Book 27
Witness Statement of Joseph Gowrie

14-Apr-16

Index

ONTARIO MUNICIPAL BOARD

Commission des affaires municipals de l'Ontario

PROCEEDING COMMENCED UNDER subsection 34(11) of the *Planning Act*, R.S.O. 1990, c. P. 13, as amended

Applicant and Appellant:	James Dick Construction Limited
Subject:	Application to amend Zoning By-law No. 57/1999 - Refusal or neglect of Township of Guelph/Eramosa to make a decision
Existing Zoning:	Agriculture (A) and Hazard (H) .
Proposed Zoning:	Extractive Industrial (M3) and Hazard (H)
Purpose:	To permit a quarry
Property Address/Description:	Part Lot 1, Concession 6
Municipality:	Guelph Eramosa
Municipality File No.:	ZBA09/12
OMB Case No.:	PL150494
OMB File No.:	PL150494
OMB Case Name:	James Dick Construction Limited v. Guelph/Eramosa (Township)

PROCEEDING COMMENCED UNDER subsection ,11(5) of the *Aggregate Resources Act,* R.S.O. 1990, c. A.8, as amended

Referred by:	Jane Ireland
Objector:	Shirley Allen
Objector:	Ron & Debbie Brennen
Objector:	John & Ann Brophy
Objector:	Dennis & Laura Campbell; and others
Applicant:	James Dick Construction Limited
Subject:	Application for a Class A licence for the removal of aggregate
Property Address/Description:	Part Lot 1, Concession 6
Municipality:	Guelph Eramosa
OMB Case No.:	PL150494
OMB File No.:	MM150034
OMB Case Name:	James Dick Construction Limited v. Guelph/Eramosa (Township)

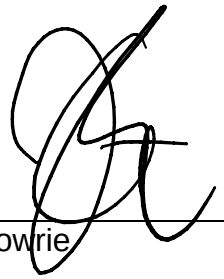
WITNESS STATEMENT FOR JOSEPH GOWRIE

1. The evidence to be presented by Joseph Gowrie will consist of a presentation and review of the following reports and documents:

Tab No.	Reports/Documents	Date
1.	Traffic Impact Study	April 23, 2012
2.	Revised Traffic Impact Study	July 31, 2013

3.	Response to R.J. Burnside & Associates Limited	July 31, 2013
4.	Revised Traffic Impact Study	November 1, 2013
5.	Revised Traffic Impact Study	December 3, 2013
6.	Response to April 7, 2014 Comments	April 17, 2014
7.	Haul Route Study	March 30, 2015
8.	Revised Traffic Impact Study	August 20, 2015
9.	Revised Haul Route Study	August 20, 2015
10.	Revised Traffic Impact Study	April 2016
11.	Revised Haul Route Study	May 2016

2. In addition, Joseph Gowrie, will refer to the Ministry and Agency Review Comments and the Township of Guelph-Eramosa Peer Review Comments set out in the Document Books produced and provided by James Dick Construction Limited.



May 28, 2016
Date

Joseph Gowrie

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July 31, 2013
Our Ref: TR12-0013

James Dick Constructed Limited
P.O. Box 470
Bolton, ON L7E 5T4

Attention: Mr. Greg Sweetnam, B.Sc.
Vice President, Resources

Dear Mr. Sweetnam:

Re: Response to R.J. Burnside & Associates Limited comments dated January 11, 2013 for Eramosa Quarry - Traffic Impact and Parking Study
Town of Guelph-Eramosa

Cole Engineering Group Ltd. (Cole Engineering) is pleased to provide this response letter to the R.J. Burnside & Associates Limited peer review comments dated January 11, 2013 with respect to our Traffic Impact Study submitted April 2012. The comments are addressed in this response letter.

Comment # 1:

"The TIS notes that 5th Line is under the jurisdiction of the Township of Guelph / Eramosa, however it is actually under the jurisdiction of Town of Milton".

Response #1:

We acknowledge that 5th Line should be labelled under the jurisdiction of the Town of Milton.

Comment # 2:

"Comments should be obtained from the Ministry of Transportation (MTO), for operations affecting Highway 7, and from the Town of Milton, for operations affecting 5th Line".

