Agenda Addendum
Council Meeting

Monday, January 25, 2021, 7:00 p.m.
Electronic Meeting
The Corporation of the Town of Orangeville
(Mayor and Clerk at Town Hall - 87 Broadway)
Orangeville, Ontario

NOTICE

Due to efforts to contain the spread of COVID-19 and to protect all individuals, the Council Chambers at Town Hall will not be open to the public to attend Council meetings until further notice. Members of the public who have an interest in a matter listed on the agenda may, up until 10:00 a.m. on the day of a scheduled Council meeting: Email councilagenda@orangeville.ca indicating your request to speak to a matter listed on the agenda. A phone number and conference ID code will be provided to you so that you may join the virtual meeting and provide your comments to Council.

Members of the public wishing to raise a question during the public question period of the Council meeting may beginning at 8:30 p.m. on the evening of the Council meeting, call +1 289-801-5774 and enter Conference ID: 407 268 072#
Correspondence/emails submitted will be considered as public information and entered into the public record.

Accessibility Accommodations

If you require access to information in an alternate format, please contact the Clerk's division by phone at 519-941-0440 x 2256 or via email at clerksdept@orangeville.ca

---

Pages

1. **Call To Order**
2. **Approval of Agenda**
   Recommendations:
   That the agenda and any addendums for the January 25, 2021 Council Meeting, be approved.
3. **Disclosure of (Direct and Indirect) Pecuniary Interest**
4. **Closed Meeting**
   None.
5. **Open Meeting - 7:00 p.m.**
6. **Singing of National Anthem**
7. **Land Acknowledgement**

We would like to acknowledge the traditional territory of the Anishinaabe people including the Ojibway, Potawatomi and Odawa of the Three Fires Confederacy.

8. Announcements by Chair

This meeting is being aired on public television and/or streamed live and may be taped for later public broadcast or webcast.
Your name is part of the public record and will be included in the minutes of this meeting.

9. Rise and Report

None.

10. Adoption of Minutes of Previous Council Meeting

Recommendations:
That the minutes of the following meetings be received:

11. Presentation, Petitions and/or Delegation

Recommendations:
That Orangeville Hydro Limited, Business Plan: 2021-2025 be received;
And that the Mayor and Clerk be authorized to execute the Shareholder's Resolution Approving the Orangeville Hydro Limited's Business Plan: 2021-2025.

12. Staff Reports

Recommendations:
That report INS-2021-007, Assumption of Cachet Development Subdivision, Registered Plan 7M-70 be received;

And that Council pass a by-law to assume the subdivision roads and all associated infrastructure works and services in the Cachet Subdivision, Registered Plan 7M-70.

Recommendations:
That report CPS-2021-006, Taxicab and Limousine Driver's Licence Extension, be received;

And that the expiry date for Taxicab and Limousine Driver's Licences issued in 2020 be extended from January 31, 2021 to April 30, 2021;

And that Council amend By-law 2004-119 to change the expiry date for Taxicab and Limousine Driver's Licences going forward.

12.3. Edelbrock Centre Transit Transfer Station Feasibility Update, INS-2021-008 — 74 - 77

Recommendations:

That report INS-2021-008, Edelbrock Centre Transit Transfer Station Feasibility Update be received;

And that Council direct staff to proceed in accordance with:

Option 1: Receive the report

Option 2: Council approves the location of the transit transfer point on a transit way connecting Centre Street and Dawson Road at the Edelbrock Centre and directs staff to work with County staff to develop an acceptable design.

Option 3: Council directs staff to report back to Council with alternative options for a transit transfer point.

12.4. Planning Applications Summary for 2020, INS-2021-009 — 78 - 87

Recommendations:

That report INS-2021-009, Planning Applications Summary for 2020, be received.

12.5. Riddell Road Intersection Analyses, INS-2021-005 — 88 - 255

Recommendations:

That report INS-2021-005, Riddell Road Intersection Analyses be received;

And That Council direct Staff to implement one of the options listed below as presented within this Report and in accordance with the measures set out in the Paradigm Riddell Road Assessment of Intersections Report:

Option 1 – Receive the report.

Option 2 - Protected Left Turn Signals.

Option 3 - Long Term Measures.

12.6. Sustainable Orangeville 2020 Annual Update, CPS-2021-003 — 256 - 261

Recommendations:

That report CPS-2021-003, titled Sustainable Orangeville 2020 annual

update be received;

And that Council approve the carry-over of $12,500 from the 2020 committee budget funds for projects that were started and are scheduled for completion in 2021;

And that the balance of the 2020 committee budget funds be transferred in to the Environmental Reserve fund for future sustainability projects.

12.7. Traffic By-law Amendment – Town-Wide Speed Limit Reduction, INS-2021-006 262 - 272

Recommendations:
That report INS-2021-006, Traffic By-law Amendment – Town-Wide Speed Limit Reduction, be received;

And that Council pass a By-law to amend Traffic By-law 78-2005 to reduce the speed limit on most Town roads from 50 km/h to 40 km/h and to add Rolling Hills Drive, McCannell Avenue and Blind Line to the list of Community Safety Zones.

13. Correspondence

13.1. Township of East Garafraxa, Notice of Adoption 273 - 273

13.2. Dufferin County, Conservation Authorities Working Group Composition 274 - 275

14. Committee/Board Minutes

14.1. 2020-01-11 Joint Accessibility Advisory Committee Minutes 276 - 278

14.2. 2020-10-15 Orangeville BIA Minutes 279 - 279

14.3. 2020-11-26 Orangeville BIA Minutes 280 - 281

14.4. 2020-12-17 Orangeville BIA Minutes 282 - 282

15. Notice of Motion Prior to Meeting

16. Notice of Motion at Meeting

17. New Business

18. Question Period

19. By-Laws

Recommendations:
That the by-laws listed below be read three times and finally passed.

19.1. A by-law to Assume Roads, Works and Services in the Cachet Development Subdivision, RP 7M-70 283 - 283

19.2. A by-law to confirm the proceedings of the Council of The Corporation of the Town of Orangeville at its regular Council Meeting held on January 25, 2021 284 - 284

20. Adjournment

Recommendations:

That the meeting be adjourned.

Council Meeting Minutes

January 11, 2021, 5:15 p.m.
Electronic Meeting
The Corporation of the Town of Orangeville
(Mayor and Clerk at Town Hall - 87 Broadway)
Orangeville, Ontario

Members Present:	Mayor S. Brown, was present in Council Chambers Deputy Mayor A. Macintosh Councillor J. Andrews Councillor G. Peters Councillor L. Post Councillor D. Sherwood Councillor T. Taylor
Staff Present:	E. Brennan, CAO D. Benotto, Software Operations Supervisor, was present in Council Chambers D. Jones, General Manager, Infrastructure Services K. Landry, Town Clerk, was present in Council Chambers A. McKinney, General Manager, Corporate Services R. Osmond, General Manager, Community Services R. Phillips, Manager, Economic Development M. Pourmanouchehri, IT Technician, was present in Council Chambers N. Syed, Treasurer B. Ward, Manager, Planning T. Macdonald, Assistant Clerk, was present in Council Chambers

---

1. Call To Order

The meeting was called to order at 5:15 p.m.

2. Approval of Agenda

Resolution 2021-001
Moved by Councillor Andrews
Seconded by Deputy Mayor Macintosh

That the agenda and any addendums for the January 11, 2021 Council Meeting, be approved.

Carried

3. Disclosure of (Direct and Indirect) Pecuniary Interest

None.

4. Closed Meeting

Resolution 2021-002
Moved by Councillor Taylor
Seconded by Councillor Post

That a closed meeting of Council be held pursuant to s. 239 (2) of the Municipal Act for the purposes of considering the following subject matters:

Minutes
4.1.1. 2020-11-23 Closed Council
4.1.2. 2020-11-30 Closed Council
4.1.3. 2020-12-07 Closed Council
4.1.4. 2020-12-14 Closed Council
4.2. Diversity and Inclusion Training
The meeting is held for the purpose of educating or training members.

4.3. A confidential verbal report from Andrea McKinney, General Manager – Corporate Services and Jason Hall, IT Manager regarding the security of property – Town's Network and Information Technology Systems.
The security of the property of the municipality or local board.

Carried

Resolution 2021-003
Moved by Councillor Sherwood
Seconded by Councillor Taylor

That Council convene into open session at 6:54 p.m.

Carried

Council recessed from 6:55 p.m. to 7:00 p.m.

5. Open Meeting - 7:00 p.m.

6. Singing of National Anthem

David Nairn, Theatre Orangeville provided a pre-recorded National Anthem which was played.

7. Land Acknowledgement

The Mayor acknowledged the traditional territory of the Anishinaabe people including the Ojibway, Potawatomi and Odawa of the Three Fires Confederacy.

8. Announcements by Chair

Mayor Brown advised the gallery and viewing audience with respect to the public nature of Council Meetings and that it is webcast.

9. Rise and Report

Resolution 2021-004
Moved by Deputy Mayor Macintosh
Seconded by Councillor Sherwood

That minutes of the following meetings be approved:

2020-11-23 Closed Council

2020-11-30 Closed Council

2020-12-07 Closed Council

2020-12-14 Closed Council

And that Diversity and Inclusion Training was conducted;

And that a confidential verbal report from Andrea McKinney, General Manager – Corporate Services and Jason Hall, IT Manager regarding the security of property – Town's Network and Information Technology Systems be received;

Carried

10. Adoption of Minutes of Previous Council Meeting

Resolution 2021-005
Moved by Councillor Andrews
Seconded by Councillor Sherwood

The minutes of the 2020-12-14 Council meeting were received as amended:

11.2 Mayor Brown also announced a $47,000 donation to several Ontario based Food Banks from Tire Discounters.

Carried

11. Presentation, Petitions and/or Delegation

11.1 Jesse Burns, Optimus - Dufferin Service Delivery Review

Jesse Burns, David Lynch and Mariam Ali, Optimus provided an overview of the results of the Dufferin Service Delivery Review focusing on shared services identification, review and recommendations.

Resolution 2021-006
Moved by Councillor Peters
Seconded by Deputy Mayor Macintosh

That the report from Jesse Burns, David Lynch and Mariam Ali, Optimus - Dufferin Service Delivery Review be received.

Carried

11.2 Terrilyn Kunopaski, Director and Trade Development, Bannikin Travel and Tourism Ltd., Orangeville Tourism Strategy and Action Plan (2021-2016)

Terrilyn Kunopaski, Director and Trade Development Bannikin Travel and Tourism Ltd. presented the Orangeville Tourism and Strategy Action Plan.

11.3 Rick Stevens, Orangeville Minor Hockey

Rick Stevens, Terry (Sheppard), Michelle Whyte and Louise Mendelson, representatives of Orangeville Minor Hockey, Orangeville Girls Hockey Association and Skate Canada outlined the challenges facing ice sports during the pandemic including the costs associated with providing these opportunities to the community.

Resolution 2021-007
Moved by Deputy Mayor Macintosh
Seconded by Councillor Andrews

That the report from Rick Stevens, Terry (Sheppard), Michelle Whyte and Louise Mendelson, representatives of Orangeville Minor Hockey, Orangeville Girls Hockey Association and Skate Canada be received;

And that Staff report back regarding their requests and that the report include information on the feasibility of extending the ice season.

Carried

11.4 Michelle Whyte, Orangeville Girls Hockey Association, Ice Costs

See 11.3.

11.5 Alethia O'Hara-Stephenson, Dufferin County Canadian Black Association

Alethia O'Hara-Stephenson provided an overview of the Dufferin County Canadian Black Association.

Resolution 2021-008
Moved by Councillor Post
Seconded by Councillor Taylor

That the Town Register as a partner on the Dufferin County Canadian Black Association business registration page at a cost of $240.00 per annum;

And that the Town list the Dufferin County Canadian Black Association as a resource on the Town webpage;

And that the Town raise a flag, which is to be provided by the Dufferin County Canadian Black Association, for black history month;

And that February be declared black history month in the Town of Orangeville.

Carried

Council recessed from 9:23 p.m. to 9:28 p.m.

11.6 Skate Canada Executive Member, Louise Mendelson

See 11.3.

12. Staff Reports

12.1 Orangeville Brampton Rail Access Group Inc. notice of termination, CAO-2021-001

Resolution 2021-009
Moved by Councillor Andrews
Seconded by Deputy Mayor Macintosh

That report CAO-2021-001, Orangeville Brampton Rail Access Group Inc. notice of termination be received.

Carried

12.2 Tourism Strategy and Action Plan (2021 – 2026), CMS-2021-001

Resolution 2021-010
Moved by Councillor Peters
Seconded by Councillor Post

That report CMS-2021-001, dated January 11, 2021 regarding the Tourism Strategy and Action Plan (2021- 2026) be received;

And that the Tourism Strategy and Action Plan prepared by Bannikin Travel and Tourism Ltd. be adopted;

And that Council direct the Economic Development and Culture office to begin implementation of the Strategy as part of its annual operating work plan;

And that staff report annually on the implementation progress of the Tourism Strategy and Action Plan.

Carried Unanimously

12.3 Regulatory By-law Review Work Plan, CPS-2020-016

Resolution 2021-011
Moved by Councillor Taylor
Seconded by Deputy Mayor Macintosh

That report CPS-2020-016 regarding the Regulatory By-law Review Work Plan be received;

And that Council direct staff to report back on the various Regulatory By-laws in accordance with the following schedule for the remainder of the term of Council subject to approval of the staffing resources identified in Clerk's Division 2021 Budget:

2021	2022
Property Standards	**Restaurant Licensing**
Vehicle for Hire	**Records Retention**
Tow Truck Licensing	
Election Signs	
Animals	
Proceedings of Council and Committees	
Parks By-law – Closing Times	
Lawn Watering	
Traffic including Encumbering Highway,	
Road Occupancy, Sale of Goods,	
Montgomery Village	
Topsoil Removal	

Carried

12.4 2021 Interim Borrowing, CPS-2021-001

Resolution 2021-012
Moved by Councillor Sherwood
Seconded by Deputy Mayor Macintosh

That report CPS-2021-001, 2021 Interim Borrowing, dated January 11, 2021, be received;

And that Council pass a by-law to authorize external temporary borrowing in 2021.

Carried

12.5 Sign Variance – Greystones Restaurant & Lounge, CPS-2021-002

Resolution 2021-013
Moved by Councillor Andrews
Seconded by Deputy Mayor Macintosh

That Report CPS-2021-002, regarding Sign Variance Application – Greystones Restaurant & Lounge – 63 Broadway be received; and

That Council grants a variance to Sign By-law 28-2013 to permit a projecting sign measuring 2.508 metres x 0.629 metres without a sway chain for the 63 Broadway conditional upon the applicant obtaining a sign permit.

Carried

12.6 Proposed Tow Truck Licensing By-law Dufferin County - - Local Municipalities, CPS-2021-004

Resolution 2021-014
Moved by Deputy Mayor Macintosh
Seconded by Mayor Brown

That Report CPS-2021-004 regarding proposed Tow Truck Licensing By-law Dufferin County Local Municipalities be received; and

That the multi-level working group regarding the Towing Industry in Dufferin and the Dufferin County local municipalities be advised that the Town will develop a uniform Tow Truck Licensing By-law in accordance with the steps outlined in Report CPS-2021-004; and

That any municipality wishing to participate in Stage 1 of the development of a uniform Tow Truck Licensing By-law contribute $1000; and

That during the development of a uniform Tow Truck Licensing By-law staff:

- **determine the costs of administering and enforcing the By-law;**
- **the licensing fees; and**
- **any other costs associated with the delivery of the program; and**

That upon the passing of a by-law Town staff provide the Dufferin County local municipalities with the opportunity to opt into having Orangeville administer the licensing and enforcement of the by-law on a cost recovery basis.

Carried Unanimously

12.7 Restaurant and Pet Shop Licences Extension, CPS-2021-005

Resolution 2021-015
Moved by Councillor Andrews
Seconded by Councillor Taylor

That report CPS-2021-005, Restaurant and Pet Shop Licences Extension, be received;

And that the expiry date for Restaurant and Pet Shop Licences issued in 2020 be extended to April 30th of 2021;

And that Council amend By-law 2004-117 and By-law 2005-095 to change the expiry date for Restaurant and Pet Shop Licences going forward.

Carried

12.8 Grey County Transit Agreement, INS-2021-001

Resolution 2021-016
Moved by Councillor Andrews
Seconded by Deputy Mayor Macintosh

That report INS-2021-001, Grey County Transit Agreement be received,

And that Council pass a by-law to authorize the entering into and execution of an Agreement between The Corporation of the County of Grey and the Corporation of the Town of Orangeville for the execution of the Bus Stop Agreement.

Carried

12.9 Cachet Developments (Orangeville) Inc., Non-decision Appeal of Applications, OPZ 3-19, INS-2021-004

Resolution 2021-017
Moved by Councillor Taylor
Seconded by Councillor Post

That report INS-2021-004, Cachet Developments (Orangeville) Inc., Non-decision Appeal of Applications, OPZ 3-19, be received;

And that staff and the Town's legal counsel be directed to attend any Local Planning Appeal Tribunal (LPAT) Pre-Hearing and/or Case Management Conference(s) convened for the appeals filed by Transmetro Limited c/o Cachet Developments (Orangeville) Inc. for their applications to amend the Town's Official Plan and Zoning By-law, based on a decision not being made within the timeframes prescribed by the Planning Act;

And that staff and legal counsel report back to Council as necessary, with respect to any update(s) concerning the status of these appeals.

Carried

13. Correspondence

Resolution 2021-018
Moved by Councillor Andrews
Seconded by Councillor Post

That the following correspondence be received:

County of Dufferin, Bill 229

Federation of Canadian Municipalities, Towards Parity

Carried

14. Committee/Board Minutes

Resolution 2021-019
Moved by Councillor Peters
Seconded by Councillor Sherwood

That the minutes of the following meeting be received:

2020-09-22 Business and Economic Development Committee Minutes
2020-11-04 Committee of Adjustment Minutes
2020-06-18 Cultural Plan Task Force Minutes
2020-11-18 Heritage Orangeville Minutes
2020-11-03 Joint Accessibility Advisory Committee Minutes
2020-11-17 Orangeville Police Services Board Minutes

Carried

15. Notice of Motion Prior to Meeting

None.

16. Notice of Motion at Meeting

Councillor Sherwood advised that she will be making a motion at the January 18, 2021 meeting to reconsider Resolution 2020-33 regarding the installation of guide rails at McCannell Avenue and Rolling Hills Drive.

Resolution 2021-020
Moved by Councillor Post
Seconded by Deputy Mayor Macintosh

That notice be waived to allow for the introduction and consideration of a motion regarding the moratorium on the two hour parking limit for downtown Orangeville as it is time sensitive.

Carried

Resolution 2021-021
Moved by Councillor Sherwood
Seconded by Councillor Andrews

That the moratorium on the two hour parking limit for Downtown Orangeville be extended to coincide with the other Covid Relief Measures that were passed on December 14, 2020, Resolution 2020-448 providing relief until March 31, 2021.

Carried

17. New Business

None.

18. Question Period

Adam Thompson advised that he is selling t-shirts that showcase his artwork and asked that anyone that may wish to order a t-shirt contact him.

19. By-Laws

Resolution 2021-022
Moved by Councillor Post
Seconded by Councillor Andrews

That the by-laws listed below be read three times and finally passed.

A by-law to amend Restaurant By-law 2004-117 and Pet Shop By-law 2005-95 to change the expiry dates of the licences of those businesses operating within the Town of Orangeville.

A by-law to authorize the entering into and execution of a Bus Stop Agreement with the Corporation of the County of Grey.

A by-law to authorize the Temporary Borrowing of monies as specified in this by-law, to meet, until the taxes are collected, the current expenditures of the Corporation of the Town of Orangeville for the year 2021.

A by-law to confirm the proceedings of the Council of The Corporation of the Town of Orangeville at its regular and closed Council Meeting held on January 11, 2021.

Carried

20. Adjournment

Resolution 2021-023
Moved by Councillor Peters
Seconded by Deputy Mayor Macintosh

That the meeting be adjourned at 10:15 p.m.

Carried

_____

Sandy Brown, Mayor

_____

Karen Landry, Clerk

Council - Budget Meeting Minutes

January 18, 2021, 6:15 p.m.
Electronic Meeting
The Corporation of the Town of Orangeville
(Mayor and Clerk at Town Hall - 87 Broadway)
Orangeville, Ontario

Members Present:	Mayor S. Brown, was present in Council Chambers Deputy Mayor A. Macintosh Councillor J. Andrews Councillor G. Peters Councillor L. Post Councillor D. Sherwood Councillor T. Taylor
Staff Present:	E. Brennan, CAO D. Benotto, Software Operations Supervisor M. Jhajj, Asset Management Specialist D. Jones, General Manager, Infrastructure Services C. Khan, Deputy Clerk K. Landry, Town Clerk, was present in Council Chambers A. McKinney, General Manager, Corporate Services R. Medeiros Financial Analyst - Operations R. Osmond, General Manager, Community Services N. Syed, Treasurer F. West, Deputy Treasurer T. Macdonald, Assistant Clerk

---

1. Call To Order

The meeting was called to order at 6:15 p.m.

2. Approval of Agenda

Resolution 2021-024
Moved by Councillor Post
Seconded by Councillor Andrews

That the agenda and any addendums for the January 18, 2021 Council - Budget Meeting, be approved.

Carried

3. Disclosure of (Direct and Indirect) Pecuniary Interest

None.

4. Closed Meeting

Resolution 2021-025
Moved by Councillor Taylor
Seconded by Councillor Peters

That a closed meeting of Council be held pursuant to s. 239 (2) of the Municipal Act for the purposes of considering the following subject matters:

Confidential Verbal Report from Ed Brennan, CAO and Doug Jones, General Manager, Infrastructure Services, Risk/Liability

Advice that is subject to solicitor-client privilege, including communications necessary for that purpose.

Carried

Resolution 2021-026
Moved by Councillor Sherwood
Seconded by Deputy Mayor Macintosh

That Council convene out of closed session at 6:38 p.m.

Carried

Council recessed from 6:38 p.m. to 7:00 p.m.

5. Open Meeting - 7:00 p.m.

6. Singing of National Anthem

David Nairn, Theatre Orangeville provided a pre-recorded National Anthem which was played.

7. Land Acknowledgement

The Mayor acknowledged the traditional territory of the Anishinaabe people including the Ojibway, Potawatomi and Odawa of the Three Fires Confederacy.

8. Announcements by Chair

Mayor Brown advised the gallery and viewing audience with respect to the public nature of Council Meetings and that it is webcast.

9. Rise and Report

Resolution 2021-027
Moved by Councillor Peters
Seconded by Councillor Andrews

That confidential Verbal Report from Ed Brennan, CAO and Doug Jones, General Manager, Infrastructure Services, Risk/Liability be received;

And that staff proceed as directed.

Carried

10. Presentation, Petitions and/or Delegation

10.1 2021 Draft Operating and Capital Budget

Ed Brennan, CAO made introductory remarks regarding the draft 2021Budget.

11. Staff Reports

11.1 Tabling of 2021 Budget

Nandini Syed, Treasurer presented a general overview of the 2021 Draft Operating and Capital Budget.

12. Notice of Motion Prior to Meeting

12.1 Councillor Sherwood, Rolling Hills

Resolution 2021-028
Moved by Councillor Sherwood
Seconded by Deputy Mayor Macintosh

That Resolution No. 2020-33 regarding the installation of barricades on the bend alongside Rolling Hills be reconsidered.

Carried

Resolution 2021-029
Moved by Councillor Sherwood
Seconded by Councillor Taylor

That temporary safety measures be installed as soon as possible on the bend alongside Rolling Hills, to be funded from general reserves.

Carried

Resolution 2021-030
Moved by Councillor Sherwood
Seconded by Councillor Andrews

That funding in the amount of $18,000.00 be included in the 2021 Capital Budget for the design and installation of a steel beam guide rail on the bend alongside Rolling Hills;

Carried Unanimously

13. Notice of Motion at Meeting

None.

14. New Business

Councillor Andrews thanked Raymond Osmond and the Community Services Team for work undertaken on the outdoor rinks.

Mayor Brown advised that skating pods are being created at Island Lake which will be available for rent.

15. Question Period

None.

16. By-Laws

Resolution 2021-031
Moved by Councillor Andrews
Seconded by Councillor Sherwood

That the by-laws listed below be read three times and finally passed.

A by-law to confirm the proceedings of the Council of The Corporation of the Town of Orangeville at its closed and Council - Budget Meeting held on January 18, 2021.

Carried

Council recessed from 7:43 p.m. to 8:00 p.m.

17. Adjournment

Resolution 2021-032
Moved by Deputy Mayor Macintosh
Seconded by Councillor Andrews

That the meeting be adjourned at 8:01 p.m.

Carried

_____

Sandy Brown, Mayor

_____

Karen Landry, Clerk

Orangeville Hydro

2021-2025 Business Plan

Energizing Our Community's Future

Table of Contents

1. Executive Summary

Orangeville Hydro Limited's Business Plan for 2021-2025 is developed in conjunction with the strategic plan, goal setting and target planning. This business plan is also based on Ontario Energy Board (OEB) initiatives and governmental public policy responsiveness as well as our internal conception of the utility to meet certain other objectives in creating efficiencies. These objectives are met while maintaining safety; excellent customer service objectives and focus; system reliability; and stable financial performance.

The key areas that are reviewed within this Business Plan are:

- Mission statement, Vision statement and Values statement
- Strategic Objectives
- SWOT Analysis
- Local economic overview and customer description
- Performance metrics
- Future Capital and Operating plans
- Financial Summary

2. Mission, Vision and Values

Orangeville Hydro's strategies are in harmony with our corporate values, our vision, our mission statement as well as our approach to a balanced scorecard and the outcomes identified in the Ontario Energy Board *Renewed Regulatory Framework for Electricity Distributors (RRFE).*

Vision Statement

To be acknowledged as a leader among electric utilities in the areas of safety, reliability, customer service, customer satisfaction, sustainability, and financial performance.

Mission Statement

To provide safe, reliable, efficient delivery of electrical energy while being accountable to our shareholders...the citizens of Orangeville and Grand Valley.

While we must operate as a business and be profitable for our shareholders, our main reason for existing is to provide safe, reliable, and economic electricity services to the people of the Town of Orangeville and the Town of Grand Valley. That is what distinguishes us from other large, remotely owned and controlled energy companies.

Values Statement

To continue into the future as a profitable electricity distribution enterprise the following principles are core values of our Company:

We value professionalism and safety in our service and our work.
We value people - our customers, employees, board members, and shareholders.
We value our community - its environment and its economic progress.
We value integrity, honesty, respect, and communications.
We value local control, local accountability, local employment, and local purchasing; and
We value easy accessibility for our customers.

3. Strategic Objectives

We will use the following strategies to overcome our weaknesses and threats and capitalize on our strengths and opportunities. These strategies will also be in harmony with the corporate values, vision, and mission statement.

Safety

Health and safety will continue to be a paramount for the company.

We provide safe work practice training for all employees consistent with industry best practices. We will continue to seek new ways to further communicate and promote a safety culture to our employees, our customers, and our community both inside and outside the workplace.

Customer Focus

As the customer's role within the electricity system evolves, successful utilities will be those who recognize that customers are not all the same. A willingness to invest in the skills, culture, technology, and practices needed to leverage those tools will be a key difference between leading and trailing utilities in a more customer-centric landscape.

We will adapt and tailor the service delivery methods to the specific needs of individual customers, leveraging technology to enhance the customer experience and increase operational agility.

Tools exist for Orangeville Hydro to understand and engage our customers at an individual level and provide a truly personalized service. Leveraging the power of big data, existing social media platforms, and the convenience of mobile technology, we can anticipate our customers' needs with increasing precision to create a more effortless customer experience.

Operational Effectiveness

We will continue to leverage the benefits of collaboration with the CHEC membership, Electricity Distributors Association, Utility Collaborative Services, and Utilities Standards Forum.

We will continue to network with other boards, stakeholders, and other utilities to develop and share best practices.

We will investigate areas that are within our control to reduce or curtail costs to better utilize resources.

We will ensure our infrastructure is maintained properly by implementing and reviewing our 2014 Distribution System Plan as well as our Asset Condition Assessment and annual Distribution Maintenance Program.

We will invest heavily in our staff and rely on them to help us accomplish our goals through the following activities:

- We will keep our people informed
- We will make sure our people understand what we expect from them and why they are important to the organization

- We will support our people by providing them with information, tools, equipment, standard policies & procedures, and training
- We will utilize a pay-for-performance model for the management team and attempt to link their compensation with their performance and the performance of the company
- We will continue to carry out our succession planning process.

Public Policy Responsiveness

We will ensure our Distribution System can accommodate Distributed Energy Resources (PV solar, combined heat and power, battery storage, and small natural-gas generators) and electric vehicle technology.

We will promote PV Solar renewable energy within our service area.

We will continue to successfully deliver Provincial Programs to our customers such as future Conservation & Demand Management Programs, the Industrial Conservation Initiative, the Home Assistance Program, the Ontario Electricity Support Program, the Low-Income Energy Assistance Program, and the COVID-19 Energy Assistance Program.

We will deliver obligations mandated by pertinent government legislation and regulatory requirements.

We will investigate altered and additional business activities to improve shareholder value, empower the customer, and advance with innovation.

Financial Performance

We will maximize financial viability by investigating efficiencies and maintaining prudent cost savings.

We will continue to maintain just and reasonable rates for our customers while achieving our deemed rate of return.

We will continue to ensure we have a high level of performance relative to our industry peers by continually reviewing the OEB LDC Yearbook data and well as our year to year trending.

We will investigate feasible opportunities to grow the distribution business.

4. SWOT Analysis

An essential element of our strategy is to ensure Orangeville Hydro Limited is ready to embrace change and disruption in our sector. In a period of significant transformation, the ability to not only accommodate change, but to make the most of it, is likely to be a distinguishing characteristic of those utilities that continue to thrive. We will advocate and lobby for public policy that benefits our customers now and in the future.

Strengths

We have positive relationships with our shareholders - the people of Orangeville and Grand Valley, individual customers, and their elected representatives.

We have a core of high-quality employees, effective management, and solid relations between the staff and the Board of Directors. In addition, we have a well-maintained distribution system.

As a small organization, we have the advantage of being flexible and nimble when it comes to implementing change and reacting to threats quickly.

We have a high level of quality customer service and customer satisfaction, based on survey results.

We have a strong relationship with local organizations, including the Home Builders Association, Dufferin Board of Trade (DBOT), the County of Dufferin, Social Services, and service clubs.

We have stability within our revenues due to operating within a regulated environment as well as our customer demographics. Over 66% of our revenue is received from our residential customers and the remainder is received by a diverse mix of small commercial, institutional, municipal, and industrial customers. Our largest customer only accounts for 1% of our total distribution revenue.

Intensification is occurring within our service territory which is contributing to consistent customer growth and increasing the efficiency of our distribution system.

Due to historical diligence in our succession planning, our workforce is in a stable position with exceptional leadership in place.

Weaknesses

We have limited land for large residential and industrial developments within our service area.

The strict regulated environment limits the scope of potential business opportunities.

We have a lean workforce. Therefore, when a departure or a leave of absence occurs the impact is significant and challenging.

Opportunities

We have an opportunity to maintain a high standard of service for our customers, contribute to the welfare of our local community, and return profits to the citizens of Orangeville and Grand Valley for their local benefit rather than remote corporate gain.

We can help increase our customers' knowledge regarding the safe use of electricity and conservation solutions to reduce their energy costs.

The opportunities for customer interaction and control are growing daily, as are our customer's expectations for choice, convenience, and responsiveness. Orangeville Hydro can be a solutions provider to improve our customer's experience.

Investigate expanding our service area by working with developers surrounding the existing service area and applying for Service Area Amendments.

The COVID-19 pandemic has created an environment to find creative solutions to serve our customers and continue the operation of all business activities under different circumstances such as working remotely. The pandemic is an opportunity to challenge the status quo and find more effective ways of operating as an organization.

Threats and Uncertainties

The COVID-19 coronavirus pandemic has created new threats and uncertainties regarding impacts to staffing levels, distribution revenue, operational capabilities, and our customers' ability to pay.

The Ontario electrical sector is subject to the current direction of the provincial government which shifts due to the four-year provincial election cycle. The changes in government create uncertainty for the direction of the Ministry of Energy and other Ministries that affect the electrical sector.

The implementation of various rules and regulations by the Ontario Energy Board will make it difficult for distribution companies to collect from customers that default on their bill payments and increase the risk of bad debts.

Revenue recovery is based on approval from the Ontario Energy Board. Their expectations and requirements are continually changing and placing downward pressure on revenue recovery.

There are increased uncertainties regarding technological advances, climate change, and cyber security (world-wide threats) that need to be considered.

The removal of all LDC's involvement in the provincial Conservation and Demand Management programs along with the reduction of programs in March of 2019 reduced the incentive for customers to conserve energy and removed a program that increased Orangeville Hydro's ability to interact with and assist customers.

Capability

A highly skilled, properly trained, and knowledgeable workforce is essential to Orangeville Hydro's continued success. Like many other companies and utilities, Orangeville Hydro 's continuing comprehensive succession planning is aimed at anticipating and fulfilling current and potential employee needs, through planning, talent attraction, effective deployment of resources, performance management, and development.

5. About the Utility

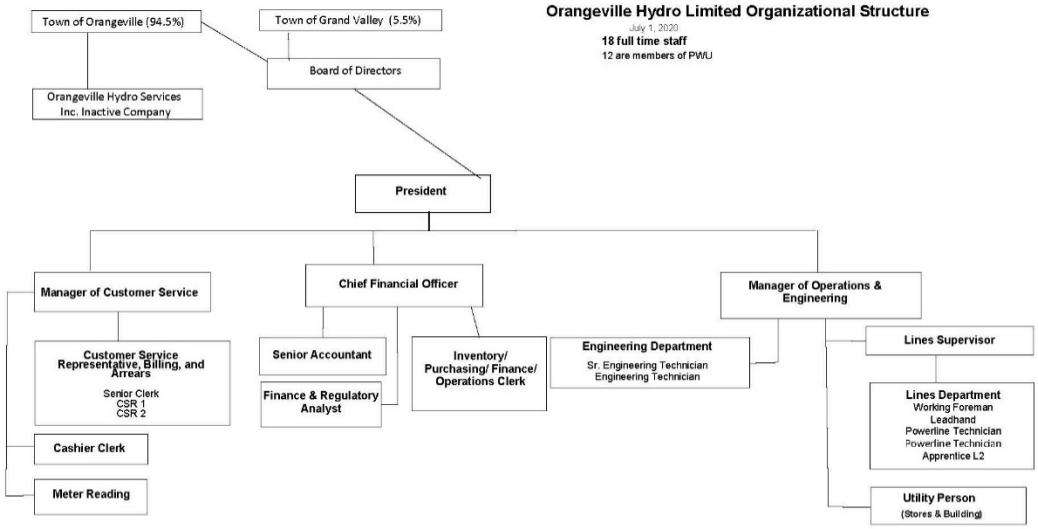
The Energy Competition Act, 1998 required local distribution utilities like Orangeville Hydro to become incorporated according to the Ontario Business Corporations Act by November 7, 2000. Hence on October 2, 2000, the Town of Orangeville passed a by-law transferring all assets and liabilities of the Orangeville Hydro-Electric Commission to Orangeville Hydro Limited. Orangeville Hydro Limited is considered a local distribution company or a wires company. In 2009, Orangeville Hydro Limited and Grand Valley Energy Inc. merged. Since then, Orangeville Hydro Limited has been owned by the Town of Orangeville (94.5%) and the Town of Grand Valley (5.5%). Orangeville Hydro Limited is licensed by the Ontario Energy Board to operate as an electricity distribution company within the current boundaries of the Town of Orangeville and the former Village of Grand Valley. Successful Service Area Amendments have allowed Orangeville Hydro to grow our service area beyond our original limits of the former Village of Grand Valley.

Orangeville Hydro must operate its business in compliance with all applicable laws, including the *Electricity Act, 1998*, the *Ontario Energy Board Act, 1998*, the *Ontario Business Corporations Act*, and the rules, policies and requirements of the OEB. These include the Distribution System Code, the Affiliate Relationships Code, the Retail Settlement Code, the Standard Supply Service Code, the Accounting Procedures Handbook and the Uniform System of Accounts as well as the applicable Rate Handbook and Filing Requirements.

Corporate Structure and Organizational Chart of the Utility

Orangeville Hydro employs 18 full time highly trained staff and is an active partner in the community.

Table 1: Corporate Structure and Organizational Chart



6. Economic Overview and Customer Description

Economic Overview of the Service Area

Orangeville Hydro's service area has a population of approximately 32,000 and is expected to grow to 42,540 by 2036 according to forecasts contained within the Dufferin County Official Plan (2017). This growth is constrained beyond these numbers due to the limited residential land development in the Town of Orangeville and the limited municipal water service and municipal sewage service in both the Town of Orangeville and the Town of Grand Valley.

The Town of Orangeville is the urban hub of Dufferin County. The population of almost 30,000 people sustains strong commercial retail stores that includes big box stores, nationwide commercial retail stores, and small locally owned retail stores. Orangeville has a strong group of manufacturers in sectors such as plastics, food products, woodworking, aerospace, and automotive. The economic base of the Town of Orangeville is diversified between many sectors.

The Town of Grand Valley is a fast-growing area within Dufferin County. Orangeville Hydro services the urban settlement area and Hydro One services the surrounding rural farmlands. The urban settlement area of the Town of Grand Valley has a population near 2,000 and is growing through both intensification and greenfield developments. The Town of Grand Valley is an urban hub with businesses for shopping, dining, and services.

Customer Description

Orangeville Hydro's breakdown of customers by class is shown below:

Table 2: Customers by Class December 31, 2019

Customer Class	Number of Customers
Residential	11,360
General Service < 50 kW	1,160
General Service > 50 kW	132
Sentinel Lights	35
Street Lights	3
Unmetered Scattered Load	31
Generation	42
Total	**12,763**

Orangeville Hydro has a steadily growing base of residential customers with new subdivisions being energized in both Orangeville and Grand Valley. There is also significant redevelopment and intensification occurring within both communities. The intensification projects will continue to increase Orangeville Hydro's density metrics such as customers per kilometer of line and customers per square kilometer. Orangeville Hydro has a diverse manufacturing sector, with several large industrial customers in the plastics and food product manufacturing sectors.

Table 3: Average Monthly Consumption per Customer (kWh)

Customer Class	2014	2015	2016	2017	2018	2019
Residential	687	667	658	620	677	654
General Service < 50 kW	2,518	2,489	2,509	2,485	2,557	2,505
General Service > 50 kW	71,425	75,531	74,124	82,350	78,941	80,110
Sentinel Lights	61	57	49	57	55	55
Street Lights	52	49	28	26	25	25
Unmetered Scattered Load	441	332	304	344	322	322

Orangeville Hydro has witnessed a slow decline in the average consumption of our residential customers for most years. This is occurring due to factors such as conservation activities, installation of more efficient equipment, improved building code requirements in new homes, intensification decreasing the average size of a household, and our customers converting from electrical heating equipment to natural gas. The decline is not necessarily consistent as weather patterns such as extreme heat waves or extended periods of extreme cold are not consistent year to year. Although residential consumption is decreasing, residential distribution rates are based on a fixed service charge, and therefore provide a stable revenue source.

The average usage of a General Service >50kW customer has increased from 2014 compared to 2019 as our large customers have expanded, as well as the customers that used to be at the lower end of the GS>50kW customer class have been reclassified to General Service <50kW.

The average monthly consumption for a streetlight connection significantly decreased in 2016 due to the High-Pressure Sodium to LED light conversions that occurred in late 2015 & 2016.

7. Performance Metrics and Future Plans

2019 Scorecard Management Discussion and Analysis

The performance outcomes outlined in the RRFE are measured on the LDCs scorecard which is published annually. In 2019 Orangeville Hydro exceeded all performance targets. A discussion of the scorecard results follows the reproduction of the scorecard below.

The scorecard is published annually by the Ontario Energy Board on or after September 30, therefore the next scorecard which will include 2020 audited results will be posted around September 30, 2021.

Scorecard - Orangeville Hydro Limited 9/1/2020

Performance Outcomes	Performance Categories	Measures		2015	2016	2017	2018	2019	Trend	Target Industry	Target Distributor
Customer Focus Services are provided in a manner that responds to identified customer preferences.	Service Quality	New Residential/Small Business Services Connected on Time		100.00%	100.00%	100.00%	100.00%	100.00%	flat	90.00%	
		Scheduled Appointments Met On Time		100.00%	99.80%	99.83%	99.76%	100.00%	up	90.00%	
		Telephone Calls Answered On Time		100.00%	99.50%	99.99%	99.94%	99.90%	down	65.00%	
	Customer Satisfaction	First Contact Resolution		3	3	99.96	99.9	99.9%			
		Billing Accuracy		99.95%	99.96%	99.93%	99.99%	100.00%	up	98.00%	
		Customer Satisfaction Survey Results		A	74.8	74.8	78.2%	78.2			
Operational Effectiveness Continuous improvement in productivity and cost performance is achieved; and distributors deliver on system reliability and quality objectives.	Safety	Level of Public Awareness		84.00%	84.00%	86.20%	86.20%	85.50%			
		Level of Compliance with Ontario Regulation 22/04 [1]		C	C	C	C	C	flat		C
		Serious Electrical Incident Index	Number of General Public Incidents	0	0	0	0	0	flat		0
			Rate per 10, 100, 1000 km of line	0.000	0.000	0.000	0.000	0.000	flat		0.000
	System Reliability	Average Number of Hours that Power to a Customer is Interrupted [2]		1.13	0.69	0.32	0.29	0.33	up		0.90
		Average Number of Times that Power to a Customer is Interrupted [2]		1.12	1.12	0.45	0.16	0.39	up		1.18
	Asset Management	Distribution System Plan Implementation Progress		101%	100	92	87%	98%			
	Cost Control	Efficiency Assessment		3	3	2	2	2			
		Total Cost per Customer [3]		$578	$575	$553	$551	$568			
		Total Cost per Km of Line [3]		$32,766	$31,963	$30,933	$31,233	$32,501			
Public Policy Responsiveness Distributors deliver on obligations mandated by government (e.g., in legislation and in regulatory requirements imposed further to Ministerial directives to the Board).	Conservation & Demand Management	Net Cumulative Energy Savings [4]		24.01%	40.78%	73.38%	84.00%	92.00%			14.15 GWh
	Connection of Renewable Generation	Renewable Generation Connection Impact Assessments Completed On Time			100.00%	100.00%					
		New Micro-embedded Generation Facilities Connected On Time		100.00%	100.00%	100.00%	100.00%		flat	90.00%	
Financial Performance Financial viability is maintained; and savings from operational effectiveness are sustainable.	Financial Ratios	Liquidity: Current Ratio (Current Assets/Current Liabilities)		1.64	1.58	1.52	1.56	1.74			
		Leverage: Total Debt (includes short-term and long-term debt) to Equity Ratio		1.15	1.06	1.17	1.05	1.15			
		Profitability: Regulatory Return on Equity	Deemed (included in rates)	9.36%	9.36%	9.36%	9.36%	9.36%			
			Achieved	6.40%	8.68%	10.60%	11.92%	10.36%			

1. Compliance with Ontario Regulation 22/04 assessed: Compliant (C); Needs Improvement (NI); or Non-Compliant (NC).
2. The trend's arrow direction is based on the comparison of the current 5-year rolling average to the distributor-specific target on the right. An upward arrow indicates decreasing reliability while downward indicates improving reliability.
3. A benchmarking analysis determines the total cost figures from the distributor's reported information.
4. The CDM measure is based on the now discontinued 2015-2020 Conservation First Framework. 2019 results include savings reported to the IESO up until the end of February 2020.

Legend: 5-year trend: up, down, flat. Current year: target met, target not met

General Scorecard Overview

In 2019, Orangeville Hydro exceeded all performance targets. Aging distribution infrastructure continues to be a challenge for many utilities today. Like most utilities in Ontario, Orangeville Hydro must replace aging infrastructure at a steady pace to meet this challenge. Therefore, Orangeville Hydro strategically plans to manage the renewal and growth of the distribution system in a cost-effective manner. In addition, vegetation control, including line clearing activities, were increased in the year to reduce the vulnerability of the distribution system to external uncontrollable events, such as weather.

Orangeville Hydro continues to focus on providing value to our customers. Orangeville Hydro offers "Customer Connect" to assist our customers with interactive information that will permit them to better monitor, understand, and control their electricity consumption. Orangeville Hydro is continually improving our website, which allows customers an improved experience when interacting with us. Our social media presence has increased, to provide immediate updates for outages as well as current news. Orangeville Hydro makes every effort to engage its customers on a regular basis to ensure that we are aware of your needs and that you are receiving the best value for your dollar.

In 2020, Orangeville Hydro will continue its efforts to improve its overall scorecard performance results as compared to prior years. This performance improvement is expected as a result of continued investment in both our infrastructure and in our response to your needs.

Service Quality

- **New Residential/Small Business Services Connected on Time**

In 2019, Orangeville Hydro connected 106 low-voltage (connections under 750 volts) residential and small business customers within the five-day timeline as prescribed by the Ontario Energy Board. This quantity is less than the 2019 new connections. Orangeville Hydro considers "New Services Connected on Time" as an important form of customer engagement as it is the utilities first opportunity to meet and/or exceed its customer's expectations, which in turn affects the level of customer satisfaction within a utility's territory. Consistent with prior years, Orangeville Hydro connected 100% of these customers on time, which significantly exceeds the Ontario Energy Board's mandated target of 90% for this measure. Orangeville Hydro expects this trend to continue into the foreseeable future.

- **Scheduled Appointments Met On Time**

Orangeville Hydro scheduled 272 appointments in 2019 to disconnect and/or reconnect service for maintenance, gain access to read or replace an inside meter, locate underground wires or otherwise complete work requested by its customers, including energizing new subdivisions. Orangeville Hydro considers "Scheduled Appointments Met" as an important form of customer engagement as customer presence is required for all types of appointments. Consistent with prior years, Orangeville Hydro met 100.00% of these appointments on time, which significantly exceeds the Ontario Energy Board's mandated target of 90% for this measure. Orangeville Hydro expects this trend to continue into the foreseeable future.

- **Telephone Calls Answered On Time**

In 2019, Orangeville Hydro received over 22,747 calls from its customers (an average of 91 calls per day), an increase of 6% from 2018. Orangeville Hydro considers "Telephone Calls" to be an important communication tool for identifying and responding to its customers' needs and preferences. Consistent with prior years, a customer service representative answered 99.9% of these calls in 30 seconds or less, which significantly exceeds the Ontario Energy Board mandated target of 65% for this measure. Orangeville Hydro expects this trend to continue into the foreseeable future.

Customer Satisfaction

- **First Contact Resolution**

First Contact Resolution is a scorecard measure introduced by the Ontario Energy Board midway through 2014. The Ontario Energy Board has not yet issued a common definition for this measure but is expected to do so within the next few years. As a result, this measure may differ from other utilities in the Province.

Orangeville Hydro defines "First Contact Resolution" as the number of customer inquiries that are not resolved by the first contact at the utility, resulting in the inquiry being escalated to an alternate contact

at the utility, typically a supervisor or a manager. This includes all customer inquiries that are made to a customer service representative whether by telephone, letter, e-mail, or in person. First contact resolution is tracked through the billing system. Once the issue has been escalated, details of the issue and the agreed upon resolution are logged on the customer's account by management. Outside escalation's are updated through email and copied to the customer's account. Orangeville Hydro considers the ability to address customer enquiries quickly and accurately to be an essential component of customer satisfaction.

- **Billing Accuracy**

Billing Accuracy is defined as the number of accurate bills issued expressed as a percentage of total bills issued. Orangeville Hydro considers timely and accurate billing to be an essential component of customer satisfaction. For 2019, Orangeville Hydro issued more than 153,427 customer bills and achieved a billing accuracy of 100.00%, which is within the Ontario Energy Board mandated target of 98%. Orangeville Hydro expects this trend to continue for 2020.

- **Customer Satisfaction Survey Results**

Customer Satisfaction Survey was a new scorecard measure introduced by the Ontario Energy Board for the 2014 scorecard. The Ontario Energy Board has not yet issued a common definition for this measure but is expected to do so within the next few years. This measure will differ from other utilities in the Province since there is not a consistent instrument or approach used across the Province. This makes meaningful comparison of results between many LDCs nearly impossible until there is a consistent Province-wide methodology.

In 2018, Orangeville Hydro engaged a third-party organization to conduct a customer satisfaction survey. This statistical survey canvassed several key areas including power quality and reliability, price, billing and payments, communications, and the overall customer service experience. Orangeville Hydro considers this customer satisfaction survey to be a useful tool for engaging the customer to get a better understanding of their wants and needs with respect to the provision of electricity services and for identifying areas that may require improvement. For 2018, Orangeville Hydro received a rating of 78.2% on its customer satisfaction survey. Orangeville Hydro is only required to report on this measure on a biennial basis (every second year) but expects this trend to continue into the foreseeable future.

Safety

- **Public Safety**

  - **Component A – Public Awareness of Electrical Safety**
    Component A consists of a statistical survey that gauges the public's awareness of key electrical safety concepts related to electrical distribution equipment found in a utility's territory. The survey also provides a benchmark of the levels of awareness including identifying gaps where additional education and awareness efforts may be required. Orangeville Hydro's ESA Public Safety Awareness Index Score for the 2019 Survey was 85.50%.

  - **Component B – Compliance with Ontario Regulation 22/04**
    Component B consists of a utilities compliance with Ontario Regulation 22/04 - Electrical Distribution Safety. Ontario Regulation 22/04 establishes the safety requirements for the design, construction, and maintenance of electrical distribution systems, particularly in relation to the

approvals and inspections required prior to putting electrical equipment into service. Over the past five years, Orangeville
Hydro was found to be compliant with Ontario Regulation 22/04 (Electrical Distribution Safety). This was achieved by our strong commitment to safety, and the adherence to company procedures & policies.

- **Component C – Serious Electrical Incident Index**
  Component C consists of the number of serious electrical incidents affecting the public, including fatalities, which occur within a utility's territory. In 2019, Orangeville Hydro had zero fatalities and zero serious incidents within its territory. Orangeville Hydro will continue to make efforts and work with the Electrical Safety Authority to continue the safe operation of our distribution system.

System Reliability

- **Average Number of Hours that Power to a Customer is Interrupted**

The average number of hours that power to a customer is interrupted is a measure of system reliability or the ability of a system to perform its required function. Orangeville Hydro views reliability of electrical service as a high priority for its customers and constantly monitors its system for signs of reliability degradation. Orangeville Hydro also regularly maintains its distribution system to ensure its level of reliability is kept as high as possible. The OEB typically requires a utility to keep its hours of interruption within the range of its historical performance, however, outside factors such as severe weather, defective equipment, or even regularly scheduled maintenance can greatly impact this measure. For 2019, Orangeville Hydro achieved an average of 0.33 hours of interrupted power, which is less than the distributor-specific target of 0.90 hours based on our 5-year average performance data. This value is also significantly less than Ontario Industry Average of 2.64 as stated in the OEB 2019 Yearbook of Electricity Distributors.

Orangeville Hydro's distribution system experienced fewer outages in 2019 than our historical average. The average is expected to return to the historical range in future years.

- **Average Number of Times that Power to a Customer is Interrupted**

The average number of times that power to a customer is interrupted is also a measure of system reliability and is also a high priority for Orangeville Hydro. As outlined above, the OEB also typically requires a utility to keep this measure within the range of its historical performance and outside factors can also greatly impact this measure. Orangeville Hydro experienced interrupted power 0.39 times during 2019, which is less than the distributor-specific target of 1.18 based on our 5-year average performance data. This value is also significantly less than Ontario Industry Average of 1.52 as stated in the OEB 2018 Yearbook of Electricity Distributors.

Orangeville Hydro's distribution system experienced fewer outages in 2019 than our historical average. The average is expected to return to the historical range in future years.

Asset Management

- **Distribution System Plan Implementation Progress**

The Distribution System Plan outlines Orangeville Hydro's forecasted capital expenditures, over a five (5) year period, which are required to maintain and expand the utility's electricity system to serve its current and future customers. The Distribution System Plan Implementation Progress measure is intended to assess Orangeville Hydro's effectiveness at planning and implementing these capital expenditures. Consistent with other new measures, utilities were given an opportunity to define this measure in the manner that best fits their organization. As a result, this measure may differ from other utilities in the Province.

Orangeville Hydro defines this measure as the tracking of actual capital project costs to planned capital project costs, expressed as a percentage. For this measure, Orangeville Hydro will include System Renewal, System Service, and General Plant capital expenditures. Orangeville Hydro moved to using this measure in 2015 based on information received from other utilities in the Province. Orangeville Hydro will continue to participate in the Ontario Energy Board Distribution System Plan Implementation Progress consultation process.

For 2019, Orangeville Hydro completed 96% of the planned capital expenditures. Since the Distribution System Plan timeframe had finished in 2018, the value was calculated as follows: the total of actual capital expenditures for 2014 to 2019, divided by the total budgeted values for 2014 to 2018 multiplied by 120%.

Cost Control

- **Efficiency Assessment**

On an annual basis, each utility in Ontario is assigned an efficiency ranking based on its performance. To determine a ranking, electricity distributors are divided into five groups based on the magnitude of the difference between their actual costs and predicted costs. In 2019, Orangeville Hydro remained in Cohort II, where a Cohort II distributor is defined as having actual costs 10% to 25% or more below predicted costs. Distributors with larger negative differences between actual and predicted costs are considered better cost performers and therefore eligible for lower stretch factors. The following outlines the five groups to which the distributors can be allocated and their definitions:

1) Cohort I (Stretch Factor = 0.0%) – Actual costs are 25% or more below predicted costs
2) Cohort II (Stretch Factor = 0.15%) – Actual costs are 10% to 25% or more below predicted costs
3) Cohort III (Stretch Factor = 0.30%) – Actual costs are within +/- 10% of predicted costs
4) Cohort IV (Stretch Factor = 0.45%) – Actual costs are 10% to 25% or more above predicted costs
5) Cohort V (Stretch Factor = 0.60%) – Actual costs are 25% or more above predicted costs

Orangeville Hydro will continue to work efficiently to ensure we stay within Cohort II and investigate opportunities to improve our cost efficiencies.

- **Total Cost per Customer**

Total cost per customer is calculated as the sum of Orangeville Hydro's capital and operating costs and dividing this cost figure by the total number of customers that Orangeville Hydro serves. Orangeville Hydro's cost performance increased in 2019 to $568 per customer, above the cost performance in 2018 at $551 per customer.

Orangeville Hydro's Total Cost per Customer has decreased on average by 0.05% per annum over the period 2011 through 2019. Orangeville Hydro has scrutinized costs to correspond with the level of expenses as approved in our rate application and has kept costs at a stable level. Like most distributors in the province, Orangeville Hydro has experienced slight increases in its total costs required to deliver quality and reliable service to customers, and also has seen a continually increasing customer base. Province wide programs such as smart meters, time of use pricing, as well as growth in wage and benefits costs for our employees have all contributed to increased operating costs. Orangeville Hydro's capital costs are planned strategically to manage the renewal and growth of the distribution system in a cost-effective manner.

Orangeville Hydro will continue to replace distribution assets proactively along a carefully managed timeframe in a manner that balances system risks and customer rate impacts. Going forward, keeping pace with economic fluctuations, Orangeville Hydro will continue to implement productivity and improvement initiatives to help offset some of the costs associated with future system improvement and enhancements and make it our goal to maintain or reduce the cost per customer.

- **Total Cost per Km of Line**

This measure uses the same total cost that is used in the Cost per Customer calculation above. The total cost is divided by the kilometers of line that Orangeville Hydro operates to serve its customers. Orangeville Hydro's 2019 cost per Km of line is $32,501, an increase of 4.1% over 2018 and an overall average decrease of 1.4% over the period 2012 to 2019. Orangeville Hydro experienced a minimal amount of growth in its total kilometers of lines. The same cost drivers that apply to the total cost per customer apply to the total cost per km of line. Orangeville Hydro continues to seek innovative solutions to help ensure cost/km of line remains competitive and within acceptable limits to our customers.

Conservation & Demand Management

- **Net Cumulative Energy Savings**

Orangeville Hydro Limited achieved 92% of its six-year Net Cumulative Energy (kWh's) Savings target of 14,150,000 kWh. This has been achieved by leveraging the suite of OEB approved CDM programs designed primarily for residential and small commercial classes of customers. The Net Cumulative Savings Results for 2015-2020 are 11,832 MWh ranking 37th out of 67 LDCs in the province.

Connection of Renewable Generation

- **Renewable Generation Connection Impact Assessments Completed on Time**

Electricity distributors are required to conduct Connection Impact Assessments (CIA's) on all renewable generation connections within 60 days of receiving the required deliverables from the proposed

Generator. Orangeville Hydro has developed and implemented an internal procedure to ensure compliance with this regulation. In 2019, Orangeville Hydro did not complete any CIAs.

- **New Micro-embedded Generation Facilities Connected On Time**

Micro-embedded generation facilities consist of solar, wind, or other clean energy projects of less than 10 kW that are typically installed by homeowners or small businesses. In 2019, Orangeville Hydro connected zero new micro-embedded generation facility within its territory. In the past any projects were connected within the prescribed timeframe of five (5) business days, which significantly exceeds the Ontario Energy Board's mandated target of 90% for this measure. Orangeville Hydro's process for these projects is well documented and Orangeville Hydro works closely with its customers and their contractors to ensure the customer's needs are met and/or exceeded. Orangeville Hydro expects the trend for this measure to continue to exceed the mandated target for the foreseeable future.

Financial Ratios

- **Liquidity: Current Ratio (Current Assets/Current Liabilities)**

As an indicator of financial health, a current ratio indicates a company's ability to pay its short-term debts and financial obligations. Typically, a current ratio between 1.5 and 3 is considered good. If the current ratio is below 1, then a company may have problems meeting its current financial obligations. If the current ratio is too high, then the company may be inefficient at using its current assets or its short-term financing facilities.

Orangeville Hydro's current ratio increased slightly from 1.56 in 2018 to 1.74 in 2019, which is still indicative of a financially healthy organization. Orangeville Hydro's current ratio is expected to remain healthy into the foreseeable future.

- **Leverage: Total Debt (includes short-term and long-term debt) to Equity Ratio**

The debt to equity ratio is a financial ratio indicating the relative proportion of shareholders' equity and debt used to finance a company's assets. The Ontario Energy Board (OEB) uses a deemed capital structure of 60% debt, 40% equity for electricity distributors when establishing rates. This deemed capital mix is equal to a debt to equity ratio of 1.5 (60/40). A debt to equity ratio of more than 1.5 indicates that a distributor is more highly leveraged than the deemed capital structure. A high debt to equity ratio may indicate that an electricity distributor may have difficulty generating sufficient cash flows to make its debt payments. A debt to equity ratio of less than 1.5 indicates that the distributor is less leveraged than the deemed capital structure. A low debt-to-equity ratio may indicate that an electricity distributor is not taking advantage of the increased profits that financial leverage may bring.

Orangeville Hydro's debt to equity rate was 1.15; or 53% debt to 47% equity in 2019. Orangeville Hydro strives to maintain a debt to equity structure that closely resembles the ratio expected by the OEB. Orangeville Hydro expects its debt to equity ratio to remain close to the expected norm into the foreseeable future.

- **Profitability: Regulatory Return on Equity – Deemed (included in rates)**

Return on equity (ROE) measures the rate of return on shareholder equity. ROE demonstrates an organization's profitability or how well a company uses its investments to generate earnings growth. A utility's ROE should be within the +/-3% range allowed by the Ontario Energy Board (OEB). Orangeville Hydro's last cost of service application was approved by the OEB and commenced on May 1, 2014. The approved rates include an expected (deemed) regulatory return on equity of 9.36%. When a distributor performs outside of this range, the actual performance may trigger a regulatory review of the distributor's revenues and costs structure by the OEB.

- **Profitability: Regulatory Return on Equity – Achieved**

Orangeville Hydro's return on equity achieved in 2019 was 10.36%, which is within the deemed ROE set by the Ontario Energy Board (OEB) of 9.36%, and a slightly lower ROE than 2018. The average return over the past 9 years was 8.74% and has continued to be within the OEB allowed range of +/-3%. Orangeville Hydro will continue to seek process improvements, find efficiencies, and manage costs while delivering on the operational and capital programs that have been put before the OEB. Orangeville Hydro will continue to deliver electricity to its customers in a safe, reliable, and efficient manner that provides good value for money while being responsive to customer and community needs and contributing to provincial and local public policy objectives.

Pacific Economics Group (PEG) Report

The PEG report compares utilities' cost efficiencies on a consistent basis and is publicly available on the OEB website. PEG produces an annual report that provides a ranking of the utilities included in the study, summarizes the results, and provides insight into the trends in utility efficiency scoring. Orangeville Hydro has been assigned a Group 2 efficiency ranking again for 2019, moving from Group 3 in 2017. (Group 2 as per PEG 3-year average). Orangeville Hydro strives to remain in the Group 2 while still achieving greater efficiencies through productivity improvements and cost control, without compromising safety and reliability. The utility is continuously looking for ways of finding efficiency in its Operations, Maintenance and Administration costs thus reducing rates.

Table 4: PEG Past Performance (Stretch Factor)

	2014	2015	2016	2017	2018	2019
Stretch Factor Cohort - Annual result	3	3	3	2	2	2
Associated Stretch Factor Value	0.30	0.30	0.30	0.15	0.15	0.15

The summary of cost performance results shows the actual total cost on an annual basis used to complete the PEG analysis. A negative percentage difference means that actual total costs are less than predicted costs. Shown below, the differential between actual total cost and predicted costs becomes increasingly larger with each year, which is why in 2017 Orangeville Hydro was moved to Group 2. Moving to Group 2 would historically have provided Orangeville Hydro with a larger increase in distribution revenue as a bonus for increased cost efficiencies.

In 2020, when Orangeville Hydro received its Cost of Service deferral approval for 2021 rates, the OEB determined that Orangeville Hydro will complete its next IRM rate application using the Annual IR methodology. This means that for 2021 rates, the distribution revenue increase will be smaller than in previous years, as the stretch factor value is .6% as opposed to .15% for Group 2 utilities. The estimated increase in distribution rates for 2021 will be 1.4%, which is calculated as 2.0% Price Escalator (which may be updated at a later date) minus .6% Stretch Factor.

Table 5: Summary of Cost Performance Results

	2014	2015	2016	2017	2018	2019
Actual Total Cost	$ 6,743,925	$ 6,848,039	$ 6,904,089	$ 6,836,145	$ 6,933,646	7,182,788
Percentage Change on previous year		1.5%	0.8%	-0.98%	1.43%	3.59%
Percentage Difference (Cost Performance) per PEG Analysis	-4.0%	-7.6%	-10.2%	-14.3%	-20.0%	-20.7%

Distribution Revenue

The Ontario Energy Board compiles an annual Yearbook which contains various financial and non-financial statistics of all utilities in the province. This report allows comparison between Orangeville Hydro and LDCs with similar characteristics, as well as neighbouring LDCs. The following charts highlight the efforts taken by Orangeville Hydro to keep the distribution revenue rates lower than many other LDCs for our customers. A three-year average from 2017-2019 was chosen to reduce the effect of anomalous data points that occur within a single year.

