TRAFFIC IMPACT STUDY UPDATE

MOSQUE DEVELOPMENT
1456 BRONTE STREET SOUTH

TOWN OF MILTON
REGION OF HALTON

PREPARED FOR:

AMJ CANADA

PREPARED BY:

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CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev.0	April 2021	Issued for Draft Review
Rev.1	April 2021	Issued for Agency Review
Rev.2	May 2021	Updated as per comments
Rev.3	August 2023	Issued for 2nd Submission

1.0 Executive Summary

AMJ Canada retained C.F. Crozier & Associates Inc. (Crozier) to undertake a Traffic Impact Study (TIS) supporting the Zoning By-Law Amendment for a proposed Mosque development at 1456 Bronte Street South, in the Town of Milton. Analysis was completed in 2021, but an updated site plan was prepared in 2023. This update is not expected to change the expected trip generation and the analysis was not changed.

Comments were made by CIMA+ on behalf of the Town of Milton on December 21, 2021. This update includes responses to these comments within the text as well as within the comment response matrix provided.

The project proposal is for a one-storey Place of Worship with a total of 757 sq.m. The development also proposes 72 at-grade parking spaces.

Turning movement counts at the intersections of Bronte Street South and Etheridge Avenue and Bronte Street South and Whitlock Avenue were conducted by Spectrum Data Inc. on February 26, 2021, between the p.m. peak hours of 3:45 p.m. and 4:45 p.m. A growth rate of 5 % per annum was applied to Bronte Street South and a 2 % to Etheridge Avenue and Whitlock Avenue to determine the future background and future total traffic conditions.

Under 2021 conditions, the study intersections operate at a Level of Service "A" during the weekday p.m. peak hour.

Under 2026 future background and future total conditions, the study intersections are expected to operate at a Level of Service "A" during the weekday p.m. peak hour with minimal delays.

The proposed development is expected to generate a total of 114 two-way trips (38 inbound and 76 outbound) during the weekday p.m. peak period.

The proposed parking supply meets the minimum requirement and is expected to be sufficient.

The expected design vehicles do not encounter any conflicts within the site when checked using AutoTURN software.

The proposed development can be supported from a traffic operations perspective as the site-generated traffic will have a negligible effect on the operations of the boundary road network.

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2.0 Introduction

AMJ Canada retained C.F. Crozier & Associates Inc. (Crozier) to undertake a Traffic Impact Study (TIS) to support the Zoning By-Law Amendment for a proposed Mosque development located at 1456 Bronte Street South, in the Town of Milton. This study aims to assess the impacts of the proposed development on the boundary road network and recommend required mitigation measures if warranted. The following intersections were analyzed:

- Bronte Street South at Etheridge Avenue (Roundabout)
- Bronte Street South at Whitlock Avenue (Roundabout)
- Bronte Street South at Site Access

The following horizon timeframes were analyzed in this study:

- 2021 traffic conditions
- Five-year horizon from the 2021 conditions (2026) with and without the proposed development

This study has been completed per the correspondence with the Town of Milton with the associated analysis and findings outlined herein. All correspondence with the Town of Milton can be found in **Appendix A.**

Comments were made by CIMA+ on behalf of the Town of Milton on December 21, 2021. This update includes responses to these comments within the text as well as within the comment response matrix provided in **Appendix A.**

3.0 2021 Conditions

This study was first completed in 2021 and per the terms of reference, 2021 was selected as the base year.

3.1 Development Lands

The subject lands cover a developable area of approximately 0.38 ha and currently consists of a single-detached house. Bronte Road bounds the site to the east and agricultural lands to the north, south, and west. The subject lands are zoned "FD – Future Development Zone" as per the Town of Milton Zoning By-Law 016-2014. Relevant zoning map excerpts have been included in **Appendix B.**

Per the latest Site Plan prepared by Paradigm Architecture and Design, issued June 6, 2023, the development proposes a single-storey place of worship of 1516 m^2 Gross Floor Area (GFA) with one right-in/right-out access to Bronte Street South. **Figure 1** contains the Site Plan.

3.2 Boundary Road Network

Bronte Street South is a north-west roadway consisting of four lanes, two driving lanes in each direction, and cycling lanes on each side. Bronte Street South is under the jurisdiction of the Town of Milton, contains a posted speed limit of 60 km/h, and has restricted parking on both sides of the roadway.

Etheridge Avenue is an east-west roadway consisting of two lanes, one lane in each direction. Etheridge Avenue is under the jurisdiction of the Town of Milton, contains an assumed speed limit of 50 km/h, and has permitted parking along both sides of the roadway.

Whitlock Avenue is an east-west roadway consisting of two lanes, one lane in each direction. Whitlock Avenue is under the jurisdiction of the Town of Milton, contains an assumed speed limit of 50 km/h, and has permitted parking along both sides of the roadway.

3.3 Public Transit

In September 2021, Milton Transit Route 10 was replaced by an on-demand service that still uses the three transit stops near the development. These three stops are identified as "alongside Frost Court" is approximately 800 m north of the site access, "alongside Lemieux Court" is approximately 1 kilometre north of the site access, and "alongside Holbrook Court" is approximately 400 m north of the site access. No date on the return of a fixed-route service has been determined.

Halton Region's goal is to achieve a transit mode split of 15-20 percent by 2031 and single-occupant vehicle trips for this site can be reduced by providing opportunities through public transit.

3.4 Traffic Data

Turning movement counts at the intersections of Bronte Street South and Etheridge Avenue and Bronte Street South and Whitlock Avenue were conducted by Spectrum Data Inc. on February 26, 2021, between the p.m. peak hours of 3:45 p.m. and 4:45 p.m. This p.m. peak hour was selected based on correspondence with the Town of Milton as well as the typical peak operations of a Mosque.

The traffic data contained in **Appendix C** provides a summary of the turning movement counts. As discussed with Town Staff, traffic volumes were increased by 20 % to reflect non-Covid conditions. Refer to **Figure 2** for the 2021 traffic volumes.

3.5 Traffic Modelling

The assessment of the site access is based on the method outlined in the "Highway Capacity Manual, 2010" using Synchro 10 modelling software. Unsignalized intersections are assessed using a Level of Service metric, with ranges of delay assigned a letter from "A" to "F". The Level of Service (LOS) definitions are included in **Appendix D**. Heavy vehicle percentages, and pedestrian movements for the study intersection were derived from the 2021 turning movement counts. The results for signalized intersection operations were derived via HCM2010 methodology. The Level of Service (LOS) definitions for unsignalized intersections are included in **Appendix D.**

ARCADY analysis software was used for the analysis of the roundabout. Per discussions with Town Staff, a 15 % and 0 % y-intercept adjustment (or capacity reductions) were applied. The y-intercept adjustments represent driver familiarity with roundabouts. As drivers become more familiar with how to maneuver in a roundabout, it is expected that this y-intercept adjustment (or capacity reductions) will decrease over time. Thus, a smaller capacity reduction should be appropriate by the 2026 horizon year.

3.6 Intersection Operations

Traffic operations at the study intersections were assessed based on the traffic volumes shown in **Figure 2**. Detailed inputs and analysis for the roundabout are provided in **Appendix E. Table 1** outlines the 2021 traffic Levels of Service.

Table 1: 2021 Levels of Service

Intersection	Movement	Level of Service (Average Delay per Vehicle(s))		V/C Ratio		Queue Length	
		15 % (Y-int)	0 % (Y-int)	15 % (Y-int)	0 % (Y-int)	15 % (Y-int)	0 % (Y-int)
		PM Peak	PM Peak	PM Peak	PM Peak	PM Peak	PM Peak
Bronte Street South at Whitlock Avenue (Roundabout)	Bronte Street (North Leg)	A (1.83 s)	A (1.52 s)	0.11	0.09	0.69 m	0.58 m
	Whitlock Avenue	A (4.06 s)	A (3.27 s)	0.18	0.15	1.26 m	1.04 m
	Bronte Street (South Leg)	A (1.84 s)	A (1.52 s)	0.16	0.14	1.15 m	0.92 m
Bronte Street South at Etheridge Avenue (Roundabout)	Bronte Street (South Leg)	A (1.73 s)	A (1.45 s)	0.06	0.05	0.34 m	0.29 m
	Etheridge Avenue	A (3.48 s)	A (3.04 s)	0.08	0.07	0.52 m	0.46 m
	Bronte Street (North Leg)	A (1.70 s)	A (1.45 s)	0.11	0.10	0.75 m	0.63 m

Note: Roundabout control delay does not include acceleration or deceleration delay.
Note: Roundabout queue is shown in results report as a decimal of a Passenger-car unit(PCU). Queue lengths are determined by multiplying decimal by PCU length.

As outlined in Table 1, the intersection of Bronte Street South at Whitlock Avenue is operating at a Level of Service "A" during the weekday p.m. peak period with a maximum delay of 4.06 seconds on Whitlock Avenue with 15 % capacity reduction and 3.27 seconds on Whitlock Avenue with no capacity reduction. A maximum volume-to-capacity ratio observed is 0.18 and is on Whitlock Avenue with a 15 % capacity reduction.

The intersection of Bronte Street south at Etheridge Avenue is operating at a Level of Service "A" during the weekday p.m. peak period with a maximum delay of 3.48 seconds on Etheridge Avenue with 15 % capacity reduction and 3.04 seconds on Etheridge Avenue with 0 % capacity reduction. A maximum volume-to-capacity ratio observed is 0.11 and is for the North Leg of Bronte Street South at Etheridge Avenue with a 15 % capacity reduction.

Analysis of 2021 conditions indicates that capacity is available for future traffic growth on the boundary road network.

4.0 Development Proposal

The subject lands cover an area of approximately 0.38 ha and currently contains a single-detached house. The property, located in a residential neighbourhood, is bounded by Bronte Street South to the east and agricultural lands to the north, south, and west.

The latest Site Plan prepared by Paradigm Architecture and Design, issued June 6, 2023. The development proposes a single-storey place of worship of 1516 m^2 Gross Floor Area (GFA) with one right-in/right-out access to Bronte Street South.

5.0 Future Background Conditions

Future background traffic volumes for a five-year horizon period, from the first analysis period of 2021 consist of the following components:

- Background traffic growth from outside the study area
- Traffic generated within the study area from other proposed developments.

5.1 Study Horizons

Per Town of Milton Staff, the horizon year corresponding to five years from the date of the study was considered for the analysis. A study horizon year of 2026 was selected to assess the operations of the development on the boundary road network.

5.2 Traffic Growth Rates

Per discussions with Town of Milton Staff, growth rates on the boundary road network were applied as follows:

- Bronte Street South: 5 % compounded annually.
- Etheridge Avenue: 2 % compounded annually.
- Whitlock Avenue: 2 % compounded annually.

No background growth outside of these growth rates were reported as part of the terms of reference. Thus, these growth rates are considered to encompass all of the growth of traffic within the study area.

5.3 Intersection Operations

Traffic operations at the study intersection were assessed based on the traffic volumes shown in **Figure 3** (the horizon year 2026). Detailed inputs and analysis are provided in **Appendix E. Table 2** outline the future background traffic Levels of Service.

Table 2: 2026 Future Background Levels of Service

Intersection	Movement	Level of Service (Average Delay per Vehicle(s))		V/C Ratio		Queue Length	
		15 % (Y-int)	0 % (Y-int)	15 % (Y-int)	0 % (Y-int)	15 % (Y-int)	0 % (Y-int)
		PM Peak	PM Peak	PM Peak	PM Peak	PM Peak	PM Peak
Bronte Street South at Whitlock Avenue (Roundabout)	Bronte Street (North Leg)	A (1.93 s)	A (1.58 s)	0.14	0.12	0.92 m	0.75 m
	Whitlock Avenue	A (4.32 s)	A (3.44 s)	0.20	0.17	1.50 m	1.21 m
	Bronte Street (South Leg)	A (1.95 s)	A (1.59 s)	0.21	0.18	1.55 m	1.26 m
Bronte Street South at Etheridge Avenue (Roundabout)	Bronte Street (South Leg)	A (1.83 s)	A (1.52 s)	0.09	0.07	0.58 m	0.46 m
	Etheridge Avenue	A (3.69 s)	A (3.20 s)	0.11	0.09	0.69 m	0.64 m
	Bronte Street (North Leg)	A (1.84 s)	A (1.56 s)	0.17	0.15	1.21 m	1.04 m

Note: Roundabout control delay does not include acceleration or deceleration delay.

As outlined in Table 2, the intersection of Bronte Street South at Whitlock Avenue is expected to operate at a Level of Service "A" during the weekday p.m. peak period with a maximum delay of 4.32 seconds on Whitlock Avenue with 15 % capacity reduction and 3.44 seconds on Whitlock Avenue with no capacity reduction. A maximum volume-to-capacity ratio observed is 0.21 and is for the South Leg on Bronte Street South with a 15 % capacity reduction.

The intersection of Bronte Street south at Etheridge Avenue is expected to operate at a Level of Service "A" during the weekday p.m. peak period with a maximum delay of 3.69 seconds on Etheridge Avenue with 15 % capacity reduction and 3.20 seconds on Etheridge Avenue with 0 % capacity reduction. A maximum volume-to-capacity ratio observed is 0.17 and is for the North Leg of Bronte Street South at Etheridge Avenue with a 15 % capacity reduction.

Analysis of future background conditions indicates that capacity is available for future traffic growth on the boundary road network.

6.0 Site Generated Traffic

The proposed development will result in additional vehicles on the boundary road network that would otherwise not exist. The development will also result in additional turning movements at the intersections.

6.1 Trip Generation

The peak hour of a Mosque is a mid-afternoon Friday. As discussed with Town Staff, site-generated traffic was estimated using previous traffic impact studies for similar developments in the surrounding municipalities.

6.1.1 4721 Palladium Way

Paradigm Transportation Solutions Limited prepared a Transportation Impact and Transportation Demand Management Options study for a proposed Islamic Place of Worship and Office development located in the Alton Village Community at 4721 Palladium Way, in the City of Burlington. The following land use statistics are provided within the report:

- Prayer Hall – 909 square metres
- Gymnasium – 493 square metres
- Offices – 155 square metres
- Classrooms – 394 square metres
- Banquet Room – 187 square metres
- Library/Lab – 187 square metres
- Office Building – 1,535 square metres

The report states that the expected number of attendees for the Friday Prayers (highest influx of attendees during a typical week) is 500. It is estimated that the proposed Mosque will generate 204 trips (90 trips inbound and 114 trips outbound) during the Friday peak period. This equates to approximately 0.41 trips/attendee. Relevant excerpts from the report are provided in **Appendix F.**

6.1.2 2065 Brock Road

Trans-Plan Transportation Engineering prepared a Transportation Study for the proposed three-storey addition to the current building (school and prayer hall use) located at 2065 Brock Road in the City of Pickering. The report was prepared to address the following additions to the site:

- Building increase from approximately 1,724 to 3,162.74 sq.m. of GFA.
- Construction of a new parking deck, with a total parking supply of 160 spaces for the site.
- Provision of bike parking: two bicycle parking racks with five spaces provided per rack, with a total of 10 spaces for the site.
- An increase from 2 to 21 classrooms (including kindergarten room and computer lab as classrooms).
- Slight increase in the worship area size from approximately 299 to 347 sq.m. of GFA.

The report states that the expected number of attendees for the Friday Prayers, the highest trip rate is estimated at 1.40 trips per attendee. It is estimated that the proposed Mosque will generate 241trips (83 trips inbound and 158 trips outbound) during the Friday peak period for 172 attendees. This equates to approximately 1.40 trips/attendees. Relevant excerpts from the report are provided in **Appendix F.**

6.1.3 Subject Site Trip Generation

Based on the available Traffic Impact Study for similar sites, an average rate of 0.62 trips/attendee was calculated. The client expects to have 50 attendees for the Friday Prayers. However, the reports indicated an occupancy of approximately 62.5 percent which would correlate to an expected 125 attendees for the Friday Prayers. These 125 attendees were for used for conservative analysis which results in a total of 114 two-way trips (38 inbound and 76 outbound) are projected during the Friday peak period.

6.2 Trip Distribution and Assignment

Trips generated by the proposed development were distributed based on 2021 travel patterns by talking the percentages of vehicles for each movement out of the total traffic on the study road network. Trip distribution was applied to the study intersections.

The inbound and outbound trips form the site were determined by taking the average of the inbound and outbound percentages from the two surrogate sites.

Trip distribution can be found in **Figure 5.**

7.0 Total Traffic Conditions

7.1 Intersection Operations

Traffic operations at the study intersection were assessed based on the Traffic Volumes shown in **Figure 4.** Detailed capacity analyses are included in **Appendix E**. **Table 3** outlines the future total Levels of Service. Arcady analysis software was used for the analysis of the roundabouts.

Table 3: 2026 Future Total Levels of Service

Intersection	Movement	Level of Service (Average Delay per Vehicle(s))		V/C Ratio		Queue	
		15 % (Y-int)	0 % (Y-int)	15 % (Y-int)	0 % (Y-int)	15 % (Y-int)	0 % (Y-int)
		PM Peak	PM Peak	PM Peak	PM Peak	PM Peak	PM Peak
Bronte Street South at Whitlock Avenue (Roundabout)	Bronte Street (North Leg)	A (1.97 s)	A (1.61 s)	0.16	0.13	1.09 m	0.86 m
	Whitlock Avenue	A (4.45 s)	A (3.53 s)	0.21	0.18	1.61 m	1.26 m
	Bronte Street (South Leg)	A (1.98 s)	A (1.61 s)	0.22	0.19	1.67 m	1.32 m
Bronte Street South at Etheridge Avenue (Roundabout)	Bronte Street (South Leg)	A (1.90 s)	A (1.55 s)	0.09	0.08	0.63 m	0.52 m
	Etheridge Avenue	A (3.84 s)	A (3.27 s)	0.12	0.10	0.81 m	0.69 m
	Bronte Street (North Leg)	A (1.90 s)	A (1.59 s)	0.21	0.18	1.55 m	1.26 m
Bronte Street South at Site Access (Stop Controlled)	SBR	A (0 s)		0.09		0 m	
	SBT	A (0 s)		0.14		0 m	
	EBR	A (9.7 s)		0.07		12.6 m	

Note: Roundabout control delay does not include acceleration or deceleration delay.
Note: The LOS of a stop-controlled intersection is based on delay associated with the critical approach.

As outlined in Table 3, the intersection of Bronte Street South at Whitlock Avenue is expected to operate at a Level of Service "A" during the weekday p.m. peak period with a maximum delay of 4.45 seconds on Whitlock Avenue with 15 % capacity reduction and 3.53 seconds on Whitlock Avenue with no capacity reduction. A maximum volume-to-capacity ratio of 0.22 is observed for the Whitlock Avenue and the South Leg on Bronte Street with a 15 % capacity reduction.

The intersection of Bronte Street south at Etheridge Avenue is expected to operate at a Level of Service "A" during the weekday p.m. peak period with a maximum delay of 3.84 seconds on Etheridge Avenue with 15 % capacity reduction and 3.27 seconds with 0 % capacity reduction. A maximum volume-to-capacity ratio observed is 0.32 and is for the North Leg of Bronte Street South at Etheridge Avenue with a 15 % capacity reduction.

The site access is expected to operate at a Level of Service "A" for all approaches with a maximum delay of 9.7 seconds for the eastbound right-turn movement. A maximum volume-to-capacity ratio observed is 0.14 and is for the southbound through movement.

Analysis of future total conditions indicates that the boundary road network is expected to operate well.

8.0 Parking Review

This section discusses the parking requirements per the Town of Milton Zoning By-Law and compares the forecasted peak parking demand based on standard analysis criteria.

8.1 Zoning By-Law Parking Requirements

Section 5.8.2 – Table 5G of the Town of Milton Zoning By-Law 016-2014 was used to calculate the required parking spaces for the proposed development. The "Place of Worship" parking rate was used to calculate the required parking for the proposed development. Relative zoning excerpts can be found in **Appendix B**. **Table 4** summarizes the Town of Milton By-Law parking requirements for the proposed development.

Table 4: Town of Milton Zoning By-Law Requirement

Use	Parking Requirements	GFA (m^2)	Parking Required	Total Parking Provided	Surplus/ (Deficiency)
Place of Worship	One parking space per 5.5 m^2 of gross floor area in the nave	242	44	**72**	**2**
	One space per 11 m^2 of gross floor area for a public hall, banquet hall or community/multi-use hall if permitted and associated with or on the same site at the Place of Worship	285	26		
Total		**525**	**70**		

As shown in Table 4, the proposed parking meets the minimum requirement. Therefore, the proposed parking will suffice.

9.0 Site Review

This section examines the site from a safety perspective and looks at vehicle maneuvering and sight distance.

9.1 Vehicle Maneuvering

An AutoTURN analysis was undertaken to confirm the turning radii was suitable for the vehicles entering and exiting the site. Figure TT-01 illustrates the maneuvers of a 12.19-meter fire truck through the site. The fire truck can maneuver without conflict through the site.

9.2 Sight Distance Analysis

A review of the available sight distance of the 1456 Bronte Street South site access was undertaken based on Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads, June 2017 (GDGCR). Bronte Street South has a posted speed limit of 60 km/h in the study area which translates to a design speed of 80 km/h.

Measurements were taken to verify that sight distances could be met from the site entrance. These measurements followed guidance in the TAC GDGCR. A driver's eye height of 1.08 metres was used, a vehicle height of 1.15 metres was used, and the measurement was taken 4.4 metres from the edge of the travel lane to represent a vehicle waiting to exit the site.

To the north, more than 200 metres of sight distance was measured, which meets the minimum of 130 metres from table 9.9.6 in the GDGCR.

10.0 Conclusions

The findings and conclusions of the analysis are contained within this report represented as follows:

- The study area intersections are operating below capacity with low delays under 2021 conditions during the weekday p.m. peak hour.
- Under 2026 future background conditions, movements are expected to continue to operate below capacity. There are no recommendations for the boundary road network.
- Under 2026 future total conditions, movements are expected to continue to operate below capacity. There are no recommendations for the boundary road network.
- The proposed right-in/right-out site access at Bronte Street South is anticipated to function at a good level of service and below capacity.
- The proposed development is expected to generate a total of 114 two-way trips (38 inbound and 76 outbound) during the weekday p.m. peak period.
- The proposed total supply of 72 parking spaces meets the minimum required as per the Town of Milton By-Law. Therefore, the parking supply is expected to be sufficient.
- The analysis undertaken was prepared using the most recent Site Plan. Any minor changes to the plan will not materially affect the conclusions contained in this report.
- No conflicts were found using AutoTURN software and the expected design vehicles.
- The site meets the TAC GDGCR sight distance requirements.
- The proposed development can be supported from a traffic operations perspective as the site-generated traffic will have a negligible effect on the operations of the public roadway system.

We trust that this review satisfies any transportation concerns associated with the Site Plan for this development. Please feel free to contact the undersigned for any further information required.

Respectfully submitted,

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APPENDIX A

Correspondence

1456 Bronte Street South, Town of Milton. Zoning By-Law Amendment Applicaton (File No. Z-12-21)

Revised: December 12, 2021

Comment Number	Commenting Agency / Department	Subject	1st ZBLA Submission	
			Comment	Response to Comment
32	Town of Milton, Planning and	Zoning	A minimum number of 70 parking spaces requires 3 accessible parking spaces, whereas only two have been provided.	Per table 5H in section 5.16 of the zoning by-law, two spaces are required.
			Town of Milton , Transportation Planning - Kavleen Sachdeva / CIMA+	
43		General Transportation and Traffic Comments	The Town of Milton has had the Transportation Impact Study and Parking Report dated May 2021 for the site at 1456 Bronte Street South prepared by C.F. Crozier and Associates peer reviewed by CIMA+.	Noted
44			The overall conclusions of the report and the requirement (or lack thereof) of future road improvements cannot be verified due to the required clarifications reltaed to the trip generation and distrbution of site traffic.	Noted, see updated report
45			Provide justification for for the site trip generation rates that are used.	Noted, see updated report
46			Provide support for inbound/outbound splits.	Noted, see updated report
47			Further, support or justify 50-person attendance during Friday PM peak.	Noted, see updated report
48			Provide detailed reasoning for site trip distribution.	Noted, see updated report
49			Include the following analysis as per correspondence with the Town (analysis to be compliant with Halton Region TIS and Access Management guidelines): - Site access operations/design and internal circulation (AutoTurn,parking layout, safety and operations) - Traffic signage and pavement marking plan	Noted, see updated report.
50			Consideration of overflow parking during large including identification of a location for potential off-site overflow parking if required.	The parking requirements per the Zoning ByLaw are met. It is noted that this development is meant to support the local community.
51			Figures in the Appendix should include their corresponding report figure number to aid identification.	Figures in appendix have the same numbers as in the report See updated report
52			Specific discussion of queue results that may impact operations at the nearby roundabout.	Noted, see updated report
53			It is recommended to included the 95th percentile queue lengths to help provide an assessment of traffic operations, particularly relating to queue spillback to the adjacent roundacout.	Noted, see updated report
54		Traffic Impact Study - Executive Summary	CIMA+ has reviewed this section and has no comments.	Noted
55		Traffic Impact Study - Introduction	CIMA+ has reviewed this section and has no comments.	Noted
56		Traffic Impact Study - Existing Conditions	Provide a justification in the body of the report as to why only the PM peak hour is analyzed. It is recommended that 95th percentile queues be preszented alongside the level of service and v/c ratio results. Queues provide useful insight into whether the storage lengths are sufficient and whether there is any sort of congestion that is not reflected in the level of service or v/c ratios, especially reltaing to potential spillback from movements into adjacent intersections or roundabouts.	PM peak hour was analyzed per the terms of reference and correspondence with the Town. See appendix A for correspondence
57		Traffic Impact Study - Development Proposal	CIMA+ has reviewed this section and has no comments.	Noted
58		Traffic Impact Study - Future Conditions	Based on the Town's comments in the attached correspondence in Appendix A, the following should be included: - A review of site acess operations/design and internal circulation (AutoTurn, parking layout, safety and operations) - Traffic signage and pavement marking plan - Detailed recommendations regarding any on-site/off-site roadway improvements, site access and site circulation are to be made - Analysis should be undertaken according to the Halton Region TIS guidelines and the Halton Region Acess Management Guidelines.	Noted, PMSP and Autoturn completeed
59		Traffic Impact Study - Traffic Growth Rates	CIMA+ recommends highlighting that the provided growth rates have already been considered future adjacent development, as identitified in the correspondence.	Noted, see updated report
60			The reference error in the first paragraph regarding Table 2 should be removed.	Noted and removed
61		Traffic Impact Study - Background Traffic Operations	It is recommended that 95th percentile queues be presented alongside the level of service and v/c ratio results. Queues provide useful insight into whether the storage lengths are sufficent, and whether there is any sort of congestion that is not reflected in the level of service or v/c ratios, espedcially relating to potential spillback from movements into adjacent intersections or roundabouts.	Noted, see updated report

