plot (3:45 PM)

SIGNAL TIMING INFORMATION

JAMES STREET (N-S) / ARGYLE AVENUE - ANN STREET (E-W)
E-W Semi-Actuated

PLAN	1	2	3	4
TIME OF OPERATION	See Attached table			
PHASE A JAMES - NORTH- SOUTH				
Green	30	30	24	
Amber	4	4	4	
All Red	3	3	3	
Walk	20	20	14	
Flashing Don't Walk	10	10	10	
PHASE B ANN EASTBOUND				
Minimum Green	6	6	6	
Extension	2	2	2	
Maximum Green	6	6	6	
Amber	3	3	3	
All Red	4	4	4	
Walk	0	0	0	
Flashing Don't Walk	0	0	0	
PHASE C ARGYLE WESTBOUND				
Minimum Green	8	8	6	
Extension	2	2	2	
Maximum Green	18	28	14	
Amber	3	3	3	
All Red	4	4	4	
Walk	7	7	5	
Flashing Don't Walk	8	8	8	

* For controller timing, the Initial is the Minimum (above) minus one Extension (above)

PLAN	MONTH	DAY	TIME
1	Oct to Jul	Mon to Sun	8 am to 9 pm
2	Aug to Sep	Mon to Sun	8 am to 9 pm
3	Jan to Dec	Mon to Sun	9 pm to 8 am
4			

FILE: TRAFFIC SIGNALS CHURCH & JAMES STS DELHI

3905—L7C WORKSHEET

ARRAY A0
SPLIT NO. 2 **INITIAL TIMING** **REV B**

CYCLE #		1	2	3	4	5	6	7	8	9
CYCLE LEN										
OUTPUT DESC	INT #									
	1	6.0								
	2	3.0								
	3	2.0								
	4	13.0								
	5	1.0								
	6	3.0								
	7	3.0								
	8	3.0								
	9	2.0								
	10	0.0								
	11	0.0								
E/W GRN	12	20.0								
	13	3.0								
	14	2.0								
	15	3.0								
	16	2.0								
	17									
	18									
	19									
	20									
	21									
	22									
	23									
LAST INT	24	16								

CYCLES 2-9 = 1 MAR. 8/90

CHANGED WALK TIME FROM 10 TO 20 SEC'S

RL

LOCATION
AUTHORIZATION DATE

3905–L7C
WORKSHEET

ARRAY AO
SPLIT NO. 1 **INITIAL TIMING** **REV B**

CYCLE #		1	2	3	4	5	6	7	8	9
CYCLE LEN										
OUTPUT DESC	INT #									
N/S PROTECTED	1	6.0								
N/S PROTECTED AMBER	2	3.0								
ALL RED	3	2.0								
N/S GREEN	4	13.0								
N/S GREEN FLASH	5	1.0								
N/S GREEN	6	3.0								
N/S GREEN	7	3.0								
N/S YELLOW	8	3.0								
N/S ALL RED	9	2.0								
EB GREEN/LGR	10	0.0								
EB GRN CLR	11	0.0								
E/W GR	12	6.0								
E/W GR	13	0.0								
E/W GR	14	0.0								
E/W YELLOW	15	3.0								
E/W ALL RED	16	2.0								
	17									
	18									
	19									
	20									
	21									
	22									
	23									
LAST INT	24	16								

CYCLES 2-9 = 1

LOCATION
DELHI, ONT.
JAMES & CHURCH STS.

D.B./R.C. OCT.30/89
AUTHORIZATION DATE

DATE 02-20-87
REV A

COLUMN NUMBER
(DISPLAY TOP LEFT HAND DIGIT)

ROW NUMBER
(DISPLAY TOP RIGHT HAND DIGIT)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0																
1	60															
2	60															
3	60	15	13													
4	60	15	13													
5	60	15	13													
6	60	15	13	0.0												
7	60	15	13	5.0						5						
8	60	15	13							5						
9	60	15	13							30						
A		15	13										8			
B		15	13										9		LED 5,6	
C													0		LED	
D															LED 3	
E															LED 5,6	
F																

Appendix C

Existing Traffic Operations Reports

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	150	3	7	177	4	10
Future Volume (vph)	150	3	7	177	4	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.998				0.901	
Flt Protected				0.998	0.987	
Satd. Flow (prot)	1711	0	0	1773	1690	0
Flt Permitted				0.998	0.987	
Satd. Flow (perm)	1711	0	0	1773	1690	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		2	2			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	0%	29%	6%	0%	0%
Adj. Flow (vph)	163	3	8	192	4	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	166	0	0	200	15	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 25.0%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	150	3	7	177	4	10
Future Vol, veh/h	150	3	7	177	4	10
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	11	0	29	6	0	0
Mvmt Flow	163	3	8	192	4	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	168	0	375	167
Stage 1	-	-	-	-	167	-
Stage 2	-	-	-	-	208	-
Critical Hdwy	-	-	4.39	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.461	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1262	-	630	882
Stage 1	-	-	-	-	867	-
Stage 2	-	-	-	-	832	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1260	-	624	881
Mov Cap-2 Maneuver	-	-	-	-	624	-
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	826	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	788	-	-	1260	-
HCM Lane V/C Ratio	0.019	-	-	0.006	-
HCM Control Delay (s)	9.7	-	-	7.9	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	81	31	1	49	33	4
Future Volume (vph)	81	31	1	49	33	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.962				0.986	
Flt Protected				0.999	0.957	
Satd. Flow (prot)	1640	0	0	1762	1746	0
Flt Permitted				0.999	0.957	
Satd. Flow (perm)	1640	0	0	1762	1746	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	1407.1	
Travel Time (s)	60.3			11.0	63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	12%	10%	100%	6%	3%	0%
Adj. Flow (vph)	88	34	1	53	36	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	122	0	0	54	40	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	16.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	81	31	1	49	33	4
Future Vol, veh/h	81	31	1	49	33	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	10	100	6	3	0
Mvmt Flow	88	34	1	53	36	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	122	0	160	105
Stage 1	-	-	-	-	105	-
Stage 2	-	-	-	-	55	-
Critical Hdwy	-	-	5.1	-	6.43	6.2
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	3.1	-	3.527	3.3
Pot Cap-1 Maneuver	-	-	1029	-	829	955
Stage 1	-	-	-	-	917	-
Stage 2	-	-	-	-	965	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1029	-	828	955
Mov Cap-2 Maneuver	-	-	-	-	828	-
Stage 1	-	-	-	-	917	-
Stage 2	-	-	-	-	964	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	9.5
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	840	-	-	1029	-
HCM Lane V/C Ratio	0.048	-	-	0.001	-
HCM Control Delay (s)	9.5	-	-	8.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	17	9	0	10	0	4	32	2	2	28	2
Future Volume (vph)	7	17	9	0	10	0	4	32	2	2	28	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.962						0.993			0.992	
Flt Protected		0.989						0.995			0.997	
Satd. Flow (prot)	0	1704	0	0	1727	0	0	1709	0	0	1668	0
Flt Permitted		0.989						0.995			0.997	
Satd. Flow (perm)	0	1704	0	0	1727	0	0	1709	0	0	1668	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			1407.1	
Travel Time (s)		29.3			22.9			10.6			63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	11%	0%	10%	0%	50%	3%	50%	0%	11%	50%
Adj. Flow (vph)	8	18	10	0	11	0	4	35	2	2	30	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	0	11	0	0	41	0	0	34	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 17.7%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	17	9	0	10	0	4	32	2	2	28	2
Future Vol, veh/h	7	17	9	0	10	0	4	32	2	2	28	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	11	0	10	0	50	3	50	0	11	50
Mvmt Flow	8	18	10	0	11	0	4	35	2	2	30	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	85	80	31	93	80	36	32	0	0	37	0	0
Stage 1	35	35	-	44	44	-	-	-	-	-	-	-
Stage 2	50	45	-	49	36	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.31	7.1	6.6	6.2	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.399	3.5	4.09	3.3	2.65	-	-	2.2	-	-
Pot Cap-1 Maneuver	906	803	1018	895	795	1042	1319	-	-	1587	-	-
Stage 1	986	858	-	975	843	-	-	-	-	-	-	-
Stage 2	968	850	-	969	849	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	894	800	1018	868	792	1042	1319	-	-	1587	-	-
Mov Cap-2 Maneuver	894	800	-	868	792	-	-	-	-	-	-	-
Stage 1	983	857	-	972	840	-	-	-	-	-	-	-
Stage 2	953	847	-	938	848	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	9.6	0.8	0.5
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1319	-	-	870	792	1587	-	-
HCM Lane V/C Ratio	0.003	-	-	0.041	0.014	0.001	-	-
HCM Control Delay (s)	7.7	0	-	9.3	9.6	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	14	24	1	0	6
Future Volume (vph)	7	14	24	1	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.995		0.865	
Flt Protected		0.983				
Satd. Flow (prot)	0	1571	1435	0	1644	0
Flt Permitted		0.983				
Satd. Flow (perm)	0	1571	1435	0	1644	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	29%	33%	0%	0%	0%
Adj. Flow (vph)	8	15	26	1	0	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	23	27	0	7	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 16.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	14	24	1	0	6
Future Vol, veh/h	7	14	24	1	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	29	33	0	0	0
Mvmt Flow	8	15	26	1	0	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	27	0	-	0	58	27
Stage 1	-	-	-	-	27	-
Stage 2	-	-	-	-	31	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1600	-	-	-	954	1054
Stage 1	-	-	-	-	1001	-
Stage 2	-	-	-	-	997	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1600	-	-	-	949	1054
Mov Cap-2 Maneuver	-	-	-	-	949	-
Stage 1	-	-	-	-	996	-
Stage 2	-	-	-	-	997	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	8.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1600	-	-	-	1054
HCM Lane V/C Ratio	0.005	-	-	-	0.006
HCM Control Delay (s)	7.3	0	-	-	8.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	5	17	53	5	21	2	384	48	15	307	12
Future Volume (vph)	6	5	17	53	5	21	2	384	48	15	307	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.98			0.99	0.98		1.00			1.00	
Frt		0.919				0.850		0.983			0.995	
Flt Protected		0.988			0.956						0.998	
Satd. Flow (prot)	0	1639	0	0	1636	1615	0	3209	0	0	3320	0
Flt Permitted		0.988			0.956			0.954			0.928	
Satd. Flow (perm)	0	1635	0	0	1627	1581	0	3061	0	0	3086	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18				160		21			6	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	6		4	4		6	10		12	12		10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	6%	12%	0%	0%	0%	9%	20%	0%	8%	14%
Adj. Flow (vph)	7	5	18	58	5	23	2	417	52	16	334	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	30	0	0	63	23	0	471	0	0	363	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue
Existing AM
(200005) Bluegrass Estates Ph 3-4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			8.4	8.4		40.1			40.1	
Actuated g/C Ratio		0.11			0.15	0.15		0.70			0.70	
v/c Ratio		0.16			0.26	0.06		0.22			0.17	
Control Delay		19.5			27.2	0.3		7.6			7.5	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		19.5			27.2	0.3		7.6			7.5	
LOS		B			C	A		A			A	
Approach Delay		19.5			20.0			7.6			7.5	
Approach LOS		B			B			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 57.5			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.26			
Intersection Signal Delay: 9.1		Intersection LOS: A	
Intersection Capacity Utilization 55.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Paradigm Transportation Solutions Limited
Synchro 10 Report

Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	30	63	23	471	363
v/c Ratio	0.16	0.26	0.06	0.22	0.17
Control Delay	19.5	27.2	0.3	7.6	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.5	27.2	0.3	7.6	7.5
Queue Length 50th (m)	1.0	5.2	0.0	9.2	7.0
Queue Length 95th (m)	8.1	16.7	0.0	27.2	21.4
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	189	518	610	2142	2154
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.16	0.12	0.04	0.22	0.17

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	0	13	0	31	0	263	7	23	333	0
Future Volume (vph)	1	0	0	13	0	31	0	263	7	23	333	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt					0.904			0.996				
Flt Protected		0.950			0.986						0.997	
Satd. Flow (prot)	0	1805	0	0	1559	0	0	3360	0	0	3408	0
Flt Permitted		0.950			0.986						0.997	
Satd. Flow (perm)	0	1805	0	0	1559	0	0	3360	0	0	3408	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Confl. Peds. (#/hr)			1	1					2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	15%	0%	6%	0%	6%	43%	0%	6%	0%
Adj. Flow (vph)	1	0	0	14	0	34	0	286	8	25	362	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1	0	0	48	0	0	294	0	0	387	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 31.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↕			↕	
Traffic Vol, veh/h	1	0	0	13	0	31	0	263	7	23	333	0
Future Vol, veh/h	1	0	0	13	0	31	0	263	7	23	333	0
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	15	0	6	0	6	43	0	6	0
Mvmt Flow	1	0	0	14	0	34	0	286	8	25	362	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	555	708	182	524	704	149	362	0	0	296	0	0
Stage 1	412	412	-	292	292	-	-	-	-	-	-	-
Stage 2	143	296	-	232	412	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.8	6.5	7.02	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.65	4	3.36	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	419	362	836	409	364	858	1208	-	-	1277	-	-
Stage 1	593	598	-	656	675	-	-	-	-	-	-	-
Stage 2	851	672	-	714	598	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	395	352	835	400	354	857	1208	-	-	1275	-	-
Mov Cap-2 Maneuver	395	352	-	400	354	-	-	-	-	-	-	-
Stage 1	593	583	-	655	674	-	-	-	-	-	-	-
Stage 2	818	671	-	696	583	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.1	11.1	0	0.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1208	-	-	395	641	1275	-	-
HCM Lane V/C Ratio	-	-	-	0.003	0.075	0.02	-	-
HCM Control Delay (s)	0	-	-	14.1	11.1	7.9	0.1	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.2	0.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↕			↕	
Traffic Volume (vph)	9	78	93	62	71	55	82	191	61	4	53	14
Future Volume (vph)	9	78	93	62	71	55	82	191	61	4	53	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		1.00	0.99		1.00	1.00	
Frt		0.930			0.960			0.964			0.969	
Flt Protected		0.997			0.984		0.950			0.950		
Satd. Flow (prot)	0	1606	0	0	1681	0	1703	3173	0	1805	3324	0
Flt Permitted		0.976			0.809		0.950			0.950		
Satd. Flow (perm)	0	1572	0	0	1377	0	1701	3173	0	1798	3324	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		64			25			57			15	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	2		12	12		2	1		4	4		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	9%	7%	7%	2%	11%	6%	9%	9%	0%	6%	0%
Adj. Flow (vph)	10	85	101	67	77	60	89	208	66	4	58	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	196	0	0	204	0	89	274	0	4	73	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		14.4			14.4		8.9	36.3		5.9	27.6	
Actuated g/C Ratio		0.22			0.22		0.13	0.54		0.09	0.41	
v/c Ratio		0.50			0.65		0.39	0.16		0.03	0.05	
Control Delay		21.3			32.1		33.6	7.4		32.5	12.7	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		21.3			32.1		33.6	7.4		32.5	12.7	
LOS		C			C		C	A		C	B	
Approach Delay		21.3			32.1			13.8			13.8	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 66.8
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 20.0 Intersection LOS: B
Intersection Capacity Utilization 62.8% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	196	204	89	274	4	73
v/c Ratio	0.50	0.65	0.39	0.16	0.03	0.05
Control Delay	21.3	32.1	33.6	7.4	32.5	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.3	32.1	33.6	7.4	32.5	12.7
Queue Length 50th (m)	14.4	20.6	10.4	5.6	0.5	2.2
Queue Length 95th (m)	33.5	42.7	24.0	16.8	3.2	7.0
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	525	438	390	1751	414	1381
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.47	0.23	0.16	0.01	0.05

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	191	9	22	206	8	8
Future Volume (vph)	191	9	22	206	8	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.994				0.932	
Flt Protected				0.995	0.976	
Satd. Flow (prot)	1836	0	0	1841	1728	0
Flt Permitted				0.995	0.976	
Satd. Flow (perm)	1836	0	0	1841	1728	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		6	6			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	0%	3%	0%	0%
Adj. Flow (vph)	208	10	24	224	9	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	218	0	0	248	18	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	191	9	22	206	8	8
Future Vol, veh/h	191	9	22	206	8	8
Conflicting Peds, #/hr	0	6	6	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	0	0	3	0	0
Mvmt Flow	208	10	24	224	9	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	224	0	491	219
Stage 1	-	-	-	-	219	-
Stage 2	-	-	-	-	272	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1357	-	540	826
Stage 1	-	-	-	-	822	-
Stage 2	-	-	-	-	778	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1350	-	527	822
Mov Cap-2 Maneuver	-	-	-	-	527	-
Stage 1	-	-	-	-	818	-
Stage 2	-	-	-	-	762	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	642	-	-	1350	-
HCM Lane V/C Ratio	0.027	-	-	0.018	-
HCM Control Delay (s)	10.8	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	69	43	8	100	53	2
Future Volume (vph)	69	43	8	100	53	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.948				0.995	
Flt Protected				0.996	0.954	
Satd. Flow (prot)	1726	0	0	1875	1624	0
Flt Permitted				0.996	0.954	
Satd. Flow (perm)	1726	0	0	1875	1624	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	1407.1	
Travel Time (s)	60.3			11.0	63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	5%	0%	1%	8%	100%
Adj. Flow (vph)	75	47	9	109	58	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	122	0	0	118	60	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	69	43	8	100	53	2
Future Vol, veh/h	69	43	8	100	53	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	5	0	1	8	100
Mvmt Flow	75	47	9	109	58	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	122	0	226	99
Stage 1	-	-	-	-	99	-
Stage 2	-	-	-	-	127	-
Critical Hdwy	-	-	4.1	-	6.48	7.2
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	-	-	2.2	-	3.572	4.2
Pot Cap-1 Maneuver	-	-	1478	-	749	745
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	884	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1478	-	745	745
Mov Cap-2 Maneuver	-	-	-	-	745	-
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	879	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	10.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	745	-	-	1478	-
HCM Lane V/C Ratio	0.08	-	-	0.006	-
HCM Control Delay (s)	10.3	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	16	7	2	12	4	10	41	1	2	40	12
Future Volume (vph)	10	16	7	2	12	4	10	41	1	2	40	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.970			0.972			0.998			0.970	
Flt Protected		0.985			0.995			0.990			0.998	
Satd. Flow (prot)	0	1663	0	0	1659	0	0	1779	0	0	1774	0
Flt Permitted		0.985			0.995			0.990			0.998	
Satd. Flow (perm)	0	1663	0	0	1659	0	0	1779	0	0	1774	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			1407.1	
Travel Time (s)		29.3			22.9			10.6			63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	0%	0%	50%	8%	0%	0%	7%	0%	0%	5%	0%
Adj. Flow (vph)	11	17	8	2	13	4	11	45	1	2	43	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	0	19	0	0	57	0	0	58	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 17.2%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	16	7	2	12	4	10	41	1	2	40	12
Future Vol, veh/h	10	16	7	2	12	4	10	41	1	2	40	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	30	0	0	50	8	0	0	7	0	0	5	0
Mvmt Flow	11	17	8	2	13	4	11	45	1	2	43	13

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	130	122	50	134	128	46	56	0	0	46	0	0
Stage 1	54	54	-	68	68	-	-	-	-	-	-	-
Stage 2	76	68	-	66	60	-	-	-	-	-	-	-
Critical Hdwy	7.4	6.5	6.2	7.6	6.58	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.77	4	3.3	3.95	4.072	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	782	772	1024	739	752	1029	1562	-	-	1575	-	-
Stage 1	892	854	-	835	827	-	-	-	-	-	-	-
Stage 2	868	842	-	837	833	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	764	766	1024	716	746	1029	1562	-	-	1575	-	-
Mov Cap-2 Maneuver	764	766	-	716	746	-	-	-	-	-	-	-
Stage 1	886	853	-	829	821	-	-	-	-	-	-	-
Stage 2	845	836	-	813	832	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.7	9.7	1.4	0.3
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1562	-	-	809	791	1575	-	-
HCM Lane V/C Ratio	0.007	-	-	0.044	0.025	0.001	-	-
HCM Control Delay (s)	7.3	0	-	9.7	9.7	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	12	16	17	1	0	4
Future Volume (vph)	12	16	17	1	0	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.993		0.865	
Flt Protected		0.979				
Satd. Flow (prot)	0	1799	1785	0	1644	0
Flt Permitted		0.979				
Satd. Flow (perm)	0	1799	1785	0	1644	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Confl. Peds. (#/hr)	4			4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	6%	0%	0%	0%
Adj. Flow (vph)	13	17	18	1	0	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	30	19	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.2%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	12	16	17	1	0	4
Future Vol, veh/h	12	16	17	1	0	4
Conflicting Peds, #/hr	4	0	0	4	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	6	6	0	0	0
Mvmt Flow	13	17	18	1	0	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	23	0	-	0	66	23
Stage 1	-	-	-	-	23	-
Stage 2	-	-	-	-	43	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1605	-	-	-	944	1060
Stage 1	-	-	-	-	1005	-
Stage 2	-	-	-	-	985	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1600	-	-	-	931	1056
Mov Cap-2 Maneuver	-	-	-	-	931	-
Stage 1	-	-	-	-	994	-
Stage 2	-	-	-	-	982	-

Approach	EB	WB	SB
HCM Control Delay, s	3.1	0	8.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1600	-	-	-	1056
HCM Lane V/C Ratio	0.008	-	-	-	0.004
HCM Control Delay (s)	7.3	0	-	-	8.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	10	8	51	6	38	7	392	61	22	470	23
Future Volume (vph)	15	10	8	51	6	38	7	392	61	22	470	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.99			0.99	0.99		1.00			1.00	
Frt		0.966				0.850		0.980			0.993	
Flt Protected		0.978			0.958			0.999			0.998	
Satd. Flow (prot)	0	1780	0	0	1820	1568	0	3404	0	0	3469	0
Flt Permitted		0.978			0.958			0.945			0.921	
Satd. Flow (perm)	0	1779	0	0	1806	1547	0	3220	0	0	3201	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				160		27			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	1		6	6		1	12		8	8		12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	0%	3%	5%
Adj. Flow (vph)	16	11	9	55	7	41	8	426	66	24	511	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	0	62	41	0	500	0	0	560	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			8.3	8.3		37.1			37.1	
Actuated g/C Ratio		0.10			0.14	0.14		0.63			0.63	
v/c Ratio		0.19			0.24	0.12		0.25			0.28	
Control Delay		24.3			27.0	0.7		8.1			8.6	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		24.3			27.0	0.7		8.1			8.6	
LOS		C			C	A		A			A	
Approach Delay		24.3			16.5			8.1			8.6	
Approach LOS		C			B			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 59.2
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.28
Intersection Signal Delay: 9.6 Intersection LOS: A
Intersection Capacity Utilization 54.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	36	62	41	500	560
v/c Ratio	0.19	0.24	0.12	0.25	0.28
Control Delay	24.3	27.0	0.7	8.1	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	27.0	0.7	8.1	8.6
Queue Length 50th (m)	2.3	5.1	0.0	9.7	11.7
Queue Length 95th (m)	10.6	16.4	0.0	27.8	32.6
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	190	559	586	2026	2007
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.19	0.11	0.07	0.25	0.28

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	16	0	31	0	376	15	42	364	2
Future Volume (vph)	0	0	0	16	0	31	0	376	15	42	364	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt					0.910			0.994			0.999	
Flt Protected					0.984						0.995	
Satd. Flow (prot)	0	1900	0	0	1636	0	0	3439	0	0	3458	0
Flt Permitted					0.984						0.995	
Satd. Flow (perm)	0	1900	0	0	1636	0	0	3439	0	0	3458	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	0%	3%	0%	4%	13%	2%	4%	0%
Adj. Flow (vph)	0	0	0	17	0	34	0	409	16	46	396	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	51	0	0	425	0	0	444	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 35.5%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	16	0	31	0	376	15	42	364	2
Future Vol, veh/h	0	0	0	16	0	31	0	376	15	42	364	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	6	0	3	0	4	13	2	4	0
Mvmt Flow	0	0	0	17	0	34	0	409	16	46	396	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	694	914	199	707	907	213	398	0	0	425	0	0
Stage 1	489	489	-	417	417	-	-	-	-	-	-	-
Stage 2	205	425	-	290	490	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.62	6.5	6.96	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.56	4	3.33	2.2	-	-	2.22	-	-
Pot Cap-1 Maneuver	333	275	815	315	278	789	1172	-	-	1131	-	-
Stage 1	534	553	-	573	595	-	-	-	-	-	-	-
Stage 2	784	590	-	682	552	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	306	261	815	302	264	789	1172	-	-	1131	-	-
Mov Cap-2 Maneuver	306	261	-	302	264	-	-	-	-	-	-	-
Stage 1	534	524	-	573	595	-	-	-	-	-	-	-
Stage 2	751	590	-	647	523	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	12.9	0	1
HCM LOS	A	B		

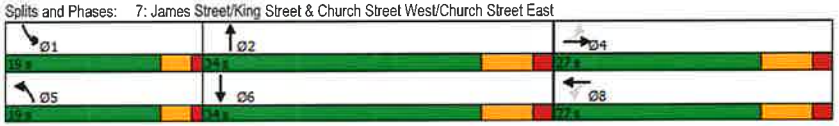
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1172	-	-	-	509	1131	-	-
HCM Lane V/C Ratio	-	-	-	-	0.1	0.04	-	-
HCM Control Delay (s)	0	-	-	0	12.9	8.3	0.2	-
HCM Lane LOS	A	-	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.3	0.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	112	179	94	73	68	59	257	67	17	182	18
Future Volume (vph)	19	112	179	94	73	68	59	257	67	17	182	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		0.99	0.99		1.00	1.00	
Frt		0.922			0.961			0.969			0.986	
Flt Protected		0.997			0.980		0.950			0.950		
Satd. Flow (prot)	0	1675	0	0	1758	0	1770	3359	0	1517	3379	0
Flt Permitted		0.967			0.623		0.950			0.950		
Satd. Flow (perm)	0	1624	0	0	1117	0	1760	3359	0	1511	3379	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			25			44			14	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	6		1	1		6	5		4	4		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	3%	3%	3%	0%	0%	2%	4%	2%	19%	5%	6%
Adj. Flow (vph)	21	122	195	102	79	74	64	279	73	18	198	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	338	0	0	255	0	64	352	0	18	218	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		19.2			19.2		7.9	32.5		6.5	27.4	
Actuated g/C Ratio		0.28			0.28		0.12	0.48		0.10	0.40	
v/c Ratio		0.65			0.77		0.31	0.22		0.12	0.16	
Control Delay		24.4			39.7		33.4	10.2		32.9	14.4	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		24.4			39.7		33.4	10.2		32.9	14.4	
LOS		C			D		C	B		C	B	
Approach Delay		24.4			39.7			13.7			15.8	
Approach LOS		C			D			B			B	