Table 6: Distribution Revenue - Residential Customer rate per month

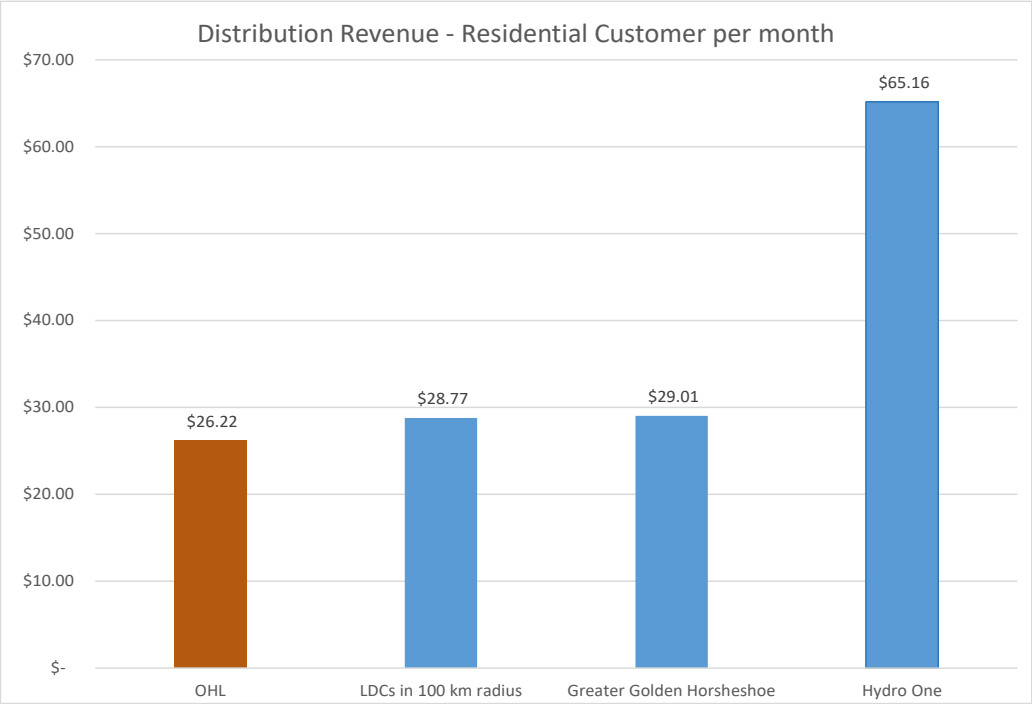


Table 7: Distribution Revenue – General Service < 50 kW Customer rate per month

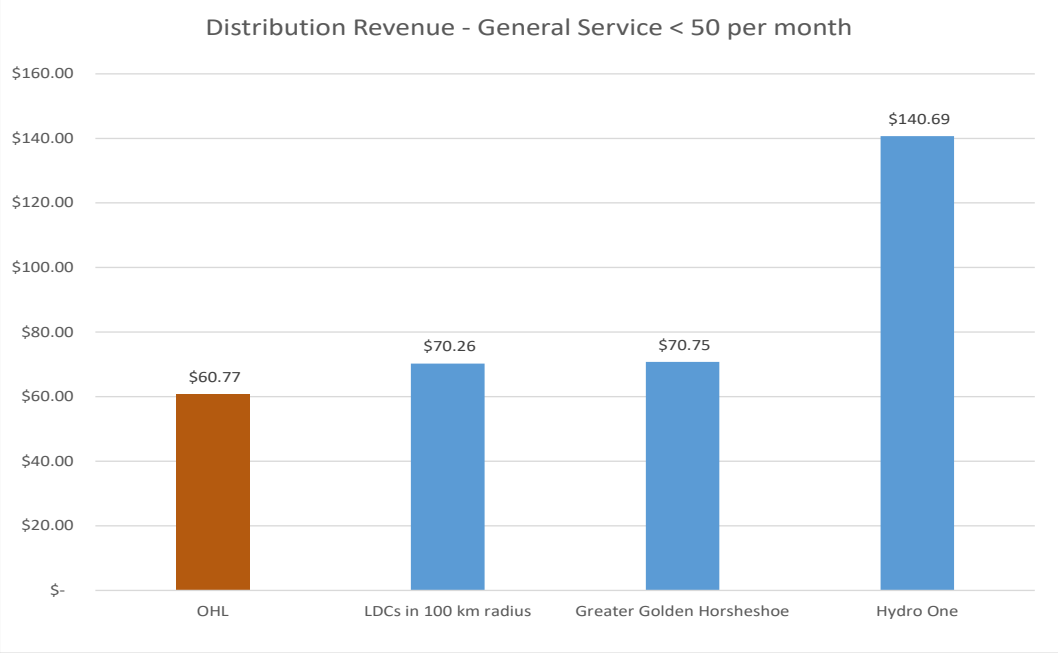
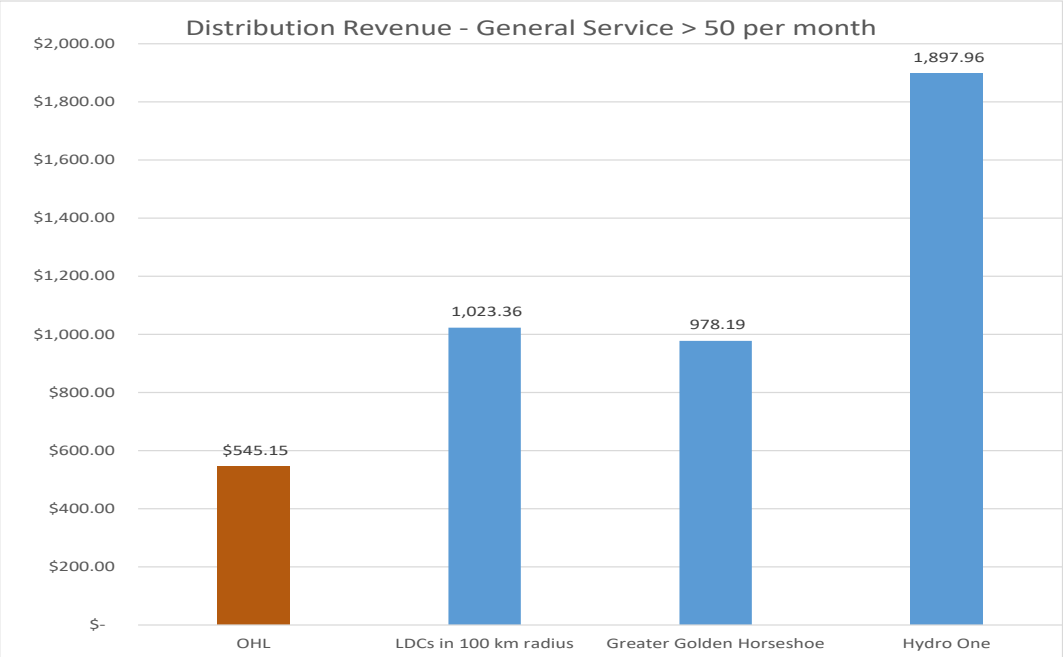


Table 8: Distribution Revenue – General Service > 50 kW Customer rate per month



Historical and Proposed Revenues

The historical customer growth has allowed Orangeville Hydro's overall distribution revenue to increase without increasing the distribution revenue per customer. In 2020, due to the COVID-19 pandemic, a decision was made to defer the May 1, 2020 distribution rate increase to November 1, 2020. This meant that the May 1, 2019 rates continued until November 1, 2020. On November 1, 2020, a small additional fixed and variable rate was added to recover these deferred revenues. This additional rate continues until October 31, 2021. On May 1, 2021 it is expected there will be another small rate increase, due to the completion of the Annual IR rate application.

Table 9: Historical and Proposed Distribution Revenues

		2014	2015	2016	2017	2018	2019	2020	2021
Residential	**Fixed Rate**	$ 15.25	$ 15.45	$ 18.19	$ 21.00	$ 23.72	$ 26.62	$ 26.74	$ 27.42
	Variable Rate	$ 0.0131	$ 0.0133	$ 0.0102	$ 0.0069	$ 0.0035	$ -	$ -	$ -
	Customers	10,407	10,570	10,730	11,084	11,285	11,367	11,419	11,517
	kWh	85,735,759	84,589,267	84,770,868	82,405,642	91,698,339	94,935,768	100,669,968	101,483,825
	Revenues	$ 3,187,626	$ 3,090,922	$ 3,200,973	$ 3,352,629	$ 3,602,177	$ 3,682,037	$ 3,860,058	$ 3,880,404
GS<50	**Fixed Rate**	$ 31.21	$ 31.62	$ 32.19	$ 32.71	$ 33.00	$ 33.45	$ 33.61	$ 34.46
	Variable Rate	$ 0.0095	$ 0.0096	$ 0.0098	$ 0.0100	$ 0.0101	$ 0.0102	$ 0.0103	$ 0.0105
	Customers	1,141	1,132	1,129	1,149	1,164	1,169	1,165	1,165
	kWh	34,481,597	33,814,274	33,991,437	34,262,940	35,720,029	36,989,653	35,514,308	36,440,047
	Revenues	$ 795,437	$ 751,287	$ 765,543	$ 919,218	$ 782,960	$ 856,918	$ 848,789	$ 886,102
						$ 45.62			
GS>50	**Fixed Rate**	$ 160.00	$ 162.08	$ 165.00	$ 167.64	$ 169.15	$ 171.43	$ 172.22	$ 176.62
	Variable Rate	$ 2.1482	$ 2.1761	$ 2.2153	$ 2.2507	$ 2.2710	$ 2.3017	$ 2.3124	$ 2.3718
	Customers	137	138	141	132	134	132	132	133
	kWh	119,994,247	124,173,673	124,528,148	129,453,609	125,990,621	128,262,888	126,101,795	128,641,694
	Revenues	$ 816,710	$ 826,561	$ 888,196	$ 870,180	$ 857,752	$ 891,714	$ 844,967	$ 985,219
Sentinel Lights	**Fixed Rate**	$ 3.12	$ 3.16	$ 3.22	$ 3.27	$ 3.30	$ 3.34	$ 3.36	$ 3.44
	Variable Rate	$ 12.1717	$ 12.3299	$ 12.5518	$ 12.7526	$ 12.8674	$ 13.0411	$ 13.1018	$ 13.4380
	Connections	141	151	152	151	155	155	158	158
	kWh	103,151	103,889	90,200	102,865	102,422	105826	107948	108177
	Revenues	$ 7,254	$ 7,339	$ 8,482	$ 8,096	$ 8,362	$ 10,064	$ 10,259	$ 10,495
Streetlights	**Fixed Rate**	$ 1.42	$ 1.44	$ 1.47	$ 1.49	$ 1.50	$ 1.52	$ 1.53	$ 1.57
	Variable Rate	$ 7.8391	$ 7.9410	$ 8.0839	$ 8.2132	$ 8.2871	$ 8.3990	$ 8.4378	$ 8.6530
	Connections	2,915	2,851	2,845	2,890	2,939	2939	2940	2940
	kWh	1,832,465	1,670,532	961,396	897,958	870,907	907844	926583	926701
	Revenues	$ 91,595	$ 91,113	$ 52,294	$ 71,690	$ 73,088	$ 74,954	$ 75,619	$ 78,266
USL	**Fixed Rate**	$ 5.95	$ 6.03	$ 6.14	$ 6.24	$ 6.30	$ 6.39	$ 6.48	$ 6.59
	Variable Rate	$ 0.0083	$ 0.0084	$ 0.0086	$ 0.0087	$ 0.0088	$ 0.0089	$ 0.0090	$ 0.0092
	Connections	73	96	97	97	97	97	97	97
	kWh	386,058	382,131	353,441	400,466	375,337	387,372	393,390	393,390
	Revenues	$ 10,158	$ 10,401	$ 10,939	$ 10,928	$ 40,430	$ 11,039	$ 11,268	$ 11,500
TOTAL	**kWh**	**242,533,277**	**244,733,765**	**244,695,490**	**247,523,480**	**254,757,654**	**261,589,351**	**263,713,992**	**267,993,834**
	Revenues	**$ 4,908,779**	**$ 4,777,622**	**$ 4,926,426**	**$ 5,232,741**	**$ 5,364,768**	**$ 5,526,725**	**$ 5,650,960**	**$ 5,851,986**

Bill Impacts

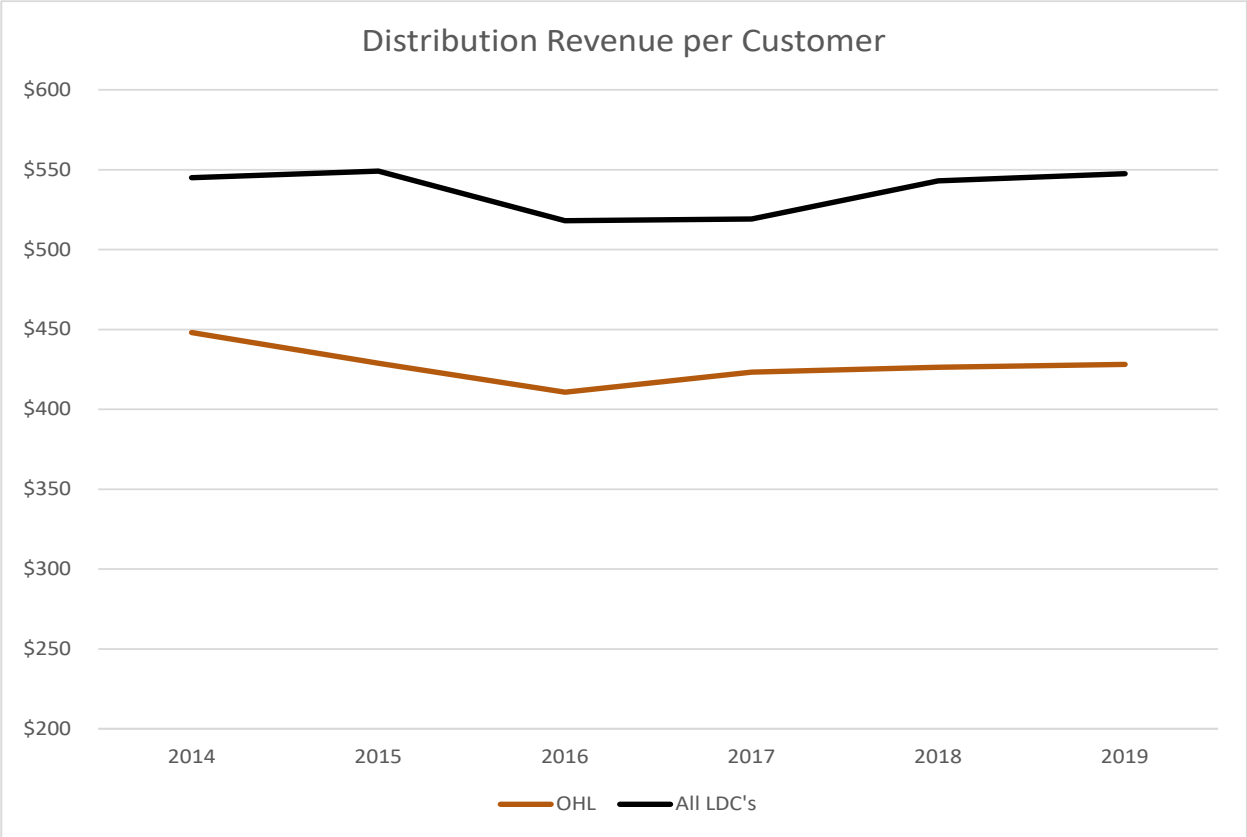
Since our last Cost of Service for 2014 rates, Orangeville Hydro's residential rate increases excluding rate riders have been near or below the rate of inflation. The transition to a fully fixed residential service charge has helped to ensure a stable source of revenue for Orangeville Hydro as well as ensuring more consistency for our residential customers energy costs. Overall residential bill impacts include rate riders, which are in place for the recovery of deferral and variance accounts from pass through charges

(regulatory assets and liabilities). As noted above, the May 1, 2020 rate change was deferred to November 1, 2020.

Table 10: Residential Bill Impacts (Distribution Only)

Excluding Rate Riders (incl. SME charge)								
		2014	2015	2016	2017	2018	2019	November 1, 2020
Residential	Fixed Rate	$ 16.04	$ 16.24	$ 18.98	$ 21.79	$ 24.29	$ 27.19	$ 27.92
	Variable Rate	$ 0.0131	$ 0.0133	$ 0.0102	$ 0.0069	$ 0.0035	$ -	$ -
	Total (700 kWh)	$ 25.21	$ 25.55	$ 26.12	$ 26.62	$ 26.74	$ 27.19	$ 27.92
	Bill Impact		1.35%	2.23%	1.91%	0.45%	1.68%	2.68%
Including Rate Riders								
		2014	2015	2016	2017	2018	2019	November 1, 2020
Residential	Fixed Rate	$ 17.08	$ 17.28	$ 19.15	$ 21.96	$ 24.46	$ 27.35	$ 28.08
	Variable Rate	$ 0.0120	$ 0.0137	$ 0.0117	$ 0.0064	$ 0.0031	$ 0.0011	$ 0.0011
	Total (700 kWh)	$ 25.48	$ 26.87	$ 27.34	$ 26.44	$ 26.63	$ 28.12	$ 28.85
	Bill Impact		5.46%	1.75%	-3.29%	0.72%	5.60%	2.60%

Table 11: Historical Distribution Revenue per Customer



8. Capital Spending

Key Objectives for Capital Expenditures

The key objectives for Orangeville Hydro's capital expenditures over the next five years include:

- Ensuring our existing and future customers enjoy the benefit of a safe and reliable distribution system,
- Ensuring our staff can work safely on and near the distribution system,
- Mitigating the inherent risks of a distribution system through an effective asset management program,
- Ensuring our load, generation, and storage customers have access to the distribution system as well as a long-term secure supply of energy, and
- Ensuring all regulatory compliance obligations are achieved.

System access expenditures for 2021 to 2025 are expected to be comparable to the historical average of 2014 to 2020. System Access projects encompass customer requests for service connections and subdivisions. Growth will occur from new subdivisions, infill developments, and intensification developments. Considering these expenditures are based on customer demand, this forecast is subject to change.

System renewal expenditures for 2021 to 2025 are expected to be comparable to the historical average of 2014 to 2020. These expenditures are to improve the distribution system by either replacing assets or extending the original service life of the major assets such as poles, transformers, switches, switching cubicles, and revenue meters. Considering these expenditures can be affected by the quantity of major assets that fail in a specific year, this forecast is subject to change.

System service expenditures for 2021 to 2025 are expected to be comparable to the historical average of 2014 to 2020. These projects are planned to ensure the distribution system continues to meet operational objectives, while addressing future needs. The expenditures within this 5 year plan are significantly driven by Orangeville Hydro's voltage conversion program as well as conductor upgrades.

General Plant expenditures for 2021 to 2025 are expected to be comparable to the historical average of 2014 to 2020. General Plant expenditures are for non-distribution assets, such as land, building, office equipment, computer hardware, vehicles, and small equipment. Intangibles are included in General Plant and include land rights and computer software.

2021 Capital Budget

Description	2021 Budget	2020 Budget	Variance 2021 Budget to 2020 Budget	2020 Forecast	Variance 2020 Forecast to 2020 Budget
System Access	322,484	365,714	(43,230)	157,176	(208,538)
System Renewal	329,867	189,880	139,987	204,936	15,056
System Service	943,153	1,005,065	(61,912)	757,527	(247,539)
General Plant	231,700	424,000	(192,300)	233,926	(190,074)
TOTAL	**$ 1,827,204**	**$ 1,984,659**	**$ (157,455)**	**$ 1,353,565**	**$ (631,094)**

Capital investments are necessary to ensure a safe and reliable distribution system and to meet our obligation to connect new customers. It is important to Orangeville Hydro that there is a strong understanding of the entire system to determine priority assets that require replacement or repair.

The 2021 budget was completed under the assumption that COVID-19 will not significantly affect the capital expenditures throughout the budget year.

The 2021 Capital Budget of $1,827,204 includes three significant System Service projects, which are: B113-MS2-West Feeder (Robb Blvd & 100 Century Drive) Voltage Conversion, B114-MS3-East Feeder (Hillside Drive) Voltage Conversion, B116-Centennial Road Primary Conductor Upgrade, and B115-5 to 39 Main Street South Pole line Rebuild (Rear Lane on East Side). System Access costs are mainly attributed to the new connection of subdivision developments such as 60-62 First St in Orangeville, and Mayberry Hills Phase 3A in Grand Valley. The 2021 General Plant Budget of $231,700 includes building upgrades, as well as office equipment upgrades. The financial system requires an upgrade to a more current version, and the customer service system requires upgrades to the customer online portal.

2021 Capital Budget by Category

Category	Reference Number	Project Description	Total Project	Contributed Capital
System Access	C01-2021	Various General Service Capital Contribution Projects	100,000	(90,000)
System Access	C02-2021	Various Residential Capital Contribution Projects	8,000	(6,000)
System Access	F01-2021	Estimated Distributed Energy Resources Projects	16,000	(16,000)
System Access	S01-2021	Various Subdivisions	423,412	(112,928)
System Access Total:			**547,412**	**(224,928)**
System Renewal	B00-2021	Failed Transformer Replacement	56,800	
System Renewal	H00-2021	Major Component Replacement	20,000	
System Renewal	M00-2021	Meter Replacement and additions	94,740	
System Renewal	P00-2021	Pole Replacement	60,000	
System Renewal	B115-2021	5 to 39 Main St South Pole Line Rebuild (Rear Lane on East side)	98,327	
System Renewal Total:			**329,867**	
System Service	B113-2021	MS2-West Feeder (Robb Blvd & 100 Century Drive) Voltage Conversion	559,763	
System Service	B114-2021	Cenennial Road Primary Conductor Upgrade	224,343	
System Service	B116-2021	MS3-East Feeder (Hillside Drive feeder) Voltage Conversion	159,047	
System Service Total:			**943,153**	
General Plant	GP 2021 - 1	Building	20,000	
General Plant	GP 2021 - 2	Office Equipment	22,000	
General Plant	GP 2021 - 3	Computer Equipment	52,000	
General Plant	GP 2021 - 4	Computer Software	125,700	
General Plant	GP 2021 - 5	Vehicles	-	
General Plant	GP 2021 - 6	Stores Equipment	2,000	
General Plant	GP 2021 - 7	Tools, Shop & Garage Equipment	5,000	
General Plant	GP 2021 - 8	Measurement & Testing	2,000	
General Plant	GP 2021 - 9	Miscellaneous Equipment	2,000	
General Plant	GP 2021 - 10	Land Rights	-	
General Plant	GP 2021 - 11	Communication Equipment	1,000	
General Plant Total:			**231,700**	

Total 2021 Budget Capital Expenditures	**2,052,132**	**$ (224,928)**
Total 2021 Budget Capital Expenditures Less Contributed Capital	**1,827,204**	

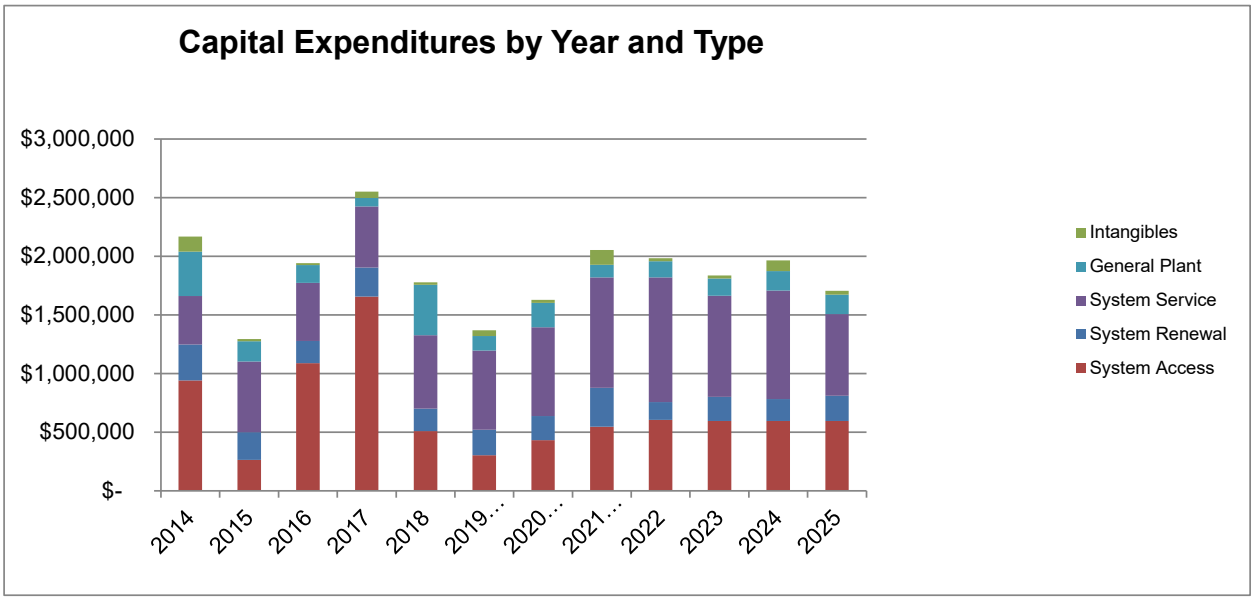
Plan - 2021 Budget Jobs		**2,052,132**
Carry forward from 2020 Jobs		**-**
Total		**2,052,132**

Legend:

	2021 Budget New Jobs
	Jobs Carried forward from 2020

2022-2025 Capital Expenditure Plan

Table 12: Capital Expenditures by Year and Type



The 2022-2025 capital forecast was completed under the assumption that COVID-19 will not significantly affect the capital expenditures throughout the years.

In 2022, the significant System Service project planned is the MS2 South Feeder Conversion on Parkview Drive, Morgandale Crescent, Highland Drive, and Newton Drive. MS2 is now the oldest Municipal Station in our distribution system and is targeted for decommissioning. The significant System Renewal is the Blind Line Overhead Primary Conductor Upgrade from Broadway to Hansen Boulevard. This project will reduce line losses and provide the capabilities to shift feeder loads from one feeder to another without concerns of capacity constraints.

In 2023, the significant System Service project planned is the MS2 South Feeder Conversion on Edelwild, Avonmore, and Johanna. This is a continuation of the underground voltage conversion from 2022. The significant System Renewal project is the Rail Line Pole Renewal. This is a unique and challenging project that is located along the rail line from Dawson Road to Broadway and Blind Line.

In 2024, the significant System Service projects planned are the MS2 East Feeder Conversion on Maple Cres and the MS2 South Feeder Conversion on Rustic, Edelwild and Cedar.

In 2025, the significant System Service projects planned are the Voltage Conversion of Cardwell, Dufferin, Ontario, and Caledonia and MS2 East Feeder Conversion of Carlton and Lawrence. That will end the multiyear voltage conversion of the Municipal Substation #2.

9. Operational Costs

Operating and maintenance work will maintain the focus on inspecting, testing, patrolling and the supervision of the distribution system and equipment such as sub-stations, transformers, and meters, along with engineering and mapping expenses. It also includes planned maintenance projects such as vegetation management in problem areas plus any costs that are a result of reactive work that occurs, such as repairing transformers and trouble calls. A well-maintained distribution system results in better system reliability which is one of our major initiatives. The operating and maintenance expenses category includes labour, material and contractor costs.

Billing and Collecting includes an allocated portion of the salary for the Manager of Customer Service to oversee the customer service department, customer service staff labour and benefits, stationery, postage, and billing system operating costs along with meter reading and smart metering costs. While our focus remains on the customer, Orangeville Hydro is always investigating efficiencies and striving to reduce costs.

Community Relations covers our safety and conservation programs for 2-3 schools each year to educate students on either conservation or safety. This budget also includes "On hold" informational messages to our customers, and participation in local events, such as Christmas in the Park and our Customer Education Day.

Administration is an integral part of our business plan. This category includes costs for the President, Chief Financial Officer, and Directors, as well as finance and regulatory staff. Labour, benefits, training, conferences, office maintenance and supplies, and insurances for property and liability, Ontario Energy Board regulatory costs, association memberships, HR, legal and auditing consultants and a portion of the IT professional are some of the other costs that drive the Administration budget. Orangeville Hydro will continue its membership in the Cornerstone Hydro Electric Concept Co-operative (CHEC) as the membership translates into valuable collaboration cost savings. Membership in Utilities Standards Forum (USF) is extremely beneficial in providing engineering standards common to the entire industry, as well as regulatory and customer service networking between other local distribution companies. Membership in the Electricity Distributors Association (EDA) is also valuable with the association being the voice for Ontario's electricity distributors.

2021 Operations, Maintenance, and Administration Budget

Description	2021 Budget	2020 Budget	Variance 2021 Budget to 2020 Budget	2020 Forecast	Variance 2020 Forecast to 2020 Budget
Operating	769,620	648,568	121,052	647,693	(875)
Maintenance	342,375	353,427	(11,052)	326,427	(27,000)
Distribution	**1,111,995**	**1,001,995**	**110,000**	**974,120**	**(27,875)**
Billing & Collecting	**926,262**	**777,239**	**149,023**	**785,112**	**7,873**
Community Relations	**26,793**	**22,154**	**4,639**	**8,022**	**(14,132)**
Administration	**1,478,856**	**1,841,482**	**(362,626)**	**1,707,521**	**(133,961)**
Total	**$ 3,543,907**	**$ 3,642,870**	**$ (98,963)**	**$ 3,474,775**	**$ (168,095)**
Total Percentage Variance			**-2.7%**		**-4.6%**

Overall, the 2021 OM&A Expenses Budget of $3,543,907, is $98,963 lower than the 2020 Budget of $3,642,870 due to the costs described below. The 2020 Forecast of $3,474,775 is $168,095 lower than the 2020 Budget.

The 2021 budget was completed under the assumption that COVID-19 will not significantly affect the OM&A expenditures throughout the budget year.

Salaries and wages are a significant aspect of the OM&A expenses, and Orangeville Hydro recognizes the value of a skilled and customer focused workforce. Orangeville Hydro is conscious of the importance of prudent operational spending and completes a monthly analysis to ensure actual spending is close to budgeted costs. Management attempts to find ways to reduce OM&A spending where possible.

In all areas, the 2021 budget includes some re-allocation of expenses between accounts. Orangeville Hydro completed a review of the Ontario Energy Board's Accounting Procedures Handbook (APH); and moved some expenses between accounts to align costs more closely with the definitions within the APH and with the department they specifically relate to. There was noticeable movement of several costs from the Administration category to either Operations and Maintenance, or Billing and Collecting. This is a significant reason these category totals increased, where Administration decreased as compared to previous years.

Distribution

This Operating and Maintenance budget includes a robust tree trimming program, as well as increased costs for hot spot repair work. A well-maintained distribution system results in better system reliability which is one of our major initiatives. The Operating budget includes labour, material and contractor costs. The 2021 Distribution Budget is higher than the 2020 Budget with an increase of $110,000. This budget includes a third of the IT contractor costs that used to be included in Administration, contractor costs to assist with the distribution system plan that is required to be completed in 2021, and higher Lines Supervisor labour as less labour hours are being attributed to capital.

Billing, Collecting and Meter Reading

The 2021 Billing and Collecting Budget is higher than the 2020 Budget by $149,023. This increase is primarily due to movement of expenses to align costs with the department they relate to. There is an increase in computer consultant costs, as one third of the IT consultant costs were moved to this category, as well as FileNexus (a document retention software) costs, with this software being primarily utilized by Customer Service. There is an increase in postage costs as a full year of collection notices are expected to be sent. Credit risk insurance was also moved here from Administration, as this insurance is in place to cover defaults by our largest customers.

Community Relations

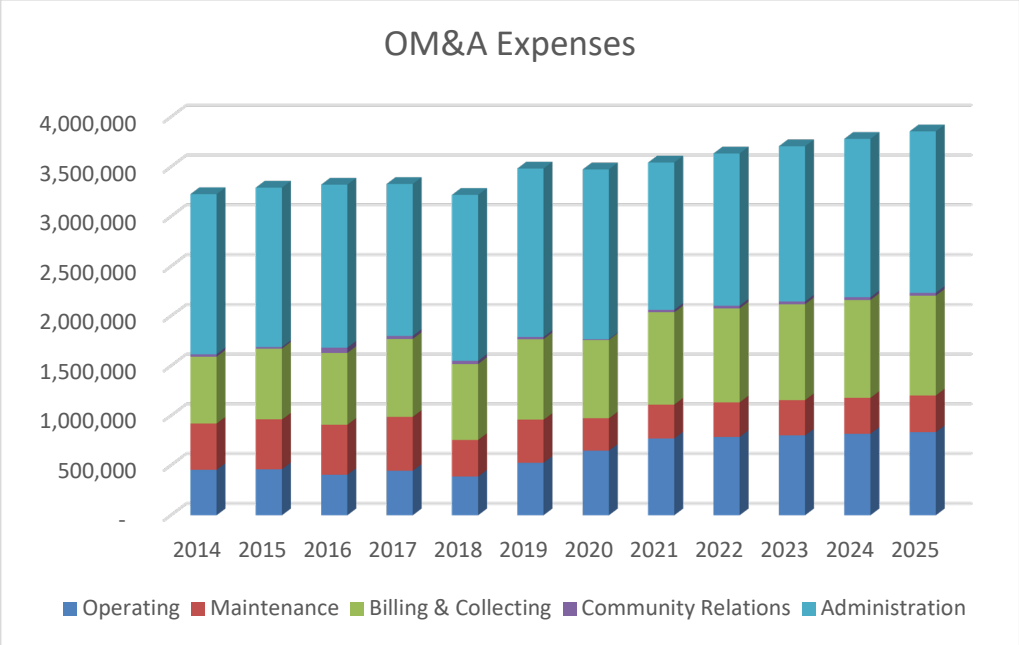
The 2021 Community Relations Budget is higher than the 2020 budget by $4,639. The budget includes four planned community engagement events, including two farmers markets, the Grand Valley Duck race, and Orangeville Hydro's customer appreciation event.

Administration

The 2021 Administration Budget is $362,626 lower than the 2020 budget as it does not include costs for an executive retirement. Offsetting this reduction are additional costs for assistance in customer engagement for our Distribution System Plan that is due in 2021. As discussed above, there were costs for the IT consultant, FileNexus file retention software and credit insurance that were moved from Administration to other areas of the budget. Operations Health and Safety training was moved from this budget to overheads in 2021, which also created a decrease in the administration budget.

2022-2025 Operating, Maintenance, and Administration Expenditure Plan

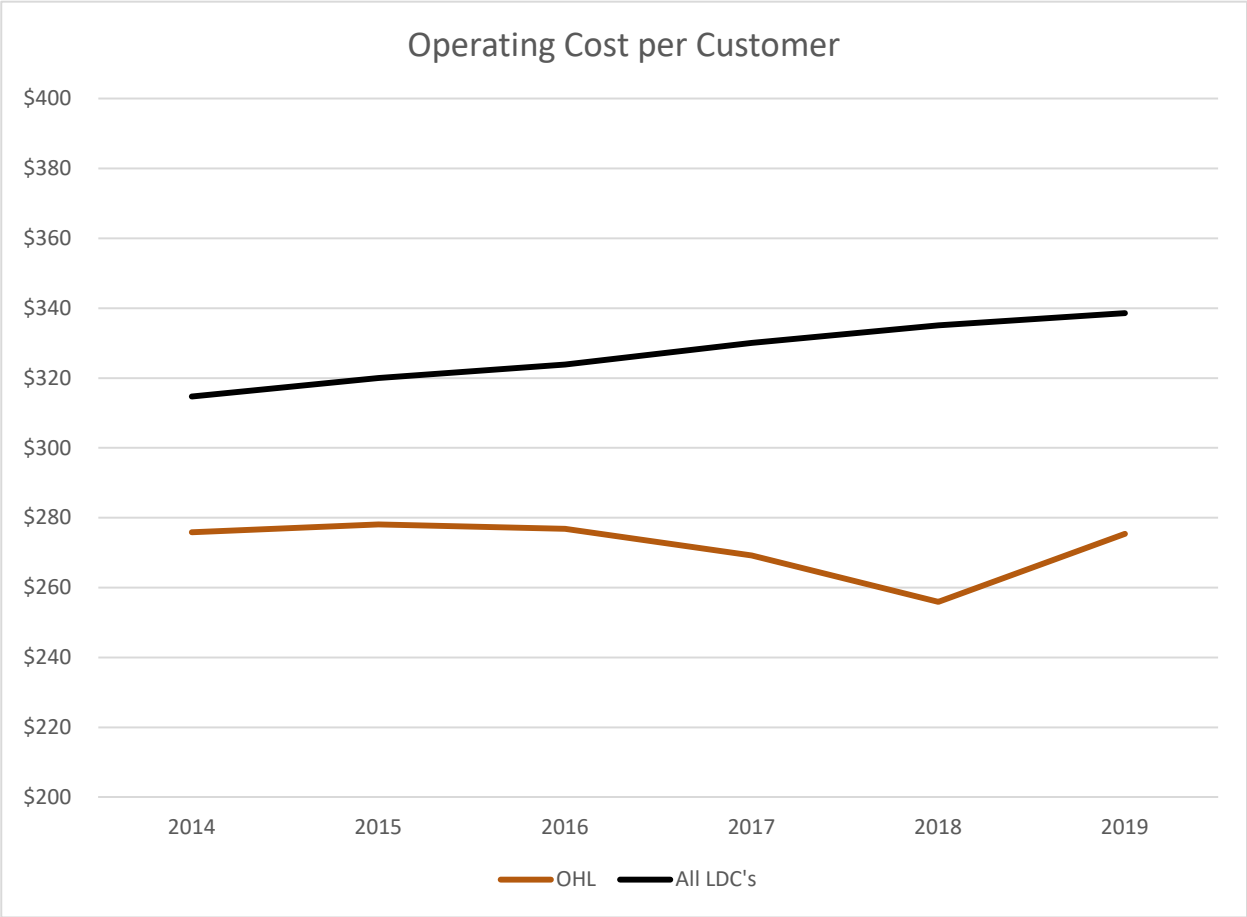
Table 13: OM&A Expenses by Year and Type



In the forecast from 2022 to 2025, an increase in most operating costs of a rate of 2% per year was used, other than union compensation, which is based on the collective agreement. The headcount remains at a steady level of 19 employees going forward into the 5-year horizon after 2020. Salaries and wages are a significant aspect of the OM&A expenses, and Orangeville Hydro recognizes the value of a skilled and customer focused workforce. Orangeville Hydro is conscious of the importance of prudent operational spending and completes a monthly analysis to ensure actual spending is close to budgeted costs. Management attempts to find ways to reduce OM&A spending where possible.

OM&A costs per customer historically is mainly on a downward trend for Orangeville Hydro compared to a province-wide upward trend. This is due to a steadily increasing customer base and OM&A expenses staying at fairly consistent levels.

Table 14: OM&A Costs per Customer

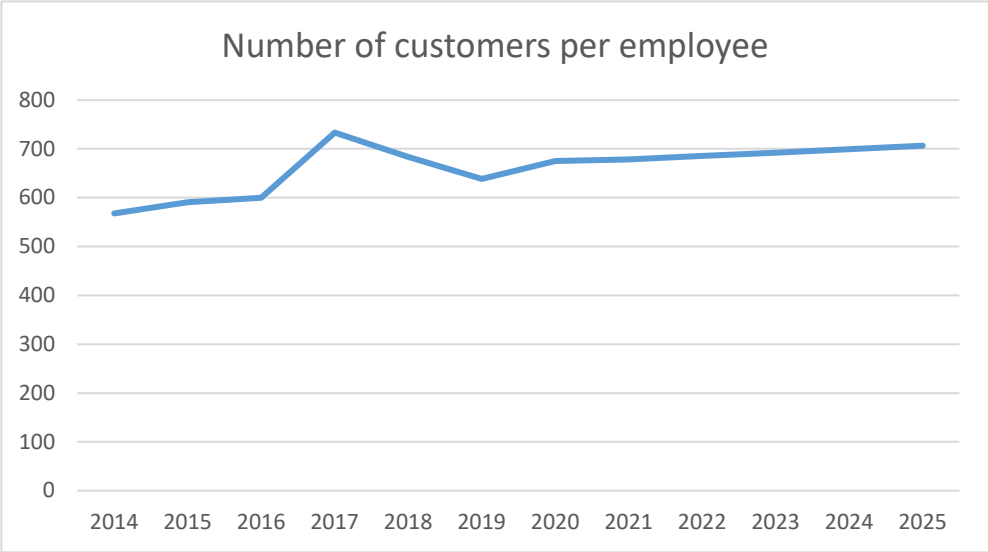


10. Personnel

Orangeville Hydro operates its business with a lean number of employees. This is proven through a comparison of Orangeville Hydro's number of customers per employee compared to other LDCs in Ontario. The efficiency is achieved through ensuring our employees are highly skilled and trained, as well as collaborating with other LDCs through CHEC, UCS, USF, and EDA.

Orangeville Hydro currently employs 18 full time employees, with plans for this to increase to 19 employees by the end of 2020. This number of employees is expected to remain consistent for the near future.

Table 15: Customers per Employee



11. Financial Summary

Table 16: Historical Financial Summary and Statistics

Financial Summary						
	2014	2015	2016	2017	2018	2019
	Actual	Actual	Actual	Actual	Actual	Actual
Energy Sales	$ 26,720,348	$ 29,637,637	$ 33,499,518	$ 30,048,911	$ 28,491,290	$ 29,164,689
Distribution Revenue	$ 4,954,958	$ 4,839,850	$ 5,200,350	$ 5,219,614	$ 5,444,878	$ 5,674,628
OM&A Expenses	$ 3,226,833	$ 3,292,572	$ 3,322,207	$ 3,328,900	$ 3,219,669	$ 3,483,836
Capital Expenditures	$ 2,167,163	$ 1,293,107	$ 1,940,991	$ 2,551,610	$ 1,778,360	$ 1,368,228
Net Income	$ 712,039	$ 549,640	$ 742,839	$ 1,070,150	$ 1,132,870	$ 901,542
Shareholder Equity	$ 9,261,741	$ 9,508,537	$ 9,865,747	$ 10,289,603	$ 10,994,887	$ 11,329,992
Total Debt	$ 11,303,321	$ 10,910,584	$ 10,505,200	$ 12,043,169	$ 11,554,844	$ 13,009,817
Capital assets (PP&E)	$ 17,089,439	$ 17,320,291	$ 18,337,875	$ 19,850,847	$ 20,620,014	$ 20,934,988
Annual Dividends to Shareholders	$ 423,796	$ 302,844	$ 385,629	$ 646,294	$ 447,092	$ 566,435
Cumulative Dividends Paid	$ 17,889,288	$ 18,192,132	$ 18,577,761	$ 19,224,055	$ 19,671,147	$ 20,237,582
Number of customers	11,757	11,934	12,000	12,462	12,690	12,766
Number of employees (FTE)	23	21	19	15	19	20
Financial Statistics						
	2014	2015	2016	2017	2018	2019
	Actual	Actual	Actual	Actual	Actual	Actual
Return on Equity (Financials)	7.69%	5.78%	7.53%	10.40%	10.30%	7.96%
Return on Equity (Regulated)	9.47%	6.40%	8.68%	10.60%	11.92%	10.34%
Debt %	55%	53%	52%	54%	51%	53%
Equity %	45%	47%	48%	46%	49%	47%
Debt to Equity %	1.21	1.15	1.06	1.17	1.05	1.15
OM&A expenses/customer	$ 274	$ 276	$ 277	$ 267	$ 254	$ 273
Customers/Employee	511	568	632	831	668	638

Table 17: Forecast Financial Summary and Statistics

Forecast Financial Summary						
	2020	2021	2022	2023	2024	2025
	Forecast	Budget	Plan	Plan	Plan	Plan
Energy Sales	$ 28,419,089	$ 30,602,138	$ 31,057,155	$ 32,109,987	$ 33,336,766	$ 34,616,141
Distribution Revenue	$ 5,691,630	$ 5,901,003	$ 5,989,327	$ 6,078,974	$ 6,169,963	$ 6,262,316
OM&A Expenses	$ 3,474,775	$ 3,543,907	$ 3,634,486	$ 3,706,950	$ 3,780,864	$ 3,856,256
Capital Expenditures	$ 1,628,441	$ 2,052,132	$ 1,982,759	$ 1,836,433	$ 1,963,909	$ 1,705,375
Net Income	$ 1,149,781	$ 1,083,885	$ 992,262	$ 994,178	$ 989,629	$ 980,774
Shareholder Equity	$ 12,029,004	$ 12,537,999	$ 12,988,318	$ 13,486,365	$ 13,978,906	$ 14,464,864
Total Debt	$ 13,383,763	$ 13,728,981	$ 14,017,628	$ 13,392,560	$ 14,470,245	$ 13,617,735
Capital assets (PP&E)	$ 21,522,190	$ 22,500,733	$ 23,349,035	$ 24,013,566	$ 24,767,229	$ 25,254,712
Annual Dividends to Shareholc	$ 450,771	$ 574,891	$ 541,942	$ 496,131	$ 497,089	$ 494,815
Cumulative Dividends Paid	$ 20,688,353	$ 21,263,243	$ 21,805,186	$ 22,301,317	$ 22,798,406	$ 23,293,220
Number of customers	12,830	12,894	13,023	13,153	13,285	13,418
Number of employees (FTE)	19	19	19	19	19	19
Forecast Statistics						
	2020	2021	2022	2023	2024	2025
	Forecast	Budget	Plan	Plan	Plan	Plan
Return on Equity (Financials)	9.56%	8.64%	7.64%	7.37%	7.08%	6.78%
Return on Equity (Regulated)						
Debt %	53%	52%	52%	50%	51%	48%
Equity %	47%	48%	48%	50%	49%	52%
Debt to Equity %	1.11	1.09	1.08	0.99	1.04	0.94
OM&A expenses/customer	$ 271	$ 275	$ 279	$ 282	$ 285	$ 287
Customers/Employee	675	679	685	692	699	706

Revenues

Energy Sales include the pass through commodity costs and are budgeted to increase 2-4% year over year, based on 2019 electricity sales, which saw significantly higher revenues than historical due to the end of the Ontario Fair Hydro Plan and the beginning of the Ontario Electricity Rebate. At that time, commodity costs were increased to reflect the actual cost of power more accurately, with a 31.8% rebate being provided to the customer. This began in November 2019. Distribution revenue is budgeted in 2021 to increase by an estimated number of customers for all customer classes as well as an increase for May 2021 forecasted rates and taking into consideration the forgone revenue rate riders. Future years are then conservatively increased by 1.5% to account for rate increases, customer growth and minimal impacts of COVID-19. The residential service charge is now fully fixed, resulting in additional revenue stability in the future. A Cost of Service deferral request was approved by the OEB for 2021 rates. An analysis is completed on an annual basis to allow determination whether to defer a cost of service application.

Expenses

Cost of Power expenses, which offset the Energy Sales, as well as most OM&A expenses are expected to increase by approximately 2% to account for inflationary increases as well as additional cost increases, and wages for employees are planned to increase according to the Collective Agreement. Finance costs will increase due to the additional borrowing projected in 2021, 2022 and 2024.

Capital Structure

In 2021, Orangeville Hydro plans to borrow $1 million to sustain our capital works plan and fund regulatory related payments, such as increased Hydro One low voltage (LV), network (NW), and connection (CN)

charges and fluctuating Global Adjustment rates, which will take the debt to equity ratio to 52:48, a small deviation from the OEB deemed structure of 60:40. A $2 million dollar loan was previously budgeted in 2020, but with some expenditures being deferred due to COVID-19, as well as a corporate-wide attempt to reduce expenses, including financing costs, the 2020 forecasted loan was reduced to $1 million. The Business Plan calls for another $1 million increase in borrowing in 2022 and $2 million additional borrowing in 2024. Orangeville Hydro will utilize the borrowing to maintain investment in our infrastructure, progression of technologies, and manage our net regulatory assets.

Rates/Return

A comprehensive review by the OEB of Orangeville Hydro's operating, maintenance, and administration costs along with recovery of income taxes and capital investments in our distribution system was completed in 2014. Orangeville Hydro earns a return on these investments at the cost of capital rate as deemed by the OEB to meet a certain revenue requirement to develop our distribution rates. Orangeville Hydro can earn a return on equity of 9.36% and to recover the OM&A costs to operate the utility efficiently. The regulated ROE is based on the regulated net income divided by the total rate base, which is calculated as the average property, plant, and equipment plus working capital. During our yearly planning process, management is continuously examining improvements thus intent on achieving a reasonable return on equity.

Corporate Income Tax

Corporate income taxes are predicted at a rate of 26.5% from 2021 through to 2025.

Dividends

Historically Orangeville Hydro has provided special dividends to the shareholders in 2005, 2008, 2013 and 2017 amounting to $3.6 million. From 2000 to 2020, Orangeville Hydro has provided the Town of Orangeville with over $20.2 million in dividends and from 2006-2020 the Town of Grand Valley has received over $450,000 in dividends. In the 2021-2025 Business Plan there are no projected special dividends, although consideration over the plan years may be made. Over the horizon of this plan the dividends are estimated at an average of $520,000 per year to 2025. Orangeville Hydro recognizes cost pressures by taking action and endeavours to meet the Ontario Energy Board's renewed regulatory framework, as well as public policy directives such as conservation and demand management initiatives. Cash position is constantly monitored with respect to our regulatory environment and vigilance is taken to ensure we can support our future capital requirements.

12. Pro-Forma Financial Statements

ORANGEVILLE HYDRO LIMITED
Statement of Comprehensive Income
Year ended December 31

	2019 Actual	2020 Forecast	2021 Budget	2022 Plan	2023 Plan	2024 Plan	2025 Plan
Revenue							
Distribution revenue	$ 5,674,628	$ 5,691,630	$ 5,901,003	$ 5,989,327	$ 6,078,974	$ 6,169,963	$ 6,262,316
Other	263,385	329,988	246,320	243,477	248,345	253,070	257,740
	5,938,013	**6,021,617**	**6,147,323**	**6,232,804**	**6,327,319**	**6,423,033**	**6,520,056**
Sale of energy	29,164,689	28,419,089	30,602,138	31,057,155	32,109,987	33,336,766	34,616,141
Total revenues	35,102,702	34,440,707	36,749,462	37,289,959	38,437,306	39,759,799	41,136,197
Operating expenses							
Operating and maintenance	958,991	974,120	1,111,995	1,134,235	1,156,920	1,180,058	1,203,659
Billing and collecting	835,794	785,112	926,262	944,788	963,683	982,957	1,002,616
Community relations		8,022	26,793	27,329	27,875	28,433	29,002
General and administrative	1,697,925	1,707,521	1,478,856	1,528,134	1,558,472	1,589,416	1,620,978
Depreciation and Amortization	882,819	892,311	927,528	990,421	1,024,965	1,065,630	1,074,611
	4,375,529	**4,367,085**	**4,471,434**	**4,624,907**	**4,731,916**	**4,846,494**	**4,930,867**
Cost of power purchased	30,112,525	29,665,458	30,257,079	30,860,533	32,091,579	33,371,867	34,703,366
Total expenses	34,488,054	34,032,543	34,728,514	35,485,440	36,823,495	38,218,361	39,634,233
Income from operating activities	**614,648**	**408,164**	**2,020,948**	**1,804,518**	**1,613,811**	**1,541,438**	**1,501,964**
Finance income	58,599	48,717	49,204	49,942	50,692	51,452	52,224
Finance costs	(490,995)	(462,522)	(463,475)	(468,377)	(445,901)	(455,722)	(452,729)
Income before income taxes	**182,252**	**-5,641**	**1,606,677**	**1,386,084**	**1,218,602**	**1,137,168**	**1,101,459**
Income tax expense	(103,245)	80,777	(226,344)	(229,797)	(209,176)	(177,171)	(192,655)
Net income for the year	**79,007**	**75,136**	**1,380,333**	**1,156,286**	**1,009,426**	**959,997**	**908,805**
Net movement in regulatory balances	1,020,659	1,246,368	(345,059)	(196,622)	(18,408)	35,101	87,225
Tax on net movement	(198,124)	(171,723)	48,611	32,598	3,160	(5,469)	(15,256)
	822,535	1,074,645	(296,448)	(164,024)	(15,248)	29,632	71,969
Net income for the year and net movement in regulatory balances, being total comprehensive income	**$ 901,542**	**$ 1,149,781**	**$ 1,083,885**	**$ 992,262**	**$ 994,178**	**$ 989,629**	**$ 980,774**

ORANGEVILLE HYDRO LIMITED
Statement of Financial Position
December 31

	2019 Actual	2020 Forecast	2021 Budget	2022 Plan	2023 Plan	2024 Plan	2025 Plan
Assets							
Current assets							
Cash	$ 656,693	$ 547,116	$ 895,175	$ 1,185,486	$ 601,004	$ 1,564,057	$ 797,315
Accounts receivable	4,207,174	4,071,014	4,111,436	4,152,263	4,193,498	4,235,145	4,277,208
Unbilled revenue	2,626,067	2,652,328	2,678,851	2,705,640	2,732,696	2,760,023	2,787,623
Inventory	291,834	293,293	294,759	296,233	297,714	299,203	300,699
Prepaid expenses	145,623	147,080	148,550	150,036	151,536	153,052	154,582
Other	489	538	592	651	716	788	866
Total current assets	7,927,880	7,711,369	8,129,365	8,490,309	7,977,165	9,012,267	8,318,294
Non-current assets							
Property, plant and equipment	20,708,211	21,296,605	22,193,306	23,070,029	23,760,901	24,481,244	24,998,909
Intangible assets	226,777	225,585	307,427	279,007	252,665	285,986	255,803
Deferred tax assets	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Total non-current assets	20,938,988	21,526,190	22,504,733	23,353,035	24,017,566	24,771,229	25,258,712
Total assets	**28,866,868**	**29,237,559**	**30,634,097**	**31,843,344**	**31,994,731**	**33,783,497**	**33,577,006**
Regulatory debit balances	2,715,283	3,714,754	3,562,922	3,431,283	3,241,164	3,276,265	3,363,490
Total assets and regulatory balances	**$ 31,582,151**	**$ 32,952,313**	**$ 34,197,019**	**$ 35,274,627**	**$ 35,235,894**	**$ 37,059,761**	**$ 36,940,497**
Liabilities							
Current Liabilities							
Accounts payable and accrued liabilities	$ 3,721,170	$ 4,043,140	$ 4,081,089	$ 4,119,412	$ 4,158,954	$ 4,198,928	$ 4,239,339
Long-term debt due within one year	564,845	652,279	705,697	745,367	770,390	852,510	866,461
Customer deposits	225,000	226,125	227,256	228,392	229,534	230,682	231,835
Other payables	114,904	112,900	114,029	115,169	116,321	117,484	118,659
Income taxes payable	(75,292)	15,150	15,302	15,455	15,609	15,765	15,923
Total current liabilities	4,550,627	5,049,594	5,143,372	5,223,794	5,290,807	5,415,369	5,472,217
Non-Current Liabilities							
Long-term debt	12,444,972	12,731,484	13,023,284	13,272,261	12,622,171	13,617,735	12,751,274
Employee future benefits	337,688	346,292	354,896	363,500	372,104	380,708	389,312
Customer deposits	499,514	403,509	387,344	371,018	354,528	337,873	321,052
Contributions in aid of construction	1,859,325	2,079,294	2,243,761	2,484,390	2,710,286	2,929,537	3,142,144
Total non-current liabilities	15,141,500	15,560,580	16,009,286	16,491,169	16,059,088	17,265,853	16,603,781
Total Liabilities	19,692,126	20,610,173	21,152,658	21,714,963	21,349,896	22,681,222	22,075,998
Equity							
Share capital	8,290,714	8,290,714	8,290,714	8,290,714	8,290,714	8,290,714	8,290,714
Retained earnings	2,991,878	3,690,890	4,199,885	4,650,205	5,148,251	5,640,792	6,126,750
Accumulated other comprehensive income	47,400	47,400	47,400	47,400	47,400	47,400	47,400
Total equity	11,329,992	12,029,004	12,537,999	12,988,318	13,486,365	13,978,906	14,464,864
Total liabilities and equity	31,022,118	32,639,177	33,690,656	34,703,282	34,836,261	36,660,127	36,540,863
Regulatory credit balances	560,033	313,135	506,363	571,346	399,634	399,634	399,634
Total liabilities, equity and regulatory balances	**$ 31,582,151**	**$ 32,952,313**	**$ 34,197,019**	**$ 35,274,627**	**$ 35,235,894**	**$ 37,059,761**	**$ 36,940,497**

ORANGEVILLE HYDRO LIMITED
Statements of Cash Flows
Year ended December 31

	2019 Actual	2020 Forecast	2021 Budget	2022 Plan	2023 Plan	2024 Plan	2025 Plan
Operating activities							
Net income and net movement in regulatory balances	$ 901,542	$ 1,149,781	$ 1,083,885	$ 992,262	$ 994,178	$ 989,629	$ 980,774
Adjustments for:							
Depreciation and amortization	981,874	993,239	1,030,589	1,091,456	1,128,902	1,167,246	1,174,892
Loss on disposal of property, plant and equipment	38,418	(64,000)	33,000	32,850	32,698	32,543	32,386
Net finance costs	432,396	413,805	414,271	418,435	395,209	404,270	400,505
Income tax expense	103,245	(80,777)	226,344	229,797	209,176	177,171	192,655
Tax on net movement in regulatory	198,124	171,723	(48,611)	(32,598)	(3,160)	5,469	15,256
Employee future benefits	8,604	8,604	8,604	8,604	8,604	8,604	8,604
Contributions received from customers	(49,035)	(54,907)	(60,461)	(66,371)	(73,104)	(79,749)	(86,393)
	$ 2,615,168	$ 2,537,468	$ 2,687,622	$ 2,674,436	$ 2,692,503	$ 2,705,184	$ 2,718,678
Changes in non-cash operating working capital:							
Accounts receivable	(174,121)	136,160	(40,422)	(40,826)	(41,235)	(41,647)	(42,063)
Unbilled revenue	283,407	(26,261)	(26,523)	(26,789)	(27,056)	(27,327)	(27,600)
Inventory	30,168	(1,459)	(1,466)	(1,474)	(1,481)	(1,489)	(1,496)
Prepaid expenses	(14,095)	(1,456)	(1,471)	(1,486)	(1,500)	(1,515)	(1,531)
Other current assets	(194)	(49)	(54)	(59)	(65)	(72)	(79)
Accounts payable and accrued liabilities	(624,722)	321,970	37,949	38,322	39,542	39,974	40,411
Other payables	6,244	(2,004)	1,129	1,140	1,152	1,163	1,175
Customer deposits	(142,008)	(94,880)	(15,034)	(15,190)	(15,348)	(15,507)	(15,668)
	$ (635,321)	$ 332,021	$ (45,893)	$ (46,361)	$ (45,992)	$ (46,420)	$ (46,851)
Regulatory balances	(1,020,659)	(1,246,368)	345,059	196,622	18,408	(35,101)	(87,225)
Income tax paid	(88,232)	171,219	(226,193)	(229,644)	(209,022)	(177,015)	(192,497)
Interest paid	(490,995)	(462,522)	(463,475)	(468,377)	(445,901)	(455,722)	(452,729)
Interest received	58,599	48,717	49,204	49,942	50,692	51,452	52,224
Net cash from operating activities	$ 438,559	$ 1,380,535	$ 2,346,325	$ 2,176,617	$ 2,060,688	$ 2,042,378	$ 1,991,601
Investing activities							
Purchase of property, plant and equipment	(1,267,962)	(1,598,189)	(1,926,432)	(1,956,859)	(1,810,533)	(1,873,909)	(1,672,475)
Proceeds on disposal of property, plant and equipment	4,452	112,000	10,000	10,150	10,302	10,457	10,614
Proceeds on disposal of intangible assets	0	0	0	0	0	0	0
Purchase of intangible assets	(71,756)	(30,252)	(125,700)	(25,900)	(25,900)	(90,000)	(32,900)
Contributions received from customers	69,938	274,876	224,928	307,000	299,000	299,000	299,000
Net cash used by investing activities	$ (1,265,328)	$ (1,241,565)	$ (1,817,204)	$ (1,665,609)	$ (1,527,131)	$ (1,654,453)	$ (1,395,761)
Financing activities							
Proceeds from long-term debt	2,000,000	1,000,000	1,000,000	1,000,000		2,000,000	
Repayment of long-term debt	(545,027)	(626,054)	(654,782)	(711,353)	(625,068)	(922,315)	(852,510)
Dividends paid	(566,435)	(450,771)	(574,891)	(541,942)	(496,131)	(497,089)	(494,815)
Net cash from financing activities	$ 888,538	$ (76,825)	$ (229,672)	$ (253,295)	$ (1,121,199)	$ 580,596	$ (1,347,325)
Change in cash	61,770	62,145	299,448	257,713	(587,641)	968,522	(751,486)
Cash, beginning of year	582,924	656,693	547,116	895,175	1,185,486	601,004	1,564,057
Cash, end of year	$ 656,693	$ 547,116	$ 895,175	$ 1,185,486	$ 601,004	$ 1,564,057	$ 797,315

13. Conclusion

The 2021 Budget presents a steady and resilient financial outlook for the following year. It was prepared with the expectation that COVID-19 will not significantly affect capital expenditures and OM&A expenses. The 2021 Budget has been prepared with conservative assumptions with regards to growth.

The 2022-2025 Business Plan presents a consistent and stable financial outlook. Orangeville Hydro continually reviews its business and operational goals against its workforce needs, its financial strength, and the impact on its customers. All projected revenues and expenses have been closely examined to ensure accuracy, with conservative assumptions with regards to growth as well as alignment with the definitions within the Ontario Energy Board Accounting Procedures Handbook. Orangeville Hydro continues to be focused on maintaining the adequacy, reliability, and quality of service to its distribution customers through effective capital and operational spending.

Report

Subject: **Assumption of Cachet Development Subdivision, Registered Plan 7M-70**

Department: **Infrastructure Services**

Division: **Transportation and Development**

Report #: **INS-2021-007**

Meeting Date: **2021-01-25**

Recommendations

That report INS-2021-007, Assumption of Cachet Development Subdivision, Registered Plan 7M-70 be received;

And that the By-law included as Attachment No. 3 to this report, be enacted to assume the subdivision roads and all associated infrastructure works and services in the Cachet Subdivision, Registered Plan 7M-70.

By-laws:

That a By-law to assume the subdivision roads and all associated infrastructure works and services in the Cachet Subdivision, Registered Plan 7M-70 be read a first, second and third time and finally passed.

Background and Analysis

The Subdivision Agreement between the Town of Orangeville (Town) and Cachet Developments (Orangeville) Inc. (Owner) for the development of Registered Plan 7M-70 (RP 7M-70) was registered in the Land Registry office on October 4th, 2016 as Number DC 177774 .

The roads and services in this development have been constructed and were granted Preliminary Acceptance in March 2017. They have performed satisfactorily since that time and have gone through all the required warranty and maintenance periods. All deficiencies that were identified as part of the final inspection process have been adequately addressed by the Owner.

Transportation and Development Staff is prepared to recommend the issuance of a Certificate of Final Acceptance (Attachment No. 1) releasing the Owner, Cachet

Developments (Orangeville) Inc. from all obligations imposed by the Subdivision Agreement and as such the ownership of all works and services shall vest in the Town. By issuing the Certificate of Final Acceptance and passing the By-law, the Town shall:

i) Assume responsibility of the roads and incorporate such roads into the Town's road system;
ii) Assume responsibility for all works and services included in the Certificate of Final Acceptance; and,
iii) Reduce or release all securities that have been given in accordance with the Subdivision Agreement relating to the works and services.

Based on the above, Staff recommends that Council consider a By-law to assume responsibility and subsequent maintenance for the subdivision roads and for the associated infrastructure works and services for the Cachet Developments Subdivision and more specifically the following:

- Lots 1 to 85, inclusive;
- Blocks 86 to 103, inclusive,
- Reserve Blocks 104 to 121 inclusive and
- Streets – Hansen Boulevard, Parkinson Crescent, Drew Brown Boulevard, Porter Drive, Paisley Way, Gibson Court, College Avenue

---

Strategic Alignment

Orangeville Forward – Strategic Plan

Priority Area: Sustainable Infrastructure

Objective: Plan for Growth

Sustainable Neighbourhood Action Plan

Theme: Land Use and Planning

Strategy: Co-ordinate Land Use and Infrastructure Planning to promote healthy, liveable and safe communities

---

Financial Impact

There is no direct financial impact associated with the recommendations of this report

Respectfully submitted
Douglas G. Jones, M.E.Sc., P.Eng.
General Manager, Infrastructure Services

Reviewed by
R. John Lackey, P. Eng.
Manager, Transportation & Development

Prepared by
Tony Dulisse, CET, CRS,
Engineering Technologist, Infrastructure Services

Attachment(s): 1. Certificate of Final Acceptance
2. Location Map
3. By-law

CERTIFICATE OF FINAL ACCEPTANCE

Cachet Developments (Orangeville) Inc., Registered Plan 7M-70,

This certificate is issued pursuant to an agreement

B E T W E E N:

Cachet Developments (Orangeville) Inc.

hereinafter referred to as the Owner

- and -

THE CORPORATION OF THE TOWN OF ORANGEVILLE

hereinafter referred to as the Town

1. The following are the facts upon which this certificate is issued:

   (a) The Town and the Owner entered into an agreement (hereinafter referred to as "the agreement") with respect to the land referred to in Registered Plan 7M-70 hereto which agreements are dated August 22nd, 2016, and registered in the Land Registry Office for the Land Titles Division of Dufferin (No. 7) on October 4th, 2016 as Number DC 177774 .