62			In section 6.1.3, the report identifies a site trip rate of 0.62 to be used at 1456 Bronte Street South, based on an average of trip rates from two proxy locations: 4721 Palladium and 2065 Brock Road. In Appendix F, correspondence between the consultant and the Town identifies that at 145 Bronte Street South, a trip rate of 0.823 be applied (written as 1458 Bronte Street South, typo is assumed). This is not consistent with the rate stated in Section 6.1.3.	The trip generation rate is explained in the report. The correspondence in Appendix F is not between the Town and Consultant, it is an internal communication that did not include the correct rate as 250 attendees was used to calculate the .816 value at 4721 Palladium way rather than the 500 attendees that should have been used. This internal email has been removed to avoid confusion
63	**Town of Milton, Transportation Planning Department**		We assume that these rates are not consistent due to outstanding clarifications required regarding the proxy site trip rate selection made in the body of the report, discussed below.	Noted, see updated report
64		**Traffic Impact Study - Trip Rates**	For 4721 Palladium Way, the attached email in Appendix F identifies a trip generation rate of 0.816, not the stated trip rate in Section 6.1.1 of 0.41. Clarification is required about the discrepancy in trip rates.	Noted, see updated report
65			For 2065 Brock Road, the attached report excerpt in Appendix F identifies a total trip rate of 0.83 trips per attendee during the weekday mid-day peak hour, which matches the rate identified for usuage in the 1456 Bronte report section 6.1.2. However, the Appendix F excerpt also identifies a total trip rate of 1.40 at 2065 Brock Road during the PM peak hour. Given that the peak hour analyzed as part of the 1456 Bronte Street report is the PM peak hour from 3:45pm to 4:45pm, a justification should be made in the body of the report as to why the lower mid-day peak hour rate from 2065 Brock Road was selected for usuage in the 1456 Bronte Street site trip rate determination, instead of the higher PM peak hour trip rate.	Noted, see updated report for inclusion of 1.40 rate from 2065 Brock Road
66			Justification for the proportion of inbound to outbound site traffic needs to be cleraly stated in the body of the report. Assuming that this ratio is based on an average of the two studios used as source data (4721 Palladium Way, and 2065 Brock Road), as presented in the body of the report, the calculation would be as follows: *Reference the Table in the comment letter.*	Noted, see updated report
67		**Traffic Impact Study - Inbound and Outbound Proportion**	Application of this average ratio to the 31 two way- trips at 1456 Bronte Street South as stated in Section 6.1.3 would yield 18 inbound vehicles and 13 outbound vehicles, the opposite of what is stated in Section 6.1.3. Assuming that this is not a typo, as Figure 4 is consistent with the body of the report, clarification is required as to how this inbound and outbound volume were developed.	Noted, see updated report for description of inbound and outbound traffic assignment
68			Additionally , the attached 4721 Palladium Way report excerpt in Appendix F not identify an inbound and outbound trip generation that corresponds with the inbound and outbound trip generation as stated in Section 6.1.1. Accordngly, we cannoy verify the validity of this estimate.	Noted, see updated report. Inbound and outbound traffic have been corrected
69		**Traffic Impact Study - Attendee Estimation**	A further justification should be provided for the selection of 50 attendees given a capacity of 200 people within the mosque. Based on the excerpts from Appendix F, for 4721 Palladium Way, 500 out of 800 of the person capacity attended Friday afternoon prayers or 62.5% of the congregation. Applied to the 200- person capacity at 1456 Bronte Street South, that would imply attendance of 125 people. The development of attendee numbers was not provided in the excerpt of the 2065 Brock Road report, and accordingly we cannot assess whether a similar methodology was used to determine attendee numbers.	50 Attendees was confirmed by the client. However, the 62.5% or 125 people was used in the analysis to be conservative/
70		**Traffic Impact Study -Trip Distribution**	The trip distribution reasoning should be explained in detail in the body of the report, Specifically, identifying what kind of calculations were undertaken (e.g. distributed proportionally based on existing turning movement counts) or if approved by the Town, provide related references.	Noted, see updated report
71		**Traffic Impact Study - Site Generated Traffic**	It should also be noted that the figure reference in Section 6.2 should be Figure 4, and not Figure 5.	Noted and corrected in updated report
72			Given these required clarifications, CIMA+ cannot determine the validity of the trip generation at this time.	Noted
73			Figure reference in Section 7.1 should be to Figure 5, not Figure 4.	Noted and corrected in updated report
74		**Traffic Impact Study - Total Traffic Conditions**	It is recommended that 95th percentile queues be presented alongside the level of service and v/c ratio results. Queues provide useful insight into whether the storage lengths are sufficent, and whether there is any sort of congestion that is not reflected in the level of service or v/c ratios, especially relating to potential spillback for movements into adjacent intersections or roundabouts.	Noted, see updated report. Note that arcady does not look at 95th percentile queue lengths.
75			Given the required clarifications relating to the site traffic generation, we cannot determine the full extent of the traffic impacts at this time.	Noted
76		**Traffic Impact Study - Parking Review**	Town of Milton Zoning By-law referenced should be 016-2014, not 016-2004. However, the associated calculations are correct.	Noted and corrected in updated report
77		**Traffic Impact Study - Additional Considerations**	Other than the recommendations stated above, the following should be considered as part of the traffic impact study: - Consideration of overflow parking during large events (assuming full capacity, or a justified percentage of full capacity), including identifications of a location for potential off-site overflow parking if required. - Specific discussion of queue results that may impact operatins at the nearby roundabout.	The parking requirements per the Zoning ByLaw are met. It is noted that this development is meant to support the local community.

			Town of Milton , Transit Services - Tony D'Alessandro, Director 905-878-7252 ext. 2548	
78	**Town of Milton, Transit Services**	**Traffic Impact Study**	The Traffic Impact Study incorrectly identifies a transit route (Route 10) operating along Bronte Street South. Effective September 2021, Milton Transit has replaced fixed-route service in the area with a transitional OnDemand Service. Bus stops identified in the Traffic Impact Study remain active to support OnDemand service connections. There are currently no other fixed-route service options adjacent to the site.	Noted and corrected in updated report
79			At present, the referenced development is beyond fxed-route coverage standards until such a time when implementation targets are achieved. Anticipated timelines for the reintroduction of fixed-route service have not been established.	Noted
80			It should be noted that Milton Transit prioritizes service to accommodate trip generation from Secondary schools during peak periods. In this context, service will be positioned to address demand from neighbouring Elsie MacGill Secondary School. Given that peak trip generation from 1456 Bronte St. South is mid-day Friday, increased traffic may impact homebound school-based trips and associated transfer connections.	Noted
81			It is requested that the applicant highlight modal split estimates to understand transit demand requirements.	Noted and corrected in updated report

Ben Paric

From: Rob.Catarino@milton.ca
Sent: April 8, 2021 5:03 PM
To: Ben Paric
Subject: RE: 1456 Bronte Street South ToR

Hello,
The property municipally known as 1456 Bronte Street S. is zoned Future Development (FD) zone under Urban Zoning by-law 016-2014. Regulations for parking requirements are found under Section 5 of this By-law. Table 5G provides the off-street parking calculation factors for various non-residential uses. The Urban Zoning By-law is available on the Town's website: https://www.milton.ca/en/business-and-development/zoning.aspx. Rural zoning by-law 144-2003 does not apply to this property.
Regards
Rob

Rob Catarino
Zoning Officer
150 Mary Street, Milton ON, L9T 6Z5
905-878-7252 x2197
www.milton.ca

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From: Janet Openshaw <Janet.Openshaw@milton.ca> **On Behalf Of** MB-Planning@milton.ca
Sent: Monday, March 29, 2021 2:46 PM
To: MB-Zoning <Zoning@milton.ca>
Cc: MB-Planning@milton.ca <Incoming-Planning-Email@milton.ca>
Subject: FW: 1456 Bronte Street South ToR

Hello,

When you have a moment would you be able to follow up with the enquiry below and attached.

Thanks, Janet

Janet Openshaw
Planning Services Representative
150 Mary Street, Milton ON, L9T 6Z5
905-878-7252 x2398
www.milton.ca

From: Ben Paric <bparic@cfcrozier.ca>
Sent: Monday, March 29, 2021 1:55 PM
To: MB-Planning@milton.ca <Incoming-Planning-Email@milton.ca>
Cc: Kavleen Sachdeva <ksachdeva@cfcrozier.ca>
Subject: FW: 1456 Bronte Street South ToR

Hello,

Crozier Consulting has been retained to complete a Traffic Impact Study for a proposed place of worship located at 1456 Bronte Street South in the Town of Milton. We received comments on our Terms of Reference in regard to parking. We were directed to confirm parking requirements with the Town of Milton's Zoning staff. We have researched and used the follow:

Based on the Town of Milton's zoning by-law 144-2003, a Place of Worship's minimum requirements is one parking space per 5.5 square meters of GFA in the nave, plus 10.8 spaces per 100 square meters of GFA for a public hall, banquet hall or community/multi-use hall associated with the Place of Worship.

Attached is the site plan. Please advise on the parking requirements and confirm if the parking rates being used are correct.

Thank you,

Ben

Ben Paric | Transportation Technologist
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

CROZIER
CONSULTING ENGINEERS

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Read our latest news and announcements here.

From: Kavleen Sachdeva <ksachdeva@cfcrozier.ca>
Sent: March 29, 2021 9:22 AM
To: Ben Paric <bparic@cfcrozier.ca>
Subject: 1456 Bronte Street South ToR

Hey Ben,

See Michael Turco's comments copied (in green) below for reference.

Based on the Town of Milton's zoning by-law 144-2003, a Place of Worship's minimum requirements is one parking space per 5.5 square meters of GFA in the nave, plus 10.8 spaces per 100 square meters of GFA for a public hall, banquet hall or community/multi-use hall associated with the Place of Worship.

The current floor plan contains a 241.5 m^2 prayer hall and 283.5 m^2 multi-purpose hall. Based on the by-law, 75 parking spaces are required. The current site plan has indicated 70 spaces. Since the development is providing surplus parking, please let us know if a memo summarizing the requirements and the proposed will suffice. These parking calculations appear that they may be incorrect. They are also not consistent with what is shown on the conceptual site plan. Please confirm parking requirements with the Town's Zoning staff (planning@milton.ca).

Parking Justification Study (if site is deficient in parking requirements per the Town's ZBL)

- Calculate the parking supply required by the Town of Milton Zoning By-Law, Section 5.8.1, Table 5E. The proposed parking supply is to be compared against these requirements
- Forecast the peak parking demand and determine whether the parking supply is sufficient to meet the calculated demand, using the Institute of Transportation Engineers Parking Generation 5th Edition AND local proxy data available within the past 5 years (ideally 2-3 sites minimum)
- Comparison of the Town's ZBL parking requirement rates vs other similar municipalities (Burlington, Oakville, Guelph, Cambridge, etc)
- Indicate the projected number of surplus or deficiency of parking spaces of the subject site for each method of calculating the parking demand, based on the proposed supply

Regards,
Kavleen
Out of office warning – I will be unavailable from April 2nd , returning to the office on April 6th.

Kavleen Sachdeva | Engineering Intern
DID: 905.876.7106

Ben Paric

From: Kavleen Sachdeva
Sent: March 3, 2021 2:18 PM
To: Ben Paric
Subject: FW: 1456 Bronte Street South ToR
Attachments: Southwest Milton High School - Site Traffic.pdf

Categories: Filed to Sharepoint

FYI

Regards,
Kavleen

Kavleen Sachdeva | Engineering Intern
DID: 905.876.7106

From: Michael.Turco@milton.ca <Michael.Turco@milton.ca>
Sent: Tuesday, February 2, 2021 2:06 PM
To: Kavleen Sachdeva <ksachdeva@cfcrozier.ca>
Cc: Kerianne Hagan <khagan@cfcrozier.ca>
Subject: RE: 1456 Bronte Street South ToR

Hello Kavleen,

Please see the Town's comments below in green:

Should you have any questions, please feel free to contact me.

Thank you,

Michael Turco, C.E.T., MITE
Transportation Planning Technologist
150 Mary Street, Milton ON,
905-878-7252 x2363
www.milton.ca

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From: Kavleen Sachdeva <ksachdeva@cfcrozier.ca>
Sent: Tuesday, January 26, 2021 5:10 PM
To: Michael Turco <Michael.Turco@milton.ca>
Cc: Kerianne Hagan <khagan@cfcrozier.ca>
Subject: 1456 Bronte Street South ToR

Hello Michael,

I hope you're doing well. We have been retained to update the Transportation Impact Study for the site located at 1456 Bronte Street South in Milton and prepare a Parking Utilization Study. The elements envisioned for this development include developing a Mosque with a gross floor area (GFA) of 751 square meters and a capacity of 350 people. The development is also to include above-ground parking associated with the site.

We kindly request that you let us know if the Terms of Reference (ToR) outlined below will be acceptable. If you are not the correct person for correspondence, I'd appreciate it if you direct me to the correct contact.

Study Methodology for the Transportation Impact and Parking Study

Study Area and Intersections to Assess

The following intersections will be analyzed:

- ~~Bronte Street South and Britannia Road~~ – not required unless the Region requests this~~; and~~
- Bronte Street South and Etheridge Avenue;
- Bronte Street South and Whitlock Avenue; and
- Site Access~~(es)~~

Given the ongoing pandemic and the current lockdown, we kindly request any historical or current counts available for the study intersections. Grown volumes will be circulated before submission for confirmation. Please confirm if a growth rate to be assumed for our analysis. Traffic growth rates:

- Bronte Street South: 5% compounded per annum
- Etheridge Avenue: 2% compounded per annum
- Whitlock Avenue: 2% compounded per annum

~~Given the nature of the proposed development, we will add the weekday A.M. and P.M. peak hour traffic volumes and divide them by four to create average hour traffic volumes.~~ Not acceptable.

As the analysis period would be a Friday peak hour of generator, the Town does not have any existing counts for these intersections. New traffic counts should be conducted at the study area intersections once provincial lockdown restrictions have been lifted. An adjustment factor may also be required to account for people working/schooling from home during the pandemic.

Analysis Periods and Scenarios

The Friday peak hour of generator for 2021 existing conditions, along with the five~~ and ten~~ year horizons (2026 ~~and 2031~~), will be considered for background and total traffic conditions. 10 year horizon not required.

Background Developments

Kindly provide any developments that should be included in the analysis as part of the background developments. Any background development TIS from the area would have not analyzed the Friday peak hour so the growth rates provided above generally takes into consideration the other area background developments.

Trip Generation

Trip generation and distribution of the Mosque will be determined using ITE 10th Ed. LUC 562-Mosque. The Friday peak hour produces an expected trip generation of 34 trips. The peak hour of the generator (using prayer room GFA) produces 48 trips. We note that ITE has a small number of studies as part of this LUC 562. ITE Trip Generation Manual is not acceptable for use in this scenario due to the small sample size. Local proxy data will need to be obtained.

Ontario Traffic Inc. collected data from a surrogate site between 12 P.M. and 3 P.M. on Friday, October 14th, 2016. The surrogate site used was the Islamic Community Centre of Milton, located at 8069 Esquesing Line in Milton. It shares the same worship time as the Mosque and is also located in the Town of Milton. The trip generation rate was found to be 0.346 trips per square metres. Applying this rate to the prayer room for the subject site, the estimated trips for the development are 84 (36 inbound and 48 outbound) during the Friday peak period. Based on historic parking spillover issues at 8069 Esquesing Line, it is our opinion that the trip generation rate for this site may have not taken into consideration people that parked on the street but went to the ICC. Other local proxy site trip generation should be obtained from similar uses within Milton, Burlington, or Oakville (ideally 2-3 sites minimum) and utilized to calculated the trip generation. Considering that social gatherings will likely be limited for the foreseeable future, any proxy data within the past ~5 years would be acceptable.

We recommend using the surrogate site data to analyze the effects of the development.

Roadway/Transit Improvements

Please provide details of any planned roadway/transit improvement in the study area.

Please refer to the Boyne Secondary Plan Survey Area Road Network Assessment (2017), Town of Milton website, and Halton Region website for information on upcoming and forecast capital projects in the area.

Parking Requirements

Based on the Town of Milton's zoning by-law 144-2003, a Place of Worship's minimum requirements is one parking space per 5.5 square meters of GFA in the nave, plus 10.8 spaces per 100 square meters of GFA for a public hall, banquet hall or community/multi-use hall associated with the Place of Worship.

The current floor plan contains a 241.5 m^2 prayer hall and 283.5 m^2 multi-purpose hall. Based on the by-law, 75 parking spaces are required. The current site plan has indicated 70 spaces. Since the development is providing surplus parking, please let us know if a memo summarizing the requirements and the proposed will suffice. These parking calculations appear that they may be incorrect. They are also not consistent with what is shown on the conceptual site plan. Please confirm parking requirements with the Town's Zoning staff (planning@milton.ca).

Parking Justification Study (if site is deficient in parking requirements per the Town's ZBL)

- Calculate the parking supply required by the Town of Milton Zoning By-Law, Section 5.8.1, Table 5E. The proposed parking supply is to be compared against these requirements

- Forecast the peak parking demand and determine whether the parking supply is sufficient to meet the calculated demand, using the Institute of Transportation Engineers Parking Generation 5th Edition AND local proxy data available within the past 5 years (ideally 2-3 sites minimum)
- Comparison of the Town's ZBL parking requirement rates vs other similar municipalities (Burlington, Oakville, Guelph, Cambridge, etc)
- Indicate the projected number of surplus or deficiency of parking spaces of the subject site for each method of calculating the parking demand, based on the proposed supply

Analysis Procedures

The Friday peak hours will be analyzed using the Synchro 10.0 analysis package and Highway Capacity Manual (HCM) procedures for the site access, and Arcady for roundabout analysis. 15% and 0% y-intercept adjustment scenarios are to be applied to the roundabout analyses.

Overall Report and analysis to be as per the Region's TIS Guidelines.
Site access operations/design and internal circulation (AutoTurn, parking layout, safety and operations) to be reviewed.
Traffic Signage and pavement marking plan.
Detailed Recommendations regarding on-site/off-site roadway improvements, site access, and site circulation, are to be made.

Could you please provide any comments you may have for the listed ToR and the following information for inclusion in the study:

- The latest traffic counts study intersections.
- The growth rate for the study area
- Details of any planned roadway/transit improvement in the study area within the horizon years
- Any further background developments and the associated traffic impact studies that are to be included in the analysis

I hope the above is acceptable. Should you have any questions or concerns, please feel free to contact me.

Regards,
Kavleen

Kavleen Sachdeva | Engineering Intern
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

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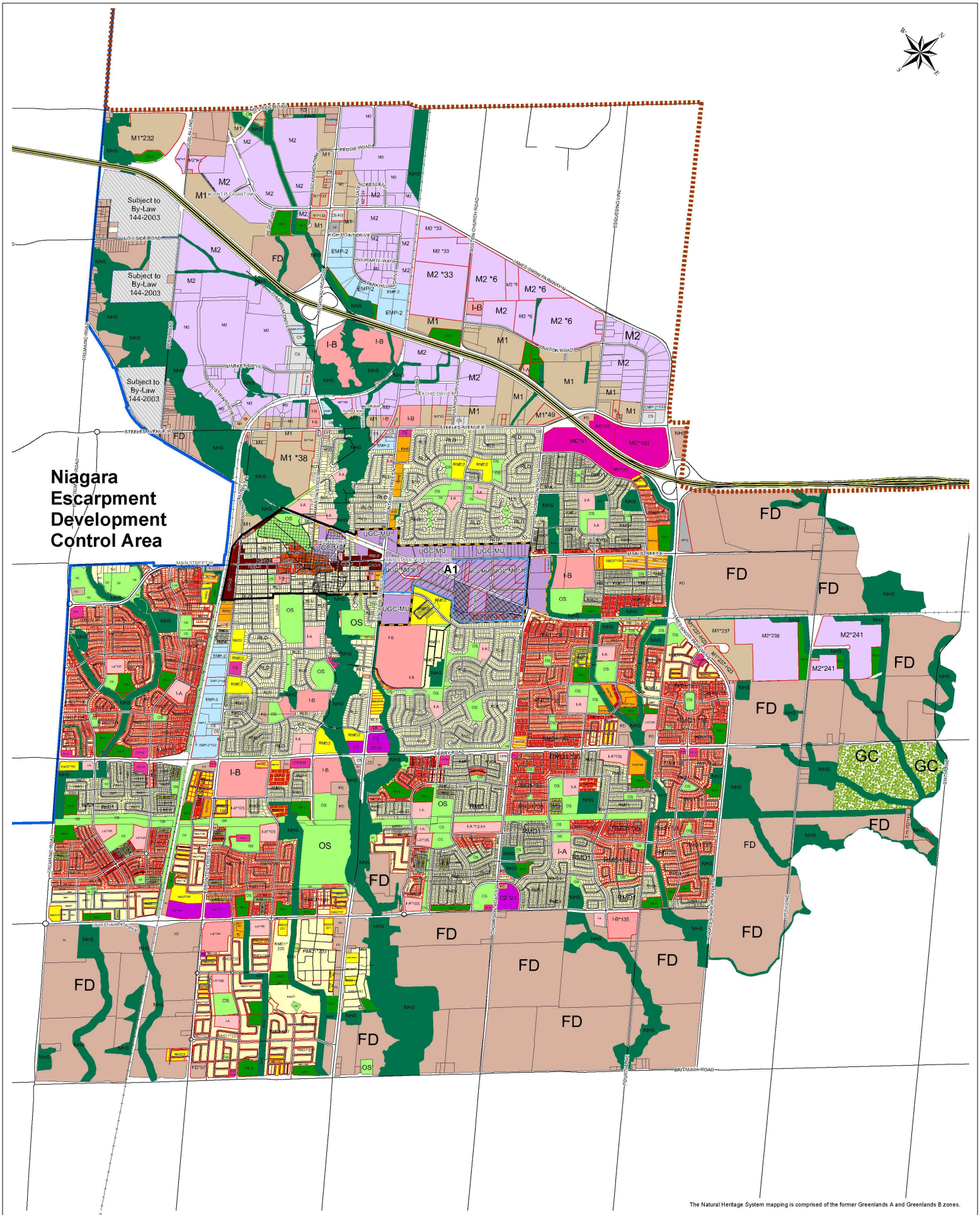
APPENDIX B

Relevant Zoning Excerpts

Schedule A - Urban Area Zoning



Town of Milton
Zoning By-law 016-2014
(HUSP Urban Area)
Date: July, 2018

Copyright 2018: Town of Milton, Teranet Inc.
Copyright 2010: Conservation Halton, Region of Halton

0 0.125 0.25 0.5 0.75 1 Kilometers

- Low Density Residential Zone (RLD)
- Medium Density Residential I Zone (RMD1)
- Medium Density Residential II Zone (RMD2)
- High Density Residential Zone (RHD)
- Residential Office Zone (RO)
- Secondary Mixed Use Commercial Zone (C2)
- Local Commercial Zone (C3)
- Auto Commercial Zone (C5)
- Business Commercial Zone (C6)
- Employment Zone (EMP-2)
- Future Development Zone (FD)
- Open Space Zone (OS)
- Open Space - Storm Water Managment Zone (OS-2)
- Central Business District Secondary Commercial Zone (CBD-B)
- Urban Growth Centre Mixed Use Zone (UGC-MU)
- Urban Growth Centre Mixed Use Zone 2 (UGC-MU-2)
- Central Business District Core Commercial Zone (CBD-A)
- Business Park Zone (M1)
- General Industrial Zone (M2)
- Minor Institutional Zone (I-A)
- Major Institutional Zone (I-B)
- Major Commercial Zone (MC)
- Natural Heritage System Zone (NHS)
- Natural Heritage System - Special Policy Area (NHS-SPA)
- Golf Course Zone (GC)
- Niagara Escarpment Development Control Area
- Special Provisions, Holding Provisions, Temporary Use Zones, and Interim Control Zones
- Site Specific Zone
- Urban Growth Centre
- Central Business Disctrict
- Under Appeal, Refer to Table 7A, Footnote *5

Type or Nature of *Use*	**Minimum Off-Street *Parking* Requirements**
Night Club	• 1 *parking space* per 5 m^2 of *gross floor area* PLUS • 1 *parking space* per 18 m^2 of patio *area*
Offices	• 1 *parking space* per 30 m^2 of *gross floor area*
Place of assembly	• 1 *parking space* per 9 m^2 of *gross floor area*
Place of entertainment Indoor Playgrounds All Other Entertainment *Uses*	 • 1 *parking space* per 20 m^2 of *gross floor area* • 1 *parking space* per 9 m^2 of *gross floor area*
Place of worship	• 1 *parking space* per 5.5m^2 of *gross floor area* in the nave PLUS • 1 spaces per 11m^2 of *gross floor area* for a public hall, *banquet hall* or community/multi-*use* hall if permitted and associated with or on the same site as the *Place of Worship*.
Police Station	• 1 *parking space* per 20 m^2,

Recreation & Athletic Facilities, Public Parks	• 15 *parking spaces* for general park visitors;
	PLUS
	• 1 *parking space* per 30m^2 *gross floor area* for all buildings, structures and pavilions;
	  • 30 *parking spaces* per baseball field;
	  • 30 *parking spaces* per soccer field;
	  • 4 *parking spaces* per tennis court
	
	Notwithstanding the requirements above, where a *Public Park* is 2.0ha or less in area no off-street parking is required
	
	Notwithstanding the requirements above, where any sports field or tennis court located within a *Public Park* having an area greater than 2.0ha and at least one lot line abutting a school property, no additional parking is required within the *Public Park* provided that the required *parking* for the school has direct access to the sports field or tennis court.