Response #2:

MTO comments have been received and are addressed in the Revised Traffic Impact Study.

Comment # 3:

"No information is provided on the anticipated lifespan of the quarry, which would provide context into the potential for longer term impacts".

Response #3:

Based on discussions with the site operator, the anticipated lifespan of the quarry is 20 years.

Comment # 4:

"The forecast of background traffic is based on traffic counts taken in February 2012. The MTO classifies Highway 9 as a commuter road, which is also confirmed by the strong directional distribution of traffic on a daily basis (i.e. high eastbound traffic in a.m. peak period and high westbound traffic in p.m. peak period). On a seasonal basis, MTO's commuter roads typically have 20 to 25% higher traffic volumes in the summer months, when compared to winter traffic (i.e. February counts). Traffic volumes should be increased to account for these seasonal variations".

Response #4:

Based on MTO's 2008 Seasonal Variation curves, the through traffic volumes along Highway 7 (commuter road) were adjusted to the summer seasonal peak. In this instance, the peak summer month was July with through volumes adjusted by a factor of 1.33. The adjusted traffic volumes for the future (2022) total traffic horizon as shown in **Figure 1**.

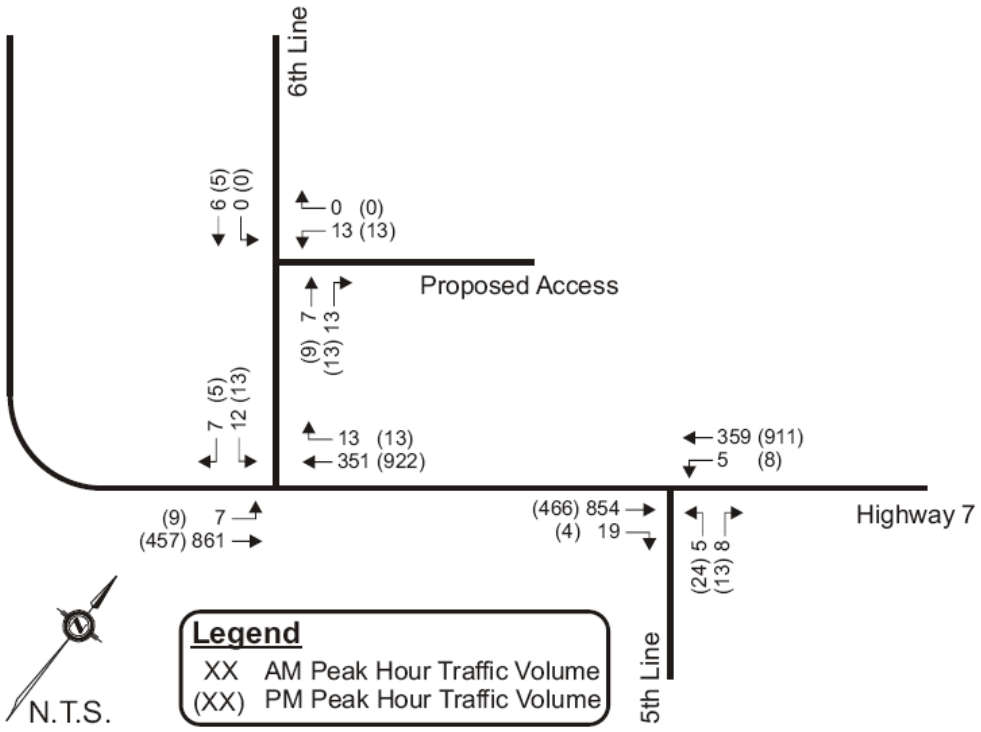

Figure 1 – Future (2022) Total Traffic Volumes

The adjusted traffic volumes were analysed using Synchro 6.0 software and the results are summarized in **Table 1**.