   (b) Pursuant to the terms of the agreement the Owner has applied for a Certificate of Final Acceptance; and

   (c) The Owner has complied with all terms of the agreement that must be satisfied prior to the issuing of this certificate.

2. The Town hereby grants its final acceptance for the services that are required to be constructed by the agreement prior to the issue of this certificate and certifies that the Owner has satisfied all other obligations that it is required to fulfil for the granting of this certificate.

3. The institution that has issued security to the Town and to the Owner to guarantee the performance of the agreement is hereby authorized to cancel the security unless otherwise required for other development lands within this plan of subdivision.

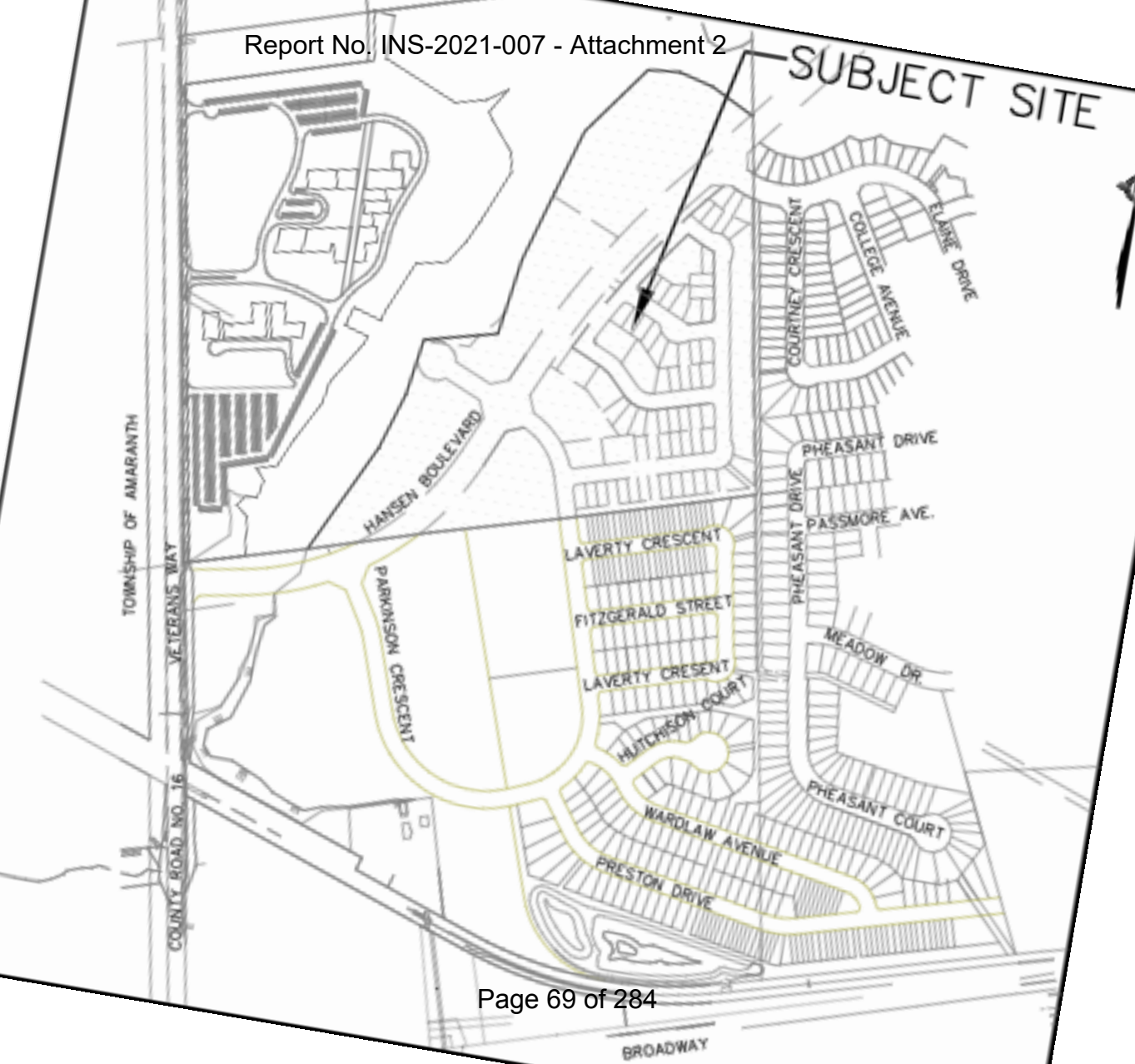
4. Pursuant to Section 17 of the agreement the signing and delivery of this certificate by the Clerk of the Town is deemed to be proof of all matters contained herein.

5. The registration of a copy of this certificate in the Registry Office hereto will act as a release of the land upon the title to which it has been registered from the terms of this agreement except for the following:

   5.1 **Schedule C, Schedule I, Schedule J of the subdivision agreement noted in Paragraph 1.**

6. This certificate of final acceptance is issued as of the 25th day of January 2021.

_____
CLERK
TOWN OF ORANGEVILLE


SUBJECT SITE
ELAINE DRIVE
COLLEGE AVENUE
COURTNEY CRESCENT
PHEASANT DRIVE
PASSMORE AVE.
PHEASANT DRIVE
HANSEN BOULEVARD
LAVERTY CRESCENT
FITZGERALD STREET
LAVERTY CRESENT
PARKINSON CRESCENT
MEADOW DR.
HUTCHISON COURT
PHEASANT COURT
WARDLAW AVENUE
PRESTON DRIVE
TOWNSHIP OF AMARANTH
VETERANS WAY
COUNTY ROAD NO. 16
BROADWAY

The Corporation of the Town of Orangeville

By-law Number 2021

A by-law to Assume Roads, Works and Services in the Cachet Development Subdivision, RP 7M-70

Whereas the Municipal Act, S.O. 2001, c.25, S.11, authorizes a municipality to pass by-laws respecting matters within the jurisdiction of highways;

And whereas Council wishes to assume the roads, works and services in Registered Plan 7M-70;

Now therefore be it resolved that Council for The Corporation of the Town of Orangeville hereby enacts as follows:

1. That the Corporation of the Town of Orangeville hereby assumes responsibility for the roads, and for all the works and municipal services constructed by the developer (Cachet Developments (Orangeville) Inc.) to service Lots 1 to 85 inclusive, Blocks 86 to 103 inclusive, Reserve Blocks 104 to 121 inclusive and streets Hansen Boulevard, Parkinson Crescent, Drew Brown Boulevard, Porter Drive, Paisley Way, Gibson Court and College Avenue, all in Registered Plan 7M-70, Town of Orangeville, County of Dufferin

2. That the Mayor and Clerk are hereby authorized to execute the said by-law and any other documents ancillary to the assumption of the said roads, works and municipal services.

Read three times and finally passed this 25th day of January, 2021

_____

Sandy Brown, Mayor

_____

Karen Landry, Clerk

Report

Subject: **Taxicab and Limousine Driver's Licence Extension**

Department: **Corporate Services**

Division: **By-law/Property Standards**

Report #: **CPS-2021-006**

Meeting Date: **2021-01-25**

Recommendations

That report CPS-2021-006, Taxicab and Limousine Driver's Licence Extension, be received;

And that the expiry date for Taxicab and Limousine Driver's Licences issued in 2020 be extended from January 31, 2021 to April 30, 2021;

And that Council amend By-law 2004-119 to change the expiry date for Taxicab and Limousine Driver's Licences going forward.

Background and Analysis

A review of the business licences issued and their respective expiry dates was conducted by the Clerk's division as a result of the Province wide shutdown and enhanced restrictions that were implemented effective December 26, 2020 due to COVID-19. Following this review, Report CPS-2021-005 (Restaurant and Pet Shop Licences Extension) was submitted to Council at its January 11, 2021 meeting. This report recommended that restaurant licences and pet shop licences that were due to expire on January 30, 2021 and January 31, 2021, be extended to April 30, 2021 to provide relief to businesses facing financial challenges due to the pandemic. Further, it was recommended that Restaurant Licence By-law 2004-117 and Pet Shop Licence By-law 2005-095 be amended to change the validity period of these licences to April 30th going forward.

Under the provisions of Taxicab By-law 2004-119, taxicab and limousine driver's licences expire on January 31 of the year following the date of issue.

The new restrictions imposed due to the Province wide shutdown has created not only financial challenges for taxicab and limousine drivers, but it has also limited in-person

access to services to obtain the documentation required to accompany the application for a taxicab or limousine driver's licence, which includes:

- Vulnerable Sector Check issued within 30 days of application
- Driver's Abstract issued within 30 days of application
- Taxicab / Limousine Driver's licence photo – provided by either attending Town Hall in-person or providing passport-size photograph taken within 30 days of application

To provide similar relief to taxicab and limousine drivers facing challenges resulting from the pandemic, an approach consistent with restaurant and pet shop licences is recommended, as follows:

1. That taxicab and limousine driver's licences due to expire on January 31, 2021 be extended to April 30, 2021.

2. That Section 10.2 of By-law 2004-119, a by-law to licence, regulate and govern taxicabs and limousines be amended to read as follows:

   10.2 All taxicab driver's or limousine driver's licences issued under the provisions of this by-law shall expire on the 31st day of April of the year following the date of issue.

   This amendment will change the validity period of taxicab and limousine driver's licences from January 31st to April 30th going forward.

Strategic Alignment

Orangeville Forward – Strategic Plan

Priority Area: Strong Governance

Objective: Financial Responsibility

Notice Provisions

Not applicable.

Financial Impact

The estimated financial impact is limited as the proposed approach does not waive licensing fees but rather defers them to a later date in 2021.

Respectfully submitted

Andrea McKinney
General Manager, Corporate Services

Reviewed by

Karen Landry
Town Clerk, Corporate Services

Prepared by

Carrie Cunningham
By-law and Property Standards Officer

Report

Subject: **Edelbrock Centre Transit Transfer Station Feasibility Update**

Department: **Infrastructure Services**

Division: **Transportation and Development**

Report #: **INS-2021-008**

Meeting Date: **2021-01-25**

Recommendations

That report INS-2021-008, Edelbrock Centre Transit Transfer Station Feasibility Update be received;

And that Council direct staff to proceed in accordance with Option _ as described in the report.

Background

At its meeting on November 23, 2020 Council revisited and ultimately overturned the resolution to locate the transit transfer point on Broadway between First Street and John Street. Subsequently, Dufferin County Council at their meeting on December 10, 2020 passed a motion to work with the Town of Orangeville to investigate potential options to locate a transit transfer point at the County's Edelbrock Social Services Building located on Centre Street.

On December 14, 2020, Council directed staff to work with the County staff to assess the feasibility and costs for locating the transit transfer point at the Edelbrock Centre, connecting Centre Street with Dawson Road based on preliminary design work prepared by Triton Engineering Services Limited (TESL). The following report provides an update on this matter and discussions held since mid-December. The report also updates Council on the matter of adding a second community garden.

Analysis

Staff is seeking Council direction regarding the siting of a new Transit Transfer Point. As Council has overturned the earlier selection of the downtown transfer point, there is currently no approved location. To facilitate the design of an efficient four-route transit system, it is necessary to establish a centrally located transfer point. Below is

information to assist Council in determining if it would like staff to pursue the option of locating the transit transfer point at the County-owned Edelbrock Centre.

Infrastructure Services has spoken with Staff at the County of Dufferin. County Staff acknowledged their willingness to work with the Town on re-locating Orangeville's Transit transfer point to the Edelbrock Centre property. However, in noting this, County Staff highlighted a number of matters which need to be satisfactorily addressed before acceptance and final approval. Specifically, the County highlighted that impacts on operations at the Edelbrock Centre, traffic/noise, route alignment, environmental matters, washroom and parking would need to be addressed. Further, property rights issues will require thorough consideration in order to determine an appropriate arrangement to satisfy each party. In summary, the County wish to ensure that the Edelbrock Centre can co-exist with the proposed new transfer point without impacting the Centre's current and/or future functions.

If Town Council chooses to pursue this option, County Staff plan to seek Committee and Council approval of criteria including the items noted above. On this basis Staff for the Town and the County will be able to ensure all matters are addressed to the satisfaction of both levels of government. County scheduling is to have a report presentation to Committee in late February 2021 and final approval of the review criteria by County Council in March 2021. During this period, both the County and Town Staff acknowledged to have further open dialogue on the transit transfer station.

With respect to costs, the original cost estimate for the dedicated transit road running between Centre Street and Dawson Road through the Edelbrock Centre property was $378,000.00. This cost estimate is still considered to be valid, however it did not include several optional items that have been subsequently discussed including:

- Modifying the design to accommodate six buses instead of four;
- Adding a heated waiting area; and,
- Adding washroom facilities.

As staff work through the design, the list of design features and costs will be finalized.

Community Garden

Community Services, through their Facilities and Parks Division have been directed by Council to carry out site evaluations to determine potential community garden sites. Potential garden sites require an evaluation of environmental conditions, elevation changes and drainage, soil conditions, accessibility, safety and security and expandability. To date Community Services has considered 40' x 60' plots at several locations. These include:

- Alder Recreation Centre,
- Tony Rose Recreation Centre,
- Rotary Park,

- Harvey Curry Park, and
- Kin Family Park.

Community Services continues to review and evaluate these locations for suitability. This confirms that additional and alternative community garden plots are actively being considered in 2021.

Options

As noted above, staff are seeking Council direction regarding the establishment of a new, centrally located transit transfer point. Information regarding the feasibility of locating the transfer point at the Edelbrock Centre is provided in this report. Staff suggest that Council have three options regarding the selection of a location:

1. Simply receive the report.

   While this option is available to Council, it would not provide staff with direction regarding the establishment of a centrally located transit transfer point.

2. Council approves the location of the transit transfer point on a transit way connecting Centre Street and Dawson Road at the Edelbrock Centre and directs staff to work with County staff to develop an acceptable design;

   Selecting this option would provide staff with clear direction to establish a centrally located transit transfer point on the Edelbrock property. Staff would work with the County to develop a preliminary design that is acceptable to both levels of government and would report back to Council for further direction on design details.

3. Council directs staff to report back to Council with alternative options for a transit transfer point.

   Over the past several years there have been studies conducted by consultants, a Committee and a Task Force, all of which have made recommendations regarding where to site a new transit transfer point. Staff could assemble the options along with the benefits and drawbacks of each for Council's review.

Strategic Alignment

Orangeville Forward – Strategic Plan

Priority Area: Sustainable Infrastructure

Objective: Provide Systems That Keep People Moving

Sustainable Neighbourhood Action Plan

Theme: Transportation Systems

Strategy: Promote More Sustainable & Efficient Transportation Systems

Financial Impact

There are no adverse financial impacts associated with this report.

Respectfully submitted

Douglas G. Jones, M.E.Sc., P. Eng.,
General Manager,
Infrastructure Services

Prepared by

R. John Lackey, P. Eng.,
Manager
Transportation & Development

Attachment(s): None

Report

Subject: **Planning Applications Summary for 2020**

Department: **Infrastructure Services**

Division: **Planning**

Report #: **INS-2021-009**

Meeting Date: **2021-01-25**

Recommendations

That report INS-2021-009, Planning Applications Summary for 2020, be received as information for Council.

Background and Analysis

The purpose of this report is to provide Council and the public with an update on planning application activity that has occurred through 2020, since the last application summary report was provided to Council in December 2019. The application activity summarized in this report consists of:

1) Applications that have been granted planning approvals;
2) New applications received; and
3) Applications that were in progress at the time of the previous summary report and remain under review.

This report also provides a breakdown of the number and composition of new dwelling units approved in 2020 and remaining under review within an active planning application process. Attachment No 1 includes a table listing of active and approved applications through 2020 and their respective development proposal details. Attachment No. 2 includes a map showing the locations of the application sites that have been approved through 2020 or remain active in a review process.

Planning Application Activity in 2020:

Since January 2020, a total of 25 new planning applications were received, which consists of:

- 12 applications for Site Plan Approval
- 4 Official Plan and Zoning By-law amendment applications

- 2 Plan of Condominium Applications
- 1 Part Lot Control exemption application
- 1 Zoning By-law amendment application to remove a Holding (H) symbol
- 5 residential demolition applications

Also within this timeframe, a total of 20 planning application approvals have been granted, which consist of:

- 5 Official Plan and Zoning By-law amendment applications
- 7 applications for Site Plan Approval
- 2 Plans of Condominium
- 1 Part Lot Control Exemption
- 5 residential demolition applications

Significant developments approved in 2020:

1. **515 Broadway (Approved: November 23, 2020)**
   Official Plan and Zoning By-law amendments to permit the development of a 6-storey, 161-unit retirement home and 18 two-storey townhouse dwellings. Applications for site plan approval and a Holding (H) Symbol removal are required for this development to proceed. These applications have not been submitted, however a related Plan of Subdivision application (SUB-2018-03) remains in process.

2. **62A-68 First Street (Approved August 10, 2020)**
   Official Plan and Zoning By-law amendments to permit 40-unit townhouse development. Applications for site plan approval and a Holding (H) Symbol removal are still required for this development to proceed. Related applications are under review (SP-2020-04 and RZH-2020-01)

3. **670-690 Broadway (Approved December 14, 2020)**
   Official Plan and Zoning By-law amendments and a Draft Plan of Vacant Land Condominium to permit a 33-unit townhouse development. Further approvals of a site plan application and Holding (H) symbol removal are required for this development to proceed. A related site plan application (SP-2020-12) is under review.

Significant applications received in 2020 for new developments that remain under review:

1. **780 Broadway (complete submission as of December 7, 2020)**
   Official Plan and Zoning By-law amendments and an application for site plan approval to Proposed development of four (4) townhouse blocks containing 54 dwelling units, and a commercial block consisting of 920.55 square meters of retail space.

2. **51 Centennial Road, Hoffman Plastics (received on May 5, 2020)**
   Application for site plan approval to permit an expansion of approximately 4,805 square-metres (51,720 square-feet) to the existing industrial building.

Summary of residential development activity approved in 2020 and remaining under review.

As illustrated in Attachment 1, a total of 106 residential dwelling units have received land use approvals in 2020. When excluding the condominium and part-lot-control exemption approvals for the nine (9) units constructed at 31 Town Line, there remains a total of 97 new dwelling units that have received land use approvals for future development. However, most of these new dwelling unit approvals will still require further planning approvals in order for building permits to be issued and construction to proceed.

For all applications involving new dwelling units, when combining those that have land use approvals (but require further development approvals to proceed) with all other planning applications currently in process, there are a total of 2,028 new dwelling units currently within an active planning approval process:

Residential	Approved in 2020			Remaining in an active application Process[2]		
	Total	within built boundary	within greenfield area	Total	within built boundary	Within greenfield area
Single-detached dwelling units	0			191	0	191
Semi-detached dwelling units	0			4	4	0
Townhome units	91[1]	58[1]	33[1]	712	58	654
Apartment units	6	6	0	1,121	60	1,061
TOTAL RESIDENTIAL	**97**	64	33	**2,028**	123	1,905

Notes:

[1] Units proposed within planning applications approved in 2020 but require further planning approvals for building permits to be issued and construction to proceed. These units are included with those remaining in an active planning process (Note 2 below)

[2] Includes any active applications underway where planning approvals are required (i.e. Official Plan/Zoning By-law amendment, Plan of Subdivision and/or Site Plan Approval) for Building Permits to be issued.

Key Residential Development Activity Highlights:

3. Apartment units (55%) and townhome dwellings (35%) are the predominant housing formats proposed within active planning applications.

4. A significant number of new dwelling units (2,028) are currently proposed within an active planning application process, which remains consistent with the statistics presented in the 2019 summary report (2,164 proposed new units for all active planning applications underway at that time).

5. The majority of dwelling units (70%) that received land use approvals in 2020 were located within the Town's built boundary. This aligns with our intensification target being 50% of all new residential development occurring annually to be within the Town's built boundary, as prescribed by both the County and Town Official Plans. Looking ahead to the units remaining in an active application process, most of these units are situated within the Town's designated greenfield area. Therefore, it may be difficult for the Town to continue to maintain or exceed this intensification target moving forward. However, it is anticipated that while these applications proceed, new applications for residential infill and intensification developments will emerge in the future, which will help the Town maintain consistency with this target.

Strategic Alignment

Orangeville Forward – Strategic Plan

Priority Area: Sustainable Infrastructure

Objective: Plan for Growth

Sustainable Neighbourhood Action Plan

Theme: Land Use and Planning

Strategy: Co-ordinate land use and infrastructure planning to promote healthy, liveable and safe communities.

Notice Provisions

Not applicable to this report.

Financial Impact

There are no anticipated financial impacts to the Town arising from this report. Staff continue to track the progress of current planning applications and future application submissions. This assists in evaluating the progress and implications of this application activity in conjunction with Town's growth targets and other service levels.

Respectfully submitted

Douglas G. Jones, M.E.Sc., P.Eng.
General Manager, Infrastructure Services

Prepared by

Brandon Ward, MCIP, RPP,
Manager, Planning, Infrastructure Services

Attachment(s): 1. Tables of Approved and Active Planning Applications
2. Approved and Active Planning Applications Maps.

Planning Applications Approved in 2020

Address	Application Type	File Number	Applicant	Received	Proposal	Commercial GFA (sq m)	Industrial GFA (sq m)	Institutional GFA (sq m)	Institutional Number of Beds	Townhouse Units	Single Detached Units	Semi Detached Units	Apartment Units	Total Dwelling Units	Approved:
101 JOHN ST	Site Plan Approval	SPA-2020-03	Clorox	March 23, 2020	To permit modification to the parking and loading area of the existing Clorox Plant, to increase security and enclose the trailer parking area.										June 1, 2020
150 FIRST ST	Site Plan Approval	SPA-2020-01	SBLP Orangeville Mall Inc.	January 22, 2020	To permit minor modifications to internal unit configuration, exterior entrances, façade materials and the parking area.										April 16, 2020
16 CENTENNIAL RD	Site Plan Approval	SPA-2018-06	Bag O Sand	March 6, 2018	To permit a 1-storey, 190.67 sq. m. addition to the rear of the existing warehouse.		190								July 26, 2020
17 ARMSTRONG	Site Plan Approval	SPA-2020-02	Steddy Corp.	March 6, 2020	To permit a 3-storey mixed use building containing 71 sq. m. of commercial uses at grade, and 2 residential units above.	71							2	2	September 22, 2020
31 TOWN LINE	Part Lot Control	PLC-2020-01	Hamount Ivenstments Ltd.	January 23, 2020	To establish legal lot boundaries for 9 townhouse units on a condominium road.					9				9	April 20, 2020
	Plan of Condominium	CD-2020-01	Hamount Investments Ltd.	January 23, 2020	To create a common-element condominium for 9 townhouse units										June 10, 2020
316 BROADWAY	Site Plan Approval	SPA-2019-09	Parvinder Samra	August 22, 2019	To permit a 27.7 sq. m. addition to the front of the existing motel.	28									May 1, 2020
340 BROADWAY	Residential Demolition Application	RD-2020-02	Hamount Investments Ltd.	May 14, 2020	To demolish a detached dwelling on the subject lands to facilitate the construction of a custom home on the existing footprint of house										July 13, 2020
5 HENRY ST	Residential Demolition Application	RD-2020-01	Eric Calder	January 7, 2020	To demolish the existing dwelling on the property and replace it with a larger dwelling to be constructed generally on the same building footprint.										March 9, 2020
515 BROADWAY	Official Plan and Zoning By-law Amendment	OPZ-2018-03	714415 Ontario Limited	August 16, 2018	To permit the development of a 6-storey, 161 unit retirement home and 18 two-storey townhouse dwellings on four separate blocks.				161	18				18	November 23, 2020
53 TOWN LINE	Residential Demolition Application	RD-2019-01	Soville Property Holdings Inc.	November 15, 2019	To demolish a detached dwelling on the subject lands which is listed on the Town of Orangeville Municipal Register. Proposed development includes the construction of a commercial building on the property.										April 20, 2020
60 CENTURY DR	Site Plan Approval	SPA-2019-07	Conseil Scolaire Viamonde	May 6, 2019	To permit minor exterior alterations including the parking area, walkways, access and play area.										July 3, 2020
62A - 68 FIRST ST	Official Plan and Zoning By-law Amendment	OPZ-2019-02	Saberwood Homes	March 18, 2019	To permit the development of 40 townhouse units, consisting of 33 standard townhouse units and 7 dual-frontage townhouse units.					40				40	August 10, 2020
62A FIRST ST	Residential Demolition Application	RD-2020-03	Saberwood Homes	April 9, 2020	To demolish a detached dwelling on the subject lands. The lands are proposed to be redeveloped with condominum townhouses.										August 10, 2020
66 FIRST ST	Residential Demolition Application	RD-2020-04	Saberwood Homes	April 9, 2020	To demolish a detached dwelling on the subject lands. The lands are proposed to be redeveloped with condominum townhouses.										August 10, 2020
670 & 690 BROADWAY	Official Plan and Zoning By-law Amendment	OPZ-2019-04	2040771 Ontario Inc. & Habitat for Humanity	July 25, 2019	To permit the development of 33 townhouse units, consisting of 26 standard townhouses and 7 dual frontage townhouses. Council approved the applications on December 14, 2020.					33				33	December 14, 2020
	Plan of Condominium	CD-2020-02	Brentwood Homes	August 17, 2020	To facilitate 33 townhouse units and common elements inluduing a parkette, road and visitor parking, and to establish required access easements.										December 14, 2020
68 FIRST ST	Residential Demolition Application	RD-2020-05	Saberwood Homes	April 9, 2020	To demolish a detached dwelling on the subject lands. The lands are proposed to be redeveloped with condominum townhouses.										August 10, 2020
71 FIFTH AVE	Official Plan and Zoning By-law Amendment	OPZ-2020-01	Absolute Insurance	March 27, 2020	To permit the conversion of the existing building into an office and to expand the parking lot to accommodate a total of 19 parking spaces.										October 19, 2020
93-97 FIRST ST	Site Plan Approval	SPA-2019-06	Fiera Properties Core Fund LP	May 6, 2019	To permit a 193.4 sq. m. addition to the existing building.	193									February 12, 2020
99 MILL ST	Official Plan and Zoning By-law Amendment	OPZ-2020-02	Clover Tuah	April 15, 2020	To permit 4 dwelling units within the existing building.								4	4	November 23, 2020
					TOTAL	**292**	**190**	**0**	**161**	**100**	**0**	**0**	**6**	**106**	

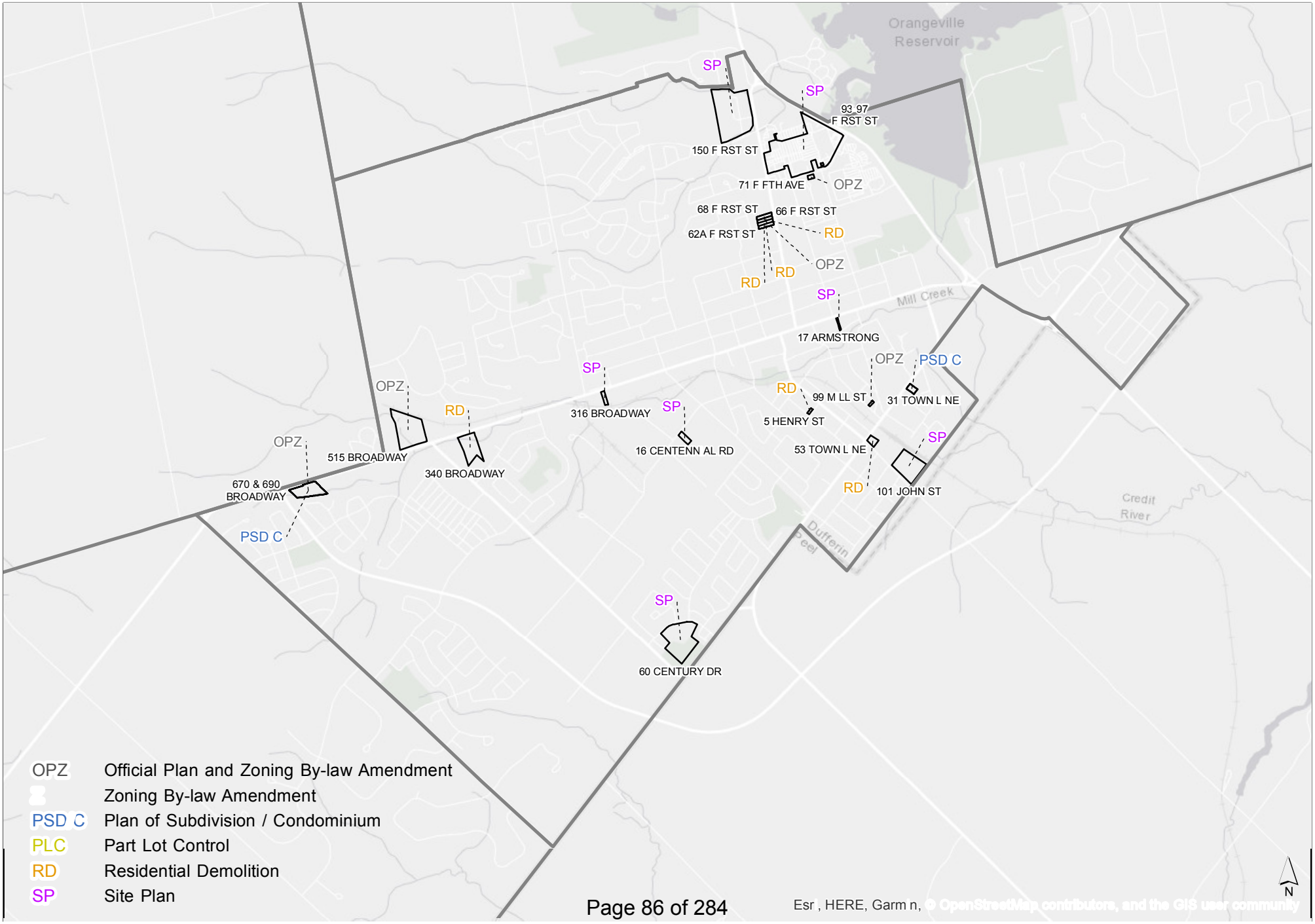
Active Planning Applications as of January 4, 2021

Address	Application Type	File Number	Applicant	Agent	Received	Proposal	Status	Commercial GFA (sq m)	Industrial GFA (sq m)	Institutional GFA (sq m)	Institutional Number of Beds/Units	Townhouse Units	Single Detached Units	Semi Detached Units	Apartment Units	Total Number of Units
150 FIRST ST	Site Plan Approval	SPA-2020-08	SBLP Orangeville Mall Inc.	Strathallen	September 29, 2020	To modify the existing mall (south side) by creating external access to the stores, along with exterior façade alterations, and a new drive-thru facility.	In Review									
200 ELIZABETH ST	Zoning By-law Amendment	RZ-2020-02	1705381 ONTARIO LTD.	Glen Schnarr & Associates Inc.	December 24, 2020	To permit the development of 4 semi-detached units fronting onto Ada Street. The northern most semi will function as a live-work unit, containing an 80 sq. m. convenience store on the ground floor, fronting onto Elizabeth Street.	Received	80						4		4
287A BROADWAY	Site Plan Approval	SPA-2020-11	Angela Saylors		December 24, 2020	To renovate the existing building, creating a 73 sq. m. office on the main floor, with a dwelling unit in the basement.	Received	73					1			1
3 HILLSIDE DR	Site Plan Approval	SPA-2019-03	Bethsaida Retirement Home	Dickinson + Hicks Architects Inc.	February 20, 2019	To permit a 3-storey, 55-bed addition to the existing retirement home.	In Review				55					
415 Richardson	Site Plan Approval	SPA-2020-09	Wightman Communications Ltd.	Domm Constructions Ltd.	November 5, 2020	To permit a 1-storey, 34.8 sq. m. telecommunications building on a severed portion of land. The building will be used to house telecommunications equipment.	In Review		35							
51 CENTENNIAL RD	Site Plan Approval	SPA-2020-05	Hofmann Plastics	R.J. Burnside	May 5, 2020	To permit a 4,805 sq. m. expansion to the existing industrial building.	In Review		4,805							
515 BROADWAY	Plan of Subdivision	SUB-2018-03	714415 Ontario Limited	MHBC Planning Limited	November 9, 2018	To facilitate the development of a 6-storey, 161 unit retirement home and 18 two-storey townhouse dwellings on four separate blocks.	In Review				161	18				18
60 & 62 BROADWAY	Official Plan and Zoning By-law Amendment	OPZ-2019-06	2575845 Ontario Inc. and 2659546 Ontario Inc.	MHBC Planning	August 29, 2019	To permit a 5-storey, 60 unit mixed-use development with 800 sq. m. of commercial uses at grade.	In Review								60	60
62A - 68 FIRST ST	Site Plan Approval	SPA-2020-04	Saberwood Homes	R.J. Burnside	April 9, 2020	To permit the development of 40 townhouse units, consisting of 33 standard townhouse units and 7 dual-frontage townhouse units.	In Review					40				40
	Zoning By-law Amendment	RZH-2020-01	RF-4 Corp. & RF-5 Corp.	Peter Bartos	November 12, 2020	To remove the holding symbol and permit the development of 40 condominium townhouse units.	In Review									
670 & 690 BROADWAY	Site Plan Approval	SPA-2020-12	2040771 Ontario Inc.	Urbtech Engineering Inc.	December 23, 2020	To permit the development of 33 condominium townhouse units.	Received					33				33
71 FIFTH AVE	Site Plan Approval	SPA-2020-06	Absolute Insurance	Dickinson + Hicks	June 10, 2020	To permit the conversion of the existing building into an office and to expand the parking lot to accommodate a total of	In Review									
780 BROADWAY	Official Plan and Zoning By-law Amendment	OPZ-2020-03	Millwick Acquisitions Corp.	Humphries Planning Group Inc.	November 11, 2020	Re-designate and rezone the subject lands to permit a mixed-use development comprised of four (4) three-storey townhouse blocks containing a total of 54 dwelling units, as well as a single-storey commercial building containing approximately 920.55 square metres of commercial floor space.	Deemed Complete	920				54				54
	Site Plan Approval	SPA-2020-10	Millwick Acquisitions Corp.	Humphries Planning Group Inc.	November 11, 2020	Proposed development of four (4) townhouse blocks containing 54 dwelling units, and a commercial block consisting of 920.55 square meters of retail space	Deemed Complete									
ALDENHILL SUBDIVISION	Official Plan and Zoning By-law Amendment	OPZ-2018-02	Alden Hill Developments Limited, Edgewood Valley Developments Limited, Transmetro Properties Limited	Hughes Management	January 2, 2018	To redesignate the lands from 'Low Density Residential', 'Neighbourhood Commercial', and 'Open Space Conservation' to site-specific 'Low Density Residential', 'Medium Density Residential', 'Neighbourhood Commercial', and 'Open Space Conservation' designations and to rezone the lands from Development 'D' Zone to site-specific R4 Zone (low-density residential) and R5 and RM1 Zones (low-density multiple residential and medium density residential); and C2 Zone (Neighbourhood Commercial) to facilitate the proposed draft plan of subdivision.	In Review					150	89			239
	Plan of Subdivision	SUB-2018-02	Alden Hill Developments Limited; Edgewood Valley Developments Limited; Transmetro Properties Limited	Hughes Management	January 2, 2018	To permit the development of a 239 unit residential subdivision, consisting of 89 single detached units and 150 townhouse units.	In Review									
CACHET DEVELOPMENTS - BLOCK 94 & 98	Official Plan and Zoning By-law Amendment	OPZ-2019-03	Transmetro Limited c/o Tom Flood	Cachet Developments (Orangeville) Inc.	March 29, 2019	To permit a 4 6-storey mixed-use buildings, containing 383 units and 2,215 sq. m. of commercial uses at grade.	Under Appeal	2,215							383	383
EDGEWOOD VALLEY PHASE 2B	Plan of Subdivision	SUB-2007-01	Edgewood Valley Developments Limited (Edgewood Valley Phase 2B)	Hughes Management	February 20, 2007	Proposed plan of subdivision to create 140 dwelling units, including 51 single-detached dwellings, 17 townhouse units and 72 (max) condominium townhouse units and blocks for Open Space Conservation and Stormwater Management uses.	In Review					89	51			140
	Zoning By-law Amendment	RZ-2007-03	Edgewood Valley Developments Limited	Hughes Management	January 1, 2007	To permit a 67 unit residential development consisting of 50 single detached units and 17 townhouse units. This application is inactive.	In Review									

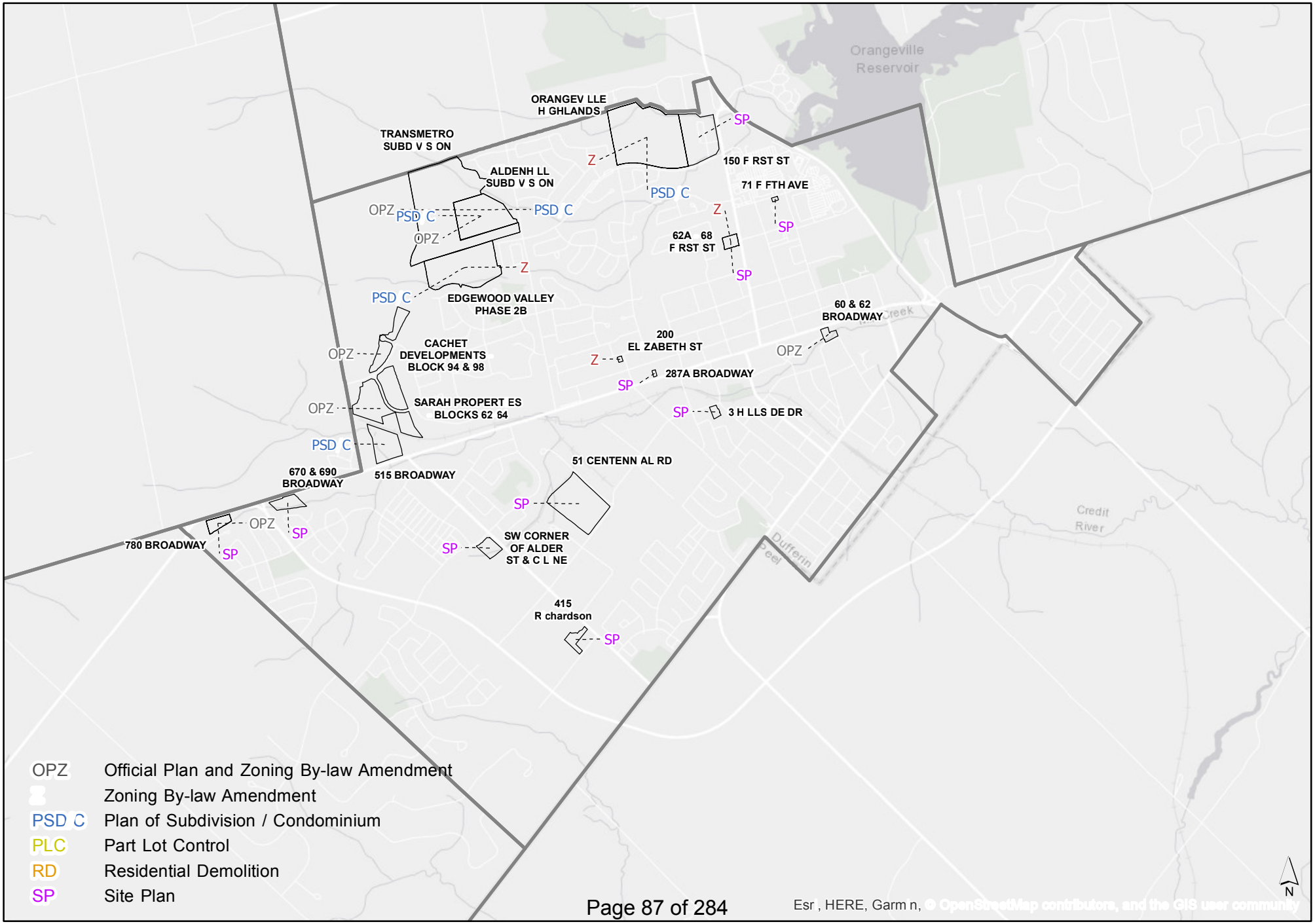
Active Planning Applications as of January 4, 2021

Address	Application Type	File Number	Applicant	Agent	Received	Proposal	Status	Commercial GFA (sq m)	Industrial GFA (sq m)	Institutional GFA (sq m)	Institutional Number of Beds/Units	Townhouse Units	Single Detached Units	Semi Detached Units	Apartment Units	Total Number of Units
ORANGEVILLE HIGHLANDS	Plan of Subdivision	SUB-2010-01	Orangeville Highlands Ltd. (Phase 2)	Ventawood Management Inc.	June 30, 2010	To facilitate the development of a plan of subdivision containing 541 residential units (93 conventional townhouse; 26 back-back townhouse; 88 stacked townhouse; and 334 apartment dwelling units (5 buildings of 5 and 6 storeys each) and blocks for Open Space Conservation, two park facilities (community park and dog park) and a stormwater management facility	Under Appeal					207			334	541
	Zoning By-law Amendment	OPZ-2010-05	Orangeville Highlands Ltd. (Phase 2)	Ventawood Management Inc.	June 30, 2010	To amend the Zoning By-law to facilitate the proposed draft plan of subdivision.	Under Appeal									
SARAH PROPERTIES - BLOCKS 62-64	Official Plan and Zoning By-law Amendment	OPZ-2019-05	Sarah Properties	Zelinka Priamo Ltd. c/o Dave Hannam	August 16, 2019	To permits a mixed use subdivision consisting of 270 apartment units with 3,140 sq. m. of commercial uses at grade, and 104 townhouse units.	In Review	3,140				104			270	374
SW CORNER OF ALDER ST & C LINE	Site Plan Approval	SPA-2019-08	Alder Square Developments Inc.	Antrix Architects Inc.	August 16, 2019	To permit a commercial development containing 3 building with a total GFA of 3,845 sq. m.	In Review	3,845								
TRANSMETRO SUBDIVISION	Official Plan and Zoning By-law Amendment	OPZ-2018-01	Transmetro Properties Limited	Hughes Management	January 2, 2018	To amend the Official Plan and Zoning By-law to facilitate the proposed draft plan of residential subdivision.	In Review									
	Plan of Subdivision	SUB-2018-01	Transmetro Properties Limited	Hughes Management	January 2, 2018	To permit the development of a 141 unit residential subdivision consisting of 50 single detached units, 17 townhouse units, and 74 other units.	In Review					17	50		74	141
							TOTAL:	**10,273**	**4,840**	**0**	**216**	**712**	**191**	**4**	**1,121**	**2,028**
												35.1%	9.4%	0.2%	55.3%	
							Within Designated Greenfield Areas:	6,275	0	0	0	654	190	0	1,061	1,905
							Within the Built Boundary:	3,998	4,840	0	216	58	1	4	60	123

Closed Planning Applications | January - December 2020



Open Planning Applications - December 2020



Report

Subject: **Riddell Road Intersection Analyses**

Department: **Infrastructure Services**

Division: **Transportation and Development**

Report #: **INS-2021-005**

Meeting Date: **2021-01-25**

Recommendations

That report INS-2021-005, Riddell Road Intersection Analyses be received;

And That Council direct Staff to implement Option __ as presented within this Report and in accordance with the measures set out in the Paradigm Riddell Road Assessment of Intersections Report.

Background

The purpose of this report is to outline the findings and recommendations of the investigations of the intersections on Riddell Road at Alder and at Spencer Avenue and Centennial Road. In late 2019 Council received a delegation from a group of west end residents that were concerned about the overall safety of the intersections of Riddell Road and Alder Street, and Riddell Road and Spencer Avenue/Centennial Road. Specifically, the delegation questioned the safety of the left turning movement from northbound Riddell Road onto both westbound Alder Street and Spencer Avenue. The delegation requested that the existing traffic signals at both intersections be modified to include advanced left turns.

As a result, Council directed staff to engage the services of a traffic consultant to investigate the afore mentioned intersections. The consultant was to complete an assessment of options and further review what implications those options might impose on Riddell Road. As well, the investigations were to include a review of solutions implemented by other municipalities, more specifically the option of roundabouts at the two intersections on Riddell Road.

Staff prepared terms of reference for the required investigations. Engineering proposals were received, and the consulting services were awarded to Paradigm Transportation Solutions Limited (Paradigm). Paradigm completed their investigations and finalized

their report in January 2021. The results of their investigations are summarized below. Paradigm's full report is found as Attachment No. 1.

Analysis

Paradigm were retained to assess the intersections on Riddell Road at Alder Street and Centennial Road/Spencer Avenue. The focus of Paradigm's study was to:

- Review existing geometry and operations of the above noted intersections;
- Review speed limits and collision data;
- Analyse future operations of the intersections with and without remedial measures;
- Provide recommendations of a short term and a long-term nature for the intersections;
- Provide guidance on future studies, and
- Prepare preliminary cost estimates for the recommended measures to be implemented, if any.

A review of the existing intersection geometry included a check on sight distances, stopping distances, left-turn lane sight lines and pavement markings. Checks were made in accordance with published design guidelines and specifically the *Geometric Design Guide for Canadian Roads, Transportation Association of Canada (TAC), June 2017* publication. The overall geometry of both intersections, including sight distances, left-turn lane sight lines, stopping distances and pavement markings all conform with the TAC guidelines and are also in compliance with Ontario Traffic Manual, Book 11 – Pavement, Hazard and Delineation Markings, March 2000. The report does however note that the northbound and southbound turn lanes at the Riddell Road, Centennial Rd./Spencer Avenue intersection is offset due to the presence of traffic islands. As such opposing left turn movements do not have a clear line of site to oncoming through traffic. While this intersection geometry is common and the intersection conforms to existing guidelines, it is not an optimal configuration and can be perceived as a safety issue by some drivers.

A review of safety performance at each intersection was also undertaken. This included a review of collision data and speed limits. The analysis determined that the intersection geometry at both study locations did not contribute to collision patterns. No discernible collision patterns were found. Also, the posted speed limits fell well under the recommended speed limit guidelines as determine by the TAC Speed Management Guide, Canadian Guidelines for Establishing Posted Speed Limits. As an example, the posted speed limit for Riddell Road is 70 km/hr. The recommended speed limit as per TAC guidelines is 80 km/hr.

The operational analysis also applied the level of service (LOS) methodology which quantifies timing delays experienced by vehicles making turning movements at intersections. The results of the study indicate that the intersections are operating at acceptable levels of service and that the intersections have spare capacity. As such, the

intersections are forecasted to continue to operate at acceptable levels of service and with spare capacity. Forecasted operations were evaluated for traffic volumes to the year, 2031.

Intersection Remedial Measures:

Riddell Road at Spencer Avenue/Centennial Road

The intersection geometry complies with design guidelines and is expected to continue to operate at acceptable levels of service, thus it does not require any remedial measures. With that said, Paradigm did identify two measures that could be implemented to mitigate the perceived safety concerns. These are the offset northbound and southbound left turn lanes which contribute to visibility concerns and the southbound dedicated right-turn lane onto Spencer Avenue from Riddell Road being used as a southbound through lane to avoid lane queueing. Protected left-turn signal phasing will address resident concerns regarding safety at the intersection. In addition to changes to the signal head equipment, left-turn lane extension pavement markings should be provided to guide vehicles making left hand turn movements.

To mitigate the issue of motorists using the dedicated southbound right turn lane to avoid southbound through lane queueing, Paradigm recommended that additional pavement markings, signage and/or maintenance free barriers, i.e. knock-down type barriers be put in place.

Note that the proposed protected left turn signal will result in a decreased LOS and added traffic congestion. To address these matters, the consultant reviewed longer term solutions. The consultant considered the option of a full roadway re-alignment to remove the offset left turn lane configuration and the conversion of the southbound right-turn lane into a shared through/right-turn lane. These longer-term alternatives are significantly more complex and would require further study.

Riddell Road and Alder Street

The intersection geometry at Riddell Road and Alder also complies with design guidelines and is expected to continue to operate at acceptable levels of service. However, the intersection has comparable concerns with the northbound–southbound left-turn lanes and straight through movements. Accordingly, these concerns may be addressed by implementing a protected left-turn signal as well as adding additional through lanes as a longer term recommendation. The protected left-turn signal is considered to be a short-term solution.

The additional through lanes would provide additional capacity and result in overall improvements to the intersection’s critical northbound and southbound movements. It should also be recognized that a future access for the Alder Street Recreation facility is planned. This entrance is proposed to be constructed as a right-in/right-out entrance approximately 285 metres north of the intersection. The provision to integrate the new recreation centre entrance and the recommended additional south-bound and north-

bound lanes should be co-ordinated simultaneously and is considered as an intermediate timing alternative.

Supplemental Recommendations

The Consultants supplemental investigations included a review of roundabouts at both study area intersections. Roundabouts have been considered as a possible long-term option to accommodate future traffic volumes. In analyzing roundabouts, Paradigm noted that Riddell Road serves as a major arterial by-pass road. It is used for routing heavy vehicles and oversized/wide loads. As such the minimum inscribed circle to accommodate vehicles is most likely required to be increased and would need to be confirmed as part of any final engineering design. Based on current conditions the consultant has determined that a roundabout with a minimum 47.5 metre inscribed circle diameter with two entering lanes on Riddell Road and one entering lane on the side street approaches will provide adequate levels of service. It is noted that a roundabout of this size can be accommodated within the existing municipal right of way at both intersections.

The Consultant's report notes that roundabouts are not required to provide adequate levels of service at the study intersections. Most importantly the consultant has indicated that with the provision of roundabouts at these intersections, it is likely to cause operational impacts at upstream and downstream intersections on Riddell Road. Accordingly, it is recommended that a corridor study be carried out to assess potential impacts and to develop a long-term plan that would meet the Town's needs as well as the County of Dufferin's. Roundabouts are costly to construct; estimated to be in the order of $1.25 to $1.5 Million each. It is recommended that along with the assessment of potential corridor impacts, the Town should also consider a cost-benefit analysis of roundabouts versus the intersection-specific recommendations.

The Consultant's final recommendations suggest regular reviews of signal timing and phasing plans and resulting intersection operations. These reviews are intended to assist in mitigating capacity and safety issues before intersection operations deteriorate to unacceptable levels.

Option Summary

Paradigm has analyzed two intersections on Riddell Road, specifically the intersection at Alder Street and the intersection at Centennial Road/Spencer Avenue. While both intersections were found to be in compliance with current standards and guidelines there were a number of measures proposed which are intended to enhance road safety. Therefore, based on the Consultant's findings the following options have been provided for consideration:

Option No.1 – Do-Nothing

At present, the Riddell Road intersections at Alder Street and Centennial Road/Spencer Avenue are operating at overall acceptable levels with spare capacity. The existing

geometry at both intersections meets published guidelines. As such, no improvements are required and there is the option to do nothing.

Option No. 2 – Protected Left Turn Signals

Some drivers perceive the two intersections to be a safety concern due to limited visibility and vehicle speed. To increase overall intersection safety the option of implementing protected left-turn phasing to address left turn movements when potential visibility issues exist. Accordingly, Option 2 would consider the installation of protected left-turn signals at each intersection within this Study.

Option No. 3 – Long Term Measures

The Consultant also considered a number of intermediate and long-term measures. Measures include roadway re-alignments, lane extensions and intersection lane reassignments, traffic control and roundabouts. All of the intermediate and long-term recommendations could be considered in the context of a future corridor study. This study should also include input from the County of Dufferin.

Timing for implementation of the measures is broken into short term (within one year), intermediate (2 to 5 years) and long-term (> 5 years) timeframes. The remedial measures and estimated costing are summarized in the following table.

TABLE No. 1

Intersection Location	**Timelines**	**Remedial Measures**	**Costing**
Centennial Road/Spencer Avenue & Riddell Road	Short term(within one year)	i) Protected left-turn signal phasing ii) Lane extension markings iii) Southbound right turn lane modifications	$25k to $35K $3500 $7500 to $10,000
	Intermediate (2 to 5 years)	i) Left turn lane alignment ii) Southbound right-turn lane conversion iii) Associated lane markings	Subject to further design review $50,000

			$3500
	Long Tenure (> 5 years)	i) Roundabout implementation (Scenario 2) ii) Corridor Study iii) Signal timing & collision data review	$1.25M to $1.5M $50,000 $2,500
Alder Street and Riddell Road	Short term (within one year)	i) Protected left turn signal phasing ii) Lane extension markings	$25K to $35K $3500
	Intermediate (2 to 5 years)	i) Lane improvements and modifications; co-ordinate with Alder Street Recreation Centre Entrance	Subject to further design review
	Long Term (> 5 years)	i) Roundabout implementation (Scenario 2) ii) Corridor Study iii) Signal timing & collision review	$1.25M to $1.5M Included above $2500

Strategic Alignment

Orangeville Forward – Strategic Plan

Priority Area: Sustainable Infrastructure

Objective: Provide Systems That Keep People Moving

Sustainable Neighbourhood Action Plan

Theme: Transportation System

Strategy: Promote More Sustainable & Efficient Transportation Systems

Financial Impact

The proposed 2021 capital budget includes neither an allowance for traffic signal modifications, i.e. protected left-turn signal timing, lane modifications, through south/northbound lane additions and/or undertaking corridor studies. While there is no direct financial impact associated with the recommendations of this report, there will be a financial impact if the Town proceeds with intersection modifications, traffic signal changes and future corridor study investigations.

Respectfully submitted

Douglas G. Jones, P. Eng.,
General Manager,
Infrastructure Services

Reviewed by

R. John Lackey, P. Eng.,
Manager,
Transportation and Development

Attachment(s): **1.** Paradigm Transportation Solutions, Riddell Road Assessment of Intersections Report, January 2021

Riddell Road
Orangeville, Ontario
Assessment of Intersections

Paradigm Transportation Solutions Limited

January 2021

ptsl.com

Project Summary

Project Number
200195

January 2021

Client
Town of Orangeville
87 Broadway
Orangeville, ON L9W 1K1

Client Contact
Tony Dulisse, C.E.T.
Transportation and Development Technologist

Consultant Project Team
Jill Juhlke, C.E.T.
Stefan Hajgato, P.Eng.
Patrick Neal, BCE

Riddell Road, Orangeville, Ontario
Assessment of Intersections

Signing Licencee

Disclaimer

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road
Cambridge ON N1R 8J8
p: 519.896.3163
905.381.2229
416.479.9684
www.ptsl.com

Version 1.0.0

Executive Summary

Content

The Town of Orangeville (the Town) retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Assessment of Intersections for Riddell Road at Alder Street and Centennial Road/Spencer Avenue.

The purpose of this study is to review the existing geometry and operations of the study area intersections to identify and validate operational and safety issues. Upon identification of issues, various mitigation measures will be developed and investigated. Schematic plans illustrating the various options will be prepared along with preliminary cost estimates.

Conclusions

At present, the Riddell Road intersections with Alder Street and Centennial Road/Spencer Avenue are operating at overall acceptable levels of service (LOS C or better). The low to moderate intersection volume to capacity ratios indicate the intersections currently have spare capacity.

Additional capacity will be required at the Riddell Road intersections with Alder Street and Centennial Road/Spencer Avenue upon reaching the 2031 forecast traffic volumes. Several remedial measures have been identified for each intersection including provision of additional capacity through additional lanes and/or lane re-assignment or changes in traffic control. Provision of these measures will result in better levels of service and more efficient travel on Riddell Road.

The remedial measures selected for implementation at each intersection and the timing of these improvements are interconnected where the shorter term improvements are dependent upon the longer-term improvement plan.

Recommendations

It is recommended the Town consider the costs and benefits of each identified improvement and carry out required consultation with County staff. It is also recommended the Town consider conducting a Riddell Road corridor study to identify any longer-term (+2031) roadway capacity needs. These will help the Town develop the preferred improvement plan which will address the identified corridor issues,

provide the required future capacity and assist in preparing future Capital Budget forecasts.

Note that regardless of the timing of improvements, the remedial measure of protected left-turn phasing at Riddell Road and Centennial Road/Spencer Avenue should be implemented in the immediate term to conform to Transportation Association of Canada *Geometric Design Guide for Canadian Roads* (2017) guidance.

Contents

Appendices

Figures

Tables

1 Introduction

1.1 Overview

The Town of Orangeville (the Town) retained Paradigm Transportation Solutions Limited (Paradigm) to undertake the Assessment of Intersections on Riddell Road at Alder Street and Centennial Road/ Spencer Avenue.

Figure 1.1 illustrates the study area.

1.2 Project Understanding

Riddell Road is a major arterial roadway providing access to local residential subdivisions, busy commercial areas and community centres and schools. It is a bypass route for vehicle traffic around Orangeville. Since opening in 2005, it has helped reduce truck and overall traffic volumes travelling through downtown Orangeville, enabling Broadway to function as a pedestrian-oriented main street. This change has contributed, in part, to Broadway being recognized as one of the Great Places in Canada.

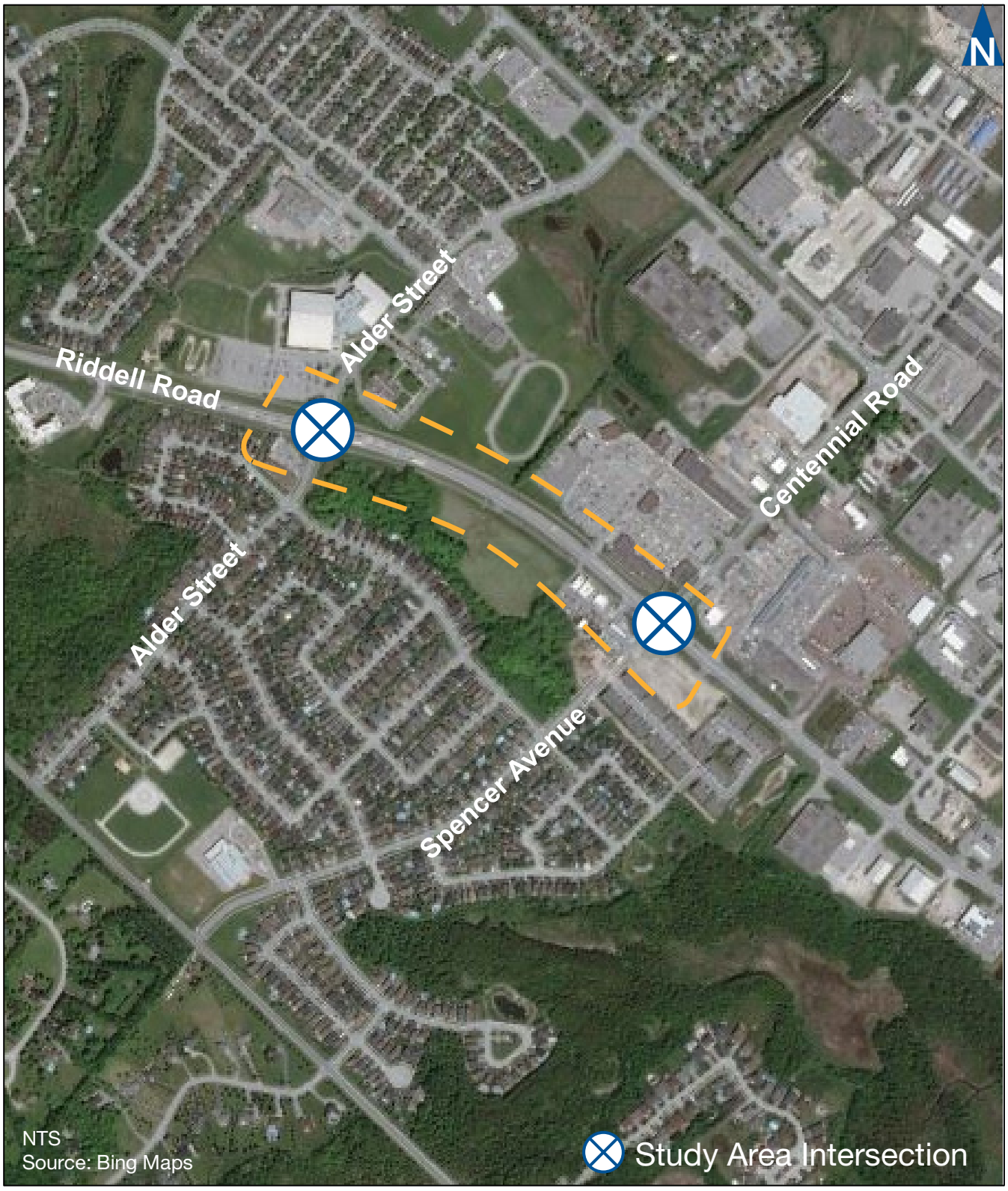
Riddell Road is approximately 7 kilometres long with a 3-kilometre section in the Town's corporate limits Dufferin County Road 109 (Broadway) to Townline (County Road 23)) and the balance under County jurisdiction. The road has a 70 km/h posted speed limit and a three-lane rural cross-section with auxiliary lanes at most intersections and private entrances. Within Orangeville, Riddell Road intersects four public roads (excluding Broadway and Townline). Adjacent land uses include commercial, industrial and residential uses.

The Town has experienced considerable growth over the past 10 years. In response, Paradigm has been retained to conduct a traffic operations assessment to identify potential safety and operational issues, recommend remedial measures and assess their effectiveness.

1.3 Purpose and Scope

The purpose of this study, as confirmed during pre-consultation with Town Staff, is to:

- Review the existing geometry and operations of the study area intersections;
- Review the five-year collision data;
- Review the current posted speed limits;



paradigm TRANSPORTATION SOLUTIONS LIMITED

Study Area

Riddell Road Assessment of Intersections
200195

Figure 1.1

- Analyse the future intersection operations both with and without remedial measures;
- Provide recommendations on immediate, intermediate and long-term improvement options for the study area intersections;
- Provide guidance on future recommended studies and practices; and
- Prepare preliminary cost estimates for the recommended measures.

This study assesses the 2031 horizon year, consistent with the *Dufferin Road 109 Traffic Capacity Analysis*[1].

[1] Prepared by Triton Engineering Services Limited for Dufferin County. *Dufferin Road 109 Traffic Capacity Analysis*. February 2020.

Note: this report has been used as background information only. Further use and interpretation should be undertaken through discussions and the County of Dufferin's approval.

2 Study Area Characteristics

This section documents current traffic conditions, operational deficiencies, and constraints, perceived or otherwise, that may be experienced by the public travelling at the intersections within the study area. The operational deficiencies and constraints identified at this stage will be fundamental to the process of defining the required remedial measures.

2.1 Land Use

The existing land uses abutting the Riddell Road corridor are primarily commercial, institutional and recreational. Although no house or school fronts directly onto Riddell Road, both Alder Street and Spencer Avenue provide access to neighbouring residential areas.