APPENDIX C

Traffic Data

Spectrum

Turning Movement Count
Location Name: BRONTE ST S & ETHERIDGE AVE
Date: Fri, Feb 26, 2021 Deployment Lead: Theo Daglis

Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

Turning Movement Count (1 . BRONTE ST S & ETHERIDGE AVE)

Start Time	N Approach BRONTE ST S					E Approach ETHERIDGE AVE					S Approach BRONTE ST S					Int. Total (15 min)	Int. Total (1 hr)
	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	UTurn S:S	Peds S:	Approach Total		
12:00:00	17	11	6	0	34	9	3	0	3	12	6	11	0	0	17	63	
12:15:00	18	14	1	0	33	14	3	0	2	17	2	15	0	0	17	67	
12:30:00	18	9	0	0	27	14	2	0	2	16	1	11	1	0	13	56	
12:45:00	15	10	3	0	28	10	1	0	0	11	0	17	0	0	17	56	242
13:00:00	18	7	0	0	25	6	1	0	1	7	1	21	1	0	23	55	234
13:15:00	19	21	0	0	40	10	2	1	2	13	3	18	0	0	21	74	241
13:30:00	22	8	0	0	30	12	2	0	2	14	4	11	2	0	17	61	246
13:45:00	17	7	1	0	25	12	1	0	2	13	1	14	0	0	15	53	243
14:00:00	23	8	0	0	31	6	3	0	0	9	1	24	0	0	25	65	253
14:15:00	17	8	2	0	27	9	3	0	1	12	3	22	0	1	25	64	243
14:30:00	26	6	3	0	35	8	2	0	5	10	1	19	0	0	20	65	247
14:45:00	25	11	0	0	36	24	2	0	2	26	7	19	1	1	27	89	283
15:00:00	16	13	2	0	31	27	6	0	2	33	6	22	0	1	28	92	310
15:15:00	17	16	0	0	33	17	6	1	4	24	3	27	0	2	30	87	333
15:30:00	27	9	0	0	36	16	6	0	2	22	5	23	0	0	28	86	354
15:45:00	36	23	0	0	59	18	5	0	1	23	2	19	0	0	21	103	368
16:00:00	32	15	0	0	47	8	4	0	0	12	2	30	0	0	32	91	367
16:15:00	29	19	4	0	52	15	5	0	4	20	4	19	0	0	23	95	375
16:30:00	33	20	7	0	60	17	3	0	3	20	2	23	0	0	25	105	394
16:45:00	19	11	2	0	32	23	2	0	3	25	5	34	0	0	39	96	387
Grand Total	444	246	31	0	721	275	62	2	41	339	59	399	5	5	463	**1523**	-
Approach%	61.6%	34.1%	4.3%		-	81.1%	18.3%	0.6%		-	12.7%	86.2%	1.1%		-	**-**	-
Totals %	29.2%	16.2%	2%		47.3%	18.1%	4.1%	0.1%		22.3%	3.9%	26.2%	0.3%		30.4%	**-**	-
Heavy	10	7	2		-	8	6	1		-	2	11	1		-	**-**	-
Heavy %	2.3%	2.8%	6.5%		-	2.9%	9.7%	50%		-	3.4%	2.8%	20%		-	**-**	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

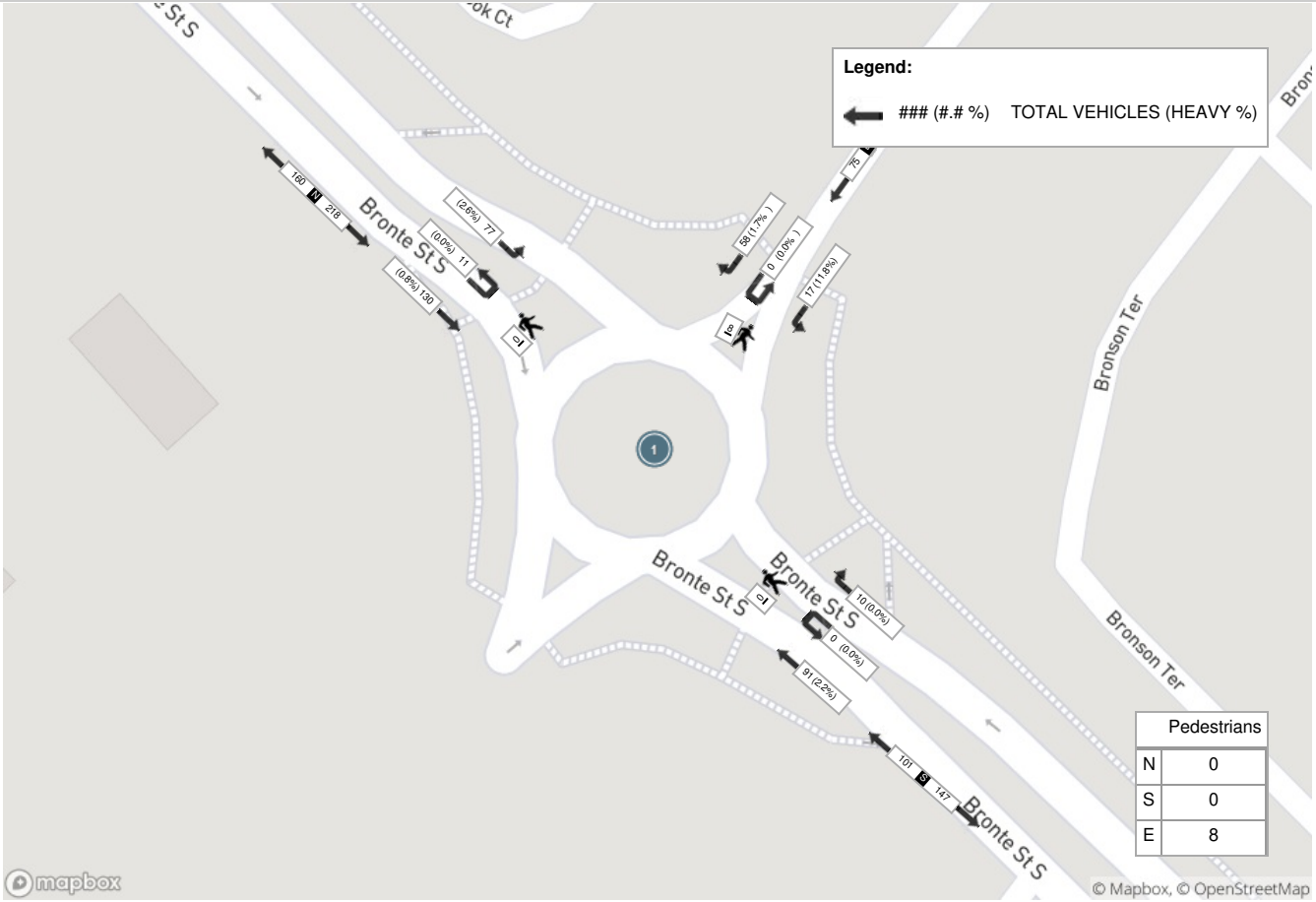
Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

Peak Hour: 03:45 PM - 04:45 PM Weather:

Start Time	N Approach BRONTE ST S					E Approach ETHERIDGE AVE					S Approach BRONTE ST S					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
15:45:00	36	23	0	0	59	18	5	0	1	23	2	19	0	0	21	103
16:00:00	32	15	0	0	47	8	4	0	0	12	2	30	0	0	32	91
16:15:00	29	19	4	0	52	15	5	0	4	20	4	19	0	0	23	95
16:30:00	33	20	7	0	60	17	3	0	3	20	2	23	0	0	25	105
Grand Total	130	77	11	0	218	58	17	0	8	75	10	91	0	0	101	**394**
Approach%	59.6%	35.3%	5%		-	77.3%	22.7%	0%		-	9.9%	90.1%	0%		-	**-**
Totals %	33%	19.5%	2.8%		55.3%	14.7%	4.3%	0%		19%	2.5%	23.1%	0%		25.6%	**-**
PHF	0.9	0.84	0.39		0.91	0.81	0.85	0		0.82	0.63	0.76	0		0.79	**-**
Heavy	1	2	0		3	1	2	0		3	0	2	0		2	**-**
Heavy %	0.8%	2.6%	0%		1.4%	1.7%	11.8%	0%		4%	0%	2.2%	0%		2%	**-**
Lights	129	75	11		215	57	15	0		72	10	87	0		97	**-**
Lights %	99.2%	97.4%	100%		98.6%	98.3%	88.2%	0%		96%	100%	95.6%	0%		96%	**-**
Single-Unit Trucks	1	0	0		1	0	1	0		1	0	1	0		1	**-**
Single-Unit Trucks %	0.8%	0%	0%		0.5%	0%	5.9%	0%		1.3%	0%	1.1%	0%		1%	**-**
Buses	0	2	0		2	1	1	0		2	0	1	0		1	**-**
Buses %	0%	2.6%	0%		0.9%	1.7%	5.9%	0%		2.7%	0%	1.1%	0%		1%	**-**
Articulated Trucks	0	0	0		0	0	0	0		0	0	0	0		0	**-**
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Bicycles on Road	0	0	0		0	0	0	0		0	0	2	0		2	**-**
Bicycles on Road %	0%	0%	0%		0%	0%	0%	0%		0%	0%	2.2%	0%		2%	**-**
Pedestrians	-	-	-	0	-	-	-	-	8	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	100%		-	-	-	0%		**-**

Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

Peak Hour: 03:45 PM - 04:45 PM Weather:



Crozier & Associates
Suite 100 2800 HIGH POINT DRIVE
MILTON ONTARIO, L9T 6P4
CANADA

Turning Movement Count (2 . BRONTE ST S & WHITLOCK AVE)

Start Time	N Approach BRONTE ST S					E Approach WHITLOCK AVE					S Approach BRONTE ST S					Int. Total (15 min)	Int. Total (1 hr)
	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	UTurn S:S	Peds S:	Approach Total		
12:00:00	30	9	0	0	39	16	1	0	6	17	1	25	0	0	26	82	
12:15:00	34	10	1	0	45	8	0	0	2	8	2	29	0	0	31	84	
12:30:00	26	13	0	1	39	19	1	0	1	20	1	24	1	0	26	85	
12:45:00	26	11	2	0	39	21	2	0	2	23	3	25	0	0	28	90	341
13:00:00	24	12	1	0	37	10	1	0	7	11	3	23	0	0	26	74	333
13:15:00	34	7	0	0	41	12	3	0	4	15	3	26	1	0	30	86	335
13:30:00	29	18	0	0	47	12	1	0	7	13	0	23	0	0	23	83	333
13:45:00	26	11	0	0	37	9	1	0	2	10	0	28	0	0	28	75	318
14:00:00	30	6	0	0	36	12	0	0	2	12	3	25	0	0	28	76	320
14:15:00	21	11	0	0	32	14	0	0	0	14	1	34	0	0	35	81	315
14:30:00	28	12	0	0	40	6	4	0	7	10	3	27	0	0	30	80	312
14:45:00	35	23	2	0	60	19	1	0	1	20	5	36	0	0	41	121	358
15:00:00	31	24	1	0	56	23	1	1	3	25	7	46	0	0	53	134	416
15:15:00	34	28	0	0	62	24	1	0	2	25	11	32	0	0	43	130	465
15:30:00	31	19	2	0	52	21	6	0	8	27	8	30	0	0	38	117	502
15:45:00	41	23	0	0	64	48	17	0	4	65	3	35	0	0	38	167	548
16:00:00	43	18	0	0	61	20	4	0	7	24	2	36	0	0	38	123	537
16:15:00	40	24	1	0	65	15	6	0	2	21	2	37	0	0	39	125	532
16:30:00	48	13	0	0	61	23	3	1	3	27	6	40	0	0	46	134	549
16:45:00	27	26	0	0	53	23	1	1	1	25	3	56	0	0	59	137	519
Grand Total	638	318	10	1	966	355	54	3	71	412	67	637	2	0	706	**2084**	-
Approach%	66%	32.9%	1%		-	86.2%	13.1%	0.7%		-	9.5%	90.2%	0.3%		-	**-**	-
Totals %	30.6%	15.3%	0.5%		46.4%	17%	2.6%	0.1%		19.8%	3.2%	30.6%	0.1%		33.9%	**-**	-
Heavy	18	11	0		-	16	0	0		-	3	17	1		-	**-**	-
Heavy %	2.8%	3.5%	0%		-	4.5%	0%	0%		-	4.5%	2.7%	50%		-	**-**	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

Crozier & Associates
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MILTON ONTARIO, L9T 6P4
CANADA

Peak Hour: 03:45 PM - 04:45 PM Weather:

Start Time	N Approach BRONTE ST S					E Approach WHITLOCK AVE					S Approach BRONTE ST S					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
15:45:00	41	23	0	0	64	48	17	0	4	65	3	35	0	0	38	167
16:00:00	43	18	0	0	61	20	4	0	7	24	2	36	0	0	38	123
16:15:00	40	24	1	0	65	15	6	0	2	21	2	37	0	0	39	125
16:30:00	48	13	0	0	61	23	3	1	3	27	6	40	0	0	46	134
Grand Total	172	78	1	0	251	106	30	1	16	137	13	148	0	0	161	**549**
Approach%	68.5%	31.1%	0.4%		-	77.4%	21.9%	0.7%		-	8.1%	91.9%	0%		-	**-**
Totals %	31.3%	14.2%	0.2%		45.7%	19.3%	5.5%	0.2%		25%	2.4%	27%	0%		29.3%	**-**
PHF	0.9	0.81	0.25		0.97	0.55	0.44	0.25		0.53	0.54	0.93	0		0.88	**-**
Heavy	3	4	0		7	5	0	0		5	0	3	0		3	**-**
Heavy %	1.7%	5.1%	0%		2.8%	4.7%	0%	0%		3.6%	0%	2%	0%		1.9%	**-**
Lights	169	74	1		244	101	30	1		132	13	143	0		156	**-**
Lights %	98.3%	94.9%	100%		97.2%	95.3%	100%	100%		96.4%	100%	96.6%	0%		96.9%	**-**
Single-Unit Trucks	1	1	0		2	0	0	0		0	0	1	0		1	**-**
Single-Unit Trucks %	0.6%	1.3%	0%		0.8%	0%	0%	0%		0%	0%	0.7%	0%		0.6%	**-**
Buses	2	3	0		5	5	0	0		5	0	2	0		2	**-**
Buses %	1.2%	3.8%	0%		2%	4.7%	0%	0%		3.6%	0%	1.4%	0%		1.2%	**-**
Articulated Trucks	0	0	0		0	0	0	0		0	0	0	0		0	**-**
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Bicycles on Road	0	0	0		0	0	0	0		0	0	2	0		2	**-**
Bicycles on Road %	0%	0%	0%		0%	0%	0%	0%		0%	0%	1.4%	0%		1.2%	**-**
Pedestrians	-	-	-	0	-	-	-	-	16	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	100%		-	-	-	0%		**-**
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	0%		-	-	-	0%		-	-	-	0%		**-**

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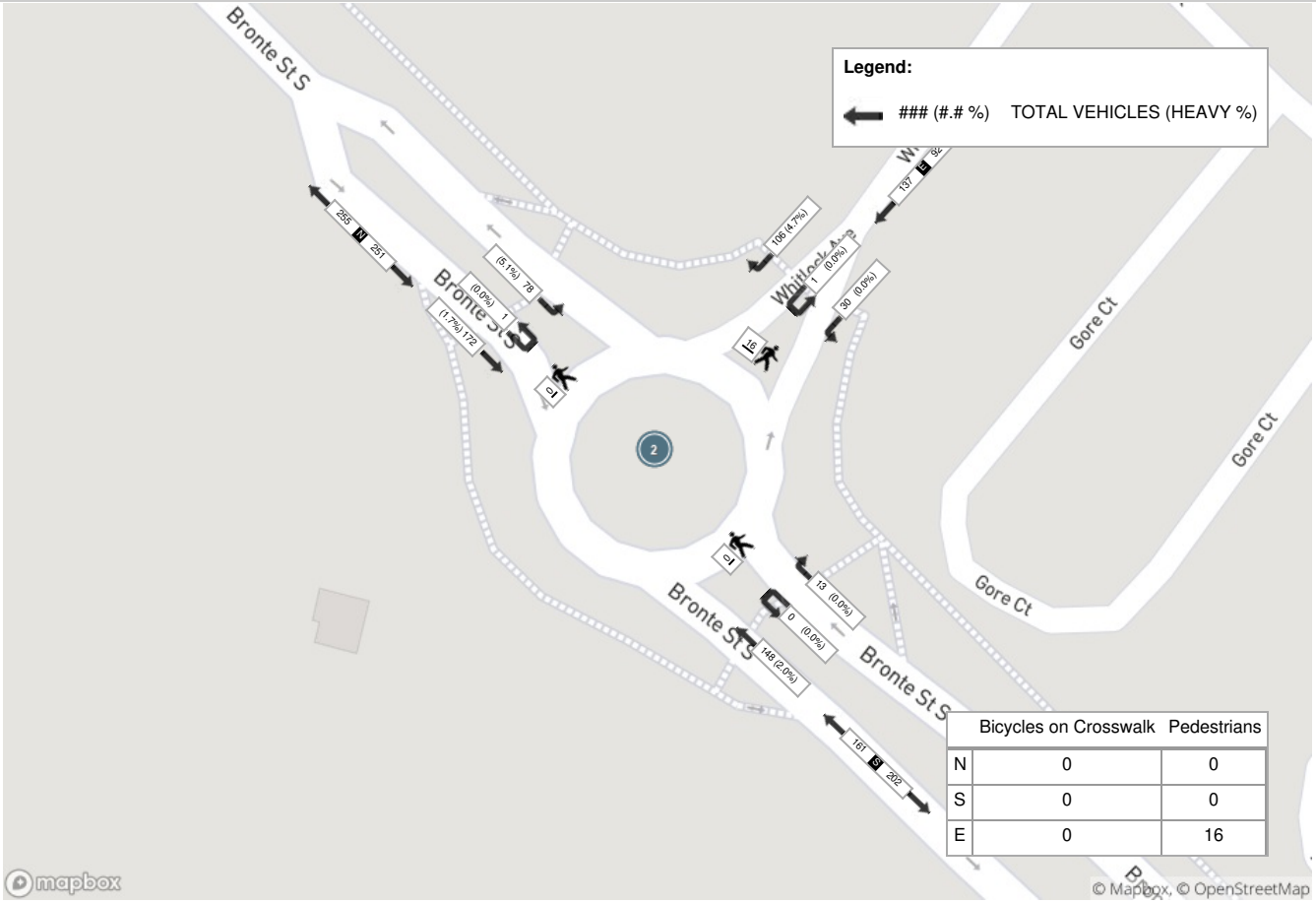
CANADA

Peak Hour: 03:45 PM - 04:45 PM Weather:



	Bicycles on Crosswalk	Pedestrians
N	0	0
S	0	0
E	0	16

APPENDIX D

Levels of Service Definitions

Highway Capacity Manual 2010

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* (Transportation Research Board, 2010).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F[1]	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Unsignalized intersection LOS criteria can be further reduced into three intersection types: all-way stop, two-way stop, and roundabout control. All-way stop and roundabout control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F[1]	>50

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

Highway Capacity Manual 2010

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* (Transportation Research Board, 2010).

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Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F[1]	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Unsignalized intersection LOS criteria can be further reduced into three intersection types: all-way stop, two-way stop, and roundabout control. All-way stop and roundabout control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F[1]	>50

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

APPENDIX E

Detailed Capacity Analysis

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution

Filename: Bronte & Etheridge.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 4/15/2021 2:13:39 AM

Summary of junction performance

	PM			
	Queue (PCU)	**Delay (s)**	**RFC**	**LOS**
	85% y-int Adjustment - Existing			
Arm 1	0.06	1.73	0.06	A
Arm 2	0.09	3.48	0.08	A
Arm 3	0.13	1.70	0.11	A
Arm 4	0.00	0.00	0.00	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM " model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM" model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM" model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 4/15/2021 2:13:36 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	3/16/2021
Version	
Status	(new file)
Identifier	

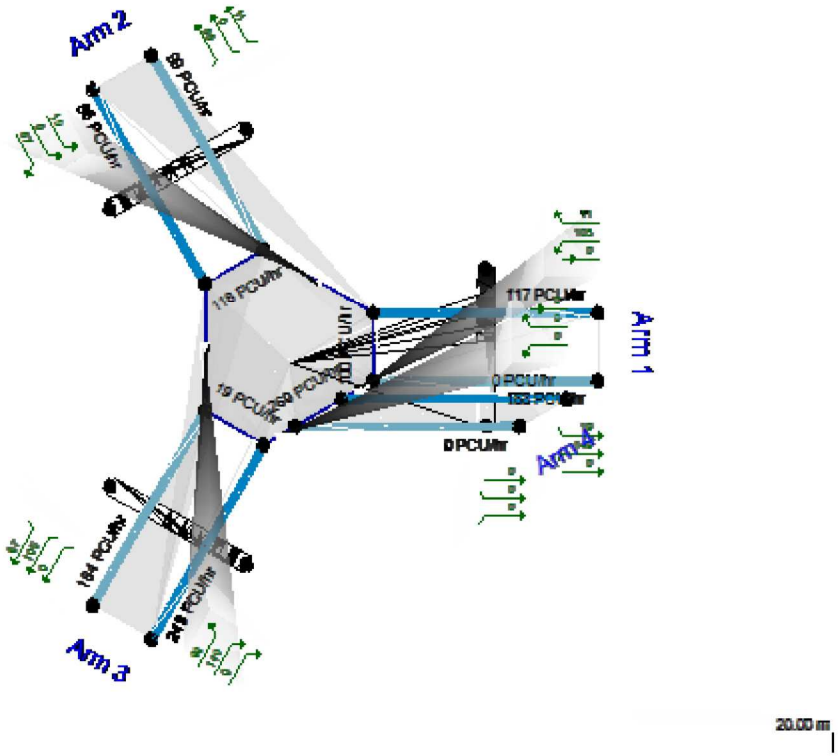
Client	
Jobnumber	
Enumerator	mferguson
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
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	PCU	PCU	perHour	s	-Min	perMin



Showing modelled flow through junction (PCU/hr).
Time Segment: (03:45-04:00)
Showing Analysis Set "A2 - 85% y-int Adjustment "; Demand Set "D1 - Existing, PM "

The junction diagram reflects the last run of ARCADY.

85% y-int Adjustment - Existing, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Arm 1 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Arm 3 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
85% y-int Adjustment	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
Existing, PM	Existing	PM		PHF	03:45	04:45	60	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3,4				2.05	A

Junction Network Options

Driving Side	Lighting
Right	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Bronte Road	South
2	2	Etheridge Avenue	East
3	3	Bronte Road	North
4	4	TBD	West

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00
4	0.00	99999.00		0.00

Roundabout Geometry

Arm	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	6.70	10.70	12.30	25.00	23.00	16.00	
2	3.40	6.50	8.70	15.00	23.00	25.00	
3	6.70	10.70	11.30	20.00	23.00	0.00	
4	3.00	3.00	0.00	3.00	13.00	0.00	

Pedestrian Crossings

Arm	Crossing Type
1	Zebra
2	Zebra
3	Zebra
4	None

Zebra Crossings

Arm	Space between crossing and junction entry (PCU)	Vehicles queueing on exit (PCU)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	9.00	6.43
2	1.00	1.00	✓	Distance			5.00	3.57	5.00	3.57
3	3.00	5.00	✓	Distance			9.00	6.43	8.00	5.71

Slope / Intercept / Capacity

Arm Intercept Adjustments

Arm	Type	Reason	Direct Intercept Adjustment (PCU/hr)	Percentage Intercept Adjustment (%)
1	Percentage			85.00

2	Percentage			85.00
3	Percentage			85.00
4	None			

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.903	2360.592
2		(calculated)	(calculated)	0.616	1250.028
3		(calculated)	(calculated)	0.937	2438.543
4		(calculated)	(calculated)	0.416	751.743

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	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	PHF	✓	122.00	100.000
2	PHF	✓	90.00	100.000
3	PHF	✓	261.00	100.000
4	PHF	✓	0.00	100.000

Peak Hour Factor Data

Arm	Hourly Volume (PCU/hr)	Peak Hour Factor	Peak Time Segment
1	122.00	0.94	SecondQuarter
2	90.00	0.94	SecondQuarter
3	261.00	0.94	SecondQuarter
4	0.00	0.94	SecondQuarter

Pedestrian Flows

General Flows Data

Arm	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00
2	PHF	8.00
3	PHF	0.00
4	-	-

Peak Hour Factor Data

Arm	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	8.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter
4	-	-	-

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.000	12.000	110.000	0.000
	2	20.000	0.000	70.000	0.000
	3	156.000	92.000	13.000	0.000
	4	0.000	0.000	0.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	0.10	0.90	0.00
	2	0.22	0.00	0.78	0.00
	3	0.60	0.35	0.05	0.00
	4	0.25	0.25	0.25	0.25

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	1.000	1.000	1.022	1.000
	2	1.118	1.000	1.017	1.000
	3	1.008	1.026	1.000	1.000
	4	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.0	0.0	2.2	0.0
	2	11.8	0.0	1.7	0.0
	3	0.8	2.6	0.0	0.0
	4	0.0	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
1	0.06	1.73	0.06	A	122.00	122.00	3.50	1.72	0.06	3.50	1.72
2	0.08	3.48	0.09	A	90.00	90.00	5.15	3.44	0.09	5.15	3.44
3	0.11	1.70	0.13	A	261.00	261.00	7.34	1.69	0.12	7.34	1.69
4	0.00	0.00	0.00	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Main Results for each time segment

Main results: (03:45-04:00)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS

1	116.81	29.20	116.59	168.16	100.34	0.00	2258.93	1098.74	0.052	0.00	0.06	1.713	A
2	86.17	21.54	85.84	99.39	117.54	8.00	1177.39	568.44	0.073	0.00	0.08	3.423	A
3	249.89	62.47	249.43	184.31	19.08	0.00	2420.67	2320.22	0.103	0.00	0.12	1.680	A
4	0.00	0.00	0.00	0.00	268.50	0.00	640.16	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:00-04:15)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	129.79	32.45	129.76	187.19	111.68	0.00	2246.43	1098.74	0.058	0.06	0.06	1.733	A
2	95.74	23.94	95.70	110.61	130.82	8.00	1169.21	568.44	0.082	0.08	0.09	3.479	A
3	277.66	69.41	277.60	205.26	21.27	0.00	2418.62	2320.22	0.115	0.12	0.13	1.703	A
4	0.00	0.00	0.00	0.00	298.87	0.00	627.55	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:15-04:30)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	124.60	31.15	124.61	179.76	107.24	0.00	2251.35	1098.75	0.055	0.06	0.06	1.728	A
2	91.91	22.98	91.93	106.22	125.63	8.00	1172.41	568.44	0.078	0.09	0.09	3.457	A
3	266.55	66.64	266.57	197.13	20.43	0.00	2419.41	2320.22	0.110	0.13	0.13	1.694	A
4	0.00	0.00	0.00	0.00	287.00	0.00	632.48	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:30-04:45)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	116.81	29.20	116.83	168.54	100.55	0.00	2258.71	1098.74	0.052	0.06	0.06	1.715	A
2	86.17	21.54	86.20	99.59	117.78	8.00	1177.24	568.44	0.073	0.09	0.08	3.426	A
3	249.89	62.47	249.93	184.82	19.15	0.00	2420.60	2320.22	0.103	0.13	0.12	1.680	A
4	0.00	0.00	0.00	0.00	269.08	0.00	639.92	0.00	0.000	0.00	0.00	0.000	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.82	0.05	1.713	A	A
2	1.20	0.08	3.423	A	A
3	1.73	0.12	1.680	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:00-04:15)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.93	0.06	1.733	A	A

2	1.37	0.09	3.479	A	A
3	1.96	0.13	1.703	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:15-04:30)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.90	0.06	1.728	A	A
2	1.34	0.09	3.457	A	A
3	1.90	0.13	1.694	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:30-04:45)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.84	0.06	1.715	A	A
2	1.24	0.08	3.426	A	A
3	1.76	0.12	1.680	A	A
4	0.00	0.00	0.000	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Bronte & Etheridge.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 4/15/2021 2:11:24 AM

Summary of junction performance

	PM			
	Queue (PCU)	**Delay (s)**	**RFC**	**LOS**
	100% y-int Adjustment - Existing			
Arm 1	0.05	1.45	0.05	A
Arm 2	0.08	3.04	0.07	A
Arm 3	0.11	1.45	0.10	A
Arm 4	0.00	0.00	0.00	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM " model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM" model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM" model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 4/15/2021 2:11:20 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	3/16/2021
Version	
Status	(new file)
Identifier	

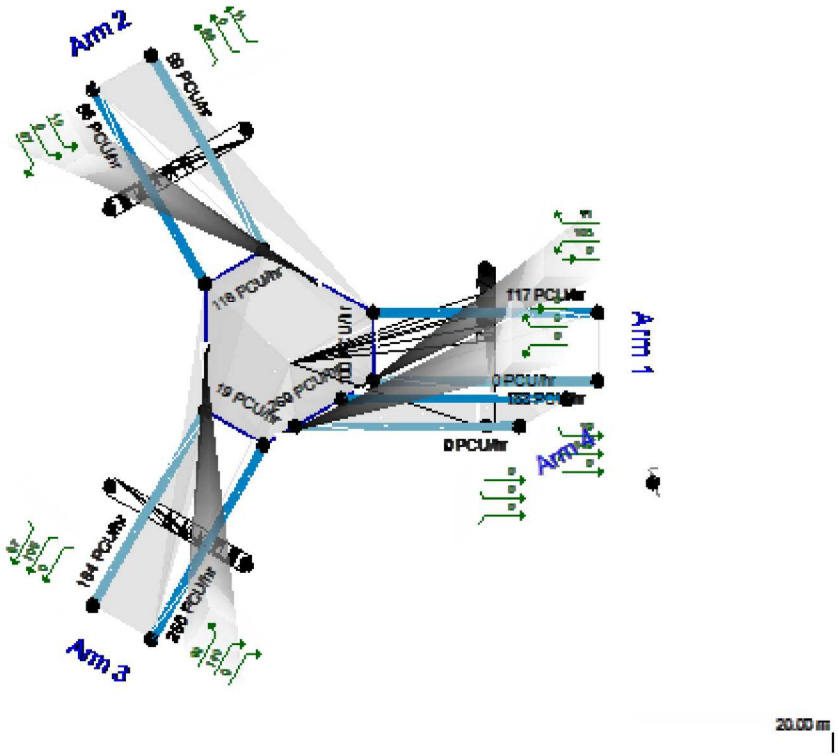
Client	
Jobnumber	
Enumerator	mferguson
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
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	PCU	PCU	perHour	s	-Min	perMin



Showing modelled flow through junction (PCU/hr).
Time Segment: (03:45-04:00)
Showing Analysis Set "A1 - 100% y-int Adjustment "; Demand Set "D1 - Existing, PM "

The junction diagram reflects the last run of ARCADY.