Table 1 – Future (2022) Total Traffic Conditions – Levels of Service

Intersection	Key Movements	AM Peak Hour LOS (v/c)	PM Peak Hour LOS (v/c)
Highway 7 / 6th Line (Unsignalized)	EB left-through SB left-right	A (0.02) E (0.22)	A (0.01) F (0.29)
Highway 7 / 5th Line (Unsignalized)	WB left-through NB left-right	A (0.01) C (0.06)	A (0.02) C (0.19)
6th Line / Proposed Access (Unsignalized)	WB left-right SB left-through	A (0.03) A (<0.01)	A (0.03) A (<0.01)

Based on **Table 1**, the future (2022) total traffic is expected to operate with a volume to capacity ratio (v/c) of under 0.30. The shared southbound left-right turn lane at the Highway 7 / 6th Line intersection is expected to operate with levels of service (LOS) 'E' and 'F' (delay of 54 seconds) during the a.m. and p.m. peak periods, respectively; however, the volume to capacity remains well under 1.00, and as such, there is significant capacity remaining to complete this manoeuvre.

Comment # 5:

"The forecast of trip generation from the proposed quarry is based on data from a proxy survey site (i.e. Erin Pit). On a weekly basis, the calculation assumes consistent traffic over a Monday to Saturday period, inclusive. Information should be provided to confirm this assumption. The number of working days assumed for the critical month (i.e. August) also does not appear into account holiday period, or any reduced operations due to weather, over the monthly period. Also the trip generation is based on average loads which are typical of tractor trailers, whereas actual trip volumes may be higher of the fleet is comprised pf higher numbers of tandem or tri-axle trucks. Based on the above factors, the estimates for peak period traffic may be low".

Response #5:

Trip generation for the site was derived using information from the Erin Gravel Pit and provides the number of vehicles per hour for the entire month of August (the peak month) and is provided in **Appendix A** for reference. The analysis in the April 2012 study assumed an average day during the peak month during both the a.m. and p.m. roadway peak periods. This would be typical of quarry operations. In addition to the trip calculations, the 33 tonne average load used to estimate the number of truck trips took into account tractor-trailers, tandem and tri-axle trucks expected to serve the site.

During the busiest month of August 2011, there were 2,826 trucks that loaded at the quarry with the peak hour being 23 vehicles and represented 0.814% of the monthly traffic at the Erin Pit. Based on the 33 tonne per load figure and as documented in the April 2012 study, at the Eramosa Quarry, there will be a total of 21,213 trucks per year, of which there will be 2,989 trips during the peak month. Applying the 0.814% peak hourly factor results in a total of 24 trucks per hour or one (1) truck every two (2) minutes and 30 seconds.

It should be noted that this assumption is based on a level of activity that will rarely take place and this calculation simply provides an upper limit of trips generated by the site. The level of activity is recognized to be unsustainable if it occurred on a normal basis. However, under this worst case scenario, trips added to the road network would still have minimal impact.

Comment # 6:

"No analysis was provided on the requirement for turning lanes at the intersection of Highway 7 / 6th Line and at the intersection of Highway 7 / 5th Line. It is recommended that turning warrants and requirements be reviewed for these intersections".

Response #6:

Based on MTO's guidelines, left turn warrants were assessed at Highway 7 / 6th line in the future (2022) total scenario, as shown in **Table 2**, during the a.m. and p.m. peak periods.

Table 2 – Left turn warrants at Highway 7 / 6th Line

Road Design Speed 100km/h	AM Peak Highway 7 / 6th Line	PM Peak Highway 7 / 6th Line
Opposing Vehicles (Vo)	364	935
Left Turn Vehicles (VL)	7	9
Advancing Vehicles (Va)	868	466
% (left turns in Va)	1%	2%
Warranted	Yes	Yes
Storage Length	25 m	25 m

As shown in **Table 2**, the left turn is warranted at Highway 7 / 6th Line for the eastbound left movement in the ultimate traffic scenario. A left turn storage length of 25 metres is recommended. A right turn lane is not required operationally at this intersection.

Analysis of auxiliary turn lanes at the Highway 7 / 5th Line intersection were not undertaken as the proposed quarry is only expected to generate through traffic at this intersection.

Comment # 7:

"The TIS does not provide any review of the need to upgrade 6th Line to accommodate the increased truck traffic. It is recommended that a geotechnical study be provided to confirm the road base and road surface requirements. Road widths should also be reviewed, to confirm sufficiency to allow two (2) lanes".