2.2 Roadways and Intersection Geometries

2.2.1 Roadway Descriptions

Details of the study area roads are as follows:

- **Riddell Road**
  - Direction: north-south
  - Right-of-Way Width: varies between 35 to 45 meters
  - Official Plan[2] Designation: arterial
  - Cross-Section:
    - South of Centennial Road/Spencer Avenue: Two-lane urban with auxiliary turning lanes at Centennial Road/Spencer Avenue intersection. The cross-section transitions to urban on the west side and rural on the east side approximately 130 metres south of the intersection
    - Between Centennial Road/Spencer Avenue and Alder Street: Two lanes with urban cross-section on west side and rural cross-section on east side with auxiliary turning lanes at Alder Street intersection
    - North of Alder Street: Two-lane rural cross-section
  - Lane Widths:
    - Through lanes: 3.75 metres

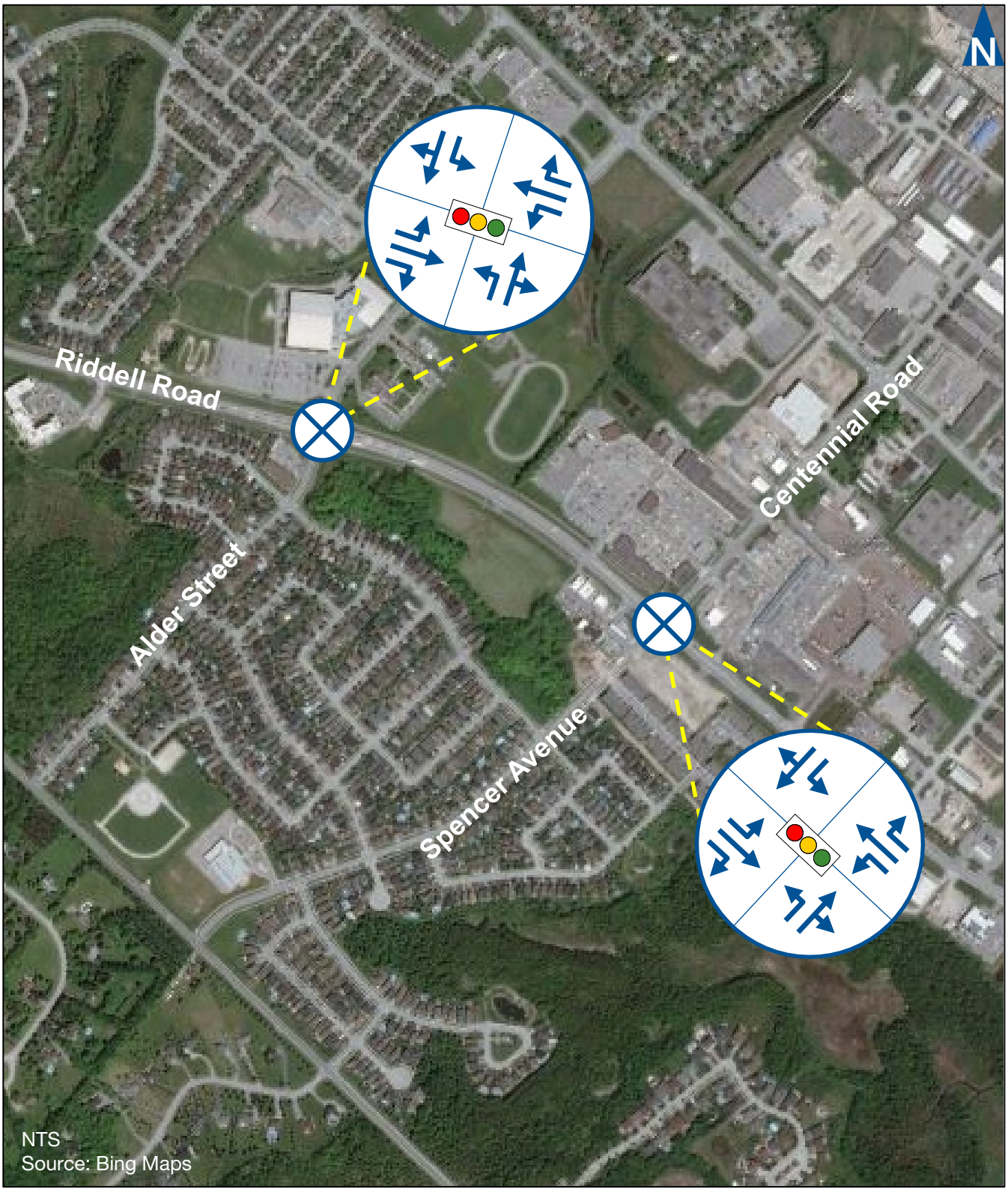
[2] *The Official Plan of the Orangeville Planning Area*. December 2018. Schedule E: Roads Plan.

    - Auxiliary lanes: 3.0 to 3.5 metres
  - Stopping/Parking Restrictions: Stopping is prohibited on both sides of the roadway throughout the study area
  - Posted Speed Limit: 70 km/h
- **Alder Street**
  - Direction: east-west
  - Official Plan Designation: minor collector
  - Cross-Section:
    - Two-lane urban west of Riddell Road
    - Three-lane urban (one through lane in each direction and a central two-way left-turn lane) east of Riddell Road
    - Auxiliary left-turn lanes are provided on both approaches at Riddell Road
  - Lane Widths:
    - Through lanes: 3.75 metres
    - Auxiliary lanes: 3.0 metres
  - Stopping/Parking Restrictions: Not posted/signed; therefore, subject to Town By-law 78-2005;
  - Posted Speed Limit: 40 km/h with a posted School Zone and Community Safety Zone east of Riddell Road.
- **Centennial Road**
  - Direction: east-west
  - Official Plan Designation: minor collector
  - Cross-Section: Three-lane urban (one through lane in each direction and a central two-way left-turn lane) with a westbound auxiliary left-turn lane at Riddell Road
  - Lane Widths:
    - Through lanes: 3.75 metres
    - Auxiliary lanes: 3.0 metres
  - Stopping/Parking Restrictions: Stopping is prohibited on both sides of the roadway throughout the study area
  - Posted Speed Limit: Not posted, designated as 50 km/h through Town By-law 78-2005.

- **Spencer Avenue**
  - Direction: east-west (connection to Riddell Road completed in 2017)
  - Official Plan Designation: minor collector
  - Cross-Section: Two-lane urban with eastbound auxiliary left-turn lane at Riddell Road
  - Lane Widths:
    - Through lanes: 3.75 metres
    - Auxiliary lanes: 3.0 metres
  - Stopping/Parking Restrictions: Stopping is prohibited on both sides of the roadway throughout the study area
  - Posted Speed Limit: 40 km/h, with a posted School Zone and Community Safety Zone west of the study area.

The roadway configurations and existing conditions were confirmed through a site visit conducted by Paradigm staff in June 2020.

Figure 2.1 illustrates the traffic control and lane configuration at the study area intersections. Note that both study area intersections operate under traffic signal control.



Existing Lane Configurations and Traffic Controls

Riddell Road Assessment of Intersections
200195

Figure 2.1

2.2.2 Sight Distance

Sight distances at both Riddell Road intersections were measured during the site visit and further validated via satellite imagery. The measured sight distances were assessed and compared to sight distance guidance and methodologies provided in the Transportation Association of Canada's (TAC) publication *Geometric Design Guidelines for Canadian Roads* (GDGCR)[3]. The assessment determined:

- All study area sight distances meet the minimum TAC departure sight distance criteria (i.e. vehicles entering Riddell Road); and
- It was also confirmed that the roadway was designed to meet the TAC stopping sight distance criteria, thereby providing motorists with ample time and space to bring their vehicles safely to a stop to avoid conflicts.

Overall, the intersection departure and stopping sight distances fall within the recommended guideline criteria which is based on standard engineering best practices.

2.2.3 Left-Turn Lane Sight Lines

Centennial Road/Spencer Avenue

The northbound and southbound left-turn lanes on Riddell Road at Centennial Road/Spencer Avenue are offset. As such, periodically the drivers waiting to make an opposing left turn do not have a clear line of site to oncoming through traffic on Riddell Road. For example, when a Riddell Road southbound transport truck is waiting to make a left turn (to go eastbound on Centennial Road), a northbound vehicle cannot see oncoming southbound through traffic (on Riddell Road) "around" the truck. This can be perceived as a safety issue by some drivers.

Chapter 9.17.4.5 Left-Turn Lanes on Both Approaches of the TAC GDGCR (2017 edition) indicates that two types of left-turn lane designs are applicable: opposing left-turn lanes and adjacent (offset) left-turn lanes. The GDGCR states the following regarding adjacent left-turn lanes: "*The provision of adjacent left-turn lanes is not generally recommended due to the potential for collisions caused by visibility problems for left-turning vehicles. Visibility problems result from the presence of vehicles in adjacent left-turn lanes and, for this reason, such movements should generally only be used at signalized intersections with protected left turn phases*".

[3] TAC. *Geometric Design Guide for Canadian Roads*. June 2017.

In general, while offset left-turn lanes are not an optimal design, they are acceptable provided appropriate signal phasing is provided. **Chapter 6** provides mitigation measures that could be implemented at this intersection to minimize the perceived issues and improve intersection operations and alignment.

Alder Street

Since the northbound and southbound left-turn lanes are aligned at this intersection, a sight line assessment was not required.

2.2.4 Pavement Markings

Pavement markings along the Riddell Road corridor include a solid yellow centreline, dashed white lines delineating travel lanes, turn lane markings (arrows), stop bars and delineated pedestrian crossings. Both signalized study area intersections (Alder Street and Centennial Road/Spencer Avenue) also provide delineated solid white parallel lines as pedestrian crosswalks and white stop bars across all approaches.

Pavement markings within the study area limits conform to standard guidelines and are in compliance with Ontario Traffic Manual Book 11 Pavement, Hazard and Delineation Markings of the Ontario Traffic Manual[4].

The pavement markings within the study area show signs of wear and loss of marking based upon the field inspection. The Town has a yearly pavement marking program where reapplication/ refreshing will occur.

2.3 Active Transportation

2.3.1 Walking

Sidewalks are provided along both sides of all study area roadways except for the section of Riddell Road south of Centennial Road/Spencer Avenue where no sidewalks are provided.

2.3.2 Cycling

Alder Street has painted sharrows in both directions on both sides of the roadway to indicate that cyclists and autos share the roadway. Signed cycling facilities (lanes, paths, etc.) are not provided along any other study area roadway.

[4] Ontario Traffic Manual, Book 11, Pavement, Hazard and Delineation Markings, Queen's Printer for Ontario, March 2000

It is noted that Riddell Road has a four-metre (approximate) hard surface shoulder reserved for future turn and/or acceleration/ deceleration lanes. To avoid confusion, it is recommended the Town stripe/hatch this area so it is clear to cyclists that these areas are not bike lanes.

3 Safety Review

A safety performance review for the Riddell Road corridor between Alder Street and Centennial Road/Spencer Avenue has been undertaken as part of this Operational Review. This review included collision analysis and a speed limit review. The results are outlined the following sections.

3.1 Collision Analysis

A high-level collision analysis was undertaken for the study area intersections of Riddell Road at Alder Street and Centennial Road/Spencer Avenue. Collision data were provided by the Town for the study area intersections for the seven-year period from January 2014 to May 2020. However, the data was limited in scope and did not contain detailed information such as collision type, location, weather conditions and severity. Therefore, only a high-level analysis could be undertaken.

Table 3.1 summarizes the overall collision data at both study area intersections. The data indicates:

- Riddell Road and Alder Street:
  - Data was provided for January 2014 through May 2020;
  - A total of 44 collisions occurred between February 2014 and May 2020;
  - The yearly collision rate is 6.14;
  - The highest number of yearly collisions, 11, occurred in 2014, reducing to nine in 2015;
  - Collisions were generally trending downward to 2016 where they have remained consistent at around five or six collisions; and
  - While not consistent year over year, collisions were recorded in February and March for most years which could be weather related.
- Riddell Road and Centennial Road/Spencer Avenue:
  - Data was provided for January 2017 through June 2019
  - A total of seven collisions occurred between January 2017 and June 2019;
  - The yearly collision rate is 2.33;
  - The highest number of collisions, four, occurred in 2019; and

- Collisions are generally trending upward.

Note that data is not provided for this intersection prior to October 2017 when the westerly (Spencer Avenue) leg was opened. It is recognized that the increase in collisions could be attributed to the opening of the westerly leg and the resulting change in traffic patterns.

In summary, other than time of year, there are no discernible collision patterns identified in the data.

TABLE 3.1: COLLISION SUMMARY

Year	Intersection	
	Alder Street	Centennial Road/ Spencer Avenue
2014	11	-
2015	9	-
2016	5	-
2017	4	1
2018	6	2
2019	5	4
2020	3*	-
Total	**43**	**7**
Avg. per Year	**6.14**	**2.33**

*Total as of 22 May 2020

Appendix A contains the detailed collision data set.

3.2 Speed Limit Review

The posted speed limit on Riddell Road in the study area is 70 km/h. Alder Street and Spencer Avenue each have posted speed limits of 40 km/h. Centennial Road does not have a posted speed limit; therefore, it is 50 km/h in accordance with the Town's Traffic Bylaw.

According to the TAC *Speed Management Guide*[5], the desirable operating speeds for the study area roadways are:

- Riddell Road south of Centennial Road/Spencer Avenue:

[5] Transportation Association of Canada. *Speed Management Guide, The Canadian Road Safety Engineering Handbook (CRSH)*. February 2016. Table 10.

- 70 to 80 km/h for a two-lane, undivided urban arterial roadway; or
- 80 to 90 km/h for a two-lane undivided rural arterial roadway

- Centennial Road, Spencer Avenue and Alder Street:
  - 60 km/h for a two-lane, undivided urban minor collector roadway

The posted speed limit of 70 km/h on Riddell Road is at or below the desirable TAC operating speeds, depending on the type of cross-section. The posted speed limits on Alder Street, Centennial Road, and Spencer Avenue are under the desirable operating speeds per the TAC guidelines.

The posted speed limits were reviewed using the methodology presented in the TAC *Canadian Guidelines for Establishing Posted Speed Limits*.[6] The analysis considers the roadway geometry, curvature, lane widths, pedestrian and cyclist exposure, pavement surface conditions, number of intersections, and number of intersections with private access driveways. **Table 3.2** provides a summary comparing the posted speed limits and TAC recommended speed limits for each study area roadway.

The findings indicate the current maximum posted speed limits are at or below the recommended speed limits.

TABLE 3.2: SPEED LIMIT COMPARISON

Roadway	Posted Maximum Speed Limit	Recommended Speed Limit (TAC Guidelines)
Riddell Road	70 km/h	80 km/h
Alder Street west of Riddell Road	40 km/h	40 km/h
Alder Street east of Riddell Road	40 km/h	50 km
Centennial Road	Unposted (assumed 50 km/h)	60 km/h
Spencer Avenue	40 km/h	50 km/h

Appendix B contains the TAC Speed Limit Assessment Forms for the study area roadways.

[6] Transportation Association of Canada. *Canadian Guidelines for Establishing Posted Speed Limits*. December 2009.

4 Traffic Operations Review

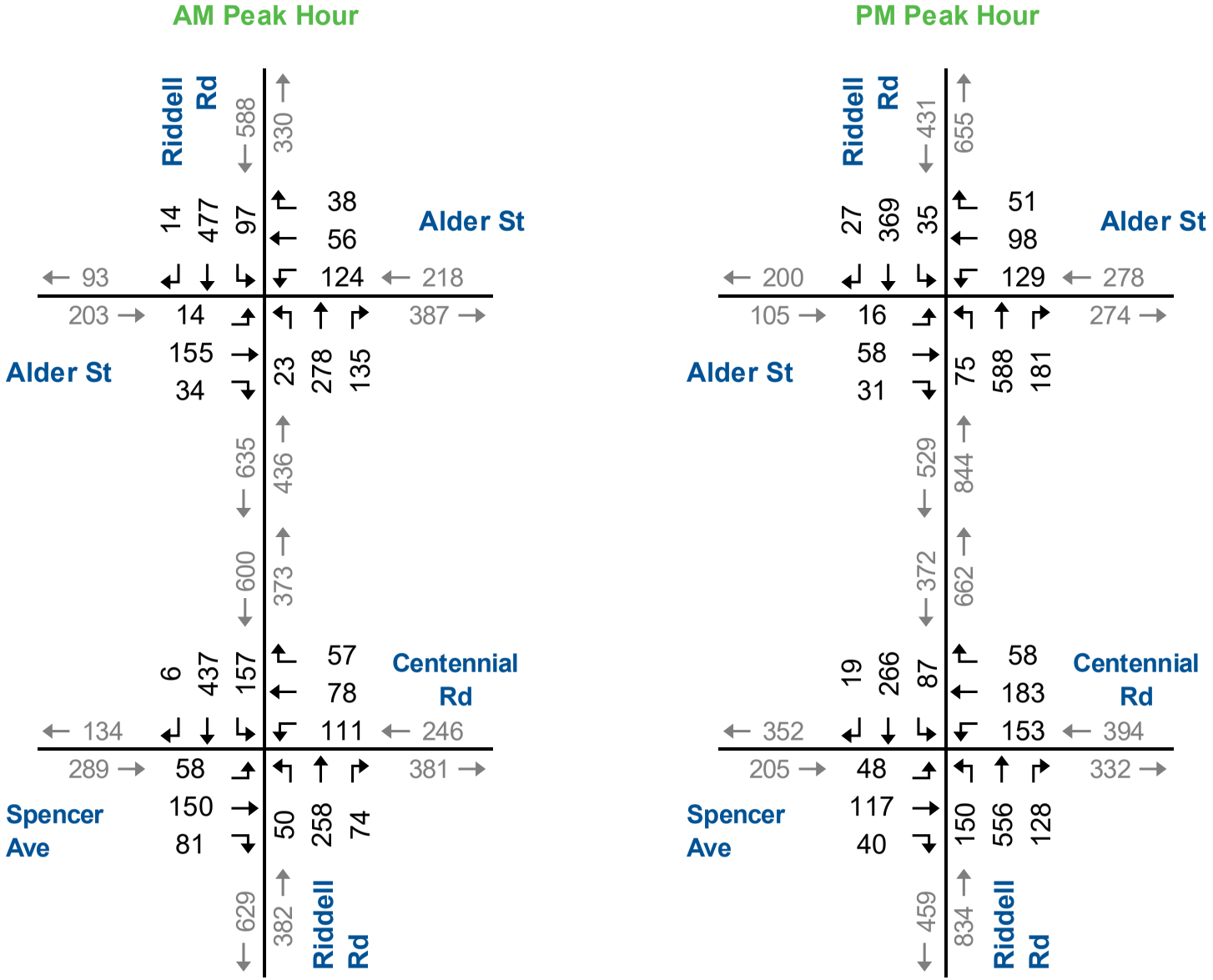
4.1 2020 Traffic Volumes

To assess intersection operations, turning movement counts are used to quantify the movement of vehicles through intersections. Existing traffic data at an intersection or on a road section forms the foundation for traffic analyses undertaken in a Transportation Impact Study (TIS).

This study was initiated and authored amidst the COVID-19 global pandemic. In response to the pandemic, the Province of Ontario implemented restrictions for day-to-day activities including the closure of non-essential businesses and other measures to curb the spread of the virus (i.e. lockdown, stay at home precautions). As a result, typical traffic volumes and travel patterns were impacted and collection of current traffic data was not possible.

However, the *Dufferin Road 109 Traffic Capacity Analysis* report contained traffic count data for the study area intersections. The data was collected in December 2018 and January 2019. To reflect 2020 conditions, a growth rate of 2% per annum compounded for two years (total growth of 4%) was applied to the data. Note that the 2% growth rate is consistent with the growth used in the County's report.

Figure 4.1 illustrates the 2020 traffic volumes.



paradigm TRANSPORTATION SOLUTIONS LIMITED

2020 Traffic Volumes

4.2 Operational Analysis Methodology

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 to or less than 10.0 seconds per vehicle. When the average delay exceeds 80 seconds for signalized intersections or 50 seconds for unsignalized intersections, or when the volume-to-capacity (v/c) ratio is greater than 1.0, the movement is classified 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 roadway improvement needs on through lanes, while LOS F may be acceptable for left-turn movements at peak times depending on delays.

The operations of intersections in the study area were evaluated with the existing turning movement volumes using Synchro 9 with HCM 2000 procedures. The intersection analysis considered three separate measures of performance:

- The LOS for each turning movement based on the average delay per vehicle;
- The v/c ratio for each turning movement; and
- The estimated 95th percentile queue length.

As per the Town of Orangeville Traffic Impact Study Guidelines, movements are considered critical when:

- V/C ratios for overall intersection operations or shared through/turning movements increase to 0.85 or above; or
- V/C ratios for exclusive turning movements increase to 0.90.

The key parameters used in the analysis include:

- Existing lane configurations;
- Existing heavy vehicle percentages;

- Existing intersection peak hour factors (PHF), which facilitates an assessment of the busiest 15-minute period within the peak hour; and
- Synchro default values for all other inputs.

4.3 2020 Traffic Operations

Table 4.1 summarizes the existing intersection operations. The entries in the table indicate the AM and PM peak hour LOS, v/c ratios, and 95th percentile queues. The results indicate the study area intersections are operating as follows:

Riddell Road and Alder Street:

- AM Peak Hour
  - Overall intersection: LOS C with a v/c ratio of 0.60; and
  - The southbound through movement is operating at LOS D with a v/c ratio of 0.91.
- PM Peak Hour
  - Overall intersection: LOS C with a v/c ratio of 0.58; and
  - The northbound through movement is operating at LOS D with a v/c ratio of 0.92.

Riddell Road and Centennial Road/Spencer Avenue:

- AM Peak Hour
  - Overall intersection: LOS B with a v/c ratio of 0.50; and
  - No critical movements are noted.
- PM Peak Hour
  - Overall intersection: LOS B with a v/c ratio of 0.64; and
  - No critical movements are noted.

Overall, the results indicate the study area intersections are operating at acceptable levels of service. The low to moderate intersection v/c ratios indicate the intersections have spare capacity.

Appendix C contains the detailed Synchro 9 reports.

TABLE 4.1: 2020 PEAK HOUR TRAFFIC OPERATIONS

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	Riddell Road & Alder Street	TCS	LOS	B	B	>	**B**	B	B	>	**B**	B	B	B	**B**	B	D	B	**C**	**C**
			Delay	12	14	>	**14**	15	13	>	**14**	15	18	14	**17**	16	37	13	**33**	**23**
			V/C	0.03	0.30	>		0.33	0.12	>		0.21	0.57	0.10		0.36	0.91	0.01		**0.60**
			95th	5	32	>		25	13	>		8	53	8		22	113	0		
			Storage	25	-	>		25	-	>		95	-	35		110	-	40		
			Avail.	21	-	>		0	-	>		87	-	27		89	-	40		
	Riddell Road & Spencer Avenue/ Centennial Road	TCS	LOS	C	C	>	**C**	C	C	>	**C**	A	A	A	**A**	A	B	A	**B**	**B**
			Delay	20	23	>	**22**	23	21	>	**22**	7	9	7	**8**	9	11	6	**10**	**14**
			V/C	0.20	0.50	>		0.50	0.25	>		0.11	0.31	0.06		0.27	0.49	0.01		**0.50**
			95th	15	42	>		27	22	>		8	33	5		23	61	0		
			Storage	50	-	>		40	-	>		105	-	60		165	-	160		
			Avail.	35	-	>		13	-	>		97	-	55		142	-	160		
PM Peak Hour	Riddell Road & Alder Street	TCS	LOS	B	B	>	**B**	B	B	>	**B**	B	D	B	**C**	B	B	B	**B**	**C**
			Delay	12	13	>	**13**	15	14	>	**14**	15	37	14	**30**	17	18	13	**18**	**23**
			V/C	0.03	0.10	>		0.26	0.18	>		0.27	0.92	0.18		0.32	0.59	0.02		**0.58**
			95th	5	14	>		25	22	>		18	146	17		12	70	2		
			Storage	25	-	>		25	-	>		95	-	35		110	-	40		
			Avail.	20	-	>		0	-	>		77	-	>		98	-	38		
	Riddell Road & Spencer Avenue/ Centennial Road	TCS	LOS	C	C	>	**C**	C	C	>	**C**	A	B	A	**B**	A	A	A	**A**	**B**
			Delay	20	21	>	**21**	24	23	>	**23**	9	15	7	**13**	9	9	7	**9**	**15**
			V/C	0.20	0.32	>		0.55	0.53	>		0.25	0.68	0.10		0.25	0.3	0.02		**0.64**
			95th	13	29	>		35	46	>		23	99	16		16	36	1		
			Storage	50	-	>		40	-	>		105	-	60		165	-	160		
			Avail.	37	-	>		5	-	>		82	-	44		149	-	159		

MOE - Measure of Effectiveness
LOS - Level of Service
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

4.4 2031 Traffic Volumes

Consistent with the *Dufferin Road 109 Traffic Capacity Analysis*, a 2.0% growth rate compounded for 11 years (total growth of 29.4%) was applied to the 2020 traffic volumes to derive the 2031 traffic volumes. It should be noted that as per the Dufferin Road 109 report, the 2.0% growth rate is considered to be conservative.

Figure 4.2 illustrates the 2031 traffic volumes.

4.5 2031 Traffic Operations

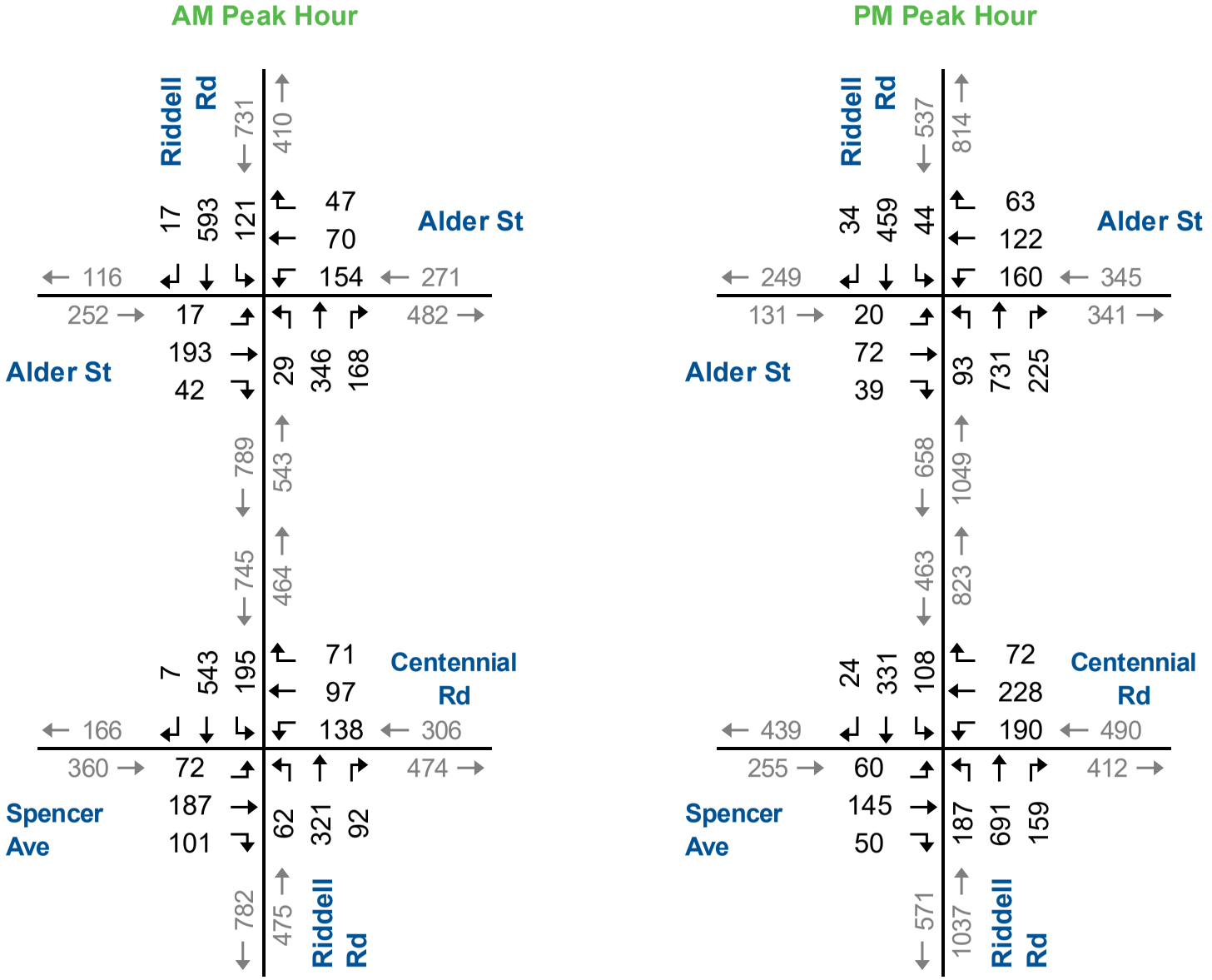
The operations of the study area intersections were evaluated under the 2031 traffic volumes. The analyses were completed using Synchro 9 with HCM 2000 procedures with optimized signal timing and phasing. The key parameters such as existing intersection configurations, heavy vehicle percentages, peak hour factors, and pedestrian volumes were retained from the existing analysis.

Table 4.2 summarizes the AM and PM peak hour background traffic intersection operations including the AM and PM peak hour LOS, v/c ratios and 95th percentile queue lengths. The results indicate the study area intersections are forecast to operate as follows:

Riddell Road and Alder Street:

- AM Peak Hour
  - Overall intersection: LOS C with a v/c ratio of 0.78;
  - The southbound through movement is forecast to operate at LOS C with a v/c ratio of 0.88; and
  - The westbound left-turn movement is forecast to exceed the 25 metres of existing storage (enough for about three vehicles) by 32 metres, or about four vehicles.
- PM Peak Hour
  - Overall intersection: LOS B with a v/c ratio of 0.71;
  - The northbound through movement is forecast to operate at LOS C with a v/c ratio of 0.89; and
  - The westbound left-turn movement is forecast to exceed the 25 metres of existing storage (enough for about three vehicles) by 23 metres, or about three vehicles.

Overall, the intersection is forecast to continue operating at acceptable levels of service and with spare capacity. The northbound and



paradigm TRANSPORTATION SOLUTIONS LIMITED

2031 Traffic Volumes

southbound through movements will continue to experience minor congestion. The forecast v/c ratios are not identified as critical under the Town's TIS guidelines. However, typically, when v/c ratios exceed 0.85 for through movements on arterial roads, remedial measures are considered.

Riddell Road and Centennial Road/Spencer Avenue:

- AM Peak Hour
  - Overall intersection: LOS B with a v/c ratio of 0.50; and
  - The westbound left-turn movement (from Riddell to Spencer) is forecast to exceed available storage by four metres, or less than one vehicle.
- PM Peak Hour
  - Overall intersection: LOS B with a v/c ratio of 0.64;
  - The westbound left-turn movement (from Riddell to Spencer) is forecast to exceed the 40 metres of existing storage (enough for about five vehicles) by 25 metres, or about three vehicles.

Overall, the intersection is forecast to continue operating at acceptable levels of service and with spare capacity. The identified queue storage issues are based on the 95th percentile back of queue estimates which are calculated based on the worst 5% of the peak hour. Conversely, the remaining 95% of the peak hour will not experience queues of this length. Therefore, the need for queue extension should be revisited as the traffic volumes increase to those outlined herein.

Appendix D contains the detailed Synchro 9 reports.

TABLE 4.2: 2031 TOTAL TRAFFIC OPERATIONS

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	Riddell Road & Alder Street	TCS	LOS	B	C	>	**C**	C	B	>	**C**	B	B	B	**B**	B	C	A	**C**	**C**
			Delay	17	23	>	**23**	30	19	>	**25**	11	14	10	**13**	12	27	10	**24**	**21**
			V/C	0.05	0.50	>		0.62	0.22	>		0.22	0.55	0.13		0.38	0.88	0.01		**0.78**
			95th	8	63	>		57	28	>		7	54	6		22	113	1		
			Storage	25	-	>		25	-	>		95	-	35		110	-	40		
			Avail.	17	-	>		-32	-	>		88	-	29		88	-	39		
	Riddell Road & Spencer Avenue/ Centennial Road	TCS	LOS	C	C	>	**C**	D	C	>	**C**	A	B	A	**A**	B	B	A	**B**	**B**
			Delay	21	27	>	**26**	47	21	>	**33**	9	11	8	**10**	11	14	7	**13**	**18**
			V/C	0.23	0.67	>		0.81	0.31	>		0.17	0.4	0.07		0.37	0.63	0.01		**0.68**
			95th	18	53	>		44	28	>		13	54	7		37	105	0		
			Storage	50	-	>		40	-	>		105	-	60		165	-	160		
			Avail.	32	-	>		-4	-	>		92	-	53		128	-	160		
PM Peak Hour	Riddell Road & Alder Street	TCS	LOS	B	B	>	**B**	C	C	>	**C**	B	C	B	**C**	B	B	A	**B**	**B**
			Delay	18	19	>	**19**	24	21	>	**22**	11	27	10	**22**	13	14	9	**13**	**20**
			V/C	0.05	0.18	>		0.43	0.32	>		0.28	0.89	0.20		0.35	0.57	0.02		**0.71**
			95th	9	27	>		48	46	>		17	152	16		12	73	3		
			Storage	25	-	>		25	-	>		95	-	35		110	-	40		
			Avail.	16	-	>		-23	-	>		78	-	>		98	-	37		
	Riddell Road & Spencer Avenue/ Centennial Road	TCS	LOS	C	C	>	**C**	D	C	>	**D**	A	B	A	**B**	B	A	A	**A**	**C**
			Delay	29	28	>	**28**	49	35	>	**40**	10	19	8	**16**	12	9	7	**10**	**21**
			V/C	0.37	0.43	>		0.81	0.70	>		0.31	0.78	0.13		0.37	0.35	0.02		**0.79**
			95th	21	46	>		65	75	>		31	164	24		24	49	2		
			Storage	50	-	>		40	-	>		105	-	60		165	-	160		
			Avail.	29	-	>		-25	-	>		74	-	36		141	-	158		

MOE - Measure of Effectiveness
LOS - Level of Service
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

5 Riddell Road and Alder Street Remedial Measures

As previously outlined, the northbound and southbound through movements at this intersection are currently experiencing congestion as indicated by the v/c ratios >0.90. These conditions are forecast to improve slightly upon reaching the 2031 traffic volumes with the optimized signal timings; however, these movements will still experience congestion.

To improve operations, Synchro analyses were undertaken to determine the level of remedial measures required to provide acceptable v/c ratios on the critical movements. The analyses were undertaken using the same methodology as for the 2031, optimized timing and phasing and the following on Riddell Road:

- An additional northbound through lane (to one left-turn lane, two through lanes and one right-turn lane); and
- Re-assignment of the southbound right-turn lane to a shared through/right-turn lane.

Table 5.1 summarizes the AM and PM peak hour background traffic Riddell Road and Alder Street intersection operations including the AM and PM peak hour LOS, v/c ratios and 95th percentile queue lengths. The results indicate the intersections is forecast to operate as follows:

- AM Peak Hour
  - Overall intersection: LOS B with a v/c ratio of 0.53;
  - The westbound left-turn movement is forecast to exceed available storage by six metres, or less than one vehicle.
- PM Peak Hour
  - Overall intersection: LOS B with a v/c ratio of 0.49;
  - The westbound left-turn movement is forecast to exceed available storage by six metres, or less than one vehicle.

As expected, provision of the additional capacity results in overall improved intersection operations and on the critical northbound and southbound through movements. As well, there is noted improvement in the intersection v/c ratios to 0.53 during the AM peak hour and 0.49 during the PM peak hour indicating the intersection will utilize about 50% of its capacity.

Appendix E contains the detailed Synchro reports.

TABLE 5.1: 2031 TRAFFIC OPERATIONS – ALDER STREET WITH IMPROVEMENTS

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	Riddell Road & Alder Street	TCS	LOS	A	B	>	**B**	B	B	>	**B**	B	B	B	**B**	B	C	A	**C**	**B**
			Delay	9	12	>	**12**	13	10	>	**12**	16	17	15	**16**	18	21	0	**21**	**17**
			V/C	0.04	0.35	>		0.39	0.16	>		0.24	0.44	0.13		0.50	0.72	0.00		**0.53**
			95th	5	38	>		31	17	>		8	28	9		26	51	0		
			Storage	25	-	>		25	-	>		95	-	35		110	-	40		
			Avail.	20	-	>		-6	-	>		87	-	26		84	-	40		
PM Peak Hour	Riddell Road & Alder Street	TCS	LOS	A	B	>	**B**	B	B	>	**B**	B	B	B	**B**	B	B	A	**B**	**B**
			Delay	10	10	>	**10**	13	11	>	**12**	15	18	13	**16**	14	15	0	**15**	**15**
			V/C	0.04	0.14	>		0.32	0.25	>		0.35	0.68	0.15		0.28	0.46	0.00		**0.49**
			95th	6	18	>		31	29	>		19	54	11		11	34	0		
			Storage	25	-	>		25	-	>		95	-	35		110	-	40		
			Avail.	19	-	>		-6	-	>		77	-	>		99	-	40		

MOE - Measure of Effectiveness
LOS - Level of Service
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

5.1 Future Recreation Centre Access

At present, the Alder Street Recreation Centre is accessed via:

- one right in/right out driveway connection to Alder Street located about 50 metres east of the east curb line of Riddell Road; and
- one all-turns driveway connection to Alder Street located about 105 metres east of the east curb line of Riddell Road.

The Town has plans to relocate the right in/right out driveway connection from Alder Street to Riddell Road near the northerly limits of the existing parking lot. It is expected that when this occurs, there will be a change in traffic patterns northbound on Riddell Road at Alder Street whereby right turns destined to the Recreation Centre will re-assign to the through movement to enter the Recreation Centre via the new right in/right out entrance (on Riddell Road). Note that the actual percentage re-assignment is not known at this time.

With this relocation, it is recommended that a dedicated inbound right-turn lane and a dedicated outbound acceleration lane be provided at the site driveway connection to Riddell Road. Since this driveway will be located on an arterial road, these lanes will provide safe areas for vehicles to decelerate when entering the site and accelerate before merging into traffic on Riddell Road. The appropriate pavement markings and signage, as per Ontario Traffic Manual, should be provided for both the inbound and outbound lanes.

As previously outlined, the northbound through movement is forecast to experience congestion at the 2031 horizon without additional capacity. However, with provision of the additional through lane, the movement will operate at acceptable levels of service and with spare capacity, capable of accommodating the re-assigned Recreation Centre volumes. Furthermore, the additional lane will continue on the far-side (north side) of the intersection where it can become the dedicated right-turn lane into the Recreation Centre.

6 Riddell Road and Centennial Road/ Spencer Avenue Remedial Options

The results of the analyses in **Chapter 4** indicate that remedial measures will not be required to provide sufficient capacity and acceptable levels of service at this intersection. However, several issues were identified by Town staff at the outset of the study, including:

- Offset of the northbound and southbound left-turn lanes; and
- Motorists using the southbound dedicated right-turn lane as a through lane to avoid the southbound through lane queue.

The following outlines the recommended improvements for three time periods: immediate implementation (within one year), intermediate-term implementation (2 to 5 years) and longer-term implementation (>5 years).

6.1 Immediate Implementation (within One Year)

6.1.1 Left-Turn Signal Timing Phase Justification

The need for left-turn signal timing phases at the study area intersections was assessed based on the information contained in Book 12 Traffic Signals of the Ontario Traffic Manual (OTM)[7]. Section 3.5 Phase Determination, Left-Turn Phase Justification outlines the methodology and states:

A left-turn phase may be justified:

i. If the left-turning vehicles are not finding suitable turning gaps, volume exceeds at least two vehicles per cycle, and the Level of Service at the intersection will not be jeopardized; or

ii. If the left-turn volume plus the opposing volume > 720 vehicles per hour; or

iii. If a field check shows that vehicles consistently require more than two cycles in the queue in order to turn left; or

iv. If an over-representation of left turning collisions is identified at the intersection.

[7] Ontario Traffic Manual, Book 12, Traffic Signals, Queen's Printer for Ontario, March 2012

Table 6.1 outlines the results of the assessment and indicates that left-turn phases are not justified at the study area intersections based on the available data.

TABLE 6.1: LEFT-TURN PHASE JUSTIFICATION

Criteria	Centennial/Spencer	
	AM	PM
>2 left turns per cycle	No	No
Volume >720 vph	No	No
>2 cycles to turn left	No	No
Left-turning collisions	n/a	n/a

6.1.2 Protected Left-Turn Signal Phasing

As outlined above, left-turn signal timing phases are not currently justified at the intersection. However, OTM Book 12 Section 3.5 Phase Determination, Fully Protected Simultaneous Left Turn Phase states: *"The fully protected simultaneous left turn operation is used where the visibility of vehicles making left turns to the opposing traffic (or vice versa) is limited, or where distractions caused by turning traffic are a concern"* or *"…on high speed roads with potential visibility problems due to geometry, or where collision problems exist"*.

Additionally, Chapter 9.17.4.5 Left-Turn Lanes on Both Approaches of the TAC GDGCR states the following for adjacent (offset) left-turn lanes, "*Visibility problems result from the presence of vehicles in adjacent left-turn lanes and, for this reason, such movements should generally only be used at signalized intersections with protected left turn phases*".

Based on OTM and TAC guidance, provision of protected left-turn phasing is warranted for the northbound and southbound left-turn movements. Therefore, it is recommended that protected left-turn phasing be implemented at this intersection in the immediate term to increase overall safety at the intersection and in the immediate area.

Required Equipment

The following equipment will be required on each approach to permit implementation of the protected phasing:

- Type 2 signal head[8] (circular red indication, a circular amber indication and green arrow indication);

[8] Figure 2 – Traffic Control Signal Heads, OTM Book 12, Traffic Signals, Queen's Printer for Ontario, March 2012

- Mounting pole/mast arm;
- A Rb-81 LEFT-TURN SIGNAL sign[9]; and
- Signal timing plan changes

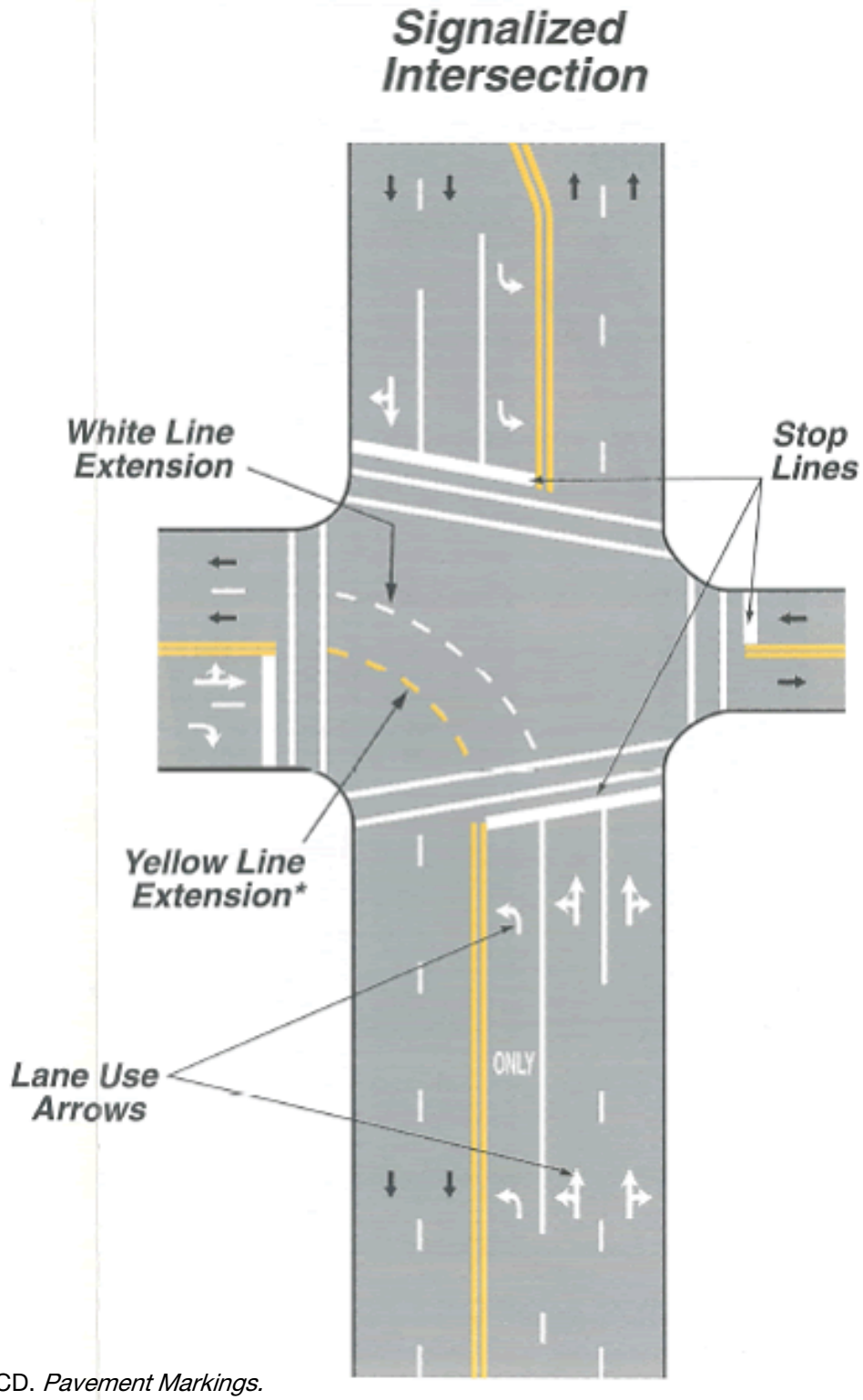
In addition to this equipment, it is recommended that left-turn lane extension markings are also provided to guide vehicles on the correct path through the intersection (**Figure 6.1**).

Operational Impacts

Synchro analyses were completed for the intersection with the protected left-turn phasing in place. The results are outlined in **Table 6.1** and indicate:

- AM Peak Hour
  - The intersection is forecast to operate at an overall LOS D with a v/c ratio of 0.77 (an increase of 0.09); and
  - No critical movements are noted.
- PM Peak Hour
  - The intersection is forecast to operate at an overall LOS D with a v/c ratio of 0.86 (an increase of 0.07); and
  - The northbound through movement is forecast to operate at LOS D with a v/c ratio of 0.88; however, this is not considered critical under the Town's TIS guidelines; and
  - The westbound left-turn movement if forecast to exceed available storage by 23 metres; and
  - The northbound right-turn movement is forecast to exceed storage by three metres.

[9] OTM Book 5, Regulatory Signs, Queen's Printer for Ontario, March 2000



Source: MUTCD. *Pavement Markings.*

paradigm TRANSPORTATION SOLUTIONS LIMITED

Example Left-Turn Lane Line Extension

TABLE 6.1: 2031 TRAFFIC OPERATIONS – SPENCER AVE/CENTENNIAL RD WITH PROTECTED LEFT-TURN PHASING

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	Riddell Road & Spencer Avenue/ Centennial Road	TCS	LOS	C	D	>	**D**	C	C	>	**C**	E	C	C	**C**	E	C	B	**D**	**D**
			Delay	34	52	>	**49**	34	27	>	**30**	70	30	21	**34**	57	27	14	**35**	**37**
			V/C	0.28	0.83	>		0.64	0.28	>		0.70	0.58	0.07		0.78	0.72	0.01		**0.77**
			95th	27	84	>		37	40	>		32	95	9		77	152	0		
			Storage	50	-	>		40	-	>		105	-	60		165	-	160		
			Avail.	23	-	>		3	-	>		73	-	51		88	-	160		
PM Peak Hour	Riddell Road & Spencer Avenue/ Centennial Road	TCS	LOS	D	D	>	**D**	E	D	>	**D**	E	D	B	**D**	F	C	B	**D**	**D**
			Delay	45	50	>	**49**	63	44	>	**52**	56	37	14	**37**	85	23	16	**37**	**41**
			V/C	0.41	0.66	>		0.84	0.70	>		0.73	0.88	0.16		0.84	0.45	0.02		**0.86**
			95th	27	67	>		63	95	>		69	243	63		63	93	0		
			Storage	50	-	>		40	-	>		105	-	60		165	-	160		
			Avail.	23	-	>		-23	-	>		36	-	-3		102	-	160		

MOE - Measure of Effectiveness
LOS - Level of Service
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

Protected phasing can be a trade off where one problem is solved and another is created simply because no other movements, including pedestrians, can operate during the phase. However, the increase in overall intersection safety is paramount over the minor increase in intersection delay that occurs. Furthermore, the intersection will still have residual capacity, albeit with some congestion, especially during the PM peak hour. Therefore, it is recommended the protected phasing is implemented in the immediate term.

Appendix F contains the detailed Synchro reports.

6.1.3 Southbound Right-Turn Lane

At present, some motorists are using the dedicated southbound right turn lane as a through lane to avoid the southbound through lane queue. There are several factors that permit this to occur:

- There is no physical barrier preventing vehicles from completing this manoeuvre; and
- The pavement width of the receiving lane(s) area and the lack of pavement markings on the south side of the intersection permits it to operate as two lanes.

To mitigate these issues, it is recommended that the following are implemented in the immediate term to curtail this practice and increase the overall safety of the intersection:

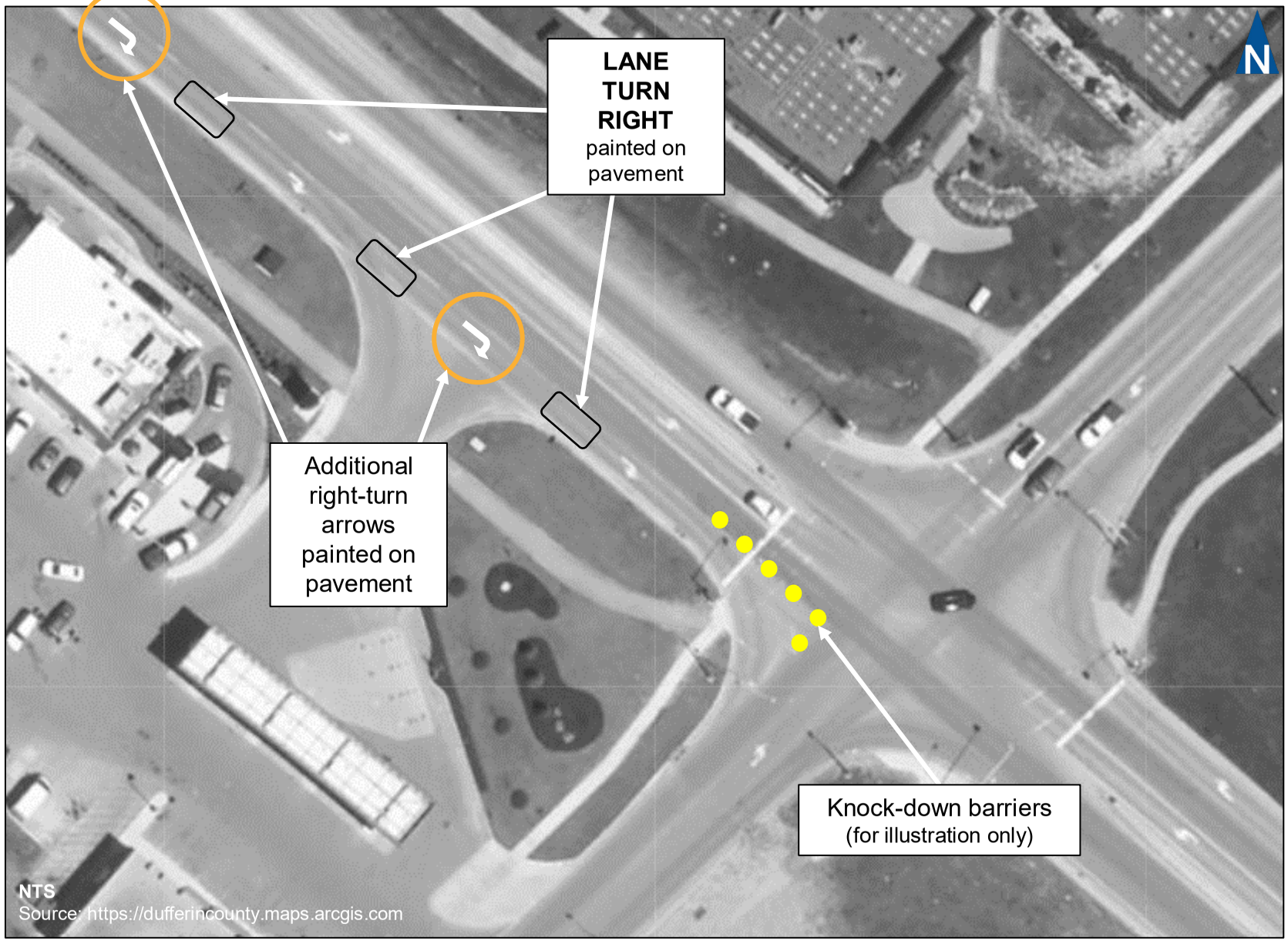
Install collapsible bollards at the “end” of the right turn lane to limit the ability of vehicles to travel through the intersection. Supplementary pavement markings such as additional turn lane arrows and “Right Turn Lane” pavement lettering could be provided to indicate to drivers that the lane exits onto Spencer Avenue.

Required Equipment

The following equipment will be required to facilitate the recommended changes:

- Pavement markings, and
- Installation of an appropriate and maintenance-friendly barrier that is acceptable to both the County of Dufferin and Town of Orangeville

Figure 6.2 provides a conceptual plan illustrating these remedial measures.



Riddell Road Southbound Right-Turn Lane Conceptual Mitigation Measures Plan

Figure 6.2

6.2 Intermediate Implementation (within Two to Five Years)

6.2.1 Left-Turn Lane Alignment

As outlined in **Section 6.1**, implementation of protected northbound and southbound left-turn signal phasing will provide for safer left turns but with a decrease in overall intersection level of service and congestion. Alternatively, the Town could undertake an alignment of the left-turn lanes. The alignment would ultimately remove the need for the protected left-turn phases as adequate sight distance would be provided for the opposing movements at the conclusion of construction. This would result in the acceptable levels of service outlined in **Chapter 4**.

It should be noted that if the Town proceeds with the roadway re-alignment, it will not negate the need to provide the protected left-turn phasing in the immediate term. As well, if the Town decides to explore changes in traffic control at this intersection in the long-term (**Chapter 7**), the lane re-alignment may not be required depending on the timing of the changes and success of the protected phasing.

6.2.2 Southbound Right-Turn Lane

Remedial measures that could be considered in the intermediate to longer-term for this intersection are: Convert the dedicated southbound right-turn lane into a shared through/right-turn lane;

- Install pavement markings on the south side of the intersection, demarcating two separate through lanes; and
- Terminate the curb lane at the commercial (hotel) entrance located approximately 100 metres south of the south curb line of Spencer Avenue.

  Prior to development of the commercial parcel, the lane should terminate in this area. After development of the parcel, this lane can be reassigned to a right-in only lane for the property.

  An additional benefit of this lane is that is will also function as an acceleration lane for vehicles turning right onto Riddell Road from Spencer Avenue.

Required Equipment

The following equipment will be required to facilitate the recommended changes:

- Pavement markings,

- Removal of Wa-56R RIGHT LANE EXITS sign
- Installation of Wa-23R LANE ENDS sign[10]; and
- Signal timing plan changes

Operational Impacts

Synchro analyses were completed for the intersection with the lane reassignment and aforementioned protected left-turn phasing in place. The results are outlined in **Table 6.2** and indicate:

- AM Peak Hour
  - The intersection is forecast to operate at an overall LOS C with a v/c ratio of 0.69 (decrease of 0.08 from previous analyses); and
  - No critical movements are noted.
- PM Peak Hour
  - The intersection is forecast to operate at an overall LOS D with a v/c ratio of 0.86 (no change from previous analyses); and
  - The northbound through movement is forecast to operate at LOS D with a v/c ratio of 0.88; however, this is not considered critical under the Town's TIS guidelines; and
  - The westbound left-turn movement if forecast to exceed available storage by 23 metres; and
  - The northbound right-turn movement is forecast to exceed storage by three metres.

Overall, the lane re-assignment coupled with the protected left-turn phasing results in slightly improved intersection operations during the AM peak hour with no change during the PM peak hour. As with implementation of the protected left-turn phases, the increase in overall intersection safety outweighs the impacts to operations. However, the additional through lane is not required from an operational perspective as previously outlined in **Chapter 4**.

Appendix G contains the detailed Synchro reports.

[10] OTM Book 5, Regulatory Signs, Queen's Printer for Ontario, March 2000

TABLE 6.2: 2031 TRAFFIC OPERATIONS – SPENCER AVE/CENTENNIAL RD WITH LANE RE-ASSIGNMENT

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	Riddell Road & Spencer Avenue/ Centennial Road	TCS	LOS	C	D	>	**D**	C	C	>	**C**	D	C	C	**C**	E	B	A	**C**	**C**
			Delay	34	53	>	**50**	32	27	>	**29**	52	31	22	**32**	57	20	0	**29**	**34**
			V/C	0.28	0.83	>		0.61	0.27	>		0.55	0.59	0.07		0.78	0.4	0.00		**0.69**
			95th	27	85	>		36	39	>		28	95	9		77	63	0		
			Storage	50	-	>		40	-	>		105	-	60		165	-	160		
			Avail.	23	-	>		4	-	>		77	-	51		88	-	160		
PM Peak Hour	Riddell Road & Spencer Avenue/ Centennial Road	TCS	LOS	D	D	>	**D**	E	D	>	**D**	E	D	B	**D**	F	B	A	**C**	**D**
			Delay	45	50	>	**49**	63	44	>	**52**	56	37	14	**37**	85	19	0	**35**	**41**
			V/C	0.41	0.66	>		0.84	0.70	>		0.73	0.88	0.16		0.84	0.26	0.00		**0.86**
			95th	27	67	>		63	95	>		69	243	63		63	43	0		
			Storage	50	-	>		40	-	>		105	-	60		165	-	160		
			Avail.	23	-	>		-23	-	>		36	-	-3		102	-	160		

MOE - Measure of Effectiveness
LOS - Level of Service
V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Storage - Existing Storage (m)
Avail. - Available Storage (m)
TCS - Traffic Control Signal
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane

7 Long-Term (>5 Years) Remedial Measures – Both Intersections

Roundabouts at both study area intersections have been identified as a long-term remedial measures to accommodate the 2031+ traffic volumes. Three design scenarios were completed for each intersection using TORUS roundabout design software and analyzed using ARCADY . The scenarios are:

- **Scenario 1**: one-lane entry on all approaches;
- **Scenario 2**: two-lane entry on the north and south approaches and one-lane entry at the east and west approaches; and
- **Scenario 3**: two-lane entry on all approaches.

The y-intercept adjustment for all scenarios is 90% as per typical industry standards since the horizon is more than 10 years from the date of this report. All scenarios were completed using the forecast 2031 traffic volumes and existing heavy vehicle percentages.

7.1 Scenario 1: One-Lane Entry on All Approaches

The scenario includes a roundabout with a 40-metre diameter with one entry lane on each approach.

Table 7.1 summarizes the Scenario 1 operations. The results indicate that both intersections are forecast to operate with acceptable levels of service and within capacity during the AM peak hour. During the PM peak hour, the intersections are forecast to operate at overall LOS F and with v/c ratios >1.0 on the northbound approaches at each intersection.

Overall, additional capacity will be required on the northbound approaches to provide acceptable levels of service during the PM peak hour; therefore, roundabouts with one entry lane on each approach is not recommended at either intersection.

TABLE 7.1: SCENARIO 1 ARCADY ANALYSES

Intersection	Intersection Approach	Queue (PCE)	Delay (sec)	V/C Ratio	Overall LOS	Intersection Delay (sec)
AM Peak Hour						
Riddell Road at Alder Street	Westbound (East Leg)	1.04	5.57	0.31	B	11.63
	Southbound (North leg)	10.23	15.73	0.76		
	Eastbound (West leg)	1.07	9.81	0.42		
	Northbound (South leg)	1.16	10.01	0.59		
Riddell Road at Centennial Road/ Spencer Avenue	Westbound (East Leg)	1.07	6.48	0.36	B	13.96
	Southbound (North leg)	13.72	19.26	0.80		
	Eastbound (West leg)	2.04	13.64	0.60		
	Northbound (South leg)	1.22	10.70	0.56		
PM Peak Hour						
Riddell Road at Alder Street	Westbound (East Leg)	2.03	11.32	0.54	F	51.34
	Southbound (North leg)	1.08	9.91	0.60		
	Eastbound (West leg)	1.00	5.49	0.18		
	Northbound (South leg)	90.68	91.40	1.02		
Riddell Road at Centennial Road/ Spencer Avenue	Westbound (East Leg)	11.66	25.70	0.79	F	105.23
	Southbound (North leg)	2.30	12.16	0.60		
	Eastbound (West leg)	1.02	6.77	0.34		
	Northbound (South leg)	132.83	208.57	1.12		

7.2 Scenario 2: Partial Two-Lane Entry

This scenario includes a roundabout with a 47.5-metre inscribed circle diameter, one entry lane on the side street approaches and two entry lanes on Riddell Road.

Table 7.2 summarizes the Scenario 2 operations. The results indicate that both intersections are forecast to operate with acceptable levels of service during the AM and PM peak hours and with spare capacity. It should be noted that the southbound leg of Riddell Road with Centennial Road/Spencer Avenue is forecast to operate at LOS D

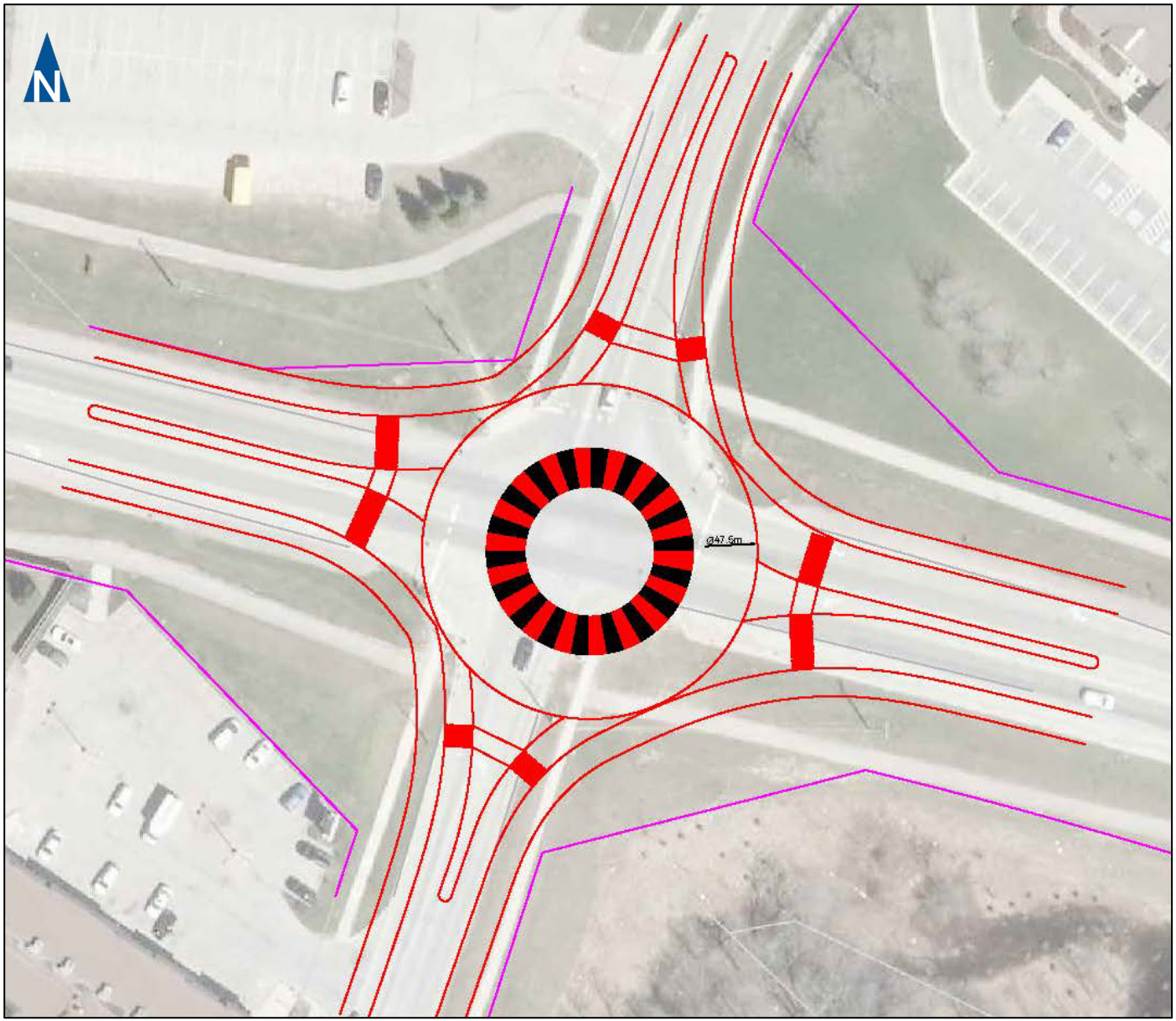
during the PM peak hour. This level of delay is typically acceptable and considered standard for left-turn movements.

Overall, the partial two-lane entry roundabout is the recommended minimum design for each intersection. It will provide acceptable levels of service, spare capacity and permit the addition of lanes if required in the future.