Intersection Summary		
Area Type:	Other	
Cycle Length: 80		
Actuated Cycle Length: 68.1		
Natural Cycle: 70		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.77		
Intersection Signal Delay: 22.3		Intersection LOS: C
Intersection Capacity Utilization 79.0%		ICU Level of Service D
Analysis Period (min) 15		

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



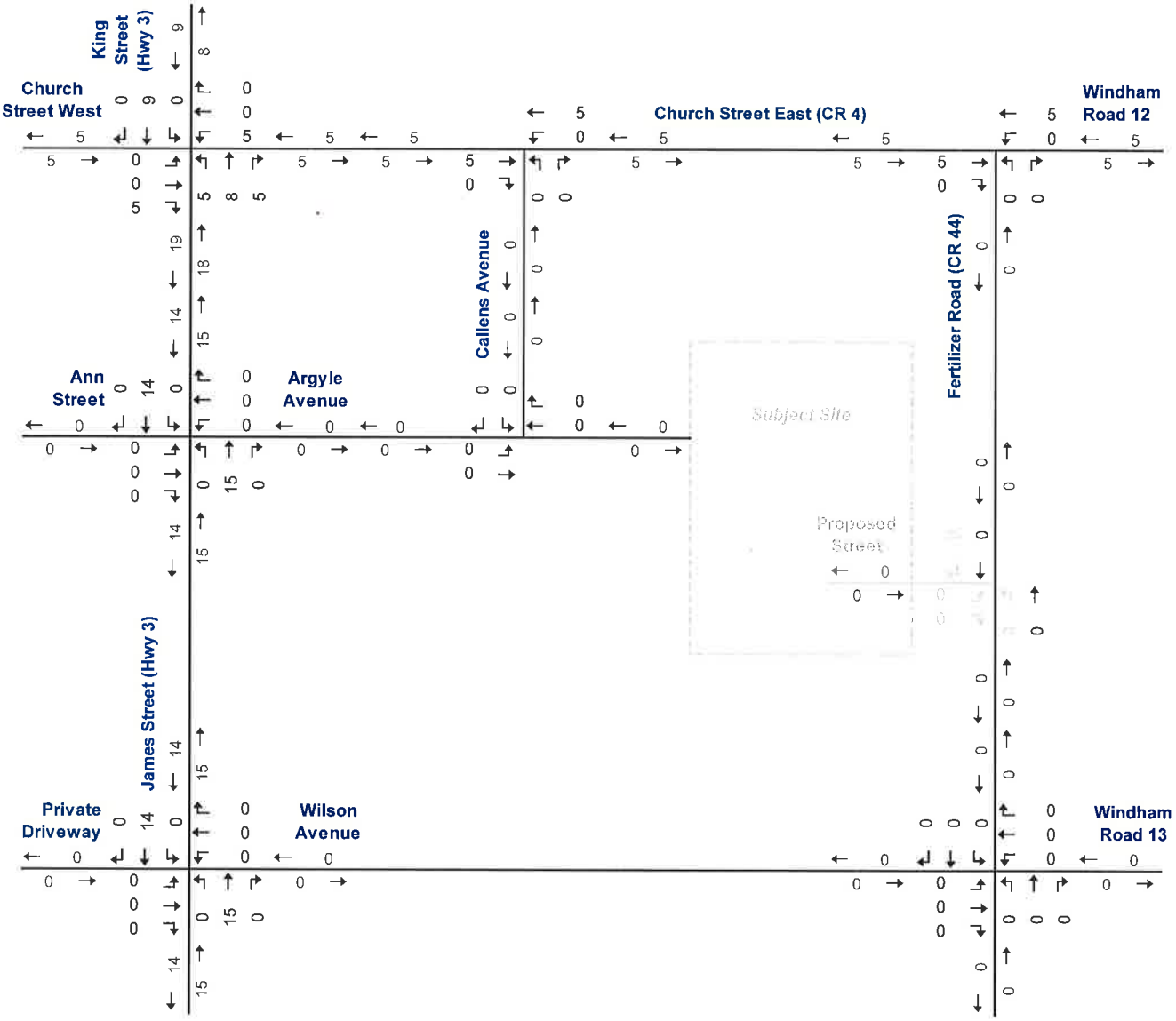
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	338	255	64	352	18	218
v/c Ratio	0.65	0.77	0.31	0.22	0.12	0.16
Control Delay	24.4	39.7	33.4	10.2	32.9	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	39.7	33.4	10.2	32.9	14.4
Queue Length 50th (m)	30.3	28.8	8.2	10.4	2.3	9.5
Queue Length 95th (m)	#60.2	#58.4	18.7	23.7	7.9	17.3
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	540	350	395	1627	338	1366
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.73	0.16	0.22	0.05	0.16

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

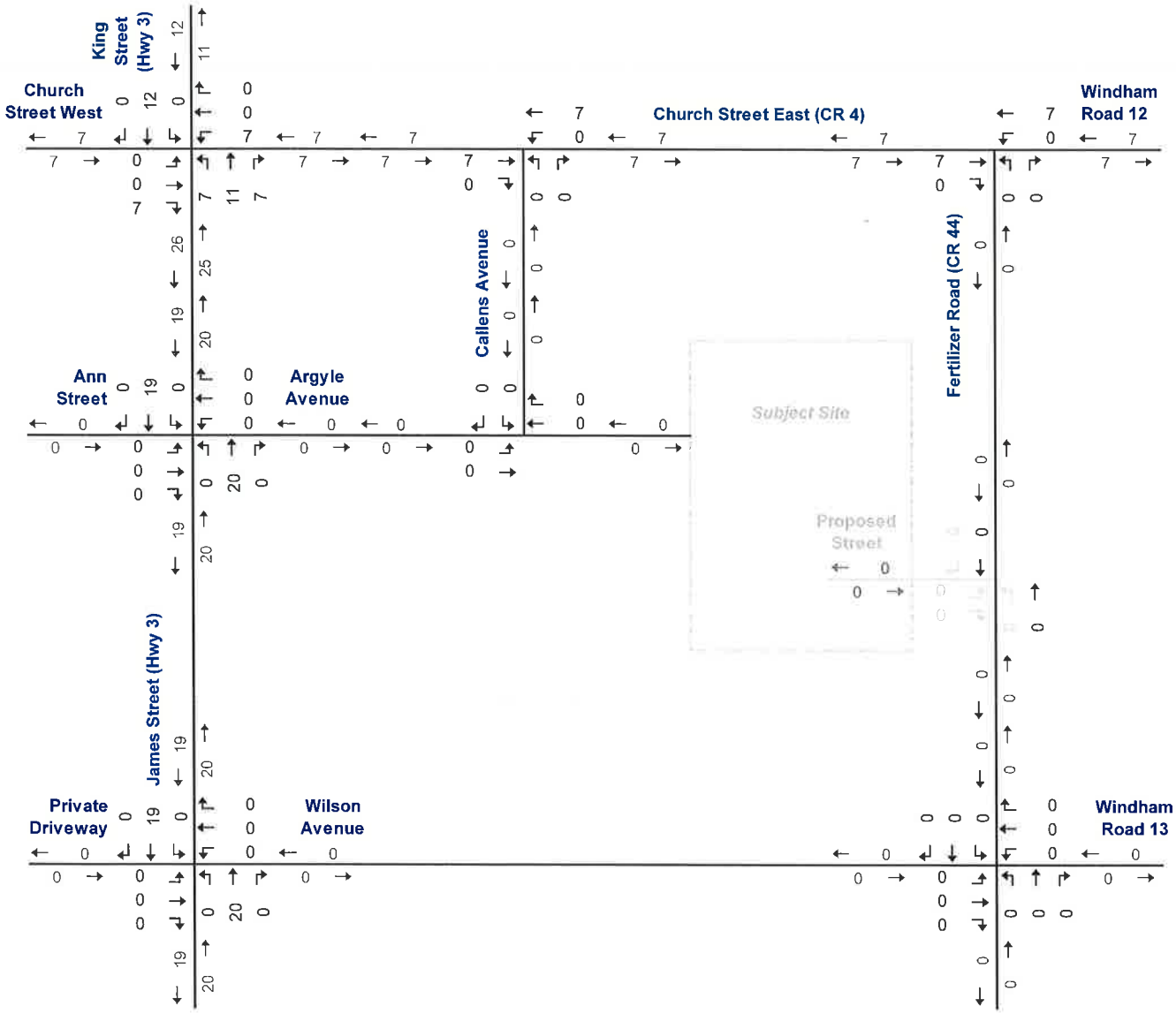
Appendix D

Background Development Traffic Volumes



NTS

Background Development Traffic Volumes – 360 James Street AM Peak Hour



NTS

Background Development Traffic Volumes – 360 James Street PM Peak Hour

Appendix E

2024 Background Traffic Operations Reports

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	164	3	7	193	4	11
Future Volume (vph)	164	3	7	193	4	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.998				0.899	
Flt Protected				0.998	0.988	
Satd. Flow (prot)	1711	0	0	1775	1688	0
Flt Permitted				0.998	0.988	
Satd. Flow (perm)	1711	0	0	1775	1688	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		2	2			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	0%	29%	6%	0%	0%
Adj. Flow (vph)	178	3	8	210	4	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	181	0	0	218	16	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 25.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	164	3	7	193	4	11
Future Vol, veh/h	164	3	7	193	4	11
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	11	0	29	6	0	0
Mvmt Flow	178	3	8	210	4	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	183	0	408	182
Stage 1	-	-	-	-	182	-
Stage 2	-	-	-	-	226	-
Critical Hdwy	-	-	4.39	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.461	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1245	-	603	866
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	816	-
Platoon blocked, %	-	-			-	
Mov Cap-1 Maneuver	-	-	1243	-	598	865
Mov Cap-2 Maneuver	-	-	-	-	598	-
Stage 1	-	-	-	-	852	-
Stage 2	-	-	-	-	810	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	773	-	-	1243	-
HCM Lane V/C Ratio	0.021	-	-	0.006	-
HCM Control Delay (s)	9.8	-	-	7.9	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	91	33	1	57	35	4
Future Volume (vph)	91	33	1	57	35	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.964				0.987	
Flt Protected				0.999	0.957	
Satd. Flow (prot)	1643	0	0	1766	1747	0
Flt Permitted				0.999	0.957	
Satd. Flow (perm)	1643	0	0	1766	1747	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	1407.1	
Travel Time (s)	60.3			11.0	63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	12%	10%	100%	6%	3%	0%
Adj. Flow (vph)	99	36	1	62	38	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	135	0	0	63	42	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	16.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	91	33	1	57	35	4
Future Vol, veh/h	91	33	1	57	35	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	10	100	6	3	0
Mvmt Flow	99	36	1	62	38	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	135	0	181	117
Stage 1	-	-	-	-	117	-
Stage 2	-	-	-	-	64	-
Critical Hdwy	-	-	5.1	-	6.43	6.2
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	3.1	-	3.527	3.3
Pot Cap-1 Maneuver	-	-	1016	-	806	941
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	956	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1016	-	805	941
Mov Cap-2 Maneuver	-	-	-	-	805	-
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	955	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	817	-	-	1016	-
HCM Lane V/C Ratio	0.052	-	-	0.001	-
HCM Control Delay (s)	9.6	-	-	8.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	7	18	10	0	11	0	4	34	2	2	30	2
Future Volume (vph)	7	18	10	0	11	0	4	34	2	2	30	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.962						0.994			0.993	
Flt Protected		0.990						0.995			0.997	
Satd. Flow (prot)	0	1704	0	0	1727	0	0	1715	0	0	1672	0
Flt Permitted		0.990						0.995			0.997	
Satd. Flow (perm)	0	1704	0	0	1727	0	0	1715	0	0	1672	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			1407.1	
Travel Time (s)		29.3			22.9			10.6			63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	11%	0%	10%	0%	50%	3%	50%	0%	11%	50%
Adj. Flow (vph)	8	20	11	0	12	0	4	37	2	2	33	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	39	0	0	12	0	0	43	0	0	37	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 17.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	7	18	10	0	11	0	4	34	2	2	30	2
Future Vol, veh/h	7	18	10	0	11	0	4	34	2	2	30	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	11	0	10	0	50	3	50	0	11	50
Mvmt Flow	8	20	11	0	12	0	4	37	2	2	33	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	90	85	34	100	85	38	35	0	0	39	0	0
Stage 1	38	38	-	46	46	-	-	-	-	-	-	-
Stage 2	52	47	-	54	39	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.31	7.1	6.6	6.2	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.399	3.5	4.09	3.3	2.65	-	-	2.2	-	-
Pot Cap-1 Maneuver	900	798	1014	886	790	1040	1316	-	-	1584	-	-
Stage 1	982	855	-	973	841	-	-	-	-	-	-	-
Stage 2	966	848	-	963	847	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	887	795	1014	858	787	1040	1316	-	-	1584	-	-
Mov Cap-2 Maneuver	887	795	-	858	787	-	-	-	-	-	-	-
Stage 1	979	854	-	970	838	-	-	-	-	-	-	-
Stage 2	949	845	-	930	846	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	9.6	0.8	0.4
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1316	-	-	866	787	1584	-	-
HCM Lane V/C Ratio	0.003	-	-	0.044	0.015	0.001	-	-
HCM Control Delay (s)	7.7	0	-	9.3	9.6	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	15	25	1	0	6
Future Volume (vph)	7	15	25	1	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.995		0.865	
Flt Protected		0.984				
Satd. Flow (prot)	0	1567	1434	0	1644	0
Flt Permitted		0.984				
Satd. Flow (perm)	0	1567	1434	0	1644	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	29%	33%	0%	0%	0%
Adj. Flow (vph)	8	16	27	1	0	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	24	28	0	7	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 17.0%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	15	25	1	0	6
Future Vol, veh/h	7	15	25	1	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	29	33	0	0	0
Mvmt Flow	8	16	27	1	0	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	28	0	-	0	60	28
Stage 1	-	-	-	-	28	-
Stage 2	-	-	-	-	32	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1599	-	-	-	952	1053
Stage 1	-	-	-	-	1000	-
Stage 2	-	-	-	-	996	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1599	-	-	-	947	1053
Mov Cap-2 Maneuver	-	-	-	-	947	-
Stage 1	-	-	-	-	995	-
Stage 2	-	-	-	-	996	-

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	8.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1599	-	-	-	1053
HCM Lane V/C Ratio	0.005	-	-	-	0.006
HCM Control Delay (s)	7.3	0	-	-	8.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	5	18	56	5	22	2	423	51	16	340	13
Future Volume (vph)	6	5	18	56	5	22	2	423	51	16	340	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.98			0.99	0.98		1.00			1.00	
Frt		0.916				0.850		0.984			0.995	
Flt Protected		0.989			0.956						0.998	
Satd. Flow (prot)	0	1631	0	0	1635	1615	0	3213	0	0	3319	0
Flt Permitted		0.989			0.956			0.954			0.926	
Satd. Flow (perm)	0	1628	0	0	1626	1581	0	3066	0	0	3079	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20				160		20			6	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	6		4	4		6	10		12	12		10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	6%	12%	0%	0%	0%	9%	20%	0%	8%	14%
Adj. Flow (vph)	7	5	20	61	5	24	2	460	55	17	370	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	32	0	0	66	24	0	517	0	0	401	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			8.5	8.5		40.2			40.2	
Actuated g/C Ratio		0.11			0.15	0.15		0.70			0.70	
v/c Ratio		0.17			0.28	0.07		0.24			0.19	
Control Delay		19.1			27.3	0.3		7.8			7.7	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		19.1			27.3	0.3		7.8			7.7	
LOS		B			C	A		A			A	
Approach Delay		19.1			20.1			7.8			7.7	
Approach LOS		B			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 57.6			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.28			
Intersection Signal Delay: 9.1		Intersection LOS: A	
Intersection Capacity Utilization 55.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	32	66	24	517	401
v/c Ratio	0.17	0.28	0.07	0.24	0.19
Control Delay	19.1	27.3	0.3	7.8	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.1	27.3	0.3	7.8	7.7
Queue Length 50th (m)	1.0	5.5	0.0	10.3	7.9
Queue Length 95th (m)	8.4	17.3	0.0	30.3	23.8
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	189	517	609	2143	2148
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.17	0.13	0.04	0.24	0.19

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	0	14	0	33	0	294	7	24	367	0
Future Volume (vph)	1	0	0	14	0	33	0	294	7	24	367	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt					0.905			0.996				
Flt Protected		0.950			0.986						0.997	
Satd. Flow (prot)	0	1805	0	0	1560	0	0	3363	0	0	3407	0
Flt Permitted		0.950			0.986						0.997	
Satd. Flow (perm)	0	1805	0	0	1560	0	0	3363	0	0	3407	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Confl. Peds. (#/hr)			1	1					2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	15%	0%	6%	0%	6%	43%	0%	6%	0%
Adj. Flow (vph)	1	0	0	15	0	36	0	320	8	26	399	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1	0	0	51	0	0	328	0	0	425	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 33.2% ICU Level of Service A
Analysis Period (min) 15

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	0	0	14	0	33	0	294	7	24	367	0
Future Vol, veh/h	1	0	0	14	0	33	0	294	7	24	367	0
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	15	0	6	0	6	43	0	6	0
Mvmt Flow	1	0	0	15	0	36	0	320	8	26	399	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	611	781	201	579	777	166	399	0	0	330	0	0
Stage 1	451	451	-	326	326	-	-	-	-	-	-	-
Stage 2	160	330	-	253	451	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.8	6.5	7.02	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.65	4	3.36	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	382	329	813	372	330	837	1171	-	-	1241	-	-
Stage 1	563	574	-	626	652	-	-	-	-	-	-	-
Stage 2	832	649	-	693	574	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	358	319	812	363	320	836	1171	-	-	1239	-	-
Mov Cap-2 Maneuver	358	319	-	363	320	-	-	-	-	-	-	-
Stage 1	563	559	-	625	651	-	-	-	-	-	-	-
Stage 2	796	648	-	674	559	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.1	11.5	0	0.6
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1171	-	-	358	602	1239	-	-
HCM Lane V/C Ratio	-	-	-	0.003	0.085	0.021	-	-
HCM Control Delay (s)	0	-	-	15.1	11.5	8	0.1	-
HCM Lane LOS	A	-	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	0.1	-	-

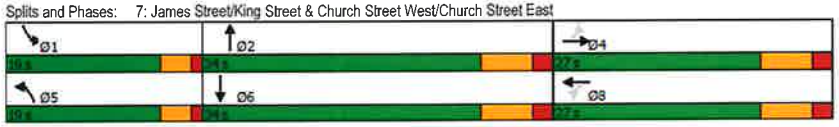
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	10	83	104	71	75	58	92	211	70	4	65	15
Future Volume (vph)	10	83	104	71	75	58	92	211	70	4	65	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.99		1.00	0.99		1.00	1.00	
Frt		0.929			0.962			0.963			0.972	
Flt Protected		0.997			0.983		0.950			0.950		
Satd. Flow (prot)	0	1604	0	0	1683	0	1703	3169	0	1805	3332	0
Flt Permitted		0.976			0.774		0.950			0.950		
Satd. Flow (perm)	0	1570	0	0	1320	0	1701	3169	0	1798	3332	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		67			24			61			16	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	2		12	12		2	1		4	4		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	9%	7%	7%	2%	11%	6%	9%	9%	0%	6%	0%
Adj. Flow (vph)	11	90	113	77	82	63	100	229	76	4	71	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	214	0	0	222	0	100	305	0	4	87	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		15.4			15.4		9.5	36.8		5.9	27.6	
Actuated g/C Ratio		0.23			0.23		0.14	0.54		0.09	0.40	
v/c Ratio		0.53			0.70		0.43	0.18		0.03	0.06	
Control Delay		21.9			35.6		34.7	7.8		33.2	13.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		21.9			35.6		34.7	7.8		33.2	13.6	
LOS		C			D		C	A		C	B	
Approach Delay		21.9			35.6			14.4			14.5	
Approach LOS		C			D			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 68.3
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 21.2 Intersection LOS: C
Intersection Capacity Utilization 64.3% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	214	222	100	305	4	87
v/c Ratio	0.53	0.70	0.43	0.18	0.03	0.06
Control Delay	21.9	35.6	34.7	7.8	33.2	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	35.6	34.7	7.8	33.2	13.6
Queue Length 50th (m)	16.4	23.7	12.1	6.9	0.5	3.0
Queue Length 95th (m)	37.1	48.2	26.3	18.5	3.2	8.2
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	517	412	382	1734	405	1357
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.54	0.26	0.18	0.01	0.06

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	210	10	23	226	8	8
Future Volume (vph)	210	10	23	226	8	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.994				0.932	
Flt Protected				0.995	0.976	
Satd. Flow (prot)	1836	0	0	1840	1728	0
Flt Permitted				0.995	0.976	
Satd. Flow (perm)	1836	0	0	1840	1728	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		6	6			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	0%	3%	0%	0%
Adj. Flow (vph)	228	11	25	246	9	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	239	0	0	271	18	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	210	10	23	226	8	8
Future Vol, veh/h	210	10	23	226	8	8
Conflicting Peds, #/hr	0	6	6	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	0	0	3	0	0
Mvmt Flow	228	11	25	246	9	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	245	0	536	240
Stage 1	-	-	-	-	240	-
Stage 2	-	-	-	-	296	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1333	-	509	804
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	759	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1326	-	495	800
Mov Cap-2 Maneuver	-	-	-	-	495	-
Stage 1	-	-	-	-	801	-
Stage 2	-	-	-	-	742	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	11.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	612	-	-	1326	-
HCM Lane V/C Ratio	0.028	-	-	0.019	-
HCM Control Delay (s)	11.1	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	80	46	8	113	56	2
Future Volume (vph)	80	46	8	113	56	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.951				0.996	
Flt Protected				0.997	0.954	
Satd. Flow (prot)	1731	0	0	1877	1628	0
Flt Permitted				0.997	0.954	
Satd. Flow (perm)	1731	0	0	1877	1628	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	637.3			245.3	1407.1	
Travel Time (s)	60.3			11.0	63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	5%	0%	1%	8%	100%
Adj. Flow (vph)	87	50	9	123	61	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	137	0	0	132	63	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 22.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	80	46	8	113	56	2
Future Vol, veh/h	80	46	8	113	56	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	5	0	1	8	100
Mvmt Flow	87	50	9	123	61	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	137	0	253	112
Stage 1	-	-	-	-	112	-
Stage 2	-	-	-	-	141	-
Critical Hdwy	-	-	4.1	-	6.48	7.2
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	-	-	2.2	-	3.572	4.2
Pot Cap-1 Maneuver	-	-	1459	-	723	731
Stage 1	-	-	-	-	898	-
Stage 2	-	-	-	-	871	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1459	-	718	731
Mov Cap-2 Maneuver	-	-	-	-	718	-
Stage 1	-	-	-	-	898	-
Stage 2	-	-	-	-	865	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	718	-	-	1459	-
HCM Lane V/C Ratio	0.088	-	-	0.006	-
HCM Control Delay (s)	10.5	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	17	7	2	13	4	11	44	1	2	42	13
Future Volume (vph)	11	17	7	2	13	4	11	44	1	2	42	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.972			0.973			0.998			0.970	
Flt Protected		0.984			0.995			0.990			0.998	
Satd. Flow (prot)	0	1660	0	0	1663	0	0	1779	0	0	1774	0
Flt Permitted		0.984			0.995			0.990			0.998	
Satd. Flow (perm)	0	1660	0	0	1663	0	0	1779	0	0	1774	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			1407.1	
Travel Time (s)		29.3			22.9			10.6			63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	0%	0%	50%	8%	0%	0%	7%	0%	0%	5%	0%
Adj. Flow (vph)	12	18	8	2	14	4	12	48	1	2	46	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	0	0	20	0	0	61	0	0	62	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	11	17	7	2	13	4	11	44	1	2	42	13
Future Vol, veh/h	11	17	7	2	13	4	11	44	1	2	42	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	30	0	0	50	8	0	0	7	0	0	5	0
Mvmt Flow	12	18	8	2	14	4	12	48	1	2	46	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	139	130	53	143	137	49	60	0	0	49	0	0
Stage 1	57	57	-	73	73	-	-	-	-	-	-	-
Stage 2	82	73	-	70	64	-	-	-	-	-	-	-
Critical Hdwy	7.4	6.5	6.2	7.6	6.58	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.77	4	3.3	3.95	4.072	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	771	764	1020	728	743	1025	1556	-	-	1571	-	-
Stage 1	889	851	-	830	823	-	-	-	-	-	-	-
Stage 2	861	838	-	833	830	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	751	757	1020	704	736	1025	1556	-	-	1571	-	-
Mov Cap-2 Maneuver	751	757	-	704	736	-	-	-	-	-	-	-
Stage 1	882	850	-	823	816	-	-	-	-	-	-	-
Stage 2	836	831	-	808	829	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.7	9.8	1.4	0.3
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1556	-	-	796	778	1571	-	-
HCM Lane V/C Ratio	0.008	-	-	0.048	0.027	0.001	-	-
HCM Control Delay (s)	7.3	0	-	9.7	9.8	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	13	17	18	1	0	4
Future Volume (vph)	13	17	18	1	0	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.994		0.865	
Flt Protected		0.979				
Satd. Flow (prot)	0	1799	1787	0	1644	0
Flt Permitted		0.979				
Satd. Flow (perm)	0	1799	1787	0	1644	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Confl. Peds. (#/hr)	4			4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	6%	0%	0%	0%
Adj. Flow (vph)	14	18	20	1	0	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	32	21	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	18.3%	ICU Level of Service A	
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	13	17	18	1	0	4
Future Vol, veh/h	13	17	18	1	0	4
Conflicting Peds, #/hr	4	0	0	4	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	6	6	0	0	0
Mvmt Flow	14	18	20	1	0	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	25	0	-	0	71	25
Stage 1	-	-	-	-	25	-
Stage 2	-	-	-	-	46	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1603	-	-	-	938	1057
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	982	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1598	-	-	-	924	1053
Mov Cap-2 Maneuver	-	-	-	-	924	-
Stage 1	-	-	-	-	991	-
Stage 2	-	-	-	-	979	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	8.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1598	-	-	-	1053
HCM Lane V/C Ratio	0.009	-	-	-	0.004
HCM Control Delay (s)	7.3	0	-	-	8.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	11	8	54	6	40	7	436	65	23	518	24
Future Volume (vph)	16	11	8	54	6	40	7	436	65	23	518	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.99			0.99	0.99		1.00			1.00	
Frt		0.968				0.850		0.981			0.994	
Flt Protected		0.978			0.957			0.999			0.998	
Satd. Flow (prot)	0	1784	0	0	1818	1568	0	3408	0	0	3473	0
Flt Permitted		0.978			0.957			0.945			0.919	
Satd. Flow (perm)	0	1783	0	0	1804	1547	0	3223	0	0	3198	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				160		26			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	1		6	6		1	12		8	8		12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	0%	3%	5%
Adj. Flow (vph)	17	12	9	59	7	43	8	474	71	25	563	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	0	0	66	43	0	553	0	0	614	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			8.3	8.3		36.4			36.4	
Actuated g/C Ratio		0.10			0.14	0.14		0.62			0.62	
v/c Ratio		0.20			0.26	0.12		0.27			0.31	
Control Delay		24.6			27.0	0.7		8.4			8.9	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		24.6			27.0	0.7		8.4			8.9	
LOS		C			C	A		A			A	
Approach Delay		24.6			16.6			8.4			8.9	
Approach LOS		C			B			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 58.6
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.31
Intersection Signal Delay: 9.8 Intersection LOS: A
Intersection Capacity Utilization 54.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	38	66	43	553	614
v/c Ratio	0.20	0.26	0.12	0.27	0.31
Control Delay	24.6	27.0	0.7	8.4	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	27.0	0.7	8.4	8.9
Queue Length 50th (m)	2.5	5.4	0.0	11.0	13.1
Queue Length 95th (m)	11.1	17.1	0.0	31.4	36.4
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	192	564	591	2013	1991
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.20	0.12	0.07	0.27	0.31