Response #7:

We are investigating modifying the road crest to improve sightlines at this time.

Comment # 8:

"Analysis of stopping sight distances have been provided for the proposed access onto 6th Line, based on an assumed 50 km/h operating speed. However, since speeds are not posed, the legal speeds on this rural road should be assumed to be 80 km/h, in accordance with the Highway Traffic Act. The required stopping sight distance should be revised accordingly".

Response #8:

As mentioned in Response #7, we are looking to modify road profiles to improve the sight distances.

Comment # 9:

"The TIS does not analyze the available sight distances at the intersection of Highway 7 / 6th Line. It should be confirmed that sufficient stopping distances and turning sight distances are available to accommodate the significant increase in turning movements at this location".

Response #9:

Highway 7 is considered a straight road and we do not anticipate issues with sight distances.

Comment # 10:

"The visibility triangles (daylighting) are limited at the intersection of Highway 7 / 6th Line, by encroachment of existing trees. Considering the down gradient on the 6th Line approach and the type of traffic (i.e. large trucks), visibility triangles should be provided for the approaches, in accordance with the requirements of the Geometric Design Manual for Ontario Highways".

Response #10:

Trees can be removed if they are found to have significant impact to sight and visibility of traffic.

Comment # 11:

"The design and placement of truck warning signs should meet the requirements of Ontario Traffic Manual, based on a design speed of 100 km/h on Highway 7 and 80 km/h on 6th Line".

Response #11:

The truck entrance warning signs are classified as 'C' warning signage and the required advance placement for Highway 7 and 6th Line is based on Ontario Traffic Manual's (OTM) posted road speed, as shown in **Table 3**.

Table 3 – OTM's Minimum Advance Placement of Condition B and C Warning Signs (Stopping Distance)

	30	40	50	60	70	**80**
	70	100	140	225	275	**335**

The minimum advance warning signage for truck entrance along Highway 7 should be placed approximately 335 metres in advance of the 6th Line junction.

If you have any questions regarding this study, please do not hesitate to contact the undersigned.

Yours truly,

COLE ENGINEERING GROUP LTD.

Kim Nystrom
Principal

Joseph Gowrie, P.Eng
Transportation Engineer

JG:dps

Encl.: Appendix A – Erin Gravel Pit Proxy Data

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APPENDIX A
Erin Gravel Pit Proxy Data

James Dick Erin Pit August 2011 Busiest Month Shipping by Hour of the Day

DATE	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	TOTAL
02-Aug	13	20	19	11	19	15	15	19	8	16	2			158
03-Aug	9	4	7	5	5	4	7	5	9	6	1			62
04-Aug	11	13	11	15	15	11	18	15	21	13	2			145
05-Aug	9	11	12	16	12	8	16	11	9	10	0			114
08-Aug	11	8	11	9	15	5	21	11	16	12	1			123
09-Aug	8	13	12	9	5	4	7	5	5	1	1			71
10-Aug	6	12	12	7	16	7	12	8	10	10	0			100
11-Aug	5	14	7	17	13	9	11	10	5	3	2			96
12-Aug	12	14	13	12	19	7	16	8	11	8	2			122
13-Aug	6	2	5	4	2	3	0	0	0	0	0			22
15-Aug	12	7	23	16	20	13	21	13	17	18	1			162
16-Aug	10	8	10	8	23	6	14	16	10	13	1			119
17-Aug	16	13	18	12	21	15	15	16	14	17	5			162
18-Aug	20	15	22	17	11	16	18	19	15	19	2			174
19-Aug	11	13	16	14	10	5	18	11	12	15	2			122
22-Aug	12	12	21	12	21	8	22	17	19	16	4	1		170
23-Aug	9	9	11	9	10	4	15	5	11	5	6			94
24-Aug	8	11	14	9	7	16	10	21	12	12	8			128
25-Aug	18	11	19	13	23	14	20	10	14	9	1			152
26-Aug	12	9	18	11	14	8	17	11	12	12	7			131
29-Aug	15	11	12	13	14	13	13	12	14	11	7			135
30-Aug	15	11	19	12	21	17	15	18	9	20	2			159
31-Aug	15	5	16	10	11	11	10	11	7	8	1			105
TOTAL	263	246	328	261	327	219	331	272	260	254	58	1		2826
%	9.3%	8.7%	11.6%	9.2%	11.6%	7.7%	11.7%	9.6%	9.2%	9.0%	2.1%	0.0%		100%