TABLE 7.2: SCENARIO 2 ARCADY ANALYSES

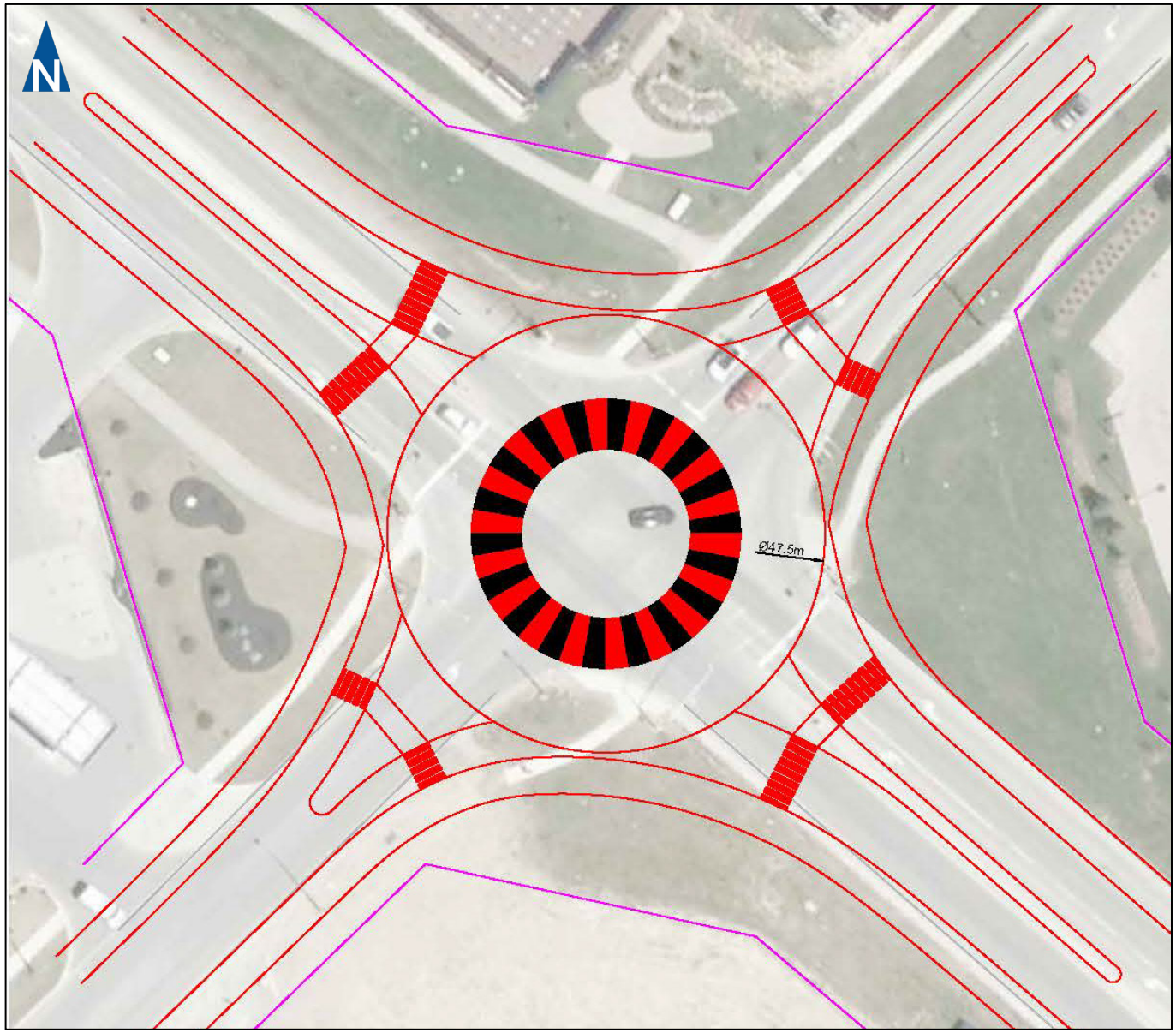
Intersection	Intersection Approach	Queue (PCE)	Delay (sec)	V/C Ratio	Overall LOS	Intersection Delay (sec)
AM Peak Hour						
Riddell Road at Alder Street	Westbound (East Leg)	1.04	5.50	0.30	A	5.46
	Southbound (North leg)	1.00	4.98	0.49		
	Eastbound (West leg)	1.07	9.34	0.40		
	Northbound (South leg)	1.16	4.29	0.38		
Riddell Road at Centennial Road/ Spencer Avenue	Westbound (East Leg)	1.07	6.36	0.36	A	6.74
	Southbound (North leg)	1.00	5.35	0.52		
	Eastbound (West leg)	2.04	12.72	0.58		
	Northbound (South leg)	1.22	4.62	0.36		
PM Peak Hour						
Riddell Road at Alder Street	Westbound (East Leg)	2.03	11.27	0.54	A	6.77
	Southbound (North leg)	1.08	4.15	0.39		
	Eastbound (West leg)	1.00	5.36	0.18		
	Northbound (South leg)	3.16	6.80	0.67		
Riddell Road at Centennial Road/ Spencer Avenue	Westbound (East Leg)	16.96	34.07	0.83	B	13.78
	Southbound (North leg)	1.15	4.87	0.37		
	Eastbound (West leg)	1.02	6.60	0.33		
	Northbound (South leg)	4.83	9.92	0.72		

Figure 7.1a and **Figure 7.1b** illustrate the roundabout placement for each intersection. The drawings show that a roundabout with a 47.5-metre inscribed circle diameter can be accommodated within the existing right-of-way of each intersection.



paradigm TRANSPORTATION SOLUTIONS LIMITED

Alder Street TORUS Roundabout Design
47.5 Metre Inscribed Circle Diameter



paradigm TRANSPORTATION SOLUTIONS LIMITED

Centennial Road/Spencer Avenue TORUS Roundabout Design
47.5 Metre Inscribed Circle Diameter

7.3 Scenario 3: Two-Lane Entry on All Approaches

This scenario analyzes a roundabout with a 55-metre inscribed circle diameter with two entry lanes on all approaches.

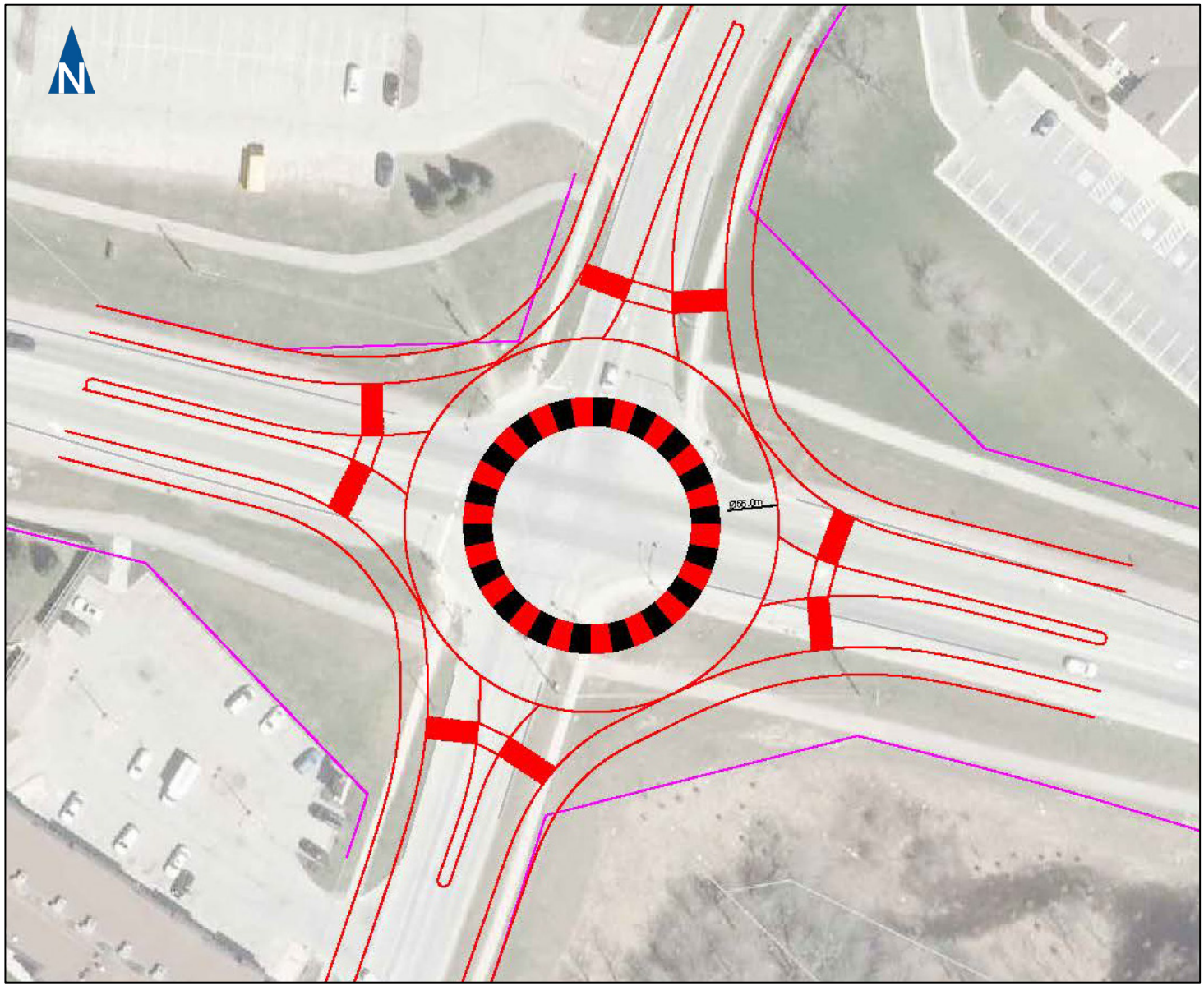
Table 7.3 summarizes the Scenario 3 operations. The results indicate that both intersections are forecast to operate with acceptable levels of service and within spare capacity during both the AM and PM peak hours.

Overall, the full two-lane entry roundabout design is an acceptable design for each intersection as it will provide acceptable levels of service on all approaches, spare capacity on Riddell Road and significant spare capacity on the side street approaches.

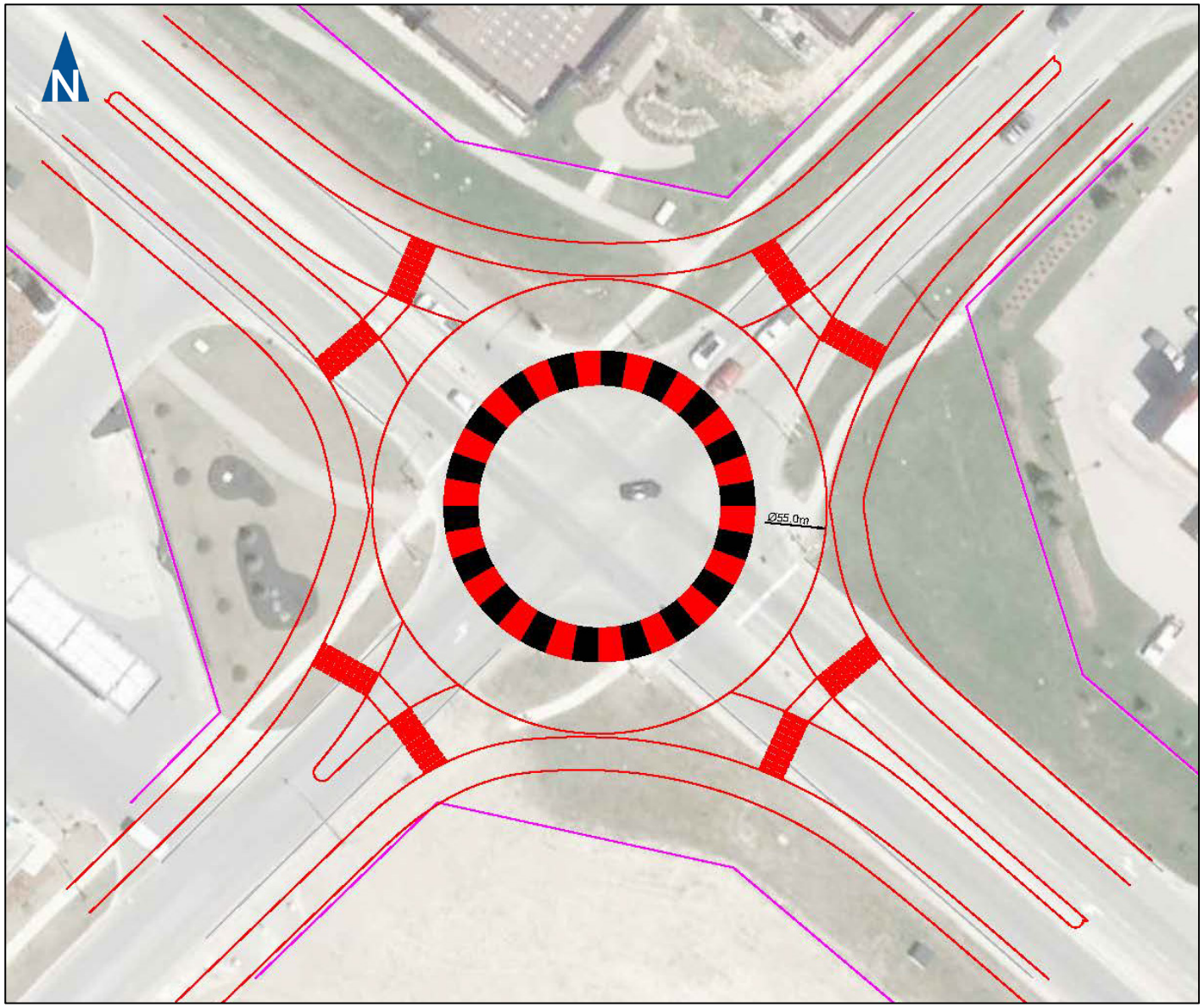
TABLE 7.3: SCENARIO 3 ARCADY ANALYSES

Intersection	Intersection Approach	Queue (PCE)	Delay (sec)	V/C Ratio	Overall LOS	Intersection Delay (sec)
AM Peak Hour						
Riddell Road at Alder Street	Westbound (East Leg)	1.04	5.50	0.30	A	5.46
	Southbound (North leg)	1.00	4.98	0.49		
	Eastbound (West leg)	1.07	9.34	0.40		
	Northbound (South leg)	1.16	4.29	0.38		
Riddell Road at Centennial Road/ Spencer Avenue	Westbound (East Leg)	1.07	6.36	0.36	A	6.74
	Southbound (North leg)	1.00	5.35	0.52		
	Eastbound (West leg)	2.04	12.72	0.58		
	Northbound (South leg)	1.22	4.62	0.36		
PM Peak Hour						
Riddell Road at Alder Street	Westbound (East Leg)	2.03	11.27	0.54	A	6.77
	Southbound (North leg)	1.08	4.15	0.39		
	Eastbound (West leg)	1.00	5.36	0.18		
	Northbound (South leg)	3.16	6.80	0.67		
Riddell Road at Centennial Road/ Spencer Avenue	Westbound (East Leg)	16.96	34.07	0.83	B	13.78
	Southbound (North leg)	1.15	4.87	0.37		
	Eastbound (West leg)	1.02	6.60	0.33		
	Northbound (South leg)	4.83	9.92	0.72		

Figure 7.2a and **Figure 7.2b** illustrate the roundabout placement for each intersection. The drawings show that a roundabout with a 55-metre inscribed circle diameter can be accommodated within the existing right-of-way at Centennial Road/Spencer Avenue. At Alder Street, minimal property acquisition may be required; however, this could be definitively determined during detailed roundabout design.



Alder Street TORUS Roundabout Design
55 Metre Inscribed Circle Diameter



Centennial Road/Spencer Avenue TORUS Roundabout Design
55 Metre Inscribed Circle Diameter

Appendix H contains the detailed ARCADY reports for all three scenarios.

7.4 Roundabout Design

The Riddell Road corridor is a by-pass routing for heavy vehicles around the downtown area of Orangeville. As well, it also accommodates oversized/wide loads on a routine basis. Therefore, future roundabouts will need to be designed with mountable curbs to accommodate these vehicles which could increase the minimum inscribed circle diameter. This can be determined through a future detailed design study.

7.5 Roadway Widening

As outlined above, two entry lanes are required on Riddell Road at both intersections to provide adequate levels of service.

As discussed in **Chapter 5**, if an additional northbound through lane is provided on Riddell Road at Alder Street, this lane should continue north of the intersection and could become the dedicated right-turn lane for the relocated Recreation Centre Driveway.

Chapter 6 recommends intermediate-term re-assignment of the existing southbound right-turn lane on Riddell Road at Spencer Avenue to a shared through/right-turn lane, thereby providing two through lanes and the associated additional capacity.

Based on the above, the Town could consider widening Riddell Road between Alder Street and Centennial Road/Spencer Avenue to provide two through lanes in each direction. This will ensure adequate capacity through the area and will provide the required number of through lanes at each roundabout approach.

The need for this widening could be further assessed through a detailed corridor study which will also provide a longer-term plan for the entirety of Riddell Road.

7.6 Roundabout Summary

Based on the completed analyses , roundabouts are not required to provide adequate levels of service at the intersections at the 2031 horizon. However, provision of a roundabout with a minimum 47.5-metre inscribed circle diameter with two entering lanes on Riddell Road and one entering lane on the side street approaches will provide adequate levels of service for the study area intersection at the 2031

horizon and additional spare capacity (beyond the intersection-specific recommendations) to accommodate growth beyond this horizon.

The need to accommodate oversized loads through the roundabouts present challenges that may need to be mitigated through design. This may ultimately result in the need to provide a larger inscribed circle diameter or special design considerations (mountable curbs). If a larger inscribed circle diameter is required, the cost could outweigh the benefit, especially if land acquisition is required.

Furthermore, provision of roundabouts at these intersections will likely affect operations of the upstream and downstream intersections on Riddell Road and the side streets (Alder Street, Centennial Road and Spencer Avenue). A corridor study will provide the Town and County with the opportunity to assess these potential impacts and develop a long-term plan that meets the needs of both agencies.

Overall, it is recommended the Town consider the cost-benefit analysis of roundabout provision versus the intersection-specific recommendations in the long-term. Additionally, it is recognized that any long-term improvements on this corridor may be dependent upon discussions with County of Dufferin and should be assessed through a more detailed corridor study.

8 Intersection Improvements Summary

The remedial measures selected for implementation at each intersection and the timing of these improvements are interconnected where the shorter term improvements are dependent upon the longer-term improvement plan. For example, if the Town proceeds with a roundabout at Centennial Road/Spencer Avenue, re-alignment of the northbound and southbound left-turn lanes may not be required if the protected signal phasing provides adequate levels of service and improves safety.

It is recommended the Town consider the costs and benefits of each identified improvement and carry out any required consultation with County staff. As well, it is also recommended the Town consider conducting a Riddell Road corridor study to identify any longer-term (+2031) roadway capacity issues (**Chapter 9**). These will help the Town develop the preferred improvement plan which will address the identified corridor issues, provide the required future capacity and assist in future Capital Budget forecasts.

Table 8.1 provides a 3-tier general cost for each identified Alder Street and Centennial Road/Spencer Avenue intersection improvement: low cost, moderate cost and high cost.

Note that regardless of the timing of improvements, the remedial measure of protected left-turn phasing at Riddell Road and Centennial Road/Spencer Avenue should be implemented in the immediate term to conform to Transportation Association of Canada *Geometric Design Guide for Canadian Roads* guidance.

TABLE 8.1: IMPROVEMENTS COSTS

Improvement Measure	Cost		
	Low	Moderate	High
Signal timing adjustments	✓		
Pavement markings	✓		
Sign removal or installation	✓		
Knock-down barriers	✓		
Signal head installation (including all hardware)		✓	
Left-Turn Lane Alignment		✓	
Riddell Road Corridor Study: Caledon Garafraxa Townline to Broadway		✓	
Roundabout installation			✓
Roadway widening Alder to Centennial/Spencer (additional through lane per direction)			✓

9 Supplemental Riddell Road Corridor Recommendations

9.1 Corridor Study

It is recommended that the Town undertake a corridor study for Riddell Road between Caledon Garafraxa Townline and Broadway. The purpose of this study will be to assess the long-term needs of the corridor in terms of capacity, intersection control and access arrangements (including restrictions). The potential for and need to provide signal progression on the corridor can also be explored. It is recommended the study be undertaken for four horizons: 5 years, 10 years, 15 years and 20 years.

Additionally, corridor study will help the Town refine the longer-term corridor improvement plan by expanding on the analyses and recommendations contained herein.

9.2 Signal Timing Review

It is recommended the Town undertake regular reviews of the signal timing and phasing plans and resulting intersection operations. These reviews will assist the Town in mitigating capacity and safety issues before intersection operations deteriorate to unacceptable levels or collisions increase. Retention of all data will also enable the Town to easily compare the impacts of any refined timing or phasing plans. As well, the data can be used for future in-house intersection analyses.

9.3 Collision Database

As with most smaller municipalities in Ontario, the availability of recent (within the past five years) detailed collision data is scarce to non-existent in Orangeville. However, this data is an important tool to help determine where mitigation may be required.

It is recommended the Town create an account with the Ministry of Transportation Ontario (MTO) to request collision records and start a collision database. Records should be requested on a yearly basis to minimize the effort required to input the data. Note that the data will be provided in a multi-layer single collision file that will require manipulation before it can be analyzed. Given this, it is further recommended that the Town consult with other municipalities within Ontario to consider approaching MTO to request the data is provided in a ready-to-analyze format.

10 Conclusions and Recommendations

10.1 Conclusions

Additional capacity will be required at the Riddell Road intersections with Alder Street and Centennial Road/Spencer Avenue upon reaching the 2031 forecast traffic volumes. Several remedial measures have been identified for each intersection including provision of additional capacity through additional lanes and/or lane re-assignment or changes in traffic control.

The remedial measures selected for implementation at each intersection and the timing of these improvements are interconnected where the shorter term improvements are dependent upon the longer-term improvement plan.

10.2 Recommendations

It is recommended the Town consider the costs and benefits of each identified improvement and carry out required consultation with County staff. It is also recommended the Town consider conducting a Riddell Road corridor study to identify any longer-term (+2031) roadway capacity needs. These will help the Town develop the preferred improvement plan which will address the identified corridor issues, provide the required future capacity and assist in preparing future Capital Budget forecasts.

Note that regardless of the timing of improvements, the remedial measure of protected left-turn phasing at Riddell Road and Centennial Road/Spencer Avenue should be implemented in the immediate term to conform to Transportation Association of Canada *Geometric Design Guide for Canadian Roads* (2017) guidance.

Appendix A

Collision Data

2014 - RIDDELL AND ALDER

	Occ #	Dom	Type	Time	Score	Notes
1)	OV14001991	OrgVl	Motor vehicle collision	2014-02-20 9:04		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 2/20/2014 12:52:39 - Reportable / Event comments: ORANGEVILLE 14 WL2 90 LAT:43 54 12.859N LONG:080 07 35.319W UNC:14 CONF:90 (51 /
2)	OV14002341	OrgVl	Motor vehicle collision	2014-02-28 7:40		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 2/28/2014 08:37:50 - Reportable / Event comments: 2 VEHICLE MVC PI / JUST SOUTH OF ALDER ON RIDDELL / New equipment list for Unit [67] :
3)	OV14002344	OrgVl	Motor vehicle collision	2014-02-28 8:20		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 2/28/2014 10:04:56 - Reportable / Event comments: CRUISER 104 HAS BEEN INVOLVED IN ACCIDENT / SHUTTING DOWN S/B RIDDELL RD / PC M
4)	OV14004397	OrgVl	Motor vehicle collision	2014-04-15 19:36		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, ORANGEVILLE CROMS Incident (501836581) / ---------- / 4/15/2014 20:17:15 - Reportable / Event comments: 2 VEH MVC PD - VEH KIA / NO INJ / AMB DISP , FIRE DISP / REQ 2 TOWS / RON COLE / ROYAI
5)	OV14005329	OrgVl	Motor vehicle collision	2014-05-02 6:08		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) CROMS Incident (501843976) / ---------- / 5/2/2014 14:03:22 - Reportable / Event comments: NEW INFORMATION / / ---------- / Closing comm
6)	OV14005954	OrgVl	Motor vehicle collision	2014-05-15 8:06		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) CROMS Incident (501848870) / ---------- / 5/15/2014 08:54:24 - Reportable / Event comments: WL2 (51 CENTINIAL DR, ORANGEVILLE, 3026104
7)	OV14007649	OrgVl	Motor vehicle collision	2014-06-19 17:30		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) CROMS Incident (501861046) / ---------- / 6/19/2014 19:18:07 - Reportable / Event comments: 3 VEH MVC / REQUEST 2 TOW TRUCK / REQUES
8)	OV14009123	OrgVl	Motor vehicle collision	2014-07-19 18:49		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) CROMS Incident (501871559) / ---------- / 7/19/2014 19:48:23 - Reportable / Event comments: "RIDDELL RD/ALDER ST ORA" at: 2014/07/19 19
9)	OV14010783	OrgVl	Motor vehicle collision	2014-08-27 20:12		Complete - solved (non-criminal) - CROMS Incident (501888686) / ---------- / 8/27/2014 20:48:02 - Reportable / Event comments: WL2 (BROADWAY AVE/2ND LINE,513090 2ND LINE, AMARANTH TWP) OMNI ROGERS WIRELESS / Duplicate Event:Location = RIDDELL
10)	OV14011115	OrgVl	Motor vehicle collision	2014-09-04 8:52		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) CROMS Incident (501888703) / ---------- / 9/4/2014 09:47:38 - Reportable / Event comments: 2 VEH - PULLED OVER / ON RIDDELL N OF ALDERC
11)	OV14013820	OrgVl	Motor vehicle collision	2014-11-07 17:53		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 11/7/2014 19:01:06 - Reportable / Event comments: LIC# AXLT564 / OTHER VEHICLE / LIC#AVJH646 / 115/4/w/2300 / New equipment list for Un

2015 RIDDELL AND ALDER

	Occ #	Dom	Type	Time	Score	Notes
1)	OV15001885	OrgVl	Motor vehicle collision	2015-02-20 11:26		Hist - Complete - unsolved - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 2/20/2015 12:31:56 - Reportable / Event comments: SUSPECT VEH H
2)	OV15002893	OrgVl	Motor vehicle collision	2015-03-16 15:14		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 3/16/2015 16:24:27 - Reportable / Event c
3)	OV15003113	OrgVl	Motor vehicle collision	2015-03-21 17:06		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 3/21/2015 17:44:38 - Reportable / Event c
4)	OV15004874	OrgVl	Motor vehicle collision	2015-04-25 17:23		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 4/25/2015 18:20:03 - Reportable / Event c
5)	OV15006775	OrgVl	Motor vehicle collision	2015-06-02 19:13		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 6/2/2015 20:47:56 - Reportable / Event comments: 1 VEH INV
6)	OV15010622	OrgVl	Motor vehicle collision	2015-08-14 16:18		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 8/14/2015 16:25:26 - Non-reportable / Event comments: SOU
7)	OV15012818	OrgVl	Motor vehicle collision	2015-10-02 16:41		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 10/2/2015 17:18:40 - Reportable / Event comments: JUST NO
8)	OV15014926	OrgVl	Impaired/over 80	2015-11-21 17:35		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 11/21/2015 19:59:47 - Reportable / Event
9)	OV15015434	OrgVl	Motor vehicle collision	2015-12-03 20:47		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 12/3/2015 21:30:20 - Reportable / Event c

2016 RIDDELL AND ALDER

	Occ #	Dom	Type	Time	Score	Notes
1)	OV16004000	OrgVl	Motor vehicle collision	2016-03-20 16:33		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, ORANGEVILLE ON Canada (Beat: O, ESZ: 81417) 3/20/2016 17:21:18 - Reportable / Event comments: MVC PD ONLY / / --
2)	OV16009709	OrgVl	Motor vehicle collision	2016-06-19 18:02		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 6/19/2016 18:45:47 - Reportable / Event comments: MVC-PD
3)	OV16011358	OrgVl	Motor vehicle collision	2016-07-18 14:08		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 7/18/2016 17:11:51 - Reportable / Event c
4)	OV16013931	OrgVl	Motor vehicle collision	2016-08-31 15:40		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 9/1/2016 06:25:57 - Reportable / Event co
5)	OV16019047	OrgVl	Motor vehicle collision	2016-12-15 15:09		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, TOWN OF ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 12/15/2016 15:57:22 - Reportable / Event comments: 2 VEHS

2017 RIDDELL AND ALDER

	Occ #	Dom	Type	Time	Score	Notes
1)	OV17003543	OrgVl	Motor vehicle collision	##############		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, ORANGEVILLE ON Canada (Beat: O, ESZ: 81417) 3/20/2017 17:00:51 - Reportable / Event comments:
2)	OV17009539	OrgVl	Motor vehicle collision	##############		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 7/15/2017 18:22:31 - Reportable / Event comments: WAS REAR
3)	OV17013546	OrgVl	Motor vehicle collision	##############		Cleared by charge (includes charges recommended) - 9/29/2017 16:03:19 - Reportable / Event comments: COMPL PLATE: BXNF860 / OTHER: BPND854 / REQUEST NEXT TRUCK ON TH
4)	OV17008898	OrgVl	Motor vehicle collision	##############		Cleared by charge (includes charges recommended) - ALDER ST and RIDDELL RD, ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 7/3/2017 17:49:05 - Reportable / Event comments: 2
5)	OV17013546	OrgVl	Motor vehicle collision	##############		Cleared by charge (includes charges recommended) - 9/29/2017 16:03:19 - Reportable / Event comments: COMPL PLATE: BXNF860 / OTHER: BPND854 / REQUEST NEXT TRUCK ON TH
6)	OV17013548	OrgVl	Motor vehicle collision	##############		Cleared by charge (includes charges recommended) - ALDER ST and RIDDELL RD, ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 9/29/2017 15:53:25 - Reportable / Event comments:

2018 RIDDELL AND ALDER

	Occ #	Dom	Type	Time	Score	Notes
1)	OV18002296	OrgVl	Motor vehicle collision	2018-02-26 7:22		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 2/26/2018 08:58:31 - Non-reportable / Event comments: SPECIAL ADDRESS COMMENT: / ***IF SECURI
2)	OV18002665	OrgVl	Motor vehicle collision	###############		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 3/4/2018 17:41:55 - Non-reportable / Event comments: AT RED LIGHT - GOT REAR ENDED / HONDA CIV
3)	OV18005924	OrgVl	Motor vehicle collision	###############		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 5/7/2018 19:13:41 - Reportable / Event comments: ALDER X RIDDELL MVC PD OCCURED AT 1230 HRS / REAR ENDED - OTH
4)	OV18007084	OrgVl	Motor vehicle collision	###############		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 5/28/2018 19:03:02 - Reportable / Event comments: 2 VEHS PD ONLY / 102/P40 / VEHS MOVED INTO C
5)	OV18014085	OrgVl	Motor vehicle collision	###############		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 10/7/2018 15:25:59 - Reportable / Event comments: SPECIAL ADDRESS COMMENT: / WILD WING ALARM SUSPENSION ON
6)	OV18016477	OrgVl	Motor vehicle collision	2018-11-26 8:12		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 11/26/2018 09:41:59 - Reportable / Event comments: 2 VEH / EMS ON SCENE / REQUEST 2 TOWS TO T

2019 ALDER AND RIDDELL

	Occ #	Dom	Type	Time	Score	Notes
1)	OV19002613	OrgVl	Motor vehicle collision	2019-03-07 7:25		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 3/7/2019 08:49:36 - Non-reportable / Event comments
2)	OV19008020	OrgVl	Motor vehicle collision	###############		Complete - solved (non-criminal) - ALDER ST and RIDDELL RD, ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 6/21/2019 18:49:17 - Non-reportable / Event comments: 2 VEH MVC / ON SIDE O
3)	OV19002613	OrgVl	Motor vehicle collision	2019-03-07 7:25		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 3/7/2019 08:49:36 - Non-reportable / Event comments
4)	OV19003679	OrgVl	Motor vehicle collision	###############		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 3/27/2019 22:46:40 - Reportable / Event comments: 2
5)	OV19009323	OrgVl	Motor vehicle collision	###############		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 7/18/2019 15:27:01 - Non-reportable / Event commen
6)	OV19013199	OrgVl	Motor vehicle collision	2019-10-09 9:07		Cleared by charge (includes charges recommended) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 10/9/2019 12:00:05 - Reportable / Event comments: M

2020 ALDER AND RIDDELL

	Occ #	Dom	Type	Time	Score	Notes
1)	OV20001435	OrgVl	Motor vehicle collision	2020-02-10 9:04		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 2/10/2020 10:15:03 - Reportable / Event comments: 2 VEH MVC / NO EMS / NOT BLOCKING TRAFFIC / EAST OF INTERSECTION / CHILD IN CAR / COMP SAID NO EMS- NO INJURIES / OFFICERS 10-6 / COMP GOING TO COME TO STN / SGT FRY TAKING / / ---------- / Closing
2)	OV20001768	OrgVl	Motor vehicle collision	2020-02-20 7:41		Cleared by charge (includes charges recommended) - ALDER ST and RIDDELL RD, ORANGEVILLE ON Canada (Beat: O, ESZ: 81400) 2/20/2020 09:44:29 - Reportable / Event comments: MVC / UNKNOWN INJURIES / TWO VEHICLES / ONE CAR BLOCKING ROAD / SGT DRYDEN WILL TAKE CALL / OTHER DRIVER IS BLEEDING AT HEAD, REQ AMBULANCE / Tracking device C110/GPS Device/Defau
3)	OV20004601	OrgVl	Motor vehicle collision	############		Complete - solved (non-criminal) - RIDDELL RD and ALDER ST, ORANGEVILLE ON (ORANGEVILLE) (Beat: O, ESZ: 81400) 5/22/2020 11:04:31 - Reportable / Event comments: 2 VEHICLES- NO INJURIES / CRV -LIC# CFDJ105DUMP TRUCK: AT95248 / OFF THE SIDE OF ROAD / / ---------- / Closing comments: PON issued for Careless Driving. See report. SC113

2017 RIDDELL AND SPENCER

	Occ #	Dom	Type	Time	Score	Notes
1)	OV17000337	OrgVl	Motor vehicle collision	############		Complete - solved (non-criminal) - RIDDELL and SPENCER ST, ORANGEVILLE ON Canada (ESZ: 1) 1/9/2017 15:20:09 - Reportable / Event comments: MALE TRAPPED / 116/P4 / RECON

	Occ #	Dom	Type	Time	Score	Notes
1)	OV18007089	OrgVl	Motor vehicle collision	###############		Cleared by charge (includes charges recommended) - RIDDELL and SPENCER ST, ORANGEVILLE ON Canada (ESZ: 1) 5/28/2018 21:57:17 - Reportable / Event comments: 2 VEHS PD ONLY / S/W C
2)	OV18016742	OrgVl	Motor vehicle collision	###############		Complete - solved (non-criminal) - RIDDELL and SPENCER ST, ORANGEVILLE ON Canada (ESZ: 1) 12/2/2018 02:18:48 - Reportable / Event comments: RIDDELL/SPENCER - VEH VS PEDESTRIAN / 1

2019 RIDDELL AND CENTENNIAL

	Occ #	Dom	Type	Time	Score	Notes
1)	OV19002542	OrgVl	Motor vehicle collision	##############		Cleared by charge (includes charges recommended) - SPENCER AV and RIDDELL RD, ORANGEVILLE ON Canada 3/5/2019 16:56:18 - Reportable / Event comments: RIDDELL/SPENCER / WRONG SIDE OF ROAD - UP ON THE SNOW BANK / N SD OF SPENCER
2)	OV19002792	OrgVl	Motor vehicle collision	##############		Cleared by charge (includes charges recommended) - CENTENNIAL RD and RIDDELL RD, ORANGEVILLE ON (Beat: O, ESZ: 81400) 3/11/2019 17:29:27 - Reportable / Event comments: FML PARTY REAR ENDED A CAR THEN BUMPED INTO THE NEXT / THEY A
3)	OV19005059	OrgVl	Motor vehicle collision	2019-04-24 9:36		Complete - solved (non-criminal) - CENTENNIAL RD and RIDDELL RD, ORANGEVILLE ON (Beat: O, ESZ: 81400) 4/24/2019 10:03:33 - Non-reportable / Event comments: 2 VEH / IN PARKING LOT FO TIMS NOW / GREEN PICK UP TRUCK AND 2001 ACURA BL
4)	OV19008028	OrgVl	Motor vehicle collision	##############		Complete - solved (non-criminal) - CENTENNIAL RD and RIDDELL RD, ORANGEVILLE ON (Beat: O, ESZ: 81400) 6/21/2019 20:00:17 - Reportable / Event comments: INADVERTENTLY CLOSED / / ---------- / Closing comments: VENASSE - SEE MVC REPORT /

Appendix B

TAC Speed Limit Assessment Forms

Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version: 10-Apr-09

Name of Corridor:	Riddell Road				
Segment Evaluated:	Alder Street	to	Montgomery Road		
Geographic Region:	Orangeville, Ontario				
Road Agency:	Town of Orangeville				
Road Classification:	Arterial	Length of Corridor:	900	m	
Urban / Rural:	Rural	Design Speed: (Required for Freeway, Expressway, Highway)		km/h	
Divided / Undivided:	Undivided	Current Posted Speed: (For information only)	70	km/h	
Major / Minor:	Major	Prevailing Speed: (85th Percentile - for information only)		km/h	
# Through Lanes Per Direction:	1 lane	Policy: (Maximum Posted Speed)			

		RISK	Score
A1	**GEOMETRY (Horizontal)**	Lower	2
A2	**GEOMETRY (Vertical)**	Lower	2
A3	**AVERAGE LANE WIDTH**	Lower	2
B	**ROADSIDE HAZARDS**	Lower	1
C1	**PEDESTRIAN EXPOSURE**	Lower	3
C2	**CYCLIST EXPOSURE**	Medium	6
D	**PAVEMENT SURFACE**	Lower	1
E1	**NUMBER OF INTERSECTIONS WITH PUBLIC ROADS**	*Number of Occurrences*	12
	STOP controlled intersection	0	
	Signalized intersection	2	
	Roundabout or traffic circle	0	
	Crosswalk	0	
	Active, at-grade railroad crossing	0	
	Sidestreet STOP-controlled or lane	1	
E2	**NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS**	*Number of Occurrences*	0
	Left turn movements permitted	0	
	Right-in / Right-out only	0	
E3	**NUMBER OF INTERCHANGES**	*Number of Occurrences*	0
	Number of interchanges along corridor	0	
F	**ON-STREET PARKING**	N/A	0

Total Risk Score:

29

Recommended Posted Speed Limit (km/h):

As determined by road characteristics

80

As determined by policy

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version: 10-Apr-09

Name of Corridor:	Riddell Road				
Segment Evaluated:	Centennial Road/Spencer Avenue	to	Alder Street		
Geographic Region:	Orangeville, Ontario				
Road Agency:	Town of Orangeville				
Road Classification:	Arterial	Length of Corridor:	500	m	
Urban / Rural:	Urban	Design Speed: (Required for Freeway, Expressway, Highway)		km/h	
Divided / Undivided:	Undivided	Current Posted Speed: (For information only)	70	km/h	
Major / Minor:	Major	Prevailing Speed: (85th Percentile - for information only)		km/h	
# Through Lanes Per Direction:	1 lane	Policy: (Maximum Posted Speed)			

		RISK	Score
A1	GEOMETRY (Horizontal)	Lower	2
A2	GEOMETRY (Vertical)	Lower	2
A3	AVERAGE LANE WIDTH	Lower	2
B	ROADSIDE HAZARDS	Lower	1
C1	PEDESTRIAN EXPOSURE	Lower	3
C2	CYCLIST EXPOSURE	Medium	6
D	PAVEMENT SURFACE	Lower	1
E1	NUMBER OF INTERSECTIONS WITH PUBLIC ROADS	*Number of Occurrences*	20
	STOP controlled intersection	0	
	Signalized intersection	2	
	Roundabout or traffic circle	0	
	Crosswalk	0	
	Active, at-grade railroad crossing	0	
	Sidestreet STOP-controlled or lane	0	
E2	NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS	*Number of Occurrences*	4
	Left turn movements permitted	1	
	Right-in / Right-out only	0	
E3	NUMBER OF INTERCHANGES	*Number of Occurrences*	0
	Number of interchanges along corridor	0	
F	ON-STREET PARKING	N/A	0

Total Risk Score:

29

Recommended Posted Speed Limit (km/h):

As determined by road characteristics

80

As determined by policy

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version: 10-Apr-09

Name of Corridor:	Riddell Road		
Segment Evaluated:	Richardson Road	to	Centennial Road/Spencer Avenue
Geographic Region:	Orangeville, Ontario		
Road Agency:	Town of Orangeville		

Road Classification:	Arterial	Length of Corridor:	500	m
Urban / Rural:	Rural	Design Speed: (Required for Freeway, Expressway, Highway)		km/h
Divided / Undivided:	Undivided	Current Posted Speed: (For information only)	70	km/h
Major / Minor:	Major	Prevailing Speed: (85th Percentile - for information only)		km/h
# Through Lanes Per Direction:	1 lane	Policy: (Maximum Posted Speed)		

		RISK	Score
A1	GEOMETRY (Horizontal)	Lower	2
A2	GEOMETRY (Vertical)	Lower	2
A3	AVERAGE LANE WIDTH	Lower	2
B	ROADSIDE HAZARDS	Lower	1
C1	PEDESTRIAN EXPOSURE	Lower	3
C2	CYCLIST EXPOSURE	Medium	6
D	PAVEMENT SURFACE	Lower	1
E1	NUMBER OF INTERSECTIONS WITH PUBLIC ROADS	*Number of Occurrences*	20
	STOP controlled intersection	0	
	Signalized intersection	2	
	Roundabout or traffic circle	0	
	Crosswalk	0	
	Active, at-grade railroad crossing	0	
	Sidestreet STOP-controlled or lane	0	
E2	NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS	*Number of Occurrences*	15
	Left turn movements permitted	4	
	Right-in / Right-out only	0	
E3	NUMBER OF INTERCHANGES	*Number of Occurrences*	0
	Number of interchanges along corridor	0	
F	ON-STREET PARKING	N/A	0

Total Risk Score:

29

Recommended Posted Speed Limit (km/h):

As determined by road characteristics

80

As determined by policy

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version: 10-Apr-09

Name of Corridor:	Alder Street				
Segment Evaluated:	B Line	to	Riddell Road		
Geographic Region:	Orangeville, Ontario				
Road Agency:	Orangeville, Ontario				
Road Classification:	Collector	Length of Corridor:	718	m	
Urban / Rural:	Urban	Design Speed: (Required for Freeway, Expressway, Highway)		km/h	
Divided / Undivided:	Undivided	Current Posted Speed: (For information only)	40	km/h	
Major / Minor:	Minor	Prevailing Speed: (85th Percentile - for information only)		km/h	
# Through Lanes Per Direction:	1 lane	Policy: (Maximum Posted Speed)			

		RISK	Score
A1	GEOMETRY (Horizontal)	Medium	2
A2	GEOMETRY (Vertical)	Lower	1
A3	AVERAGE LANE WIDTH	Medium	4
B	ROADSIDE HAZARDS	Medium	2
C1	PEDESTRIAN EXPOSURE	Lower	3
C2	CYCLIST EXPOSURE	Higher	9
D	PAVEMENT SURFACE	Lower	1
E1	NUMBER OF INTERSECTIONS WITH PUBLIC ROADS	*Number of Occurrences*	14
	STOP controlled intersection	1	
	Signalized intersection	1	
	Roundabout or traffic circle	0	
	Crosswalk	0	
	Active, at-grade railroad crossing	0	
	Sidestreet STOP-controlled or lane	5	
E2	NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS	*Number of Occurrences*	10
	Left turn movements permitted	14	
	Right-in / Right-out only	0	
E3	NUMBER OF INTERCHANGES	*Number of Occurrences*	0
	Number of interchanges along corridor	0	
F	ON-STREET PARKING	Medium	6

Total Risk Score:

52

Recommended Posted Speed Limit (km/h):

As determined by road characteristics

40

As determined by policy

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version: 10-Apr-09

Name of Corridor:	Alder Street				
Segment Evaluated:	Riddell Road	to	C Line		
Geographic Region:	Orangeville, Ontario				
Road Agency:	Orangeville, Ontario				
Road Classification:	Collector	Length of Corridor:	650	m	
Urban / Rural:	Urban	Design Speed: (Required for Freeway, Expressway, Highway)		km/h	
Divided / Undivided:	Undivided	Current Posted Speed: (For information only)	40	km/h	
Major / Minor:	Minor	Prevailing Speed: (85th Percentile - for information only)		km/h	
# Through Lanes Per Direction:	1 lane	Policy: (Maximum Posted Speed)			

		RISK	Score
A1	GEOMETRY (Horizontal)	Medium	2
A2	GEOMETRY (Vertical)	Lower	1
A3	AVERAGE LANE WIDTH	Medium	4
B	ROADSIDE HAZARDS	Lower	1
C1	PEDESTRIAN EXPOSURE	Lower	3
C2	CYCLIST EXPOSURE	Medium	6
D	PAVEMENT SURFACE	Lower	1
E1	NUMBER OF INTERSECTIONS WITH PUBLIC ROADS	*Number of Occurrences*	14
	STOP controlled intersection	0	
	Signalized intersection	2	
	Roundabout or traffic circle	0	
	Crosswalk	0	
	Active, at-grade railroad crossing	0	
	Sidestreet STOP-controlled or lane	4	
E2	NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS	*Number of Occurrences*	8
	Left turn movements permitted	10	
	Right-in / Right-out only	0	
E3	NUMBER OF INTERCHANGES	*Number of Occurrences*	0
	Number of interchanges along corridor	0	
F	ON-STREET PARKING	Lower	3

Total Risk Score:

43

Recommended Posted Speed Limit (km/h):

As determined by road characteristics

50

As determined by policy

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version: 10-Apr-09

Name of Corridor:	Centennial Road				
Segment Evaluated:	Riddell Road	to	C Line		
Geographic Region:	Orangeville, Ontario				
Road Agency:					
Road Classification:	Collector	Length of Corridor:	500	m	
Urban / Rural:	Urban	Design Speed: (Required for Freeway, Expressway, Highway)		km/h	
Divided / Undivided:	Undivided	Current Posted Speed: (For information only)	50	km/h	
Major / Minor:	Minor	Prevailing Speed: (85th Percentile - for information only)		km/h	
# Through Lanes Per Direction:	1 lane	Policy: (Maximum Posted Speed)			

		RISK	Score
A1	GEOMETRY (Horizontal)	Lower	1
A2	GEOMETRY (Vertical)	Lower	1
A3	AVERAGE LANE WIDTH	Lower	2
B	ROADSIDE HAZARDS	Higher	3
C1	PEDESTRIAN EXPOSURE	Lower	3
C2	CYCLIST EXPOSURE	Lower	3
D	PAVEMENT SURFACE	Lower	1
E1	NUMBER OF INTERSECTIONS WITH PUBLIC ROADS	*Number of Occurrences*	14
	STOP controlled intersection	0	
	Signalized intersection	2	
	Roundabout or traffic circle	0	
	Crosswalk	0	
	Active, at-grade railroad crossing	0	
	Sidestreet STOP-controlled or lane	0	
E2	NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS	*Number of Occurrences*	4
	Left turn movements permitted	3	
	Right-in / Right-out only	2	
E3	NUMBER OF INTERCHANGES	*Number of Occurrences*	0
	Number of interchanges along corridor	0	
F	ON-STREET PARKING	N/A	0

Total Risk Score:

33

Recommended Posted Speed Limit (km/h):

As determined by road characteristics

60

As determined by policy

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version: 10-Apr-09

Name of Corridor:	Spencer Avenue				
Segment Evaluated:	Riddell Road	to	Buckingham Street		
Geographic Region:	Orangeville, Ontario				
Road Agency:					
Road Classification:	Collector	Length of Corridor:	500	m	
Urban / Rural:	Urban	Design Speed: (Required for Freeway, Expressway, Highway)		km/h	
Divided / Undivided:	Undivided	Current Posted Speed: (For information only)	40	km/h	
Major / Minor:	Major	Prevailing Speed: (85th Percentile - for information only)		km/h	
# Through Lanes Per Direction:	1 lane	Policy: (Maximum Posted Speed)			

		RISK	Score
A1	**GEOMETRY (Horizontal)**	Medium	2
A2	**GEOMETRY (Vertical)**	Lower	1
A3	**AVERAGE LANE WIDTH**	Medium	4
B	**ROADSIDE HAZARDS**	Lower	1
C1	**PEDESTRIAN EXPOSURE**	Lower	3
C2	**CYCLIST EXPOSURE**	Medium	6
D	**PAVEMENT SURFACE**	Lower	1
E1	**NUMBER OF INTERSECTIONS WITH PUBLIC ROADS**	*Number of Occurrences*	11
	STOP controlled intersection	0	
	Signalized intersection	1	
	Roundabout or traffic circle	0	
	Crosswalk	0	
	Active, at-grade railroad crossing	0	
	Sidestreet STOP-controlled or lane	4	
E2	**NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS**	*Number of Occurrences*	15
	Left turn movements permitted	32	
	Right-in / Right-out only	0	
E3	**NUMBER OF INTERCHANGES**	*Number of Occurrences*	0
	Number of interchanges along corridor	0	
F	**ON-STREET PARKING**	N/A	0

Total Risk Score:

44

Recommended Posted Speed Limit (km/h):

As determined by road characteristics

50

As determined by policy

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

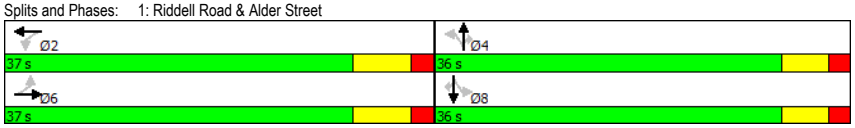
Appendix C

2020 Traffic Operations Reports

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	14	155	124	56	23	278	135	97	477	14
Future Volume (vph)	14	155	124	56	23	278	135	97	477	14
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		2		4			8	
Permitted Phases	6		2		4		4	8		8
Detector Phase	6	6	2	2	4	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	8.0	8.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	31.0	31.0	31.0	31.0	36.0	36.0	36.0	36.0	36.0	36.0
Total Split (s)	37.0	37.0	37.0	37.0	36.0	36.0	36.0	36.0	36.0	36.0
Total Split (%)	50.7%	50.7%	50.7%	50.7%	49.3%	49.3%	49.3%	49.3%	49.3%	49.3%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	30.1	30.1	30.1	30.1	27.4	27.4	27.4	27.4	27.4	27.4
Actuated g/C Ratio	0.43	0.43	0.43	0.43	0.39	0.39	0.39	0.39	0.39	0.39
v/c Ratio	0.03	0.31	0.33	0.16	0.21	0.57	0.23	0.36	0.91	0.03
Control Delay	13.1	14.5	17.0	9.3	18.7	21.2	3.5	18.9	40.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.1	14.5	17.0	9.3	18.7	21.2	3.5	18.9	40.7	0.1
LOS	B	B	B	A	B	C	A	B	D	A
Approach Delay		14.4		13.7		15.5			36.2	
Approach LOS		B		B		B			D	

Intersection Summary		
Cycle Length: 73		
Actuated Cycle Length: 70.5		
Natural Cycle: 70		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.91		
Intersection Signal Delay: 23.5	Intersection LOS: C	
Intersection Capacity Utilization 82.0%	ICU Level of Service D	
Analysis Period (min) 15		

Splits and Phases: 1: Riddell Road & Alder Street



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	17	230	151	114	28	339	165	118	582	17
v/c Ratio	0.03	0.31	0.33	0.16	0.21	0.57	0.23	0.36	0.91	0.03
Control Delay	13.1	14.5	17.0	9.3	18.7	21.2	3.5	18.9	40.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.1	14.5	17.0	9.3	18.7	21.2	3.5	18.9	40.7	0.1
Queue Length 50th (m)	1.4	20.0	14.4	5.8	2.5	35.8	0.0	11.3	73.9	0.0
Queue Length 95th (m)	4.5	31.9	25.4	13.4	7.6	52.9	8.0	21.5	#112.5	0.0
Internal Link Dist (m)		197.3		149.7		592.2			140.4	
Turn Bay Length (m)	25.0		25.0		95.0		35.0	110.0		40.0
Base Capacity (vph)	554	731	460	733	147	653	769	356	704	658
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.31	0.33	0.16	0.19	0.52	0.21	0.33	0.83	0.03

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	155	34	124	56	38	23	278	135	97	477	14
Future Volume (vph)	14	155	34	124	56	38	23	278	135	97	477	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.94	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1693		1671	1658		1582	1532	1583	1671	1652	1462
Flt Permitted	0.68	1.00		0.62	1.00		0.21	1.00	1.00	0.48	1.00	1.00
Satd. Flow (perm)	1299	1693		1082	1658		346	1532	1583	837	1652	1462
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	17	189	41	151	68	46	28	339	165	118	582	17
RTOR Reduction (vph)	0	10	0	0	26	0	0	0	101	0	0	10
Lane Group Flow (vph)	17	220	0	151	88	0	28	339	64	118	582	7
Confl. Peds. (#/hr)			52	52			2					2
Heavy Vehicles (%)	0%	9%	0%	2%	2%	16%	14%	24%	2%	8%	15%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4		4	8		8
Actuated Green, G (s)	30.1	30.1		30.1	30.1		27.4	27.4	27.4	27.4	27.4	27.4
Effective Green, g (s)	30.1	30.1		30.1	30.1		27.4	27.4	27.4	27.4	27.4	27.4
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.39	0.39	0.39	0.39	0.39	0.39
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2		0.2	0.2		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	554	722		461	707		134	595	615	325	642	568
v/s Ratio Prot		0.13			0.05			0.22			c0.35	
v/s Ratio Perm	0.01			c0.14			0.08		0.04	0.14		0.00
v/c Ratio	0.03	0.30		0.33	0.12		0.21	0.57	0.10	0.36	0.91	0.01
Uniform Delay, d1	11.7	13.3		13.5	12.2		14.3	16.9	13.7	15.3	20.3	13.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	1.1		1.9	0.4		0.8	1.3	0.1	0.7	16.4	0.0
Delay (s)	11.8	14.4		15.3	12.6		15.1	18.2	13.8	16.0	36.8	13.2
Level of Service	B	B		B	B		B	B	B	B	D	B
Approach Delay (s)		14.2			14.2			16.7			32.8	
Approach LOS		B			B			B			C	

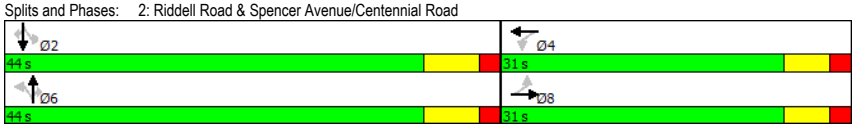
Intersection Summary				
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	70.5	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	82.0%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	58	150	111	78	50	258	74	157	437	6
Future Volume (vph)	58	150	111	78	50	258	74	157	437	6
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		8		4		6			2	
Permitted Phases	8		4		6		6	2		2
Detector Phase	8	8	4	4	6	6	6	2	2	2
Switch Phase										
Minimum Initial (s)	15.0	15.0	15.0	15.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	31.0	31.0	31.0	31.0	44.0	44.0	44.0	44.0	44.0	44.0
Total Split (s)	31.0	31.0	31.0	31.0	44.0	44.0	44.0	44.0	44.0	44.0
Total Split (%)	41.3%	41.3%	41.3%	41.3%	58.7%	58.7%	58.7%	58.7%	58.7%	58.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	15.9	15.9	15.9	15.9	37.0	37.0	37.0	37.0	37.0	37.0
Actuated g/C Ratio	0.24	0.24	0.24	0.24	0.56	0.56	0.56	0.56	0.56	0.56
v/c Ratio	0.20	0.53	0.50	0.31	0.11	0.31	0.10	0.27	0.49	0.01
Control Delay	21.8	22.9	30.0	15.3	7.9	9.2	2.5	9.4	11.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	22.9	30.0	15.3	7.9	9.2	2.5	9.4	11.4	0.0
LOS	C	C	C	B	A	A	A	A	B	A
Approach Delay		22.7		21.9		7.8			10.8	
Approach LOS		C		C		A			B	

Intersection Summary			
Cycle Length: 75			
Actuated Cycle Length: 65.9			
Natural Cycle: 75			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.53			
Intersection Signal Delay: 14.1		Intersection LOS: B	
Intersection Capacity Utilization 86.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Riddell Road & Spencer Avenue/Centennial Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	60	239	114	139	52	266	76	162	451	6
v/c Ratio	0.20	0.53	0.50	0.31	0.11	0.31	0.10	0.27	0.49	0.01
Control Delay	21.8	22.9	30.0	15.3	7.9	9.2	2.5	9.4	11.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	22.9	30.0	15.3	7.9	9.2	2.5	9.4	11.4	0.0
Queue Length 50th (m)	6.2	22.1	12.7	8.9	2.7	15.8	0.0	9.3	30.5	0.0
Queue Length 95th (m)	15.1	42.0	27.3	22.0	8.4	33.4	5.4	22.6	60.8	0.0
Internal Link Dist (m)		130.7		209.9		212.7			592.2	
Turn Bay Length (m)	50.0		40.0		105.0		60.0	165.0		160.0
Base Capacity (vph)	472	686	361	667	488	847	759	593	912	687
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.35	0.32	0.21	0.11	0.31	0.10	0.27	0.49	0.01

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	150	81	111	78	57	50	258	74	157	437	6
Future Volume (vph)	58	150	81	111	78	57	50	258	74	157	437	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1746		1661	1672		1768	1508	1292	1687	1624	1188
Flt Permitted	0.67	1.00		0.55	1.00		0.47	1.00	1.00	0.60	1.00	1.00
Satd. Flow (perm)	1245	1746		955	1672		868	1508	1292	1057	1624	1188
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	60	155	84	114	80	59	52	266	76	162	451	6
RTOR Reduction (vph)	0	30	0	0	40	0	0	0	33	0	0	3
Lane Group Flow (vph)	60	209	0	114	99	0	52	266	43	162	451	3
Confl. Peds. (#/hr)			7	7			2					2
Heavy Vehicles (%)	2%	1%	4%	8%	3%	11%	2%	26%	25%	7%	17%	33%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6		6	2		2
Actuated Green, G (s)	15.8	15.8		15.8	15.8		37.0	37.0	37.0	37.0	37.0	37.0
Effective Green, g (s)	15.8	15.8		15.8	15.8		37.0	37.0	37.0	37.0	37.0	37.0
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.56	0.56	0.56	0.56	0.56	0.56
Clearance Time (s)	6.0	6.0		6.0	6.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	298	419		229	401		488	847	726	594	913	668
v/s Ratio Prot		c0.12			0.06			0.18			c0.28	
v/s Ratio Perm	0.05			0.12			0.06		0.03	0.15		0.00
v/c Ratio	0.20	0.50		0.50	0.25		0.11	0.31	0.06	0.27	0.49	0.01
Uniform Delay, d1	20.0	21.6		21.6	20.2		6.7	7.7	6.5	7.4	8.7	6.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.9		1.7	0.3		0.4	1.0	0.2	1.1	1.9	0.0
Delay (s)	20.3	22.5		23.3	20.5		7.1	8.6	6.7	8.6	10.6	6.3
Level of Service	C	C		C	C		A	A	A	A	B	A
Approach Delay (s)		22.1			21.8			8.1			10.1	
Approach LOS		C			C			A			B	

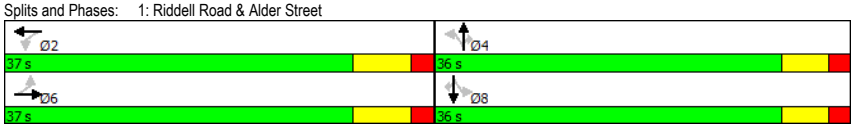
Intersection Summary					
HCM 2000 Control Delay	13.7	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.50				
Actuated Cycle Length (s)	65.8	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	86.4%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	16	58	129	98	75	588	181	35	369	27
Future Volume (vph)	16	58	129	98	75	588	181	35	369	27
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		2		4			8	
Permitted Phases	6		2		4		4	8		8
Detector Phase	6	6	2	2	4	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	8.0	8.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	31.0	31.0	31.0	31.0	36.0	36.0	36.0	36.0	36.0	36.0
Total Split (s)	37.0	37.0	37.0	37.0	36.0	36.0	36.0	36.0	36.0	36.0
Total Split (%)	50.7%	50.7%	50.7%	50.7%	49.3%	49.3%	49.3%	49.3%	49.3%	49.3%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	30.1	30.1	30.1	30.1	28.3	28.3	28.3	28.3	28.3	28.3
Actuated g/C Ratio	0.42	0.42	0.42	0.42	0.40	0.40	0.40	0.40	0.40	0.40
v/c Ratio	0.03	0.13	0.26	0.21	0.27	0.92	0.27	0.32	0.59	0.04
Control Delay	13.2	9.9	15.8	11.0	17.2	41.0	6.0	23.5	20.9	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	9.9	15.8	11.0	17.2	41.0	6.0	23.5	20.9	1.4
LOS	B	A	B	B	B	D	A	C	C	A
Approach Delay		10.4		13.2		31.4			20.0	
Approach LOS		B		B		C			B	

Intersection Summary		
Cycle Length: 73		
Actuated Cycle Length: 71.4		
Natural Cycle: 70		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.92		
Intersection Signal Delay: 24.0	Intersection LOS: C	
Intersection Capacity Utilization 75.1%	ICU Level of Service D	
Analysis Period (min) 15		

Splits and Phases: 1: Riddell Road & Alder Street



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	17	97	140	162	82	639	197	38	401	29
v/c Ratio	0.03	0.13	0.26	0.21	0.27	0.92	0.27	0.32	0.59	0.04
Control Delay	13.2	9.9	15.8	11.0	17.2	41.0	6.0	23.5	20.9	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	9.9	15.8	11.0	17.2	41.0	6.0	23.5	20.9	1.4
Queue Length 50th (m)	1.4	5.4	12.9	10.5	7.5	82.6	5.0	3.6	43.0	0.0
Queue Length 95th (m)	5.1	14.1	25.4	22.3	17.7	#146.3	17.1	12.0	69.9	1.9
Internal Link Dist (m)		197.3		149.7		592.2			140.4	
Turn Bay Length (m)	25.0		25.0		95.0		35.0	110.0		40.0
Base Capacity (vph)	522	768	544	768	326	740	760	126	726	699
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.13	0.26	0.21	0.25	0.86	0.26	0.30	0.55	0.04

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	58	31	129	98	51	75	588	181	35	369	27
Future Volume (vph)	16	58	31	129	98	51	75	588	181	35	369	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1781		1771	1767		1803	1759	1615	1805	1727	1579
Flt Permitted	0.65	1.00		0.69	1.00		0.41	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)	1243	1781		1294	1767		774	1759	1615	300	1727	1579
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	63	34	140	107	55	82	639	197	38	401	29
RTOR Reduction (vph)	0	20	0	0	25	0	0	0	84	0	0	18
Lane Group Flow (vph)	17	77	0	140	137	0	82	639	113	38	401	11
Confl. Peds. (#/hr)			7	7			2					2
Heavy Vehicles (%)	0%	0%	0%	1%	0%	6%	0%	8%	0%	0%	10%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4		4	8		8
Actuated Green, G (s)	30.1	30.1		30.1	30.1		28.3	28.3	28.3	28.3	28.3	28.3
Effective Green, g (s)	30.1	30.1		30.1	30.1		28.3	28.3	28.3	28.3	28.3	28.3
Actuated g/C Ratio	0.42	0.42		0.42	0.42		0.40	0.40	0.40	0.40	0.40	0.40
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2		0.2	0.2		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	524	750		545	744		306	697	640	118	684	625
v/s Ratio Prot		0.04			0.08			c0.36			0.23	
v/s Ratio Perm	0.01			c0.11			0.11		0.07	0.13		0.01
v/c Ratio	0.03	0.10		0.26	0.18		0.27	0.92	0.18	0.32	0.59	0.02
Uniform Delay, d1	12.1	12.5		13.4	13.0		14.6	20.4	14.0	14.9	16.9	13.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.3		1.1	0.5		0.5	16.8	0.1	1.6	1.3	0.0
Delay (s)	12.2	12.8		14.5	13.5		15.0	37.2	14.1	16.5	18.2	13.1
Level of Service	B	B		B	B		B	D	B	B	B	B
Approach Delay (s)		12.7			14.0			30.3			17.8	
Approach LOS		B			B			C			B	