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↕			↕	
Traffic Volume (vph)	0	0	0	17	0	33	0	419	16	45	405	2
Future Volume (vph)	0	0	0	17	0	33	0	419	16	45	405	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt					0.910			0.995			0.999	
Flt Protected					0.984						0.995	
Satd. Flow (prot)	0	1900	0	0	1636	0	0	3443	0	0	3458	0
Flt Permitted					0.984						0.995	
Satd. Flow (perm)	0	1900	0	0	1636	0	0	3443	0	0	3458	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	0%	3%	0%	4%	13%	2%	4%	0%
Adj. Flow (vph)	0	0	0	18	0	36	0	455	17	49	440	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	54	0	0	472	0	0	491	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.0%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↕			↕	
Traffic Vol, veh/h	0	0	0	17	0	33	0	419	16	45	405	2
Future Vol, veh/h	0	0	0	17	0	33	0	419	16	45	405	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	6	0	3	0	4	13	2	4	0
Mvmt Flow	0	0	0	18	0	36	0	455	17	49	440	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	767	1011	221	782	1004	236	442	0	0	472	0	0
Stage 1	539	539	-	464	464	-	-	-	-	-	-	-
Stage 2	228	472	-	318	540	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.62	6.5	6.96	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.56	4	3.33	2.2	-	-	2.22	-	-
Pot Cap-1 Maneuver	295	241	789	277	244	763	1129	-	-	1086	-	-
Stage 1	499	525	-	537	567	-	-	-	-	-	-	-
Stage 2	760	562	-	657	524	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	268	227	789	264	229	763	1129	-	-	1086	-	-
Mov Cap-2 Maneuver	268	227	-	264	229	-	-	-	-	-	-	-
Stage 1	499	494	-	537	567	-	-	-	-	-	-	-
Stage 2	724	562	-	618	493	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	13.8	0	1
HCM LOS	A	B		

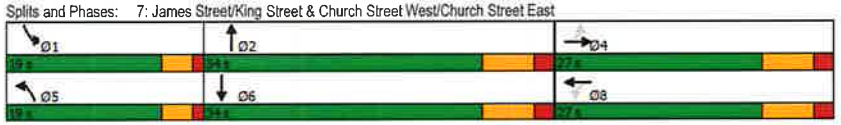
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1129	-	-	-	464	1086	-	-
HCM Lane V/C Ratio	-	-	-	-	0.117	0.045	-	-
HCM Control Delay (s)	0	-	-	0	13.8	8.5	0.2	-
HCM Lane LOS	A	-	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.4	0.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	119	197	107	77	72	70	284	78	18	205	19
Future Volume (vph)	20	119	197	107	77	72	70	284	78	18	205	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		0.99	0.99		1.00	1.00	
Frt		0.921			0.962			0.968			0.987	
Flt Protected		0.997			0.980		0.950			0.950		
Satd. Flow (prot)	0	1673	0	0	1759	0	1770	3355	0	1517	3383	0
Flt Permitted		0.968			0.569		0.950			0.950		
Satd. Flow (perm)	0	1624	0	0	1021	0	1760	3355	0	1512	3383	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		85			23			47			13	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	6		1	1		6	5		4	4		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	3%	3%	3%	0%	0%	2%	4%	2%	19%	5%	6%
Adj. Flow (vph)	22	129	214	116	84	78	76	309	85	20	223	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	365	0	0	278	0	76	394	0	20	244	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		20.1			20.1		8.4	35.1		6.6	27.2	
Actuated g/C Ratio		0.28			0.28		0.12	0.49		0.09	0.38	
v/c Ratio		0.71			0.92		0.37	0.24		0.14	0.19	
Control Delay		27.8			62.5		35.0	10.2		33.6	15.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		27.8			62.5		35.0	10.2		33.6	15.6	
LOS		C			E		C	B		C	B	
Approach Delay		27.8			62.5			14.2			17.0	
Approach LOS		C			E			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 71.6			
Natural Cycle: 70			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 28.1		Intersection LOS: C	
Intersection Capacity Utilization 81.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	365	278	76	394	20	244
v/c Ratio	0.71	0.92	0.37	0.24	0.14	0.19
Control Delay	27.8	62.5	35.0	10.2	33.6	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	62.5	35.0	10.2	33.6	15.6
Queue Length 50th (m)	34.4	34.3	9.8	11.8	2.6	11.0
Queue Length 95th (m)	#74.8	#82.5	21.2	26.6	8.5	19.6
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	517	303	373	1668	319	1291
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.92	0.20	0.24	0.06	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Appendix F

2024 Total Traffic Operations Reports

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	181	8	7	196	16	11
Future Volume (vph)	181	8	7	196	16	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.994				0.944	
Flt Protected				0.998	0.972	
Satd. Flow (prot)	1709	0	0	1775	1743	0
Flt Permitted				0.998	0.972	
Satd. Flow (perm)	1709	0	0	1775	1743	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		2	2			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	0%	29%	6%	0%	0%
Adj. Flow (vph)	197	9	8	213	17	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	206	0	0	221	29	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	26.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	181	8	7	196	16	11
Future Vol, veh/h	181	8	7	196	16	11
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	11	0	29	6	0	0
Mvmt Flow	197	9	8	213	17	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	208	0	433	204
Stage 1	-	-	-	-	204	-
Stage 2	-	-	-	-	229	-
Critical Hdwy	-	-	4.39	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.461	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1218	-	584	842
Stage 1	-	-	-	-	835	-
Stage 2	-	-	-	-	814	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1216	-	579	841
Mov Cap-2 Maneuver	-	-	-	-	579	-
Stage 1	-	-	-	-	833	-
Stage 2	-	-	-	-	808	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	663	-	-	1216	-
HCM Lane V/C Ratio	0.044	-	-	0.006	-
HCM Control Delay (s)	10.7	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	91	50	15	57	38	14
Future Volume (vph)	91	50	15	57	38	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.952				0.964	
Flt Protected				0.990	0.965	
Satd. Flow (prot)	1625	0	0	1501	1730	0
Flt Permitted				0.990	0.965	
Satd. Flow (perm)	1625	0	0	1501	1730	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	841.3	
Travel Time (s)	60.3			11.0	37.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	12%	10%	100%	6%	3%	0%
Adj. Flow (vph)	99	54	16	62	41	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	153	0	0	78	56	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 25.0%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	91	50	15	57	38	14
Future Vol, veh/h	91	50	15	57	38	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	10	100	6	3	0
Mvmt Flow	99	54	16	62	41	15

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	153	0	220	126
Stage 1	-	-	-	-	126	-
Stage 2	-	-	-	-	94	-
Critical Hdwy	-	-	5.1	-	6.43	6.2
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	3.1	-	3.527	3.3
Pot Cap-1 Maneuver	-	-	998	-	766	930
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	927	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	998	-	753	930
Mov Cap-2 Maneuver	-	-	-	-	753	-
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	911	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	9.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	794	-	-	998	-
HCM Lane V/C Ratio	0.071	-	-	0.016	-
HCM Control Delay (s)	9.9	-	-	8.7	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	21	18	10	0	11	5	4	43	2	5	37	4
Future Volume (vph)	21	18	10	0	11	5	4	43	2	5	37	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.972			0.960			0.995			0.989	
Flt Protected		0.979						0.996			0.995	
Satd. Flow (prot)	0	1731	0	0	1704	0	0	1738	0	0	1654	0
Flt Permitted		0.979						0.996			0.995	
Satd. Flow (perm)	0	1731	0	0	1704	0	0	1738	0	0	1654	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			565.7	
Travel Time (s)		29.3			22.9			10.6			25.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	11%	0%	10%	0%	50%	3%	50%	0%	11%	50%
Adj. Flow (vph)	23	20	11	0	12	5	4	47	2	5	40	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	54	0	0	17	0	0	53	0	0	49	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.6%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	21	18	10	0	11	5	4	43	2	5	37	4
Future Vol, veh/h	21	18	10	0	11	5	4	43	2	5	37	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	11	0	10	0	50	3	50	0	11	50
Mvmt Flow	23	20	11	0	12	5	4	47	2	5	40	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	117	109	42	124	110	48	44	0	0	49	0	0
Stage 1	52	52	-	56	56	-	-	-	-	-	-	-
Stage 2	65	57	-	68	54	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.31	7.1	6.6	6.2	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.399	3.5	4.09	3.3	2.65	-	-	2.2	-	-
Pot Cap-1 Maneuver	864	774	1004	855	765	1027	1305	-	-	1571	-	-
Stage 1	966	844	-	961	833	-	-	-	-	-	-	-
Stage 2	951	840	-	947	834	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	845	769	1004	826	760	1027	1305	-	-	1571	-	-
Mov Cap-2 Maneuver	845	769	-	826	760	-	-	-	-	-	-	-
Stage 1	963	841	-	958	831	-	-	-	-	-	-	-
Stage 2	930	837	-	912	831	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.6	9.4	0.6	0.8
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1305	-	-	842	827	1571	-	-
HCM Lane V/C Ratio	0.003	-	-	0.063	0.021	0.003	-	-
HCM Control Delay (s)	7.8	0	-	9.6	9.4	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	45	57	13	5	6
Future Volume (vph)	7	45	57	13	5	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.975		0.921	
Flt Protected		0.993			0.980	
Satd. Flow (prot)	0	1510	1460	0	1715	0
Flt Permitted		0.993			0.980	
Satd. Flow (perm)	0	1510	1460	0	1715	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	29%	33%	0%	0%	0%
Adj. Flow (vph)	8	49	62	14	5	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	57	76	0	12	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.3%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection						
Int Delay, s/veh	1.1					
Movement	**EBL**	**EBT**	**WBT**	**WBR**	**SBL**	**SBR**
Lane Configurations						
Traffic Vol, veh/h	7	45	57	13	5	6
Future Vol, veh/h	7	45	57	13	5	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	29	33	0	0	0
Mvmt Flow	8	49	62	14	5	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	76	0	-	0	134	69
Stage 1	-	-	-	-	69	-
Stage 2	-	-	-	-	65	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1536	-	-	-	864	1000
Stage 1	-	-	-	-	959	-
Stage 2	-	-	-	-	963	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1536	-	-	-	860	1000
Mov Cap-2 Maneuver	-	-	-	-	860	-
Stage 1	-	-	-	-	954	-
Stage 2	-	-	-	-	963	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1536	-	-	-	931
HCM Lane V/C Ratio	0.005	-	-	-	0.013
HCM Control Delay (s)	7.4	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	5	18	76	5	34	2	423	65	32	340	13
Future Volume (vph)	6	5	18	76	5	34	2	423	65	32	340	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.98			0.99	0.98		1.00			1.00	
Frt		0.916				0.850		0.980			0.995	
Flt Protected		0.989			0.955						0.996	
Satd. Flow (prot)	0	1631	0	0	1630	1615	0	3189	0	0	3323	0
Flt Permitted		0.989			0.955			0.954			0.880	
Satd. Flow (perm)	0	1628	0	0	1621	1581	0	3042	0	0	2935	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20				160		27			5	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	6		4	4		6	10		12	12		10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	6%	12%	0%	0%	0%	9%	20%	0%	6%	14%
Adj. Flow (vph)	7	5	20	83	5	37	2	460	71	35	370	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	32	0	0	88	37	0	533	0	0	419	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			8.9	8.9		35.9			35.9	
Actuated g/C Ratio		0.10			0.15	0.15		0.61			0.61	
v/c Ratio		0.17			0.35	0.10		0.28			0.23	
Control Delay		19.4			28.4	0.5		8.9			9.0	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		19.4			28.4	0.5		8.9			9.0	
LOS		B			C	A		A			A	
Approach Delay		19.4			20.2			8.9			9.0	
Approach LOS		B			C			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 58.6
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.35
Intersection Signal Delay: 10.5 Intersection LOS: B
Intersection Capacity Utilization 57.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	32	88	37	533	419
v/c Ratio	0.17	0.35	0.10	0.28	0.23
Control Delay	19.4	28.4	0.5	8.9	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.4	28.4	0.5	8.9	9.0
Queue Length 50th (m)	1.0	7.4	0.0	10.6	8.4
Queue Length 95th (m)	8.6	21.5	0.0	32.5	26.4
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	187	508	602	1874	1799
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.17	0.17	0.06	0.28	0.23

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	0	16	0	33	0	308	21	24	387	0
Future Volume (vph)	1	0	0	16	0	33	0	308	21	24	387	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt					0.908			0.990				
Flt Protected		0.950			0.984						0.997	
Satd. Flow (prot)	0	1805	0	0	1559	0	0	3298	0	0	3407	0
Flt Permitted		0.950			0.984						0.997	
Satd. Flow (perm)	0	1805	0	0	1559	0	0	3298	0	0	3407	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Confl. Peds. (#/hr)			1	1					2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	15%	0%	6%	0%	6%	43%	0%	6%	0%
Adj. Flow (vph)	1	0	0	17	0	36	0	335	23	26	421	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1	0	0	53	0	0	358	0	0	447	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	0	0	16	0	33	0	308	21	24	387	0
Future Vol, veh/h	1	0	0	16	0	33	0	308	21	24	387	0
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	15	0	6	0	6	43	0	6	0
Mvmt Flow	1	0	0	17	0	36	0	335	23	26	421	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	641	833	212	613	822	181	421	0	0	360	0	0
Stage 1	473	473	-	349	349	-	-	-	-	-	-	-
Stage 2	168	360	-	264	473	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.8	6.5	7.02	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.65	4	3.36	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	364	307	800	351	311	818	1149	-	-	1210	-	-
Stage 1	546	562	-	606	637	-	-	-	-	-	-	-
Stage 2	823	630	-	683	562	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	341	298	799	343	302	817	1149	-	-	1208	-	-
Mov Cap-2 Maneuver	341	298	-	343	302	-	-	-	-	-	-	-
Stage 1	546	546	-	605	636	-	-	-	-	-	-	-
Stage 2	787	629	-	663	546	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.6	12.1	0	0.6
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1149	-	-	341	563	1208	-	-
HCM Lane V/C Ratio	-	-	-	0.003	0.095	0.022	-	-
HCM Control Delay (s)	0	-	-	15.6	12.1	8	0.1	-
HCM Lane LOS	A	-	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	0.1	-	-

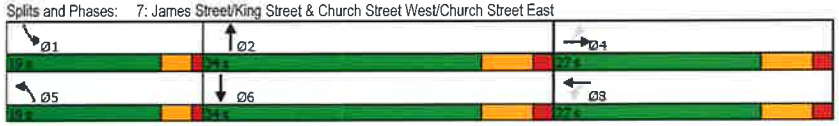
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	10	91	110	71	81	67	96	219	70	18	75	15
Future Volume (vph)	10	91	110	71	81	67	96	219	70	18	75	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.99		1.00	0.99		1.00	1.00	
Frt		0.930			0.959			0.964			0.976	
Flt Protected		0.998			0.984		0.950			0.950		
Satd. Flow (prot)	0	1608	0	0	1678	0	1703	3173	0	1805	3343	0
Flt Permitted		0.978			0.768		0.950			0.950		
Satd. Flow (perm)	0	1575	0	0	1305	0	1701	3173	0	1798	3343	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		65			27			58			16	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	2		12	12		2	1		4	4		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	9%	7%	7%	2%	11%	6%	9%	9%	0%	6%	0%
Adj. Flow (vph)	11	99	120	77	88	73	104	238	76	20	82	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	230	0	0	238	0	104	314	0	20	98	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		16.0			16.0		9.6	34.7		6.5	27.7	
Actuated g/C Ratio		0.23			0.23		0.14	0.50		0.09	0.40	
v/c Ratio		0.55			0.74		0.44	0.19		0.12	0.07	
Control Delay		23.0			37.7		35.2	9.7		33.7	14.2	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		23.0			37.7		35.2	9.7		33.7	14.2	
LOS		C			D		D	A		C	B	
Approach Delay		23.0			37.7			16.1			17.5	
Approach LOS		C			D			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 69.1
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 22.9 Intersection LOS: C
Intersection Capacity Utilization 65.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	230	238	104	314	20	98
v/c Ratio	0.55	0.74	0.44	0.19	0.12	0.07
Control Delay	23.0	37.7	35.2	9.7	33.7	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	37.7	35.2	9.7	33.7	14.2
Queue Length 50th (m)	18.7	25.8	13.0	7.7	2.5	3.6
Queue Length 95th (m)	40.9	#57.1	27.1	20.1	8.9	9.1
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	512	406	378	1620	401	1348
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.59	0.28	0.19	0.05	0.07

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	13	12	28	41	34	31
Future Volume (vph)	13	12	28	41	34	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.935	
Flt Protected	0.975			0.980		
Satd. Flow (prot)	1698	0	0	1825	1742	0
Flt Permitted	0.975			0.980		
Satd. Flow (perm)	1698	0	0	1825	1742	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	170.1			565.7	841.3	
Travel Time (s)	12.2			25.5	37.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	13	30	45	37	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	0	0	75	71	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	12	28	41	34	31
Future Vol, veh/h	13	12	28	41	34	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	13	30	45	37	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	159	54	71	0	-	0
Stage 1	54	-	-	-	-	-
Stage 2	105	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	832	1013	1529	-	-	-
Stage 1	969	-	-	-	-	-
Stage 2	919	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	815	1013	1529	-	-	-
Mov Cap-2 Maneuver	815	-	-	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	919	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.1	3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1529	-	899	-	-
HCM Lane V/C Ratio	0.02	-	0.03	-	-
HCM Control Delay (s)	7.4	0	9.1	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	211	23	23	239	16	8
Future Volume (vph)	211	23	23	239	16	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.987				0.953	
Flt Protected				0.996	0.968	
Satd. Flow (prot)	1826	0	0	1842	1753	0
Flt Permitted				0.996	0.968	
Satd. Flow (perm)	1826	0	0	1842	1753	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		6	6			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	0%	3%	0%	0%
Adj. Flow (vph)	229	25	25	260	17	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	254	0	0	285	26	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 39.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	211	23	23	239	16	8
Future Vol, veh/h	211	23	23	239	16	8
Conflicting Peds, #/hr	0	6	6	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	0	0	3	0	0
Mvmt Flow	229	25	25	260	17	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	260	0	558	248
Stage 1	-	-	-	-	248	-
Stage 2	-	-	-	-	310	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1316	-	494	796
Stage 1	-	-	-	-	798	-
Stage 2	-	-	-	-	748	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1309	-	481	792
Mov Cap-2 Maneuver	-	-	-	-	481	-
Stage 1	-	-	-	-	794	-
Stage 2	-	-	-	-	732	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	553	-	-	1309	-
HCM Lane V/C Ratio	0.047	-	-	0.019	-
HCM Control Delay (s)	11.8	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	80	47	19	113	69	17
Future Volume (vph)	80	47	19	113	69	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.950				0.974	
Flt Protected				0.993	0.961	
Satd. Flow (prot)	1729	0	0	1871	1414	0
Flt Permitted				0.993	0.961	
Satd. Flow (perm)	1729	0	0	1871	1414	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	835.5	
Travel Time (s)	60.3			11.0	37.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	5%	0%	1%	8%	100%
Adj. Flow (vph)	87	51	21	123	75	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	138	0	0	144	93	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 28.9% ICU Level of Service A
Analysis Period (min) 15

Intersection

Int Delay, s/veh 3.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	80	47	19	113	69	17
Future Vol, veh/h	80	47	19	113	69	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	5	0	1	8	100
Mvmt Flow	87	51	21	123	75	18

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	138	0	278	113
Stage 1	-	-	-	-	113	-
Stage 2	-	-	-	-	165	-
Critical Hdwy	-	-	4.1	-	6.48	7.2
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	-	-	2.2	-	3.572	4.2
Pot Cap-1 Maneuver	-	-	1458	-	699	730
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	850	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1458	-	689	730
Mov Cap-2 Maneuver	-	-	-	-	689	-
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	837	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	11
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	697	-	-	1458	-
HCM Lane V/C Ratio	0.134	-	-	0.014	-
HCM Control Delay (s)	11	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	17	7	2	13	8	11	52	1	7	52	24
Future Volume (vph)	12	17	7	2	13	8	11	52	1	7	52	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.972			0.951			0.998			0.961	
Flt Protected		0.984			0.996			0.992			0.996	
Satd. Flow (prot)	0	1652	0	0	1659	0	0	1780	0	0	1763	0
Flt Permitted		0.984			0.996			0.992			0.996	
Satd. Flow (perm)	0	1652	0	0	1659	0	0	1780	0	0	1763	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			571.5	
Travel Time (s)		29.3			22.9			10.6			25.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	0%	0%	50%	8%	0%	0%	7%	0%	0%	5%	0%
Adj. Flow (vph)	13	18	8	2	14	9	12	57	1	8	57	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	39	0	0	25	0	0	70	0	0	91	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 17.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	17	7	2	13	8	11	52	1	7	52	24
Future Vol, veh/h	12	17	7	2	13	8	11	52	1	7	52	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	30	0	0	50	8	0	0	7	0	0	5	0
Mvmt Flow	13	18	8	2	14	9	12	57	1	8	57	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	179	168	70	181	181	58	83	0	0	58	0	0
Stage 1	86	86	-	82	82	-	-	-	-	-	-	-
Stage 2	93	82	-	99	99	-	-	-	-	-	-	-
Critical Hdwy	7.4	6.5	6.2	7.6	6.58	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.77	4	3.3	3.95	4.072	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	725	728	998	686	702	1014	1527	-	-	1559	-	-
Stage 1	857	827	-	820	815	-	-	-	-	-	-	-
Stage 2	849	831	-	802	802	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	700	719	998	661	693	1014	1527	-	-	1559	-	-
Mov Cap-2 Maneuver	700	719	-	661	693	-	-	-	-	-	-	-
Stage 1	850	823	-	813	808	-	-	-	-	-	-	-
Stage 2	820	824	-	774	798	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10	9.8	1.3	0.6
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1527	-	-	753	775	1559	-	-
HCM Lane V/C Ratio	0.008	-	-	0.052	0.032	0.005	-	-
HCM Control Delay (s)	7.4	0	-	10	9.8	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	13	51	53	9	13	4
Future Volume (vph)	13	51	53	9	13	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.980		0.970	
Flt Protected		0.990			0.963	
Satd. Flow (prot)	0	1795	1771	0	1775	0
Flt Permitted		0.990			0.963	
Satd. Flow (perm)	0	1795	1771	0	1775	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Confl. Peds. (#/hr)	4			4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	6%	0%	0%	0%
Adj. Flow (vph)	14	55	58	10	14	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	69	68	0	18	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.1%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	13	51	53	9	13	4
Future Vol, veh/h	13	51	53	9	13	4
Conflicting Peds, #/hr	4	0	0	4	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	6	6	0	0	0
Mvmt Flow	14	55	58	10	14	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	72	0	-	0	150	67
Stage 1	-	-	-	-	67	-
Stage 2	-	-	-	-	83	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1541	-	-	-	847	1002
Stage 1	-	-	-	-	961	-
Stage 2	-	-	-	-	945	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1536	-	-	-	834	999
Mov Cap-2 Maneuver	-	-	-	-	834	-
Stage 1	-	-	-	-	949	-
Stage 2	-	-	-	-	942	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1536	-	-	-	868
HCM Lane V/C Ratio	0.009	-	-	-	0.021
HCM Control Delay (s)	7.4	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	11	8	72	6	57	7	436	85	37	518	24
Future Volume (vph)	16	11	8	72	6	57	7	436	85	37	518	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.99			0.99	0.99		1.00			1.00	
Frt		0.968				0.850		0.976			0.994	
Flt Protected		0.978			0.956			0.999			0.997	
Satd. Flow (prot)	0	1784	0	0	1816	1568	0	3391	0	0	3472	0
Flt Permitted		0.978			0.956			0.945			0.887	
Satd. Flow (perm)	0	1783	0	0	1802	1547	0	3207	0	0	3088	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				160		35			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	1		6	6		1	12		8	8		12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	0%	3%	5%
Adj. Flow (vph)	17	12	9	78	7	62	8	474	92	40	563	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	0	0	85	62	0	574	0	0	629	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			8.6	8.6		35.3			35.3	
Actuated g/C Ratio		0.11			0.15	0.15		0.61			0.61	
v/c Ratio		0.19			0.31	0.17		0.29			0.33	
Control Delay		24.8			27.3	1.0		8.7			9.5	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		24.8			27.3	1.0		8.7			9.5	
LOS		C			C	A		A			A	
Approach Delay		24.8			16.2			8.7			9.5	
Approach LOS		C			B			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 57.8			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.33			
Intersection Signal Delay: 10.3		Intersection LOS: B	
Intersection Capacity Utilization 63.7%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	38	85	62	574	629
v/c Ratio	0.19	0.31	0.17	0.29	0.33
Control Delay	24.8	27.3	1.0	8.7	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	24.8	27.3	1.0	8.7	9.5
Queue Length 50th (m)	2.5	7.1	0.0	11.3	13.6
Queue Length 95th (m)	11.2	20.7	0.0	33.4	39.3
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	195	573	598	1973	1889
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.19	0.15	0.10	0.29	0.33

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	28	0	33	0	439	17	45	423	2
Future Volume (vph)	0	0	0	28	0	33	0	439	17	45	423	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt					0.926			0.995			0.999	
Flt Protected					0.978						0.995	
Satd. Flow (prot)	0	1900	0	0	1649	0	0	3443	0	0	3457	0
Flt Permitted					0.978						0.995	
Satd. Flow (perm)	0	1900	0	0	1649	0	0	3443	0	0	3457	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	0%	3%	0%	4%	13%	2%	4%	0%
Adj. Flow (vph)	0	0	0	30	0	36	0	477	18	49	460	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	66	0	0	495	0	0	511	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 39.3% ICU Level of Service A
Analysis Period (min) 15