Busiest Hour 23 Trucks Shipped in one hour
% of Monthly Shipping 23/2826 0.814%

Total Monthly Tonnage Percentage for Erin Pit 2011

Jan-11	3.55%	
Feb-11	1.34%	
Mar-11	2.29%	
Apr-11	5.56%	
May-11	9.44%	
Jun-11	13.86%	
Jul-11	11.05%	
Aug-11	14.09%	Busiest Month
Sep-11	12.27%	
11-Oct	8.90%	
Nov-11	11.70%	
Dec-11	5.95%	
Total		

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April 17, 2014
Our Ref: TR12-0013

James Dick Construction Ltd.
P.O. Box 470
Bolton, ON L7E 5T4

Attention: Mr. Greg Sweetnam, B.Sc.
Vice President, Resources

Dear Mr. Sweetnam:

Re: Response to April 7, 2014 Comments
Eramosa Quarry
Township of Guelph-Eramosa

James Dick Construction Ltd. (the "Owner") received comments from R.J. Burnside & Associates Limited (R.J. Burnside) dated April 7, 2014 regarding the *Revised Traffic Impact Study Eramosa Quarry, Township of Guelph-Eramosa* prepared by Cole Engineering Group Ltd. (Cole Engineering).

Comment 4 of the R.J. Burnside letter requests that a left turn warrant be undertaken at the 5th Line / Highway 7 intersection for the westbound left turn manoeuvre. Therefore, using the future (2023) total traffic volumes in the *Revised Traffic Impact Study*, the left turn warrant was undertaken. The completed warrant is provided in **Figure 1** for reference.

Based on the warrant, a westbound left turn lane is required for the 5th Line / Highway 7 intersection during both the a.m. and p.m. peak periods in excess of 25 meters. This is due to background development traffic as traffic from the Eramosa Quarry will not be making the westbound left turn onto 5th Line since it is not a designated truck route.

COLE ENGINEERING GROUP LTD.

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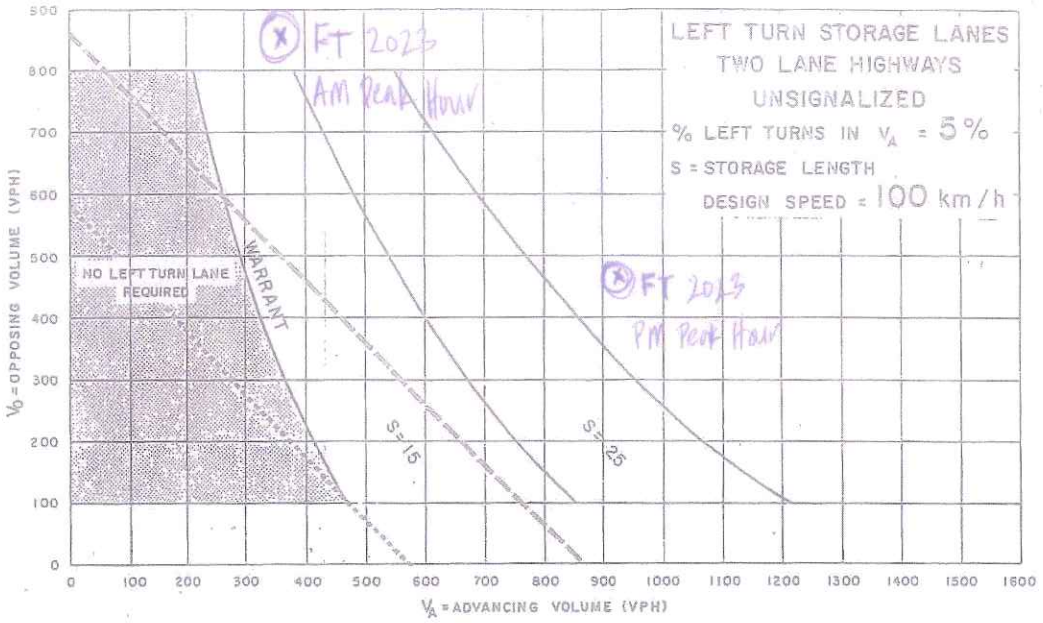