100% y-int Adjustment - Existing, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Arm 1 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Arm 3 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Arm 4 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
100% y-int Adjustment	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
Existing, PM	Existing	PM		PHF	03:45	04:45	60	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3,4				1.75	A

Junction Network Options

Driving Side	Lighting
Right	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Bronte Road	South
2	2	Etheridge Avenue	East
3	3	Bronte Road	North
4	4	TBD	West

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00
4	0.00	99999.00		0.00

Roundabout Geometry

Arm	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	7.00	10.00	12.20	25.00	40.00	16.00	
2	3.50	5.50	7.00	20.00	40.00	25.00	
3	6.70	11.00	12.50	26.00	40.00	16.00	
4	3.50	7.30	11.50	23.00	40.00	25.00	

Pedestrian Crossings

Arm	Crossing Type
1	Zebra
2	Zebra
3	Zebra
4	Zebra

Zebra Crossings

Arm	Space between crossing and junction entry (PCU)	Vehicles queueing on exit (PCU)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	10.00	7.14
2	1.00	1.00	✓	Distance			6.50	4.64	5.50	3.93
3	3.00	5.00	✓	Distance			10.50	7.50	9.50	6.79
4	1.00	1.00	✓	Distance			6.00	4.29	5.50	3.93

Slope / Intercept / Capacity

Arm Intercept Adjustments

Arm	Type	Reason	Direct Intercept Adjustment (PCU/hr)	Percentage Intercept Adjustment (%)

1	Percentage			100.00
2	Percentage			100.00
3	Percentage			100.00
4	None			

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.876	2783.176
2		(calculated)	(calculated)	0.587	1400.959
3		(calculated)	(calculated)	0.881	2808.951
4		(calculated)	(calculated)	0.641	1658.584

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	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	PHF	✓	122.00	100.000
2	PHF	✓	90.00	100.000
3	PHF	✓	261.00	100.000
4	PHF	✓	0.00	100.000

Peak Hour Factor Data

Arm	Hourly Volume (PCU/hr)	Peak Hour Factor	Peak Time Segment
1	122.00	0.94	SecondQuarter
2	90.00	0.94	SecondQuarter
3	261.00	0.94	SecondQuarter
4	0.00	0.94	SecondQuarter

Pedestrian Flows

General Flows Data

Arm	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00
2	PHF	8.00
3	PHF	0.00
4	PHF	0.00

Peak Hour Factor Data

Arm	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	8.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter
4	0.00	1.00	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.000	12.000	110.000	0.000
	2	20.000	0.000	70.000	0.000
	3	156.000	92.000	13.000	0.000
	4	0.000	0.000	0.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	0.10	0.90	0.00
	2	0.22	0.00	0.78	0.00
	3	0.60	0.35	0.05	0.00
	4	0.25	0.25	0.25	0.25

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	1.000	1.000	1.022	1.000
	2	1.118	1.000	1.017	1.000
	3	1.008	1.026	1.000	1.000
	4	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.0	0.0	2.2	0.0
	2	11.8	0.0	1.7	0.0
	3	0.8	2.6	0.0	0.0
	4	0.0	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
1	0.05	1.45	0.05	A	122.00	122.00	2.92	1.44	0.05	2.92	1.44
2	0.07	3.04	0.08	A	90.00	90.00	4.51	3.01	0.08	4.51	3.01
3	0.10	1.45	0.11	A	261.00	261.00	6.27	1.44	0.10	6.27	1.44
4	0.00	0.00	0.00	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Main Results for each time segment

Main results: (03:45-04:00)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS

1	116.81	29.20	116.62	168.21	100.37	0.00	2677.41	1148.24	0.044	0.00	0.05	1.433	A
2	86.17	21.54	85.88	99.42	117.58	8.00	1331.42	714.61	0.065	0.00	0.07	2.999	A
3	249.89	62.47	249.50	184.38	19.09	0.00	2792.13	2668.98	0.090	0.00	0.10	1.435	A
4	0.00	0.00	0.00	0.00	268.58	0.00	1486.47	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:00-04:15)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	129.79	32.45	129.76	187.20	111.68	0.00	2664.00	1148.25	0.049	0.05	0.05	1.448	A
2	95.74	23.94	95.71	110.62	130.83	8.00	1323.64	714.60	0.072	0.07	0.08	3.042	A
3	277.66	69.41	277.61	205.27	21.27	0.00	2790.20	2668.98	0.100	0.10	0.11	1.452	A
4	0.00	0.00	0.00	0.00	298.88	0.00	1467.06	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:15-04:30)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	124.60	31.15	124.60	179.76	107.24	0.00	2669.29	1148.25	0.047	0.05	0.05	1.442	A
2	91.91	22.98	91.93	106.22	125.63	8.00	1326.69	714.60	0.069	0.08	0.08	3.027	A
3	266.55	66.64	266.57	197.12	20.43	0.00	2790.95	2668.98	0.096	0.11	0.11	1.445	A
4	0.00	0.00	0.00	0.00	287.00	0.00	1474.67	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:30-04:45)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	116.81	29.20	116.82	168.53	100.54	0.00	2677.21	1148.25	0.044	0.05	0.05	1.433	A
2	86.17	21.54	86.19	99.59	117.78	8.00	1331.30	714.60	0.065	0.08	0.07	3.000	A
3	249.89	62.47	249.92	184.82	19.15	0.00	2792.07	2668.98	0.090	0.11	0.10	1.435	A
4	0.00	0.00	0.00	0.00	269.08	0.00	1486.16	0.00	0.000	0.00	0.00	0.000	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.69	0.05	1.433	A	A
2	1.06	0.07	2.999	A	A
3	1.48	0.10	1.435	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:00-04:15)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.78	0.05	1.448	A	A

2	1.20	0.08	3.042	A	A
3	1.67	0.11	1.452	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:15-04:30)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.75	0.05	1.442	A	A
2	1.17	0.08	3.027	A	A
3	1.62	0.11	1.445	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:30-04:45)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.70	0.05	1.433	A	A
2	1.09	0.07	3.000	A	A
3	1.50	0.10	1.435	A	A
4	0.00	0.00	0.000	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Bronte & Etheridge.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 4/15/2021 2:14:39 AM

Summary of junction performance

	PM			
	Queue (PCU)	**Delay (s)**	**RFC**	**LOS**
	85% y-int Adjustment - FB			
Arm 1	0.10	1.83	0.09	A
Arm 2	0.12	3.69	0.11	A
Arm 3	0.21	1.84	0.17	A
Arm 4	0.00	0.00	0.00	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM" model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM " model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM" model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 4/15/2021 2:14:36 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	3/16/2021
Version	
Status	(new file)
Identifier	

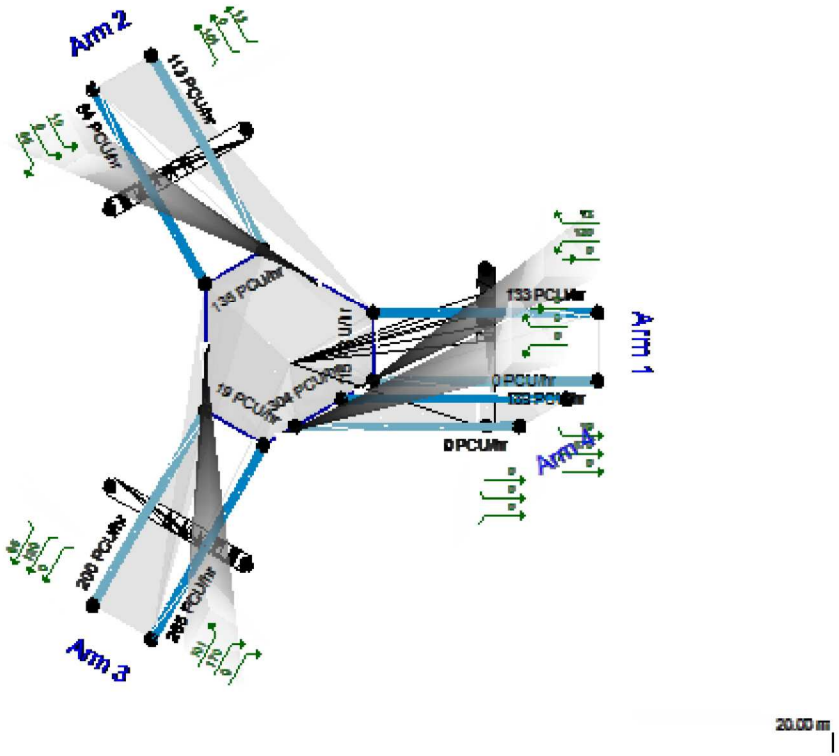
Client	
Jobnumber	
Enumerator	mferguson
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
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	PCU	PCU	perHour	s	-Min	perMin



Showing modelled flow through junction (PCU/hr).
Time Segment: (03:45-04:00)
Showing Analysis Set "A2 - 85% y-int Adjustment "; Demand Set "D2 - FB, PM "

The junction diagram reflects the last run of ARCADY.

85% y-int Adjustment - FB, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Arm 1 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Arm 3 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
85% y-int Adjustment	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
FB, PM	FB	PM		PHF	03:45	04:45	60	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3,4				2.15	A

Junction Network Options

Driving Side	Lighting
Right	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Bronte Road	South
2	2	Etheridge Avenue	East
3	3	Bronte Road	North
4	4	TBD	West

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00
4	0.00	99999.00		0.00

Roundabout Geometry

Arm	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	6.70	10.70	12.30	25.00	23.00	16.00	
2	3.40	6.50	8.70	15.00	23.00	25.00	
3	6.70	10.70	11.30	20.00	23.00	0.00	
4	3.00	3.00	0.00	3.00	13.00	0.00	

Pedestrian Crossings

Arm	Crossing Type
1	Zebra
2	Zebra
3	Zebra
4	None

Zebra Crossings

Arm	Space between crossing and junction entry (PCU)	Vehicles queueing on exit (PCU)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	9.00	6.43
2	1.00	1.00	✓	Distance			5.00	3.57	5.00	3.57
3	3.00	5.00	✓	Distance			9.00	6.43	8.00	5.71

Slope / Intercept / Capacity

Arm Intercept Adjustments

Arm	Type	Reason	Direct Intercept Adjustment (PCU/hr)	Percentage Intercept Adjustment (%)
1	Percentage			85.00

2	Percentage			85.00
3	Percentage			85.00
4	None			

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.903	2360.592
2		(calculated)	(calculated)	0.616	1250.028
3		(calculated)	(calculated)	0.937	2438.543
4		(calculated)	(calculated)	0.416	751.743

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	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	PHF	✓	156.00	100.000
2	PHF	✓	99.00	100.000
3	PHF	✓	335.00	100.000
4	PHF	✓	0.00	100.000

Peak Hour Factor Data

Arm	Hourly Volume (PCU/hr)	Peak Hour Factor	Peak Time Segment
1	156.00	0.82	SecondQuarter
2	99.00	0.82	SecondQuarter
3	335.00	0.82	SecondQuarter
4	0.00	0.82	SecondQuarter

Pedestrian Flows

General Flows Data

Arm	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00
2	PHF	16.00
3	PHF	0.00
4	-	-

Peak Hour Factor Data

Arm	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	16.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter
4	-	-	-

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.000	15.000	141.000	0.000
	2	22.000	0.000	77.000	0.000
	3	200.000	118.000	17.000	0.000
	4	0.000	0.000	0.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	0.10	0.90	0.00
	2	0.22	0.00	0.78	0.00
	3	0.60	0.35	0.05	0.00
	4	0.25	0.25	0.25	0.25

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	1.000	1.000	1.020	1.000
	2	1.000	1.000	1.047	1.000
	3	1.017	1.051	1.000	1.000
	4	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.0	0.0	2.0	0.0
	2	0.0	0.0	4.7	0.0
	3	1.7	5.1	0.0	0.0
	4	0.0	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
1	0.09	1.83	0.10	A	156.00	156.00	4.63	1.78	0.08	4.63	1.78
2	0.11	3.69	0.12	A	99.00	99.00	5.86	3.55	0.10	5.86	3.55
3	0.17	1.84	0.21	A	335.00	335.00	9.95	1.78	0.17	9.95	1.78
4	0.00	0.00	0.00	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Main Results for each time segment

Main results: (03:45-04:00)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS

1	133.17	33.29	132.91	189.11	115.02	0.00	2243.36	1097.77	0.059	0.00	0.06	1.735	A
2	84.51	21.13	84.19	113.32	134.62	16.00	1166.27	566.06	0.072	0.00	0.08	3.447	A
3	285.98	71.49	285.43	200.10	18.71	0.00	2421.02	2320.71	0.118	0.00	0.14	1.732	A
4	0.00	0.00	0.00	0.00	304.13	0.00	625.36	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:00-04:15)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	190.24	47.56	190.11	270.52	164.52	0.00	2187.01	1097.77	0.087	0.06	0.10	1.834	A
2	120.73	30.18	120.56	162.08	192.55	16.00	1130.65	566.06	0.107	0.08	0.12	3.692	A
3	408.54	102.13	408.25	286.32	26.79	0.00	2413.45	2320.71	0.169	0.14	0.21	1.844	A
4	0.00	0.00	0.00	0.00	435.04	0.00	570.96	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:15-04:30)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	167.41	41.85	167.47	238.33	144.92	0.00	2209.68	1097.77	0.076	0.10	0.08	1.796	A
2	106.24	26.56	106.31	142.78	169.61	16.00	1144.76	566.06	0.093	0.12	0.11	3.594	A
3	359.51	89.88	359.63	252.30	23.62	0.00	2416.41	2320.71	0.149	0.21	0.18	1.798	A
4	0.00	0.00	0.00	0.00	383.25	0.00	592.48	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:30-04:45)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	133.17	33.29	133.25	189.64	115.31	0.00	2243.04	1097.77	0.059	0.08	0.06	1.736	A
2	84.51	21.13	84.61	113.60	134.96	16.00	1166.07	566.06	0.072	0.11	0.08	3.448	A
3	285.98	71.49	286.14	200.77	18.80	0.00	2420.93	2320.71	0.118	0.18	0.14	1.735	A
4	0.00	0.00	0.00	0.00	304.95	0.00	625.02	0.00	0.000	0.00	0.00	0.000	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.95	0.06	1.735	A	A
2	1.19	0.08	3.447	A	A
3	2.04	0.14	1.732	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:00-04:15)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.44	0.10	1.834	A	A

2	1.82	0.12	3.692	A	A
3	3.10	0.21	1.844	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:15-04:30)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.26	0.08	1.796	A	A
2	1.62	0.11	3.594	A	A
3	2.72	0.18	1.798	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:30-04:45)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.97	0.06	1.736	A	A
2	1.24	0.08	3.448	A	A
3	2.09	0.14	1.735	A	A
4	0.00	0.00	0.000	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Bronte & Etheridge.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 4/15/2021 2:12:17 AM

Summary of junction performance

	PM			
	Queue (PCU)	**Delay (s)**	**RFC**	**LOS**
	100% y-int Adjustment - FB			
Arm 1	0.08	1.52	0.07	A
Arm 2	0.11	3.20	0.09	A
Arm 3	0.18	1.56	0.15	A
Arm 4	0.00	0.00	0.00	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM" model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM " model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM" model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 4/15/2021 2:12:14 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	3/16/2021
Version	
Status	(new file)
Identifier	

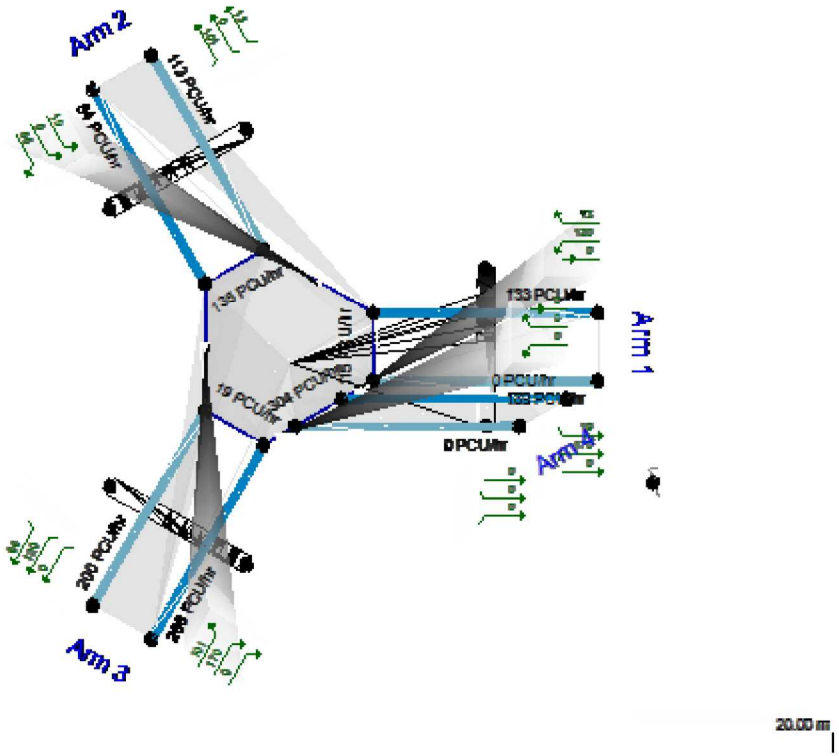
Client	
Jobnumber	
Enumerator	mferguson
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
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	PCU	PCU	perHour	s	-Min	perMin



Showing modelled flow through junction (PCU/hr).
Time Segment: (03:45-04:00)
Showing Analysis Set "A1 - 100% y-int Adjustment "; Demand Set "D2 - FB, PM "

The junction diagram reflects the last run of ARCADY.

100% y-int Adjustment - FB, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Arm 1 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Arm 3 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Arm 4 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
100% y-int Adjustment	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
FB, PM	FB	PM		PHF	03:45	04:45	60	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3,4				1.82	A

Junction Network Options

Driving Side	Lighting
Right	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Bronte Road	South
2	2	Etheridge Avenue	East
3	3	Bronte Road	North
4	4	TBD	West

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00
4	0.00	99999.00		0.00

Roundabout Geometry

Arm	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	7.00	10.00	12.20	25.00	40.00	16.00	
2	3.50	5.50	7.00	20.00	40.00	25.00	
3	6.70	11.00	12.50	26.00	40.00	16.00	
4	3.50	7.30	11.50	23.00	40.00	25.00	

Pedestrian Crossings

Arm	Crossing Type
1	Zebra
2	Zebra
3	Zebra
4	Zebra

Zebra Crossings

Arm	Space between crossing and junction entry (PCU)	Vehicles queueing on exit (PCU)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	10.00	7.14
2	1.00	1.00	✓	Distance			6.50	4.64	5.50	3.93
3	3.00	5.00	✓	Distance			10.50	7.50	9.50	6.79
4	1.00	1.00	✓	Distance			6.00	4.29	5.50	3.93

Slope / Intercept / Capacity

Arm Intercept Adjustments

Arm	Type	Reason	Direct Intercept Adjustment (PCU/hr)	Percentage Intercept Adjustment (%)

1	Percentage			100.00
2	Percentage			100.00
3	Percentage			100.00
4	None			

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.876	2783.176
2		(calculated)	(calculated)	0.587	1400.959
3		(calculated)	(calculated)	0.881	2808.951
4		(calculated)	(calculated)	0.641	1658.584

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	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	PHF	✓	156.00	100.000
2	PHF	✓	99.00	100.000
3	PHF	✓	335.00	100.000
4	PHF	✓	0.00	100.000

Peak Hour Factor Data

Arm	Hourly Volume (PCU/hr)	Peak Hour Factor	Peak Time Segment
1	156.00	0.82	SecondQuarter
2	99.00	0.82	SecondQuarter
3	335.00	0.82	SecondQuarter
4	0.00	0.82	SecondQuarter

Pedestrian Flows

General Flows Data

Arm	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00
2	PHF	16.00
3	PHF	0.00
4	PHF	0.00

Peak Hour Factor Data

Arm	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	16.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter
4	0.00	1.00	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.000	15.000	141.000	0.000
	2	22.000	0.000	77.000	0.000
	3	200.000	118.000	17.000	0.000
	4	0.000	0.000	0.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	0.10	0.90	0.00
	2	0.22	0.00	0.78	0.00
	3	0.60	0.35	0.05	0.00
	4	0.25	0.25	0.25	0.25

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	1.000	1.000	1.020	1.000
	2	1.000	1.000	1.047	1.000
	3	1.017	1.051	1.000	1.000
	4	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To			
		1	2	3	4
From	1	0.0	0.0	2.0	0.0
	2	0.0	0.0	4.7	0.0
	3	1.7	5.1	0.0	0.0
	4	0.0	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
1	0.07	1.52	0.08	A	156.00	156.00	3.85	1.48	0.06	3.85	1.48
2	0.09	3.20	0.11	A	99.00	99.00	5.11	3.10	0.09	5.11	3.10
3	0.15	1.56	0.18	A	335.00	335.00	8.44	1.51	0.14	8.44	1.51
4	0.00	0.00	0.00	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Main Results for each time segment

Main results: (03:45-04:00)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS

1	133.17	33.29	132.96	189.17	115.06	0.00	2660.98	1145.44	0.050	0.00	0.05	1.449	A
2	84.51	21.13	84.23	113.35	134.66	16.00	1320.11	712.92	0.064	0.00	0.07	3.018	A
3	285.98	71.49	285.51	200.17	18.72	0.00	2792.45	2669.31	0.102	0.00	0.12	1.475	A
4	0.00	0.00	0.00	0.00	304.23	0.00	1463.63	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:00-04:15)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	190.24	47.56	190.14	270.56	164.54	0.00	2599.87	1145.44	0.073	0.05	0.08	1.520	A
2	120.73	30.18	120.59	162.10	192.57	16.00	1286.22	712.91	0.094	0.07	0.11	3.199	A
3	408.54	102.13	408.30	286.36	26.80	0.00	2785.33	2669.31	0.147	0.12	0.18	1.556	A
4	0.00	0.00	0.00	0.00	435.10	0.00	1379.77	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:15-04:30)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	167.41	41.85	167.46	238.31	144.92	0.00	2624.60	1145.44	0.064	0.08	0.07	1.493	A
2	106.24	26.56	106.30	142.77	169.60	16.00	1299.66	712.91	0.082	0.11	0.09	3.125	A
3	359.51	89.88	359.61	252.28	23.62	0.00	2788.13	2669.31	0.129	0.18	0.15	1.523	A
4	0.00	0.00	0.00	0.00	383.23	0.00	1413.01	0.00	0.000	0.00	0.00	0.000	A

Main results: (04:30-04:45)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	133.17	33.29	133.23	189.61	115.30	0.00	2660.69	1145.44	0.050	0.07	0.05	1.449	A
2	84.51	21.13	84.60	113.59	134.94	16.00	1319.94	712.91	0.064	0.09	0.07	3.021	A
3	285.98	71.49	286.12	200.74	18.80	0.00	2792.38	2669.31	0.102	0.15	0.12	1.475	A
4	0.00	0.00	0.00	0.00	304.92	0.00	1463.19	0.00	0.000	0.00	0.00	0.000	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.80	0.05	1.449	A	A
2	1.04	0.07	3.018	A	A
3	1.74	0.12	1.475	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:00-04:15)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.19	0.08	1.520	A	A

2	1.58	0.11	3.199	A	A
3	2.62	0.17	1.556	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:15-04:30)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.05	0.07	1.493	A	A
2	1.40	0.09	3.125	A	A
3	2.30	0.15	1.523	A	A
4	0.00	0.00	0.000	A	A

Queueing Delay results: (04:30-04:45)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.81	0.05	1.449	A	A
2	1.08	0.07	3.021	A	A
3	1.78	0.12	1.475	A	A
4	0.00	0.00	0.000	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Bronte & Whitlock.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 4/15/2021 1:22:38 AM

Summary of junction performance

	PM			
	Queue (PCU)	**Delay (s)**	**RFC**	**LOS**
	85% y-int Adjustment - Existing			
Arm 1	0.12	1.83	0.11	A
Arm 2	0.22	4.06	0.18	A
Arm 3	0.20	1.84	0.16	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM " model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM" model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM" model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 4/15/2021 1:22:35 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	3/16/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	

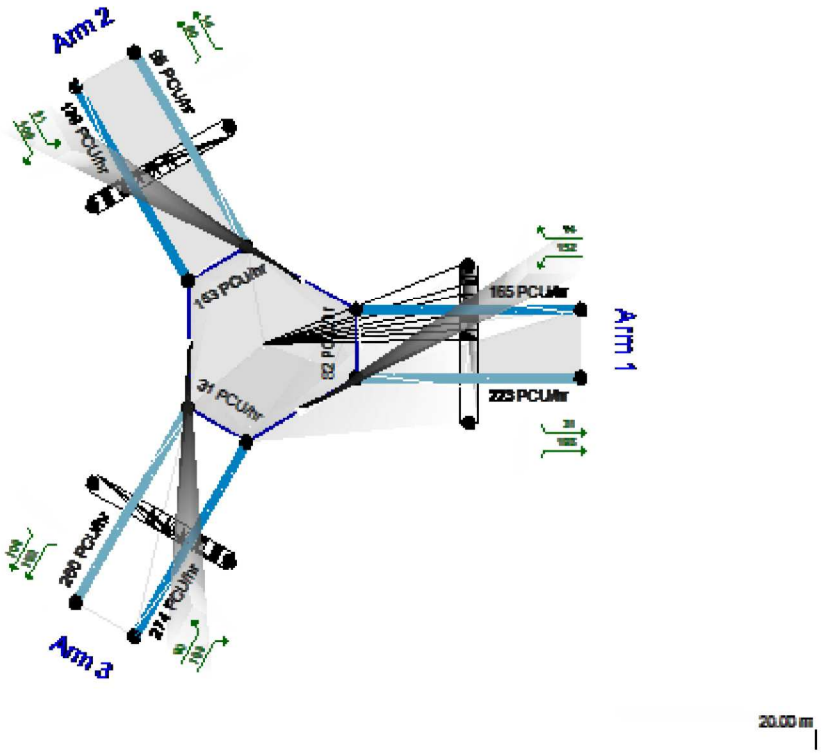
Enumerator	mferguson
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
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	PCU	PCU	perHour	s	-Min	perMin



Showing modelled flow through junction (PCU/hr).
Time Segment: (03:45-04:00)
Showing Analysis Set "A2 - 85% y-int Adjustment "; Demand Set "D1 - Existing, PM "

The junction diagram reflects the last run of ARCADY.