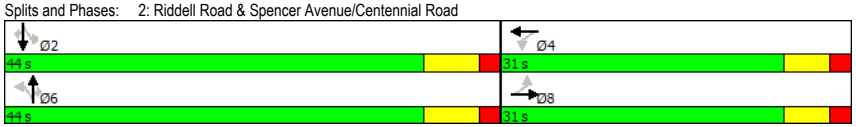
Intersection Summary				
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.58			
Actuated Cycle Length (s)	71.4	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	75.1%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	48	117	153	183	150	556	128	87	266	19
Future Volume (vph)	48	117	153	183	150	556	128	87	266	19
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		8		4		6			2	
Permitted Phases	8		4		6		6	2		2
Detector Phase	8	8	4	4	6	6	6	2	2	2
Switch Phase										
Minimum Initial (s)	15.0	15.0	15.0	15.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	31.0	31.0	31.0	31.0	44.0	44.0	44.0	44.0	44.0	44.0
Total Split (s)	31.0	31.0	31.0	31.0	44.0	44.0	44.0	44.0	44.0	44.0
Total Split (%)	41.3%	41.3%	41.3%	41.3%	58.7%	58.7%	58.7%	58.7%	58.7%	58.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	16.6	16.6	16.6	16.6	37.1	37.1	37.1	37.1	37.1	37.1
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.56	0.56	0.56	0.56	0.56	0.56
v/c Ratio	0.20	0.35	0.55	0.55	0.25	0.68	0.17	0.25	0.30	0.03
Control Delay	21.8	19.6	29.8	24.7	9.6	16.6	2.4	10.7	9.5	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	19.6	29.8	24.7	9.6	16.6	2.4	10.7	9.5	1.3
LOS	C	B	C	C	A	B	A	B	A	A
Approach Delay		20.1		26.7		13.2			9.4	
Approach LOS		C		C		B			A	

Intersection Summary			
Cycle Length: 75			
Actuated Cycle Length: 66.7			
Natural Cycle: 75			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 16.1		Intersection LOS: B	
Intersection Capacity Utilization 83.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Riddell Road & Spencer Avenue/Centennial Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	49	162	158	249	155	573	132	90	274	20
v/c Ratio	0.20	0.35	0.55	0.55	0.25	0.68	0.17	0.25	0.30	0.03
Control Delay	21.8	19.6	29.8	24.7	9.6	16.6	2.4	10.7	9.5	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	19.6	29.8	24.7	9.6	16.6	2.4	10.7	9.5	1.3
Queue Length 50th (m)	5.1	14.6	17.9	25.4	8.8	45.3	0.0	5.1	16.1	0.0
Queue Length 95th (m)	13.1	29.3	35.3	45.9	22.7	99.1	7.4	15.9	35.9	1.4
Internal Link Dist (m)		130.7		209.9		212.7			592.2	
Turn Bay Length (m)	50.0		40.0		105.0		60.0	165.0		160.0
Base Capacity (vph)	370	689	432	669	611	838	776	361	902	694
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.24	0.37	0.37	0.25	0.68	0.17	0.25	0.30	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	117	40	153	183	58	150	556	128	87	266	19
Future Volume (vph)	48	117	40	153	183	58	150	556	128	87	266	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1796		1671	1745		1770	1508	1292	1687	1624	1214
Flt Permitted	0.53	1.00		0.65	1.00		0.59	1.00	1.00	0.37	1.00	1.00
Satd. Flow (perm)	988	1796		1151	1745		1101	1508	1292	650	1624	1214
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	49	121	41	158	189	60	155	573	132	90	274	20
RTOR Reduction (vph)	0	18	0	0	17	0	0	0	59	0	0	9
Lane Group Flow (vph)	49	144	0	158	232	0	155	573	73	90	274	11
Heavy Vehicles (%)	2%	1%	4%	8%	3%	11%	2%	26%	25%	7%	17%	33%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6		6	2		2
Actuated Green, G (s)	16.6	16.6		16.6	16.6		37.1	37.1	37.1	37.1	37.1	37.1
Effective Green, g (s)	16.6	16.6		16.6	16.6		37.1	37.1	37.1	37.1	37.1	37.1
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.56	0.56	0.56	0.56	0.56	0.56
Clearance Time (s)	6.0	6.0		6.0	6.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	245	446		286	434		612	838	718	361	903	675
v/s Ratio Prot		0.08			0.13			c0.38			0.17	
v/s Ratio Perm	0.05			c0.14			0.14		0.06	0.14		0.01
v/c Ratio	0.20	0.32		0.55	0.53		0.25	0.68	0.10	0.25	0.30	0.02
Uniform Delay, d1	19.8	20.5		21.8	21.7		7.6	10.6	7.0	7.6	7.9	6.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.4		2.3	1.3		1.0	4.5	0.3	1.6	0.9	0.0
Delay (s)	20.2	20.9		24.1	23.0		8.6	15.1	7.2	9.3	8.8	6.7
Level of Service	C	C		C	C		A	B	A	A	A	A
Approach Delay (s)		20.7			23.4			12.7			8.8	
Approach LOS		C			C			B			A	

Intersection Summary				
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	66.7	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	83.3%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Appendix D

2031 Traffic Operations Reports

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	17	193	154	70	28	345	168	120	592	17
Future Volume (vph)	17	193	154	70	28	345	168	120	592	17
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		2		4			8	
Permitted Phases	6		2		4		4	8		8
Detector Phase	6	6	2	2	4	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	8.0	8.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	31.0	31.0	31.0	31.0	36.0	36.0	36.0	36.0	36.0	36.0
Total Split (s)	31.0	31.0	31.0	31.0	59.0	59.0	59.0	59.0	59.0	59.0
Total Split (%)	34.4%	34.4%	34.4%	34.4%	65.6%	65.6%	65.6%	65.6%	65.6%	65.6%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	24.5	24.5	24.5	24.5	37.1	37.1	37.1	37.1	37.1	37.1
Actuated g/C Ratio	0.33	0.33	0.33	0.33	0.50	0.50	0.50	0.50	0.50	0.50
v/c Ratio	0.05	0.51	0.63	0.25	0.22	0.55	0.23	0.38	0.88	0.03
Control Delay	22.6	26.3	36.7	18.1	13.4	15.5	2.0	14.0	29.8	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.6	26.3	36.7	18.1	13.4	15.5	2.0	14.0	29.8	0.7
LOS	C	C	D	B	B	B	A	B	C	A
Approach Delay		26.0		28.6		11.2			26.5	
Approach LOS		C		C		B			C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 74.9
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 22.1 — Intersection LOS: C
Intersection Capacity Utilization 89.7% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 1: Riddell Road & Alder Street

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	21	287	188	144	34	421	205	146	722	21
v/c Ratio	0.05	0.51	0.63	0.25	0.22	0.55	0.23	0.38	0.88	0.03
Control Delay	22.6	26.3	36.7	18.1	13.4	15.5	2.0	14.0	29.8	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.6	26.3	36.7	18.1	13.4	15.5	2.0	14.0	29.8	0.7
Queue Length 50th (m)	2.1	32.3	23.2	11.1	2.6	40.1	0.0	12.4	88.5	0.0
Queue Length 95th (m)	8.0	63.2	#56.7	27.6	7.2	54.3	6.2	21.6	112.8	0.6
Internal Link Dist (m)		197.3		149.7		592.2			140.4	
Turn Bay Length (m)	25.0		25.0		95.0		35.0	110.0		40.0
Base Capacity (vph)	413	559	300	567	227	1106	1200	560	1193	1068
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.51	0.63	0.25	0.15	0.38	0.17	0.26	0.61	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	193	43	154	70	48	28	345	168	120	592	17
Future Volume (vph)	17	193	43	154	70	48	28	345	168	120	592	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.95	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1691		1679	1655		1582	1532	1583	1671	1652	1462
Flt Permitted	0.67	1.00		0.52	1.00		0.19	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)	1264	1691		926	1655		316	1532	1583	775	1652	1462
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	21	235	52	188	85	59	34	421	205	146	722	21
RTOR Reduction (vph)	0	8	0	0	26	0	0	0	103	0	0	11
Lane Group Flow (vph)	21	279	0	188	118	0	34	421	102	146	722	10
Confl. Peds. (#/hr)			52	52			2					2
Heavy Vehicles (%)	0%	9%	0%	2%	2%	16%	14%	24%	2%	8%	15%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4		4	8		8
Actuated Green, G (s)	24.5	24.5		24.5	24.5		37.1	37.1	37.1	37.1	37.1	37.1
Effective Green, g (s)	24.5	24.5		24.5	24.5		37.1	37.1	37.1	37.1	37.1	37.1
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.50	0.50	0.50	0.50	0.50	0.50
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2		0.2	0.2		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	415	555		304	543		157	761	787	385	821	727
v/s Ratio Prot		0.16			0.07			0.27			c0.44	
v/s Ratio Perm	0.02			c0.20			0.11		0.06	0.19		0.01
v/c Ratio	0.05	0.50		0.62	0.22		0.22	0.55	0.13	0.38	0.88	0.01
Uniform Delay, d1	17.1	20.1		21.1	18.1		10.6	13.0	10.1	11.6	16.8	9.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	3.2		9.1	0.9		0.7	0.9	0.1	0.6	10.6	0.0
Delay (s)	17.3	23.4		30.2	19.0		11.3	13.9	10.1	12.2	27.3	9.5
Level of Service	B	C		C	B		B	B	B	B	C	A
Approach Delay (s)		23.0			25.4			12.6			24.4	
Approach LOS		C			C			B			C	

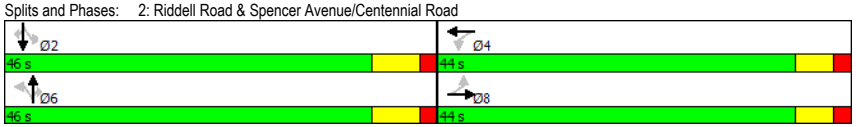
Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	74.6	Sum of lost time (s)	13.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	72	186	138	97	62	321	92	195	543	8
Future Volume (vph)	72	186	138	97	62	321	92	195	543	8
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		8		4		6			2	
Permitted Phases	8		4		6		6	2		2
Detector Phase	8	8	4	4	6	6	6	2	2	2
Switch Phase										
Minimum Initial (s)	15.0	15.0	15.0	15.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	31.0	31.0	31.0	31.0	44.0	44.0	44.0	44.0	44.0	44.0
Total Split (s)	44.0	44.0	44.0	44.0	46.0	46.0	46.0	46.0	46.0	46.0
Total Split (%)	48.9%	48.9%	48.9%	48.9%	51.1%	51.1%	51.1%	51.1%	51.1%	51.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	18.9	18.9	18.9	18.9	39.2	39.2	39.2	39.2	39.2	39.2
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.55	0.55	0.55	0.55	0.55	0.55
v/c Ratio	0.23	0.68	0.81	0.36	0.17	0.40	0.13	0.37	0.63	0.01
Control Delay	21.8	28.6	57.3	16.5	11.0	12.1	3.0	12.8	16.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	28.6	57.3	16.5	11.0	12.1	3.0	12.8	16.1	0.0
LOS	C	C	E	B	B	B	A	B	B	A
Approach Delay		27.4		34.9		10.2			15.0	
Approach LOS		C		C		B			B	

Intersection Summary			
Cycle Length: 90			
Actuated Cycle Length: 71.2			
Natural Cycle: 75			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 19.6		Intersection LOS: B	
Intersection Capacity Utilization 85.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Riddell Road & Spencer Avenue/Centennial Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	74	339	142	173	64	331	95	201	560	8
v/c Ratio	0.23	0.68	0.81	0.36	0.17	0.40	0.13	0.37	0.63	0.01
Control Delay	21.8	28.6	57.3	16.5	11.0	12.1	3.0	12.8	16.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	28.6	57.3	16.5	11.0	12.1	3.0	12.8	16.1	0.0
Queue Length 50th (m)	8.1	38.4	18.5	13.5	3.8	22.8	0.0	13.5	45.9	0.0
Queue Length 95th (m)	17.8	52.9	#44.4	28.2	13.2	54.3	7.3	37.0	104.9	0.0
Internal Link Dist (m)		130.7		209.9		212.7			592.2	
Turn Bay Length (m)	50.0		40.0		105.0		60.0	165.0		160.0
Base Capacity (vph)	647	967	355	921	376	829	753	545	893	684
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.35	0.40	0.19	0.17	0.40	0.13	0.37	0.63	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	186	101	138	97	71	62	321	92	195	543	8
Future Volume (vph)	72	186	101	138	97	71	62	321	92	195	543	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1778		1671	1673		1770	1508	1292	1687	1624	1214
Flt Permitted	0.65	1.00		0.38	1.00		0.37	1.00	1.00	0.56	1.00	1.00
Satd. Flow (perm)	1207	1778		663	1673		686	1508	1292	991	1624	1214
Peak-hour factor, PHF	0.97	0.79	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	74	235	104	142	100	73	64	331	95	201	560	8
RTOR Reduction (vph)	0	23	0	0	37	0	0	0	43	0	0	4
Lane Group Flow (vph)	74	316	0	142	136	0	64	331	52	201	560	4
Heavy Vehicles (%)	2%	1%	4%	8%	3%	11%	2%	26%	25%	7%	17%	33%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6		6	2		2
Actuated Green, G (s)	18.9	18.9		18.9	18.9		39.2	39.2	39.2	39.2	39.2	39.2
Effective Green, g (s)	18.9	18.9		18.9	18.9		39.2	39.2	39.2	39.2	39.2	39.2
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.55	0.55	0.55	0.55	0.55	0.55
Clearance Time (s)	6.0	6.0		6.0	6.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	320	472		176	444		378	831	712	546	895	669
v/s Ratio Prot		0.18			0.08			0.22			c0.34	
v/s Ratio Perm	0.06			c0.21			0.09		0.04	0.20		0.00
v/c Ratio	0.23	0.67		0.81	0.31		0.17	0.40	0.07	0.37	0.63	0.01
Uniform Delay, d1	20.4	23.3		24.4	20.9		7.9	9.2	7.5	9.0	10.9	7.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	3.7		23.0	0.4		1.0	1.4	0.2	1.9	3.3	0.0
Delay (s)	20.8	27.0		47.4	21.2		8.9	10.6	7.7	10.9	14.2	7.2
Level of Service	C	C		D	C		A	B	A	B	B	A
Approach Delay (s)		25.9			33.0			9.8			13.3	
Approach LOS		C			C			A			B	

Intersection Summary				
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.68			
Actuated Cycle Length (s)	71.1	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	85.4%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Timings
1: Riddell Road & Alder Street

2031 PM Peak Hour
200195 - Orangeville Intersections

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	19	72	160	122	93	731	225	44	459	34
Future Volume (vph)	19	72	160	122	93	731	225	44	459	34
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6		2		4			8	
Permitted Phases	6		2		4		4	8		8
Detector Phase	6	6	2	2	4	4	4	8	8	8
Switch Phase										
Minimum Initial (s)	8.0	8.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	31.0	31.0	31.0	31.0	36.0	36.0	36.0	36.0	36.0	36.0
Total Split (s)	31.0	31.0	31.0	31.0	59.0	59.0	59.0	59.0	59.0	59.0
Total Split (%)	34.4%	34.4%	34.4%	34.4%	65.6%	65.6%	65.6%	65.6%	65.6%	65.6%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	Max	Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	24.5	24.5	24.5	24.5	39.0	39.0	39.0	39.0	39.0	39.0
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.51	0.51	0.51	0.51	0.51	0.51
v/c Ratio	0.05	0.20	0.43	0.35	0.28	0.89	0.27	0.35	0.57	0.04
Control Delay	23.4	18.9	28.1	21.9	12.1	29.6	4.2	18.1	15.2	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	18.9	28.1	21.9	12.1	29.6	4.2	18.1	15.2	2.0
LOS	C	B	C	C	B	C	A	B	B	A
Approach Delay		19.6		24.8		22.6			14.6	
Approach LOS		B		C		C			B	

Intersection Summary			
Cycle Length: 90			
Actuated Cycle Length: 76.7			
Natural Cycle: 75			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 20.7		Intersection LOS: C	
Intersection Capacity Utilization 82.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Riddell Road & Alder Street

Queues
1: Riddell Road & Alder Street

2031 PM Peak Hour
200195 - Orangeville Intersections

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	21	120	174	201	101	795	245	48	499	37
v/c Ratio	0.05	0.20	0.43	0.35	0.28	0.89	0.27	0.35	0.57	0.04
Control Delay	23.4	18.9	28.1	21.9	12.1	29.6	4.2	18.1	15.2	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	18.9	28.1	21.9	12.1	29.6	4.2	18.1	15.2	2.0
Queue Length 50th (m)	2.2	10.0	21.1	20.1	8.1	100.1	6.1	4.0	48.4	0.0
Queue Length 95th (m)	8.7	27.1	47.9	45.9	17.2	152.4	16.3	12.3	73.3	3.0
Internal Link Dist (m)		197.3		149.7		592.2			140.4	
Turn Bay Length (m)	25.0		25.0		95.0		35.0	110.0		40.0
Base Capacity (vph)	383	587	403	582	503	1239	1185	193	1216	1126
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.20	0.43	0.35	0.20	0.64	0.21	0.25	0.41	0.03

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	72	39	160	122	63	93	731	225	44	459	34
Future Volume (vph)	19	72	39	160	122	63	93	731	225	44	459	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1781		1770	1768		1803	1759	1615	1805	1727	1579
Flt Permitted	0.63	1.00		0.68	1.00		0.38	1.00	1.00	0.14	1.00	1.00
Satd. Flow (perm)	1200	1781		1267	1768		716	1759	1615	273	1727	1579
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	78	42	174	133	68	101	795	245	48	499	37
RTOR Reduction (vph)	0	20	0	0	19	0	0	0	79	0	0	18
Lane Group Flow (vph)	21	100	0	174	182	0	101	795	166	48	499	19
Confl. Peds. (#/hr)			7	7			2					2
Heavy Vehicles (%)	0%	0%	0%	1%	0%	6%	0%	8%	0%	0%	10%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4		4	8		8
Actuated Green, G (s)	24.5	24.5		24.5	24.5		39.0	39.0	39.0	39.0	39.0	39.0
Effective Green, g (s)	24.5	24.5		24.5	24.5		39.0	39.0	39.0	39.0	39.0	39.0
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.51	0.51	0.51	0.51	0.51	0.51
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	0.2	0.2		0.2	0.2		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	384	570		405	566		365	896	823	139	880	804
v/s Ratio Prot		0.06			0.10			c0.45			0.29	
v/s Ratio Perm	0.02			c0.14			0.14		0.10	0.18		0.01
v/c Ratio	0.05	0.18		0.43	0.32		0.28	0.89	0.20	0.35	0.57	0.02
Uniform Delay, d1	18.0	18.7		20.5	19.7		10.7	16.8	10.2	11.2	12.9	9.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.7		3.3	1.5		0.4	10.6	0.1	1.5	0.8	0.0
Delay (s)	18.3	19.4		23.8	21.2		11.1	27.4	10.4	12.7	13.8	9.3
Level of Service	B	B		C	C		B	C	B	B	B	A
Approach Delay (s)		19.2			22.4			22.3			13.4	
Approach LOS		B			C			C			B	

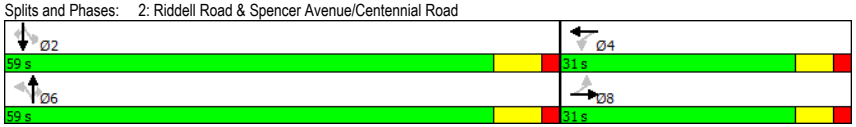
Intersection Summary				
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	82.6%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	60	145	190	228	186	691	159	109	331	23
Future Volume (vph)	60	145	190	228	186	691	159	109	331	23
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		8		4		6			2	
Permitted Phases	8		4		6		6	2		2
Detector Phase	8	8	4	4	6	6	6	2	2	2
Switch Phase										
Minimum Initial (s)	15.0	15.0	15.0	15.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	31.0	31.0	31.0	31.0	44.0	44.0	44.0	44.0	44.0	44.0
Total Split (s)	31.0	31.0	31.0	31.0	59.0	59.0	59.0	59.0	59.0	59.0
Total Split (%)	34.4%	34.4%	34.4%	34.4%	65.6%	65.6%	65.6%	65.6%	65.6%	65.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	20.9	20.9	20.9	20.9	52.1	52.1	52.1	52.1	52.1	52.1
Actuated g/C Ratio	0.24	0.24	0.24	0.24	0.61	0.61	0.61	0.61	0.61	0.61
v/c Ratio	0.37	0.44	0.81	0.71	0.31	0.78	0.19	0.37	0.35	0.03
Control Delay	33.9	28.0	56.4	37.5	10.8	21.4	2.1	14.3	10.4	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	28.0	56.4	37.5	10.8	21.4	2.1	14.3	10.4	2.0
LOS	C	C	E	D	B	C	A	B	B	A
Approach Delay		29.4		44.8		16.6			10.9	
Approach LOS		C		D		B			B	

Intersection Summary			
Cycle Length: 90			
Actuated Cycle Length: 86			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 23.0		Intersection LOS: C	
Intersection Capacity Utilization 93.6%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 2: Riddell Road & Spencer Avenue/Centennial Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	62	200	196	309	192	712	164	112	341	24
v/c Ratio	0.37	0.44	0.81	0.71	0.31	0.78	0.19	0.37	0.35	0.03
Control Delay	33.9	28.0	56.4	37.5	10.8	21.4	2.1	14.3	10.4	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	28.0	56.4	37.5	10.8	21.4	2.1	14.3	10.4	2.0
Queue Length 50th (m)	8.9	26.4	32.0	46.3	15.4	87.9	0.0	9.4	28.1	0.0
Queue Length 95th (m)	21.1	46.2	#64.7	74.6	30.6	#163.8	8.0	23.8	48.5	2.3
Internal Link Dist (m)		130.7		209.9		212.7			592.2	
Turn Bay Length (m)	50.0		40.0		105.0		60.0	165.0		160.0
Base Capacity (vph)	199	536	291	520	615	913	847	301	983	749
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.37	0.67	0.59	0.31	0.78	0.19	0.37	0.35	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	145	49	190	228	72	186	691	159	109	331	23
Future Volume (vph)	60	145	49	190	228	72	186	691	159	109	331	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1796		1671	1746		1770	1508	1292	1687	1624	1214
Flt Permitted	0.37	1.00		0.57	1.00		0.55	1.00	1.00	0.28	1.00	1.00
Satd. Flow (perm)	684	1796		998	1746		1017	1508	1292	496	1624	1214
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	62	149	51	196	235	74	192	712	164	112	341	24
RTOR Reduction (vph)	0	14	0	0	13	0	0	0	65	0	0	9
Lane Group Flow (vph)	62	186	0	196	296	0	192	712	99	112	341	15
Heavy Vehicles (%)	2%	1%	4%	8%	3%	11%	2%	26%	25%	7%	17%	33%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6		6	2		2
Actuated Green, G (s)	20.9	20.9		20.9	20.9		52.1	52.1	52.1	52.1	52.1	52.1
Effective Green, g (s)	20.9	20.9		20.9	20.9		52.1	52.1	52.1	52.1	52.1	52.1
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.61	0.61	0.61	0.61	0.61	0.61
Clearance Time (s)	6.0	6.0		6.0	6.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	166	436		242	424		616	913	782	300	983	735
v/s Ratio Prot		0.10			0.17			c0.47			0.21	
v/s Ratio Perm	0.09			c0.20			0.19		0.08	0.23		0.01
v/c Ratio	0.37	0.43		0.81	0.70		0.31	0.78	0.13	0.37	0.35	0.02
Uniform Delay, d1	27.1	27.5		30.7	29.7		8.2	12.7	7.2	8.6	8.5	6.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.7		17.8	5.0		1.3	6.6	0.3	3.5	1.0	0.0
Delay (s)	28.5	28.2		48.5	34.6		9.6	19.2	7.6	12.2	9.4	6.8
Level of Service	C	C		D	C		A	B	A	B	A	A
Approach Delay (s)		28.2			40.0			15.7			9.9	
Approach LOS		C			D			B			A	

Intersection Summary				
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	86.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	93.6%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Appendix E

Riddell Road and Alder Street Remedial Measures Traffic Operations Reports

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	21	287	188	144	34	421	205	146	743
v/c Ratio	0.04	0.36	0.40	0.18	0.23	0.44	0.31	0.50	0.73
Control Delay	11.2	13.0	15.6	9.0	19.4	17.9	3.9	23.4	22.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.2	13.0	15.6	9.0	19.4	17.9	3.9	23.4	22.8
Queue Length 50th (m)	1.3	19.8	13.9	6.7	3.0	20.7	0.0	14.0	40.7
Queue Length 95th (m)	5.0	38.3	30.5	16.7	8.3	28.1	8.8	25.9	50.7
Internal Link Dist (m)		197.3		149.7		592.2			140.4
Turn Bay Length (m)	25.0		25.0		95.0		35.0	110.0	
Base Capacity (vph)	587	791	475	792	342	2241	1265	685	2410
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.36	0.40	0.18	0.10	0.19	0.16	0.21	0.31

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	193	43	154	70	48	28	345	168	120	592	17
Future Volume (vph)	17	193	43	154	70	48	28	345	168	120	592	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.95	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	0.94		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	1695		1689	1655		1582	2911	1583	1671	3129	
Flt Permitted	0.67	1.00		0.58	1.00		0.27	1.00	1.00	0.51	1.00	
Satd. Flow (perm)	1264	1695		1038	1655		444	2911	1583	890	3129	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	21	235	52	188	85	59	34	421	205	146	722	21
RTOR Reduction (vph)	0	7	0	0	22	0	0	0	138	0	3	0
Lane Group Flow (vph)	21	280	0	188	122	0	34	421	67	146	740	0
Confl. Peds. (#/hr)			52	52			2					2
Heavy Vehicles (%)	0%	9%	0%	2%	2%	16%	14%	24%	2%	8%	15%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4		4	8		
Actuated Green, G (s)	29.1	29.1		29.1	29.1		20.4	20.4	20.4	20.4	20.4	
Effective Green, g (s)	29.1	29.1		29.1	29.1		20.4	20.4	20.4	20.4	20.4	
Actuated g/C Ratio	0.47	0.47		0.47	0.47		0.33	0.33	0.33	0.33	0.33	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	0.2	0.2		0.2	0.2		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	588	789		483	770		144	950	516	290	1021	
v/s Ratio Prot		0.17			0.07			0.14			c0.24	
v/s Ratio Perm	0.02			c0.18			0.08		0.04	0.16		
v/c Ratio	0.04	0.35		0.39	0.16		0.24	0.44	0.13	0.50	0.72	
Uniform Delay, d1	9.1	10.7		10.9	9.6		15.4	16.6	14.8	17.0	18.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	1.2		2.4	0.4		0.8	0.3	0.1	1.4	2.6	
Delay (s)	9.2	11.9		13.3	10.1		16.2	16.9	14.9	18.3	21.1	
Level of Service	A	B		B	B		B	B	B	B	C	
Approach Delay (s)		11.8			11.9			16.3			20.7	
Approach LOS		B			B			B			C	

Intersection Summary					
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.53				
Actuated Cycle Length (s)	62.5	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	76.0%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	21	120	174	201	101	795	245	48	536
v/c Ratio	0.04	0.16	0.33	0.26	0.35	0.68	0.34	0.28	0.47
Control Delay	12.3	10.2	14.8	11.6	17.2	19.0	3.4	17.7	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.3	10.2	14.8	11.6	17.2	19.0	3.4	17.7	15.1
Queue Length 50th (m)	1.3	5.7	12.0	11.4	7.9	37.8	0.0	3.7	22.4
Queue Length 95th (m)	5.7	17.5	30.8	29.3	18.5	53.6	11.2	11.0	33.7
Internal Link Dist (m)		197.3		149.7		592.2			140.4
Turn Bay Length (m)	25.0		25.0		95.0		35.0	110.0	
Base Capacity (vph)	507	769	534	763	757	3088	1510	452	3016
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.16	0.33	0.26	0.13	0.26	0.16	0.11	0.18

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	72	39	160	122	63	93	731	225	44	459	34
Future Volume (vph)	19	72	39	160	122	63	93	731	225	44	459	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	0.95		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	1783		1775	1768		1803	3343	1615	1805	3263	
Flt Permitted	0.63	1.00		0.68	1.00		0.43	1.00	1.00	0.26	1.00	
Satd. Flow (perm)	1200	1783		1270	1768		820	3343	1615	491	3263	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	78	42	174	133	68	101	795	245	48	499	37
RTOR Reduction (vph)	0	17	0	0	16	0	0	0	160	0	10	0
Lane Group Flow (vph)	21	103	0	174	185	0	101	795	85	48	526	0
Confl. Peds. (#/hr)			7	7			2					2
Heavy Vehicles (%)	0%	0%	0%	1%	0%	6%	0%	8%	0%	0%	10%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4		4	8		
Actuated Green, G (s)	24.2	24.2		24.2	24.2		19.9	19.9	19.9	19.9	19.9	
Effective Green, g (s)	24.2	24.2		24.2	24.2		19.9	19.9	19.9	19.9	19.9	
Actuated g/C Ratio	0.42	0.42		0.42	0.42		0.35	0.35	0.35	0.35	0.35	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	0.2	0.2		0.2	0.2		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	508	755		538	749		285	1165	562	171	1137	
v/s Ratio Prot		0.06			0.10			c0.24			0.16	
v/s Ratio Perm	0.02			c0.14			0.12		0.05	0.10		
v/c Ratio	0.04	0.14		0.32	0.25		0.35	0.68	0.15	0.28	0.46	
Uniform Delay, d1	9.6	10.1		11.0	10.6		13.8	15.9	12.8	13.4	14.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.4		1.6	0.8		0.8	1.7	0.1	0.9	0.3	
Delay (s)	9.8	10.4		12.6	11.4		14.6	17.6	12.9	14.3	14.7	
Level of Service	A	B		B	B		B	B	B	B	B	
Approach Delay (s)		10.3			11.9			16.3			14.7	
Approach LOS		B			B			B			B	

Intersection Summary					
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.49				
Actuated Cycle Length (s)	57.1	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	64.4%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

Appendix F

Riddell Road and Centennial Road/Spencer Avenue Protected Left-Turn Phasing Operations Reports

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	74	339	142	173	64	331	95	201	560	8
v/c Ratio	0.28	0.83	0.59	0.31	0.56	0.59	0.17	0.78	0.72	0.01
Control Delay	36.5	54.5	34.6	22.6	68.1	32.9	4.5	64.1	29.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.5	54.5	34.6	22.6	68.1	32.9	4.5	64.1	29.7	0.0
Queue Length 50th (m)	13.3	66.5	21.4	21.9	13.8	58.8	0.0	41.8	97.8	0.0
Queue Length 95th (m)	26.8	83.8	36.6	39.8	#32.4	94.7	9.1	#76.8	152.2	0.0
Internal Link Dist (m)		130.7		209.9		212.7			592.2	
Turn Bay Length (m)	50.0		40.0		105.0		60.0	165.0		160.0
Base Capacity (vph)	327	496	240	639	119	563	551	294	781	625
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.68	0.59	0.27	0.54	0.59	0.17	0.68	0.72	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	186	101	138	97	71	62	321	92	195	543	8
Future Volume (vph)	72	186	101	138	97	71	62	321	92	195	543	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		2.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1778		1671	1673		1770	1508	1292	1687	1624	1214
Flt Permitted	0.65	1.00		0.23	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1207	1778		397	1673		1770	1508	1292	1687	1624	1214
Peak-hour factor, PHF	0.97	0.79	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	74	235	104	142	100	73	64	331	95	201	560	8
RTOR Reduction (vph)	0	15	0	0	25	0	0	0	59	0	0	4
Lane Group Flow (vph)	74	324	0	142	148	0	64	331	36	201	560	4
Heavy Vehicles (%)	2%	1%	4%	8%	3%	11%	2%	26%	25%	7%	17%	33%
Turn Type	Perm	NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		8		7	4		1	6		5	2	
Permitted Phases	8			4					6			2
Actuated Green, G (s)	23.0	23.0		33.0	33.0		5.4	39.4	39.4	15.9	49.9	49.9
Effective Green, g (s)	23.0	23.0		33.0	33.0		5.4	39.4	39.4	15.9	49.9	49.9
Actuated g/C Ratio	0.22	0.22		0.32	0.32		0.05	0.38	0.38	0.15	0.48	0.48
Clearance Time (s)	6.0	6.0		2.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	266	392		223	529		91	569	488	257	776	580
v/s Ratio Prot		c0.18		c0.05	0.09		0.04	0.22		c0.12	c0.34	
v/s Ratio Perm	0.06			0.15					0.03			0.00
v/c Ratio	0.28	0.83		0.64	0.28		0.70	0.58	0.07	0.78	0.72	0.01
Uniform Delay, d1	33.8	38.8		27.9	26.7		48.7	25.9	20.8	42.5	21.7	14.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	13.3		5.8	0.3		21.8	4.3	0.3	14.3	5.7	0.0
Delay (s)	34.3	52.1		33.7	27.0		70.4	30.2	21.1	56.8	27.4	14.3
Level of Service	C	D		C	C		E	C	C	E	C	B
Approach Delay (s)		48.9			30.0			33.7			35.0	
Approach LOS		D			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.77			
Actuated Cycle Length (s)	104.3	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	76.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	21	120	174	201	101	795	245	48	536
v/c Ratio	0.04	0.16	0.33	0.26	0.35	0.68	0.34	0.28	0.47
Control Delay	12.3	10.2	14.8	11.6	17.2	19.0	3.4	17.7	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.3	10.2	14.8	11.6	17.2	19.0	3.4	17.7	15.1
Queue Length 50th (m)	1.3	5.7	12.0	11.4	7.9	37.8	0.0	3.7	22.4
Queue Length 95th (m)	5.7	17.5	30.8	29.3	18.5	53.6	11.2	11.0	33.7
Internal Link Dist (m)		197.3		149.7		592.2			140.4
Turn Bay Length (m)	25.0		25.0		95.0		35.0	110.0	
Base Capacity (vph)	507	769	534	763	757	3088	1510	452	3016
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.16	0.33	0.26	0.13	0.26	0.16	0.11	0.18

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	72	39	160	122	63	93	731	225	44	459	34
Future Volume (vph)	19	72	39	160	122	63	93	731	225	44	459	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	0.95		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	1783		1775	1768		1803	3343	1615	1805	3263	
Flt Permitted	0.63	1.00		0.68	1.00		0.43	1.00	1.00	0.26	1.00	
Satd. Flow (perm)	1200	1783		1270	1768		820	3343	1615	491	3263	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	78	42	174	133	68	101	795	245	48	499	37
RTOR Reduction (vph)	0	17	0	0	16	0	0	0	160	0	10	0
Lane Group Flow (vph)	21	103	0	174	185	0	101	795	85	48	526	0
Confl. Peds. (#/hr)			7	7			2					2
Heavy Vehicles (%)	0%	0%	0%	1%	0%	6%	0%	8%	0%	0%	10%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4		4	8		
Actuated Green, G (s)	24.2	24.2		24.2	24.2		19.9	19.9	19.9	19.9	19.9	
Effective Green, g (s)	24.2	24.2		24.2	24.2		19.9	19.9	19.9	19.9	19.9	
Actuated g/C Ratio	0.42	0.42		0.42	0.42		0.35	0.35	0.35	0.35	0.35	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	0.2	0.2		0.2	0.2		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	508	755		538	749		285	1165	562	171	1137	
v/s Ratio Prot		0.06			0.10			c0.24			0.16	
v/s Ratio Perm	0.02			c0.14			0.12		0.05	0.10		
v/c Ratio	0.04	0.14		0.32	0.25		0.35	0.68	0.15	0.28	0.46	
Uniform Delay, d1	9.6	10.1		11.0	10.6		13.8	15.9	12.8	13.4	14.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.4		1.6	0.8		0.8	1.7	0.1	0.9	0.3	
Delay (s)	9.8	10.4		12.6	11.4		14.6	17.6	12.9	14.3	14.7	
Level of Service	A	B		B	B		B	B	B	B	B	
Approach Delay (s)		10.3			11.9			16.3			14.7	
Approach LOS		B			B			B			B	

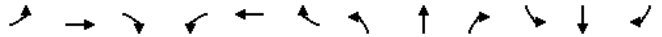
Intersection Summary					
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.49				
Actuated Cycle Length (s)	57.1	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	64.4%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	62	200	196	309	192	712	164	112	341	24
v/c Ratio	0.41	0.67	0.77	0.71	0.73	0.88	0.22	0.84	0.45	0.04
Control Delay	51.4	53.5	55.1	47.0	62.2	38.5	5.6	96.0	24.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.4	53.5	55.1	47.0	62.2	38.5	5.6	96.0	24.6	0.1
Queue Length 50th (m)	13.1	41.5	37.2	63.2	42.5	136.5	4.9	25.8	51.5	0.0
Queue Length 95th (m)	27.2	66.5	#63.1	94.6	69.0	#243.4	17.6	#63.1	92.6	0.0
Internal Link Dist (m)		130.7		209.9		212.7			592.2	
Turn Bay Length (m)	50.0		40.0		105.0		60.0	165.0		160.0
Base Capacity (vph)	208	407	256	543	341	805	745	134	755	617
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.49	0.77	0.57	0.56	0.88	0.22	0.84	0.45	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	145	49	190	228	72	186	691	159	109	331	23
Future Volume (vph)	60	145	49	190	228	72	186	691	159	109	331	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		2.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1796		1671	1746		1770	1508	1292	1687	1624	1214
Flt Permitted	0.51	1.00		0.38	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	941	1796		676	1746		1770	1508	1292	1687	1624	1214
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	62	149	51	196	235	74	192	712	164	112	341	24
RTOR Reduction (vph)	0	11	0	0	10	0	0	0	55	0	0	13
Lane Group Flow (vph)	62	189	0	196	299	0	192	712	109	112	341	11
Heavy Vehicles (%)	2%	1%	4%	8%	3%	11%	2%	26%	25%	7%	17%	33%
Turn Type	Perm	NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		8		7	4		1	6		5	2	
Permitted Phases	8			4					6			2
Actuated Green, G (s)	18.1	18.1		27.7	27.7		16.9	60.5	60.5	9.0	52.6	52.6
Effective Green, g (s)	18.1	18.1		27.7	27.7		16.9	60.5	60.5	9.0	52.6	52.6
Actuated g/C Ratio	0.16	0.16		0.24	0.24		0.15	0.53	0.53	0.08	0.46	0.46
Clearance Time (s)	6.0	6.0		2.0	6.0		3.0	7.0	7.0	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	150	287		232	427		264	805	690	134	754	564
v/s Ratio Prot		0.11		c0.06	c0.17		c0.11	c0.47		c0.07	0.21	
v/s Ratio Perm	0.07			0.15					0.08			0.01
v/c Ratio	0.41	0.66		0.84	0.70		0.73	0.88	0.16	0.84	0.45	0.02
Uniform Delay, d1	42.8	44.7		39.6	39.0		46.0	23.3	13.4	51.4	20.5	16.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	5.4		23.5	5.1		9.6	13.6	0.5	34.1	2.0	0.1
Delay (s)	44.6	50.0		63.1	44.1		55.5	36.8	13.9	85.4	22.5	16.4
Level of Service	D	D		E	D		E	D	B	F	C	B
Approach Delay (s)		48.8			51.5			36.7			37.0	
Approach LOS		D			D			D			D	

Intersection Summary				
HCM 2000 Control Delay	41.3	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	113.2	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	90.5%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

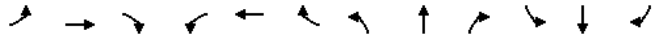
Appendix G

Riddell Road and Centennial Road/Spencer Avenue Lane Re-assignment Operations Reports

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	74	339	142	173	64	331	95	201	568
v/c Ratio	0.28	0.83	0.57	0.30	0.46	0.60	0.18	0.78	0.40
Control Delay	36.7	55.0	32.4	21.9	58.1	33.8	4.6	64.0	21.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.7	55.0	32.4	21.9	58.1	33.8	4.6	64.0	21.2
Queue Length 50th (m)	13.4	66.9	21.2	21.5	13.6	60.1	0.0	42.2	44.6
Queue Length 95th (m)	26.9	84.5	36.3	39.2	28.3	95.4	9.1	#76.8	62.7
Internal Link Dist (m)		130.7		209.9		212.7			592.2
Turn Bay Length (m)	50.0		40.0		105.0		60.0	165.0	
Base Capacity (vph)	322	488	254	649	163	553	542	295	1413
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.69	0.56	0.27	0.39	0.60	0.18	0.68	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	186	101	138	97	71	62	321	92	195	543	8
Future Volume (vph)	72	186	101	138	97	71	62	321	92	195	543	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		2.0	6.0		3.0	7.0	7.0	3.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	0.95	
Frt	1.00	0.95		1.00	0.94		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1778		1671	1673		1770	1508	1292	1687	3073	
Flt Permitted	0.65	1.00		0.22	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1207	1778		392	1673		1770	1508	1292	1687	3073	
Peak-hour factor, PHF	0.97	0.79	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	74	235	104	142	100	73	64	331	95	201	560	8
RTOR Reduction (vph)	0	15	0	0	25	0	0	0	60	0	1	0
Lane Group Flow (vph)	74	324	0	142	148	0	64	331	35	201	567	0
Heavy Vehicles (%)	2%	1%	4%	8%	3%	11%	2%	26%	25%	7%	17%	33%
Turn Type	Perm	NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		8		7	4		1	6		5	2	
Permitted Phases	8			4					6			
Actuated Green, G (s)	22.8	22.8		33.6	33.6		6.9	38.6	38.6	15.9	47.6	
Effective Green, g (s)	22.8	22.8		33.6	33.6		6.9	38.6	38.6	15.9	47.6	
Actuated g/C Ratio	0.22	0.22		0.32	0.32		0.07	0.37	0.37	0.15	0.46	
Clearance Time (s)	6.0	6.0		2.0	6.0		3.0	7.0	7.0	3.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	264	389		234	539		117	559	479	257	1405	
v/s Ratio Prot		c0.18		c0.05	0.09		0.04	c0.22		c0.12	0.18	
v/s Ratio Perm	0.06			0.14					0.03			
v/c Ratio	0.28	0.83		0.61	0.27		0.55	0.59	0.07	0.78	0.40	
Uniform Delay, d1	33.8	38.8		27.3	26.2		47.1	26.4	21.2	42.4	18.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	14.2		4.4	0.3		5.1	4.6	0.3	14.3	0.9	
Delay (s)	34.4	53.0		31.7	26.5		52.2	31.0	21.5	56.7	19.7	
Level of Service	C	D		C	C		D	C	C	E	B	
Approach Delay (s)		49.7			28.8			31.9			29.4	
Approach LOS		D			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	104.1	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	71.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	62	200	196	309	192	712	164	112	365
v/c Ratio	0.41	0.67	0.77	0.71	0.73	0.88	0.22	0.84	0.26
Control Delay	51.4	53.5	55.1	47.0	62.2	38.5	5.6	96.0	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.4	53.5	55.1	47.0	62.2	38.5	5.6	96.0	20.0
Queue Length 50th (m)	13.1	41.5	37.2	63.2	42.5	136.5	4.9	25.8	25.5
Queue Length 95th (m)	27.2	66.5	#63.1	94.6	69.0	#243.4	17.6	#63.1	43.4
Internal Link Dist (m)		130.7		209.9		212.7			592.2
Turn Bay Length (m)	50.0		40.0		105.0		60.0	165.0	
Base Capacity (vph)	208	407	256	543	341	805	745	134	1410
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.49	0.77	0.57	0.56	0.88	0.22	0.84	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	145	49	190	228	72	186	691	159	109	331	23
Future Volume (vph)	60	145	49	190	228	72	186	691	159	109	331	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		2.0	6.0		3.0	7.0	7.0	3.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	0.95	
Frt	1.00	0.96		1.00	0.96		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1796		1671	1746		1770	1508	1292	1687	3028	
Flt Permitted	0.51	1.00		0.38	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	941	1796		676	1746		1770	1508	1292	1687	3028	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	62	149	51	196	235	74	192	712	164	112	341	24
RTOR Reduction (vph)	0	11	0	0	10	0	0	0	55	0	4	0
Lane Group Flow (vph)	62	189	0	196	299	0	192	712	109	112	361	0
Heavy Vehicles (%)	2%	1%	4%	8%	3%	11%	2%	26%	25%	7%	17%	33%
Turn Type	Perm	NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		8		7	4		1	6		5	2	
Permitted Phases	8			4					6			
Actuated Green, G (s)	18.1	18.1		27.7	27.7		16.9	60.5	60.5	9.0	52.6	
Effective Green, g (s)	18.1	18.1		27.7	27.7		16.9	60.5	60.5	9.0	52.6	
Actuated g/C Ratio	0.16	0.16		0.24	0.24		0.15	0.53	0.53	0.08	0.46	
Clearance Time (s)	6.0	6.0		2.0	6.0		3.0	7.0	7.0	3.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	150	287		232	427		264	805	690	134	1407	
v/s Ratio Prot		0.11		c0.06	c0.17		c0.11	c0.47		c0.07	0.12	
v/s Ratio Perm	0.07			0.15					0.08			
v/c Ratio	0.41	0.66		0.84	0.70		0.73	0.88	0.16	0.84	0.26	
Uniform Delay, d1	42.8	44.7		39.6	39.0		46.0	23.3	13.4	51.4	18.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.8	5.4		23.5	5.1		9.6	13.6	0.5	34.1	0.4	
Delay (s)	44.6	50.0		63.1	44.1		55.5	36.8	13.9	85.4	18.9	
Level of Service	D	D		E	D		E	D	B	F	B	
Approach Delay (s)		48.8			51.5			36.7			34.5	
Approach LOS		D			D			D			C	

Intersection Summary				
HCM 2000 Control Delay	40.8	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	113.2	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	90.5%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Appendix H

2031 ARCADY Reports

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

For sales and distribution information, program advice and maintenance, contact TRL:
Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk

Filename: Alder and Riddell.arc8
Path: C:\Users\AdamMorrison\Desktop\Projects\200195 - Arcady
Report generation date: 2020-08-25 8:03:46 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - Background 2031						
Intersection 1 - Leg North	0.46	1.04	5.57	0.31	A	11.63	B
Intersection 1 - Leg West	3.41	10.23	15.73	0.76	C		
Intersection 1 - Leg South	0.75	1.07	9.81	0.42	A		
Intersection 1 - Leg East	1.63	1.16	10.01	0.59	B		
Intersection 2 - Leg North	0.46	1.04	5.50	0.30	A	5.46	A
Intersection 2 - Leg West	1.10	?	4.98	0.49	A		
Intersection 2 - Leg South	0.72	1.07	9.34	0.40	A		
Intersection 2 - Leg East	0.71	1.16	4.29	0.38	A		
Intersection 3 - Leg North	0.25	~1	3.03	0.19	A	4.32	A
Intersection 3 - Leg West	1.09	?	4.91	0.49	A		
Intersection 3 - Leg South	0.32	~1	4.18	0.23	A		
Intersection 3 - Leg East	0.70	1.16	4.23	0.38	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Background 2031, PM" model duration: 4:00 PM - 5:30 PM
"D2 - Background 2031, AM " model duration: 8:00 AM - 9:30 AM

Run using Junctions 8.0.6.541 at 2020-08-25 8:03:45 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2020-08-25
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Background 2031, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Background 2031, AM	Background 2031	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	1	(untitled)	Roundabout	North,West,South,East				11.63	B
2	2	(untitled)	Roundabout	North,West,South,East				5.46	A
3	3	(untitled)	Roundabout	North,West,South,East				4.32	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1	**North**	North	Alder Street	
1	**West**	West	Riddell Road	
1	**South**	South	Alder Street	
1	**East**	East	Riddell Road	
2	**North**	North	Alder Street	
2	**West**	West	Riddell Road	
2	**South**	South	Alder Street	
2	**East**	East	Riddell Road	
3	**North**	North	Alder Street	
3	**West**	West	Riddell Road	
3	**South**	South	Alder Street	
3	**East**	East	Riddell Road	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	**North**	0.00	99999.00		0.00
1	**West**	0.00	99999.00		0.00
1	**South**	0.00	99999.00		0.00
1	**East**	0.00	99999.00		0.00
2	**North**	0.00	99999.00		0.00

2	West	0.00	99999.00		0.00
2	South	0.00	99999.00		0.00
2	East	0.00	99999.00		0.00
3	North	0.00	99999.00		0.00
3	West	0.00	99999.00		0.00
3	South	0.00	99999.00		0.00
3	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	North	3.50	4.50	30.00	20.00	40.00	25.00	
1	West	3.50	4.50	30.00	20.00	40.00	25.00	
1	South	3.50	4.50	30.00	20.00	40.00	25.00	
1	East	3.50	4.50	30.00	20.00	40.00	25.00	
2	North	3.50	4.50	30.00	20.00	47.50	25.00	
2	West	3.50	8.00	30.00	20.00	47.50	25.00	
2	South	3.50	4.50	30.00	20.00	47.50	25.00	
2	East	3.50	8.00	30.00	20.00	47.50	25.00	
3	North	3.50	8.00	30.00	20.00	55.00	25.00	
3	West	3.50	8.00	30.00	20.00	55.00	25.00	
3	South	3.50	8.00	30.00	20.00	55.00	25.00	
3	East	3.50	8.00	30.00	20.00	55.00	25.00	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Intersection	Leg	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
1	North	Percentage	Region of Waterloo Standard		90.00
1	West	Percentage	Region of Waterloo Standard		90.00
1	South	Percentage	Region of Waterloo Standard		90.00
1	East	Percentage	Region of Waterloo Standard		90.00
2	North	Percentage	Region of Waterloo Standard		90.00
2	West	Percentage	Region of Waterloo Standard		90.00
2	South	Percentage	Region of Waterloo Standard		90.00
2	East	Percentage	Region of Waterloo Standard		90.00
3	North	Percentage	Region of Waterloo Standard		90.00
3	West	Percentage	Region of Waterloo Standard		90.00
3	South	Percentage	Region of Waterloo Standard		90.00
3	East	Percentage	Region of Waterloo Standard		90.00

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1	North		(calculated)	(calculated)	0.579	1221.701
1	West		(calculated)	(calculated)	0.579	1221.701
1	South		(calculated)	(calculated)	0.579	1221.701
1	East		(calculated)	(calculated)	0.579	1221.701
2	North		(calculated)	(calculated)	0.558	1221.701
2	West		(calculated)	(calculated)	0.685	1814.551
2	South		(calculated)	(calculated)	0.558	1221.701
2	East		(calculated)	(calculated)	0.685	1814.551
3	North		(calculated)	(calculated)	0.647	1814.551
3	West		(calculated)	(calculated)	0.647	1814.551
3	South		(calculated)	(calculated)	0.647	1814.551
3	East		(calculated)	(calculated)	0.647	1814.551

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry

		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	North	ONE HOUR	✓	272.00	100.000
1	West	ONE HOUR	✓	729.00	100.000
1	South	ONE HOUR	✓	253.00	100.000
1	East	ONE HOUR	✓	541.00	100.000
2	North	ONE HOUR	✓	272.00	100.000
2	West	ONE HOUR	✓	729.00	100.000
2	South	ONE HOUR	✓	253.00	100.000
2	East	ONE HOUR	✓	541.00	100.000
3	North	ONE HOUR	✓	272.00	100.000
3	West	ONE HOUR	✓	729.00	100.000
3	South	ONE HOUR	✓	253.00	100.000
3	East	ONE HOUR	✓	541.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.000	48.000	70.000	154.000
	West	120.000	0.000	17.000	592.000
	South	193.000	17.000	0.000	43.000
	East	168.000	345.000	28.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.18	0.26	0.57
	West	0.16	0.00	0.02	0.81
	South	0.76	0.07	0.00	0.17
	East	0.31	0.64	0.05	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.000	48.000	70.000	154.000
	West	120.000	0.000	17.000	592.000
	South	193.000	17.000	0.000	43.000
	East	168.000	345.000	28.000	0.000

Turning Proportions (PCE) - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.18	0.26	0.57
	West	0.16	0.00	0.02	0.81
	South	0.76	0.07	0.00	0.17
	East	0.31	0.64	0.05	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 3 (for whole period)

		To			
		North	West	South	East
	North	0.000	48.000	70.000	154.000

From	West	120.000	0.000	17.000	592.000
	South	193.000	17.000	0.000	43.000
	East	168.000	345.000	28.000	0.000

Turning Proportions (PCE) - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.18	0.26	0.57
	West	0.16	0.00	0.02	0.81
	South	0.76	0.07	0.00	0.17
	East	0.31	0.64	0.05	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.160	1.020	1.020
	West	1.080	1.000	1.080	1.150
	South	1.090	1.000	1.000	1.000
	East	1.020	1.240	1.140	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	16.0	2.0	2.0
	West	8.0	0.0	8.0	15.0
	South	9.0	0.0	0.0	0.0
	East	2.0	24.0	14.0	0.0

Average PCE Per Vehicle - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.160	1.020	1.020
	West	1.080	1.000	1.080	1.150
	South	1.090	1.000	1.000	1.000
	East	1.020	1.240	1.140	1.000

Truck Percentages - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.0	16.0	2.0	2.0
	West	8.0	0.0	8.0	15.0
	South	9.0	0.0	0.0	0.0
	East	2.0	24.0	14.0	0.0

Average PCE Per Vehicle - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.160	1.020	1.020
	West	1.080	1.000	1.080	1.150
	South	1.090	1.000	1.000	1.000
	East	1.020	1.240	1.140	1.000

Truck Percentages - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	0.0	16.0	2.0	2.0
	West	8.0	0.0	8.0	15.0
	South	9.0	0.0	0.0	0.0
	East	2.0	24.0	14.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1	North	0.31	5.57	0.46	1.04	A	249.59	374.39	31.05	4.98	0.35	31.05	4.98
1	West	0.76	15.73	3.41	10.23	C	668.94	1003.41	180.56	10.80	2.01	180.59	10.80
1	South	0.42	9.81	0.75	1.07	A	232.16	348.24	44.61	7.69	0.50	44.61	7.69
1	East	0.59	10.01	1.63	1.16	B	496.43	744.65	98.49	7.94	1.09	98.50	7.94
2	North	0.30	5.50	0.46	1.04	A	249.59	374.39	30.74	4.93	0.34	30.74	4.93
2	West	0.49	4.98	1.10	?	A	668.94	1003.41	71.25	4.26	0.79	71.26	4.26
2	South	0.40	9.34	0.72	1.07	A	232.16	348.24	43.10	7.43	0.48	43.10	7.43
2	East	0.38	4.29	0.71	1.16	A	496.43	744.65	47.38	3.82	0.53	47.38	3.82
3	North	0.19	3.03	0.25	~1	A	249.59	374.39	17.68	2.83	0.20	17.68	2.83
3	West	0.49	4.91	1.09	?	A	668.94	1003.41	70.56	4.22	0.78	70.56	4.22
3	South	0.23	4.18	0.32	~1	A	232.16	348.24	21.34	3.68	0.24	21.34	3.68
3	East	0.38	4.23	0.70	1.16	A	496.43	744.65	46.86	3.78	0.52	46.86	3.78

Main Results for each time segment

Main results: (08:00-08:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	204.78	51.19	203.78	359.61	291.62	0.00	1052.93	840.41	0.194	0.00	0.25	4.415	A
1	West	548.83	137.21	544.47	306.64	188.75	0.00	1112.46	793.97	0.493	0.00	1.09	7.148	A
1	South	190.47	47.62	189.24	86.08	647.15	0.00	847.16	497.51	0.225	0.00	0.31	5.829	A
1	East	407.29	101.82	404.52	589.69	246.70	0.00	1078.92	907.06	0.378	0.00	0.69	6.153	A
2	North	204.78	51.19	203.78	360.37	292.49	0.00	1058.50	631.06	0.193	0.00	0.25	4.385	A
2	West	548.83	137.21	546.65	307.45	188.82	0.00	1685.25	1405.16	0.326	0.00	0.55	3.587	A
2	South	190.47	47.62	189.27	86.19	649.28	0.00	859.42	256.59	0.222	0.00	0.30	5.722	A
2	East	407.29	101.82	405.78	591.46	247.08	0.00	1645.36	1510.32	0.248	0.00	0.38	3.356	A
3	North	204.78	51.19	204.18	360.78	292.53	0.00	1625.41	1189.09	0.126	0.00	0.15	2.638	A
3	West	548.83	137.21	546.66	307.56	189.15	0.00	1692.25	1136.59	0.324	0.00	0.54	3.565	A
3	South	190.47	47.62	189.80	86.30	649.51	0.00	1394.59	661.49	0.137	0.00	0.17	3.187	A
3	East	407.29	101.82	405.79	591.79	247.53	0.00	1654.51	1338.57	0.246	0.00	0.38	3.331	A

Main results: (08:15-08:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	244.52	61.13	244.22	431.26	349.77	0.00	1019.27	840.41	0.240	0.25	0.33	4.838	A
1	West	655.36	163.84	653.04	367.75	226.23	0.00	1090.77	793.97	0.601	1.09	1.67	9.294	A
1	South	227.44	56.86	226.91	103.19	776.08	0.00	772.54	497.51	0.294	0.31	0.44	7.033	A
1	East	486.35	121.59	485.19	707.15	295.84	0.00	1050.48	907.06	0.463	0.69	0.98	7.355	A
2	North	244.52	61.13	244.22	431.75	350.24	0.00	1026.28	631.06	0.238	0.25	0.32	4.794	A
2	West	655.36	163.84	654.59	368.19	226.27	0.00	1659.61	1405.16	0.395	0.55	0.74	4.067	A
2	South	227.44	56.86	226.93	103.26	777.60	0.00	787.82	256.59	0.289	0.30	0.43	6.844	A
2	East	486.35	121.59	485.87	708.42	296.12	0.00	1611.78	1510.32	0.302	0.38	0.50	3.697	A
3	North	244.52	61.13	244.37	431.97	350.27	0.00	1588.08	1189.09	0.154	0.15	0.19	2.791	A
3	West	655.36	163.84	654.61	368.24	226.39	0.00	1668.17	1136.59	0.393	0.54	0.73	4.033	A
3	South	227.44	56.86	227.22	103.30	777.69	0.00	1311.71	661.49	0.173	0.17	0.22	3.542	A
3	East	486.35	121.59	485.88	708.56	296.36	0.00	1622.93	1338.57	0.300	0.38	0.49	3.661	A

Main results: (08:30-08:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS

1	North	299.48	74.87	298.95	526.82	427.58	0.00	974.23	840.41	0.307	0.33	0.46	5.551	A
1	West	802.64	200.66	796.10	449.64	276.89	0.00	1061.45	793.97	0.756	1.67	3.31	15.046	C
1	South	278.56	69.64	277.36	126.20	946.79	0.00	673.74	497.51	0.413	0.44	0.74	9.664	A
1	East	595.65	148.91	593.14	862.89	361.27	0.00	1012.61	907.06	0.588	0.98	1.61	9.871	A
2	North	299.48	74.87	298.96	528.24	428.75	0.00	982.47	631.06	0.305	0.32	0.45	5.486	A
2	West	802.64	200.66	801.20	450.72	276.99	0.00	1624.88	1405.16	0.494	0.74	1.10	4.956	A
2	South	278.56	69.64	277.44	126.41	951.78	0.00	690.64	256.59	0.403	0.43	0.71	9.276	A
2	East	595.65	148.91	594.82	867.05	362.17	0.00	1566.55	1510.32	0.380	0.50	0.70	4.283	A
3	North	299.48	74.87	299.23	528.81	428.81	0.00	1537.29	1189.09	0.195	0.19	0.25	3.030	A
3	West	802.64	200.66	801.23	450.83	277.21	0.00	1635.31	1136.59	0.491	0.73	1.08	4.896	A
3	South	278.56	69.64	278.17	126.48	951.96	0.00	1199.03	661.49	0.232	0.22	0.32	4.170	A
3	East	595.65	148.91	594.84	867.35	362.78	0.00	1579.99	1338.57	0.377	0.49	0.70	4.225	A

Main results: (08:45-09:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	299.48	74.87	299.47	529.46	429.33	0.00	973.22	840.41	0.308	0.46	0.46	5.568	A
1	West	802.64	200.66	802.23	451.35	277.44	0.00	1061.13	793.97	0.756	3.31	3.41	15.729	C
1	South	278.56	69.64	278.51	126.60	953.07	0.00	670.10	497.51	0.416	0.74	0.75	9.807	A
1	East	595.65	148.91	595.56	868.35	363.23	0.00	1011.48	907.06	0.589	1.61	1.63	10.010	B
2	North	299.48	74.87	299.47	529.56	429.39	0.00	982.12	631.06	0.305	0.45	0.46	5.495	A
2	West	802.64	200.66	802.62	451.41	277.45	0.00	1624.56	1405.16	0.494	1.10	1.10	4.975	A
2	South	278.56	69.64	278.53	126.61	953.46	0.00	689.70	256.59	0.404	0.71	0.72	9.342	A
2	East	595.65	148.91	595.64	868.68	363.31	0.00	1565.77	1510.32	0.380	0.70	0.71	4.294	A
3	North	299.48	74.87	299.48	529.58	429.39	0.00	1536.92	1189.09	0.195	0.25	0.25	3.031	A
3	West	802.64	200.66	802.62	451.41	277.45	0.00	1635.15	1136.59	0.491	1.08	1.09	4.912	A
3	South	278.56	69.64	278.55	126.62	953.46	0.00	1198.06	661.49	0.233	0.32	0.32	4.178	A
3	East	595.65	148.91	595.64	868.68	363.33	0.00	1579.63	1338.57	0.377	0.70	0.70	4.233	A

Main results: (09:00-09:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	244.52	61.13	245.04	435.17	352.39	0.00	1017.75	840.41	0.240	0.46	0.33	4.860	A
1	West	655.36	163.84	661.97	370.33	227.10	0.00	1090.27	793.97	0.601	3.41	1.76	9.691	A
1	South	227.44	56.86	228.63	103.80	785.27	0.00	767.22	497.51	0.296	0.75	0.45	7.150	A
1	East	486.35	121.59	488.83	715.16	298.74	0.00	1048.80	907.06	0.464	1.63	1.02	7.471	A
2	North	244.52	61.13	245.03	433.74	351.24	0.00	1025.72	631.06	0.238	0.46	0.33	4.808	A
2	West	655.36	163.84	656.78	369.27	227.00	0.00	1659.11	1405.16	0.395	1.10	0.75	4.087	A
2	South	227.44	56.86	228.55	103.59	780.19	0.00	786.38	256.59	0.289	0.72	0.44	6.900	A
2	East	486.35	121.59	487.16	710.93	297.82	0.00	1610.62	1510.32	0.302	0.71	0.50	3.710	A
3	North	244.52	61.13	244.77	433.18	351.18	0.00	1587.49	1189.09	0.154	0.25	0.19	2.796	A
3	West	655.36	163.84	656.75	369.16	226.79	0.00	1667.92	1136.59	0.393	1.09	0.74	4.051	A
3	South	227.44	56.86	227.83	103.52	780.02	0.00	1310.21	661.49	0.174	0.32	0.23	3.549	A
3	East	486.35	121.59	487.15	710.63	297.22	0.00	1622.38	1338.57	0.300	0.70	0.50	3.674	A