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	28	0	33	0	439	17	45	423	2
Future Vol, veh/h	0	0	0	28	0	33	0	439	17	45	423	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	6	0	3	0	4	13	2	4	0
Mvmt Flow	0	0	0	30	0	36	0	477	18	49	460	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	798	1054	231	814	1046	248	462	0	0	495	0	0
Stage 1	559	559	-	486	486	-	-	-	-	-	-	-
Stage 2	239	495	-	328	560	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.62	6.5	6.96	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.56	4	3.33	2.2	-	-	2.22	-	-
Pot Cap-1 Maneuver	280	228	777	263	230	749	1110	-	-	1065	-	-
Stage 1	486	514	-	521	554	-	-	-	-	-	-	-
Stage 2	749	549	-	648	514	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	254	214	777	251	216	749	1110	-	-	1065	-	-
Mov Cap-2 Maneuver	254	214	-	251	216	-	-	-	-	-	-	-
Stage 1	486	482	-	521	554	-	-	-	-	-	-	-
Stage 2	713	549	-	608	482	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	16	0	1
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1110	-	-	-	392	1065	-	-
HCM Lane V/C Ratio	-	-	-	-	0.169	0.046	-	-
HCM Control Delay (s)	0	-	-	0	16	8.5	0.2	-
HCM Lane LOS	A	-	-	A	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.6	0.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	20	124	202	107	85	85	76	295	78	27	214	19
Future Volume (vph)	20	124	202	107	85	85	76	295	78	27	214	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		0.99	0.99		1.00	1.00	
Frt		0.921			0.959			0.969			0.988	
Flt Protected		0.997			0.981		0.950			0.950		
Satd. Flow (prot)	0	1673	0	0	1756	0	1770	3359	0	1517	3387	0
Flt Permitted		0.968			0.575		0.950			0.950		
Satd. Flow (perm)	0	1624	0	0	1029	0	1760	3359	0	1512	3387	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		84			27			45			13	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	6		1	1		6	5		4	4		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	3%	3%	3%	0%	0%	2%	4%	2%	19%	5%	6%
Adj. Flow (vph)	22	135	220	116	92	92	83	321	85	29	233	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	377	0	0	300	0	83	406	0	29	254	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		20.1			20.1		8.7	33.0		7.0	27.2	
Actuated g/C Ratio		0.28			0.28		0.12	0.46		0.10	0.38	
v/c Ratio		0.73			0.98		0.39	0.26		0.20	0.20	
Control Delay		29.5			74.9		35.2	12.1		34.3	15.9	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		29.5			74.9		35.2	12.1		34.3	15.9	
LOS		C			E		D	B		C	B	
Approach Delay		29.5			74.9			16.0			17.8	
Approach LOS		C			E			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 71.9
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 32.1 Intersection LOS: C
Intersection Capacity Utilization 83.4% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	377	300	83	406	29	254
v/c Ratio	0.73	0.98	0.39	0.26	0.20	0.20
Control Delay	29.5	74.9	35.2	12.1	34.3	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.5	74.9	35.2	12.1	34.3	15.9
Queue Length 50th (m)	36.7	~38.3	10.7	12.4	3.8	11.5
Queue Length 95th (m)	#80.3	#90.5	22.7	28.1	10.9	20.5
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	515	307	371	1565	318	1288
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.98	0.22	0.26	0.09	0.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	28	26	13	58	57	12
Future Volume (vph)	28	26	13	58	57	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.977	
Flt Protected	0.975			0.991		
Satd. Flow (prot)	1698	0	0	1846	1820	0
Flt Permitted	0.975			0.991		
Satd. Flow (perm)	1698	0	0	1846	1820	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	181.2			571.5	635.5	
Travel Time (s)	13.0			25.7	37.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	28	14	63	62	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	58	0	0	77	75	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 20.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	26	13	58	57	12
Future Vol, veh/h	28	26	13	58	57	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	28	14	63	62	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	160	69	75	0	-	0
Stage 1	69	-	-	-	-	-
Stage 2	91	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	831	994	1524	-	-	-
Stage 1	954	-	-	-	-	-
Stage 2	933	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	823	994	1524	-	-	-
Mov Cap-2 Maneuver	823	-	-	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	933	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	1.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1524	-	897	-	-
HCM Lane V/C Ratio	0.009	-	0.065	-	-
HCM Control Delay (s)	7.4	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Appendix G

2029 Background Traffic Operations Reports

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	181	4	8	212	5	12
Future Volume (vph)	181	4	8	212	5	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.997				0.902	
Flt Protected				0.998	0.986	
Satd. Flow (prot)	1710	0	0	1774	1690	0
Flt Permitted				0.998	0.986	
Satd. Flow (perm)	1710	0	0	1774	1690	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		2	2			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	0%	29%	6%	0%	0%
Adj. Flow (vph)	197	4	9	230	5	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	201	0	0	239	18	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 27.6%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	181	4	8	212	5	12
Future Vol, veh/h	181	4	8	212	5	12
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	11	0	29	6	0	0
Mvmt Flow	197	4	9	230	5	13

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	203	0	449	201
Stage 1	-	-	-	-	201	-
Stage 2	-	-	-	-	248	-
Critical Hdwy	-	-	4.39	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.461	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1223	-	571	845
Stage 1	-	-	-	-	838	-
Stage 2	-	-	-	-	798	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1221	-	565	844
Mov Cap-2 Maneuver	-	-	-	-	565	-
Stage 1	-	-	-	-	836	-
Stage 2	-	-	-	-	792	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	737	-	-	1221	-
HCM Lane V/C Ratio	0.025	-	-	0.007	-
HCM Control Delay (s)	10	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	100	36	1	62	39	5
Future Volume (vph)	100	36	1	62	39	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.964				0.986	
Flt Protected				0.999	0.957	
Satd. Flow (prot)	1643	0	0	1768	1746	0
Flt Permitted				0.999	0.957	
Satd. Flow (perm)	1643	0	0	1768	1746	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	1407.1	
Travel Time (s)	60.3			11.0	63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	12%	10%	100%	6%	3%	0%
Adj. Flow (vph)	109	39	1	67	42	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	148	0	0	68	47	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 17.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	100	36	1	62	39	5
Future Vol, veh/h	100	36	1	62	39	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	10	100	6	3	0
Mvmt Flow	109	39	1	67	42	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	148	0	198	129
Stage 1	-	-	-	-	129	-
Stage 2	-	-	-	-	69	-
Critical Hdwy	-	-	5.1	-	6.43	6.2
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	3.1	-	3.527	3.3
Pot Cap-1 Maneuver	-	-	1003	-	788	926
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	951	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1003	-	787	926
Mov Cap-2 Maneuver	-	-	-	-	787	-
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	950	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	801	-	-	1003	-
HCM Lane V/C Ratio	0.06	-	-	0.001	-
HCM Control Delay (s)	9.8	-	-	8.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	20	11	0	12	0	5	37	2	2	33	2
Future Volume (vph)	8	20	11	0	12	0	5	37	2	2	33	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.962						0.994			0.993	
Flt Protected		0.990						0.995			0.998	
Satd. Flow (prot)	0	1705	0	0	1727	0	0	1708	0	0	1675	0
Flt Permitted		0.990						0.995			0.998	
Satd. Flow (perm)	0	1705	0	0	1727	0	0	1708	0	0	1675	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			1407.1	
Travel Time (s)		29.3			22.9			10.6			63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	11%	0%	10%	0%	50%	3%	50%	0%	11%	50%
Adj. Flow (vph)	9	22	12	0	13	0	5	40	2	2	36	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	0	0	13	0	0	47	0	0	40	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.3%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	20	11	0	12	0	5	37	2	2	33	2
Future Vol, veh/h	8	20	11	0	12	0	5	37	2	2	33	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	11	0	10	0	50	3	50	0	11	50
Mvmt Flow	9	22	12	0	13	0	5	40	2	2	36	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	99	93	37	109	93	41	38	0	0	42	0	0
Stage 1	41	41	-	51	51	-	-	-	-	-	-	-
Stage 2	58	52	-	58	42	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.31	7.1	6.6	6.2	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.399	3.5	4.09	3.3	2.65	-	-	2.2	-	-
Pot Cap-1 Maneuver	888	790	1010	874	782	1036	1312	-	-	1580	-	-
Stage 1	979	853	-	967	837	-	-	-	-	-	-	-
Stage 2	959	844	-	959	844	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	873	786	1010	843	778	1036	1312	-	-	1580	-	-
Mov Cap-2 Maneuver	873	786	-	843	778	-	-	-	-	-	-	-
Stage 1	975	852	-	963	834	-	-	-	-	-	-	-
Stage 2	940	841	-	923	843	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.4	9.7	0.9	0.4
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1312	-	-	857	778	1580	-	-
HCM Lane V/C Ratio	0.004	-	-	0.049	0.017	0.001	-	-
HCM Control Delay (s)	7.8	0	-	9.4	9.7	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	8	16	28	1	0	7
Future Volume (vph)	8	16	28	1	0	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.996		0.865	
Flt Protected		0.983				
Satd. Flow (prot)	0	1570	1434	0	1644	0
Flt Permitted		0.983				
Satd. Flow (perm)	0	1570	1434	0	1644	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	29%	33%	0%	0%	0%
Adj. Flow (vph)	9	17	30	1	0	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	26	31	0	8	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 17.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	16	28	1	0	7
Future Vol, veh/h	8	16	28	1	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	29	33	0	0	0
Mvmt Flow	9	17	30	1	0	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	31	0	-	0	66	31
Stage 1	-	-	-	-	31	-
Stage 2	-	-	-	-	35	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1595	-	-	-	944	1049
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	993	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1595	-	-	-	938	1049
Mov Cap-2 Maneuver	-	-	-	-	938	-
Stage 1	-	-	-	-	991	-
Stage 2	-	-	-	-	993	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1595	-	-	-	1049
HCM Lane V/C Ratio	0.005	-	-	-	0.007
HCM Control Delay (s)	7.3	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	6	20	62	6	25	2	465	56	18	374	14
Future Volume (vph)	7	6	20	62	6	25	2	465	56	18	374	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.98			0.99	0.98		1.00			1.00	
Frt		0.920				0.850		0.984			0.995	
Flt Protected		0.989			0.957						0.998	
Satd. Flow (prot)	0	1643	0	0	1640	1615	0	3213	0	0	3320	0
Flt Permitted		0.989			0.957			0.954			0.918	
Satd. Flow (perm)	0	1640	0	0	1632	1581	0	3065	0	0	3053	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				160		21			6	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	6		4	4		6	10		12	12		10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	6%	12%	0%	0%	0%	9%	20%	0%	8%	14%
Adj. Flow (vph)	8	7	22	67	7	27	2	505	61	20	407	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	37	0	0	74	27	0	568	0	0	442	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			8.6	8.6		37.0			37.0	
Actuated g/C Ratio		0.10			0.14	0.14		0.62			0.62	
v/c Ratio		0.20			0.31	0.07		0.30			0.23	
Control Delay		19.5			28.2	0.4		8.8			8.7	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		19.5			28.2	0.4		8.8			8.7	
LOS		B			C	A		A			A	
Approach Delay		19.5			20.8			8.8			8.7	
Approach LOS		B			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 59.4			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.31			
Intersection Signal Delay: 10.2		Intersection LOS: B	
Intersection Capacity Utilization 55.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	37	74	27	568	442
v/c Ratio	0.20	0.31	0.07	0.30	0.23
Control Delay	19.5	28.2	0.4	8.8	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.5	28.2	0.4	8.8	8.7
Queue Length 50th (m)	1.3	6.1	0.0	11.7	8.8
Queue Length 95th (m)	9.3	18.7	0.0	34.3	26.8
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	187	502	595	1916	1903
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.20	0.15	0.05	0.30	0.23

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	0	15	0	36	0	323	8	27	404	0
Future Volume (vph)	1	0	0	15	0	36	0	323	8	27	404	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt					0.904			0.996				
Flt Protected		0.950			0.986						0.997	
Satd. Flow (prot)	0	1805	0	0	1559	0	0	3363	0	0	3407	0
Flt Permitted		0.950			0.986						0.997	
Satd. Flow (perm)	0	1805	0	0	1559	0	0	3363	0	0	3407	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Confl. Peds. (#/hr)			1	1					2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	15%	0%	6%	0%	6%	43%	0%	6%	0%
Adj. Flow (vph)	1	0	0	16	0	39	0	351	9	29	439	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1	0	0	55	0	0	360	0	0	468	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 35.1% ICU Level of Service A
Analysis Period (min) 15

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	0	0	15	0	36	0	323	8	27	404	0
Future Vol, veh/h	1	0	0	15	0	36	0	323	8	27	404	0
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	15	0	6	0	6	43	0	6	0
Mvmt Flow	1	0	0	16	0	39	0	351	9	29	439	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	673	859	221	637	855	182	439	0	0	362	0	0
Stage 1	497	497	-	358	358	-	-	-	-	-	-	-
Stage 2	176	362	-	279	497	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.8	6.5	7.02	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.65	4	3.36	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	345	296	789	337	298	817	1132	-	-	1208	-	-
Stage 1	529	548	-	598	631	-	-	-	-	-	-	-
Stage 2	814	629	-	669	548	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	321	286	788	328	288	816	1132	-	-	1206	-	-
Mov Cap-2 Maneuver	321	286	-	328	288	-	-	-	-	-	-	-
Stage 1	529	530	-	597	630	-	-	-	-	-	-	-
Stage 2	775	628	-	647	530	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.3	12	0	0.6
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1132	-	-	321	568	1206	-	-
HCM Lane V/C Ratio	-	-	-	0.003	0.098	0.024	-	-
HCM Control Delay (s)	0	-	-	16.3	12	8.1	0.1	-
HCM Lane LOS	A	-	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	0.1	-	-

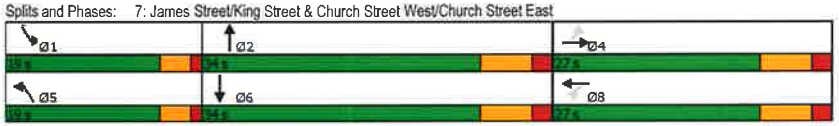
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↑↑		↰	↑↑	
Traffic Volume (vph)	11	91	114	78	83	64	101	232	76	5	71	16
Future Volume (vph)	11	91	114	78	83	64	101	232	76	5	71	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.99		1.00	0.99		1.00	1.00	
Frt		0.929			0.961			0.963			0.973	
Flt Protected		0.997			0.983		0.950			0.950		
Satd. Flow (prot)	0	1604	0	0	1681	0	1703	3169	0	1805	3335	0
Flt Permitted		0.976			0.746		0.950			0.950		
Satd. Flow (perm)	0	1570	0	0	1271	0	1701	3169	0	1798	3335	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		67			24			61			17	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	2		12	12		2	1		4	4		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	9%	7%	7%	2%	11%	6%	9%	9%	0%	6%	0%
Adj. Flow (vph)	12	99	124	85	90	70	110	252	83	5	77	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	235	0	0	245	0	110	335	0	5	94	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		16.5			16.5		9.9	37.1		5.9	27.7	
Actuated g/C Ratio		0.24			0.24		0.14	0.53		0.08	0.40	
v/c Ratio		0.56			0.77		0.46	0.20		0.03	0.07	
Control Delay		23.0			41.2		35.7	8.3		33.6	14.2	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		23.0			41.2		35.7	8.3		33.6	14.2	
LOS		C			D		D	A		C	B	
Approach Delay		23.0			41.2			15.1			15.2	
Approach LOS		C			D			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 69.9
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 23.1 Intersection LOS: C
Intersection Capacity Utilization 66.1% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	235	245	110	335	5	94
v/c Ratio	0.56	0.77	0.46	0.20	0.03	0.07
Control Delay	23.0	41.2	35.7	8.3	33.6	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	41.2	35.7	8.3	33.6	14.2
Queue Length 50th (m)	19.3	27.6	14.2	8.8	0.7	3.5
Queue Length 95th (m)	42.1	#62.4	28.3	20.6	3.8	8.7
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	508	390	374	1712	397	1331
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.63	0.29	0.20	0.01	0.07

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	231	11	26	248	9	9
Future Volume (vph)	231	11	26	248	9	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.994				0.932	
Flt Protected				0.995	0.976	
Satd. Flow (prot)	1836	0	0	1840	1728	0
Flt Permitted				0.995	0.976	
Satd. Flow (perm)	1836	0	0	1840	1728	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		6	6			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	0%	3%	0%	0%
Adj. Flow (vph)	251	12	28	270	10	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	263	0	0	298	20	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 40.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	231	11	26	248	9	9
Future Vol, veh/h	231	11	26	248	9	9
Conflicting Peds, #/hr	0	6	6	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	0	0	3	0	0
Mvmt Flow	251	12	28	270	10	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	269	0	589	263
Stage 1	-	-	-	-	263	-
Stage 2	-	-	-	-	326	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1306	-	474	781
Stage 1	-	-	-	-	786	-
Stage 2	-	-	-	-	736	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1299	-	460	777
Mov Cap-2 Maneuver	-	-	-	-	460	-
Stage 1	-	-	-	-	782	-
Stage 2	-	-	-	-	718	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	578	-	-	1299	-
HCM Lane V/C Ratio	0.034	-	-	0.022	-
HCM Control Delay (s)	11.4	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	88	50	9	124	62	2
Future Volume (vph)	88	50	9	124	62	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.951				0.996	
Flt Protected				0.997	0.954	
Satd. Flow (prot)	1731	0	0	1877	1631	0
Flt Permitted				0.997	0.954	
Satd. Flow (perm)	1731	0	0	1877	1631	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	1407.1	
Travel Time (s)	60.3			11.0	63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	5%	0%	1%	8%	100%
Adj. Flow (vph)	96	54	10	135	67	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	150	0	0	145	69	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 24.2%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	88	50	9	124	62	2
Future Vol, veh/h	88	50	9	124	62	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	5	0	1	8	100
Mvmt Flow	96	54	10	135	67	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	150	0	278	123
Stage 1	-	-	-	-	123	-
Stage 2	-	-	-	-	155	-
Critical Hdwy	-	-	4.1	-	6.48	7.2
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	-	-	2.2	-	3.572	4.2
Pot Cap-1 Maneuver	-	-	1444	-	699	719
Stage 1	-	-	-	-	888	-
Stage 2	-	-	-	-	859	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1444	-	694	719
Mov Cap-2 Maneuver	-	-	-	-	694	-
Stage 1	-	-	-	-	888	-
Stage 2	-	-	-	-	853	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	695	-	-	1444	-
HCM Lane V/C Ratio	0.1	-	-	0.007	-
HCM Control Delay (s)	10.8	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	19	8	2	14	5	12	48	1	2	47	14
Future Volume (vph)	12	19	8	2	14	5	12	48	1	2	47	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.972			0.969			0.998			0.970	
Flt Protected		0.985			0.995			0.990			0.999	
Satd. Flow (prot)	0	1668	0	0	1665	0	0	1779	0	0	1775	0
Flt Permitted		0.985			0.995			0.990			0.999	
Satd. Flow (perm)	0	1668	0	0	1665	0	0	1779	0	0	1775	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			1407.1	
Travel Time (s)		29.3			22.9			10.6			63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	0%	0%	50%	8%	0%	0%	7%	0%	0%	5%	0%
Adj. Flow (vph)	13	21	9	2	15	5	13	52	1	2	51	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	0	0	22	0	0	66	0	0	68	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.0%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	12	19	8	2	14	5	12	48	1	2	47	14
Future Vol, veh/h	12	19	8	2	14	5	12	48	1	2	47	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	30	0	0	50	8	0	0	7	0	0	5	0
Mvmt Flow	13	21	9	2	15	5	13	52	1	2	51	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	152	142	59	157	149	53	66	0	0	53	0	0
Stage 1	63	63	-	79	79	-	-	-	-	-	-	-
Stage 2	89	79	-	78	70	-	-	-	-	-	-	-
Critical Hdwy	7.4	6.5	6.2	7.6	6.58	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.77	4	3.3	3.95	4.072	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	756	753	1012	712	732	1020	1549	-	-	1566	-	-
Stage 1	882	846	-	823	818	-	-	-	-	-	-	-
Stage 2	854	833	-	824	825	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	734	745	1012	686	725	1020	1549	-	-	1566	-	-
Mov Cap-2 Maneuver	734	745	-	686	725	-	-	-	-	-	-	-
Stage 1	874	845	-	816	811	-	-	-	-	-	-	-
Stage 2	826	826	-	796	824	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.9	9.8	1.4	0.2
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1549	-	-	784	774	1566	-	-
HCM Lane V/C Ratio	0.008	-	-	0.054	0.029	0.001	-	-
HCM Control Delay (s)	7.3	0	-	9.9	9.8	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	14	19	20	1	0	5
Future Volume (vph)	14	19	20	1	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.994		0.865	
Flt Protected		0.980				
Satd. Flow (prot)	0	1799	1786	0	1644	0
Flt Permitted		0.980				
Satd. Flow (perm)	0	1799	1786	0	1644	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Confl. Peds. (#/hr)	4			4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	6%	0%	0%	0%
Adj. Flow (vph)	15	21	22	1	0	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	36	23	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	19	20	1	0	5
Future Vol, veh/h	14	19	20	1	0	5
Conflicting Peds, #/hr	4	0	0	4	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	6	6	0	0	0
Mvmt Flow	15	21	22	1	0	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	27	0	-	0	78	27
Stage 1	-	-	-	-	27	-
Stage 2	-	-	-	-	51	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1600	-	-	-	930	1054
Stage 1	-	-	-	-	1001	-
Stage 2	-	-	-	-	977	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1595	-	-	-	915	1050
Mov Cap-2 Maneuver	-	-	-	-	915	-
Stage 1	-	-	-	-	988	-
Stage 2	-	-	-	-	974	-

Approach	EB	WB	SB
HCM Control Delay, s	3.1	0	8.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1595	-	-	-	1050
HCM Lane V/C Ratio	0.01	-	-	-	0.005
HCM Control Delay (s)	7.3	0	-	-	8.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

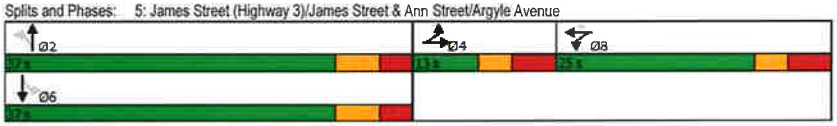
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	12	9	60	7	45	8	479	71	26	570	27
Future Volume (vph)	18	12	9	60	7	45	8	479	71	26	570	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.99			0.99	0.99		1.00			1.00	
Frt		0.969				0.850		0.981			0.994	
Flt Protected		0.977			0.957			0.999			0.998	
Satd. Flow (prot)	0	1785	0	0	1818	1568	0	3408	0	0	3473	0
Flt Permitted		0.977			0.957			0.943			0.912	
Satd. Flow (perm)	0	1783	0	0	1805	1547	0	3216	0	0	3173	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				160		25			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	1		6	6		1	12		8	8		12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	0%	3%	5%
Adj. Flow (vph)	20	13	10	65	8	49	9	521	77	28	620	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	0	0	73	49	0	607	0	0	677	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			8.5	8.5		35.5			35.5	
Actuated g/C Ratio		0.10			0.14	0.14		0.59			0.59	
v/c Ratio		0.23			0.29	0.14		0.32			0.36	
Control Delay		26.1			28.5	0.8		10.0			10.7	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		26.1			28.5	0.8		10.0			10.7	
LOS		C			C	A		A			B	
Approach Delay		26.2			17.4			10.0			10.7	
Approach LOS		C			B			A			B	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 60.2
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.36
Intersection Signal Delay: 11.4 Intersection LOS: B
Intersection Capacity Utilization 56.5% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	43	73	49	607	677
v/c Ratio	0.23	0.29	0.14	0.32	0.36
Control Delay	26.1	28.5	0.8	10.0	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	28.5	0.8	10.0	10.7
Queue Length 50th (m)	3.7	8.1	0.0	22.6	27.0
Queue Length 95th (m)	12.1	18.4	0.0	35.5	41.5
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	189	550	580	1906	1873
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.23	0.13	0.08	0.32	0.36

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↕			↕	
Traffic Volume (vph)	0	0	0	19	0	36	0	461	18	49	445	2
Future Volume (vph)	0	0	0	19	0	36	0	461	18	49	445	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt					0.912			0.994			0.999	
Flt Protected					0.983						0.995	
Satd. Flow (prot)	0	1900	0	0	1637	0	0	3439	0	0	3457	0
Flt Permitted					0.983						0.995	
Satd. Flow (perm)	0	1900	0	0	1637	0	0	3439	0	0	3457	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	0%	3%	0%	4%	13%	2%	4%	0%
Adj. Flow (vph)	0	0	0	21	0	39	0	501	20	53	484	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	60	0	0	521	0	0	539	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↕			↕	
Traffic Vol, veh/h	0	0	0	19	0	36	0	461	18	49	445	2
Future Vol, veh/h	0	0	0	19	0	36	0	461	18	49	445	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	6	0	3	0	4	13	2	4	0
Mvmt Flow	0	0	0	21	0	39	0	501	20	53	484	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	842	1112	243	859	1103	261	486	0	0	521	0	0
Stage 1	591	591	-	511	511	-	-	-	-	-	-	-
Stage 2	251	521	-	348	592	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.62	6.5	6.96	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.56	4	3.33	2.2	-	-	2.22	-	-
Pot Cap-1 Maneuver	261	211	764	244	213	735	1087	-	-	1041	-	-
Stage 1	465	498	-	503	540	-	-	-	-	-	-	-
Stage 2	737	535	-	630	497	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	234	196	764	231	198	735	1087	-	-	1041	-	-
Mov Cap-2 Maneuver	234	196	-	231	198	-	-	-	-	-	-	-
Stage 1	465	463	-	503	540	-	-	-	-	-	-	-
Stage 2	698	535	-	586	462	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	15	0	1
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1087	-	-	-	419	1041	-	-
HCM Lane V/C Ratio	-	-	-	-	0.143	0.051	-	-
HCM Control Delay (s)	0	-	-	0	15	8.6	0.2	-
HCM Lane LOS	A	-	-	A	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.5	0.2	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	131	217	117	86	80	76	312	86	20	225	21
Future Volume (vph)	22	131	217	117	86	80	76	312	86	20	225	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		0.99	0.99		1.00	1.00	
Frt		0.921			0.962			0.968			0.987	
Flt Protected		0.997			0.980		0.950			0.950		
Satd. Flow (prot)	0	1673	0	0	1759	0	1770	3355	0	1517	3383	0
Flt Permitted		0.966			0.532		0.950			0.950		
Satd. Flow (perm)	0	1620	0	0	955	0	1761	3355	0	1512	3383	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		85			24			47			13	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	6		1	1		6	5		4	4		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	3%	3%	3%	0%	0%	2%	4%	2%	19%	5%	6%
Adj. Flow (vph)	24	142	236	127	93	87	83	339	93	22	245	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	402	0	0	307	0	83	432	0	22	268	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		20.1			20.1		8.7	33.2		6.7	27.2	
Actuated g/C Ratio		0.28			0.28		0.12	0.46		0.09	0.38	
v/c Ratio		0.78			1.08		0.39	0.27		0.16	0.21	
Control Delay		32.8			105.2		35.2	12.0		33.9	16.0	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		32.8			105.2		35.2	12.0		33.9	16.0	
LOS		C			F		D	B		C	B	
Approach Delay		32.8			105.2			15.8			17.4	
Approach LOS		C			F			B			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 80	
Actuated Cycle Length: 71.9	
Natural Cycle: 70	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 1.08	
Intersection Signal Delay: 38.7	Intersection LOS: D
Intersection Capacity Utilization 85.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	402	307	83	432	22	268
v/c Ratio	0.78	1.08	0.39	0.27	0.16	0.21
Control Delay	32.8	105.2	35.2	12.0	33.9	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.8	105.2	35.2	12.0	33.9	16.0
Queue Length 50th (m)	40.6	~46.7	10.7	13.3	2.9	12.3
Queue Length 95th (m)	#89.0	#96.8	22.7	29.4	9.3	21.6
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	514	284	371	1573	318	1286
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	1.08	0.22	0.27	0.07	0.21