85% y-int Adjustment - Existing, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Arm 1 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Arm 3 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
85% y-int Adjustment	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
Existing, PM	Existing	PM		PHF	03:45	04:45	60	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3				2.37	A

Junction Network Options

Driving Side	Lighting
Right	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Bronte Road	South
2	2	Whitlock Avenue	East
3	3	Bronte Road	North

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

Arm	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	6.70	10.70	12.30	25.00	40.00	16.00	
2	3.40	6.50	8.70	15.00	40.00	25.00	
3	6.70	10.70	11.30	20.00	40.00	0.00	

Pedestrian Crossings

Arm	Crossing Type
1	Zebra
2	Zebra
3	Zebra

Zebra Crossings

Arm	Space between crossing and junction entry (PCU)	Vehicles queueing on exit (PCU)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	9.00	6.43
2	1.00	1.00	✓	Distance			5.00	3.57	5.00	3.57
3	3.00	5.00	✓	Distance			9.00	6.43	8.00	5.71

Slope / Intercept / Capacity

Arm Intercept Adjustments

Arm	Type	Reason	Direct Intercept Adjustment (PCU/hr)	Percentage Intercept Adjustment (%)
1	Percentage			85.00
2	Percentage			85.00
3	Percentage			85.00

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.875	2360.592
2		(calculated)	(calculated)	0.596	1250.028
3		(calculated)	(calculated)	0.907	2438.543

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	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	PHF	✓	194.00	100.000
2	PHF	✓	164.00	100.000
3	PHF	✓	321.00	100.000

Peak Hour Factor Data

Arm	Hourly Volume (PCU/hr)	Peak Hour Factor	Peak Time Segment
1	194.00	0.82	SecondQuarter
2	164.00	0.82	SecondQuarter
3	321.00	0.82	SecondQuarter

Pedestrian Flows

General Flows Data

Arm	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00

2	PHF	16.00
3	PHF	0.00

Peak Hour Factor Data

Arm	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	16.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.000	16.000	178.000
	2	36.000	1.000	127.000
	3	226.000	94.000	1.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.08	0.92
	2	0.22	0.01	0.77
	3	0.70	0.29	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.020
	2	1.000	1.000	1.047
	3	1.017	1.051	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

	To

From		1	2	3
	1	0.0	0.0	2.0
	2	0.0	0.0	4.7
	3	1.7	5.1	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
1	0.11	1.83	0.12	A	194.00	194.00	5.74	1.78	0.10	5.74	1.78
2	0.18	4.06	0.22	A	164.00	164.00	10.47	3.83	0.17	10.47	3.83
3	0.16	1.84	0.20	A	321.00	321.00	9.52	1.78	0.16	9.52	1.78

Main Results for each time segment

Main results: (03:45-04:00)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	165.61	41.40	165.29	223.16	81.79	0.00	2279.26	1380.40	0.073	0.00	0.08	1.733	A
2	140.00	35.00	139.43	94.57	152.51	16.00	1158.27	490.22	0.121	0.00	0.14	3.658	A
3	274.02	68.51	273.50	260.49	31.46	0.00	2410.02	2338.26	0.114	0.00	0.13	1.729	A

Main results: (04:00-04:15)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	236.59	59.15	236.42	319.25	116.99	0.00	2239.83	1380.41	0.106	0.08	0.12	1.829	A
2	200.00	50.00	199.67	135.27	218.14	16.00	1119.20	490.22	0.179	0.14	0.22	4.055	A
3	391.46	97.87	391.19	372.77	45.05	0.00	2397.69	2338.26	0.163	0.13	0.20	1.841	A

Main results: (04:15-04:30)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	208.20	52.05	208.26	281.28	103.06	0.00	2255.72	1380.41	0.092	0.12	0.10	1.789	A
2	176.00	44.00	176.13	119.16	192.16	16.00	1134.67	490.22	0.155	0.22	0.19	3.891	A
3	344.49	86.12	344.60	328.55	39.74	0.00	2402.51	2338.26	0.143	0.20	0.17	1.798	A

Main results: (04:30-04:45)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	165.61	41.40	165.70	223.81	82.00	0.00	2279.03	1380.41	0.073	0.10	0.08	1.736	A
2	140.00	35.00	140.19	94.81	152.89	16.00	1158.04	490.22	0.121	0.19	0.14	3.664	A
3	274.02	68.51	274.19	261.46	31.63	0.00	2409.86	2338.26	0.114	0.17	0.13	1.729	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.18	0.08	1.733	A	A
2	2.08	0.14	3.658	A	A
3	1.95	0.13	1.729	A	A

Queueing Delay results: (04:00-04:15)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.78	0.12	1.829	A	A
2	3.30	0.22	4.055	A	A
3	2.97	0.20	1.841	A	A

Queueing Delay results: (04:15-04:30)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.57	0.10	1.789	A	A
2	2.91	0.19	3.891	A	A
3	2.60	0.17	1.798	A	A

Queueing Delay results: (04:30-04:45)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.21	0.08	1.736	A	A
2	2.18	0.15	3.664	A	A
3	2.00	0.13	1.729	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Bronte & Whitlock.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 4/15/2021 1:20:21 AM

Summary of junction performance

	PM			
	Queue (PCU)	**Delay (s)**	**RFC**	**LOS**
	100% y-int Adjustment - Existing			
Arm 1	0.10	1.52	0.09	A
Arm 2	0.18	3.27	0.15	A
Arm 3	0.16	1.52	0.14	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM " model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM" model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM" model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 4/15/2021 1:20:18 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	3/16/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	

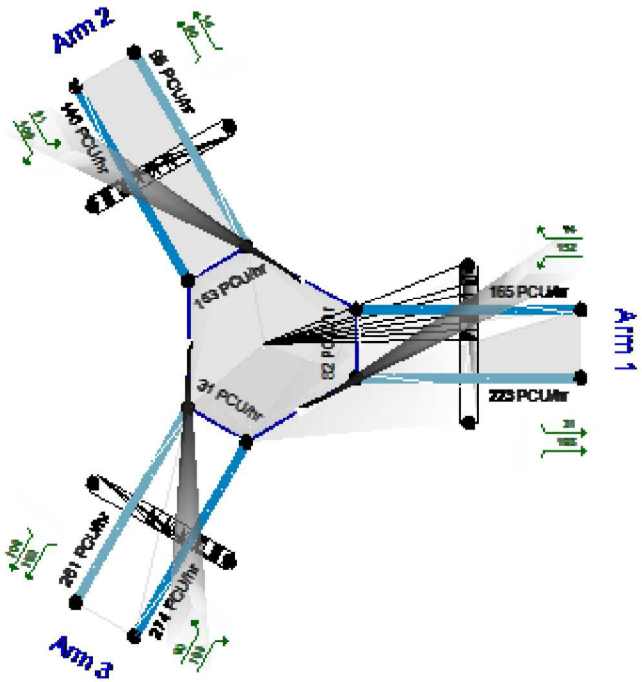
Enumerator	mferguson
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
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	PCU	PCU	perHour	s	-Min	perMin



Showing modelled flow through junction (PCU/hr).
Time Segment: (03:45-04:00)
Showing Analysis Set "A1 - 100% y-int Adjustment "; Demand Set "D1 - Existing, PM "

The junction diagram reflects the last run of ARCADY.

100% y-int Adjustment - Existing, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Arm 1 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Arm 3 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
100% y-int Adjustment	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
Existing, PM	Existing	PM		PHF	03:45	04:45	60	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3				1.94	A

Junction Network Options

Driving Side	Lighting
Right	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Bronte Road	South
2	2	Whitlock Avenue	East
3	3	Bronte Road	North

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

Arm	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	6.70	10.70	12.30	25.00	40.00	16.00	
2	3.40	6.50	8.70	15.00	40.00	25.00	
3	6.70	10.70	11.30	20.00	40.00	0.00	

Pedestrian Crossings

Arm	Crossing Type
1	Zebra
2	Zebra
3	Zebra

Zebra Crossings

Arm	Space between crossing and junction entry (PCU)	Vehicles queueing on exit (PCU)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	9.00	6.43
2	1.00	1.00	✓	Distance			5.00	3.57	5.00	3.57
3	3.00	5.00	✓	Distance			9.00	6.43	8.00	5.71

Slope / Intercept / Capacity

Arm Intercept Adjustments

Arm	Type	Reason	Direct Intercept Adjustment (PCU/hr)	Percentage Intercept Adjustment (%)
1	Percentage			100.00
2	Percentage			100.00
3	Percentage			100.00

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.875	2777.167
2		(calculated)	(calculated)	0.596	1470.621
3		(calculated)	(calculated)	0.907	2868.874

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	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	PHF	✓	194.00	100.000
2	PHF	✓	164.00	100.000
3	PHF	✓	321.00	100.000

Peak Hour Factor Data

Arm	Hourly Volume (PCU/hr)	Peak Hour Factor	Peak Time Segment
1	194.00	0.82	SecondQuarter
2	164.00	0.82	SecondQuarter
3	321.00	0.82	SecondQuarter

Pedestrian Flows

General Flows Data

Arm	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00

2	PHF	16.00
3	PHF	0.00

Peak Hour Factor Data

Arm	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	16.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.000	16.000	178.000
	2	36.000	1.000	127.000
	3	226.000	94.000	1.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.08	0.92
	2	0.22	0.01	0.77
	3	0.70	0.29	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.020
	2	1.000	1.000	1.047
	3	1.017	1.051	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

	To

From		1	2	3
	1	0.0	0.0	2.0
	2	0.0	0.0	4.7
	3	1.7	5.1	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
1	0.09	1.52	0.10	A	194.00	194.00	4.78	1.48	0.08	4.78	1.48
2	0.15	3.27	0.18	A	164.00	164.00	8.54	3.12	0.14	8.54	3.12
3	0.14	1.52	0.16	A	321.00	321.00	7.88	1.47	0.13	7.88	1.47

Main Results for each time segment

Main results: (03:45-04:00)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	165.61	41.40	165.34	223.25	81.82	0.00	2694.02	1490.02	0.061	0.00	0.07	1.449	A
2	140.00	35.00	139.53	94.60	152.56	16.00	1378.30	650.01	0.102	0.00	0.12	3.011	A
3	274.02	68.51	273.59	260.61	31.48	0.00	2840.33	2735.90	0.096	0.00	0.11	1.439	A

Main results: (04:00-04:15)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	236.59	59.15	236.45	319.30	117.01	0.00	2652.99	1490.02	0.089	0.07	0.10	1.516	A
2	200.00	50.00	199.74	135.29	218.17	16.00	1339.28	650.01	0.149	0.12	0.18	3.272	A
3	391.46	97.87	391.24	372.85	45.06	0.00	2828.01	2735.90	0.138	0.11	0.16	1.516	A

Main results: (04:15-04:30)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	208.20	52.05	208.25	281.26	103.05	0.00	2669.60	1490.02	0.078	0.10	0.09	1.488	A
2	176.00	44.00	176.10	119.15	192.15	16.00	1354.76	650.01	0.130	0.18	0.16	3.163	A
3	344.49	86.12	344.58	328.52	39.73	0.00	2832.85	2735.90	0.122	0.16	0.14	1.487	A

Main results: (04:30-04:45)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	165.61	41.40	165.69	223.78	81.99	0.00	2693.83	1490.02	0.061	0.09	0.07	1.449	A
2	140.00	35.00	140.15	94.80	152.88	16.00	1378.11	650.01	0.102	0.16	0.12	3.014	A
3	274.02	68.51	274.15	261.41	31.62	0.00	2840.20	2735.90	0.096	0.14	0.11	1.439	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	0.99	0.07	1.449	A	A
2	1.72	0.11	3.011	A	A
3	1.63	0.11	1.439	A	A

Queueing Delay results: (04:00-04:15)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.48	0.10	1.516	A	A
2	2.68	0.18	3.272	A	A
3	2.45	0.16	1.516	A	A

Queueing Delay results: (04:15-04:30)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.30	0.09	1.488	A	A
2	2.36	0.16	3.163	A	A
3	2.15	0.14	1.487	A	A

Queueing Delay results: (04:30-04:45)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.01	0.07	1.449	A	A
2	1.79	0.12	3.014	A	A
3	1.66	0.11	1.439	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Bronte & Whitlock.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 4/15/2021 1:23:14 AM

Summary of junction performance

	PM			
	Queue (PCU)	**Delay (s)**	**RFC**	**LOS**
	85% y-int Adjustment - FB			
Arm 1	0.16	1.93	0.14	A
Arm 2	0.26	4.32	0.20	A
Arm 3	0.27	1.95	0.21	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM" model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM " model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM" model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 4/15/2021 1:23:12 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	3/16/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	

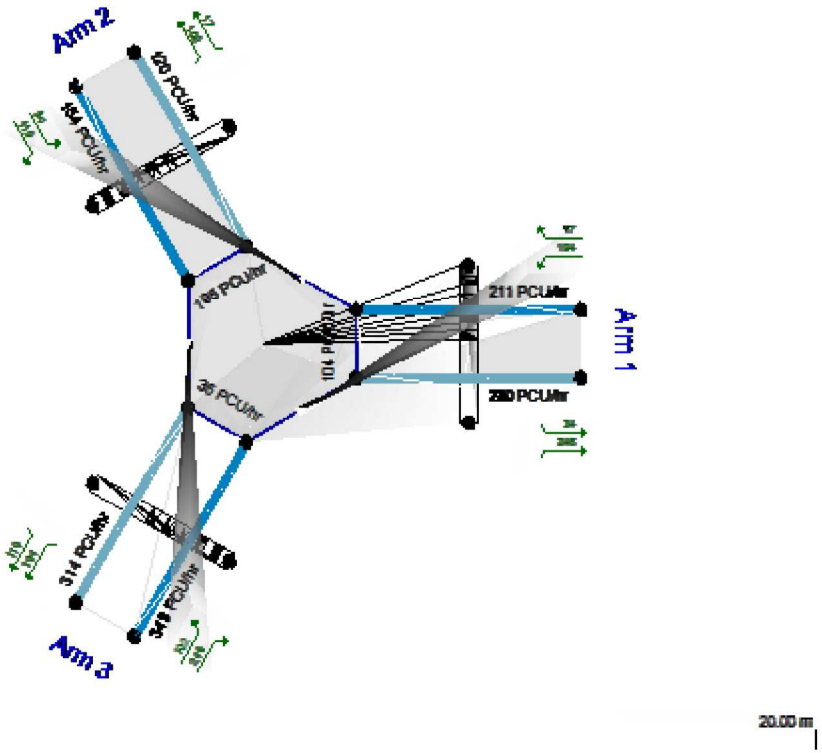
Enumerator	mferguson
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
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	PCU	PCU	perHour	s	-Min	perMin



Showing modelled flow through junction (PCU/hr).
Time Segment: (03:45-04:00)
Showing Analysis Set "A2 - 85% y-int Adjustment "; Demand Set "D2 - FB, PM "

The junction diagram reflects the last run of ARCADY.

85% y-int Adjustment - FB, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Arm 1 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Arm 3 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
85% y-int Adjustment	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
FB, PM	FB	PM		PHF	03:45	04:45	60	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3				2.46	A

Junction Network Options

Driving Side	Lighting
Right	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Bronte Road	South
2	2	Whitlock Avenue	East
3	3	Bronte Road	North

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

Arm	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	6.70	10.70	12.30	25.00	40.00	16.00	
2	3.40	6.50	8.70	15.00	40.00	25.00	
3	6.70	10.70	11.30	20.00	40.00	0.00	

Pedestrian Crossings

Arm	Crossing Type
1	Zebra
2	Zebra
3	Zebra

Zebra Crossings

Arm	Space between crossing and junction entry (PCU)	Vehicles queueing on exit (PCU)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	9.00	6.43
2	1.00	1.00	✓	Distance			5.00	3.57	5.00	3.57
3	3.00	5.00	✓	Distance			9.00	6.43	8.00	5.71

Slope / Intercept / Capacity

Arm Intercept Adjustments

Arm	Type	Reason	Direct Intercept Adjustment (PCU/hr)	Percentage Intercept Adjustment (%)
1	Percentage			85.00
2	Percentage			85.00
3	Percentage			85.00

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.875	2360.592
2		(calculated)	(calculated)	0.596	1250.028
3		(calculated)	(calculated)	0.907	2438.543

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	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	PHF	✓	248.00	100.000
2	PHF	✓	181.00	100.000
3	PHF	✓	410.00	100.000

Peak Hour Factor Data

Arm	Hourly Volume (PCU/hr)	Peak Hour Factor	Peak Time Segment
1	248.00	0.82	SecondQuarter
2	181.00	0.82	SecondQuarter
3	410.00	0.82	SecondQuarter

Pedestrian Flows

General Flows Data

Arm	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00

2	PHF	16.00
3	PHF	0.00

Peak Hour Factor Data

Arm	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	16.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.000	20.000	228.000
	2	40.000	1.000	140.000
	3	289.000	120.000	1.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.08	0.92
	2	0.22	0.01	0.77
	3	0.70	0.29	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.020
	2	1.000	1.000	1.047
	3	1.017	1.051	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

	To

From		1	2	3
	1	0.0	0.0	2.0
	2	0.0	0.0	4.7
	3	1.7	5.1	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
1	0.14	1.93	0.16	A	248.00	248.00	7.66	1.85	0.13	7.66	1.85
2	0.20	4.32	0.26	A	181.00	181.00	12.16	4.03	0.20	12.16	4.03
3	0.21	1.95	0.27	A	410.00	410.00	12.74	1.87	0.21	12.74	1.87

Main Results for each time segment

Main results: (03:45-04:00)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	211.71	52.93	211.29	280.22	103.94	0.00	2254.75	1384.36	0.094	0.00	0.11	1.793	A
2	154.51	38.63	153.86	120.12	195.10	16.00	1132.92	487.49	0.136	0.00	0.16	3.807	A
3	350.00	87.50	349.30	314.11	34.85	0.00	2406.94	2338.41	0.145	0.00	0.17	1.795	A

Main results: (04:00-04:15)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	302.44	75.61	302.21	400.86	148.66	0.00	2202.49	1384.36	0.137	0.11	0.16	1.929	A
2	220.73	55.18	220.33	171.82	279.06	16.00	1082.94	487.49	0.204	0.16	0.26	4.321	A
3	500.00	125.00	499.62	449.48	49.91	0.00	2393.29	2338.41	0.209	0.17	0.27	1.951	A

Main results: (04:15-04:30)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	266.15	66.54	266.24	353.22	130.97	0.00	2223.57	1384.36	0.120	0.16	0.14	1.872	A
2	194.24	48.56	194.41	151.37	245.84	16.00	1102.71	487.49	0.176	0.26	0.22	4.108	A
3	440.00	110.00	440.16	396.21	44.04	0.00	2398.61	2338.41	0.183	0.27	0.23	1.889	A

Main results: (04:30-04:45)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	211.71	52.93	211.84	281.06	104.21	0.00	2254.43	1384.36	0.094	0.14	0.11	1.794	A
2	154.51	38.63	154.75	120.44	195.61	16.00	1132.62	487.49	0.136	0.22	0.16	3.816	A
3	350.00	87.50	350.22	315.30	35.05	0.00	2406.76	2338.41	0.145	0.23	0.18	1.796	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.56	0.10	1.793	A	A
2	2.39	0.16	3.807	A	A
3	2.58	0.17	1.795	A	A

Queueing Delay results: (04:00-04:15)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	2.40	0.16	1.929	A	A
2	3.88	0.26	4.321	A	A
3	4.01	0.27	1.951	A	A

Queueing Delay results: (04:15-04:30)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	2.10	0.14	1.872	A	A
2	3.39	0.23	4.108	A	A
3	3.50	0.23	1.889	A	A

Queueing Delay results: (04:30-04:45)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.60	0.11	1.794	A	A
2	2.51	0.17	3.816	A	A
3	2.65	0.18	1.796	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Bronte & Whitlock.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 4/15/2021 1:20:56 AM

Summary of junction performance

	PM			
	Queue (PCU)	**Delay (s)**	**RFC**	**LOS**
	100% y-int Adjustment - FB			
Arm 1	0.13	1.58	0.12	A
Arm 2	0.21	3.44	0.17	A
Arm 3	0.22	1.59	0.18	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM" model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM " model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM" model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 4/15/2021 1:20:53 AM

File summary

Title	(untitled)
Location	
Site Number	
Date	3/16/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	

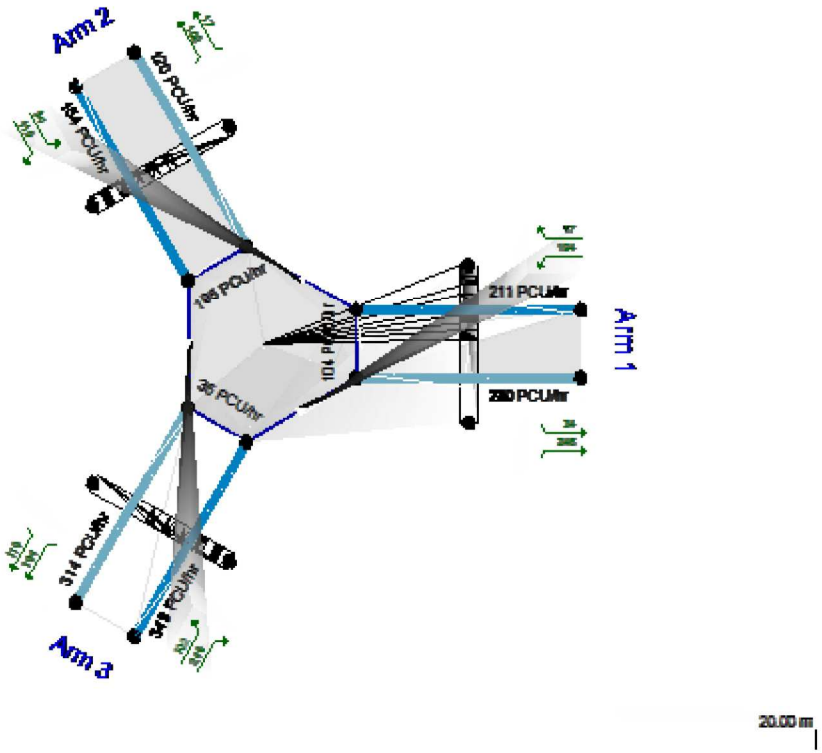
Enumerator	mferguson
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
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	PCU	PCU	perHour	s	-Min	perMin



Showing modelled flow through junction (PCU/hr).
Time Segment: (03:45-04:00)
Showing Analysis Set "A1 - 100% y-int Adjustment "; Demand Set "D2 - FB, PM "

The junction diagram reflects the last run of ARCADY.