Figure 1 Highway 7 / 5th Line Left Turn Warrant

Using the *Geometric Design Standards for Ontario Highways* published by the Ministry of Transportation of Ontario (MTO), the westbound left turn lane at the 5th Line / Highway 7 intersection requires 160 meters of taper and 70 meters of parallel lane for deceleration, as well as 25 meters of storage. The left turn lane will require a runout lane which is the same length as the deceleration lane requirements. Due to the proximity of the 6th Line / Highway 7 intersection, the runout lanes from each intersection are expected to encroach. As a result, it is recommended that a center lane be maintained to facilitate the runout between each intersection.

We trust that this information is sufficient and if you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

COLE ENGINEERING GROUP LTD.

LICENSED PROFESSIONAL ENGINEER
J. E. GOWRIE
100134878
04/17/14
PROVINCE OF ONTARIO

Joseph E. Gowrie, P.Eng.
Project Manager
Traffic

JG:

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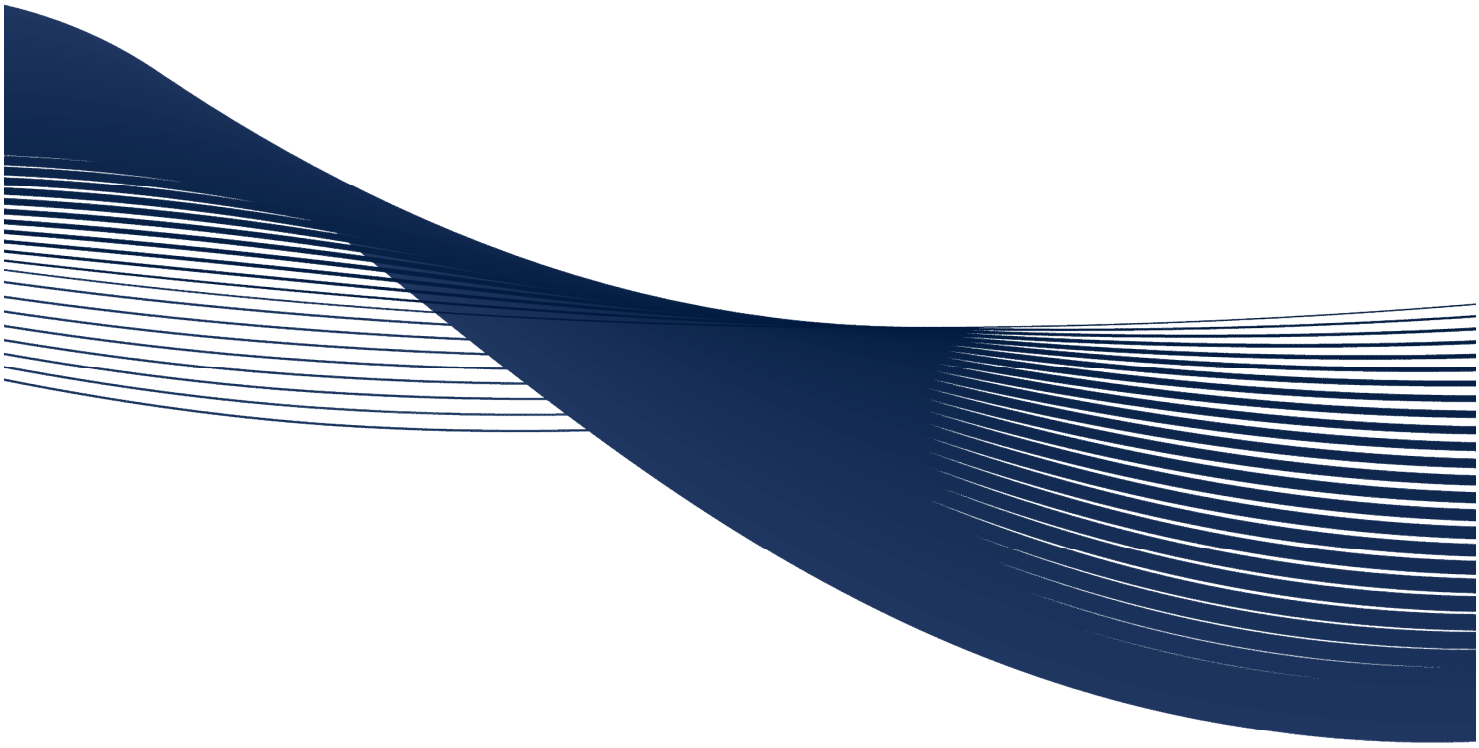
JAMES DICK CONSTRUCTION LIMITED