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Appendix H

2029 Total Traffic Operations Reports

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	198	9	8	215	17	12
Future Volume (vph)	198	9	8	215	17	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.994				0.943	
Flt Protected				0.998	0.972	
Satd. Flow (prot)	1709	0	0	1775	1742	0
Flt Permitted				0.998	0.972	
Satd. Flow (perm)	1709	0	0	1775	1742	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		2	2			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	0%	29%	6%	0%	0%
Adj. Flow (vph)	215	10	9	234	18	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	225	0	0	243	31	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 27.8%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	198	9	8	215	17	12
Future Vol, veh/h	198	9	8	215	17	12
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	11	0	29	6	0	0
Mvmt Flow	215	10	9	234	18	13

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	227	0	474	222
Stage 1	-	-	-	-	222	-
Stage 2	-	-	-	-	252	-
Critical Hdwy	-	-	4.39	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.461	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1197	-	553	823
Stage 1	-	-	-	-	820	-
Stage 2	-	-	-	-	795	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1195	-	547	822
Mov Cap-2 Maneuver	-	-	-	-	547	-
Stage 1	-	-	-	-	818	-
Stage 2	-	-	-	-	788	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	11
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	635	-	-	1195	-
HCM Lane V/C Ratio	0.05	-	-	0.007	-
HCM Control Delay (s)	11	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	100	53	15	62	42	15
Future Volume (vph)	100	53	15	62	42	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.953				0.965	
Flt Protected				0.990	0.964	
Satd. Flow (prot)	1627	0	0	1515	1729	0
Flt Permitted				0.990	0.964	
Satd. Flow (perm)	1627	0	0	1515	1729	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	841.3	
Travel Time (s)	60.3			11.0	37.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	12%	10%	100%	6%	3%	0%
Adj. Flow (vph)	109	58	16	67	46	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	167	0	0	83	62	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 25.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	100	53	15	62	42	15
Future Vol, veh/h	100	53	15	62	42	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	10	100	6	3	0
Mvmt Flow	109	58	16	67	46	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	167	0	237	138
Stage 1	-	-	-	-	138	-
Stage 2	-	-	-	-	99	-
Critical Hdwy	-	-	5.1	-	6.43	6.2
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	3.1	-	3.527	3.3
Pot Cap-1 Maneuver	-	-	984	-	749	916
Stage 1	-	-	-	-	886	-
Stage 2	-	-	-	-	922	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	984	-	736	916
Mov Cap-2 Maneuver	-	-	-	-	736	-
Stage 1	-	-	-	-	886	-
Stage 2	-	-	-	-	906	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.7	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	776	-	-	984	-
HCM Lane V/C Ratio	0.08	-	-	0.017	-
HCM Control Delay (s)	10	-	-	8.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	22	20	11	0	12	5	5	46	2	5	40	4
Future Volume (vph)	22	20	11	0	12	5	5	46	2	5	40	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.972			0.962			0.995			0.990	
Flt Protected		0.980						0.996			0.995	
Satd. Flow (prot)	0	1731	0	0	1705	0	0	1731	0	0	1657	0
Flt Permitted		0.980						0.996			0.995	
Satd. Flow (perm)	0	1731	0	0	1705	0	0	1731	0	0	1657	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			565.7	
Travel Time (s)		29.3			22.9			10.6			25.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	11%	0%	10%	0%	50%	3%	50%	0%	11%	50%
Adj. Flow (vph)	24	22	12	0	13	5	5	50	2	5	43	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	58	0	0	18	0	0	57	0	0	52	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	22	20	11	0	12	5	5	46	2	5	40	4
Future Vol, veh/h	22	20	11	0	12	5	5	46	2	5	40	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	11	0	10	0	50	3	50	0	11	50
Mvmt Flow	24	22	12	0	13	5	5	50	2	5	43	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	125	117	45	133	118	51	47	0	0	52	0	0
Stage 1	55	55	-	61	61	-	-	-	-	-	-	-
Stage 2	70	62	-	72	57	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.31	7.1	6.6	6.2	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.399	3.5	4.09	3.3	2.65	-	-	2.2	-	-
Pot Cap-1 Maneuver	854	766	1000	844	758	1023	1302	-	-	1567	-	-
Stage 1	962	841	-	955	829	-	-	-	-	-	-	-
Stage 2	945	835	-	943	832	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	834	761	1000	811	753	1023	1302	-	-	1567	-	-
Mov Cap-2 Maneuver	834	761	-	811	753	-	-	-	-	-	-	-
Stage 1	958	838	-	951	826	-	-	-	-	-	-	-
Stage 2	921	832	-	905	830	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.6	9.5	0.7	0.7
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1302	-	-	833	816	1567	-	-
HCM Lane V/C Ratio	0.004	-	-	0.069	0.023	0.003	-	-
HCM Control Delay (s)	7.8	0	-	9.6	9.5	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	8	46	60	13	5	7
Future Volume (vph)	8	46	60	13	5	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.976		0.917	
Flt Protected		0.992			0.981	
Satd. Flow (prot)	0	1513	1458	0	1709	0
Flt Permitted		0.992			0.981	
Satd. Flow (perm)	0	1513	1458	0	1709	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	29%	33%	0%	0%	0%
Adj. Flow (vph)	9	50	65	14	5	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	59	79	0	13	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.2%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	46	60	13	5	7
Future Vol, veh/h	8	46	60	13	5	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	29	33	0	0	0
Mvmt Flow	9	50	65	14	5	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	79	0	-	0	140	72
Stage 1	-	-	-	-	72	-
Stage 2	-	-	-	-	68	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1532	-	-	-	858	996
Stage 1	-	-	-	-	956	-
Stage 2	-	-	-	-	960	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1532	-	-	-	853	996
Mov Cap-2 Maneuver	-	-	-	-	853	-
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	960	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1532	-	-	-	931
HCM Lane V/C Ratio	0.006	-	-	-	0.014
HCM Control Delay (s)	7.4	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	6	20	82	6	37	2	465	70	34	374	14
Future Volume (vph)	7	6	20	82	6	37	2	465	70	34	374	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.98			0.99	0.98		1.00			1.00	
Frt		0.920				0.850		0.980			0.995	
Flt Protected		0.989			0.956						0.996	
Satd. Flow (prot)	0	1643	0	0	1635	1615	0	3190	0	0	3323	0
Flt Permitted		0.989			0.956			0.954			0.674	
Satd. Flow (perm)	0	1640	0	0	1626	1581	0	3043	0	0	2914	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				160		26			5	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	6		4	4		6	10		12	12		10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	6%	12%	0%	0%	0%	9%	20%	0%	6%	14%
Adj. Flow (vph)	8	7	22	89	7	40	2	505	76	37	407	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	37	0	0	96	40	0	583	0	0	459	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			9.1	9.1		35.5			35.5	
Actuated g/C Ratio		0.10			0.16	0.16		0.61			0.61	
v/c Ratio		0.19			0.38	0.10		0.31			0.26	
Control Delay		19.8			28.5	0.5		9.4			9.4	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		19.8			28.5	0.5		9.4			9.4	
LOS		B			C	A		A			A	
Approach Delay		19.8			20.3			9.4			9.4	
Approach LOS		B			C			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 58.4
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.38
Intersection Signal Delay: 10.9 Intersection LOS: B
Intersection Capacity Utilization 60.4% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	37	96	40	583	459
v/c Ratio	0.19	0.38	0.10	0.31	0.26
Control Delay	19.8	28.5	0.5	9.4	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.8	28.5	0.5	9.4	9.4
Queue Length 50th (m)	1.3	8.1	0.0	12.1	9.5
Queue Length 95th (m)	9.4	23.1	0.0	36.5	29.5
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	191	512	605	1858	1771
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.19	0.19	0.07	0.31	0.26

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	0	17	0	36	0	337	22	27	424	0
Future Volume (vph)	1	0	0	17	0	36	0	337	22	27	424	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt					0.908			0.991				
Flt Protected		0.950			0.984						0.997	
Satd. Flow (prot)	0	1805	0	0	1560	0	0	3304	0	0	3407	0
Flt Permitted		0.950			0.984						0.997	
Satd. Flow (perm)	0	1805	0	0	1560	0	0	3304	0	0	3407	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Confl. Peds. (#/hr)			1	1					2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	15%	0%	6%	0%	6%	43%	0%	6%	0%
Adj. Flow (vph)	1	0	0	18	0	39	0	366	24	29	461	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1	0	0	57	0	0	390	0	0	490	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	0	0	17	0	36	0	337	22	27	424	0
Future Vol, veh/h	1	0	0	17	0	36	0	337	22	27	424	0
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	15	0	6	0	6	43	0	6	0
Mvmt Flow	1	0	0	18	0	39	0	366	24	29	461	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	702	911	232	670	899	197	461	0	0	392	0	0
Stage 1	519	519	-	380	380	-	-	-	-	-	-	-
Stage 2	183	392	-	290	519	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.8	6.5	7.02	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.65	4	3.36	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	329	276	776	318	281	799	1111	-	-	1178	-	-
Stage 1	513	536	-	580	617	-	-	-	-	-	-	-
Stage 2	807	610	-	658	536	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	305	266	775	309	271	798	1111	-	-	1176	-	-
Mov Cap-2 Maneuver	305	266	-	309	271	-	-	-	-	-	-	-
Stage 1	513	518	-	579	616	-	-	-	-	-	-	-
Stage 2	767	609	-	636	518	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.8	12.6	0	0.6
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1		SBL	SBT	SBR
Capacity (veh/h)	1111	-	-	305	529	1176	-	-
HCM Lane V/C Ratio	-	-	-	0.004	0.109	0.025	-	-
HCM Control Delay (s)	0	-	-	16.8	12.6	8.1	0.1	-
HCM Lane LOS	A	-	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.4	0.1	-	-

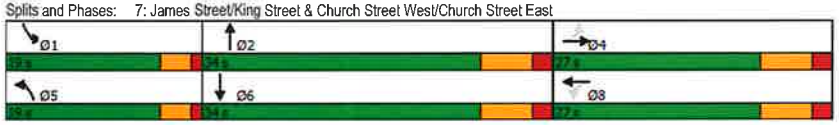
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	11	99	120	78	89	73	105	240	76	19	81	16
Future Volume (vph)	11	99	120	78	89	73	105	240	76	19	81	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		1.00	0.99		1.00	1.00	
Frt		0.930			0.959			0.964			0.976	
Flt Protected		0.998			0.984		0.950			0.950		
Satd. Flow (prot)	0	1608	0	0	1678	0	1703	3173	0	1805	3343	0
Flt Permitted		0.977			0.742		0.950			0.950		
Satd. Flow (perm)	0	1574	0	0	1262	0	1701	3173	0	1798	3343	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		65			26			58			17	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	2		12	12		2	1		4	4		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	9%	7%	7%	2%	11%	6%	9%	9%	0%	6%	0%
Adj. Flow (vph)	12	108	130	85	97	79	114	261	83	21	88	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	250	0	0	261	0	114	344	0	21.	105	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		17.2			17.2		10.2	35.0		6.5	27.7	
Actuated g/C Ratio		0.24			0.24		0.14	0.50		0.09	0.39	
v/c Ratio		0.58			0.80		0.47	0.21		0.13	0.08	
Control Delay		24.2			43.8		36.1	10.2		34.3	14.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		24.2			43.8		36.1	10.2		34.3	14.8	
LOS		C			D		D	B		C	B	
Approach Delay		24.2			43.8			16.7			18.0	
Approach LOS		C			D			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 70.7
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 25.0 Intersection LOS: C
Intersection Capacity Utilization 67.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	250	261	114	344	21	105
v/c Ratio	0.58	0.80	0.47	0.21	0.13	0.08
Control Delay	24.2	43.8	36.1	10.2	34.3	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	43.8	36.1	10.2	34.3	14.8
Queue Length 50th (m)	21.7	30.0	15.0	9.6	2.8	4.2
Queue Length 95th (m)	46.0	#69.2	29.3	22.1	9.2	9.6
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	502	384	370	1600	392	1318
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.68	0.31	0.21	0.05	0.08

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	13	12	28	46	37	31
Future Volume (vph)	13	12	28	46	37	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.938	
Flt Protected	0.975			0.982		
Satd. Flow (prot)	1698	0	0	1829	1747	0
Flt Permitted	0.975			0.982		
Satd. Flow (perm)	1698	0	0	1829	1747	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	170.1			565.7	841.3	
Travel Time (s)	12.2			25.5	37.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	13	30	50	40	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	0	0	80	74	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.6%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	12	28	46	37	31
Future Vol, veh/h	13	12	28	46	37	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	13	30	50	40	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	167	57	74	0	-	0
Stage 1	57	-	-	-	-	-
Stage 2	110	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	823	1009	1526	-	-	-
Stage 1	966	-	-	-	-	-
Stage 2	915	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	807	1009	1526	-	-	-
Mov Cap-2 Maneuver	807	-	-	-	-	-
Stage 1	947	-	-	-	-	-
Stage 2	915	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	2.8	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1526	-	893	-	-
HCM Lane V/C Ratio	0.02	-	0.03	-	-
HCM Control Delay (s)	7.4	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	232	24	26	261	17	9
Future Volume (vph)	232	24	26	261	17	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.987				0.952	
Flt Protected				0.996	0.969	
Satd. Flow (prot)	1826	0	0	1842	1753	0
Flt Permitted				0.996	0.969	
Satd. Flow (perm)	1826	0	0	1842	1753	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		6	6			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	0%	3%	0%	0%
Adj. Flow (vph)	252	26	28	284	18	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	278	0	0	312	28	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	232	24	26	261	17	9
Future Vol, veh/h	232	24	26	261	17	9
Conflicting Peds, #/hr	0	6	6	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	0	0	3	0	0
Mvmt Flow	252	26	28	284	18	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	284	0	611	271
Stage 1	-	-	-	-	271	-
Stage 2	-	-	-	-	340	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1290	-	460	773
Stage 1	-	-	-	-	779	-
Stage 2	-	-	-	-	725	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1283	-	446	769
Mov Cap-2 Maneuver	-	-	-	-	446	-
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	706	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	522	-	-	1283	-
HCM Lane V/C Ratio	0.054	-	-	0.022	-
HCM Control Delay (s)	12.3	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	88	51	20	124	75	17
Future Volume (vph)	88	51	20	124	75	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.951				0.976	
Flt Protected				0.993	0.961	
Satd. Flow (prot)	1731	0	0	1871	1431	0
Flt Permitted				0.993	0.961	
Satd. Flow (perm)	1731	0	0	1871	1431	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	835.5	
Travel Time (s)	60.3			11.0	37.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	5%	0%	1%	8%	100%
Adj. Flow (vph)	96	55	22	135	82	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	151	0	0	157	100	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 30.6%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	3.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	88	51	20	124	75	17
Future Vol, veh/h	88	51	20	124	75	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	5	0	1	8	100
Mvmt Flow	96	55	22	135	82	18

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	151	0	303	124
Stage 1	-	-	-	-	124	-
Stage 2	-	-	-	-	179	-
Critical Hdwy	-	-	4.1	-	6.48	7.2
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	-	-	2.2	-	3.572	4.2
Pot Cap-1 Maneuver	-	-	1442	-	676	718
Stage 1	-	-	-	-	887	-
Stage 2	-	-	-	-	838	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1442	-	665	718
Mov Cap-2 Maneuver	-	-	-	-	665	-
Stage 1	-	-	-	-	887	-
Stage 2	-	-	-	-	825	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	674	-	-	1442	-
HCM Lane V/C Ratio	0.148	-	-	0.015	-
HCM Control Delay (s)	11.3	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	13	19	8	2	14	9	12	56	1	7	57	25
Future Volume (vph)	13	19	8	2	14	9	12	56	1	7	57	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.972			0.950			0.998			0.962	
Flt Protected		0.984			0.996			0.991			0.996	
Satd. Flow (prot)	0	1659	0	0	1662	0	0	1778	0	0	1764	0
Flt Permitted		0.984			0.996			0.991			0.996	
Satd. Flow (perm)	0	1659	0	0	1662	0	0	1778	0	0	1764	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			571.5	
Travel Time (s)		29.3			22.9			10.6			25.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	0%	0%	50%	8%	0%	0%	7%	0%	0%	5%	0%
Adj. Flow (vph)	14	21	9	2	15	10	13	61	1	8	62	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	0	0	27	0	0	75	0	0	97	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	13	19	8	2	14	9	12	56	1	7	57	25
Future Vol, veh/h	13	19	8	2	14	9	12	56	1	7	57	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	30	0	0	50	8	0	0	7	0	0	5	0
Mvmt Flow	14	21	9	2	15	10	13	61	1	8	62	27

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	192	180	76	195	193	62	89	0	0	62	0	0
Stage 1	92	92	-	88	88	-	-	-	-	-	-	-
Stage 2	100	88	-	107	105	-	-	-	-	-	-	-
Critical Hdwy	7.4	6.5	6.2	7.6	6.58	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.77	4	3.3	3.95	4.072	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	710	717	991	671	692	1009	1519	-	-	1554	-	-
Stage 1	851	823	-	814	810	-	-	-	-	-	-	-
Stage 2	842	826	-	794	797	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	684	707	991	643	682	1009	1519	-	-	1554	-	-
Mov Cap-2 Maneuver	684	707	-	643	682	-	-	-	-	-	-	-
Stage 1	843	819	-	807	803	-	-	-	-	-	-	-
Stage 2	811	819	-	763	793	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	9.9	1.3	0.6
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1519	-	-	741	768	1554	-	-
HCM Lane V/C Ratio	0.009	-	-	0.059	0.035	0.005	-	-
HCM Control Delay (s)	7.4	0	-	10.2	9.9	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	14	53	55	9	13	5
Future Volume (vph)	14	53	55	9	13	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.981		0.964	
Flt Protected		0.990			0.964	
Satd. Flow (prot)	0	1795	1773	0	1766	0
Flt Permitted		0.990			0.964	
Satd. Flow (perm)	0	1795	1773	0	1766	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Confl. Peds. (#/hr)	4			4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	6%	0%	0%	0%
Adj. Flow (vph)	15	58	60	10	14	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	73	70	0	19	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.2%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	53	55	9	13	5
Future Vol, veh/h	14	53	55	9	13	5
Conflicting Peds, #/hr	4	0	0	4	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	6	6	0	0	0
Mvmt Flow	15	58	60	10	14	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	74	0	-	0	157	69
Stage 1	-	-	-	-	69	-
Stage 2	-	-	-	-	88	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1538	-	-	-	839	1000
Stage 1	-	-	-	-	959	-
Stage 2	-	-	-	-	940	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1533	-	-	-	826	997
Mov Cap-2 Maneuver	-	-	-	-	826	-
Stage 1	-	-	-	-	947	-
Stage 2	-	-	-	-	937	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1533	-	-	-	867
HCM Lane V/C Ratio	0.01	-	-	-	0.023
HCM Control Delay (s)	7.4	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	12	9	78	7	62	8	479	91	40	570	27
Future Volume (vph)	18	12	9	78	7	62	8	479	91	40	570	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.99			0.99	0.99		1.00			1.00	
Frt		0.969				0.850		0.976			0.994	
Flt Protected		0.977			0.956			0.999			0.997	
Satd. Flow (prot)	0	1785	0	0	1816	1568	0	3391	0	0	3472	0
Flt Permitted		0.977			0.956			0.943			0.879	
Satd. Flow (perm)	0	1783	0	0	1802	1547	0	3201	0	0	3060	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				160		34			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	1		6	6		1	12		8	8		12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	0%	3%	5%
Adj. Flow (vph)	20	13	10	85	8	67	9	521	99	43	620	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	0	0	93	67	0	629	0	0	692	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			8.8	8.8		35.6			35.6	
Actuated g/C Ratio		0.10			0.15	0.15		0.59			0.59	
v/c Ratio		0.23			0.35	0.19		0.33			0.38	
Control Delay		26.5			29.3	1.1		10.2			11.2	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		26.5			29.3	1.1		10.2			11.2	
LOS		C			C	A		B			B	
Approach Delay		26.5			17.5			10.2			11.2	
Approach LOS		C			B			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 60.6			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.38			
Intersection Signal Delay: 11.9		Intersection LOS: B	
Intersection Capacity Utilization 67.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	43	93	67	629	692
v/c Ratio	0.23	0.35	0.19	0.33	0.38
Control Delay	26.5	29.3	1.1	10.2	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	29.3	1.1	10.2	11.2
Queue Length 50th (m)	3.7	10.4	0.0	23.2	28.1
Queue Length 95th (m)	12.2	22.2	0.0	37.7	44.7
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	188	547	578	1892	1798
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.23	0.17	0.12	0.33	0.38

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	30	0	36	0	481	19	49	463	2
Future Volume (vph)	0	0	0	30	0	36	0	481	19	49	463	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt					0.927			0.994			0.999	
Flt Protected					0.978						0.995	
Satd. Flow (prot)	0	1900	0	0	1650	0	0	3439	0	0	3457	0
Flt Permitted					0.978						0.995	
Satd. Flow (perm)	0	1900	0	0	1650	0	0	3439	0	0	3457	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	0%	3%	0%	4%	13%	2%	4%	0%
Adj. Flow (vph)	0	0	0	33	0	39	0	523	21	53	503	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	72	0	0	544	0	0	558	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 42.1% ICU Level of Service A
Analysis Period (min) 15

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↕			↕	
Traffic Vol, veh/h	0	0	0	30	0	36	0	481	19	49	463	2
Future Vol, veh/h	0	0	0	30	0	36	0	481	19	49	463	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	6	0	3	0	4	13	2	4	0
Mvmt Flow	0	0	0	33	0	39	0	523	21	53	503	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	872	1154	253	892	1145	272	505	0	0	544	0	0
Stage 1	610	610	-	534	534	-	-	-	-	-	-	-
Stage 2	262	544	-	358	611	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.62	6.5	6.96	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.56	4	3.33	2.2	-	-	2.22	-	-
Pot Cap-1 Maneuver	248	199	753	230	201	723	1070	-	-	1021	-	-
Stage 1	453	488	-	488	528	-	-	-	-	-	-	-
Stage 2	726	522	-	622	487	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	222	185	753	217	187	723	1070	-	-	1021	-	-
Mov Cap-2 Maneuver	222	185	-	217	187	-	-	-	-	-	-	-
Stage 1	453	453	-	488	528	-	-	-	-	-	-	-
Stage 2	687	522	-	577	452	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	17.9	0	1.1
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1070	-	-	-	351	1021	-	-
HCM Lane V/C Ratio	-	-	-	-	0.204	0.052	-	-
HCM Control Delay (s)	0	-	-	0	17.9	8.7	0.3	-
HCM Lane LOS	A	-	-	A	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.8	0.2	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑↑↱		↰	↑↑↱	
Traffic Volume (vph)	22	136	222	117	94	93	82	323	86	29	234	21
Future Volume (vph)	22	136	222	117	94	93	82	323	86	29	234	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		0.99	0.99		1.00	1.00	
Frt		0.921			0.959			0.969			0.988	
Flt Protected		0.997			0.981		0.950			0.950		
Satd. Flow (prot)	0	1673	0	0	1756	0	1770	3359	0	1517	3386	0
Flt Permitted		0.964			0.534		0.950			0.950		
Satd. Flow (perm)	0	1617	0	0	956	0	1761	3359	0	1512	3386	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		84			26			45			13	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	6		1	1		6	5		4	4		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	3%	3%	3%	0%	0%	2%	4%	2%	19%	5%	6%
Adj. Flow (vph)	24	148	241	127	102	101	89	351	93	32	254	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	413	0	0	330	0	89	444	0	32	277	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		20.1			20.1		9.0	33.1		7.1	27.2	
Actuated g/C Ratio		0.28			0.28		0.12	0.46		0.10	0.38	
v/c Ratio		0.81			1.16		0.40	0.28		0.21	0.22	
Control Delay		35.0			130.9		35.5	12.4		34.7	16.2	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		35.0			130.9		35.5	12.4		34.7	16.2	
LOS		C			F		D	B		C	B	
Approach Delay		35.0			130.9			16.3			18.1	
Approach LOS		C			F			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 72.1
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.16
Intersection Signal Delay: 45.4 Intersection LOS: D
Intersection Capacity Utilization 87.2% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	413	330	89	444	32	277
v/c Ratio	0.81	1.16	0.40	0.28	0.21	0.22
Control Delay	35.0	130.9	35.5	12.4	34.7	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	130.9	35.5	12.4	34.7	16.2
Queue Length 50th (m)	42.8	~53.4	11.5	13.8	4.2	12.8
Queue Length 95th (m)	#94.3	#105.5	24.0	31.1	11.8	22.4
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	512	285	370	1566	317	1284
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.81	1.16	0.24	0.28	0.10	0.22

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	28	26	13	64	63	12
Future Volume (vph)	28	26	13	64	63	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.978	
Flt Protected	0.975			0.992		
Satd. Flow (prot)	1698	0	0	1848	1822	0
Flt Permitted	0.975			0.992		
Satd. Flow (perm)	1698	0	0	1848	1822	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	181.2			571.5	635.5	
Travel Time (s)	13.0			25.7	37.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	28	14	70	68	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	58	0	0	84	81	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	26	13	64	63	12
Future Vol, veh/h	28	26	13	64	63	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	28	14	70	68	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	173	75	81	0	-	0
Stage 1	75	-	-	-	-	-
Stage 2	98	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	817	986	1517	-	-	-
Stage 1	948	-	-	-	-	-
Stage 2	926	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	809	986	1517	-	-	-
Mov Cap-2 Maneuver	809	-	-	-	-	-
Stage 1	939	-	-	-	-	-
Stage 2	926	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.4	1.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1517	-	886	-	-
HCM Lane V/C Ratio	0.009	-	0.066	-	-
HCM Control Delay (s)	7.4	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Appendix I