100% y-int Adjustment - FB, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Arm 1 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Arm 3 - Zebra Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
100% y-int Adjustment	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
FB, PM	FB	PM		PHF	03:45	04:45	60	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	(untitled)	Roundabout	1,2,3				1.99	A

Junction Network Options

Driving Side	Lighting
Right	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Bronte Road	South
2	2	Whitlock Avenue	East
3	3	Bronte Road	North

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

Arm	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	6.70	10.70	12.30	25.00	40.00	16.00	
2	3.40	6.50	8.70	15.00	40.00	25.00	
3	6.70	10.70	11.30	20.00	40.00	0.00	

Pedestrian Crossings

Arm	Crossing Type
1	Zebra
2	Zebra
3	Zebra

Zebra Crossings

Arm	Space between crossing and junction entry (PCU)	Vehicles queueing on exit (PCU)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	9.00	6.43
2	1.00	1.00	✓	Distance			5.00	3.57	5.00	3.57
3	3.00	5.00	✓	Distance			9.00	6.43	8.00	5.71

Slope / Intercept / Capacity

Arm Intercept Adjustments

Arm	Type	Reason	Direct Intercept Adjustment (PCU/hr)	Percentage Intercept Adjustment (%)
1	Percentage			100.00
2	Percentage			100.00
3	Percentage			100.00

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.875	2777.167
2		(calculated)	(calculated)	0.596	1470.621
3		(calculated)	(calculated)	0.907	2868.874

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	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	PHF	✓	248.00	100.000
2	PHF	✓	181.00	100.000
3	PHF	✓	410.00	100.000

Peak Hour Factor Data

Arm	Hourly Volume (PCU/hr)	Peak Hour Factor	Peak Time Segment
1	248.00	0.82	SecondQuarter
2	181.00	0.82	SecondQuarter
3	410.00	0.82	SecondQuarter

Pedestrian Flows

General Flows Data

Arm	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00

2	PHF	16.00
3	PHF	0.00

Peak Hour Factor Data

Arm	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	16.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.000	20.000	228.000
	2	40.000	1.000	140.000
	3	289.000	120.000	1.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.08	0.92
	2	0.22	0.01	0.77
	3	0.70	0.29	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.020
	2	1.000	1.000	1.047
	3	1.017	1.051	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

	To

From		1	2	3
	1	0.0	0.0	2.0
	2	0.0	0.0	4.7
	3	1.7	5.1	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)	Total Queueing Delay (PCU-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCU-min/min)	Inclusive Total Queueing Delay (PCU-min)	Inclusive Average Queueing Delay (s)
1	0.12	1.58	0.13	A	248.00	248.00	6.34	1.53	0.11	6.34	1.53
2	0.17	3.44	0.21	A	181.00	181.00	9.82	3.26	0.16	9.82	3.26
3	0.18	1.59	0.22	A	410.00	410.00	10.47	1.53	0.17	10.47	1.53

Main Results for each time segment

Main results: (03:45-04:00)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	211.71	52.93	211.36	280.33	103.97	0.00	2668.54	1495.22	0.079	0.00	0.09	1.491	A
2	154.51	38.63	153.98	120.17	195.16	16.00	1352.96	646.64	0.114	0.00	0.13	3.108	A
3	350.00	87.50	349.42	314.26	34.88	0.00	2837.25	2736.05	0.123	0.00	0.14	1.485	A

Main results: (04:00-04:15)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	302.44	75.61	302.26	400.94	148.69	0.00	2613.79	1495.22	0.116	0.09	0.13	1.585	A
2	220.73	55.18	220.42	171.85	279.10	16.00	1303.03	646.64	0.169	0.13	0.21	3.445	A
3	500.00	125.00	499.69	449.59	49.93	0.00	2823.60	2736.05	0.177	0.14	0.22	1.589	A

Main results: (04:15-04:30)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	266.15	66.54	266.22	353.19	130.96	0.00	2635.99	1495.22	0.101	0.13	0.11	1.546	A
2	194.24	48.56	194.37	151.36	245.82	16.00	1322.83	646.64	0.147	0.21	0.18	3.304	A
3	440.00	110.00	440.12	396.16	44.03	0.00	2828.95	2736.05	0.156	0.22	0.19	1.546	A

Main results: (04:30-04:45)

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Entry Flow (PCU/hr)	Exit Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	Saturation Capacity (PCU/hr)	RFC	Start Queue (PCU)	End Queue (PCU)	Delay (s)	LOS
1	211.71	52.93	211.81	281.02	104.20	0.00	2668.27	1495.22	0.079	0.11	0.09	1.494	A
2	154.51	38.63	154.69	120.43	195.59	16.00	1352.71	646.64	0.114	0.18	0.13	3.115	A
3	350.00	87.50	350.18	315.24	35.04	0.00	2837.10	2736.05	0.123	0.19	0.14	1.485	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.30	0.09	1.491	A	A
2	1.96	0.13	3.108	A	A
3	2.14	0.14	1.485	A	A

Queueing Delay results: (04:00-04:15)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.98	0.13	1.585	A	A
2	3.11	0.21	3.445	A	A
3	3.28	0.22	1.589	A	A

Queueing Delay results: (04:15-04:30)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.73	0.12	1.546	A	A
2	2.72	0.18	3.304	A	A
3	2.86	0.19	1.546	A	A

Queueing Delay results: (04:30-04:45)

Arm	Queueing Total Delay (PCU-min)	Queueing Rate Of Delay (PCU-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	1.33	0.09	1.494	A	A
2	2.04	0.14	3.115	A	A
3	2.19	0.15	1.485	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Bronte & Etheridge.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 2023-08-17 2:28:46 PM

Summary of intersection performance

	PM			
	Queue (PCE)	Delay (s)	V/C Ratio	LOS
	85% y-int Adjustment - FT			
Leg 1	0.11	1.90	0.09	A
Leg 2	0.14	3.84	0.12	A
Leg 3	0.27	1.93	0.21	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM" model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM" model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM " model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 2023-08-17 2:28:43 PM

File summary

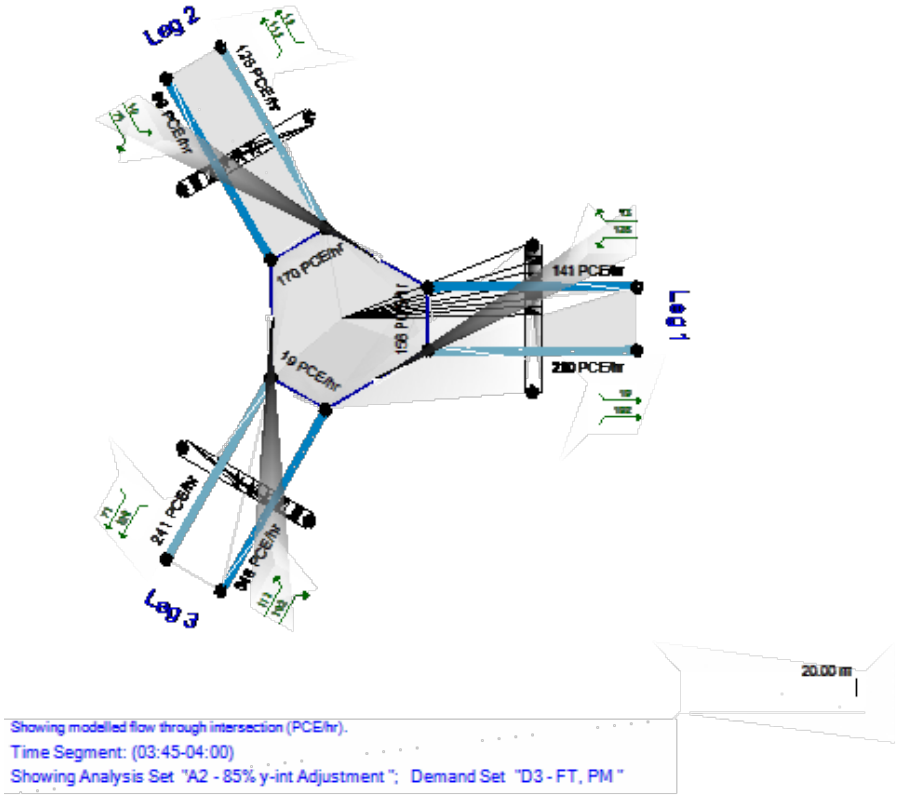
Title	(untitled)
Location	
Site Number	
Date	2021-03-16
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	mferguson
Description	

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



The intersection diagram reflects the last run of ARCADY.

85% y-int Adjustment - FT, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Leg 1 - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Leg 3 - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
85% y-int Adjustment	ARCADY		✓				100.000	100.000	

Demand Set Details

					Model	Model	Model	Time	Results	Single				

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Start Time (HH:mm)	Finish Time (HH:mm)	Time Period Length (min)	Segment Length (min)	For Central Hour Only	Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
FT, PM	FT	PM		PHF	03:45	04:45	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	1,2,3				2.22	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
1	1	Bronte Road	South
2	2	Etheridge Avenue	East
3	3	Bronte Road	North

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

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	6.70	10.70	12.30	25.00	23.00	16.00	
2	3.40	6.50	8.70	15.00	23.00	25.00	
3	6.70	10.70	11.30	20.00	23.00	0.00	

Pedestrian Crossings

Leg	Crossing Type
1	Unsignalled Pedestrian Crossing
2	Unsignalled Pedestrian Crossing
3	Unsignalled Pedestrian Crossing

Unsignalled Pedestrian Crossing Crossings

Leg	Space between crossing and intersection entry (PCE)	Vehicles queueing on exit (PCE)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	9.00	6.43
2	1.00	1.00	✓	Distance			5.00	3.57	5.00	3.57
3	3.00	5.00	✓	Distance			9.00	6.43	8.00	5.71

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
1	Percentage			85.00
2	Percentage			85.00
3	Percentage			85.00

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1		(calculated)	(calculated)	0.903	2360.592
2		(calculated)	(calculated)	0.616	1250.028
3		(calculated)	(calculated)	0.937	2438.543

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

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	PHF	✓	165.00	100.000
2	PHF	✓	105.00	100.000
3	PHF	✓	408.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
1	165.00	0.82	SecondQuarter
2	105.00	0.82	SecondQuarter
3	408.00	0.82	SecondQuarter

Pedestrian Flows

General Flows Data

Leg	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00
2	PHF	16.00
3	PHF	0.00

Peak Hour Factor Data

Leg	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	16.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.000	15.000	150.000
	2	22.000	0.000	83.000
	3	225.000	133.000	50.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.09	0.91
	2	0.21	0.00	0.79
	3	0.55	0.33	0.12

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.020
	2	1.000	1.000	1.047
	3	1.017	1.051	1.000

Truck Percentages - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	2.0
	2	0.0	0.0	4.7
	3	1.7	5.1	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max 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	0.09	1.90	0.11	A	165.00	165.00	5.04	1.83	0.08	5.04	1.83
2	0.12	3.84	0.14	A	105.00	105.00	6.42	3.67	0.11	6.42	3.67
3	0.21	1.93	0.27	A	408.00	408.00	12.55	1.85	0.21	12.55	1.85

Main Results for each time segment

Main results: (03:45-04:00)

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	140.85	35.21	140.58	210.40	155.91	0.00	2203.87	1067.96	0.064	0.00	0.07	1.775	A
2	89.63	22.41	89.28	126.09	170.40	16.00	1144.27	474.72	0.078	0.00	0.09	3.538	A
3	348.29	87.07	347.60	240.97	18.71	0.00	2421.02	2345.37	0.144	0.00	0.17	1.780	A

Main results: (04:00-04:15)

Leg	Total Demand	Intersection	Entry Flow	Exit Flow	Circulating	Pedestrian Demand	Capacity	Saturation Capacity	V/C	Start Queue	End Queue	Delay	LOS

	(PCE/hr)	Arrivals (PCE)	(PCE/hr)	(PCE/hr)	Flow (PCE/hr)	(Ped/hr)	(PCE/hr)	(PCE/hr)	Ratio	(PCE)	(PCE)	(s)	
1	201.22	50.30	201.07	300.97	223.00	0.00	2129.58	1067.96	0.094	0.07	0.11	1.899	A
2	128.05	32.01	127.86	180.35	243.72	16.00	1099.18	474.72	0.116	0.09	0.14	3.841	A
3	497.56	124.39	497.19	344.79	26.79	0.00	2413.45	2345.37	0.206	0.17	0.27	1.927	A

Main results: (04:15-04:30)

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	177.07	44.27	177.13	265.17	196.46	0.00	2159.38	1067.96	0.082	0.11	0.09	1.848	A
2	112.68	28.17	112.76	158.88	214.71	16.00	1117.03	474.72	0.101	0.14	0.12	3.715	A
3	437.85	109.46	438.01	303.84	23.63	0.00	2416.41	2345.37	0.181	0.27	0.23	1.865	A

Main results: (04:30-04:45)

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	140.85	35.21	140.94	211.00	156.32	0.00	2203.43	1067.96	0.064	0.09	0.07	1.776	A
2	89.63	22.41	89.75	126.42	170.84	16.00	1144.00	474.72	0.078	0.12	0.09	3.539	A
3	348.29	87.07	348.51	241.78	18.80	0.00	2420.93	2345.37	0.144	0.23	0.17	1.783	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

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	1.03	0.07	1.775	A	A
2	1.29	0.09	3.538	A	A
3	2.55	0.17	1.780	A	A

Queueing Delay results: (04:00-04:15)

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	1.58	0.11	1.899	A	A
2	2.01	0.13	3.841	A	A
3	3.94	0.26	1.927	A	A

Queueing Delay results: (04:15-04:30)

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	1.38	0.09	1.848	A	A
2	1.77	0.12	3.715	A	A
3	3.44	0.23	1.865	A	A

Queueing Delay results: (04:30-04:45)

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	1.05	0.07	1.776	A	A
2	1.35	0.09	3.539	A	A
3	2.61	0.17	1.783	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Bronte & Whitlock.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 2023-08-17 2:38:11 PM

Summary of intersection performance

	PM			
	Queue (PCE)	Delay (s)	V/C Ratio	LOS
	85% y-int Adjustment - FT			
Leg 1	0.19	1.97	0.16	A
Leg 2	0.28	4.45	0.21	A
Leg 3	0.29	1.98	0.22	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM" model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM" model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM " model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 2023-08-17 2:38:08 PM

File summary

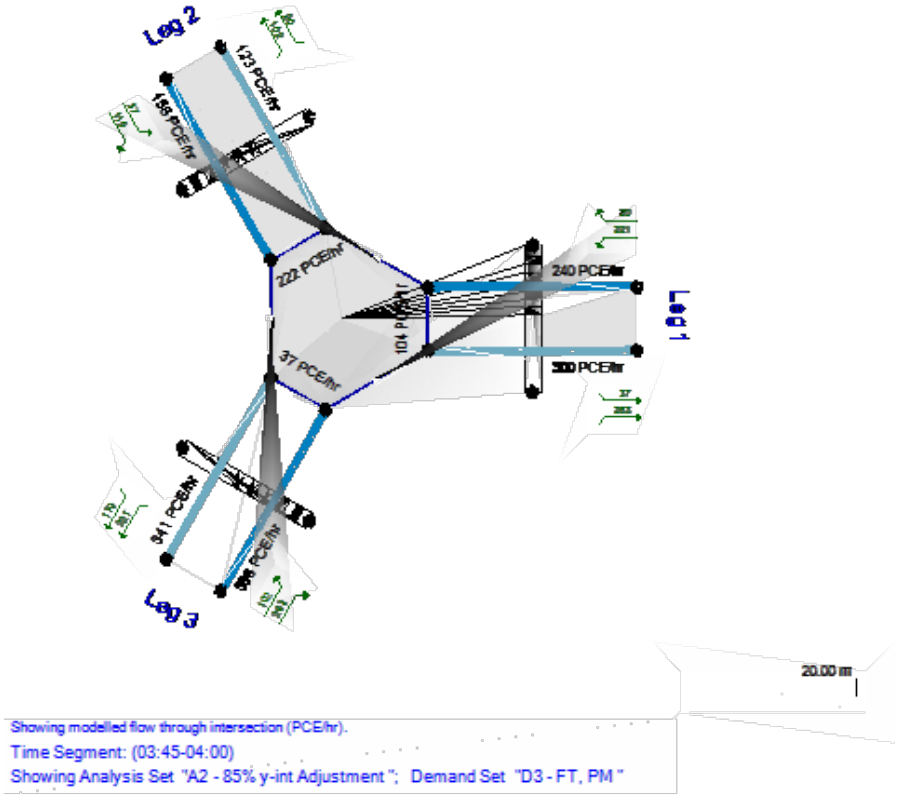
Title	(untitled)
Location	
Site Number	
Date	2021-03-16
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	mferguson
Description	

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



The intersection diagram reflects the last run of ARCADY.

85% y-int Adjustment - FT, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Leg 1 - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Leg 3 - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
85% y-int Adjustment	ARCADY		✓				100.000	100.000	

Demand Set Details

					Model	Model	Model	Time	Results	Single				

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Start Time (HH:mm)	Finish Time (HH:mm)	Time Period Length (min)	Segment Length (min)	For Central Hour Only	Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
FT, PM	FT	PM		PHF	03:45	04:45	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	1,2,3				2.49	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
1	1	Bronte Road	South
2	2	Whitlock Avenue	East
3	3	Bronte Road	North

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

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	6.70	10.70	12.30	25.00	40.00	16.00	
2	3.40	6.50	8.70	15.00	40.00	25.00	
3	6.70	10.70	11.30	20.00	40.00	0.00	

Pedestrian Crossings

Leg	Crossing Type
1	Unsignalled Pedestrian Crossing
2	Unsignalled Pedestrian Crossing
3	Unsignalled Pedestrian Crossing

Unsignalled Pedestrian Crossing Crossings

Leg	Space between crossing and intersection entry (PCE)	Vehicles queueing on exit (PCE)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	9.00	6.43
2	1.00	1.00	✓	Distance			5.00	3.57	5.00	3.57
3	3.00	5.00	✓	Distance			9.00	6.43	8.00	5.71

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
1	Percentage			85.00
2	Percentage			85.00
3	Percentage			85.00

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1		(calculated)	(calculated)	0.875	2360.592
2		(calculated)	(calculated)	0.596	1250.028
3		(calculated)	(calculated)	0.907	2438.543

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

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	PHF	✓	282.00	100.000
2	PHF	✓	184.00	100.000
3	PHF	✓	430.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
1	282.00	0.82	SecondQuarter
2	184.00	0.82	SecondQuarter
3	430.00	0.82	SecondQuarter

Pedestrian Flows

General Flows Data

Leg	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00
2	PHF	16.00
3	PHF	0.00

Peak Hour Factor Data

Leg	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	16.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.000	23.000	259.000
	2	43.000	1.000	140.000
	3	309.000	120.000	1.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.08	0.92
	2	0.23	0.01	0.76
	3	0.72	0.28	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.020
	2	1.000	1.000	1.047
	3	1.017	1.051	1.000

Truck Percentages - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	2.0
	2	0.0	0.0	4.7
	3	1.7	5.1	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max 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	0.16	1.97	0.19	A	282.00	282.00	8.87	1.89	0.15	8.87	1.89
2	0.21	4.45	0.28	A	184.00	184.00	12.66	4.13	0.21	12.67	4.13
3	0.22	1.98	0.29	A	430.00	430.00	13.52	1.89	0.23	13.52	1.89

Main Results for each time segment

Main results: (03:45-04:00)

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	240.73	60.18	240.25	299.80	103.94	0.00	2254.13	1429.91	0.107	0.00	0.12	1.819	A
2	157.07	39.27	156.40	122.68	221.50	16.00	1117.20	463.46	0.141	0.00	0.17	3.877	A
3	367.07	91.77	366.34	340.50	37.40	0.00	2404.63	2338.05	0.153	0.00	0.18	1.812	A

Main results: (04:00-04:15)

Leg	Total Demand	Intersection	Entry Flow	Exit Flow	Circulating	Pedestrian Demand	Capacity	Saturation Capacity	V/C	Start Queue	End Queue	Delay	LOS

	(PCE/hr)	Arrivals (PCE)	(PCE/hr)	(PCE/hr)	Flow (PCE/hr)	(Ped/hr)	(PCE/hr)	(PCE/hr)	Ratio	(PCE)	(PCE)	(s)	
1	343.90	85.98	343.64	428.87	148.66	0.00	2201.34	1429.90	0.156	0.12	0.19	1.973	A
2	224.39	56.10	223.96	175.47	316.83	16.00	1060.45	463.47	0.212	0.17	0.28	4.454	A
3	524.39	131.10	523.98	487.23	53.56	0.00	2389.98	2338.05	0.219	0.18	0.29	1.980	A

Main results: (04:15-04:30)

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	302.63	75.66	302.74	377.92	130.98	0.00	2222.65	1429.90	0.136	0.19	0.16	1.911	A
2	197.46	49.37	197.64	154.59	279.12	16.00	1082.90	463.47	0.182	0.28	0.23	4.212	A
3	461.46	115.37	461.63	429.50	47.26	0.00	2395.69	2338.05	0.193	0.29	0.25	1.912	A

Main results: (04:30-04:45)

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	240.73	60.18	240.89	300.72	104.22	0.00	2253.81	1429.90	0.107	0.16	0.12	1.820	A
2	157.07	39.27	157.32	123.01	222.09	16.00	1116.85	463.46	0.141	0.23	0.17	3.886	A
3	367.07	91.77	367.31	341.80	37.62	0.00	2404.43	2338.05	0.153	0.25	0.19	1.812	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

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	1.80	0.12	1.819	A	A
2	2.47	0.16	3.877	A	A
3	2.73	0.18	1.812	A	A

Queueing Delay results: (04:00-04:15)

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	2.79	0.19	1.973	A	A
2	4.06	0.27	4.454	A	A
3	4.27	0.28	1.980	A	A

Queueing Delay results: (04:15-04:30)

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	2.43	0.16	1.911	A	A
2	3.53	0.24	4.212	A	A
3	3.71	0.25	1.912	A	A

Queueing Delay results: (04:30-04:45)

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	1.85	0.12	1.820	A	A
2	2.60	0.17	3.886	A	A
3	2.81	0.19	1.812	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Bronte & Etheridge.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 2023-08-17 2:28:18 PM

Summary of intersection performance

	PM			
	Queue (PCE)	Delay (s)	V/C Ratio	LOS
	100% y-int Adjustment - FT			
Leg 1	0.09	1.56	0.08	A
Leg 2	0.12	3.31	0.10	A
Leg 3	0.22	1.61	0.18	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM" model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM" model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM " model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 2023-08-17 2:28:15 PM

File summary

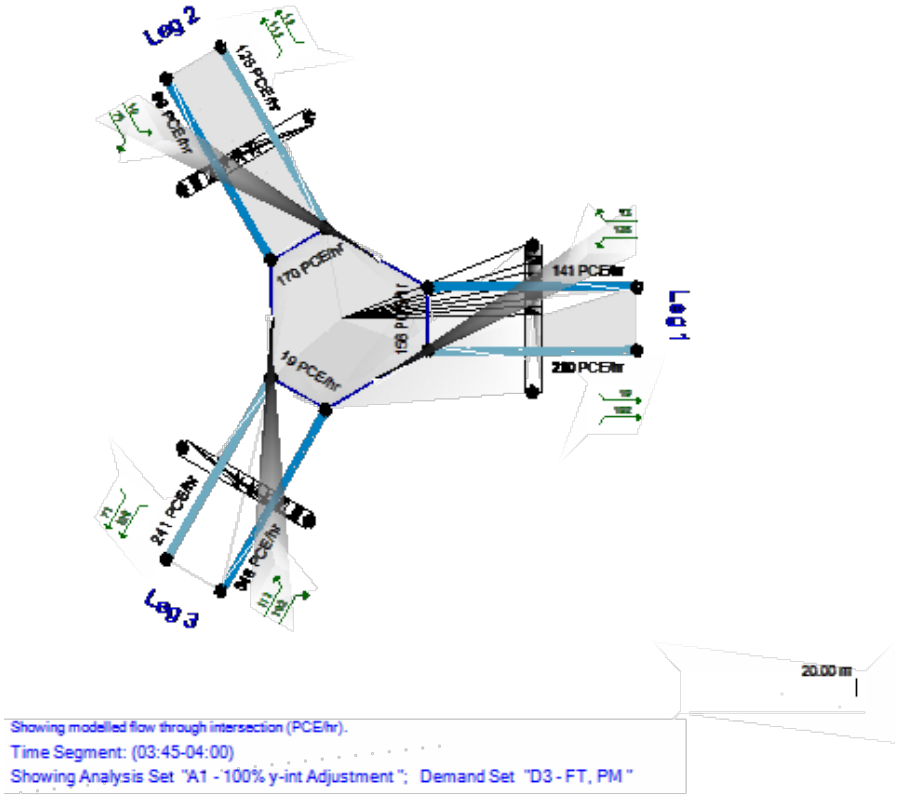
Title	(untitled)
Location	
Site Number	
Date	2021-03-16
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	mferguson
Description	

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



The intersection diagram reflects the last run of ARCADY.

100% y-int Adjustment - FT, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Leg 1 - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Leg 3 - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
100% y-int Adjustment	ARCADY		✓				100.000	100.000	

Demand Set Details

					Model	Model	Model	Time	Results	Single				

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Start Time (HH:mm)	Finish Time (HH:mm)	Time Period Length (min)	Segment Length (min)	For Central Hour Only	Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
FT, PM	FT	PM		PHF	03:45	04:45	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	1,2,3				1.86	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
1	1	Bronte Road	South
2	2	Etheridge Avenue	East
3	3	Bronte Road	North

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

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	7.00	10.00	12.20	25.00	40.00	16.00	
2	3.50	5.50	7.00	20.00	40.00	25.00	
3	6.70	11.00	12.50	26.00	40.00	16.00	

Pedestrian Crossings

Leg	Crossing Type
1	Unsignalled Pedestrian Crossing
2	Unsignalled Pedestrian Crossing
3	Unsignalled Pedestrian Crossing

Unsignalled Pedestrian Crossing Crossings

Leg	Space between crossing and intersection entry (PCE)	Vehicles queueing on exit (PCE)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	10.00	7.14
2	1.00	1.00	✓	Distance			6.50	4.64	5.50	3.93
3	3.00	5.00	✓	Distance			10.50	7.50	9.50	6.79

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
1	Percentage			100.00
2	Percentage			100.00
3	Percentage			100.00

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1		(calculated)	(calculated)	0.876	2783.176
2		(calculated)	(calculated)	0.587	1400.959
3		(calculated)	(calculated)	0.881	2808.951

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

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	PHF	✓	165.00	100.000
2	PHF	✓	105.00	100.000
3	PHF	✓	408.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
1	165.00	0.82	SecondQuarter
2	105.00	0.82	SecondQuarter
3	408.00	0.82	SecondQuarter

Pedestrian Flows

General Flows Data

Leg	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00
2	PHF	16.00
3	PHF	0.00

Peak Hour Factor Data

Leg	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	16.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.000	15.000	150.000
	2	22.000	0.000	83.000
	3	225.000	133.000	50.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.09	0.91
	2	0.21	0.00	0.79
	3	0.55	0.33	0.12

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.020
	2	1.000	1.000	1.047
	3	1.017	1.051	1.000

Truck Percentages - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	2.0
	2	0.0	0.0	4.7
	3	1.7	5.1	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max 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	0.08	1.56	0.09	A	165.00	165.00	4.17	1.52	0.07	4.17	1.52
2	0.10	3.31	0.12	A	105.00	105.00	5.57	3.18	0.09	5.57	3.18
3	0.18	1.61	0.22	A	408.00	408.00	10.58	1.56	0.18	10.58	1.56

Main Results for each time segment

Main results: (03:45-04:00)

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	140.85	35.21	140.62	210.47	155.96	0.00	2621.17	1141.73	0.054	0.00	0.06	1.477	A
2	89.63	22.41	89.33	126.13	170.45	16.00	1299.16	596.77	0.069	0.00	0.08	3.085	A
3	348.29	87.07	347.71	241.06	18.72	0.00	2792.45	2698.74	0.125	0.00	0.15	1.510	A

Main results: (04:00-04:15)

Leg	Total Demand	Intersection	Entry Flow	Exit Flow	Circulating	Pedestrian Demand	Capacity	Saturation Capacity	V/C	Start Queue	End Queue	Delay	LOS

	(PCE/hr)	Arrivals (PCE)	(PCE/hr)	(PCE/hr)	Flow (PCE/hr)	(Ped/hr)	(PCE/hr)	(PCE/hr)	Ratio	(PCE)	(PCE)	(s)	
1	201.22	50.30	201.10	301.02	223.03	0.00	2541.61	1141.73	0.079	0.06	0.09	1.565	A
2	128.05	32.01	127.89	180.38	243.76	16.00	1256.25	596.77	0.102	0.08	0.12	3.307	A
3	497.56	124.39	497.25	344.85	26.80	0.00	2785.33	2698.74	0.179	0.15	0.22	1.613	A

Main results: (04:15-04:30)

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	177.07	44.27	177.12	265.16	196.45	0.00	2573.70	1141.73	0.069	0.09	0.08	1.531	A
2	112.68	28.17	112.75	158.87	214.69	16.00	1273.27	596.77	0.089	0.12	0.10	3.215	A
3	437.85	109.46	437.98	303.82	23.62	0.00	2788.13	2698.74	0.157	0.22	0.19	1.570	A