REVISED HAUL ROUTE STUDY

Eramosa Quarry, Township of Guelph-Eramosa

Project No.: TR12-0013



AUGUST 2015

COLE ENGINEERING GROUP LTD.

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COLE ENGINEERING

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August 20, 2015
Our Ref: TR12-0013

James Dick Construction Ltd.
P.O. Box 470
Bolton, ON L7E 5T4

Attention: Mr. Greg Sweetnam, B.Sc.
Vice President, Resources

Dear Mr. Sweetnam:

Re: Revised Haul Route Study
Eramosa Quarry (Hidden Quarry)
Township of Guelph-Eramosa

Cole Engineering Group Ltd. is pleased to submit this Haul Route Study for the proposed Eramosa Quarry in the Township of Guelph-Eramosa.

Our study finds that the proposed quarry will have minimal impact on the surrounding road network with an average of 14 truck trips during the a.m. peak period dispersed over several haul routes. This study has also reviewed the existing traffic and collision history along Regional Road 25, the expected major route of the Eramosa Quarry and finds that Steps 5 through 8 of the *Haul Route Study – Terms of Reference* are not required.

Should you have any questions regarding the study, please do not hesitate to contact the undersigned.

Yours truly,

COLE ENGINEERING GROUP LTD.

Joseph E. Gowrie, P.Eng.
Project Manager, Traffic

JG:

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Statement of Conditions

This Report / Study (the "Work") has been prepared at the request of, and for the exclusive use of, the Owner / Client, and its affiliates (the "Intended User"). No one other than the Intended User has the right to use and rely on the Work without first obtaining the written authorization of Cole Engineering Group Ltd. and its Owner. Cole Engineering expressly excludes liability to any party except the intended User for any use of, and/or reliance upon, the work.

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APPENDICES

1.0 Introduction

Cole Engineering Group Ltd. (Cole Engineering) has prepared this Haul Route study on behalf of James Dick Construction Ltd. (the "Owner") for the proposed Hidden Quarry (Eramosa Quarry). The subject lands are approximately 39.4 hectares (97 acres) in area and are located on the northeast quadrant of the Highway 7 and 6th Line intersection (west half of Lot 1, Concession 6) in the Township of Guelph/Eramosa. The site location is identified in **Figure 1-1**.

The study has been requested by the Region of Halton, Town of Milton and Town of Halton Hills and its purpose is to identify the operating characteristics of the facility and the expected haul routes to and from the proposed quarry. The *Haul Route Study – Terms of Reference Proposed "Hidden Quarry" – James Dick Construction Ltd. (Terms of Reference)* which is provided in **Appendix A**.

2.0 Operating Characteristics

2.1. Fleet Size

The number of trips forecasted in the analysis was derived using the James Dick Construction Ltd.'s fleet size. The information related to James Dick Construction Ltd.'s fleet if provided in **Table 2-1**.

Table 2-1 Fleet Size

Vehicle Type	Payload	Number of Units
Tri-Axle Straight Truck	22.7 Tonnes	21
Tri-Axle Tractor Trailer	35.1 Tonnes	18
Quad-Axle Tractor Trailer	39.1 Tonnes	16
Tri-Axel Pony Pup Combination	41.4 Tonnes	30
Total	**35.0 Tonnes**	**85**

There is a fleet size of 85 vehicles with an average haul size of 35 tonnes. To be conservative, a load size of 33 tonnes per truck was assumed in calculations.