2034 Background Traffic Operations Reports

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	199	4	9	234	5	13
Future Volume (vph)	199	4	9	234	5	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.998				0.901	
Flt Protected				0.998	0.987	
Satd. Flow (prot)	1711	0	0	1774	1690	0
Flt Permitted				0.998	0.987	
Satd. Flow (perm)	1711	0	0	1774	1690	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		2	2			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	0%	29%	6%	0%	0%
Adj. Flow (vph)	216	4	10	254	5	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	220	0	0	264	19	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 29.6%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	199	4	9	234	5	13
Future Vol, veh/h	199	4	9	234	5	13
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	11	0	29	6	0	0
Mvmt Flow	216	4	10	254	5	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	222	0	494	220
Stage 1	-	-	-	-	220	-
Stage 2	-	-	-	-	274	-
Critical Hdwy	-	-	4.39	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.461	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1203	-	538	825
Stage 1	-	-	-	-	821	-
Stage 2	-	-	-	-	777	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1201	-	532	824
Mov Cap-2 Maneuver	-	-	-	-	532	-
Stage 1	-	-	-	-	819	-
Stage 2	-	-	-	-	769	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	715	-	-	1201	-
HCM Lane V/C Ratio	0.027	-	-	0.008	-
HCM Control Delay (s)	10.2	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	110	40	1	68	43	5
Future Volume (vph)	110	40	1	68	43	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.964				0.987	
Flt Protected				0.999	0.957	
Satd. Flow (prot)	1643	0	0	1770	1747	0
Flt Permitted				0.999	0.957	
Satd. Flow (perm)	1643	0	0	1770	1747	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	1407.1	
Travel Time (s)	60.3			11.0	63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	12%	10%	100%	6%	3%	0%
Adj. Flow (vph)	120	43	1	74	47	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	163	0	0	75	52	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.2%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	110	40	1	68	43	5
Future Vol, veh/h	110	40	1	68	43	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	10	100	6	3	0
Mvmt Flow	120	43	1	74	47	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	163	0	218	142
Stage 1	-	-	-	-	142	-
Stage 2	-	-	-	-	76	-
Critical Hdwy	-	-	5.1	-	6.43	6.2
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	3.1	-	3.527	3.3
Pot Cap-1 Maneuver	-	-	988	-	768	911
Stage 1	-	-	-	-	883	-
Stage 2	-	-	-	-	944	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	988	-	767	911
Mov Cap-2 Maneuver	-	-	-	-	767	-
Stage 1	-	-	-	-	883	-
Stage 2	-	-	-	-	943	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	9.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	780	-	-	988	-
HCM Lane V/C Ratio	0.067	-	-	0.001	-
HCM Control Delay (s)	9.9	-	-	8.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	9	22	12	0	13	0	5	41	3	3	36	3
Future Volume (vph)	9	22	12	0	13	0	5	41	3	3	36	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.963						0.992			0.991	
Flt Protected		0.989						0.995			0.997	
Satd. Flow (prot)	0	1705	0	0	1727	0	0	1703	0	0	1663	0
Flt Permitted		0.989						0.995			0.997	
Satd. Flow (perm)	0	1705	0	0	1727	0	0	1703	0	0	1663	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			1407.1	
Travel Time (s)		29.3			22.9			10.6			63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	11%	0%	10%	0%	50%	3%	50%	0%	11%	50%
Adj. Flow (vph)	10	24	13	0	14	0	5	45	3	3	39	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	47	0	0	14	0	0	53	0	0	45	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	9	22	12	0	13	0	5	41	3	3	36	3
Future Vol, veh/h	9	22	12	0	13	0	5	41	3	3	36	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	11	0	10	0	50	3	50	0	11	50
Mvmt Flow	10	24	13	0	14	0	5	45	3	3	39	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	111	105	41	122	105	47	42	0	0	48	0	0
Stage 1	47	47	-	57	57	-	-	-	-	-	-	-
Stage 2	64	58	-	65	48	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.31	7.1	6.6	6.2	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.399	3.5	4.09	3.3	2.65	-	-	2.2	-	-
Pot Cap-1 Maneuver	872	778	1005	858	770	1028	1308	-	-	1572	-	-
Stage 1	972	848	-	960	832	-	-	-	-	-	-	-
Stage 2	952	839	-	951	839	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	855	773	1005	823	765	1028	1308	-	-	1572	-	-
Mov Cap-2 Maneuver	855	773	-	823	765	-	-	-	-	-	-	-
Stage 1	968	846	-	956	829	-	-	-	-	-	-	-
Stage 2	932	836	-	910	837	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.5	9.8	0.8	0.5
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1308	-	-	844	765	1572	-	-
HCM Lane V/C Ratio	0.004	-	-	0.055	0.018	0.002	-	-
HCM Control Delay (s)	7.8	0	-	9.5	9.8	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	9	18	31	1	0	8
Future Volume (vph)	9	18	31	1	0	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.996		0.865	
Flt Protected		0.984				
Satd. Flow (prot)	0	1567	1433	0	1644	0
Flt Permitted		0.984				
Satd. Flow (perm)	0	1567	1433	0	1644	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	29%	33%	0%	0%	0%
Adj. Flow (vph)	10	20	34	1	0	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	30	35	0	9	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.1%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	18	31	1	0	8
Future Vol, veh/h	9	18	31	1	0	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	29	33	0	0	0
Mvmt Flow	10	20	34	1	0	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	35	0	-	0	75	35
Stage 1	-	-	-	-	35	-
Stage 2	-	-	-	-	40	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1589	-	-	-	933	1044
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	988	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1589	-	-	-	927	1044
Mov Cap-2 Maneuver	-	-	-	-	927	-
Stage 1	-	-	-	-	987	-
Stage 2	-	-	-	-	988	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1589	-	-	-	1044
HCM Lane V/C Ratio	0.006	-	-	-	0.008
HCM Control Delay (s)	7.3	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	6	22	69	6	27	3	512	62	19	411	16
Future Volume (vph)	8	6	22	69	6	27	3	512	62	19	411	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.98			0.99	0.98		1.00			1.00	
Frt		0.919				0.850		0.984			0.995	
Flt Protected		0.989			0.956						0.998	
Satd. Flow (prot)	0	1640	0	0	1637	1615	0	3213	0	0	3320	0
Flt Permitted		0.989			0.956			0.953			0.915	
Satd. Flow (perm)	0	1637	0	0	1628	1581	0	3062	0	0	3043	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24				160		20			6	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	6		4	4		6	10		12	12		10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	6%	12%	0%	0%	0%	9%	20%	0%	8%	14%
Adj. Flow (vph)	9	7	24	75	7	29	3	557	67	21	447	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	40	0	0	82	29	0	627	0	0	485	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			8.8	8.8		36.1			36.1	
Actuated g/C Ratio		0.10			0.15	0.15		0.61			0.61	
v/c Ratio		0.21			0.34	0.08		0.33			0.26	
Control Delay		19.5			28.2	0.4		9.3			9.0	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		19.5			28.2	0.4		9.3			9.0	
LOS		B			C	A		A			A	
Approach Delay		19.5			21.0			9.3			9.0	
Approach LOS		B			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 58.7			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.34			
Intersection Signal Delay: 10.6		Intersection LOS: B	
Intersection Capacity Utilization 65.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	40	82	29	627	485
v/c Ratio	0.21	0.34	0.08	0.33	0.26
Control Delay	19.5	28.2	0.4	9.3	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.5	28.2	0.4	9.3	9.0
Queue Length 50th (m)	1.4	6.8	0.0	13.2	10.0
Queue Length 95th (m)	9.8	20.3	0.0	39.1	30.1
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	191	508	601	1892	1875
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.21	0.16	0.05	0.33	0.26

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	0	17	0	40	0	355	9	30	445	0
Future Volume (vph)	1	0	0	17	0	40	0	355	9	30	445	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt					0.905			0.996				
Flt Protected		0.950			0.985						0.997	
Satd. Flow (prot)	0	1805	0	0	1559	0	0	3362	0	0	3408	0
Flt Permitted		0.950			0.985						0.997	
Satd. Flow (perm)	0	1805	0	0	1559	0	0	3362	0	0	3408	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Confl. Peds. (#/hr)			1	1					2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	15%	0%	6%	0%	6%	43%	0%	6%	0%
Adj. Flow (vph)	1	0	0	18	0	43	0	386	10	33	484	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1	0	0	61	0	0	396	0	0	517	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 37.1% ICU Level of Service A
Analysis Period (min) 15

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	0	0	17	0	40	0	355	9	30	445	0
Future Vol, veh/h	1	0	0	17	0	40	0	355	9	30	445	0
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	15	0	6	0	6	43	0	6	0
Mvmt Flow	1	0	0	18	0	43	0	388	10	33	484	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	743	948	243	702	943	200	484	0	0	398	0	0
Stage 1	550	550	-	393	393	-	-	-	-	-	-	-
Stage 2	193	398	-	309	550	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.8	6.5	7.02	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.65	4	3.36	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	307	263	764	301	265	795	1089	-	-	1172	-	-
Stage 1	492	519	-	569	609	-	-	-	-	-	-	-
Stage 2	796	606	-	641	519	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	282	252	763	291	254	794	1089	-	-	1170	-	-
Mov Cap-2 Maneuver	282	252	-	291	254	-	-	-	-	-	-	-
Stage 1	492	499	-	568	608	-	-	-	-	-	-	-
Stage 2	752	605	-	615	499	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.8	12.8	0	0.6
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1089	-	-	282	524	1170	-	-
HCM Lane V/C Ratio	-	-	-	0.004	0.118	0.028	-	-
HCM Control Delay (s)	0	-	-	17.8	12.8	8.2	0.1	-
HCM Lane LOS	A	-	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.4	0.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	12	101	125	85	92	71	111	255	84	5	78	18
Future Volume (vph)	12	101	125	85	92	71	111	255	84	5	78	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.99		1.00	0.99		1.00	1.00	
Frt		0.929			0.961			0.963			0.971	
Flt Protected		0.997			0.983		0.950			0.950		
Satd. Flow (prot)	0	1604	0	0	1682	0	1703	3169	0	1805	3329	0
Flt Permitted		0.976			0.719		0.950			0.950		
Satd. Flow (perm)	0	1570	0	0	1226	0	1701	3169	0	1799	3329	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		66			24			60			20	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	2		12	12		2	1		4	4		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	9%	7%	7%	2%	11%	6%	9%	9%	0%	6%	0%
Adj. Flow (vph)	13	110	136	92	100	77	121	277	91	5	85	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	259	0	0	269	0	121	368	0	5	105	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		18.0			18.0		10.4	37.5		5.9	27.6	
Actuated g/C Ratio		0.25			0.25		0.15	0.52		0.08	0.38	
v/c Ratio		0.58			0.83		0.49	0.22		0.03	0.08	
Control Delay		24.4			47.3		36.7	8.8		34.0	14.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		24.4			47.3		36.7	8.8		34.0	14.6	
LOS		C			D		D	A		C	B	
Approach Delay		24.4			47.3			15.7			15.4	
Approach LOS		C			D			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 71.7
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 25.2 Intersection LOS: C
Intersection Capacity Utilization 68.2% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	259	269	121	368	5	105
v/c Ratio	0.58	0.83	0.49	0.22	0.03	0.08
Control Delay	24.4	47.3	36.7	8.8	34.0	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	47.3	36.7	8.8	34.0	14.6
Queue Length 50th (m)	22.9	32.1	16.0	10.4	0.7	4.0
Queue Length 95th (m)	48.0	#74.6	30.7	22.8	3.9	9.5
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	495	366	364	1685	386	1294
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.73	0.33	0.22	0.01	0.08

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	254	12	28	273	10	10
Future Volume (vph)	254	12	28	273	10	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.994				0.932	
Flt Protected				0.995	0.976	
Satd. Flow (prot)	1836	0	0	1840	1728	0
Flt Permitted				0.995	0.976	
Satd. Flow (perm)	1836	0	0	1840	1728	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		6	6			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	0%	3%	0%	0%
Adj. Flow (vph)	276	13	30	297	11	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	289	0	0	327	22	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	254	12	28	273	10	10
Future Vol, veh/h	254	12	28	273	10	10
Conflicting Peds, #/hr	0	6	6	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	0	0	3	0	0
Mvmt Flow	276	13	30	297	11	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	295	0	646	289
Stage 1	-	-	-	-	289	-
Stage 2	-	-	-	-	357	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1278	-	439	755
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	713	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1272	-	425	751
Mov Cap-2 Maneuver	-	-	-	-	425	-
Stage 1	-	-	-	-	761	-
Stage 2	-	-	-	-	693	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	543	-	-	1272	-
HCM Lane V/C Ratio	0.04	-	-	0.024	-
HCM Control Delay (s)	11.9	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	96	56	10	136	69	3
Future Volume (vph)	96	56	10	136	69	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.950				0.995	
Flt Protected				0.997	0.954	
Satd. Flow (prot)	1729	0	0	1877	1617	0
Flt Permitted				0.997	0.954	
Satd. Flow (perm)	1729	0	0	1877	1617	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	1407.1	
Travel Time (s)	60.3			11.0	63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	5%	0%	1%	8%	100%
Adj. Flow (vph)	104	61	11	148	75	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	165	0	0	159	78	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 26.1%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	96	56	10	136	69	3
Future Vol, veh/h	96	56	10	136	69	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	5	0	1	8	100
Mvmt Flow	104	61	11	148	75	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	165	0	305	135
Stage 1	-	-	-	-	135	-
Stage 2	-	-	-	-	170	-
Critical Hdwy	-	-	4.1	-	6.48	7.2
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	-	-	2.2	-	3.572	4.2
Pot Cap-1 Maneuver	-	-	1426	-	675	707
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	846	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1426	-	670	707
Mov Cap-2 Maneuver	-	-	-	-	670	-
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	839	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	11.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	671	-	-	1426	-
HCM Lane V/C Ratio	0.117	-	-	0.008	-
HCM Control Delay (s)	11.1	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	21	9	3	16	5	13	53	1	3	52	16
Future Volume (vph)	13	21	9	3	16	5	13	53	1	3	52	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.971			0.973			0.998			0.970	
Flt Protected		0.985			0.994			0.991			0.998	
Satd. Flow (prot)	0	1668	0	0	1649	0	0	1780	0	0	1774	0
Flt Permitted		0.985			0.994			0.991			0.998	
Satd. Flow (perm)	0	1668	0	0	1649	0	0	1780	0	0	1774	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			1407.1	
Travel Time (s)		29.3			22.9			10.6			63.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	0%	0%	50%	8%	0%	0%	7%	0%	0%	5%	0%
Adj. Flow (vph)	14	23	10	3	17	5	14	58	1	3	57	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	47	0	0	25	0	0	73	0	0	77	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.7%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	13	21	9	3	16	5	13	53	1	3	52	16
Future Vol, veh/h	13	21	9	3	16	5	13	53	1	3	52	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	30	0	0	50	8	0	0	7	0	0	5	0
Mvmt Flow	14	23	10	3	17	5	14	58	1	3	57	17

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	170	159	66	175	167	59	74	0	0	59	0	0
Stage 1	72	72	-	87	87	-	-	-	-	-	-	-
Stage 2	98	87	-	88	80	-	-	-	-	-	-	-
Critical Hdwy	7.4	6.5	6.2	7.6	6.58	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.77	4	3.3	3.95	4.072	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	735	737	1003	692	715	1012	1538	-	-	1558	-	-
Stage 1	872	839	-	815	811	-	-	-	-	-	-	-
Stage 2	844	827	-	814	817	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	711	729	1003	664	707	1012	1538	-	-	1558	-	-
Mov Cap-2 Maneuver	711	729	-	664	707	-	-	-	-	-	-	-
Stage 1	864	837	-	808	804	-	-	-	-	-	-	-
Stage 2	814	820	-	783	815	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10	10	1.4	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1538	-	-	767	748	1558	-	-
HCM Lane V/C Ratio	0.009	-	-	0.061	0.035	0.002	-	-
HCM Control Delay (s)	7.4	0	-	10	10	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	16	21	22	1	0	5
Future Volume (vph)	16	21	22	1	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.995		0.865	
Flt Protected		0.979				
Satd. Flow (prot)	0	1798	1788	0	1644	0
Flt Permitted		0.979				
Satd. Flow (perm)	0	1798	1788	0	1644	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Confl. Peds. (#/hr)	4			4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	6%	0%	0%	0%
Adj. Flow (vph)	17	23	24	1	0	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	40	25	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.7%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	21	22	1	0	5
Future Vol, veh/h	16	21	22	1	0	5
Conflicting Peds, #/hr	4	0	0	4	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	6	6	0	0	0
Mvmt Flow	17	23	24	1	0	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	29	0	-	0	86	29
Stage 1	-	-	-	-	29	-
Stage 2	-	-	-	-	57	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1597	-	-	-	920	1052
Stage 1	-	-	-	-	999	-
Stage 2	-	-	-	-	971	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1592	-	-	-	904	1048
Mov Cap-2 Maneuver	-	-	-	-	904	-
Stage 1	-	-	-	-	985	-
Stage 2	-	-	-	-	968	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1592	-	-	-	1048
HCM Lane V/C Ratio	0.011	-	-	-	0.005
HCM Control Delay (s)	7.3	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	13	10	66	8	49	9	527	79	28	627	30
Future Volume (vph)	19	13	10	66	8	49	9	527	79	28	627	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.99			0.99	0.99		1.00			1.00	
Frt		0.968				0.850		0.981			0.993	
Flt Protected		0.978			0.957			0.999			0.998	
Satd. Flow (prot)	0	1784	0	0	1818	1568	0	3408	0	0	3469	0
Flt Permitted		0.978			0.957			0.941			0.907	
Satd. Flow (perm)	0	1783	0	0	1805	1547	0	3210	0	0	3152	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				160		26			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	1		6	6		1	12		8	8		12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	0%	3%	5%
Adj. Flow (vph)	21	14	11	72	9	53	10	573	86	30	682	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	46	0	0	81	53	0	669	0	0	745	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			8.6	8.6		35.5			35.5	
Actuated g/C Ratio		0.10			0.14	0.14		0.59			0.59	
v/c Ratio		0.24			0.31	0.15		0.35			0.40	
Control Delay		26.3			28.8	0.9		10.3			11.2	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		26.3			28.8	0.9		10.3			11.2	
LOS		C			C	A		B			B	
Approach Delay		26.3			17.8			10.3			11.2	
Approach LOS		C			B			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 60.3
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.40
Intersection Signal Delay: 11.8 Intersection LOS: B
Intersection Capacity Utilization 59.8% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	46	81	53	669	745
v/c Ratio	0.24	0.31	0.15	0.35	0.40
Control Delay	26.3	28.8	0.9	10.3	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	26.3	28.8	0.9	10.3	11.2
Queue Length 50th (m)	3.9	9.0	0.0	25.6	30.7
Queue Length 95th (m)	12.7	19.9	0.0	40.2	47.3
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	189	549	579	1900	1858
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.24	0.15	0.09	0.35	0.40

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	21	0	40	0	506	19	54	490	3
Future Volume (vph)	0	0	0	21	0	40	0	506	19	54	490	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt					0.912			0.994			0.999	
Flt Protected					0.983						0.995	
Satd. Flow (prot)	0	1900	0	0	1637	0	0	3439	0	0	3458	0
Flt Permitted					0.983						0.995	
Satd. Flow (perm)	0	1900	0	0	1637	0	0	3439	0	0	3458	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	0%	3%	0%	4%	13%	2%	4%	0%
Adj. Flow (vph)	0	0	0	23	0	43	0	550	21	59	533	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	66	0	0	571	0	0	595	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	21	0	40	0	506	19	54	490	3
Future Vol, veh/h	0	0	0	21	0	40	0	506	19	54	490	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	6	0	3	0	4	13	2	4	0
Mvmt Flow	0	0	0	23	0	43	0	550	21	59	533	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	928	1224	268	946	1215	286	536	0	0	571	0	0
Stage 1	653	653	-	561	561	-	-	-	-	-	-	-
Stage 2	275	571	-	385	654	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.62	6.5	6.96	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.56	4	3.33	2.2	-	-	2.22	-	-
Pot Cap-1 Maneuver	226	181	736	210	183	708	1042	-	-	998	-	-
Stage 1	427	467	-	470	513	-	-	-	-	-	-	-
Stage 2	713	508	-	599	466	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	198	166	736	197	168	708	1042	-	-	998	-	-
Mov Cap-2 Maneuver	198	166	-	197	168	-	-	-	-	-	-	-
Stage 1	427	428	-	470	513	-	-	-	-	-	-	-
Stage 2	669	508	-	549	427	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	16.7	0	1.1
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1042	-	-	-	374	998	-	-
HCM Lane V/C Ratio	-	-	-	-	0.177	0.059	-	-
HCM Control Delay (s)	0	-	-	0	16.7	8.8	0.3	-
HCM Lane LOS	A	-	-	A	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.6	0.2	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	145	239	129	94	88	83	343	94	22	247	23
Future Volume (vph)	25	145	239	129	94	88	83	343	94	22	247	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		1.00	0.99		1.00	1.00	
Frt		0.921			0.962			0.968			0.987	
Flt Protected		0.997			0.980		0.950			0.950		
Satd. Flow (prot)	0	1673	0	0	1759	0	1770	3355	0	1517	3383	0
Flt Permitted		0.960			0.484		0.950			0.950		
Satd. Flow (perm)	0	1610	0	0	869	0	1761	3355	0	1512	3383	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		84			24			47			13	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	6		1	1		6	5		4	4		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	3%	3%	3%	0%	0%	2%	4%	2%	19%	5%	6%
Adj. Flow (vph)	27	158	260	140	102	96	90	373	102	24	268	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	445	0	0	338	0	90	475	0	24	293	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		20.1			20.1		9.0	33.4		6.8	27.2	
Actuated g/C Ratio		0.28			0.28		0.12	0.46		0.09	0.38	
v/c Ratio		0.87			1.31		0.41	0.30		0.17	0.23	
Control Delay		42.1			188.1		35.5	12.4		34.3	16.4	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		42.1			188.1		35.5	12.4		34.3	16.4	
LOS		D			F		D	B		C	B	
Approach Delay		42.1			188.1			16.1			17.7	
Approach LOS		D			F			B			B	

Intersection Summary		
Area Type:	Other	
Cycle Length: 80		
Actuated Cycle Length: 72.2		
Natural Cycle: 75		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 1.31		
Intersection Signal Delay: 58.3		Intersection LOS: E
Intersection Capacity Utilization 89.3%		ICU Level of Service E
Analysis Period (min) 15		

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	445	338	90	475	24	293
v/c Ratio	0.87	1.31	0.41	0.30	0.17	0.23
Control Delay	42.1	188.1	35.5	12.4	34.3	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.1	188.1	35.5	12.4	34.3	16.4
Queue Length 50th (m)	48.5	~60.0	11.7	15.1	3.1	13.7
Queue Length 95th (m)	#106.1	#112.6	24.0	32.8	9.8	23.7
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	509	259	370	1577	317	1282
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.87	1.31	0.24	0.30	0.08	0.23