Main results: (09:15-09:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	204.78	51.19	205.09	363.34	294.49	0.00	1051.26	840.41	0.195	0.33	0.25	4.435	A
1	West	548.83	137.21	551.35	309.54	190.04	0.00	1111.71	793.97	0.494	1.76	1.12	7.330	A
1	South	190.47	47.62	191.03	86.78	654.61	0.00	842.84	497.51	0.226	0.45	0.31	5.901	A
1	East	407.29	101.82	408.51	596.32	249.32	0.00	1077.40	907.06	0.378	1.02	0.71	6.241	A
2	North	204.78	51.19	205.08	362.80	293.98	0.00	1057.67	631.06	0.194	0.33	0.25	4.401	A
2	West	548.83	137.21	549.61	309.07	190.00	0.00	1684.45	1405.16	0.326	0.75	0.55	3.605	A
2	South	190.47	47.62	191.00	86.70	652.91	0.00	857.40	256.59	0.222	0.44	0.31	5.771	A
2	East	407.29	101.82	407.78	594.90	249.01	0.00	1644.04	1510.32	0.248	0.50	0.38	3.373	A
3	North	204.78	51.19	204.93	362.56	293.95	0.00	1624.49	1189.09	0.126	0.19	0.15	2.644	A
3	West	548.83	137.21	549.60	309.01	189.87	0.00	1691.78	1136.59	0.324	0.74	0.55	3.582	A
3	South	190.47	47.62	190.69	86.66	652.81	0.00	1392.46	661.49	0.137	0.23	0.17	3.196	A
3	East	407.29	101.82	407.77	594.75	248.75	0.00	1653.71	1338.57	0.246	0.50	0.38	3.344	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	3.66	0.24	4.415	A	A
1	West	15.56	1.04	7.148	A	A
1	South	4.46	0.30	5.829	A	A
1	East	10.02	0.67	6.153	A	A
2	North	3.64	0.24	4.385	A	A
2	West	7.99	0.53	3.587	A	A
2	South	4.38	0.29	5.722	A	A
2	East	5.56	0.37	3.356	A	A
3	North	2.21	0.15	2.638	A	A
3	West	7.94	0.53	3.565	A	A
3	South	2.48	0.17	3.187	A	A
3	East	5.52	0.37	3.331	A	A

Queueing Delay results: (08:15-08:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	4.81	0.32	4.838	A	A
1	West	23.86	1.59	9.294	A	A
1	South	6.43	0.43	7.033	A	A
1	East	14.27	0.95	7.355	A	A
2	North	4.77	0.32	4.794	A	A
2	West	10.82	0.72	4.067	A	A
2	South	6.26	0.42	6.844	A	A
2	East	7.34	0.49	3.697	A	A
3	North	2.80	0.19	2.791	A	A
3	West	10.74	0.72	4.033	A	A
3	South	3.29	0.22	3.542	A	A
3	East	7.27	0.48	3.661	A	A

Queueing Delay results: (08:30-08:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	6.72	0.45	5.551	A	A
1	West	45.10	3.01	15.046	C	B
1	South	10.63	0.71	9.664	A	A
1	East	22.97	1.53	9.871	A	A
2	North	6.64	0.44	5.486	A	A
2	West	16.01	1.07	4.956	A	A
2	South	10.23	0.68	9.276	A	A
2	East	10.35	0.69	4.283	A	A
3	North	3.72	0.25	3.030	A	A
3	West	15.82	1.05	4.896	A	A
3	South	4.73	0.32	4.170	A	A
3	East	10.21	0.68	4.225	A	A

Queueing Delay results: (08:45-09:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	6.90	0.46	5.568	A	A
1	West	50.52	3.37	15.729	C	B
1	South	11.20	0.75	9.807	A	A
1	East	24.39	1.63	10.010	B	B
2	North	6.82	0.45	5.495	A	A
2	West	16.52	1.10	4.975	A	A
2	South	10.71	0.71	9.342	A	A
2	East	10.60	0.71	4.294	A	A
3	North	3.77	0.25	3.031	A	A
3	West	16.31	1.09	4.912	A	A
3	South	4.83	0.32	4.178	A	A
3	East	10.45	0.70	4.233	A	A

Queueing Delay results: (09:00-09:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service

1	North	5.09	0.34	4.860	A	A
1	West	27.95	1.86	9.691	A	A
1	South	7.05	0.47	7.150	A	A
1	East	15.85	1.06	7.471	A	A
2	North	5.03	0.34	4.808	A	A
2	West	11.47	0.76	4.087	A	A
2	South	6.80	0.45	6.900	A	A
2	East	7.70	0.51	3.710	A	A
3	North	2.89	0.19	2.796	A	A
3	West	11.37	0.76	4.051	A	A
3	South	3.44	0.23	3.549	A	A
3	East	7.61	0.51	3.674	A	A

Queueing Delay results: (09:15-09:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	3.87	0.26	4.435	A	A
1	West	17.56	1.17	7.330	A	A
1	South	4.83	0.32	5.901	A	A
1	East	10.98	0.73	6.241	A	A
2	North	3.84	0.26	4.401	A	A
2	West	8.44	0.56	3.605	A	A
2	South	4.72	0.31	5.771	A	A
2	East	5.84	0.39	3.373	A	A
3	North	2.29	0.15	2.644	A	A
3	West	8.38	0.56	3.582	A	A
3	South	2.58	0.17	3.196	A	A
3	East	5.79	0.39	3.344	A	A

Queue Variation Results for each time segment

Queue Variation results: (08:00-08:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	1.09	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.69	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.55	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.30	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.15	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.54	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.17	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

									Probability Of	Probability Of

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Reaching Or Exceeding Marker	Exactly Reaching Marker
1	North	0.33	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	1.67	0.00	0.00	3.41	4.54			N/A	N/A
1	South	0.44	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.98	0.00	0.00	0.00	1.16			N/A	N/A
2	North	0.32	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.74	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.43	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.50	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.19	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.73	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.22	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.49	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	3.31	0.00	0.00	2.27	10.23			N/A	N/A
1	South	0.74	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	1.61	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	1.10	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.71	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.70	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	1.08	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.32	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.70	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.46	0.00	0.00	0.00	1.04			N/A	N/A
1	West	3.41	0.00	0.00	0.00	5.68			N/A	N/A
1	South	0.75	0.00	0.00	0.00	1.07			N/A	N/A

1	East	1.63	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	0.46	0.00	0.00	0.00	1.04			N/A	N/A
2	West	1.10	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.72	0.00	0.00	0.00	1.07			N/A	N/A
2	East	0.71	0.00	0.00	0.00	1.16			N/A	N/A
3	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	1.09	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.32	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.70	0.00	0.00	0.00	1.16			N/A	N/A

Queue Variation results: (09:00-09:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.33	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	1.76	0.00	0.00	3.41	4.54			N/A	N/A
1	South	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	1.02	0.00	0.00	1.16	1.16			N/A	N/A
2	North	0.33	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.75	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.44	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.50	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.19	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.74	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.50	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:15-09:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	1.12	0.00	0.00	1.14	3.41			N/A	N/A
1	South	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.71	0.00	0.00	0.00	1.16			N/A	N/A
2	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.55	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

3	**North**	0.15	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**West**	0.55	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**South**	0.17	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**East**	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

Filename: Alder and Riddell.arc8
Path: C:\Users\AdamMorrison\Desktop\Projects\200195 - Arcady
Report generation date: 2020-08-25 8:02:53 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - Background 2031						
Intersection 1 - Leg North	1.17	2.03	11.32	0.54	B	51.34	F
Intersection 1 - Leg West	1.61	1.08	9.91	0.60	A		
Intersection 1 - Leg South	0.22	~1	5.49	0.18	A		
Intersection 1 - Leg East	29.95	90.68	91.40	1.02	F		
Intersection 2 - Leg North	1.17	2.03	11.27	0.54	B	6.77	A
Intersection 2 - Leg West	0.68	1.08	4.15	0.39	A		
Intersection 2 - Leg South	0.21	~1	5.36	0.18	A		
Intersection 2 - Leg East	2.16	3.16	6.80	0.67	A		
Intersection 3 - Leg North	0.46	1.02	4.38	0.31	A	5.41	A
Intersection 3 - Leg West	0.67	1.08	4.08	0.38	A		
Intersection 3 - Leg South	0.12	~1	3.00	0.11	A		
Intersection 3 - Leg East	2.14	3.16	6.73	0.67	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Background 2031, PM " model duration: 4:00 PM - 5:30 PM
"D2 - Background 2031, AM" model duration: 8:00 AM - 9:30 AM

Run using Junctions 8.0.6.541 at 2020-08-25 8:02:52 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2020-08-25
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Background 2031, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Background 2031, PM	Background 2031	PM		ONE HOUR	16:00	17:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	1	(untitled)	Roundabout	North,West,South,East				51.34	F
2	2	(untitled)	Roundabout	North,West,South,East				6.77	A
3	3	(untitled)	Roundabout	North,West,South,East				5.41	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1	**North**	North	Alder Street	
1	**West**	West	Riddell Road	
1	**South**	South	Alder Street	
1	**East**	East	Riddell Road	
2	**North**	North	Alder Street	
2	**West**	West	Riddell Road	
2	**South**	South	Alder Street	
2	**East**	East	Riddell Road	
3	**North**	North	Alder Street	
3	**West**	West	Riddell Road	
3	**South**	South	Alder Street	
3	**East**	East	Riddell Road	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	**North**	0.00	99999.00		0.00
1	**West**	0.00	99999.00		0.00
1	**South**	0.00	99999.00		0.00
1	**East**	0.00	99999.00		0.00
2	**North**	0.00	99999.00		0.00

2	West	0.00	99999.00		0.00
2	South	0.00	99999.00		0.00
2	East	0.00	99999.00		0.00
3	North	0.00	99999.00		0.00
3	West	0.00	99999.00		0.00
3	South	0.00	99999.00		0.00
3	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	North	3.50	4.50	30.00	20.00	40.00	25.00	
1	West	3.50	4.50	30.00	20.00	40.00	25.00	
1	South	3.50	4.50	30.00	20.00	40.00	25.00	
1	East	3.50	4.50	30.00	20.00	40.00	25.00	
2	North	3.50	4.50	30.00	20.00	47.50	25.00	
2	West	3.50	8.00	30.00	20.00	47.50	25.00	
2	South	3.50	4.50	30.00	20.00	47.50	25.00	
2	East	3.50	8.00	30.00	20.00	47.50	25.00	
3	North	3.50	8.00	30.00	20.00	55.00	25.00	
3	West	3.50	8.00	30.00	20.00	55.00	25.00	
3	South	3.50	8.00	30.00	20.00	55.00	25.00	
3	East	3.50	8.00	30.00	20.00	55.00	25.00	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Intersection	Leg	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
1	North	Percentage	Region of Waterloo Standard		90.00
1	West	Percentage	Region of Waterloo Standard		90.00
1	South	Percentage	Region of Waterloo Standard		90.00
1	East	Percentage	Region of Waterloo Standard		90.00
2	North	Percentage	Region of Waterloo Standard		90.00
2	West	Percentage	Region of Waterloo Standard		90.00
2	South	Percentage	Region of Waterloo Standard		90.00
2	East	Percentage	Region of Waterloo Standard		90.00
3	North	Percentage	Region of Waterloo Standard		90.00
3	West	Percentage	Region of Waterloo Standard		90.00
3	South	Percentage	Region of Waterloo Standard		90.00
3	East	Percentage	Region of Waterloo Standard		90.00

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1	North		(calculated)	(calculated)	0.579	1221.701
1	West		(calculated)	(calculated)	0.579	1221.701
1	South		(calculated)	(calculated)	0.579	1221.701
1	East		(calculated)	(calculated)	0.579	1221.701
2	North		(calculated)	(calculated)	0.558	1221.701
2	West		(calculated)	(calculated)	0.685	1814.551
2	South		(calculated)	(calculated)	0.558	1221.701
2	East		(calculated)	(calculated)	0.685	1814.551
3	North		(calculated)	(calculated)	0.647	1814.551
3	West		(calculated)	(calculated)	0.647	1814.551
3	South		(calculated)	(calculated)	0.647	1814.551
3	East		(calculated)	(calculated)	0.647	1814.551

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry

		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	North	ONE HOUR	✓	345.00	100.000
1	West	ONE HOUR	✓	537.00	100.000
1	South	ONE HOUR	✓	130.00	100.000
1	East	ONE HOUR	✓	1049.00	100.000
2	North	ONE HOUR	✓	345.00	100.000
2	West	ONE HOUR	✓	537.00	100.000
2	South	ONE HOUR	✓	130.00	100.000
2	East	ONE HOUR	✓	1049.00	100.000
3	North	ONE HOUR	✓	345.00	100.000
3	West	ONE HOUR	✓	537.00	100.000
3	South	ONE HOUR	✓	130.00	100.000
3	East	ONE HOUR	✓	1049.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.000	63.000	122.000	160.000
	West	44.000	0.000	34.000	459.000
	South	72.000	19.000	0.000	39.000
	East	225.000	731.000	93.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.18	0.35	0.46
	West	0.08	0.00	0.06	0.85
	South	0.55	0.15	0.00	0.30
	East	0.21	0.70	0.09	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.000	63.000	122.000	160.000
	West	44.000	0.000	34.000	459.000
	South	72.000	19.000	0.000	39.000
	East	225.000	731.000	93.000	0.000

Turning Proportions (PCE) - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.18	0.35	0.46
	West	0.08	0.00	0.06	0.85
	South	0.55	0.15	0.00	0.30
	East	0.21	0.70	0.09	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 3 (for whole period)

		To			
		North	West	South	East
	North	0.000	63.000	122.000	160.000

From	West	44.000	0.000	34.000	459.000
	South	72.000	19.000	0.000	39.000
	East	225.000	731.000	93.000	0.000

Turning Proportions (PCE) - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.18	0.35	0.46
	West	0.08	0.00	0.06	0.85
	South	0.55	0.15	0.00	0.30
	East	0.21	0.70	0.09	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.060	1.000	1.010
	West	1.000	1.000	1.000	1.100
	South	1.000	1.000	1.000	1.000
	East	1.000	1.080	1.000	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	6.0	0.0	1.0
	West	0.0	0.0	0.0	10.0
	South	0.0	0.0	0.0	0.0
	East	0.0	8.0	0.0	0.0

Average PCE Per Vehicle - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.060	1.000	1.010
	West	1.000	1.000	1.000	1.100
	South	1.000	1.000	1.000	1.000
	East	1.000	1.080	1.000	1.000

Truck Percentages - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.0	6.0	0.0	1.0
	West	0.0	0.0	0.0	10.0
	South	0.0	0.0	0.0	0.0
	East	0.0	8.0	0.0	0.0

Average PCE Per Vehicle - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.060	1.000	1.010
	West	1.000	1.000	1.000	1.100
	South	1.000	1.000	1.000	1.000
	East	1.000	1.080	1.000	1.000

Truck Percentages - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	0.0	6.0	0.0	1.0
	West	0.0	0.0	0.0	10.0
	South	0.0	0.0	0.0	0.0
	East	0.0	8.0	0.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1	North	0.54	11.32	1.17	2.03	B	316.58	474.87	67.88	8.58	0.75	67.89	8.58
1	West	0.60	9.91	1.61	1.08	A	492.76	739.14	95.62	7.76	1.06	95.64	7.76
1	South	0.18	5.49	0.22	~1	A	119.29	178.94	14.55	4.88	0.16	14.55	4.88
1	East	1.02	91.40	29.95	90.68	F	962.58	1443.87	899.91	37.40	10.00	900.05	37.40
2	North	0.54	11.27	1.17	2.03	B	316.58	474.87	66.31	8.38	0.74	66.32	8.38
2	West	0.39	4.15	0.68	1.08	A	492.76	739.14	45.16	3.67	0.50	45.16	3.67
2	South	0.18	5.36	0.21	~1	A	119.29	178.94	14.30	4.79	0.16	14.30	4.79
2	East	0.67	6.80	2.16	3.16	A	962.58	1443.87	126.85	5.27	1.41	126.86	5.27
3	North	0.31	4.38	0.46	1.02	A	316.58	474.87	29.84	3.77	0.33	29.84	3.77
3	West	0.38	4.08	0.67	1.08	A	492.76	739.14	44.58	3.62	0.50	44.58	3.62
3	South	0.11	3.00	0.12	~1	A	119.29	178.94	8.32	2.79	0.09	8.32	2.79
3	East	0.67	6.73	2.14	3.16	A	962.58	1443.87	125.93	5.23	1.40	125.94	5.23

Main Results for each time segment

Main results: (16:00-16:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	259.73	64.93	257.99	254.40	627.81	0.00	858.35	741.47	0.303	0.00	0.44	6.070	A
1	West	404.28	101.07	401.63	605.67	280.13	0.00	1059.57	822.24	0.382	0.00	0.66	5.909	A
1	South	97.87	24.47	97.41	185.91	495.85	0.00	934.72	576.93	0.105	0.00	0.12	4.298	A
1	East	789.74	197.44	781.12	492.17	101.09	0.00	1163.19	948.97	0.679	0.00	2.16	9.729	A
2	North	259.73	64.93	258.02	255.61	631.87	0.00	869.14	505.46	0.299	0.00	0.43	5.963	A
2	West	404.28	101.07	402.85	609.28	280.61	0.00	1622.40	1436.27	0.249	0.00	0.36	3.198	A
2	South	97.87	24.47	97.41	186.46	497.00	0.00	944.39	340.25	0.104	0.00	0.12	4.249	A
2	East	789.74	197.44	786.28	493.22	101.20	0.00	1745.26	1570.87	0.453	0.00	0.86	3.944	A
3	North	259.73	64.93	258.82	255.71	631.91	0.00	1405.97	1031.22	0.185	0.00	0.23	3.182	A
3	West	404.28	101.07	402.86	609.46	281.27	0.00	1632.69	1189.51	0.248	0.00	0.36	3.171	A
3	South	97.87	24.47	97.59	186.74	497.39	0.00	1492.95	784.91	0.066	0.00	0.07	2.579	A
3	East	789.74	197.44	786.30	493.65	101.32	0.00	1749.04	1396.28	0.452	0.00	0.86	3.928	A

Main results: (16:15-16:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	310.15	77.54	309.29	304.50	750.95	0.00	787.08	741.47	0.394	0.44	0.65	7.634	A
1	West	482.75	120.69	481.61	724.60	335.64	0.00	1027.45	822.24	0.470	0.66	0.95	7.137	A
1	South	116.87	29.22	116.72	222.69	594.56	0.00	877.60	576.93	0.133	0.12	0.15	4.731	A
1	East	943.03	235.76	934.29	590.11	121.17	0.00	1151.57	948.97	0.819	2.16	4.34	16.806	C
2	North	310.15	77.54	309.32	306.11	756.62	0.00	799.53	505.46	0.388	0.43	0.63	7.443	A
2	West	482.75	120.69	482.29	729.63	336.31	0.00	1584.26	1436.27	0.305	0.36	0.47	3.539	A
2	South	116.87	29.22	116.73	223.39	595.21	0.00	889.59	340.25	0.131	0.12	0.15	4.658	A
2	East	943.03	235.76	941.50	590.71	121.23	0.00	1731.54	1570.87	0.545	0.86	1.25	4.793	A
3	North	310.15	77.54	309.83	306.15	756.64	0.00	1325.32	1031.22	0.234	0.23	0.31	3.599	A
3	West	482.75	120.69	482.30	729.75	336.72	0.00	1596.83	1189.51	0.302	0.36	0.47	3.500	A
3	South	116.87	29.22	116.79	223.57	595.46	0.00	1429.54	784.91	0.082	0.07	0.09	2.741	A
3	East	943.03	235.76	941.52	590.98	121.27	0.00	1736.14	1396.28	0.543	0.86	1.24	4.768	A

Main results: (16:30-16:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS

1	North	379.85	94.96	377.95	361.49	878.27	0.00	713.40	741.47	0.532	0.65	1.13	10.832	B
1	West	591.25	147.81	588.72	850.51	405.70	0.00	986.90	822.24	0.599	0.95	1.58	9.739	A
1	South	143.13	35.78	142.88	267.69	726.73	0.00	801.10	576.93	0.179	0.15	0.22	5.469	A
1	East	1154.97	288.74	1091.50	721.35	148.25	0.00	1135.90	948.97	1.017	4.34	20.21	53.020	F
2	North	379.85	94.96	377.77	374.48	925.33	0.00	705.39	505.46	0.539	0.63	1.15	11.085	B
2	West	591.25	147.81	590.44	892.24	410.87	0.00	1533.20	1436.27	0.386	0.47	0.68	4.137	A
2	South	143.13	35.78	142.89	273.05	728.25	0.00	815.36	340.25	0.176	0.15	0.21	5.352	A
2	East	1154.97	288.74	1151.42	722.74	148.40	0.00	1712.93	1570.87	0.674	1.25	2.13	6.717	A
3	North	379.85	94.96	379.25	374.57	925.39	0.00	1216.21	1031.22	0.312	0.31	0.46	4.364	A
3	West	591.25	147.81	590.46	892.56	412.08	0.00	1548.11	1189.51	0.382	0.47	0.67	4.072	A
3	South	143.13	35.78	143.01	273.58	728.96	0.00	1343.22	784.91	0.107	0.09	0.12	2.999	A
3	East	1154.97	288.74	1151.47	723.48	148.49	0.00	1718.54	1396.28	0.672	1.24	2.11	6.653	A

Main results: (16:45-17:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	379.85	94.96	379.67	367.08	897.54	0.00	702.24	741.47	0.541	1.13	1.17	11.317	B
1	West	591.25	147.81	591.14	867.93	409.28	0.00	984.83	822.24	0.600	1.58	1.61	9.909	A
1	South	143.13	35.78	143.13	270.63	729.79	0.00	799.33	576.93	0.179	0.22	0.22	5.485	A
1	East	1154.97	288.74	1115.99	724.29	148.63	0.00	1135.68	948.97	1.017	20.21	29.95	91.403	F
2	North	379.85	94.96	379.78	375.42	928.09	0.00	703.86	505.46	0.540	1.15	1.17	11.269	B
2	West	591.25	147.81	591.24	895.05	412.81	0.00	1531.87	1436.27	0.386	0.68	0.68	4.149	A
2	South	143.13	35.78	143.13	274.12	729.93	0.00	814.42	340.25	0.176	0.21	0.21	5.362	A
2	East	1154.97	288.74	1154.88	724.42	148.63	0.00	1712.77	1570.87	0.674	2.13	2.16	6.801	A
3	North	379.85	94.96	379.84	375.43	928.09	0.00	1214.47	1031.22	0.313	0.46	0.46	4.378	A
3	West	591.25	147.81	591.24	895.06	412.87	0.00	1547.60	1189.51	0.382	0.67	0.67	4.081	A
3	South	143.13	35.78	143.13	274.14	729.96	0.00	1342.57	784.91	0.107	0.12	0.12	3.000	A
3	East	1154.97	288.74	1154.88	724.46	148.64	0.00	1718.45	1396.28	0.672	2.11	2.14	6.733	A

Main results: (17:00-17:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	310.15	77.54	311.86	327.84	834.61	0.00	738.66	741.47	0.420	1.17	0.75	8.598	A
1	West	482.75	120.69	485.22	799.29	347.18	0.00	1020.77	822.24	0.473	1.61	0.99	7.320	A
1	South	116.87	29.22	117.12	233.27	599.13	0.00	874.95	576.93	0.134	0.22	0.16	4.751	A
1	East	943.03	235.76	1040.71	594.51	121.74	0.00	1151.24	948.97	0.819	29.95	5.53	47.088	E
2	North	310.15	77.54	312.22	307.51	760.65	0.00	797.28	505.46	0.389	1.17	0.65	7.564	A
2	West	482.75	120.69	483.55	733.74	339.12	0.00	1582.33	1436.27	0.305	0.68	0.48	3.556	A
2	South	116.87	29.22	117.11	224.94	597.73	0.00	888.18	340.25	0.132	0.21	0.15	4.671	A
2	East	943.03	235.76	946.56	593.25	121.60	0.00	1731.29	1570.87	0.545	2.16	1.28	4.858	A
3	North	310.15	77.54	310.74	307.43	760.59	0.00	1322.77	1031.22	0.234	0.46	0.31	3.612	A
3	West	482.75	120.69	483.53	733.42	337.91	0.00	1596.07	1189.51	0.302	0.67	0.47	3.512	A
3	South	116.87	29.22	116.99	224.41	597.03	0.00	1428.52	784.91	0.082	0.12	0.09	2.744	A
3	East	943.03	235.76	946.51	592.50	121.51	0.00	1735.99	1396.28	0.543	2.14	1.27	4.828	A

Main results: (17:15-17:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	259.73	64.93	260.91	259.67	644.81	0.00	848.51	741.47	0.306	0.75	0.45	6.233	A
1	West	404.28	101.07	405.52	621.29	284.42	0.00	1057.09	822.24	0.382	0.99	0.68	6.003	A
1	South	97.87	24.47	98.02	189.10	500.84	0.00	931.83	576.93	0.105	0.16	0.12	4.317	A
1	East	789.74	197.44	802.64	497.02	101.84	0.00	1162.76	948.97	0.679	5.53	2.31	10.892	B
2	North	259.73	64.93	260.60	257.18	635.92	0.00	866.87	505.46	0.300	0.65	0.44	6.035	A
2	West	404.28	101.07	404.75	613.36	283.17	0.00	1620.65	1436.27	0.249	0.48	0.36	3.210	A
2	South	97.87	24.47	98.01	187.94	499.98	0.00	942.73	340.25	0.104	0.15	0.12	4.262	A
2	East	789.74	197.44	791.33	496.22	101.77	0.00	1744.86	1570.87	0.453	1.28	0.88	3.987	A
3	North	259.73	64.93	260.06	257.14	635.90	0.00	1403.39	1031.22	0.185	0.31	0.23	3.196	A
3	West	404.28	101.07	404.74	613.24	282.72	0.00	1631.75	1189.51	0.248	0.47	0.36	3.181	A
3	South	97.87	24.47	97.95	187.74	499.72	0.00	1491.44	784.91	0.066	0.09	0.07	2.583	A
3	East	789.74	197.44	791.31	495.94	101.73	0.00	1748.78	1396.28	0.452	1.27	0.88	3.970	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	6.32	0.42	6.070	A	A
1	West	9.57	0.64	5.909	A	A
1	South	1.71	0.11	4.298	A	A
1	East	29.84	1.99	9.729	A	A
2	North	6.21	0.41	5.963	A	A
2	West	5.26	0.35	3.198	A	A
2	South	1.69	0.11	4.249	A	A
2	East	12.59	0.84	3.944	A	A
3	North	3.37	0.22	3.182	A	A
3	West	5.22	0.35	3.171	A	A
3	South	1.03	0.07	2.579	A	A
3	East	12.54	0.84	3.928	A	A

Queueing Delay results: (16:15-16:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	9.46	0.63	7.634	A	A
1	West	13.75	0.92	7.137	A	A
1	South	2.25	0.15	4.731	A	A
1	East	58.02	3.87	16.806	C	B
2	North	9.23	0.62	7.443	A	A
2	West	6.97	0.47	3.539	A	A
2	South	2.22	0.15	4.658	A	A
2	East	18.18	1.21	4.793	A	A
3	North	4.56	0.30	3.599	A	A
3	West	6.90	0.46	3.500	A	A
3	South	1.32	0.09	2.741	A	A
3	East	18.08	1.21	4.768	A	A

Queueing Delay results: (16:30-16:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	16.06	1.07	10.832	B	B
1	West	22.48	1.50	9.739	A	A
1	South	3.17	0.21	5.469	A	A
1	East	203.41	13.56	53.020	F	D
2	North	16.40	1.09	11.085	B	B
2	West	9.92	0.66	4.137	A	A
2	South	3.11	0.21	5.352	A	A
2	East	30.53	2.04	6.717	A	A
3	North	6.73	0.45	4.364	A	A
3	West	9.77	0.65	4.072	A	A
3	South	1.76	0.12	2.999	A	A
3	East	30.25	2.02	6.653	A	A

Queueing Delay results: (16:45-17:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	17.39	1.16	11.317	B	B
1	West	23.93	1.60	9.909	A	A
1	South	3.25	0.22	5.485	A	A
1	East	378.97	25.26	91.403	F	F
2	North	17.49	1.17	11.269	B	B
2	West	10.16	0.68	4.149	A	A
2	South	3.18	0.21	5.362	A	A
2	East	32.24	2.15	6.801	A	A
3	North	6.89	0.46	4.378	A	A
3	West	10.00	0.67	4.081	A	A
3	South	1.78	0.12	3.000	A	A
3	East	31.92	2.13	6.733	A	A

Queueing Delay results: (17:00-17:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service

1	North	11.66	0.78	8.598	A	A
1	West	15.41	1.03	7.320	A	A
1	South	2.37	0.16	4.751	A	A
1	East	191.65	12.78	47.088	E	D
2	North	10.22	0.68	7.564	A	A
2	West	7.31	0.49	3.556	A	A
2	South	2.33	0.16	4.671	A	A
2	East	19.81	1.32	4.858	A	A
3	North	4.77	0.32	3.612	A	A
3	West	7.22	0.48	3.512	A	A
3	South	1.36	0.09	2.744	A	A
3	East	19.68	1.31	4.828	A	A

Queueing Delay results: (17:15-17:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	6.99	0.47	6.233	A	A
1	West	10.48	0.70	6.003	A	A
1	South	1.80	0.12	4.317	A	A
1	East	38.02	2.53	10.892	B	B
2	North	6.76	0.45	6.035	A	A
2	West	5.51	0.37	3.210	A	A
2	South	1.78	0.12	4.262	A	A
2	East	13.50	0.90	3.987	A	A
3	North	3.52	0.23	3.196	A	A
3	West	5.46	0.36	3.181	A	A
3	South	1.07	0.07	2.583	A	A
3	East	13.44	0.90	3.970	A	A

Queue Variation Results for each time segment

Queue Variation results: (16:00-16:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.44	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	0.66	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	0.12	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	2.16	0.00	1.05	3.16	3.16			N/A	N/A
2	North	0.43	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.36	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.12	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.86	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.36	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.07	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.86	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:15-16:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker

1	North	0.65	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	0.95	0.00	0.00	1.08	1.08			N/A	N/A
1	South	0.15	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	4.34	0.00	0.00	10.54	14.76			N/A	N/A
2	North	0.63	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.15	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	1.25	0.00	0.00	2.11	3.16			N/A	N/A
3	North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.09	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	1.24	0.00	0.00	2.11	3.16			N/A	N/A

Queue Variation results: (16:30-16:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.13	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	1.58	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	0.22	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	20.21	0.00	12.65	45.34	59.05			N/A	N/A
2	North	1.15	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.68	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.21	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	2.13	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.67	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.12	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	2.11	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:45-17:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.17	0.00	0.00	0.00	2.03			N/A	N/A
1	West	1.61	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	0.22	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	29.95	0.00	18.98	69.59	90.68			N/A	N/A
2	North	1.17	0.00	0.00	0.00	2.03			N/A	N/A

2	West	0.68	0.00	0.00	0.00	1.08			N/A	N/A
2	South	0.21	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	2.16	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.46	0.00	0.00	0.00	1.02			N/A	N/A
3	West	0.67	0.00	0.00	0.00	1.08			N/A	N/A
3	South	0.12	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	2.14	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:00-17:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.75	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	0.99	0.00	0.00	1.08	1.08			N/A	N/A
1	South	0.16	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	5.53	0.00	0.00	12.65	21.09			N/A	N/A
2	North	0.65	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.15	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	1.28	0.00	0.00	1.05	2.11			N/A	N/A
3	North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.09	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	1.27	0.00	0.00	1.05	2.11			N/A	N/A

Queue Variation results: (17:15-17:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	0.68	0.00	0.00	0.00	1.08			N/A	N/A
1	South	0.12	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	2.31	0.00	0.00	1.05	6.33			N/A	N/A
2	North	0.44	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.36	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.12	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.88	0.00	0.00	1.05	1.05			N/A	N/A
3	North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.36	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.07	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

3	**East**	0.88	0.00	0.00	1.05	1.05			N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

Filename: Centennial and Riddell.arc8
Path: C:\Users\AdamMorrison\Desktop\Projects\200195 - Arcady
Report generation date: 2020-08-25 7:58:35 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - Background 2031						
Intersection 1 - Leg North	0.60	1.07	6.48	0.36	A	13.96	B
Intersection 1 - Leg West	4.24	13.72	19.26	0.80	C		
Intersection 1 - Leg South	1.47	2.04	13.64	0.60	B		
Intersection 1 - Leg East	1.53	1.22	10.70	0.56	B		
Intersection 2 - Leg North	0.59	1.07	6.36	0.36	A	6.74	A
Intersection 2 - Leg West	1.21	?	5.35	0.52	A		
Intersection 2 - Leg South	1.38	2.04	12.72	0.58	B		
Intersection 2 - Leg East	0.67	1.22	4.62	0.36	A		
Intersection 3 - Leg North	0.31	~1	3.34	0.23	A	4.64	A
Intersection 3 - Leg West	1.19	?	5.26	0.51	A		
Intersection 3 - Leg South	0.50	1.02	4.62	0.33	A		
Intersection 3 - Leg East	0.66	1.22	4.53	0.35	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Background 2031, AM " model duration: 8:00 AM - 9:30 AM
"D2 - Background 2031, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2020-08-25 7:58:33 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2020-08-25
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Background 2031, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Background 2031, AM	Background 2031	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	1	(untitled)	Roundabout	North,West,South,East				13.96	B
2	2	(untitled)	Roundabout	North,West,South,East				6.74	A
3	3	(untitled)	Roundabout	North,West,South,East				4.64	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1	**North**	North	Alder Street	
1	**West**	West	Riddell Road	
1	**South**	South	Alder Street	
1	**East**	East	Riddell Road	
2	**North**	North	Alder Street	
2	**West**	West	Riddell Road	
2	**South**	South	Alder Street	
2	**East**	East	Riddell Road	
3	**North**	North	Alder Street	
3	**West**	West	Riddell Road	
3	**South**	South	Alder Street	
3	**East**	East	Riddell Road	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	**North**	0.00	99999.00		0.00
1	**West**	0.00	99999.00		0.00
1	**South**	0.00	99999.00		0.00
1	**East**	0.00	99999.00		0.00
2	**North**	0.00	99999.00		0.00

2	West	0.00	99999.00		0.00
2	South	0.00	99999.00		0.00
2	East	0.00	99999.00		0.00
3	North	0.00	99999.00		0.00
3	West	0.00	99999.00		0.00
3	South	0.00	99999.00		0.00
3	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	North	3.50	4.50	30.00	20.00	40.00	25.00	
1	West	3.50	4.50	30.00	20.00	40.00	25.00	
1	South	3.50	4.50	30.00	20.00	40.00	25.00	
1	East	3.50	4.50	30.00	20.00	40.00	25.00	
2	North	3.50	4.50	30.00	20.00	47.50	25.00	
2	West	3.50	8.00	30.00	20.00	47.50	25.00	
2	South	3.50	4.50	30.00	20.00	47.50	25.00	
2	East	3.50	8.00	30.00	20.00	47.50	25.00	
3	North	3.50	8.00	30.00	20.00	55.00	25.00	
3	West	3.50	8.00	30.00	20.00	55.00	25.00	
3	South	3.50	8.00	30.00	20.00	55.00	25.00	
3	East	3.50	8.00	30.00	20.00	55.00	25.00	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Intersection	Leg	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
1	North	Percentage	Region of Waterloo Standard		90.00
1	West	Percentage	Region of Waterloo Standard		90.00
1	South	Percentage	Region of Waterloo Standard		90.00
1	East	Percentage	Region of Waterloo Standard		90.00
2	North	Percentage	Region of Waterloo Standard		90.00
2	West	Percentage	Region of Waterloo Standard		90.00
2	South	Percentage	Region of Waterloo Standard		90.00
2	East	Percentage	Region of Waterloo Standard		90.00
3	North	Percentage	Region of Waterloo Standard		90.00
3	West	Percentage	Region of Waterloo Standard		90.00
3	South	Percentage	Region of Waterloo Standard		90.00
3	East	Percentage	Region of Waterloo Standard		90.00

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1	North		(calculated)	(calculated)	0.579	1221.701
1	West		(calculated)	(calculated)	0.579	1221.701
1	South		(calculated)	(calculated)	0.579	1221.701
1	East		(calculated)	(calculated)	0.579	1221.701
2	North		(calculated)	(calculated)	0.558	1221.701
2	West		(calculated)	(calculated)	0.685	1814.551
2	South		(calculated)	(calculated)	0.558	1221.701
2	East		(calculated)	(calculated)	0.685	1814.551
3	North		(calculated)	(calculated)	0.647	1814.551
3	West		(calculated)	(calculated)	0.647	1814.551
3	South		(calculated)	(calculated)	0.647	1814.551
3	East		(calculated)	(calculated)	0.647	1814.551

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry

		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	North	ONE HOUR	✓	306.00	100.000
1	West	ONE HOUR	✓	746.00	100.000
1	South	ONE HOUR	✓	359.00	100.000
1	East	ONE HOUR	✓	475.00	100.000
2	North	ONE HOUR	✓	306.00	100.000
2	West	ONE HOUR	✓	746.00	100.000
2	South	ONE HOUR	✓	359.00	100.000
2	East	ONE HOUR	✓	475.00	100.000
3	North	ONE HOUR	✓	306.00	100.000
3	West	ONE HOUR	✓	746.00	100.000
3	South	ONE HOUR	✓	359.00	100.000
3	East	ONE HOUR	✓	475.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.000	71.000	97.000	138.000
	West	195.000	0.000	8.000	543.000
	South	186.000	72.000	0.000	101.000
	East	92.000	321.000	62.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.23	0.32	0.45
	West	0.26	0.00	0.01	0.73
	South	0.52	0.20	0.00	0.28
	East	0.19	0.68	0.13	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.000	71.000	97.000	138.000
	West	195.000	0.000	8.000	543.000
	South	186.000	72.000	0.000	101.000
	East	92.000	321.000	62.000	0.000

Turning Proportions (PCE) - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.23	0.32	0.45
	West	0.26	0.00	0.01	0.73
	South	0.52	0.20	0.00	0.28
	East	0.19	0.68	0.13	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 3 (for whole period)

		To			
		North	West	South	East
	North	0.000	71.000	97.000	138.000

From	West	195.000	0.000	8.000	543.000
	South	186.000	72.000	0.000	101.000
	East	92.000	321.000	62.000	0.000

Turning Proportions (PCE) - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.23	0.32	0.45
	West	0.26	0.00	0.01	0.73
	South	0.52	0.20	0.00	0.28
	East	0.19	0.68	0.13	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.110	1.030	1.080
	West	1.070	1.000	1.330	1.170
	South	1.010	1.020	1.000	1.040
	East	1.250	1.260	1.020	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	11.0	3.0	8.0
	West	7.0	0.0	33.0	17.0
	South	1.0	2.0	0.0	4.0
	East	25.0	26.0	2.0	0.0

Average PCE Per Vehicle - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.110	1.030	1.080
	West	1.070	1.000	1.330	1.170
	South	1.010	1.020	1.000	1.040
	East	1.250	1.260	1.020	1.000

Truck Percentages - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.0	11.0	3.0	8.0
	West	7.0	0.0	33.0	17.0
	South	1.0	2.0	0.0	4.0
	East	25.0	26.0	2.0	0.0

Average PCE Per Vehicle - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.110	1.030	1.080
	West	1.070	1.000	1.330	1.170
	South	1.010	1.020	1.000	1.040
	East	1.250	1.260	1.020	1.000

Truck Percentages - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	0.0	11.0	3.0	8.0
	West	7.0	0.0	33.0	17.0
	South	1.0	2.0	0.0	4.0
	East	25.0	26.0	2.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1	North	0.36	6.48	0.60	1.07	A	280.79	421.19	39.51	5.63	0.44	39.51	5.63
1	West	0.80	19.26	4.24	13.72	C	684.54	1026.81	211.70	12.37	2.35	211.74	12.37
1	South	0.60	13.64	1.47	2.04	B	329.42	494.14	78.82	9.57	0.88	78.83	9.57
1	East	0.56	10.70	1.53	1.22	B	435.87	653.80	92.10	8.45	1.02	92.11	8.45
2	North	0.36	6.36	0.59	1.07	A	280.79	421.19	38.99	5.55	0.43	39.00	5.56
2	West	0.52	5.35	1.21	?	A	684.54	1026.81	77.17	4.51	0.86	77.18	4.51
2	South	0.58	12.72	1.38	2.04	B	329.42	494.14	75.28	9.14	0.84	75.29	9.14
2	East	0.36	4.62	0.67	1.22	A	435.87	653.80	44.59	4.09	0.50	44.60	4.09
3	North	0.23	3.34	0.31	~1	A	280.79	421.19	21.62	3.08	0.24	21.62	3.08
3	West	0.51	5.26	1.19	?	A	684.54	1026.81	76.24	4.46	0.85	76.25	4.46
3	South	0.33	4.62	0.50	1.02	A	329.42	494.14	32.38	3.93	0.36	32.38	3.93
3	East	0.35	4.53	0.66	1.22	A	435.87	653.80	43.91	4.03	0.49	43.92	4.03

Main Results for each time segment

Main results: (08:00-08:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	230.37	57.59	229.14	353.37	340.08	0.00	1024.87	752.87	0.225	0.00	0.31	4.835	A
1	West	561.63	140.41	556.88	346.91	222.31	0.00	1093.03	821.60	0.514	0.00	1.19	7.613	A
1	South	270.27	67.57	268.37	124.95	654.24	0.00	843.05	554.78	0.321	0.00	0.48	6.371	A
1	East	357.60	89.40	355.02	584.18	338.43	0.00	1025.83	866.65	0.349	0.00	0.65	6.526	A
2	North	230.37	57.59	229.15	354.25	341.03	0.00	1031.42	551.99	0.223	0.00	0.31	4.796	A
2	West	561.63	140.41	559.31	347.71	222.47	0.00	1662.21	1398.14	0.338	0.00	0.58	3.724	A
2	South	270.27	67.57	268.41	125.13	656.65	0.00	855.31	311.05	0.316	0.00	0.47	6.238	A
2	East	357.60	89.40	356.19	585.97	339.09	0.00	1582.35	1411.22	0.226	0.00	0.35	3.581	A
3	North	230.37	57.59	229.65	354.72	341.22	0.00	1593.93	1057.16	0.145	0.00	0.18	2.822	A
3	West	561.63	140.41	559.33	348.01	222.86	0.00	1670.45	1182.74	0.336	0.00	0.58	3.697	A
3	South	270.27	67.57	269.29	125.29	656.90	0.00	1389.82	749.75	0.194	0.00	0.25	3.274	A
3	East	357.60	89.40	356.20	586.45	339.74	0.00	1594.88	1266.26	0.224	0.00	0.35	3.545	A

Main results: (08:15-08:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	275.09	68.77	274.68	423.76	407.96	0.00	985.59	752.87	0.279	0.31	0.41	5.415	A
1	West	670.64	167.66	667.88	416.09	266.54	0.00	1067.44	821.60	0.628	1.19	1.88	10.230	B
1	South	322.73	80.68	321.72	149.83	784.59	0.00	767.61	554.78	0.420	0.48	0.73	8.218	A
1	East	427.02	106.75	425.93	700.52	405.79	0.00	986.85	866.65	0.433	0.65	0.92	7.818	A
2	North	275.09	68.77	274.68	424.41	408.48	0.00	993.78	551.99	0.277	0.31	0.41	5.356	A
2	West	670.64	167.66	669.79	416.54	266.63	0.00	1631.97	1398.14	0.411	0.58	0.79	4.275	A
2	South	322.73	80.68	321.78	149.93	786.49	0.00	782.86	311.05	0.412	0.47	0.71	7.949	A
2	East	427.02	106.75	426.57	701.94	406.33	0.00	1536.31	1411.22	0.278	0.35	0.47	3.957	A
3	North	275.09	68.77	274.89	424.73	408.61	0.00	1550.35	1057.16	0.177	0.18	0.23	3.020	A
3	West	670.64	167.66	669.81	416.71	266.79	0.00	1642.05	1182.74	0.408	0.58	0.78	4.230	A
3	South	322.73	80.68	322.38	150.00	786.59	0.00	1305.95	749.75	0.247	0.25	0.33	3.734	A
3	East	427.02	106.75	426.58	702.21	406.77	0.00	1551.54	1266.26	0.275	0.35	0.46	3.903	A

Main results: (08:30-08:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS

1	North	336.91	84.23	336.16	516.60	498.50	0.00	933.19	752.87	0.361	0.41	0.60	6.445	A
1	West	821.36	205.34	812.65	508.54	326.12	0.00	1032.96	821.60	0.795	1.88	4.06	17.998	C
1	South	395.27	98.82	392.48	183.23	955.54	0.00	668.68	554.78	0.591	0.73	1.43	13.165	B
1	East	522.98	130.75	520.62	853.53	494.48	0.00	935.51	866.65	0.559	0.92	1.51	10.530	B
2	North	336.91	84.23	336.18	518.86	499.81	0.00	942.82	551.99	0.357	0.41	0.59	6.343	A
2	West	821.36	205.34	819.70	509.65	326.34	0.00	1591.09	1398.14	0.516	0.79	1.21	5.324	A
2	South	395.27	98.82	392.69	183.52	962.53	0.00	684.64	311.05	0.577	0.71	1.35	12.471	B
2	East	522.98	130.75	522.19	858.74	496.47	0.00	1474.59	1411.22	0.355	0.47	0.67	4.610	A
3	North	336.91	84.23	336.59	519.86	500.21	0.00	1491.13	1057.16	0.226	0.23	0.31	3.337	A
3	West	821.36	205.34	819.75	510.14	326.65	0.00	1603.34	1182.74	0.512	0.78	1.19	5.243	A
3	South	395.27	98.82	394.59	183.65	962.75	0.00	1192.06	749.75	0.332	0.33	0.50	4.602	A
3	East	522.98	130.75	522.21	859.49	497.85	0.00	1492.65	1266.26	0.350	0.46	0.65	4.524	A

Main results: (08:45-09:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	336.91	84.23	336.90	520.49	500.85	0.00	931.83	752.87	0.362	0.60	0.60	6.475	A
1	West	821.36	205.34	820.65	510.77	326.98	0.00	1032.46	821.60	0.796	4.06	4.24	19.264	C
1	South	395.27	98.82	395.09	183.84	963.78	0.00	663.90	554.78	0.595	1.43	1.47	13.645	B
1	East	522.98	130.75	522.88	860.42	498.45	0.00	933.22	866.65	0.560	1.51	1.53	10.702	B
2	North	336.91	84.23	336.90	520.72	500.93	0.00	942.19	551.99	0.358	0.59	0.59	6.364	A
2	West	821.36	205.34	821.33	510.84	326.99	0.00	1590.64	1398.14	0.516	1.21	1.21	5.350	A
2	South	395.27	98.82	395.17	183.86	964.46	0.00	683.56	311.05	0.578	1.35	1.38	12.724	B
2	East	522.98	130.75	522.97	860.94	498.68	0.00	1473.07	1411.22	0.355	0.67	0.67	4.624	A
3	North	336.91	84.23	336.91	520.77	500.95	0.00	1490.64	1057.16	0.226	0.31	0.31	3.338	A
3	West	821.36	205.34	821.33	510.86	327.00	0.00	1603.12	1182.74	0.512	1.19	1.19	5.265	A
3	South	395.27	98.82	395.26	183.87	964.46	0.00	1190.95	749.75	0.332	0.50	0.50	4.615	A
3	East	522.98	130.75	522.97	860.97	498.75	0.00	1492.07	1266.26	0.351	0.65	0.66	4.534	A

Main results: (09:00-09:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	275.09	68.77	275.82	429.47	411.48	0.00	983.55	752.87	0.280	0.60	0.42	5.451	A
1	West	670.64	167.66	679.60	419.44	267.86	0.00	1066.67	821.60	0.629	4.24	1.99	10.868	B
1	South	322.73	80.68	325.55	150.76	796.70	0.00	760.60	554.78	0.424	1.47	0.76	8.497	A
1	East	427.02	106.75	429.35	710.65	411.61	0.00	983.48	866.65	0.434	1.53	0.95	7.962	A
2	North	275.09	68.77	275.80	427.14	410.18	0.00	992.83	551.99	0.277	0.59	0.41	5.380	A
2	West	670.64	167.66	672.27	418.34	267.65	0.00	1631.28	1398.14	0.411	1.21	0.80	4.299	A
2	South	322.73	80.68	325.32	150.48	789.45	0.00	781.21	311.05	0.413	1.38	0.73	8.102	A
2	East	427.02	106.75	427.80	705.24	409.52	0.00	1534.13	1411.22	0.278	0.67	0.47	3.974	A
3	North	275.09	68.77	275.41	426.13	409.78	0.00	1549.59	1057.16	0.178	0.31	0.23	3.026	A
3	West	670.64	167.66	672.23	417.85	267.34	0.00	1641.69	1182.74	0.409	1.19	0.80	4.253	A
3	South	322.73	80.68	323.40	150.35	789.23	0.00	1304.25	749.75	0.247	0.50	0.34	3.749	A
3	East	427.02	106.75	427.77	704.49	408.14	0.00	1550.66	1266.26	0.275	0.66	0.47	3.915	A

Main results: (09:15-09:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	230.37	57.59	230.80	357.69	343.70	0.00	1022.78	752.87	0.225	0.42	0.31	4.866	A
1	West	561.63	140.41	564.68	350.42	224.07	0.00	1092.02	821.60	0.514	1.99	1.23	7.851	A
1	South	270.27	67.57	271.37	126.04	662.71	0.00	838.15	554.78	0.322	0.76	0.49	6.494	A
1	East	357.60	89.40	358.76	591.45	342.63	0.00	1023.40	866.65	0.349	0.95	0.66	6.624	A
2	North	230.37	57.59	230.79	356.94	343.12	0.00	1030.25	551.99	0.224	0.41	0.31	4.821	A
2	West	561.63	140.41	562.50	349.93	223.97	0.00	1661.18	1398.14	0.338	0.80	0.59	3.751	A
2	South	270.27	67.57	271.28	125.93	660.54	0.00	853.14	311.05	0.317	0.73	0.48	6.325	A
2	East	357.60	89.40	358.06	589.83	341.99	0.00	1580.37	1411.22	0.226	0.47	0.36	3.595	A
3	North	230.37	57.59	230.57	356.59	342.98	0.00	1592.79	1057.16	0.145	0.23	0.18	2.830	A
3	West	561.63	140.41	562.48	349.74	223.81	0.00	1669.84	1182.74	0.336	0.80	0.58	3.719	A
3	South	270.27	67.57	270.63	125.86	660.43	0.00	1387.53	749.75	0.195	0.34	0.25	3.291	A
3	East	357.60	89.40	358.05	589.54	341.52	0.00	1593.73	1266.26	0.224	0.47	0.35	3.559	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	4.50	0.30	4.835	A	A
1	West	16.91	1.13	7.613	A	A
1	South	6.89	0.46	6.371	A	A
1	East	9.32	0.62	6.526	A	A
2	North	4.46	0.30	4.796	A	A
2	West	8.48	0.57	3.724	A	A
2	South	6.75	0.45	6.238	A	A
2	East	5.20	0.35	3.581	A	A
3	North	2.66	0.18	2.822	A	A
3	West	8.42	0.56	3.697	A	A
3	South	3.61	0.24	3.274	A	A
3	East	5.15	0.34	3.545	A	A

Queueing Delay results: (08:15-08:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	6.04	0.40	5.415	A	A
1	West	26.69	1.78	10.230	B	B
1	South	10.55	0.70	8.218	A	A
1	East	13.32	0.89	7.818	A	A
2	North	5.97	0.40	5.356	A	A
2	West	11.62	0.77	4.275	A	A
2	South	10.22	0.68	7.949	A	A
2	East	6.89	0.46	3.957	A	A
3	North	3.41	0.23	3.020	A	A
3	West	11.51	0.77	4.230	A	A
3	South	4.92	0.33	3.734	A	A
3	East	6.80	0.45	3.903	A	A

Queueing Delay results: (08:30-08:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	8.73	0.58	6.445	A	A
1	West	54.14	3.61	17.998	C	B
1	South	20.00	1.33	13.165	B	B
1	East	21.50	1.43	10.530	B	B
2	North	8.59	0.57	6.343	A	A
2	West	17.55	1.17	5.324	A	A
2	South	19.02	1.27	12.471	B	B
2	East	9.77	0.65	4.610	A	A
3	North	4.60	0.31	3.337	A	A
3	West	17.29	1.15	5.243	A	A
3	South	7.37	0.49	4.602	A	A
3	East	9.59	0.64	4.524	A	A

Queueing Delay results: (08:45-09:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	9.01	0.60	6.475	A	A
1	West	62.46	4.16	19.264	C	B
1	South	21.80	1.45	13.645	B	B
1	East	22.87	1.52	10.702	B	B
2	North	8.86	0.59	6.364	A	A
2	West	18.16	1.21	5.350	A	A
2	South	20.48	1.37	12.724	B	B
2	East	10.02	0.67	4.624	A	A
3	North	4.67	0.31	3.338	A	A
3	West	17.87	1.19	5.265	A	A
3	South	7.56	0.50	4.615	A	A
3	East	9.83	0.66	4.534	A	A

Queueing Delay results: (09:00-09:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service

1	North	6.44	0.43	5.451	A	A
1	West	32.21	2.15	10.868	B	B
1	South	11.99	0.80	8.497	A	A
1	East	14.85	0.99	7.962	A	A
2	North	6.35	0.42	5.380	A	A
2	West	12.37	0.82	4.299	A	A
2	South	11.42	0.76	8.102	A	A
2	East	7.24	0.48	3.974	A	A
3	North	3.53	0.24	3.026	A	A
3	West	12.24	0.82	4.253	A	A
3	South	5.16	0.34	3.749	A	A
3	East	7.13	0.48	3.915	A	A

Queueing Delay results: (09:15-09:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	4.79	0.32	4.866	A	A
1	West	19.30	1.29	7.851	A	A
1	South	7.59	0.51	6.494	A	A
1	East	10.24	0.68	6.624	A	A
2	North	4.75	0.32	4.821	A	A
2	West	8.99	0.60	3.751	A	A
2	South	7.38	0.49	6.325	A	A
2	East	5.47	0.36	3.595	A	A
3	North	2.76	0.18	2.830	A	A
3	West	8.91	0.59	3.719	A	A
3	South	3.78	0.25	3.291	A	A
3	East	5.41	0.36	3.559	A	A

Queue Variation Results for each time segment

Queue Variation results: (08:00-08:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	1.19	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.65	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.58	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.18	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.58	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

									Probability Of	Probability Of

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Reaching Or Exceeding Marker	Exactly Reaching Marker
1	North	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	1.88	0.00	0.00	3.43	5.72			N/A	N/A
1	South	0.73	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.92	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.79	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.71	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.78	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.33	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.60	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	4.06	0.00	0.00	4.57	13.72			N/A	N/A
1	South	1.43	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	1.51	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	0.59	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	1.21	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	1.35	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.67	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	1.19	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.50	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.65	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.60	0.00	0.00	0.00	1.07			N/A	N/A
1	West	4.24	0.00	0.00	1.14	10.29			N/A	N/A

1	South	1.47	0.00	0.00	0.00	2.04			N/A	N/A
1	East	1.53	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	0.59	0.00	0.00	0.00	1.07			N/A	N/A
2	West	1.21	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	1.38	0.00	0.00	0.00	2.04			N/A	N/A
2	East	0.67	0.00	0.00	0.00	1.22			N/A	N/A
3	North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	1.19	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.50	0.00	0.00	0.00	1.02			N/A	N/A
3	East	0.66	0.00	0.00	0.00	1.22			N/A	N/A

Queue Variation results: (09:00-09:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.42	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	1.99	0.00	0.00	3.43	5.72			N/A	N/A
1	South	0.76	0.00	0.00	0.00	1.02			N/A	N/A
1	East	0.95	0.00	0.00	0.00	1.22			N/A	N/A
2	North	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.80	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.73	0.00	0.00	0.00	1.02			N/A	N/A
2	East	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.80	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:15-09:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	1.23	0.00	0.00	1.14	3.43			N/A	N/A
1	South	0.49	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	0.66	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.59	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	0.36	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.18	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very		N/A	N/A

							small or very big.			
3	**West**	0.58	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**South**	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	**East**	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

Filename: Centennial and Riddell.arc8
Path: C:\Users\AdamMorrison\Desktop\Projects\200195 - Arcady
Report generation date: 2020-08-25 7:57:39 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - Background 2031						
Intersection 1 - Leg North	3.67	11.66	25.70	0.79	D	105.23	F
Intersection 1 - Leg West	1.69	2.30	12.16	0.60	B		
Intersection 1 - Leg South	0.52	1.02	6.77	0.34	A		
Intersection 1 - Leg East	71.44	132.83	208.57	1.12	F		
Intersection 2 - Leg North	4.81	16.96	34.07	0.83	D	13.78	B
Intersection 2 - Leg West	0.69	1.15	4.87	0.37	A		
Intersection 2 - Leg South	0.51	1.02	6.60	0.33	A		
Intersection 2 - Leg East	3.09	4.83	9.92	0.72	A		
Intersection 3 - Leg North	0.93	1.06	6.28	0.47	A	7.18	A
Intersection 3 - Leg West	0.67	1.15	4.74	0.37	A		
Intersection 3 - Leg South	0.26	~1	3.37	0.20	A		
Intersection 3 - Leg East	3.00	4.83	9.63	0.72	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Background 2031, AM" model duration: 8:00 AM - 9:30 AM
"D2 - Background 2031, PM " model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2020-08-25 7:57:37 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2020-08-25
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Background 2031, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Background 2031, PM	Background 2031	PM		ONE HOUR	16:00	17:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	1	(untitled)	Roundabout	North,West,South,East				105.23	F
2	2	(untitled)	Roundabout	North,West,South,East				13.78	B
3	3	(untitled)	Roundabout	North,West,South,East				7.18	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1	**North**	North	Alder Street	
1	**West**	West	Riddell Road	
1	**South**	South	Alder Street	
1	**East**	East	Riddell Road	
2	**North**	North	Alder Street	
2	**West**	West	Riddell Road	
2	**South**	South	Alder Street	
2	**East**	East	Riddell Road	
3	**North**	North	Alder Street	
3	**West**	West	Riddell Road	
3	**South**	South	Alder Street	
3	**East**	East	Riddell Road	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	**North**	0.00	99999.00		0.00
1	**West**	0.00	99999.00		0.00
1	**South**	0.00	99999.00		0.00
1	**East**	0.00	99999.00		0.00
2	**North**	0.00	99999.00		0.00

2	West	0.00	99999.00		0.00
2	South	0.00	99999.00		0.00
2	East	0.00	99999.00		0.00
3	North	0.00	99999.00		0.00
3	West	0.00	99999.00		0.00
3	South	0.00	99999.00		0.00
3	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	North	3.50	4.50	30.00	20.00	40.00	25.00	
1	West	3.50	4.50	30.00	20.00	40.00	25.00	
1	South	3.50	4.50	30.00	20.00	40.00	25.00	
1	East	3.50	4.50	30.00	20.00	40.00	25.00	
2	North	3.50	4.50	30.00	20.00	47.50	25.00	
2	West	3.50	8.00	30.00	20.00	47.50	25.00	
2	South	3.50	4.50	30.00	20.00	47.50	25.00	
2	East	3.50	8.00	30.00	20.00	47.50	25.00	
3	North	3.50	8.00	30.00	20.00	55.00	25.00	
3	West	3.50	8.00	30.00	20.00	55.00	25.00	
3	South	3.50	8.00	30.00	20.00	55.00	25.00	
3	East	3.50	8.00	30.00	20.00	55.00	25.00	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Intersection	Leg	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
1	North	Percentage	Region of Waterloo Standard		90.00
1	West	Percentage	Region of Waterloo Standard		90.00
1	South	Percentage	Region of Waterloo Standard		90.00
1	East	Percentage	Region of Waterloo Standard		90.00
2	North	Percentage	Region of Waterloo Standard		90.00
2	West	Percentage	Region of Waterloo Standard		90.00
2	South	Percentage	Region of Waterloo Standard		90.00
2	East	Percentage	Region of Waterloo Standard		90.00
3	North	Percentage	Region of Waterloo Standard		90.00
3	West	Percentage	Region of Waterloo Standard		90.00
3	South	Percentage	Region of Waterloo Standard		90.00
3	East	Percentage	Region of Waterloo Standard		90.00

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1	North		(calculated)	(calculated)	0.579	1221.701
1	West		(calculated)	(calculated)	0.579	1221.701
1	South		(calculated)	(calculated)	0.579	1221.701
1	East		(calculated)	(calculated)	0.579	1221.701
2	North		(calculated)	(calculated)	0.558	1221.701
2	West		(calculated)	(calculated)	0.685	1814.551
2	South		(calculated)	(calculated)	0.558	1221.701
2	East		(calculated)	(calculated)	0.685	1814.551
3	North		(calculated)	(calculated)	0.647	1814.551
3	West		(calculated)	(calculated)	0.647	1814.551
3	South		(calculated)	(calculated)	0.647	1814.551
3	East		(calculated)	(calculated)	0.647	1814.551

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry

		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	North	ONE HOUR	✓	490.00	100.000
1	West	ONE HOUR	✓	463.00	100.000
1	South	ONE HOUR	✓	254.00	100.000
1	East	ONE HOUR	✓	1036.00	100.000
2	North	ONE HOUR	✓	490.00	100.000
2	West	ONE HOUR	✓	463.00	100.000
2	South	ONE HOUR	✓	254.00	100.000
2	East	ONE HOUR	✓	1036.00	100.000
3	North	ONE HOUR	✓	490.00	100.000
3	West	ONE HOUR	✓	463.00	100.000
3	South	ONE HOUR	✓	254.00	100.000
3	East	ONE HOUR	✓	1036.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.000	72.000	228.000	190.000
	West	109.000	0.000	23.000	331.000
	South	145.000	60.000	0.000	49.000
	East	159.000	691.000	186.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.15	0.47	0.39
	West	0.24	0.00	0.05	0.71
	South	0.57	0.24	0.00	0.19
	East	0.15	0.67	0.18	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.000	72.000	228.000	190.000
	West	109.000	0.000	23.000	331.000
	South	145.000	60.000	0.000	49.000
	East	159.000	691.000	186.000	0.000

Turning Proportions (PCE) - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.15	0.47	0.39
	West	0.24	0.00	0.05	0.71
	South	0.57	0.24	0.00	0.19
	East	0.15	0.67	0.18	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 3 (for whole period)

		To			
		North	West	South	East
	North	0.000	72.000	228.000	190.000

From	West	109.000	0.000	23.000	331.000
	South	145.000	60.000	0.000	49.000
	East	159.000	691.000	186.000	0.000

Turning Proportions (PCE) - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	0.00	0.15	0.47	0.39
	West	0.24	0.00	0.05	0.71
	South	0.57	0.24	0.00	0.19
	East	0.15	0.67	0.18	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.110	1.030	1.080
	West	1.070	1.000	1.330	1.170
	South	1.010	1.020	1.000	1.040
	East	1.250	1.260	1.020	1.000

Truck Percentages - Intersection 1 (for whole period)

		To			
		North	West	South	East
From	North	0.0	11.0	3.0	8.0
	West	7.0	0.0	33.0	17.0
	South	1.0	2.0	0.0	4.0
	East	25.0	26.0	2.0	0.0

Average PCE Per Vehicle - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.110	1.030	1.080
	West	1.070	1.000	1.330	1.170
	South	1.010	1.020	1.000	1.040
	East	1.250	1.260	1.020	1.000

Truck Percentages - Intersection 2 (for whole period)

		To			
		North	West	South	East
From	North	0.0	11.0	3.0	8.0
	West	7.0	0.0	33.0	17.0
	South	1.0	2.0	0.0	4.0
	East	25.0	26.0	2.0	0.0

Average PCE Per Vehicle - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	1.000	1.110	1.030	1.080
	West	1.070	1.000	1.330	1.170
	South	1.010	1.020	1.000	1.040
	East	1.250	1.260	1.020	1.000

Truck Percentages - Intersection 3 (for whole period)