Main results: (04:30-04:45)

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	140.85	35.21	140.92	210.97	156.30	0.00	2620.78	1141.73	0.054	0.08	0.06	1.479	A
2	89.63	22.41	89.73	126.41	170.82	16.00	1298.95	596.77	0.069	0.10	0.08	3.088	A
3	348.29	87.07	348.47	241.75	18.80	0.00	2792.38	2698.74	0.125	0.19	0.15	1.510	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

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	0.86	0.06	1.477	A	A
2	1.13	0.08	3.085	A	A
3	2.17	0.14	1.510	A	A

Queueing Delay results: (04:00-04:15)

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	1.30	0.09	1.565	A	A
2	1.73	0.12	3.307	A	A
3	3.31	0.22	1.613	A	A

Queueing Delay results: (04:15-04:30)

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	1.14	0.08	1.531	A	A
2	1.53	0.10	3.215	A	A
3	2.89	0.19	1.570	A	A

Queueing Delay results: (04:30-04:45)

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	0.88	0.06	1.479	A	A
2	1.17	0.08	3.088	A	A
3	2.21	0.15	1.510	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Bronte & Whitlock.arc8
Path: I:\1200\1244-AMJ Canada\4384-1456 Bronte St S\Design\Arcady
Report generation date: 2023-08-17 2:37:37 PM

Summary of intersection performance

	PM			
	Queue (PCE)	Delay (s)	V/C Ratio	LOS
	100% y-int Adjustment - FT			
Leg 1	0.15	1.61	0.13	A
Leg 2	0.22	3.53	0.18	A
Leg 3	0.23	1.61	0.19	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Existing, PM" model duration: 3:45 AM - 4:45 AM
"D2 - FB, PM" model duration: 3:45 AM - 4:45 AM
"D3 - FT, PM " model duration: 3:45 AM - 4:45 AM

Run using Junctions 8.0.6.541 at 2023-08-17 2:37:34 PM

File summary

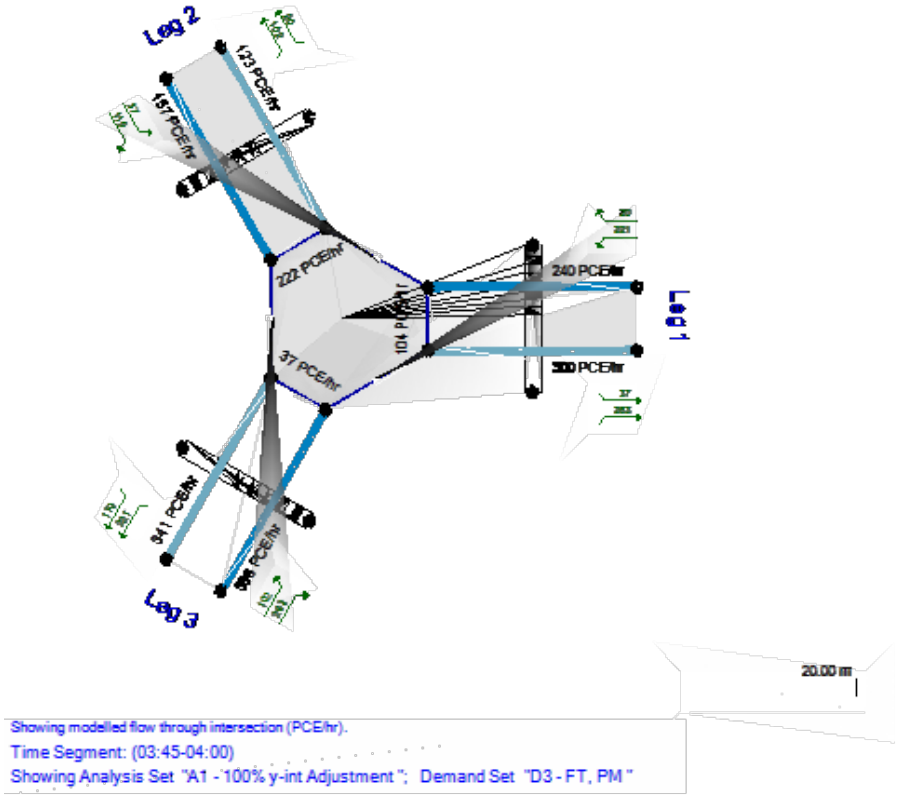
Title	(untitled)
Location	
Site Number	
Date	2021-03-16
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	mferguson
Description	

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



The intersection diagram reflects the last run of ARCADY.

100% y-int Adjustment - FT, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Leg 1 - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Leg 3 - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?

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
100% y-int Adjustment	ARCADY		✓				100.000	100.000	

Demand Set Details

					Model	Model	Model	Time	Results	Single				

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Start Time (HH:mm)	Finish Time (HH:mm)	Time Period Length (min)	Segment Length (min)	For Central Hour Only	Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
FT, PM	FT	PM		PHF	03:45	04:45	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	(untitled)	Roundabout	1,2,3				2.00	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
1	1	Bronte Road	South
2	2	Whitlock Avenue	East
3	3	Bronte Road	North

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

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	6.70	10.70	12.30	25.00	40.00	16.00	
2	3.40	6.50	8.70	15.00	40.00	25.00	
3	6.70	10.70	11.30	20.00	40.00	0.00	

Pedestrian Crossings

Leg	Crossing Type
1	Unsignalled Pedestrian Crossing
2	Unsignalled Pedestrian Crossing
3	Unsignalled Pedestrian Crossing

Unsignalled Pedestrian Crossing Crossings

Leg	Space between crossing and intersection entry (PCE)	Vehicles queueing on exit (PCE)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
1	3.00	5.00	✓	Distance			10.00	7.14	9.00	6.43
2	1.00	1.00	✓	Distance			5.00	3.57	5.00	3.57
3	3.00	5.00	✓	Distance			9.00	6.43	8.00	5.71

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
1	Percentage			100.00
2	Percentage			100.00
3	Percentage			100.00

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1		(calculated)	(calculated)	0.875	2777.167
2		(calculated)	(calculated)	0.596	1470.621
3		(calculated)	(calculated)	0.907	2868.874

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

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1	PHF	✓	282.00	100.000
2	PHF	✓	184.00	100.000
3	PHF	✓	430.00	100.000

Peak Hour Factor Data

Leg	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
1	282.00	0.82	SecondQuarter
2	184.00	0.82	SecondQuarter
3	430.00	0.82	SecondQuarter

Pedestrian Flows

General Flows Data

Leg	Profile Type	Average Pedestrian Flow (Ped/hr)
1	PHF	0.00
2	PHF	16.00
3	PHF	0.00

Peak Hour Factor Data

Leg	Hourly Volume (Ped/hr)	Peak Hour Factor	Peak Time Segment
1	0.00	1.00	SecondQuarter
2	16.00	1.00	SecondQuarter
3	0.00	1.00	SecondQuarter

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.000	23.000	259.000
	2	43.000	1.000	140.000
	3	309.000	120.000	1.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.08	0.92
	2	0.23	0.01	0.76
	3	0.72	0.28	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.020
	2	1.000	1.000	1.047
	3	1.017	1.051	1.000

Truck Percentages - Intersection 1 (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	2.0
	2	0.0	0.0	4.7
	3	1.7	5.1	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max 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	0.13	1.61	0.15	A	282.00	282.00	7.32	1.56	0.12	7.32	1.56
2	0.18	3.53	0.22	A	184.00	184.00	10.18	3.32	0.17	10.18	3.32
3	0.19	1.61	0.23	A	430.00	430.00	11.08	1.55	0.18	11.08	1.55

Main Results for each time segment

Main results: (03:45-04:00)

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	240.73	60.18	240.33	299.92	103.97	0.00	2667.81	1555.11	0.090	0.00	0.10	1.509	A
2	157.07	39.27	156.52	122.72	221.58	16.00	1337.25	614.85	0.117	0.00	0.14	3.155	A
3	367.07	91.77	366.46	340.67	37.43	0.00	2834.93	2735.55	0.129	0.00	0.15	1.496	A

Main results: (04:00-04:15)

Leg	Total Demand	Intersection	Entry Flow	Exit Flow	Circulating	Pedestrian Demand	Capacity	Saturation Capacity	V/C	Start Queue	End Queue	Delay	LOS

	(PCE/hr)	Arrivals (PCE)	(PCE/hr)	(PCE/hr)	Flow (PCE/hr)	(Ped/hr)	(PCE/hr)	(PCE/hr)	Ratio	(PCE)	(PCE)	(s)	
1	343.90	85.98	343.69	428.96	148.69	0.00	2612.43	1555.11	0.132	0.10	0.15	1.615	A
2	224.39	56.10	224.06	175.50	316.88	16.00	1280.56	614.85	0.175	0.14	0.22	3.528	A
3	524.39	131.10	524.06	487.36	53.58	0.00	2820.29	2735.55	0.186	0.15	0.23	1.608	A

Main results: (04:15-04:30)

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	302.63	75.66	302.72	377.88	130.96	0.00	2634.90	1555.11	0.115	0.15	0.13	1.571	A
2	197.46	49.37	197.60	154.58	279.10	16.00	1303.03	614.85	0.152	0.22	0.19	3.374	A
3	461.46	115.37	461.60	429.45	47.25	0.00	2826.03	2735.55	0.163	0.23	0.20	1.561	A

Main results: (04:30-04:45)

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	240.73	60.18	240.86	300.67	104.20	0.00	2667.54	1555.11	0.090	0.13	0.10	1.512	A
2	157.07	39.27	157.26	122.99	222.07	16.00	1336.96	614.85	0.117	0.19	0.14	3.161	A
3	367.07	91.77	367.26	341.72	37.61	0.00	2834.77	2735.55	0.129	0.20	0.15	1.496	A

Queueing Delay Results for each time segment

Queueing Delay results: (03:45-04:00)

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	1.50	0.10	1.509	A	A
2	2.02	0.13	3.155	A	A
3	2.26	0.15	1.496	A	A

Queueing Delay results: (04:00-04:15)

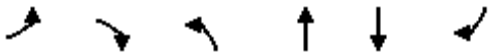
Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	2.29	0.15	1.615	A	A
2	3.23	0.22	3.528	A	A
3	3.48	0.23	1.608	A	A

Queueing Delay results: (04:15-04:30)

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	2.00	0.13	1.571	A	A
2	2.82	0.19	3.374	A	A
3	3.03	0.20	1.561	A	A

Queueing Delay results: (04:30-04:45)

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	1.53	0.10	1.512	A	A
2	2.10	0.14	3.161	A	A
3	2.31	0.15	1.496	A	A



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	52	0	0	332	24
Future Volume (vph)	0	52	0	0	332	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.865			0.990	
Flt Protected						
Satd. Flow (prot)	0	1611	0	3539	3504	0
Flt Permitted						
Satd. Flow (perm)	0	1611	0	3539	3504	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	170.2			49.6	268.0	
Travel Time (s)	12.3			3.6	19.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	57	0	0	361	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	57	0	0	387	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection: 7: Site Access

Movement	EB
Directions Served	R
Maximum Queue (m)	9.1
Average Queue (m)	5.9
95th Queue (m)	12.6
Link Distance (m)	158.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

APPENDIX F

Trip Generation Methodology

paradigm
TRANSPORTATION SOLUTIONS LIMITED

4721 Palladium Way
Transportation Impact Study & TDM Options Report

Paradigm Transportation Solutions Limited

September 2017

Executive Summary

Content

The Halton Islamic Association (HIA) retained Paradigm Transportation Solutions Limited (Paradigm) to carry out this Transportation Impact and Transportation Demand Management Options study for a proposed Islamic Place of Worship and Office development.

The purpose of this study is to determine the impacts of the development traffic on the surrounding road network and identify any improvements necessary to accommodate this traffic. The study also assesses the site's Transportation Demand Management (TDM) measures that will be included in the final site concept plan.

Development Concept

The HIA intends to provide an Islamic Place of Worship with a small office component in the Alton Village Community at 4721 Palladium Way 4721 Palladium Way in the City of Burlington. The build-out of the subject site is anticipated to occur in four phases. The following land uses are proposed for each phase:

- Phase 1 – Construction of the Gymnasium. Used as a temporary Prayer Hall. Estimated completion date Year 2018;
- Phase 2 – Construction of Prayer Hall. Estimated completion date Year 2020;
- Phase 3 – Expansion of Building "A". Ancillary land uses space for Offices, Classrooms, banquet room and library/lab space. Estimated completion date Year 2022; and
- Phase 4 – Construction of Office building (Building "B). Estimated completion date Year 2024;

The site's parking demand is proposed to be accommodated by 261 parking spaces. The Zoning By-law parking requirement is 6 spaces per 100 square metres of GFA. The Zoning By-law requirement is 174 spaces. The site is considered oversupplied under the Zoning By-law.

The parking supply for the Prayer Hall is proposed at 21 spaces per 100 square metres of GFA during Friday worship periods. During this time, no other on-site activity will occur. During non-worship periods the parking supply for the Prayer Hall is proposed at 16 spaces per 100 square metres of GFA.

The parking supply for the Office component is proposed at 3.4 spaces per 100 square metres of GFA.

3.3 Site Traffic Estimates

The Institute of Transportation Engineers (ITE) Trip Generation[6] and a first principles trip generation method is used to estimated the site trip generation.

ITE data has been used for the Office land use (Building "B") in Phase 4 of the development. As published ITE data does not contain trip generation information for the weekday mid-day and Friday afternoon time periods, a factor was developed from the existing count data.

Table 3.3 details the entering peak hour traffic volumes at the Appleby Line intersection with Palladium Way. A factor of 0.40 and 0.75 was developed for the weekday Mid-day and the Friday afternoon peak hours.

TABLE 3.3: OFF-PEAK TRIP GENERATION FACTOR – ITE LUC 710 OFFICE

Peak Hour	Entering Volume	PM Peak Hour Ratio
Weekday AM	1,746	**0.83**
Weekday Mid-Day	837	**0.40**
Weekday PM	2,103	**1.00**
Friday Afternoon	1,579	**0.75**
Saturday Mid-Day	1,023	**0.49**

The first principles calculation provides insight on the key factors influencing demand. Trip generation depends on the capacity of the worship space, a factor to account for the fact that facilities are not always at 100 percent capacity and that some people may park off-site, the percent of people arriving by car, and the average number of passengers per vehicle.

To determine the percentage of people traveling by car an intercept survey was conducted at the HIA's temporary worship space at the Haber Recreation Centre[7].

The Haber Centre is currently the venue of the Friday prayers. It attracts worshippers who will ordinarily be coming to the Palladium Way site and is therefore a good representation for the proposed Palladium Way site.

The intercept survey determined age groups, postal code data, travel mode, and mode of travel. **Appendix D** contains the intercept survey. The survey found:

[6] Trip Generation Manual 9th Edition Institute of Transportation Engineers Washington DC 2012 – Average Rates

[7] Haber Recreation Centre | 3040 Tim Dobbie Dr, Burlington, ON | Survey Dates Friday 14 & 28 July 2017.

- 73 percent of persons attending the Friday afternoon service travelled by automobile.
- The average vehicle occupancy is noted to be 2.86 persons per vehicle.

The following formula was used to estimated the trip generation associated with Building "A":

$$Trip\ Generation = \frac{(Person\ Capacity\ x\ Occupany\ Factor\ x\ Auto\ Mode\ Split)}{Auto\ Occupancy}$$

- Person capacity – Congregation Size = 800 persons
- Occupancy Factor – Level of Site Occupancy = percent of peak utilization. **Table 3.1** indicates that the peak attendance occurs on Friday afternoon.
  - Weekday AM – 6 percent of peak (30 attendees/500 attendees);
  - Weekday Mid-Day/PM – 8 percent of peak (40 attendees/500 attendees);
  - Friday Afternoon – 100 percent of peak (500 attendees/500 attendees);
  - Saturday Mid-day – 10 percent of peak (50 attendees/500 attendees);
- Auto Mode Split – Collected in intercept survey – 73 percent automotive oriented.
- Auto Occupancy - Collected in intercept survey – average occupancy of 2.86 persons per vehicle.

The TMC data from an existing Mosque site in Milton[8] was used to establish a directional distribution for the site generated trips. **Appendix D** contains the Milton TMC data.

Table 3.4 outlines the estimated trip generation for the subject site for Phases 1-3. **Table 3.5** outlines the estimated trip generation for the subject site for Phases 4. **Appendix E** contains detailed trip generation tables.

[8] Islamic Community Centre of Milton – 8069 Esquesing Line Milton ON. TMC Data June 2017

lot and some parking spillover to adjacent streets was observed. The Mosque floor areas were established by inspection and measurements on the site.

This Mosque had some minor traffic activity during the weekday AM and PM peak hours of the adjacent roadways. The Friday afternoon peak hour occurred between 1:15 PM and 2:15 PM with a total of 319 vehicle trips occurring. At this time 171 vehicle trips (54% of the total) were inbound trips. The traffic activity is probably over-represented by vehicles circulating looking for parking space.

Masummen Islamic Centre (7580 Kennedy Rd, Brampton)

This Mosque is a relatively new facility and is not known to have traffic and parking problems. With a single access and a public parking lot directly across the street to accommodate overflow parking it was also a relatively easy site to survey. The Mosque floor areas for this site were established with data from the City of Brampton records.

This Mosque had no observed traffic activity during the weekday AM and PM peak hours of the adjacent roadways. The Friday afternoon peak hour occurred between 12:30 PM and 1:30 PM with a total of 125 vehicle trips occurring. At this time 100 vehicle trips (80% of the total) were inbound trips.

The trip rates for the three above noted Mosques is summarized in **Table 1**

TABLE 1: MOSQUE TRIP GENERATION SUMMARY

		Development Name			Average
		Ahmadiyya Muslim Jama`at Canada	Jame Makki Masjid Mosque	Masummen Islamic Centre	
Gross Floor Area (GFA sqft)		12,200	11,000	10,996	11,399
Designated Prayer Area (sqft)		7,300	5,000	2,787	5,029
On-site Parking Supply		200	85	113	133
Survey Observations					
Weekday AM	Inbound	8	6	0	5
	Outbound	5	17	0	7
	Total	13	23	0	12
	Time	07:30-08:30	07:30-08:30	NA	
Weekday PM	Inbound	7	42	0	16
	Outbound	10	25	0	12
	Total	17	67	0	28
	Time	16:45-17:45	17:00-18:00	NA	
Friday Afternoon	Inbound	195	171	100	155
	Outbound	26	148	25	66
	Total	221	319	125	222
	Time	13:00-14:00	13:15-14:15	13:30-13:30	
Survey Site Trip Rates					
Weekday AM	GFA	1.1	2.1	0.0	1.05
	Prayer Area	1.8	4.6	0.0	2.39
Weekday PM	GFA	1.4	6.1	0.0	2.46
	Prayer Area	2.3	13.4	0.0	5.57
Friday Afternoon	GFA	18.1	29.0	11.4	19.48
	Prayer Area	30.3	63.8	44.9	44.14

TABLE 2: PRELIMINARY ESTIMATE - TRIP GENERATION

Land Use	GFA M2	GFA SQFT	AM Peak Hour				PM Peak Hour				Afternoon Peak Hour			
			Rate	In	Out	Sum	Rate	In	Out	Sum	Rate	In	Out	Sum
Mosque PTSL Data (Prayer Hall)	909	9,784	2.39 **	9	14	23	5.57 **	32	22	54	44.14 **	303	129	432
710 - General Office (GFA)*	1,909	20,548	*	48	6	54	*	17	84	101	***	7	34	41
Total Generation				**57**	**20**	**77**		**49**	**106**	**155**		**310**	**163**	**473**
Modal Split****			5%	3	1	4	5%	2	5	7	5%	16	8	24
Net Generation				**54**	**19**	**73**		**47**	**101**	**148**		**294**	**155**	**449**

*Equation Rate
**Average Rate
***Ratio of PM Peak Hour to Hour of Afternoon Prayer (TBD in updated TMC)
****Approved Active Transportation Rate from Region/City

LUC 710 – Afternoon Peak Hour Trip Generation Factoring

The afternoon peak hour trip generation for LUC 710 has been factored using a historical turning movement count. Year 2011 TMC data for Appleby Line at Palladium Way was used to determine the ratio between the PM peak hour and the 13:00 hour (Friday afternoon prayer services). The hourly traffic volumes are noted as follows:

- PM Peak Hour – 1,522 vph entering.
- Afternoon Peak Hour (13:00hr-14:00hr) – 621 vph entering.
- PM/Afternoon Ratio – 41%

This ratio will be adjusted to reflect the updated TMC data to be collected as part of Task 2.

TRANS-PLAN™
Transportation Engineering

TRAFFIC IMPACT STUDY, PARKING STUDY, SITE CIRCULATION REVIEW & TDM PLAN
(Update as per Region Comments)

Proposed Addition to Pickering Islamic Centre
2065 Brock Road
City of Pickering, Ontario

Prepared for: Pickering Islamic Centre – Masjid Usman

July 2018

17 Atlantic Avenue
Toronto, Ontario, Canada, M6K 3E7
1 (647) 931-7383, 1 (877) 668-8784
admin@trans-plan.com
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1. INTRODUCTION

Trans-Plan was retained by Pickering Islamic Centre to conduct a Transportation Study for the proposed three-storey addition to the current building (school and prayer hall use) located at 2065 Brock Road in the City of Pickering, Ontario. The submitted transportation study, dated June 8, 2017, was reviewed by the Region of Durham and traffic comments was provided. This transportation study has been updated based on the Region of Durham comments dated October 26, 2017, and includes the following studies and tasks:

Traffic Impact Study

- a review and assessment of the existing road network
- a review of the existing and future pedestrian safety along Brock Road related to the site
- an assessment of boundary road operations under future background conditions, including a review of traffic growth, area developments and proposed transportation improvements in the study area
- traffic surveys at the Islamic Centre during the peak period of operations on a Friday for school and prayer activity
- an assessment of the impact of existing and future site-generated traffic on the study area intersections and proposed boundary roadway connections under future traffic conditions
- a sensitivity analysis regarding traffic and parking impacts of special events that occur at the Islamic Centre
- recommendations to mitigate any identified traffic impacts on the boundary roadways, resulting from the proposed development

Parking Study

- a review of site parking supply and requirements based on the City of Pickering's current Zoning By-law
- parking surveys at the Islamic Centre during the peak period of operations on a Friday for school and prayer activity
- a review of the existing site parking demand and the estimated future parking demand of the site due to the planned addition
- a review of off-site parking opportunities at nearby properties, public parking lots and local streets
- recommendations to accommodate future parking demands

Transportation Demand Management

- a review of existing and future transportation demand management (TDM) opportunities near the study area
- recommendation of various TDM measures for the site to encourage a reduction in single-occupant auto trips and auto parking demands

Table 6 - Summary of Existing Auto Trip Generation and Passenger Drop-offs / Pick-ups of Students

Peak Hour Start Time	No. of Students	Vehicle Volumes (peak hour)			Drop-offs (vehicles)	
		In	Out	Two-way	Peak 1-hr	Peak 5-min
8:00am; School Arrival	72					
	Volumes	31	33	64	35	12
	Trip Rate	0.43	0.46	0.89	0.49	0.17
	No. of Attendees	Vehicle Volumes (peak hour)				
		In	Out	Two-way		
	367*					
1:00pm Prayers	Volumes	253	52	305		
	Trip Rate	0.69	0.14	0.83		
	No. of Attendees	Vehicle Volumes (peak hour)				
		In	Out	Two-way		
	172*					
2:45pm Prayers	Volumes	83	158	241		
	Trip Rate	0.48	0.92	1.40		
	No. of Students	Vehicle Volumes (peak hour)			Pick-ups (vehicles)	
		In	Out	Two-way	Peak 1-hr	Peak 5-min
3:30pm; School Dismissal	72					
	Volumes	35	35	70	35	7
	Trip Rate	0.49	0.49	0.97	0.49	0.10

Note: (*) Includes attendees that parked outside of the site and walked to prayer hall.

Attendees (Pedestrians) Crossing at Brock Road

Attendees were required to find alternative parking locations when the site was unable to accommodate demands during the Friday afternoon prayers. Attendees parked at the Brock Ridge Community Park, the vacant lot at the southeast corner of Brock Road and Usman Road (south leg), the presentation centre located north of the site, and at the residential neighbourhood on the west side of Brock Road. The volume of attendees that parked off-site, walked from their parked vehicles and crossed at Brock Road to attend the prayer hall were recorded. Table 7 includes the number of crossings at the signalized intersection of Brock Road at Major Oaks Road / Usman Road (i.e. protected crossings) and at the mid-block on Brock Road, between Finch Avenue and Major Oaks Road (i.e. unprotected crossings).

There were no walk trips and / or crossing along Brock Road observed during the school morning arrival and afternoon dismissal periods, given that students arrived / departed by auto drop-offs and pick-ups on-site.

Table 7 - Summary of Walk Trips and Pedestrian Crossing

Event	Peak Time	Peak Walk Trips	Pedestrian Crossings at Brock Road	
			Crossing at Major Oaks Road (signalized)	Crossing at the Midblock of Brock Road (unprotected)
2:00pm Prayers	1:45pm	67	25	42
3:00pm Prayers	3:00pm	14	2	12

The results indicate that 42 attendees crossed the mid-block of Brock Road (south of Major Oaks Road) against traffic to attend the Friday afternoon prayers at 2:00pm (recorded on Friday March 24, 2017). Similarly, 12 attendees crossed the mid-block of Brock Road against traffic to attend the Friday afternoon prayers at 3:00pm. It was noted, however, that all illegal crossings at the midblock were by adults.

7.3 Site Trip Generation for the Proposed Addition

Site trips were generated separately for the individual uses at the PIC: the prayer hall and the school components, and combined where appropriate.

Place of Worship

Auto site trips generated for the place of worship is expected to be similar to the existing trip generation, given the modest proposed increase to the prayer hall and given that any growth would be offset by the increase in walk trips, seeing as some attendees would live in the area, at the future residential development to the east of Usman Road. The site trip generation for the prayer hall component of the PIC is shown in Table 8.

Table 8 - Trip Generation of Place of Worship

Land Use		Midday Peak Hour			PM Peak Hour		
		367 Attendees			172 Attendees		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Place of Worship	Distribution	83%	17%	100%	34%	66%	100%
	Rate	0.69	0.14	0.83	0.48	0.92	1.40
	Trips	253	52	305	83	158	241

The place of worship generates approximately 305 two-way trips in the weekday MD peak hour (during early afternoon prayers) and 241 two-way trips in the weekday PM peak hour (during mid-afternoon prayers).