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Appendix J

2034 Total Traffic Operations Reports

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	216	9	9	237	17	13
Future Volume (vph)	216	9	9	237	17	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.994				0.941	
Flt Protected				0.998	0.973	
Satd. Flow (prot)	1708	0	0	1775	1740	0
Flt Permitted				0.998	0.973	
Satd. Flow (perm)	1708	0	0	1775	1740	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		2	2			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	0%	29%	6%	0%	0%
Adj. Flow (vph)	235	10	10	258	18	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	245	0	0	268	32	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 29.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	216	9	9	237	17	13
Future Vol, veh/h	216	9	9	237	17	13
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	11	0	29	6	0	0
Mvmt Flow	235	10	10	258	18	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	247	0	520	242
Stage 1	-	-	-	-	242	-
Stage 2	-	-	-	-	278	-
Critical Hdwy	-	-	4.39	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.461	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1176	-	520	802
Stage 1	-	-	-	-	803	-
Stage 2	-	-	-	-	774	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1174	-	514	801
Mov Cap-2 Maneuver	-	-	-	-	514	-
Stage 1	-	-	-	-	801	-
Stage 2	-	-	-	-	766	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	608	-	-	1174	-
HCM Lane V/C Ratio	0.054	-	-	0.008	-
HCM Control Delay (s)	11.3	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	110	57	15	68	46	15
Future Volume (vph)	110	57	15	68	46	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.954				0.967	
Flt Protected				0.991	0.964	
Satd. Flow (prot)	1628	0	0	1534	1732	0
Flt Permitted				0.991	0.964	
Satd. Flow (perm)	1628	0	0	1534	1732	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	841.3	
Travel Time (s)	60.3			11.0	37.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	12%	10%	100%	6%	3%	0%
Adj. Flow (vph)	120	62	16	74	50	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	0	0	90	66	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 26.6%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	110	57	15	68	46	15
Future Vol, veh/h	110	57	15	68	46	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	10	100	6	3	0
Mvmt Flow	120	62	16	74	50	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	182	0	257	151
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	106	-
Critical Hdwy	-	-	5.1	-	6.43	6.2
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	3.1	-	3.527	3.3
Pot Cap-1 Maneuver	-	-	970	-	730	901
Stage 1	-	-	-	-	874	-
Stage 2	-	-	-	-	916	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	970	-	718	901
Mov Cap-2 Maneuver	-	-	-	-	718	-
Stage 1	-	-	-	-	874	-
Stage 2	-	-	-	-	900	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	756	-	-	970	-
HCM Lane V/C Ratio	0.088	-	-	0.017	-
HCM Control Delay (s)	10.2	-	-	8.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	23	22	12	0	13	5	5	50	3	6	43	5
Future Volume (vph)	23	22	12	0	13	5	5	50	3	6	43	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.972			0.964			0.993			0.989	
Flt Protected		0.980						0.996			0.994	
Satd. Flow (prot)	0	1730	0	0	1706	0	0	1723	0	0	1653	0
Flt Permitted		0.980						0.996			0.994	
Satd. Flow (perm)	0	1730	0	0	1706	0	0	1723	0	0	1653	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			565.7	
Travel Time (s)		29.3			22.9			10.6			25.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	11%	0%	10%	0%	50%	3%	50%	0%	11%	50%
Adj. Flow (vph)	25	24	13	0	14	5	5	54	3	7	47	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	62	0	0	19	0	0	62	0	0	59	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.6%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	23	22	12	0	13	5	5	50	3	6	43	5
Future Vol, veh/h	23	22	12	0	13	5	5	50	3	6	43	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	6	11	0	10	0	50	3	50	0	11	50
Mvmt Flow	25	24	13	0	14	5	5	54	3	7	47	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	139	131	50	148	132	56	52	0	0	57	0	0
Stage 1	64	64	-	66	66	-	-	-	-	-	-	-
Stage 2	75	67	-	82	66	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.31	7.1	6.6	6.2	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.399	3.5	4.09	3.3	2.65	-	-	2.2	-	-
Pot Cap-1 Maneuver	836	752	993	825	744	1016	1296	-	-	1560	-	-
Stage 1	952	834	-	950	824	-	-	-	-	-	-	-
Stage 2	939	831	-	931	824	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	813	745	993	789	737	1016	1296	-	-	1560	-	-
Mov Cap-2 Maneuver	813	745	-	789	737	-	-	-	-	-	-	-
Stage 1	948	830	-	946	821	-	-	-	-	-	-	-
Stage 2	914	828	-	888	820	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.8	9.6	0.7	0.8
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1296	-	-	815	798	1560	-	-
HCM Lane V/C Ratio	0.004	-	-	0.076	0.025	0.004	-	-
HCM Control Delay (s)	7.8	0	-	9.8	9.6	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	9	48	63	13	5	8
Future Volume (vph)	9	48	63	13	5	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.977		0.913	
Flt Protected		0.992			0.982	
Satd. Flow (prot)	0	1516	1457	0	1703	0
Flt Permitted		0.992			0.982	
Satd. Flow (perm)	0	1516	1457	0	1703	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	29%	33%	0%	0%	0%
Adj. Flow (vph)	10	52	68	14	5	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	62	82	0	14	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.7%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	48	63	13	5	8
Future Vol, veh/h	9	48	63	13	5	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	29	33	0	0	0
Mvmt Flow	10	52	68	14	5	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	82	0	-	0	147	75
Stage 1	-	-	-	-	75	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1528	-	-	-	850	992
Stage 1	-	-	-	-	953	-
Stage 2	-	-	-	-	956	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1528	-	-	-	844	992
Mov Cap-2 Maneuver	-	-	-	-	844	-
Stage 1	-	-	-	-	946	-
Stage 2	-	-	-	-	956	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1528	-	-	-	929
HCM Lane V/C Ratio	0.006	-	-	-	0.015
HCM Control Delay (s)	7.4	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	6	22	89	6	39	3	512	76	35	411	16
Future Volume (vph)	8	6	22	89	6	39	3	512	76	35	411	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.98			0.99	0.98		1.00			1.00	
Frt		0.919				0.850		0.981			0.995	
Flt Protected		0.989			0.955						0.996	
Satd. Flow (prot)	0	1640	0	0	1632	1615	0	3194	0	0	3321	0
Flt Permitted		0.989			0.955			0.953			0.870	
Satd. Flow (perm)	0	1637	0	0	1623	1581	0	3044	0	0	2900	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24				160		26			6	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	6		4	4		6	10		12	12		10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	6%	12%	0%	0%	0%	9%	20%	0%	8%	14%
Adj. Flow (vph)	9	7	24	97	7	42	3	557	83	38	447	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	40	0	0	104	42	0	643	0	0	502	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			9.4	9.4		35.5			35.5	
Actuated g/C Ratio		0.10			0.16	0.16		0.61			0.61	
v/c Ratio		0.21			0.40	0.11		0.35			0.29	
Control Delay		19.8			28.8	0.6		9.8			9.7	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		19.8			28.8	0.6		9.8			9.7	
LOS		B			C	A		A			A	
Approach Delay		19.8			20.7			9.8			9.7	
Approach LOS		B			C			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 58.6
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.40
Intersection Signal Delay: 11.3 — Intersection LOS: B
Intersection Capacity Utilization 62.5% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	0	19	0	40	0	369	23	30	465	0
Future Volume (vph)	1	0	0	19	0	40	0	369	23	30	465	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt					0.909			0.991				
Flt Protected		0.950			0.984						0.997	
Satd. Flow (prot)	0	1805	0	0	1560	0	0	3307	0	0	3407	0
Flt Permitted		0.950			0.984						0.997	
Satd. Flow (perm)	0	1805	0	0	1560	0	0	3307	0	0	3407	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Confl. Peds. (#/hr)			1	1					2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	15%	0%	6%	0%	6%	43%	0%	6%	0%
Adj. Flow (vph)	1	0	0	21	0	43	0	401	25	33	505	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1	0	0	64	0	0	426	0	0	538	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	0	0	19	0	40	0	369	23	30	465	0
Future Vol, veh/h	1	0	0	19	0	40	0	369	23	30	465	0
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	15	0	6	0	6	43	0	6	0
Mvmt Flow	1	0	0	21	0	43	0	401	25	33	505	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	772	999	254	736	987	215	505	0	0	428	0	0
Stage 1	571	571	-	416	416	-	-	-	-	-	-	-
Stage 2	201	428	-	320	571	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.8	6.5	7.02	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.8	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.65	4	3.36	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	293	245	752	284	249	778	1070	-	-	1142	-	-
Stage 1	478	508	-	551	595	-	-	-	-	-	-	-
Stage 2	788	588	-	631	508	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	268	235	751	275	239	777	1070	-	-	1140	-	-
Mov Cap-2 Maneuver	268	235	-	275	239	-	-	-	-	-	-	-
Stage 1	478	488	-	550	594	-	-	-	-	-	-	-
Stage 2	744	587	-	605	488	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.5	13.5	0	0.6
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1070	-	-	268	489	1140	-	-
HCM Lane V/C Ratio	-	-	-	0.004	0.131	0.029	-	-
HCM Control Delay (s)	0	-	-	18.5	13.5	8.3	0.1	-
HCM Lane LOS	A	-	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.4	0.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	109	131	85	98	80	115	263	84	19	88	18
Future Volume (vph)	12	109	131	85	98	80	115	263	84	19	88	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		1.00	0.99		1.00	1.00	
Frt		0.930			0.959			0.964			0.974	
Flt Protected		0.998			0.984		0.950			0.950		
Satd. Flow (prot)	0	1608	0	0	1678	0	1703	3173	0	1805	3337	0
Flt Permitted		0.977			0.720		0.950			0.950		
Satd. Flow (perm)	0	1574	0	0	1224	0	1701	3173	0	1799	3337	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		65			26			58			20	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	2		12	12		2	1		4	4		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	9%	7%	7%	2%	11%	6%	9%	9%	0%	6%	0%
Adj. Flow (vph)	13	118	142	92	107	87	125	286	91	21	96	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	273	0	0	286	0	125	377	0	21	116	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		18.9			18.9		10.6	35.2		6.5	27.5	
Actuated g/C Ratio		0.26			0.26		0.15	0.49		0.09	0.38	
v/c Ratio		0.60			0.85		0.50	0.24		0.13	0.09	
Control Delay		25.1			49.5		37.2	10.7		34.6	14.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		25.1			49.5		37.2	10.7		34.6	14.8	
LOS		C			D		D	B		C	B	
Approach Delay		25.1			49.5			17.3			17.9	
Approach LOS		C			D			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 72.5
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 26.8 Intersection LOS: C
Intersection Capacity Utilization 69.9% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	13	12	28	50	41	31
Future Volume (vph)	13	12	28	50	41	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.942	
Flt Protected	0.975			0.982		
Satd. Flow (prot)	1698	0	0	1829	1755	0
Flt Permitted	0.975			0.982		
Satd. Flow (perm)	1698	0	0	1829	1755	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	170.1			565.7	841.3	
Travel Time (s)	12.2			25.5	37.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	13	30	54	45	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	0	0	84	79	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	12	28	50	41	31
Future Vol, veh/h	13	12	28	50	41	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	13	30	54	45	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	176	62	79	0	-	0
Stage 1	62	-	-	-	-	-
Stage 2	114	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	814	1003	1519	-	-	-
Stage 1	961	-	-	-	-	-
Stage 2	911	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	798	1003	1519	-	-	-
Mov Cap-2 Maneuver	798	-	-	-	-	-
Stage 1	942	-	-	-	-	-
Stage 2	911	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	2.7	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1519	-	685	-	-
HCM Lane V/C Ratio	0.02	-	0.031	-	-
HCM Control Delay (s)	7.4	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	255	25	28	286	18	10
Future Volume (vph)	255	25	28	286	18	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.988				0.952	
Flt Protected				0.996	0.969	
Satd. Flow (prot)	1827	0	0	1842	1753	0
Flt Permitted				0.996	0.969	
Satd. Flow (perm)	1827	0	0	1842	1753	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	177.9			837.3	538.8	
Travel Time (s)	12.8			60.3	38.8	
Confl. Peds. (#/hr)		6	6			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	0%	0%	3%	0%	0%
Adj. Flow (vph)	277	27	30	311	20	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	304	0	0	341	31	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	255	25	28	286	18	10
Future Vol, veh/h	255	25	28	286	18	10
Conflicting Peds, #/hr	0	6	6	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	0	0	3	0	0
Mvmt Flow	277	27	30	311	20	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	310	0	668	297
Stage 1	-	-	-	-	297	-
Stage 2	-	-	-	-	371	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1262	-	426	747
Stage 1	-	-	-	-	758	-
Stage 2	-	-	-	-	702	-
Platoon blocked, %	-	-			-	
Mov Cap-1 Maneuver	-	-	1256	-	412	743
Mov Cap-2 Maneuver	-	-	-	-	412	-
Stage 1	-	-	-	-	754	-
Stage 2	-	-	-	-	682	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	490	-	-	1256	-
HCM Lane V/C Ratio	0.062	-	-	0.024	-
HCM Control Delay (s)	12.8	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	96	57	21	136	82	18
Future Volume (vph)	96	57	21	136	82	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.950				0.975	
Flt Protected				0.993	0.961	
Satd. Flow (prot)	1729	0	0	1871	1426	0
Flt Permitted				0.993	0.961	
Satd. Flow (perm)	1729	0	0	1871	1426	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	837.3			245.3	835.5	
Travel Time (s)	60.3			11.0	37.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	5%	0%	1%	8%	100%
Adj. Flow (vph)	104	62	23	148	89	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	166	0	0	171	109	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 32.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	3.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	96	57	21	136	82	18
Future Vol, veh/h	96	57	21	136	82	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	5	0	1	8	100
Mvmt Flow	104	62	23	148	89	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	166	0	329	135
Stage 1	-	-	-	-	135	-
Stage 2	-	-	-	-	194	-
Critical Hdwy	-	-	4.1	-	6.48	7.2
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	-	-	2.2	-	3.572	4.2
Pot Cap-1 Maneuver	-	-	1424	-	653	707
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	825	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1424	-	641	707
Mov Cap-2 Maneuver	-	-	-	-	641	-
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	810	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	652	-	-	1424	-
HCM Lane V/C Ratio	0.167	-	-	0.016	-
HCM Control Delay (s)	11.6	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	14	21	9	3	16	9	13	61	1	8	62	27
Future Volume (vph)	14	21	9	3	16	9	13	61	1	8	62	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.972			0.955			0.998			0.963	
Flt Protected		0.985			0.995			0.991			0.996	
Satd. Flow (prot)	0	1663	0	0	1648	0	0	1778	0	0	1766	0
Flt Permitted		0.985			0.995			0.991			0.996	
Satd. Flow (perm)	0	1663	0	0	1648	0	0	1778	0	0	1766	0
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		487.9			382.3			235.8			571.5	
Travel Time (s)		29.3			22.9			10.6			25.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	0%	0%	50%	8%	0%	0%	7%	0%	0%	5%	0%
Adj. Flow (vph)	15	23	10	3	17	10	14	66	1	9	67	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	30	0	0	81	0	0	105	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	14	21	9	3	16	9	13	61	1	8	62	27
Future Vol, veh/h	14	21	9	3	16	9	13	61	1	8	62	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	30	0	0	50	8	0	0	7	0	0	5	0
Mvmt Flow	15	23	10	3	17	10	14	66	1	9	67	29

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	208	195	82	211	209	67	96	0	0	67	0	0
Stage 1	100	100	-	95	95	-	-	-	-	-	-	-
Stage 2	108	95	-	116	114	-	-	-	-	-	-	-
Critical Hdwy	7.4	6.5	6.2	7.6	6.58	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.4	5.5	-	6.6	5.58	-	-	-	-	-	-	-
Follow-up Hdwy	3.77	4	3.3	3.95	4.072	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	693	704	983	654	678	1002	1510	-	-	1547	-	-
Stage 1	842	816	-	806	805	-	-	-	-	-	-	-
Stage 2	833	820	-	785	790	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	665	693	983	623	667	1002	1510	-	-	1547	-	-
Mov Cap-2 Maneuver	665	693	-	623	667	-	-	-	-	-	-	-
Stage 1	834	811	-	798	797	-	-	-	-	-	-	-
Stage 2	799	812	-	751	785	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.3	10.1	1.3	0.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1510	-	-	727	741	1547	-	-
HCM Lane V/C Ratio	0.009	-	-	0.066	0.041	0.006	-	-
HCM Control Delay (s)	7.4	0	-	10.3	10.1	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	16	55	57	9	13	5
Future Volume (vph)	16	55	57	9	13	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.981		0.964	
Flt Protected		0.989			0.964	
Satd. Flow (prot)	0	1795	1772	0	1766	0
Flt Permitted		0.989			0.964	
Satd. Flow (perm)	0	1795	1772	0	1766	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		636.3	377.5		538.8	
Travel Time (s)		45.8	27.2		38.8	
Confl. Peds. (#/hr)	4			4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	6%	6%	0%	0%	0%
Adj. Flow (vph)	17	60	62	10	14	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	77	72	0	19	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	55	57	9	13	5
Future Vol, veh/h	16	55	57	9	13	5
Conflicting Peds, #/hr	4	0	0	4	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	6	6	0	0	0
Mvmt Flow	17	60	62	10	14	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	76	0	-	0	165	71
Stage 1	-	-	-	-	71	-
Stage 2	-	-	-	-	94	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1536	-	-	-	830	997
Stage 1	-	-	-	-	957	-
Stage 2	-	-	-	-	935	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1531	-	-	-	816	994
Mov Cap-2 Maneuver	-	-	-	-	816	-
Stage 1	-	-	-	-	944	-
Stage 2	-	-	-	-	932	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1531	-	-	-	859
HCM Lane V/C Ratio	0.011	-	-	-	0.023
HCM Control Delay (s)	7.4	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	13	10	84	8	66	9	527	99	42	627	30
Future Volume (vph)	19	13	10	84	8	66	9	527	99	42	627	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		40.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor		0.99			0.99	0.99		1.00			1.00	
Frt		0.968				0.850		0.977			0.993	
Flt Protected		0.978			0.956			0.999			0.997	
Satd. Flow (prot)	0	1784	0	0	1816	1568	0	3394	0	0	3468	0
Flt Permitted		0.978			0.956			0.941			0.871	
Satd. Flow (perm)	0	1783	0	0	1802	1547	0	3197	0	0	3029	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				160		34			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		114.8			312.4			199.2			278.1	
Travel Time (s)		8.3			22.5			14.3			20.0	
Confl. Peds. (#/hr)	1		6	6		1	12		8	8		12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	0%	3%	5%
Adj. Flow (vph)	21	14	11	91	9	72	10	573	108	46	682	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	46	0	0	100	72	0	691	0	0	761	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA		Split	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		8.0	8.0	8.0	30.0	30.0		30.0	30.0	
Minimum Split (s)	13.0	13.0		15.0	15.0	15.0	37.0	37.0		37.0	37.0	
Total Split (s)	13.0	13.0		25.0	25.0	25.0	37.0	37.0		37.0	37.0	
Total Split (%)	17.3%	17.3%		33.3%	33.3%	33.3%	49.3%	49.3%		49.3%	49.3%	
Maximum Green (s)	6.0	6.0		18.0	18.0	18.0	30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	4.0	4.0		4.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		7.0			7.0	7.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)				7.0	7.0	7.0	20.0	20.0		20.0	20.0	
Flash Dont Walk (s)				8.0	8.0	8.0	10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	
Act Effct Green (s)		6.1			9.0	9.0		35.6			35.6	
Actuated g/C Ratio		0.10			0.15	0.15		0.59			0.59	
v/c Ratio		0.24			0.37	0.20		0.37			0.43	
Control Delay		26.7			29.6	1.2		10.6			11.8	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		26.7			29.6	1.2		10.6			11.8	
LOS		C			C	A		B			B	
Approach Delay		26.7			17.7			10.6			11.8	
Approach LOS		C			B			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 60.7			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.43			
Intersection Signal Delay: 12.3		Intersection LOS: B	
Intersection Capacity Utilization 71.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: James Street (Highway 3)/James Street & Ann Street/Argyle Avenue



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	46	100	72	691	761
v/c Ratio	0.24	0.37	0.20	0.37	0.43
Control Delay	26.7	29.6	1.2	10.6	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	29.6	1.2	10.6	11.8
Queue Length 50th (m)	3.9	11.3	0.0	28.4	32.0
Queue Length 95th (m)	12.9	23.5	0.0	42.8	51.1
Internal Link Dist (m)	90.8	288.4		175.2	254.1
Turn Bay Length (m)			40.0		
Base Capacity (vph)	188	546	577	1887	1777
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.24	0.18	0.12	0.37	0.43

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	32	0	40	0	526	20	54	508	3
Future Volume (vph)	0	0	0	32	0	40	0	526	20	54	508	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt					0.926			0.994			0.999	
Flt Protected					0.978						0.995	
Satd. Flow (prot)	0	1900	0	0	1649	0	0	3439	0	0	3457	0
Flt Permitted					0.978						0.995	
Satd. Flow (perm)	0	1900	0	0	1649	0	0	3439	0	0	3457	0
Link Speed (k/h)		50			50			60			50	
Link Distance (m)		71.4			1303.3			297.5			681.7	
Travel Time (s)		5.1			93.8			17.9			49.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	6%	0%	3%	0%	4%	13%	2%	4%	0%
Adj. Flow (vph)	0	0	0	35	0	43	0	572	22	59	552	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	78	0	0	594	0	0	614	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	32	0	40	0	526	20	54	508	3
Future Vol, veh/h	0	0	0	32	0	40	0	526	20	54	508	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	6	0	3	0	4	13	2	4	0
Mvmt Flow	0	0	0	35	0	43	0	572	22	59	552	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	958	1266	278	977	1256	297	555	0	0	594	0	0
Stage 1	672	672	-	583	583	-	-	-	-	-	-	-
Stage 2	286	594	-	394	673	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.62	6.5	6.96	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.62	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.56	4	3.33	2.2	-	-	2.22	-	-
Pot Cap-1 Maneuver	215	171	725	199	173	696	1026	-	-	978	-	-
Stage 1	416	458	-	455	502	-	-	-	-	-	-	-
Stage 2	703	496	-	592	457	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	188	156	725	186	158	696	1026	-	-	978	-	-
Mov Cap-2 Maneuver	188	156	-	186	158	-	-	-	-	-	-	-
Stage 1	416	418	-	455	502	-	-	-	-	-	-	-
Stage 2	659	496	-	540	417	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	20.2	0	1.1
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1026	-	-	-	314	978	-	-
HCM Lane V/C Ratio	-	-	-	-	0.249	0.06	-	-
HCM Control Delay (s)	0	-	-	0	20.2	8.9	0.3	-
HCM Lane LOS	A	-	-	A	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	1	0.2	-	-

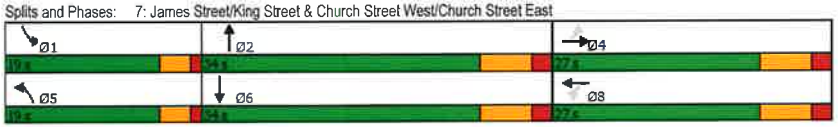
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↑↕		↰	↑↕	
Traffic Volume (vph)	25	150	244	129	102	101	89	354	94	31	256	23
Future Volume (vph)	25	150	244	129	102	101	89	354	94	31	256	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		1.00	0.99		1.00	1.00	
Frt		0.921			0.959			0.969			0.988	
Flt Protected		0.997			0.981		0.950			0.950		
Satd. Flow (prot)	0	1673	0	0	1756	0	1770	3359	0	1517	3387	0
Flt Permitted		0.957			0.487		0.950			0.950		
Satd. Flow (perm)	0	1605	0	0	872	0	1761	3359	0	1512	3387	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		84			26			45			13	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	6		1	1		6	5		4	4		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	3%	3%	3%	0%	0%	2%	4%	2%	19%	5%	6%
Adj. Flow (vph)	27	163	265	140	111	110	97	385	102	34	278	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	455	0	0	361	0	97	487	0	34	303	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		9.0	34.0		9.0	34.0	
Total Split (s)	27.0	27.0		27.0	27.0		19.0	34.0		19.0	34.0	
Total Split (%)	33.8%	33.8%		33.8%	33.8%		23.8%	42.5%		23.8%	42.5%	
Maximum Green (s)	20.0	20.0		20.0	20.0		15.0	27.0		15.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	10.0	10.0		10.0	10.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		20.2			20.2		9.3	33.4		7.2	27.2	
Actuated g/C Ratio		0.28			0.28		0.13	0.46		0.10	0.38	
v/c Ratio		0.90			1.38		0.43	0.31		0.23	0.24	
Control Delay		45.7			220.7		35.9	12.7		35.0	16.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		45.7			220.7		35.9	12.7		35.0	16.6	
LOS		D			F		D	B		C	B	
Approach Delay		45.7			220.7			16.6			18.5	
Approach LOS		D			F			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 72.5
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.38
Intersection Signal Delay: 67.0 Intersection LOS: E
Intersection Capacity Utilization 91.4% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	455	361	97	487	34	303
v/c Ratio	0.90	1.38	0.43	0.31	0.23	0.24
Control Delay	45.7	220.7	35.9	12.7	35.0	16.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.7	220.7	35.9	12.7	35.0	16.6
Queue Length 50th (m)	50.8	~66.7	12.6	15.6	4.5	14.4
Queue Length 95th (m)	#111.0	#121.3	25.6	34.5	12.3	24.6
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	506	261	369	1571	316	1279
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	1.38	0.26	0.31	0.11	0.24

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	28	26	13	71	70	12
Future Volume (vph)	28	26	13	71	70	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.980	
Flt Protected	0.975			0.992		
Satd. Flow (prot)	1698	0	0	1848	1825	0
Flt Permitted	0.975			0.992		
Satd. Flow (perm)	1698	0	0	1848	1825	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	181.2			571.5	835.5	
Travel Time (s)	13.0			25.7	37.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	28	14	77	76	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	58	0	0	91	89	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.1%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	26	13	71	70	12
Future Vol, veh/h	28	26	13	71	70	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	28	14	77	76	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	188	83	89	0	-	0
Stage 1	83	-	-	-	-	-
Stage 2	105	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	801	976	1506	-	-	-
Stage 1	940	-	-	-	-	-
Stage 2	919	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	793	976	1506	-	-	-
Mov Cap-2 Maneuver	793	-	-	-	-	-
Stage 1	931	-	-	-	-	-
Stage 2	919	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.4	1.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1506	-	872	-	-
HCM Lane V/C Ratio	0.009	-	0.067	-	-
HCM Control Delay (s)	7.4	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Appendix K

2034 Total Traffic Operations Reports – Intersection Improvements

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	109	131	85	98	80	115	263	84	19	88	18
Future Volume (vph)	12	109	131	85	98	80	115	263	84	19	88	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		1.00	0.99		1.00	1.00	
Frt		0.930			0.959			0.964			0.974	
Flt Protected		0.998			0.984		0.950			0.950		
Satd. Flow (prot)	0	1613	0	0	1679	0	1703	3172	0	1805	3337	0
Flt Permitted		0.975			0.726		0.950			0.950		
Satd. Flow (perm)	0	1576	0	0	1236	0	1700	3172	0	1788	3337	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		66			27			49			20	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	2		12	12		2	1		4	4		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	9%	7%	7%	2%	11%	6%	9%	9%	0%	6%	0%
Adj. Flow (vph)	13	118	142	92	107	87	125	286	91	21	96	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	273	0	0	286	0	125	377	0	21	116	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	38.0	38.0		38.0	38.0		9.0	34.0		9.0	34.0	
Total Split (s)	38.0	38.0		38.0	38.0		18.0	34.0		18.0	34.0	
Total Split (%)	42.2%	42.2%		42.2%	42.2%		20.0%	37.8%		20.0%	37.8%	
Maximum Green (s)	31.0	31.0		31.0	31.0		14.0	27.0		14.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	24.0	24.0		24.0	24.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		20.5			20.5		10.6	35.7		6.6	28.0	
Actuated g/C Ratio		0.27			0.27		0.14	0.48		0.09	0.37	
v/c Ratio		0.57			0.80		0.52	0.24		0.13	0.09	
Control Delay		22.7			40.5		40.8	12.9		38.0	17.1	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		22.7			40.5		40.8	12.9		38.0	17.1	
LOS		C			D		D	B		D	B	
Approach Delay		22.7			40.5			19.9			20.3	
Approach LOS		C			D			B			C	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 74.7
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 25.5 Intersection LOS: C
Intersection Capacity Utilization 74.1% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	273	286	125	377	21	116
v/c Ratio	0.57	0.80	0.52	0.24	0.13	0.09
Control Delay	22.7	40.5	40.8	12.9	38.0	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.7	40.5	40.8	12.9	38.0	17.1
Queue Length 50th (m)	25.0	34.6	16.8	11.5	2.9	4.7
Queue Length 95th (m)	48.6	64.2	36.2	31.4	10.1	12.2
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	715	546	330	1539	350	1261
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.52	0.38	0.24	0.06	0.09

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	150	244	129	102	101	89	354	94	31	256	23
Future Volume (vph)	25	150	244	129	102	101	89	354	94	31	256	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	30.0		0.0	15.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			0.99		0.99	0.99		1.00	1.00	
Frt		0.921			0.959			0.969			0.988	
Flt Protected		0.997			0.981		0.950			0.950		
Satd. Flow (prot)	0	1673	0	0	1757	0	1770	3358	0	1517	3386	0
Flt Permitted		0.962			0.599		0.950			0.950		
Satd. Flow (perm)	0	1614	0	0	1073	0	1759	3358	0	1511	3386	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		74			28			33			9	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		119.7			796.6			260.7			102.7	
Travel Time (s)		8.6			57.4			18.8			7.4	
Confl. Peds. (#/hr)	6		1	1		6	5		4	4		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	3%	3%	3%	0%	0%	2%	4%	2%	19%	5%	6%
Adj. Flow (vph)	27	163	265	140	111	110	97	385	102	34	278	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	455	0	0	361	0	97	487	0	34	303	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway 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
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	38.0	38.0		9.0	38.0		9.0	34.0		9.0	34.0	
Total Split (s)	39.0	39.0		12.0	51.0		15.0	34.0		15.0	34.0	
Total Split (%)	39.0%	39.0%		12.0%	51.0%		15.0%	34.0%		15.0%	34.0%	
Maximum Green (s)	32.0	32.0		8.0	44.0		11.0	27.0		11.0	27.0	
Yellow Time (s)	5.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0			7.0		4.0	7.0		4.0	7.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	24.0	24.0			24.0			20.0			20.0	
Flash Dont Walk (s)	7.0	7.0			7.0			7.0			7.0	
Pedestrian Calls (#/hr)	0	0			0			0			0	
Act Effct Green (s)		38.4			38.4		9.5	31.4		7.7	27.8	
Actuated g/C Ratio		0.42			0.42		0.10	0.34		0.08	0.30	
v/c Ratio		0.63			0.77		0.53	0.41		0.27	0.29	
Control Delay		22.0			34.2		52.9	25.3		47.6	27.3	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		22.0			34.2		52.9	25.3		47.6	27.3	
LOS		C			C		D	C		D	C	
Approach Delay		22.0			34.2			29.9			29.4	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 91.4
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 28.6 Intersection LOS: C
Intersection Capacity Utilization 92.7% ICU Level of Service F
Analysis Period (min) 15