		To			
		North	West	South	East
From	North	0.0	11.0	3.0	8.0
	West	7.0	0.0	33.0	17.0
	South	1.0	2.0	0.0	4.0
	East	25.0	26.0	2.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1	North	0.79	25.70	3.67	11.66	D	449.63	674.45	182.03	16.19	2.02	182.08	16.20
1	West	0.60	12.16	1.69	2.30	B	424.86	637.29	98.32	9.26	1.09	98.33	9.26
1	South	0.34	6.77	0.52	1.02	A	233.07	349.61	33.58	5.76	0.37	33.58	5.76
1	East	1.12	208.57	71.44	132.83	F	950.65	1425.98	2445.42	102.89	27.17	2445.75	102.91
2	North	0.83	34.07	4.81	16.96	D	449.63	674.45	197.29	17.55	2.19	197.31	17.55
2	West	0.37	4.87	0.69	1.15	A	424.86	637.29	44.70	4.21	0.50	44.70	4.21
2	South	0.33	6.60	0.51	1.02	A	233.07	349.61	32.92	5.65	0.37	32.92	5.65
2	East	0.72	9.92	3.09	4.83	A	950.65	1425.98	169.99	7.15	1.89	170.01	7.15
3	North	0.47	6.28	0.93	1.06	A	449.63	674.45	56.15	5.00	0.62	56.16	5.00
3	West	0.37	4.74	0.67	1.15	A	424.86	637.29	43.75	4.12	0.49	43.75	4.12
3	South	0.20	3.37	0.26	~1	A	233.07	349.61	17.92	3.07	0.20	17.92	3.07
3	East	0.72	9.63	3.00	4.83	A	950.65	1425.98	166.55	7.01	1.85	166.57	7.01

Main Results for each time segment

Main results: (16:00-16:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	368.90	92.22	365.48	307.94	695.29	0.00	819.30	733.01	0.450	0.00	0.85	8.350	A
1	West	348.57	87.14	345.98	611.06	449.71	0.00	961.43	774.46	0.363	0.00	0.65	6.708	A
1	South	191.22	47.81	190.20	325.18	470.51	0.00	949.39	631.24	0.201	0.00	0.26	4.822	A
1	East	779.96	194.99	768.27	425.75	234.96	0.00	1085.71	821.32	0.718	0.00	2.92	13.249	B
2	North	368.90	92.22	365.56	309.37	701.57	0.00	830.24	518.25	0.444	0.00	0.83	8.158	A
2	West	348.57	87.14	347.19	616.02	451.11	0.00	1505.65	1342.37	0.232	0.00	0.35	3.573	A
2	South	191.22	47.81	190.22	326.61	471.69	0.00	958.51	397.78	0.200	0.00	0.25	4.764	A
2	East	779.96	194.99	775.69	426.65	235.26	0.00	1653.46	1378.31	0.472	0.00	1.07	4.929	A
3	North	368.90	92.22	367.33	309.62	701.71	0.00	1360.84	1030.03	0.271	0.00	0.39	3.830	A
3	West	348.57	87.14	347.21	616.41	452.63	0.00	1521.89	1108.38	0.229	0.00	0.34	3.526	A
3	South	191.22	47.81	190.64	327.44	472.40	0.00	1509.11	875.25	0.127	0.00	0.15	2.778	A
3	East	779.96	194.99	775.73	427.43	235.60	0.00	1662.22	1189.09	0.469	0.00	1.06	4.880	A

Main results: (16:15-16:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	440.50	110.12	437.92	368.22	828.13	0.00	742.41	733.01	0.593	0.85	1.50	12.429	B
1	West	416.23	104.06	415.00	728.27	537.79	0.00	910.45	774.46	0.457	0.65	0.95	8.346	A
1	South	228.34	57.09	227.98	388.60	564.19	0.00	895.17	631.24	0.255	0.26	0.35	5.491	A
1	East	931.34	232.84	914.66	510.47	281.70	0.00	1058.67	821.32	0.880	2.92	7.09	27.388	D
2	North	440.50	110.12	438.03	370.64	840.44	0.00	752.76	518.25	0.585	0.83	1.45	12.031	B
2	West	416.23	104.06	415.75	737.98	540.49	0.00	1444.44	1342.37	0.288	0.35	0.46	4.028	A
2	South	228.34	57.09	227.99	391.30	564.95	0.00	906.47	397.78	0.252	0.25	0.34	5.399	A
2	East	931.34	232.84	929.20	511.06	281.88	0.00	1621.53	1378.31	0.574	1.07	1.60	6.258	A
3	North	440.50	110.12	439.84	370.75	840.53	0.00	1271.08	1030.03	0.347	0.39	0.56	4.587	A
3	West	416.23	104.06	415.77	738.33	542.04	0.00	1464.08	1108.38	0.284	0.34	0.45	3.952	A
3	South	228.34	57.09	228.17	392.15	565.67	0.00	1448.80	875.25	0.158	0.15	0.19	3.002	A
3	East	931.34	232.84	929.25	511.80	282.03	0.00	1632.19	1189.09	0.571	1.06	1.58	6.165	A

Main results: (16:30-16:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS

1	North	539.50	134.88	531.91	432.95	917.20	0.00	690.86	733.01	0.781	1.50	3.40	22.970	C
1	West	509.77	127.44	506.99	814.81	634.30	0.00	854.59	774.46	0.597	0.95	1.65	11.829	B
1	South	279.66	69.91	278.97	453.23	688.05	0.00	823.48	631.24	0.340	0.35	0.52	6.722	A
1	East	1140.66	285.16	1005.64	622.51	344.51	0.00	1022.31	821.32	1.116	7.09	40.85	100.396	F
2	North	539.50	134.88	527.76	453.26	1026.66	0.00	648.85	518.25	0.831	1.45	4.39	29.090	D
2	West	509.77	127.44	508.91	900.45	653.97	0.00	1366.74	1342.37	0.373	0.46	0.68	4.827	A
2	South	279.66	69.91	279.00	474.61	688.27	0.00	837.67	397.78	0.334	0.34	0.50	6.551	A
2	East	1140.66	285.16	1134.94	622.28	344.99	0.00	1578.32	1378.31	0.723	1.60	3.03	9.679	A
3	North	539.50	134.88	538.04	453.52	1026.95	0.00	1150.55	1030.03	0.469	0.56	0.92	6.216	A
3	West	509.77	127.44	508.93	902.20	662.78	0.00	1386.01	1108.38	0.368	0.45	0.66	4.723	A
3	South	279.66	69.91	279.38	479.44	692.28	0.00	1366.94	875.25	0.205	0.19	0.26	3.369	A
3	East	1140.66	285.16	1135.18	626.36	345.29	0.00	1591.29	1189.09	0.717	1.58	2.95	9.419	A

Main results: (16:45-17:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	539.50	134.88	538.40	435.89	928.05	0.00	684.58	733.01	0.788	3.40	3.67	25.698	D
1	West	509.77	127.44	509.60	824.34	642.11	0.00	850.08	774.46	0.600	1.65	1.69	12.162	B
1	South	279.66	69.91	279.64	458.65	693.06	0.00	820.59	631.24	0.341	0.52	0.52	6.774	A
1	East	1140.66	285.16	1018.27	627.03	345.66	0.00	1021.64	821.32	1.116	40.85	71.44	208.569	F
2	North	539.50	134.88	537.81	454.67	1031.46	0.00	646.18	518.25	0.835	4.39	4.81	34.070	D
2	West	509.77	127.44	509.74	905.73	663.53	0.00	1360.19	1342.37	0.375	0.68	0.69	4.874	A
2	South	279.66	69.91	279.64	480.32	692.96	0.00	835.05	397.78	0.335	0.50	0.51	6.597	A
2	East	1140.66	285.16	1140.43	626.90	345.70	0.00	1577.83	1378.31	0.723	3.03	3.09	9.923	A
3	North	539.50	134.88	539.46	454.68	1031.48	0.00	1147.62	1030.03	0.470	0.92	0.93	6.275	A
3	West	509.77	127.44	509.76	905.99	664.95	0.00	1384.61	1108.38	0.368	0.66	0.67	4.738	A
3	South	279.66	69.91	279.66	481.09	693.62	0.00	1366.07	875.25	0.205	0.26	0.26	3.372	A
3	East	1140.66	285.16	1140.45	627.56	345.71	0.00	1591.02	1189.09	0.717	2.95	3.00	9.634	A

Main results: (17:00-17:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	440.50	110.12	447.05	388.98	934.54	0.00	680.82	733.01	0.647	3.67	2.03	16.755	C
1	West	416.23	104.06	418.90	813.50	568.09	0.00	892.91	774.46	0.466	1.69	1.02	8.794	A
1	South	228.34	57.09	229.02	415.56	571.44	0.00	890.97	631.24	0.256	0.52	0.35	5.543	A
1	East	931.34	232.84	1040.07	517.00	283.46	0.00	1057.65	821.32	0.881	71.44	44.26	202.314	F
2	North	440.50	110.12	453.48	372.73	847.35	0.00	748.91	518.25	0.588	4.81	1.56	13.450	B
2	West	416.23	104.06	417.08	745.74	555.09	0.00	1434.45	1342.37	0.290	0.69	0.47	4.079	A
2	South	228.34	57.09	228.99	399.97	572.20	0.00	902.43	397.78	0.253	0.51	0.35	5.448	A
2	East	931.34	232.84	937.07	518.19	283.00	0.00	1620.76	1378.31	0.575	3.09	1.66	6.412	A
3	North	440.50	110.12	441.96	372.48	847.05	0.00	1266.86	1030.03	0.348	0.93	0.57	4.634	A
3	West	416.23	104.06	417.06	743.80	545.21	0.00	1462.03	1108.38	0.285	0.67	0.46	3.971	A
3	South	228.34	57.09	228.62	394.56	567.71	0.00	1447.48	875.25	0.158	0.26	0.19	3.006	A
3	East	931.34	232.84	936.83	513.63	282.70	0.00	1631.76	1189.09	0.571	3.00	1.63	6.305	A

Main results: (17:15-17:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1	North	368.90	92.22	372.64	336.54	843.83	0.00	733.33	733.01	0.503	2.03	1.10	10.690	B
1	West	348.57	87.14	349.91	729.22	487.25	0.00	939.70	774.46	0.371	1.02	0.69	7.044	A
1	South	191.22	47.81	191.60	360.14	477.02	0.00	945.62	631.24	0.202	0.35	0.26	4.862	A
1	East	779.96	194.99	943.35	431.61	237.02	0.00	1084.53	821.32	0.719	44.26	3.42	56.492	F
2	North	368.90	92.22	371.68	311.60	707.43	0.00	826.98	518.25	0.446	1.56	0.87	8.435	A
2	West	348.57	87.14	349.07	621.61	457.51	0.00	1501.27	1342.37	0.232	0.47	0.35	3.598	A
2	South	191.22	47.81	191.59	330.72	475.85	0.00	956.19	397.78	0.200	0.35	0.26	4.796	A
2	East	779.96	194.99	782.22	430.63	236.81	0.00	1652.39	1378.31	0.472	1.66	1.09	5.008	A
3	North	368.90	92.22	369.58	311.47	707.33	0.00	1357.20	1030.03	0.272	0.57	0.40	3.868	A
3	West	348.57	87.14	349.04	621.21	455.70	0.00	1519.90	1108.38	0.229	0.46	0.34	3.541	A
3	South	191.22	47.81	191.40	329.74	475.01	0.00	1507.42	875.25	0.127	0.19	0.15	2.786	A
3	East	779.96	194.99	782.16	429.76	236.64	0.00	1661.54	1189.09	0.469	1.63	1.08	4.957	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	12.16	0.81	8.350	A	A
1	West	9.33	0.62	6.708	A	A
1	South	3.72	0.25	4.822	A	A
1	East	39.43	2.63	13.249	B	B
2	North	11.90	0.79	8.158	A	A
2	West	5.06	0.34	3.573	A	A
2	South	3.68	0.25	4.764	A	A
2	East	15.44	1.03	4.929	A	A
3	North	5.74	0.38	3.830	A	A
3	West	5.00	0.33	3.526	A	A
3	South	2.17	0.14	2.778	A	A
3	East	15.29	1.02	4.880	A	A

Queueing Delay results: (16:15-16:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	21.13	1.41	12.429	B	B
1	West	13.80	0.92	8.346	A	A
1	South	5.08	0.34	5.491	A	A
1	East	88.87	5.92	27.388	D	C
2	North	20.51	1.37	12.031	B	B
2	West	6.83	0.46	4.028	A	A
2	South	5.00	0.33	5.399	A	A
2	East	23.21	1.55	6.258	A	A
3	North	8.19	0.55	4.587	A	A
3	West	6.70	0.45	3.952	A	A
3	South	2.81	0.19	3.002	A	A
3	East	22.88	1.53	6.165	A	A

Queueing Delay results: (16:30-16:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	44.75	2.98	22.970	C	C
1	West	23.33	1.56	11.829	B	B
1	South	7.55	0.50	6.722	A	A
1	East	371.40	24.76	100.396	F	F
2	North	55.12	3.67	29.090	D	C
2	West	9.95	0.66	4.827	A	A
2	South	7.37	0.49	6.551	A	A
2	East	42.48	2.83	9.679	A	A
3	North	13.41	0.89	6.216	A	A
3	West	9.74	0.65	4.723	A	A
3	South	3.85	0.26	3.369	A	A
3	East	41.42	2.76	9.419	A	A

Queueing Delay results: (16:45-17:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	53.48	3.57	25.698	D	C
1	West	25.15	1.68	12.162	B	B
1	South	7.82	0.52	6.774	A	A
1	East	843.19	56.21	208.569	F	F
2	North	69.58	4.64	34.070	D	C
2	West	10.26	0.68	4.874	A	A
2	South	7.62	0.51	6.597	A	A
2	East	46.01	3.07	9.923	A	A
3	North	13.95	0.93	6.275	A	A
3	West	10.00	0.67	4.738	A	A
3	South	3.92	0.26	3.372	A	A
3	East	44.73	2.98	9.634	A	A

Queueing Delay results: (17:00-17:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service

1	North	33.09	2.21	16.755	C	B
1	West	16.05	1.07	8.794	A	A
1	South	5.44	0.36	5.543	A	A
1	East	867.81	57.85	202.314	F	F
2	North	26.56	1.77	13.450	B	B
2	West	7.25	0.48	4.079	A	A
2	South	5.34	0.36	5.448	A	A
2	East	26.00	1.73	6.412	A	A
3	North	8.77	0.58	4.634	A	A
3	West	7.06	0.47	3.971	A	A
3	South	2.91	0.19	3.006	A	A
3	East	25.56	1.70	6.305	A	A

Queueing Delay results: (17:15-17:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	North	17.41	1.16	10.690	B	B
1	West	10.65	0.71	7.044	A	A
1	South	3.98	0.27	4.862	A	A
1	East	234.73	15.65	56.492	F	E
2	North	13.62	0.91	8.435	A	A
2	West	5.34	0.36	3.598	A	A
2	South	3.92	0.26	4.796	A	A
2	East	16.85	1.12	5.008	A	A
3	North	6.09	0.41	3.868	A	A
3	West	5.25	0.35	3.541	A	A
3	South	2.25	0.15	2.786	A	A
3	East	16.67	1.11	4.957	A	A

Queue Variation Results for each time segment

Queue Variation results: (16:00-16:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	0.85	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	West	0.65	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	2.92	0.00	1.21	4.83	6.04			N/A	N/A
2	North	0.83	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	West	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	1.07	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.39	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.15	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	1.06	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:15-16:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker

1	North	1.50	0.00	0.00	2.12	3.18			N/A	N/A
1	West	0.95	0.00	0.00	0.00	1.15			N/A	N/A
1	South	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	7.09	0.00	2.42	16.91	22.94			N/A	N/A
2	North	1.45	0.00	0.00	2.12	4.24			N/A	N/A
2	West	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	1.60	0.00	0.00	2.42	3.62			N/A	N/A
3	North	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.19	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	1.58	0.00	0.00	2.42	3.62			N/A	N/A

Queue Variation results: (16:30-16:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	3.40	0.00	0.00	5.30	11.66			N/A	N/A
1	West	1.65	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	South	0.52	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	40.85	10.87	36.23	68.83	82.11			N/A	N/A
2	North	4.39	0.00	0.00	8.48	15.90			N/A	N/A
2	West	0.68	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.50	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	3.03	0.00	0.00	0.00	4.83			N/A	N/A
3	North	0.92	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.66	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	2.95	0.00	0.00	0.00	4.83			N/A	N/A

Queue Variation results: (16:45-17:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	3.67	0.00	0.00	2.12	10.60			N/A	N/A
1	West	1.69	0.00	0.00	0.00	2.30			N/A	N/A
1	South	0.52	0.00	0.00	0.00	1.02			N/A	N/A
1	East	71.44	25.36	65.21	114.71	132.83			N/A	N/A
2	North	4.81	0.00	0.00	6.36	16.96			N/A	N/A
2	West	0.69	0.00	0.00	0.00	1.15			N/A	N/A
2	South	0.51	0.00	0.00	0.00	1.02			N/A	N/A
2	East	3.09	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	North	0.93	0.00	0.00	0.00	1.06			N/A	N/A
3	West	0.67	0.00	0.00	0.00	1.15			N/A	N/A
3	South	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	3.00	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:00-17:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	2.03	0.00	0.00	4.24	6.36			N/A	N/A
1	West	1.02	0.00	0.00	1.15	1.15			N/A	N/A
1	South	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	44.26	14.49	39.85	72.45	84.53			N/A	N/A
2	North	1.56	0.00	0.00	3.18	4.24			N/A	N/A
2	West	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	1.66	0.00	0.00	2.42	3.62			N/A	N/A
3	North	0.57	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.19	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	1.63	0.00	0.00	2.42	3.62			N/A	N/A

Queue Variation results: (17:15-17:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1	North	1.10	0.00	0.00	1.06	3.18			N/A	N/A
1	West	0.69	0.00	0.00	0.00	1.15			N/A	N/A
1	South	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1	East	3.42	0.00	0.00	1.21	9.66			N/A	N/A
2	North	0.87	0.00	0.00	0.00	2.12			N/A	N/A
2	West	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	South	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2	East	1.09	0.00	0.00	1.21	2.42			N/A	N/A
3	North	0.40	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	West	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	South	0.15	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
3	East	1.08	0.00	0.00	1.21	2.42			N/A	N/A

Report

Subject: **Sustainable Orangeville 2020 Annual Update**

Department: **Corporate Services**

Division: **Clerks**

Report #: **CPS-2021-003**

Meeting Date: **2021-01-25**

Recommendations

That report CPS-2021-003, titled Sustainable Orangeville 2020 annual update be received;

And that Council approve the carry-over of $12,500 from the 2020 committee budget funds for projects that were started and are scheduled for completion in 2021;

And that the balance of the 2020 committee budget funds be transferred in to the Environmental Reserve fund for future sustainability projects.

Background and Analysis

The Sustainable Orangeville committee (previously known as the Orangeville Sustainability Action Team or OSAT) consists of 11 members, including one member of Council, one Communities in Bloom member, one Upper Grand District School Board representative, eight public members and Town staff representation.

The committees mandate is to work to reduce Orangeville's environmental impact and improve the quality of life for residents through; urban food systems, active transportation awareness and infrastructure, waste reduction initiatives, water conservation and stewardship, air quality, energy conservation, urban forestry, assistance in implementation of the Town's Sustainable Neighbourhood Action Plan.

Baby Tree Program

Unfortunately, due to the COVID-19 pandemic the annual baby tree planting ceremony usually scheduled for April was cancelled. The committee only received two submissions for babies born in 2019 and therefore opted to postpone the ceremony until April of 2021.

The committee has begun a pruning and maintenance plan in coordination with the parks division to assist in the upkeep and health of some of the baby tree forests in need of some extra care.

Baby Tree Plantings		
Year	**Location**	**Number**
2009	Kin Family Park, 485 College Ave.	20
2010	Fendley Park	21
2011	Fendley Park	21
2012	Princess of Wales Park	21
2013	Rebecca Hills Park	6
2014	Harvey Curry Park	6
2015	Alder Recreation Centre Parklands	9
2016	Kin Family Park	13
2017	Kin Family Park	3
2018	Parkinson Park	5
2019	Mother Teresa Park	7
2020	Cancelled due to COVID	0
	Total	132

Bee City Designation
In March of 2020, the committee was successful in having Orangeville recognized as a designated Bee City, for the Town's commitment to develop, restore and preserve pollinator-friendly local habitats. The Town has pledged to refrain from pesticide use whenever possible, plant native species, increase naturalization and add additional pollinator garden beds throughout the community.

Earth Week
The annual earth week tree planting, book exchange, and special workshops and events scheduled for April where cancelled due to the pandemic.

Fall Tree Planting
In partnership with the Credit Valley Conservation Authority, a Fall tree planting event took place at Harvey Curry Park on October 17, 2020. Online registration was

mandatory and strict COVID health and safety protocols were enforced. Two hundred trees and shrubs were planted by 40 volunteer planters.

Sustainable Orangeville Tree Plantings		
Year	**Location**	**Number**
2008	Maywood Park/Amelia to Blind Line	900
2009	Kay Cee Gardens/Mill Creek	675
2010	Montgomery/Morrow	619
2011	Mill Creek	650
2011	Montgomery/Morrow	700
2012	Montgomery/Morrow	400
2013	Rotary Park	500
2014	Edelbrock Centre and Montgomery Village	1,100
2015	Best Western, Hwy 9/Hwy 10	500
2016	Rotary Park & behind Best Western	500
2016	Tree Canada Fruit & Nut Tree Grant for Community Garden	65
2016	NW corner of Hwy 10 & McCannell Ave	150
2017	Broadway Pentecostal / Alder Parklands / Island Court Parkette (Trees Can Grant)	523
2018	Broadway Pentecostal	500
2018	Fall Tree Planting - East Entrance	150
2019	Montgomery Trail between Alder & Fendley Park	500
2019	Fall Tree Planting - Monora Trail between Blind Line & Amelia	200
2020	Fall Tree Planting - Harvey Curry Park	200
	Total	**8,832**

Community Clean Up Event

The Sustainable Orangeville committee partnered with the Rotary Club for the Let's make Orangeville Shine community clean up day which took place on September 16, 2020. The committee set up the on-line registration system for the event, provided

marketing and promotion, and coordinated the Literatti App to track the waste collected during the event.

Community Garden & Orchard
The community garden had another successful year with a wait list and all 24 plots reserved. The Food Bank has a designated plot that was maintained by student volunteers.

Environmental Sustainability Awards
Gary Skinn was selected as the Environmental Sustainability award recipient in the Individual category. Due to the lack of nominations received the other categories for youth, business, group were not awarded.

Urban Harvest Program
The 2020 fruit harvest was very small this year based on the unusual spring weather and dry summer resulting in low quantities, as well as poor quality of the fruit that was harvested. Also, the natural 2-year fruiting habits of many fruit trees meant that after last year's bumper crop many of the same trees didn't bear any fruit at all in 2020. The challenges with COVID-19 also limited the number of volunteers who wanted to help with the harvests, as well as tree owners willing to register with our program.

Only three properties were harvested this year, all of which were repeat participants from previous years. A total of 203 lbs. of apples were picked, of which 159 lbs. were donated to the Orangeville Food Bank and 44 lbs. went with the volunteers.

Year	Lbs. Harvests	Food Bank Donations
2018	912 lbs.	912 lbs.
2019	1,679 lbs.	1,581 lbs.
2020	203 lbs.	159 lbs.
Total	2,794 lbs.	2,652 lbs.

Seed Library
This was the committee’s third year offering the seed library program. Due to the on-going pandemic and the closure to the Mill Street library the seed library transitioned to a self-serve porch pick up model during the 2020 gardening season. Seeds have been graciously donated again from Dufferin Garden Centre for the 2021 seed library gardening season.

Communities in Bloom
Recruitment for volunteers commenced in the beginning of the year, however due to the pandemic the national judges tour was cancelled which in turn halted the communities in bloom programming for 2020.

In-complete projects started in 2020 that will carry-over to 2021:

East Entrance Welcome Garden and Baby Tree Forest Maintenance and Repairs:
The committee motioned on September 1, 2020 to allocate $10,000 of the committee's 2020 budget funds towards the required maintenance, repairs, and signage replacements for the many baby tree forests planted within Orangeville parks since 2009 and for landscaping and repairs to the East Entrance gardens by the welcome signage on highway 10 by McCannell Ave.

Hutchinson Court Trail Volunteer Naturalization Pollinator project:
At the November 3, 2020 committee meeting, Shaun Booth presented to the committee with an initiative to create a naturalized pollinator garden with volunteers along the Hutchinson Court Trail. The committee has requested that Mr. Booth formalize plans to be submitted and reviewed/approved by the Facilities and Parks Division. The committee motioned to allocate $2,000 of the 2020 committee budget funds towards new plants and materials pending final approval from the Parks division.

Backyard Hens virtual education workshop:
The Sustainable Orangeville committee assisted in selection of education and marketing materials for the new backyard hens pilot project. The committee motioned on November 24, 2020 to offer a virtual education workshop to assist those registered participants in the pilot program. The committee motioned to allocate $500 of committee budget funds as per the estimated cost received from the instructors.

Strategic Alignment

Orangeville Forward – Strategic Plan

Priority Area: Community Stewardship

Objective: Engaged and involved

Sustainable Neighbourhood Action Plan

Theme: Social Well-being

Strategy: Provide accessible social and community program options that support health, wellness and learning.

Notice Provisions

N/A

Financial Impact

The Sustainable Orangeville committee approved and commenced the following project initiatives in 2020. These projects are scheduled to be completed in 2021 and therefore is requesting that the allocated 2020 committee budget funds of $12,500 be carried over to 2021 to assist in the completion of these initiatives.

Project / Initiative	**Project carry-over**
Landscaping, Maintenance & Repairs – East Entrance Garden & Baby Tree Forests	$10,000.00
Hutchinson Court Trail Naturalization Volunteer Pollinator Garden initiative (Pending plan approval from Parks)	$2,000.00
Backyard Hens virtual education workshop for participants	$500.00
Total	**$12,500.00**

Due to COVID many of the committee's programs and funding was not expensed in 2020 and would like to request that the balance of the 2020 Sustainable Orangeville committee budget funds, which amount to approximately $17,000, be transferred to the Environmental reserve fund for future sustainability projects.

Respectfully submitted

Andrea McKinney
General Manager, Corporate Services

Reviewed by

Ray Osmond
General Manager, Community Services

Reviewed by

Charles Cosgrove
Manager, Facilities and Parks

Prepared by

Andrea Shaw
Committee Administrator

Report

Subject: **Traffic By-law Amendment – Town-Wide Speed Limit Reduction**

Department: **Infrastructure Services**

Division: **Public Works**

Report #: **INS-2021-006**

Meeting Date: **2021-01-25**

Recommendations

That report INS-2021-006, Traffic By-law Amendment – Town-Wide Speed Limit Reduction, be received;

And that Council pass a By-law to amend Traffic By-law 78-2005 to reduce the speed limit on most Town roads from 50 km/h to 40 km/h and to add Rolling Hills Drive, McCannell Avenue and Blind Line to the list of Community Safety Zones.

Background

On May 30, 2017, the Province of Ontario passed Bill 65, the Safer School Zone Act which permits municipalities to enact neighbourhood speed limit reductions. Currently, the default speed limit in Ontario is 50 km/h, unless posted otherwise. Section 128 (2.1) of the Ontario Highway Traffic Act (the Act) now allows municipalities to pass a by-law to set a speed limit less than 50 km/h for all roads within a designated area.

At its meeting on September 28, 2020, Council passed two motions directing staff amend the Traffic By-law (the By-law). Specifically, the first motion stated that all 50 km/h roadways in Orangeville be revised to 40km/hour. Excluded streets will include major town roads listed as follows: Hansen, First Street, Townline, C Line, Riddell, Centennial, B Line and Broadway. Upon implementation of this initiative, the town will engage in a robust public education campaign and a request for support from Ontario Provincial Police Service for targeted enforcement. The second motion stated that the following streets will be changed to a community safety zone: McCannell Avenue and Rolling Hills Drive and, Blind Line (within Orangeville limits).

The By-law will implement the changes described above, however these changes will not become effective until signs are erected in accordance with the Highway Traffic Act (1990), as amended.

Analysis

Implementing the direction of Council will be somewhat more involved and costly than initially anticipated. This relates primarily to the fact that the majority of roads leading motorists into the Town of Orangeville are included in the list of roads that will continue to have a speed limit in excess of 40 km/h, as illustrated on Attachment No. 1 to this report.

Ontario Regulation 615 Signs (5.1.1) (the Regulation) describes the required signage for an area that has been designated by By-law as having a speed limit of less than 50 km/k. The Regulation states that speed limit signs shall be erected on each highway that enters the designated area at the boundary of the designated area. These signs will include an AREA tab specifying that the driver is entering a 40 km/h area. The Regulation also requires that signs be erected at the boundary of a designated area informing motorists that they are leaving the designated area.

Were all of the roads leading motorists into Town to be included in the Town-wide 40 km/h zone, it is our understanding that the erection of 40 km/h AREA signs at each entrance to the municipality (and 40 km/h ENDS signs as roads led out of Town) is all that would be required to comply with the Act and Regulation. However, as the majority of roads coming into Town will continue to have speed limits in excess of 40 km/h, having the 40 km/h AREA sign at the entrance to Town followed immediately by a 50 km/h speed limit sign would be confusing for drivers, and potentially impact the enforceability of the new speed limits.

To resolve this issue and to amend the By-law in a manner that complies with the Act, staff recommend identifying nine designated 40 km/h areas as shown on Attachment No. 1. The boundaries between these areas will be roads that will continue to have speed limits in excess of 40 km/h. To comply with the Act and Regulation, the signs described above would need to be posted on each road that enters the designated area at the boundary of the designated area. The boundaries between the nine designated areas are either Town boundaries or roads that will continue to have a higher speed limit. This approach will ensure that 40 km/h AREA signs inform motorists that they are entering an area with a new speed limit each time they turn off one of the roads that are included in the list of roads that will continue to have a speed limit in excess of 40 km/h.

Attachments No. 2 through 7 to this report illustrate additional details of the proposed nine designated 40 km/h areas. These attachments also illustrate the approximate locations for the 40 km/h AREA and 40 km/h ENDS signs that are required for each road meeting the boundary of a designated area, in accordance with the Act and Regulation Staff estimate that a total of 186 new signs will be required, which will cost approximately $25,000 in materials. Town staff will erect the signs and, while there will

not be any additional cost to the Town, it is anticipated that the cost of the staff time to install the signs will be in the order of $8,000.

To inform the public regarding this change, staff propose to use a variety of media. The Town's various digital platforms will be used, including the website, Twitter and Facebook. We would also include this information on Municipal 511. We propose to issue a news release, publish print ads and include this information in the Town page on a regular basis. Staff also propose a series of ads on local radio to reach a broader audience. Our portable electronic message boards will also be deployed at entrances to Town to inform motorists of the change.

Strategic Alignment

Orangeville Forward – Strategic Plan

Priority Area: Community Stewardship

Objective: Safe and Protected

Sustainable Neighbourhood Action Plan

Theme: Transportation System

Strategy: Promote walking and biking by increasing the connectivity and safety of active transportation infrastructure

---

Notice Provisions

None.

Financial Impact

The cost to implement the recommendations of this report will be approximately $25,000. An allowance for this work has not been included in the draft 2021 Operating Budget.

Respectfully submitted

Douglas G. Jones, M.E.Sc., P.Eng.
General Manager, Infrastructure Services

Attachment(s):

1. Designated 40 km/h Speed Limit Areas
2. Designated 40 km/h Speed Limit Areas A/B
3. Designated 40 km/h Speed Limit Areas C/D
4. Designated 40 km/h Speed Limit Area E
5. Designated 40 km/h Speed Limit Areas F/G
6. Designated 40 km/h Speed Limit Area H
7. Designated 40 km/h Speed Limit Area I

ATTACHMENT No.1 to Report INS-2021-006

Total Signs: 186

New 40 kmh Area Signs

Road with speed limit over 40 kmh

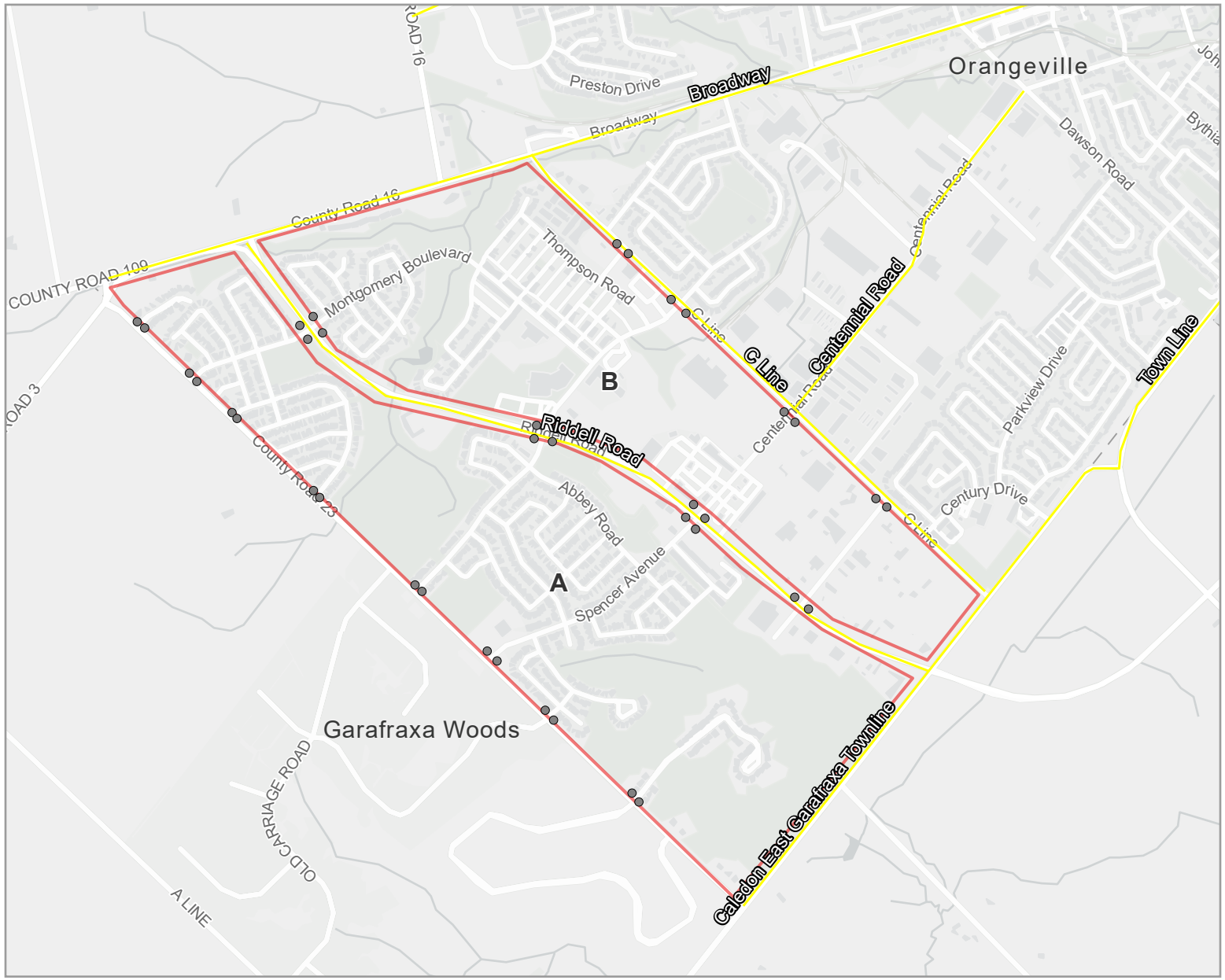
Designated 40 kmh Area

0 1 2 4 Kilometers

N

ATTACHMENT No.2 to Report INS-2021-006

Area: A/B
Total Signs: 38



New 40 kmh Area Signs

Road with speed limit over 40 kmh

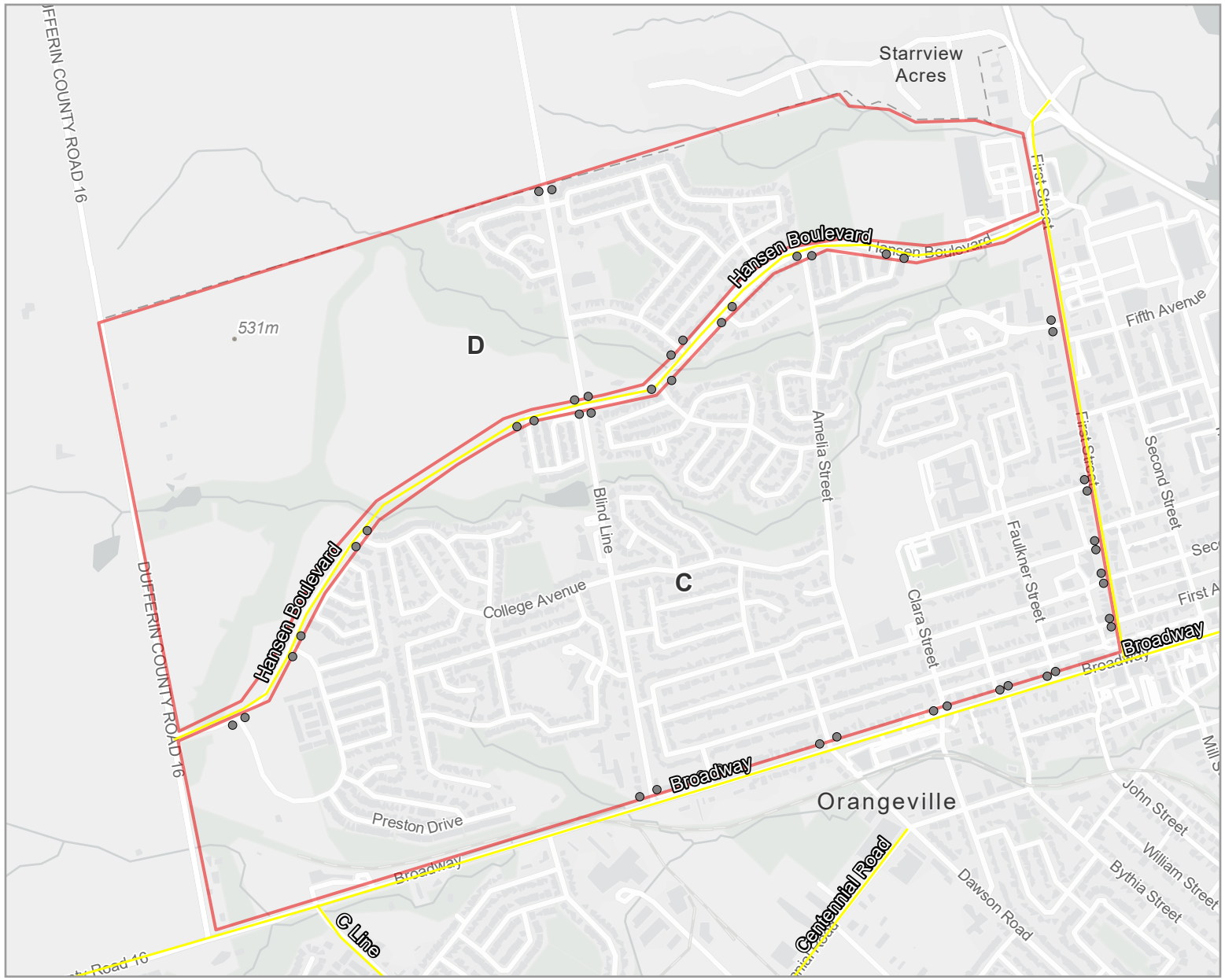
Designated 40 kmh Area

0 0.5 1 2 Kilometers

N

ATTACHMENT No.3 to Report INS-2021-006

Area: C/D
Total Signs: 48



New 40 kmh Area Signs

Road with speed limit over 40 kmh

Designated 40 kmh Area

0 0.5 1 2 Kilometers

N

ATTACHMENT No.4 to Report INS-2021-006

Area: E
Total Signs: 22

New 40 kmh Area Signs

Road with speed limit over 40 kmh

Designated 40 kmh Area

0 0.5 1 2 Kilometers

N

ATTACHMENT No.5 to Report INS-2021-006

Area: F/G
Total Signs: 8

New 40 kmh Area Signs

Road with speed limit over 40 kmh

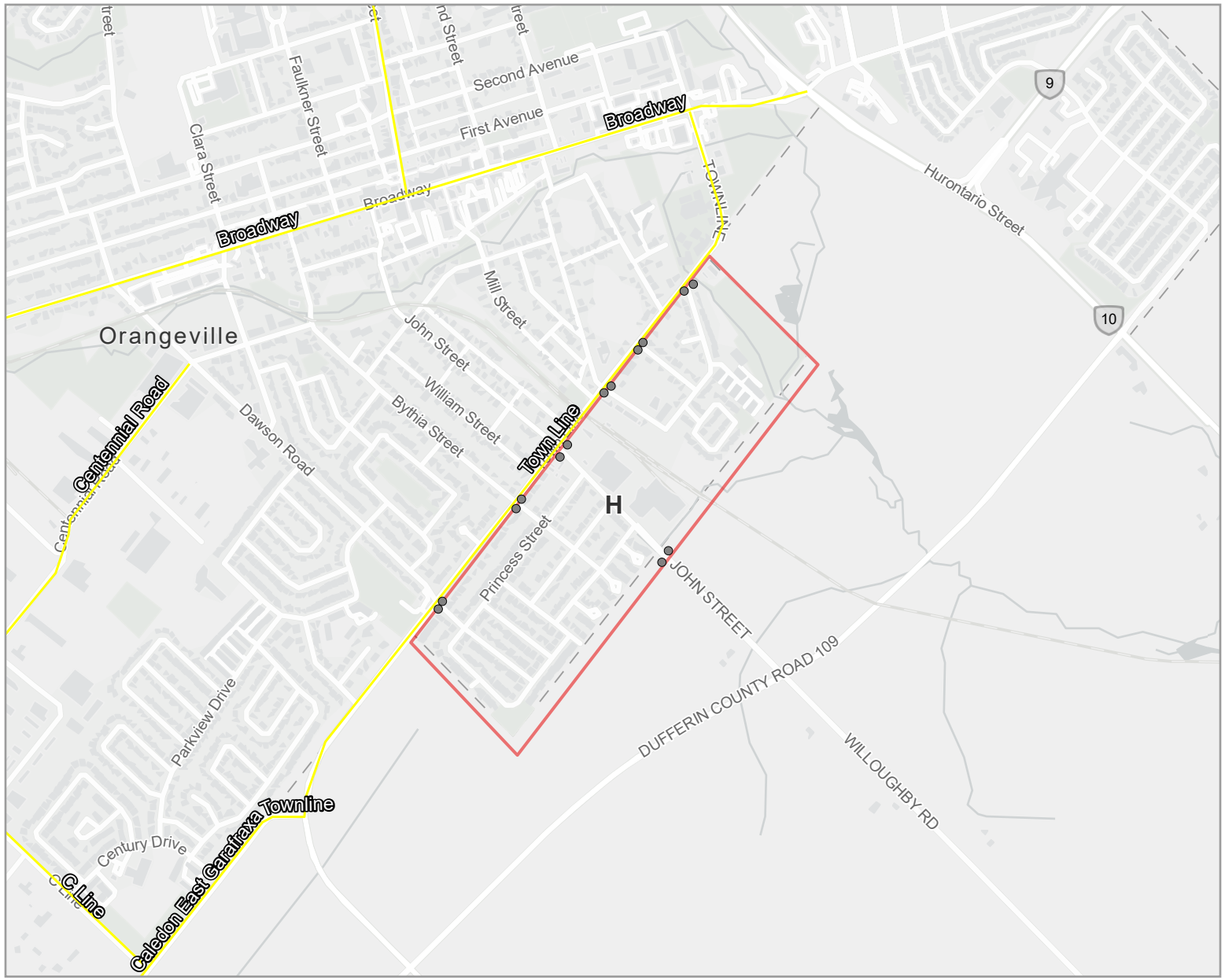
Designated 40 kmh Area

0 0.5 1 2 Kilometers

N

ATTACHMENT No.6 to Report INS-2021-006

Area: H
Total Signs: 14



New 40 kmh Area Signs

Road with speed limit over 40 kmh

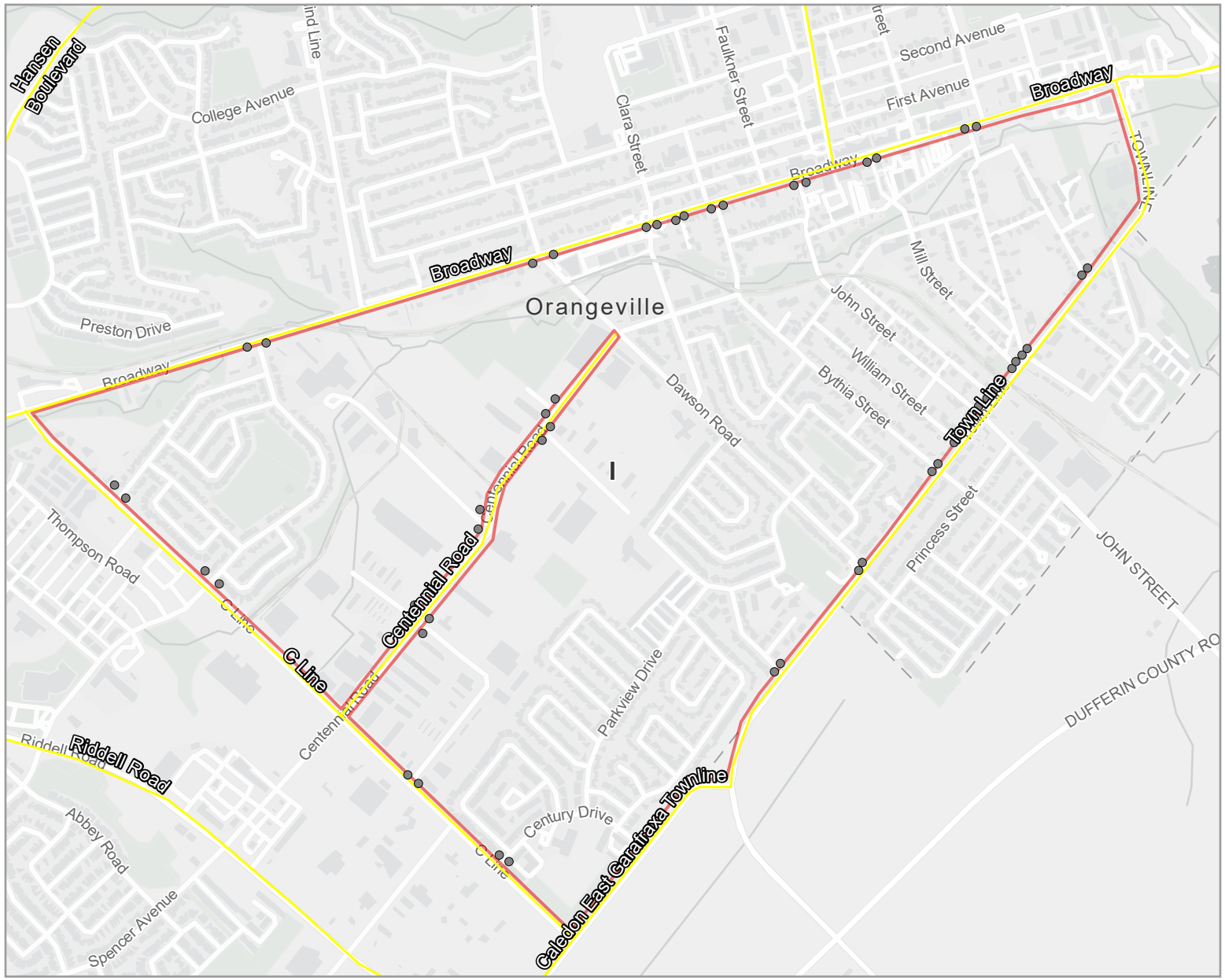
Designated 40 kmh Area

0 0.5 1 2 Kilometers

N

ATTACHMENT No.7 to Report INS-2021-006

Area: I
Total Signs: 54



New 40 kmh Area Signs

Road with speed limit over 40 kmh

Designated 40 kmh Area

0 0.5 1 2 Kilometers

N

NOTICE OF ADOPTION OF AN AMENDMENT TO THE TOWNSHIP OF EAST GARAFRAXA OFFICIAL PLAN

TAKE NOTICE that the Council of the Corporation of the Township of East Garafraxa passed **By-law No. 50-2020** on the 22nd day of December, 2020 pursuant to Sections 17, 22 and 26 of the Planning Act, R.S.O., 1990, as amended to adopt **Amendment No. 8** to the Township of East Garafraxa Official Plan. The amendment applies to the lands of the Township of East Garafraxa in their entirety.

AND TAKE NOTICE that through the circulation and review of the amendment to the Township of East Garafraxa Official Plan, the Township received five (5) written submissions from agencies and the members of the public prior to the decision of Council and two (2) verbal submissions from members of the public at the statutory public meeting. Council considered all the submissions received with respect to the amendment, the effect of which helped Council to make an informed decision.

AND TAKE NOTICE that Official Plan Amendment No. 8 requires approval from the County of Dufferin, which is the approval authority under the Planning Act. Any person or public body will be entitled to receive notice of the decision of the approval authority if a written request to be notified of the decision (including the person's or public body's address, fax number or email address) is made to the approval authority at the following address:

County of Dufferin Planning Department
Attention: Ms. J. Li, Planning Coordinator
55 Zina Street
Orangeville, ON L9W 1E5

An explanation of the purpose and effect of the Official Plan Amendment is given below. The complete Official Plan Amendment and related information, in conformity with COVID protocols, is available via email or fax by contacting the Clerk's Department during regular office hours using the information below.

DATED AT THE TOWNSHIP OF EAST GARAFRAXA THIS 6TH DAY OF JANUARY, 2021.

Susan M. Stone, A.M.C.T., Clerk
CAO/Clerk Treasurer
Township of East Garafraxa
065371 Dufferin County Road 3, Unit 2,
East Garafraxa, ON L9W 7J8
Tel: 226-259-9400
Email: sstone@eastgarafraxa.ca

Township File: OPA No. 8
Applicant: The Township of East Garafraxa
Address: 065371 Dufferin County Road 3, Unit 2, East Garafraxa, ON L9W 7J8

PURPOSE AND EFFECT OF THE OFFICIAL PLAN AMENDMENT

The purpose of this Amendment is to ensure the Township of East Garafraxa Official Plan is consistent with the Provincial Policy Statement, 2020 (PPS 2020) and to bring the Plan into conformity with the County of Dufferin Official Plan, the Credit Valley-Toronto and Region - Central Lake Ontario (CTC) Source Protection Plan; and the Grand River Source Protection Plan.

January 15, 2021

Honourable Jeff Yurek
Ministry of the Environment, Conservation & Parks
777 Bay St., 5th Floor
Toronto ON M7A 2J3

Honourable Yurek,

At its meeting held on January 15, 2021, Dufferin County Council passed the following resolution regarding the Conservation Authorities Working Group:

> WHEREAS the Province of Ontario made changes to the Conservation Authorities Act via the passage of Bill 228 in December 2020;
>
> AND WHEREAS the Province announced in December 2020 that they would form a Conservation Authority Working Group to "make sure conservation authorities and other stakeholder groups have a stronger voice at the table when it comes to implementing recent changes to the Conservation Authorities Act";
>
> AND WHEREAS the recently announced the appointments to the Conservation Authority Working Group which is comprised of 2/3rd conservation authority representatives and a single municipal representative;
>
> AND WHEREAS municipalities are the major sources of funding for Conservation Authorities in the Province and are greatly affected by decisions of recommendations coming out of the work of the Conservation Authority Working Group;
>
> BE IT RESOLVED THAT County Council request that the Province reassess the composition of the Conservation Authority Working Group to allow for equal representation from municipalities and conservation authorities;
>
> AND THAT this motion be forwarded to AMO for circulation to all municipalities in Ontario, the Honourable Minister Yurek and the Chair of the Conservation Authority Working Group.

Regards,

Michelle Dunne
Clerk

cc Hassan Basit, Chair, Conservation Authorities Working Group
Association of Municipalities of Ontario (AMO)
Dufferin County Municipalities

Minutes of the Joint Accessibility Advisory Committee

December 1, 2020, 3:30 p.m.
Chair and Secretary Participating Remotely

Members Present:	Councillor Post
	D. Anderson (absent)
	L. Barnett
	S. Bhamu
	P. Bond (regrets)
	P. Charbonneau
	M. Gravelle (regrets)
	J. Jackson
	L. Rankin (regrets)
	K. Anderson
	T. Lewis
	A. O'Hara-Stephenson
Staff Present:	S. Doherty, Manager, Rec/Events
	T. Macdonald
	K. Landry, Clerk

---

1. Call to Order

2. Disclosures of (Direct or Indirect) Pecuniary Interest

None

3. Adoption of Minutes of Previous Meeting

Resolution: 2020-018
Moved by L. Barnett

That the minutes of the following meeting be approved:

2020-11-03 Joint Accessibility Advisory Committee

Carried

4. Presentations

None.

5. Items for Discussion and Reports

5.1 Circulation of Planning Matters to the Committee

Karen Landry, Town Clerk outlined the options for the committee relating to circulation of planning matters to the committee and provided her recommendation that matters which require circulation to the committee be provided directly to the committee for inclusion on the agenda and that

the committee meeting calendar be provided to the County of Dufferin and all Dufferin municipalities.

5.2 Budget

Councillor Post advised the committee that Council approved the $10,000 budget carry over request for the ramp program.

5.3 Accessibility Ramp Program

Sharon Doherty, Manager, Recreation and Events provided an update to the committee on staff discussions relating to the accessibility ramps. Ms. Doherty advised that the Town will be replacing the bricks on the sidewalk/roadway in the downtown core late in 2021and suggested that this information should be taken into consideration.

The committee discussed the necessity of outlining a framework for a ramp program and Sharon Doherty will reach out to Cambridge and Oakville to obtain the framework that they are utilizing.

5.4 Business Accessibility Listing - Data Collection System

Simran Bhamu suggested that the committee create google docs forms to obtain information relating to accessibility features at businesses for all of Dufferin County.

Karen Landry, Town Clerk suggested that Ruth Phillips, Manager, Economic Development may be able to assist with this initiative and also outlined a similar program currently being undertaken relating to accessible parking spaces. Councillor Post will follow up with Ruth Phillips and this matter will be discussed again at the January meeting.

5.5 Accessibility Audit

Sharon Doherty, Manager Recreation and Events provided an update on the Accessibility Audit that has just been completed and will be submitted to the Ministry.

5.6 Tip of the Month

The tip of the month for December was determined at the November meeting to be please help our Emergency Services better serve people with disabilities. Register by downloading the form from https://www.orangeville.ca/en/living-here/emergency-response-registry.aspx.

6. Correspondence

6.1 James Johnstone, Township of Amaranth, Waldemar Park

Resolution: 2020-019
Moved by P. Charbonneau

That the correspondence from James Johnstone, Township of Amaranth, Waldemar Park be received;

Carried

Resolution: 2020-020
Moved by K. Anderson

That the Township of Amaranth be advised that the committee requests that consideration be given to making the play structures accessible.

Carried

7. New Business

Simran mentioned the inclusion on Data Orangeville about religious buildings.

Sharon Doherty indicated that if a more robust multi year accessibility plan were required that some budget funds would need to be set aside.

8. Date of Next Meeting

That the date of the next meeting is January 5, 2021.

9. Adjournment

That the meeting be adjourned at 4:20 p.m.

Minutes

Orangeville BIA Board of Management Meeting
Thursday, October 15th, 2020 at 0830
Electronic Meeting conducted via Microsoft Teams
OBIA Chair, 94 Broadway, Orangeville, ON
OBIA General Manager/Recording Secretary, Mono ON

Members: **T. Brett, S. Koroscil, Councilor Sherwood, S. Singh, M. Beattie**

Regrets: **H. Hochmeister, J. Sammut**

Absent: **S. Singh**

Delegations: N. Syed; Treasurer, Town of Orangeville

Murray Short, RLB

1. Call to Order – 8:30 am
2. Declaration of Pecuniary Interest - None
3. Attendance – as listed above
4. Minutes
   Moved by D. Sherwood, M. Beattie -Carried
   Motion to approve Board of Management Meeting Minutes of October 15, 2020.
5. Staff Updates
   5.1. GM's Update - Deferred
   5.2. Better Together Task Force Update - Deferred
   5.3. Ambassador's Update - Deferred
   5.4. Farmers' Market Update - Deferred
6. Financial Report
   6.1. 2019 Audited Financial Statement
   Moved by D. Sherwood, T. Brett -Carried
   Motion to accept the draft 2019 OBIA Audited Financial Statement as presented.
7. Blade Sign Grant Program – Grant to be a maximum of $635 and will not cover taxes, permit fees or costs associated with the sign face. Staff to finalize grant application form for Board's approval.
8. Transit Transfer Station – The OBIA will continue its work to have the downtown transit transfer station reconsidered. Staff to reach out to members to encourage their engagement in the official process.
9. Holiday Décor
   Moved by T. Brett, S. Koroscil -Carried
   Motion to purchase MKL holiday décor light sticks up to a maximum of $20K plus HST.
10. OBIA Office Lease - Deferred
11. Parking Strategy - Deferred
12. New Business - None
13. Adjournment –
    Moved by M. Beattie, T. Brett -Carried
    Motion to Adjourn 9:37am.

Minutes

Orangeville BIA

Board of Management Meeting
Thursday, November 26th, 2020 at 0900
Electronic Meeting conducted via Microsoft Teams
OBIA Chair, 94 Broadway, Orangeville, ON
OBIA Administrator/Acting Recording Secretary, Orangeville, ON

Members: **J. Sammut, T. Brett, S. Koroscil, Councilor Sherwood**
Regrets: **H. Hochmeister**
Absent: **S. Singh**
Delegation: **Carol Baber, Dufferin County Housing Program Manager**

1. Call to Order – 0902
2. Declaration of Pecuniary Interest - None
3. Attendance – as listed above
4. Minutes
   Moved by T. Brett, S. Koroscil -Carried
   Motion to approve Board of Management Meeting Minutes of October 15, 2020.

5. Delegation - Homelessness in Dufferin County; Carol Barber, Dufferin County Housing Program Manager – Dufferin County's resources for homeless persons was outlined. BIA staff to distribute information and cards to members.
6. Staff Updates
   6.1. GM's Report – As provided.
   6.2. Better Together Task Force Update – Starlight Shopping overview, introduction of Polar Bear Chair and selfie contest. Blade Sign Grant to be discussed as a separate item. T. Brett offered some very positive feedback on Halloween décor and customer feedback.
   6.3. Ambassador Update – ShopDowntownOrangeville.ca push for Christmas and in the light of a possible lockdown. Staff is staying on top of government resources and programs and will relay information to members. CFIB is a wealth of information that can be accessed if necessary.
   6.4. Farmers' Market Update – Board expressed concerns regarding lower attendance, sales numbers and loss of top Winter Market vendor and would like staff to find a way to encourage them to return.
7. Financial Report – 2020 Budget numbers are still missing so its difficult to know where we are. Alison has reached out to Town staff but has not been successful thus far. Another attempt will need to be made to make sure the budget numbers are inputted before the budget meeting.
8. Blade Sign Grant Program – Grant program and application is complete and just needs Board approval. Estimated prices to be added to the package. Sway chain may need to be added to the newer design for safety.
   Moved by D. Sherwood, J. Sammut Carried.
   Motion to approve Blade Sign Grant Package for distribution to members with an immediate start date.
9. Transit Transfer Station – Council voted to overturn its previous decision on the downtown location and will revisit the Edelbrock Centre and other locations for the transit location.
10. Holiday Décor & Tree Lighting Update – feedback on the décor and tree lighting video has been very positive.
11. Camera Update – Update in not available. IT has been very busy with the OPP transition.
12. OBIA Office Lease – The BIA should maintain a presence downtown. Item deferred.
13. Orangeville Legion/Public Plaza – J. Sammut & T. Brett to reach out to the Legion to express

the BIA's position on the public plaza. Specifically, that the BIA has not made any decisions with regards to the plaza, only that an idea was presented and endorsed in principle with the understanding that all stakeholders, including the Legion, would be engaged prior to any decisions or actions being taken.

14. 86-90 Broadway Update / Parking Strategy – Deferred.
15. Digital Billboard Signage - T. Brett gave a brief overview of the idea to install a large digital sign on Hwy 10 at McCannell Ave. along with some smaller digital signs at the main entrances to town. Staff to invite salesperson to make a presentation to the Board. Decision deferred.
16. Daylight Savings Time – Deadline has passed. Staff to reach out to DBot regarding timing of private member bill.
17. In Camera Session for the purposes of personal matters about an identifiable individual, including municipal or local board employees and a proposed or pending acquisition or disposition of land by the municipality or local board – Item deferred.
18. New Business – Council has approved outdoor patios extension to December 31st but businesses should be maintaining the sidewalks in terms of snow removal.

19. A**djournment - 1046**

Special OBIA Board Meeting
Minutes

Orangeville BIA
Special Board of Management Meeting
Thursday, December 17, 2020 at 0900
Electronic Meeting conducted via Microsoft Teams
OBIA Chair, 94 Broadway, Orangeville, ON
OBIA General Manager/Recording Secretary, Mono ON

Members: T. Brett, J. Sammut, S. Koroscil, Councilor Sherwood, M. Beattie, H. Hochmeister

1. Call to Order – 0903
2. Declaration of Pecuniary Interest – none.
3. Attendance – as listed above.
4. OBIA 2021 Budget – A. Scheel to make adjustments as discussed.
   Moved by M. Beattie, H. Hochmeister Carried.
   Motion to approve 2021 draft budget with changes as discussed. Final budget with updated 2020 actuals and revisions to be reviewed and approved before presentation at the AGM.
5. 2021 AGM – Confirmed attendees to receive a curated refreshment package to enjoy while attending the virtual meeting. Details to be discussed at a special meeting in early January,
6. Resignation – Staff to put out a call to members regarding Board vacancies.

   Moved by J. Sammut, D. Sherwood Carried.

   T. Brett to represent the OBIA on BDAC and A. Scheel to represent the OBIA on Heritage Orangeville temporarily. M. Beattie will replace A. Scheel sometime in 2021. Upon notice, A. Scheel will attend any Town Committee meeting as a non-voting capacity in the event that the Board representative cannot attend.

7. A**djournment**

The Corporation of the Town of Orangeville

By-law Number 2021

A by-law to Assume Roads, Works and Services in the Cachet Development Subdivision, RP 7M-70

Whereas the Municipal Act, S.O. 2001, c.25, S.11, authorizes a municipality to pass by-laws respecting matters within the jurisdiction of highways;

And whereas Council wishes to assume the roads, works and services in Registered Plan 7M-70;

Now therefore be it resolved that Council for The Corporation of the Town of Orangeville hereby enacts as follows:

1. That the Corporation of the Town of Orangeville hereby assumes responsibility for the roads, and for all the works and municipal services constructed by the developer (Cachet Developments (Orangeville) Inc.) to service Lots 1 to 85 inclusive, Blocks 86 to 103 inclusive, Reserve Blocks 104 to 121 inclusive and streets Hansen Boulevard, Parkinson Crescent, Drew Brown Boulevard, Porter Drive, Paisley Way, Gibson Court and College Avenue, all in Registered Plan 7M-70, Town of Orangeville, County of Dufferin

2. That the Mayor and Clerk are hereby authorized to execute the said by-law and any other documents ancillary to the assumption of the said roads, works and municipal services.

Read three times and finally passed this 25th day of January, 2021

_____

Sandy Brown, Mayor

_____

Karen Landry, Clerk

The Corporation of the Town of Orangeville

By-law Number 2021-

A by-law to confirm the proceedings of the Council of The Corporation of the Town of Orangeville at its regular Council Meeting held on January 25, 2021

Whereas Section 5 (1) of the Municipal Act, 2001, as amended, provides that the powers of a municipal corporation shall be exercised by its council;

And whereas Section 5 (3) of the Municipal Act, 2001, as amended, provides that municipal powers shall be exercised by by-law;

Be it therefore enacted by the municipal Council of The Corporation of the Town of Orangeville as follows:

1. That all actions of the Council of The Corporation of the Town of Orangeville at its regular and Council Meeting held on January 25, 2021, with respect to every report, motion, by-law, or other action passed and taken by the Council, including the exercise of natural person powers, are hereby adopted, ratified and confirmed as if all such proceedings were expressly embodied in this or a separate by-law.

2. That the Mayor and Clerk are authorized and directed to do all the things necessary to give effect to the action of the Council of The Corporation of the Town of Orangeville referred to in the preceding section.

3. That the Mayor and the Clerk are authorized and directed to execute all documents necessary in that behalf and to affix thereto the seal of The Corporation of the Town of Orangeville.

Passed in open Council this 25th day of January, 2021

_____

Sandy Brown, Mayor

_____

Karen Landry, Clerk