School

The additional school trips were generated using the trip rates determined from our traffic survey results. The student enrollment is planned to increase from 72 students to approximately 300 students in the five- to ten-year horizon. Among the 300 students, approximately 30 students are assumed to be bussed. Furthermore, approximately 20 students are assumed to walk to the school from the future residential development east of Usman Road. Teachers and administrative staff are expected to drive to the site and

were also incorporated into the trip generation estimates for the school. Although the grade 11 and 12 students are of legal age to drive (16 years and up), it is expected that there be very minimal trips generated by student drivers due to the Graduated Licensing System (accompanying driver requirement for at least one year) and because student drivers would be required to have unrestricted access to a personal vehicle during the school day. The site trip generation for the weekday school component of the PIC is shown in Table 9.

Table 9 – Site Trip Generation of the School

Trip Type	Number of Persons		Morning School Peak Hour (8:00am to 9:00am)			Afternoon School Peak Hour (3:00pm to 4:00pm; coincides with 3:00pm prayer time)		
			IN	OUT	TOTAL	IN	OUT	TOTAL
Students								
Auto Drop-off / Pick-up	250	Trips	80	113	192	120	94	213
School Bus Trips	30		2	2	4	2	2	4
Walking Trips	20		20	0	20	0	20	20
Total	300		102	115	216	122	116	237
Staff								
Teachers	21	Trips	21	0	21	0	21	21
Administrative Staff	5		5	0	5	0	5	5
Total	26		26	0	26	0	26	26
Total School Auto Trips	**250**	**Rate**	**0.43**	**0.46**	**0.89**	**0.49**	**0.49**	**0.97**
		Trips	**108**	**115**	**222**	**122**	**122**	**243**

The school is expected to generate approximately 222 new two-way trips in the weekday AM peak hour with a trip rate of 0.89 trips per student. The 222 two-way trips include 192 student drop-offs auto trips, 4 school bus trips and 26 staff auto trips. During the weekday PM peak hour, the school is expected to generate approximately 243 new two-way trips with a trip rate of 0.97 trips per student. The 243 two-way trips include 213 student pick-up auto trips, 4 school bus trips and 26 staff auto trips. Additionally, there are 20 walk trips expected to occur in the weekday AM peak hour and weekday PM peak hour.

Given that the Friday afternoon (3:00pm) prayer time and the weekday PM school peak hour (afternoon dismissal) overlap, the site traffic was combined to obtain an estimated total of 484 (241 school + 243 prayer hall) two-way peak hour auto trips in the Friday (mid) afternoon peak hour. The combined site trips for the place of worship and for the school are summarized in Table 10.

Table 10 - Combined Trip Generation of Place of Worship and School Uses

Trip Type	AM Peak Hour			MD Peak Hour			PM Peak Hour		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Place of Worship Site Trips	0	0	0	253	52	305	83	158	241
School Site Trips	108	115	222	0	0	0	122	122	243
Total Site Trips	**108**	**115**	**222**	**253**	**52**	**305**	**205**	**280**	**484**

Background Site Trip Generation

2065 Brock Road Background Developments

Dev 1 - 2055 Brock Road, Pickering, Proposed Residential Development

Dwelling Type	Size (Units)		AM Peak Hour			MIDDAY Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total	In	Out	Total
Residential Condominium & Townhouses ITE Code 230	59	Distribution	17%	83%	100%	67%	33%	100%	67%	33%	100%
		Equation	Ln(T)=0.80Ln(X)+0.26						Ln(T)=0.82Ln(X)+0.32		
		Rate	0.10	0.47	0.58	0.30	0.15	0.44	0.44	0.22	0.66
		Trips	6	28	34	17	9	26	26	13	39
		Total Trips	**6**	**28**	**34**	**17**	**9**	**26**	**26**	**13**	**39**

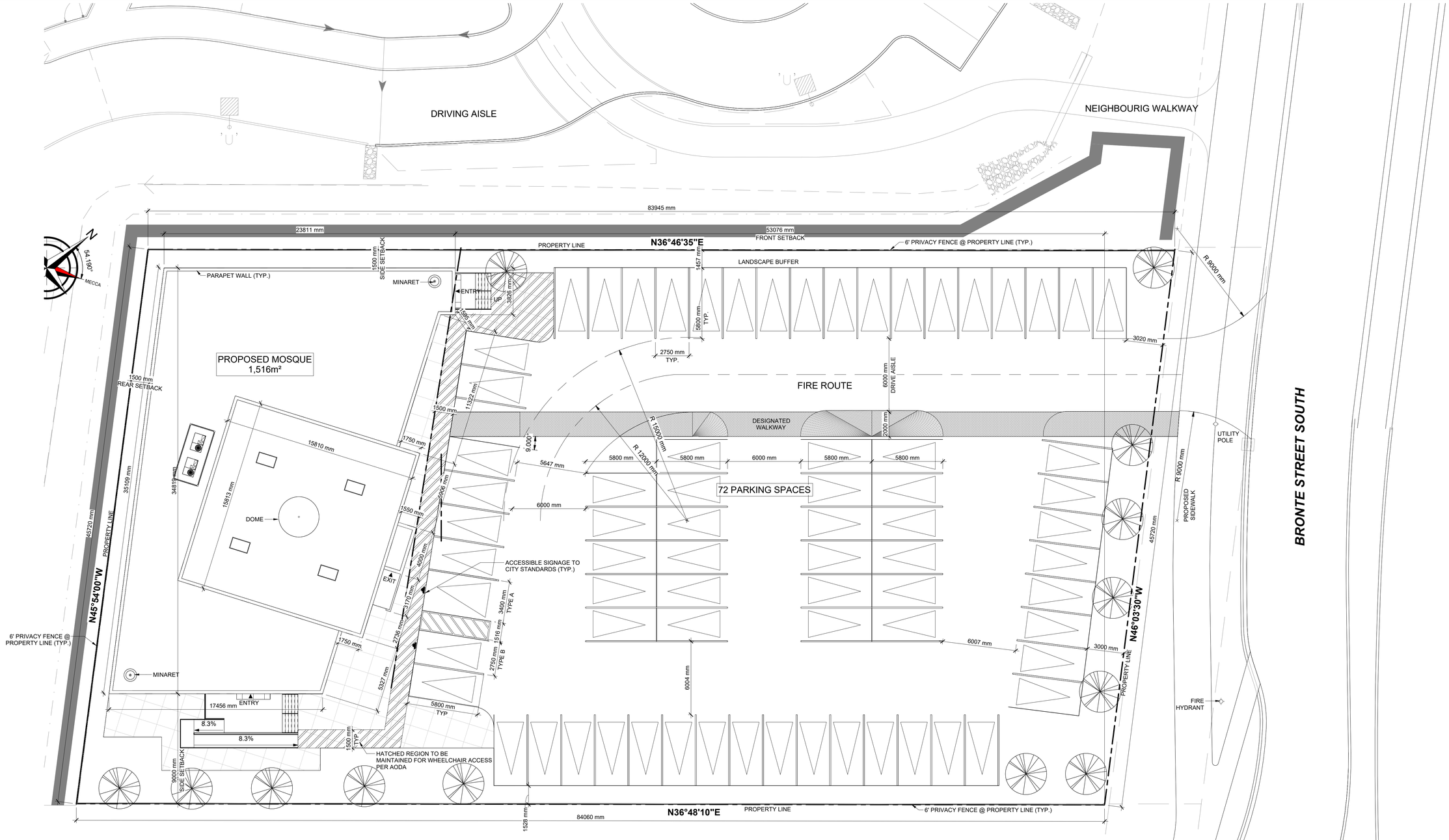
Dev 2 - 2090 Duberry Drive, Pickering, Proposed Residential Development

Dwelling Type	Size (Units)		AM Peak Hour			MIDDAY Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total	In	Out	Total
Single Homes ITE Code 210	40	Dir. Distr.	25%	75%	100%	63%	37%	100%	63%	37%	100%
		Equation	T = 0.70 (X) + 9.74						Ln(T)=0.90Ln(X)+0.51		
		Rate	0.24	0.71	0.95	0.47	0.28	0.75	0.72	0.43	1.15
		Trips	10	28	38	19	11	30	29	17	46
		Total Trips	**10**	**28**	**38**	**19**	**11**	**30**	**29**	**17**	**46**

Dev 3 - 2095 Brock Road, Pickering, Proposed Residential Development

Dwelling Type	Size (Units)		AM Peak Hour			MIDDAY Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total	In	Out	Total
Residential Condominium & Townhouses ITE Code 230	59	Distribution	17%	83%	100%	67%	33%	100%	67%	33%	100%
		Equation	Ln(T)=0.80Ln(X)+0.26						Ln(T)=0.82Ln(X)+0.32		
		Rate	0.10	0.47	0.58	0.30	0.15	0.44	0.44	0.22	0.66
		Trips	6	28	34	17	9	26	26	13	39
Single Homes ITE Code 210	60	Dir. Distr.	25%	75%	100%	63%	37%	100%	63%	37%	100%
		Equation	T = 0.70 (X) + 9.74						Ln(T)=0.90Ln(X)+0.51		
		Rate	0.22	0.65	0.87	0.46	0.27	0.73	0.69	0.41	1.10
		Trips	13	39	52	28	16	44	42	24	66
		Total Trips	**19**	**67**	**86**	**45**	**25**	**70**	**68**	**37**	**105**

FIGURES



1 SITE PLAN
SCALE: 1 : 150

ISSUE

NO.	DATE	DESCRIPTION
1	2023/03/02	ISSUED FOR COORDINATION

NO.	DATE	DESCRIPTION
1	2023/03/02	REVISION TO BLDG LOCATION

REVISION

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paradigm
architecture + desi
9198 Gerrard St E Toronto ON M4E 2C7
[t]416.686.3624 www.paradigm-ad.com

STAMP:

PROJECT NAME / LOCATION:

MILTON AMJ COMMUNITY CENTRE

1458 BRONTE STREET SOUTH.MILTON

DRAWING TITLE:

SITE PLAN

DRAWN BY: MM/MC	PROJECT NO.: 856
CHECKED BY: MC	SCALE: 1 : 150
	DATE: 2023-06-02
	DRAWING NO.: A1.0

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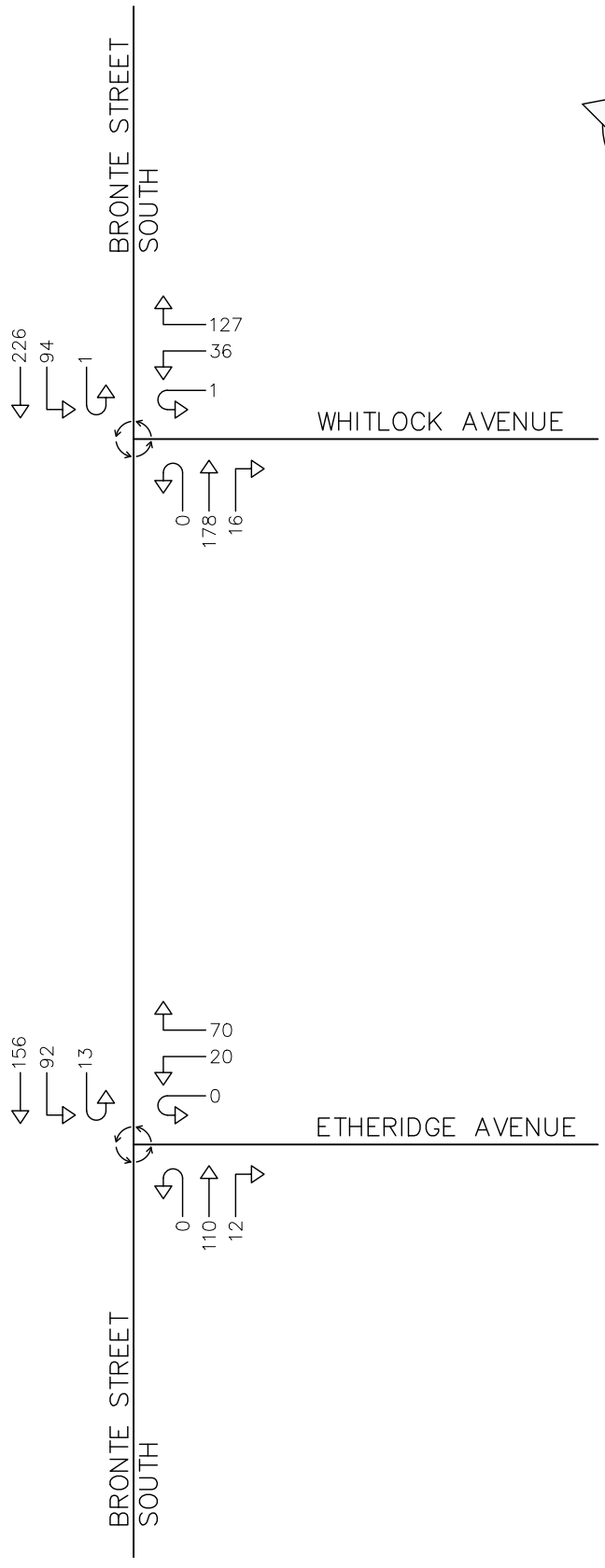

LEGEND:

- STOP CONTROL
- ROUND ABOUT
- PM — WEEKDAY PM PEAK HOUR VOLUMES

1456 BRONTE STREET SOUTH
TOWN OF MILTON

EXISTING TRAFFIC VOLUMES

CROZIER CONSULTING ENGINEERS
211 YONGE STREET
SUITE 301
TORONTO, ON M5B 1M4
416-477-3392 T
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
T.D.S.	B.P.		1244-5526
Date	Check	Scale	Dwg.
2021/04/19	K.S.	N.T.S	FIG. 02

NOTE:
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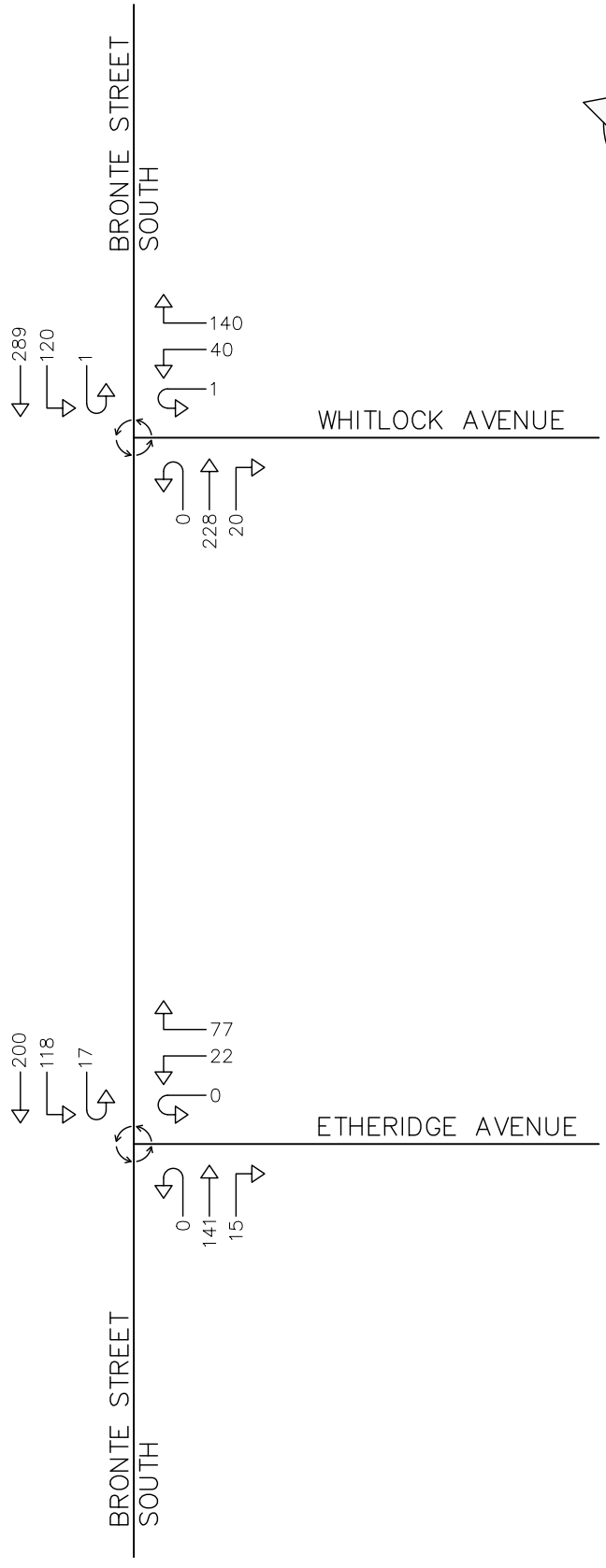

LEGEND:

- STOP CONTROL
- ROUND ABOUT
- PM — WEEKDAY PM PEAK HOUR VOLUMES

1456 BRONTE STREET SOUTH
TOWN OF MILTON

FUTURE BACKGROUND TRAFFIC VOLUMES

CROZIER CONSULTING ENGINEERS
211 YONGE STREET
SUITE 301
TORONTO, ON M5B 1M4
416-477-3392 T
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
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Date	Check	Scale	Dwg.
2021/04/19	K.S.	N.T.S	FIG. 03

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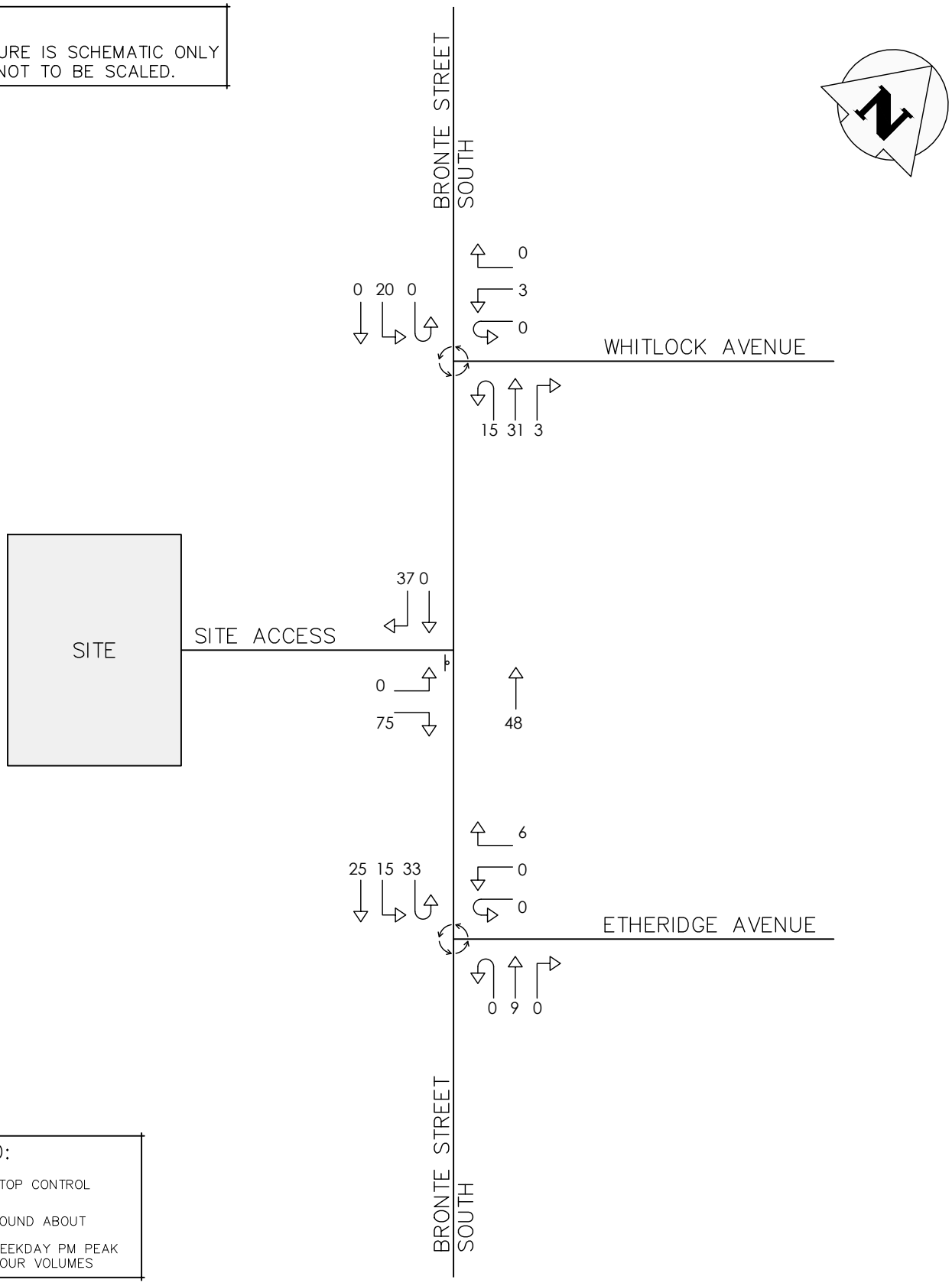

LEGEND:

- STOP CONTROL
- ROUND ABOUT
- PM — WEEKDAY PM PEAK HOUR VOLUMES

1456 BRONTE STREET SOUTH
TOWN OF MILTON

TRIP ASSIGNMENT

CROZIER CONSULTING ENGINEERS
211 YONGE STREET
SUITE 301
TORONTO, ON M5B 1M4
416-477-3392 T
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
T.D.S.	B.P.		1244-5526
Date	Check	Scale	Dwg.
2023/08/17	K.S.	N.T.S	FIG. 04

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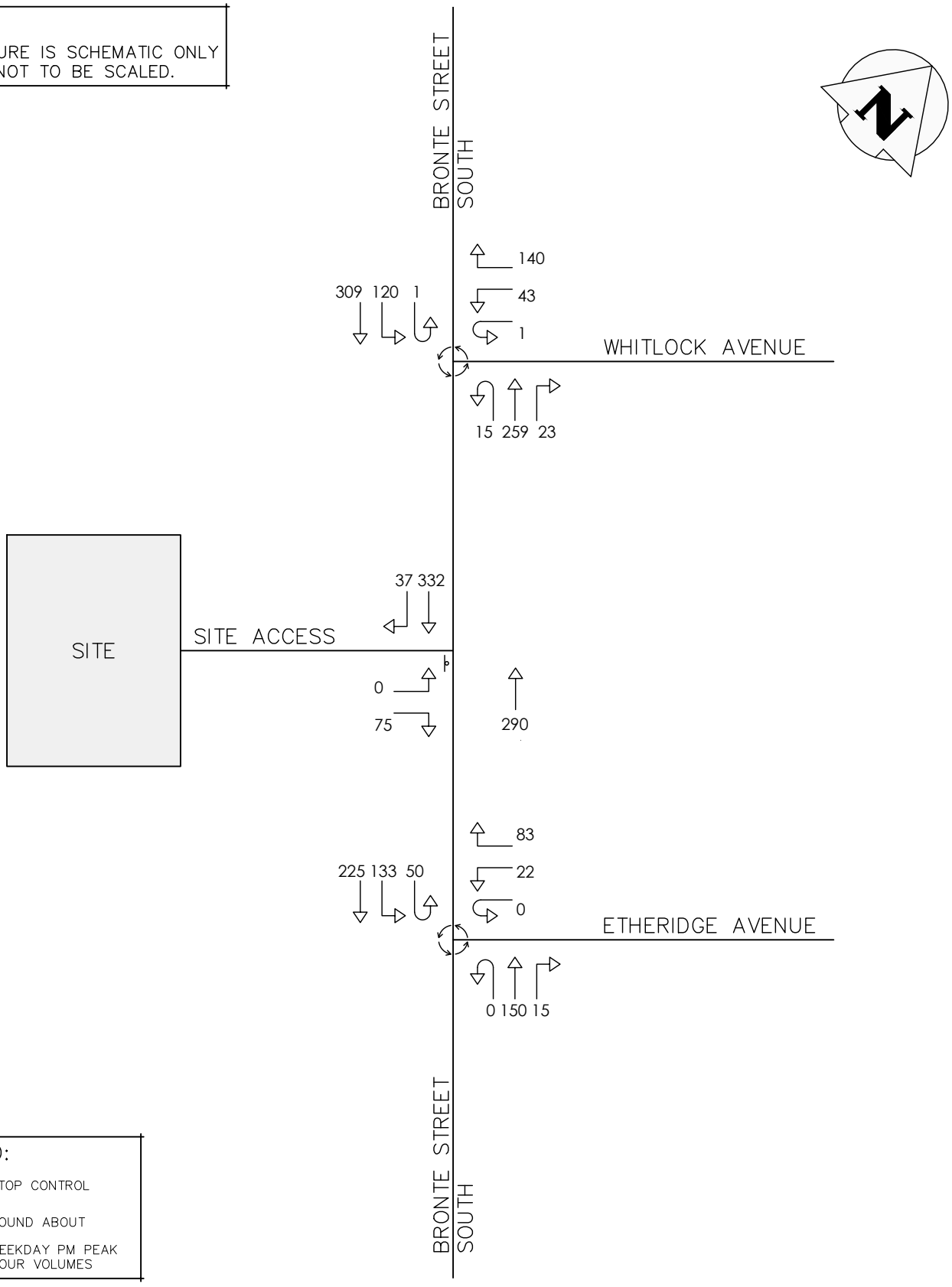


LEGEND:

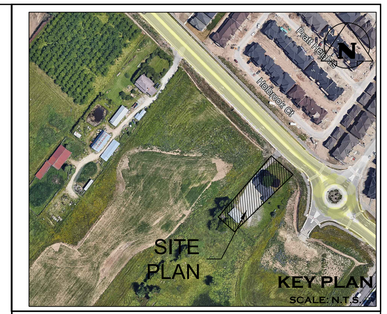
- STOP CONTROL
- ROUND ABOUT
- PM — WEEKDAY PM PEAK HOUR VOLUMES

1456 BRONTE STREET SOUTH
TOWN OF MILTON

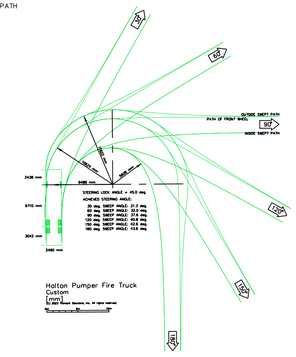
FUTURE TOTAL TRAFFIC VOLUMES

CROZIER CONSULTING ENGINEERS
211 YONGE STREET
SUITE 301
TORONTO, ON M5B 1M4
416-477-3392 T
WWW.CFCROZIER.CA

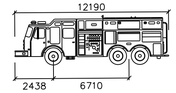
Drawn	Design	Project No.	
T.D.S.	B.P.		1244-5526
Date	Check	Scale	Dwg.
2023/08/17	K.S.	N.T.S	FIG. 05



SWEEP PATH



VEHICLE PROFILE



Halton Pumper Fire Truck

mm

Width	: 2490
Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 45.0

No.	ISSUE	DATE: 05/26/2021
1	ISSUED FOR 1st SUBMISSION	05/26/2021
2	ISSUED FOR 2nd SUBMISSION	08/16/2023

Project

1458 BRONTE STREET SOUTH
MILTON

Drawing

FIRE TRUCK ENTRANCE
AND EXIT PATHS

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Drawn By: B.L.	Design By: I.L.	Project: 1244-4384	
Check By: I.L.	Check By: B.B.	Scale: 1:200	Drawing: TT01