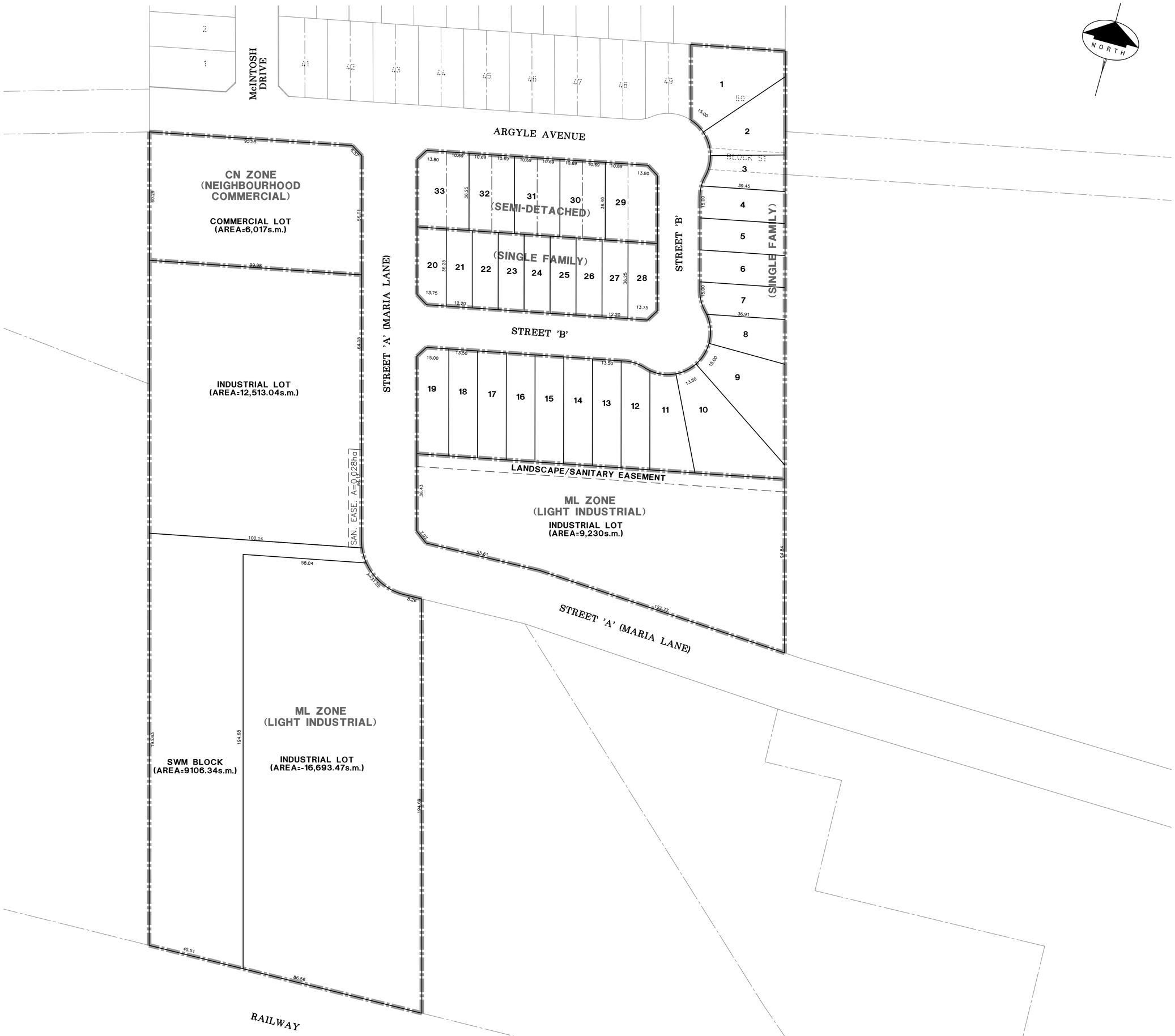
Splits and Phases: 7: James Street/King Street & Church Street West/Church Street East



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	455	361	97	487	34	303
v/c Ratio	0.63	0.77	0.53	0.41	0.27	0.29
Control Delay	22.0	34.2	52.9	25.3	47.6	27.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	34.2	52.9	25.3	47.6	27.3
Queue Length 50th (m)	53.8	51.5	17.8	36.7	6.3	23.5
Queue Length 95th (m)	65.5	#91.8	33.6	53.8	15.3	35.1
Internal Link Dist (m)	95.7	772.6		236.7		78.7
Turn Bay Length (m)			30.0		15.0	
Base Capacity (vph)	765	546	219	1176	188	1037
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.66	0.44	0.41	0.18	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



LEGEND:

NO.	REVISION	DATE (MM/DD/YY)	BY

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
440 HARDY ROAD , UNIT #1 , BRANTFORD – ONTARIO , N3T 5L8
TEL. (519) 753-2656 FAX. (519) 753-4263 www.cohooneng.com

PROJECT:

BLUEGRASS ESTATES SUBDIVISION (PHASE 4)

ARGYLE AVENUE
NORFOLK COUNTY

CLIENT: JELES DESIGN & CONSTRUCTION LTD.

ZONING MAP

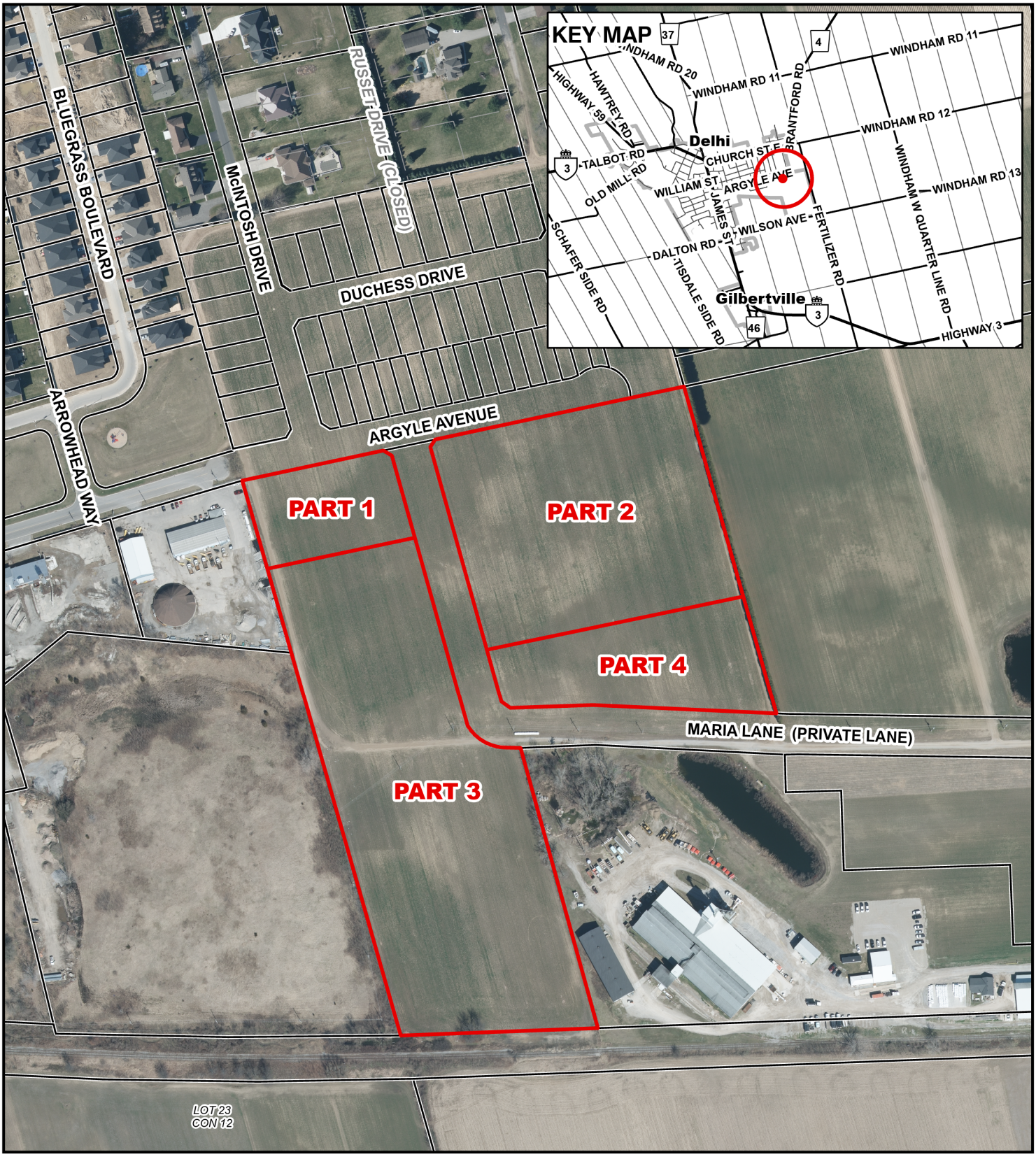
DESIGN:	R.W.P.	SCALE:	1:750
DRAWN:	S.L.M.	JOB No:	13227
CHECKED:	R.W.P.		
SHEET:	1 of 1	DWG. No:	13227–ZONE
DATE:	NOV. 4/25		

MAP A

CONTEXT MAP

Geographic Township of WINDHAM

OPNPL2025365
ZNPL2025364



2/11/2026

Legend

Subject Lands

2020 Air Photo

N

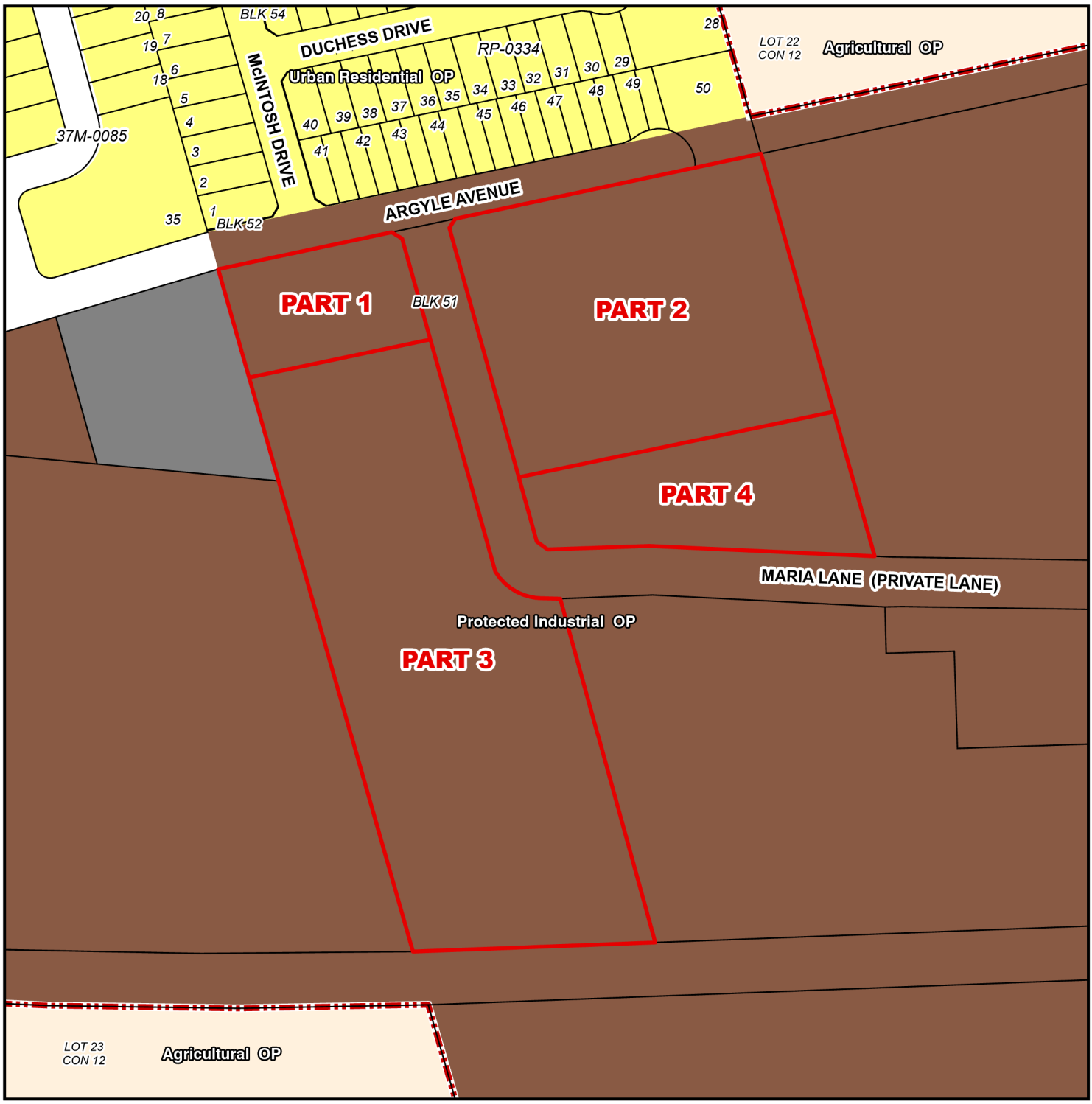
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MAP B

OFFICIAL PLAN MAP

Geographic Township of WINDHAM

OPNPL2025365
ZNPL2025364



Legend

Subject Lands

Official Plan Designations

- Agricultural
- Urban Residential
- Protected Industrial
- Major Public Infrastructure
- Urban Area Boundary

2/11/2026

N

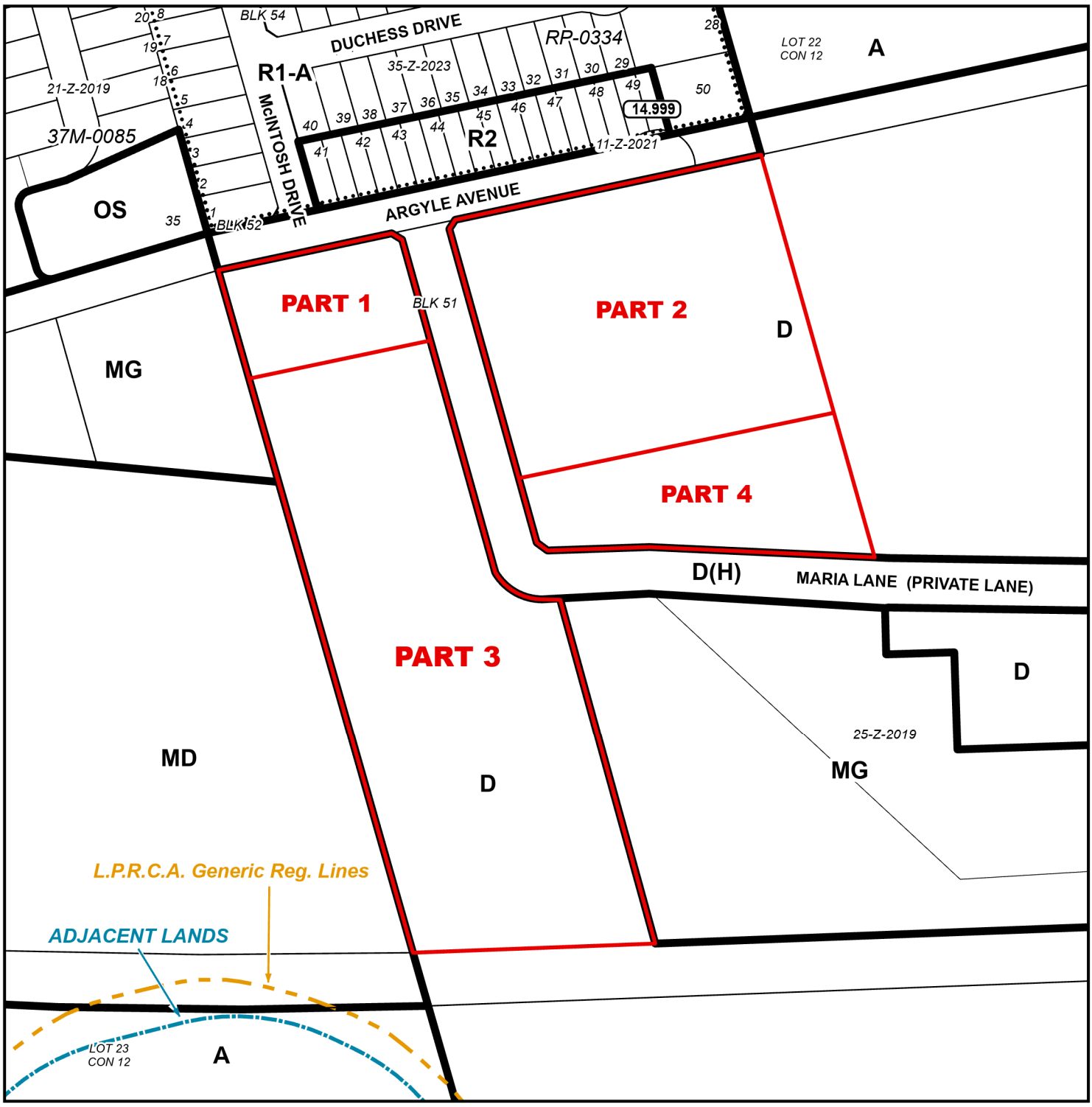
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MAP C

PROPOSED ZONING BY-LAW AMENDMENT MAP

Geographic Township of WINDHAM

OPNPL2025365
ZNPL2025364



LEGEND

- Subject Lands
- Adjacent Lands
- LPRCA Generic RegLines

ZONING BY-LAW 1-Z-2014

- (H) - Holding
- A - Agricultural Zone
- D - Development Zone
- MD - Disposal Industrial Zone
- MG - General Industrial Zone
- OS - Open Space Zone
- R1-A - Residential R1-A Zone
- R2 - Residential R2 Zone

2/11/2026

N

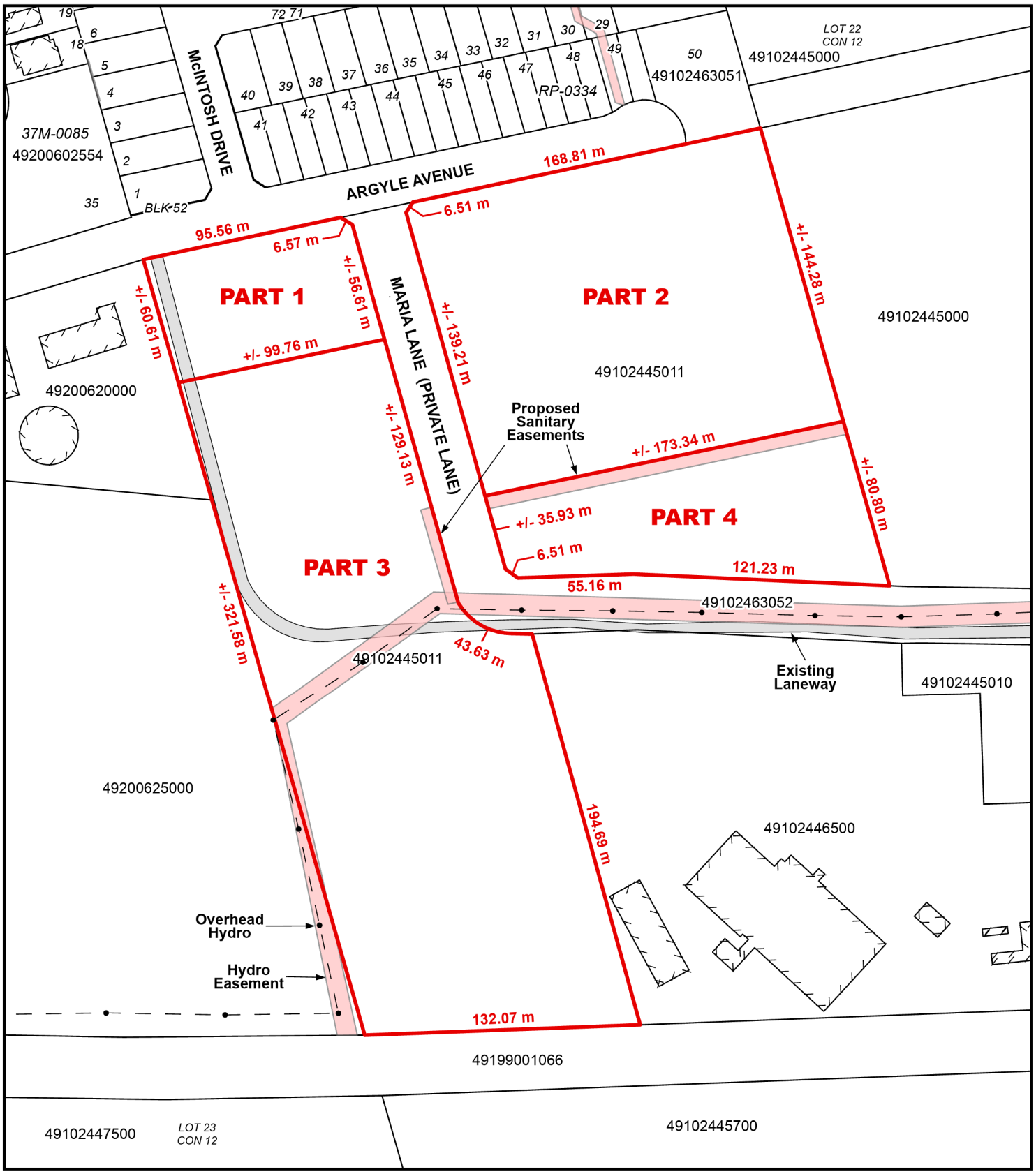
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MAP D

CONCEPTUAL PLAN

Geographic Township of WINDHAM

OPNPL2025365
ZNPL2025364



Legend

- Subject Lands
- Easements

2/11/2026

N

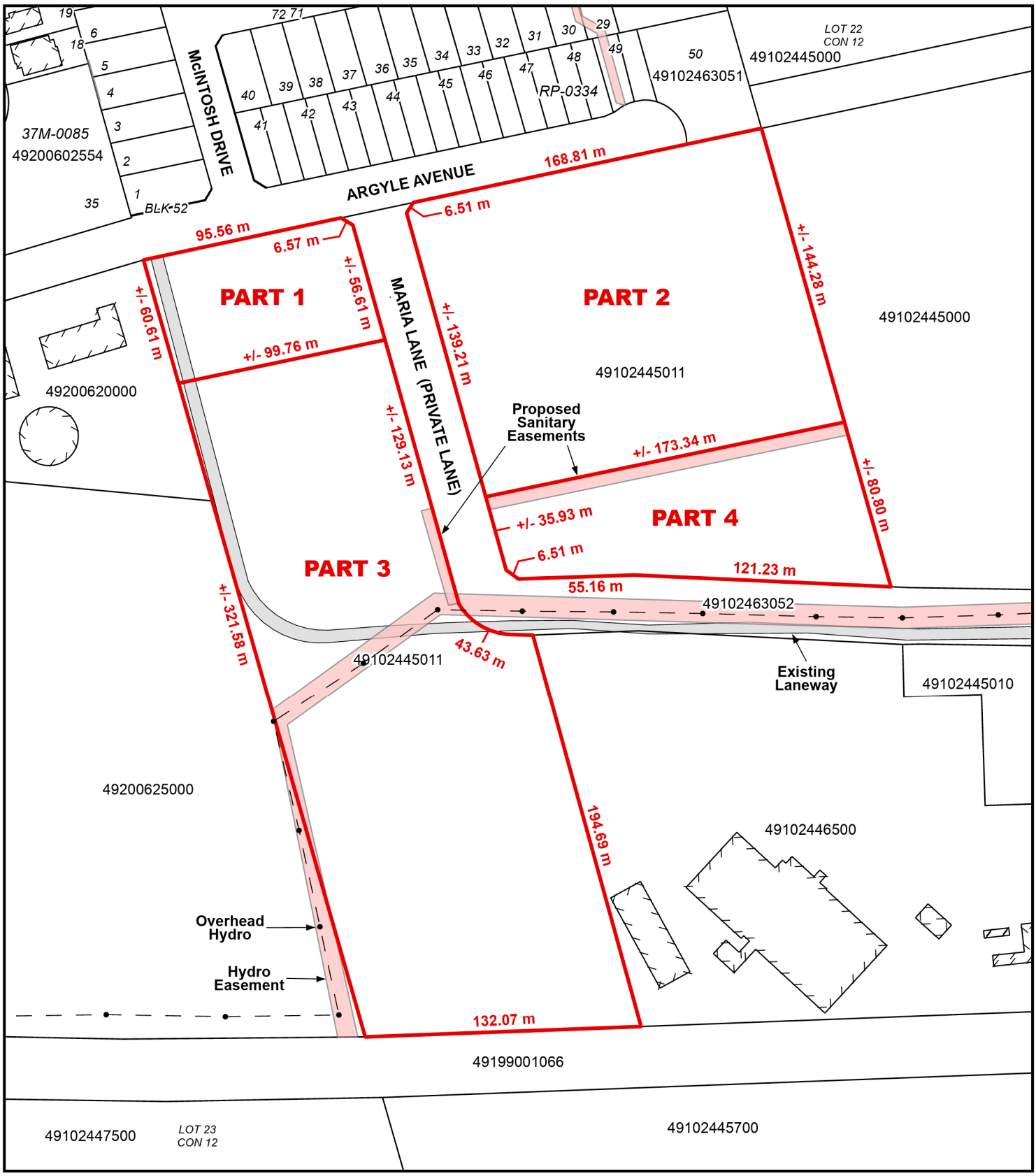
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LOCATION OF LANDS AFFECTED

CONCEPTUAL PLAN

Geographic Township of WINDHAM

OPNPL2025365
ZNPL2025364



Legend

- Subject Lands
- Easements

2/11/2026

N

0 20 40 60 80 100 Metres