2.2. Truck Traffic

The proposed quarry is applying for a license of 700,000 tonnes of aggregate and has a life expectancy of 20 years. Based on the fleet operated by James Dick Construction, each load will be approximately 33 tonnes resulting in a total of 21,213 truck loads per year. The quarry will only be operated from 6:00 a.m. to 6:00 p.m. Monday to Saturday, excluding public holidays, and have an average of 69 truck loads per day. It is important to note that the distribution of truck traffic varies throughout the year based on construction projects.

Operation of the Hidden Quarry is expected to be similar to the Erin Pit which has a license for 723,000 tonnes per annum. The Erin Pit data is provided in **Appendix B**. This is a good comparison due to its proximity as well as the similar license size to the Hidden Quarry. Using the data provided by James Dick Construction Ltd., the annual distribution of truck traffic for the Hidden Quarry is provided in **Figure 2-1**.

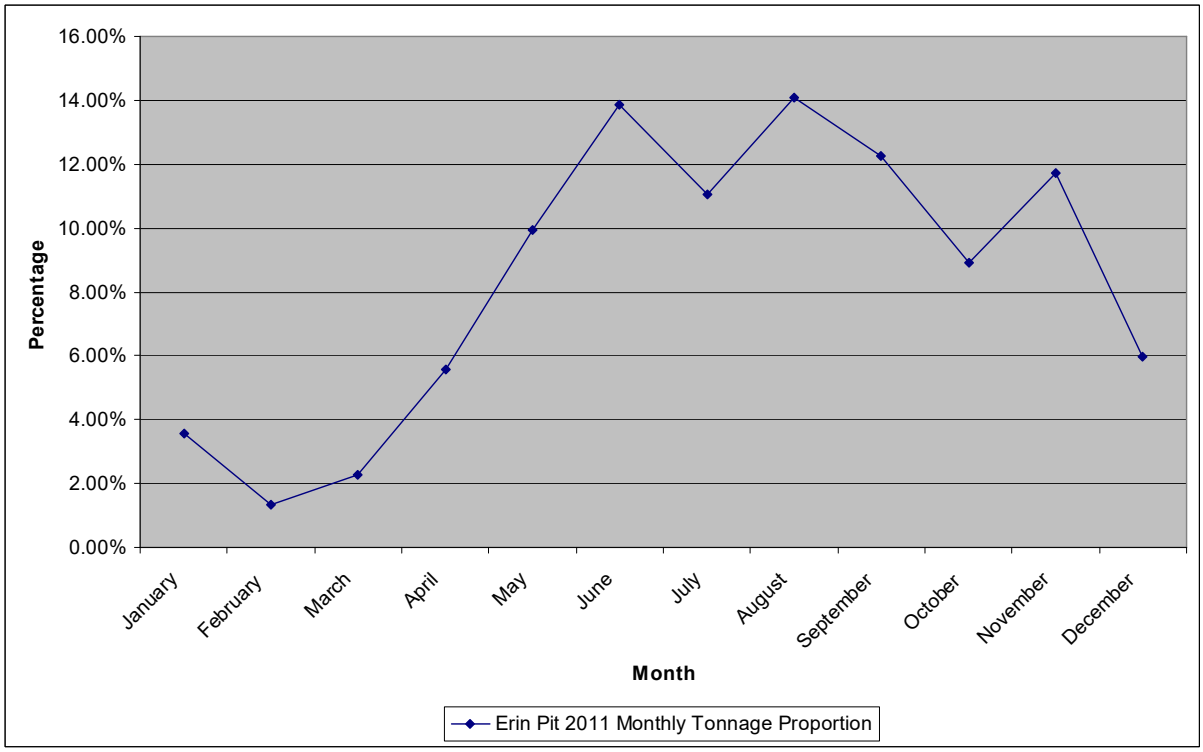

Figure 2-1 2011 Erin Pit Monthly Distribution

Based on the monthly variation of traffic, the quarry is expected to have an approximate total of 12 truck loads (24 trips) in the month of February to an approximate total of 115 truck loads in the month of August. The expected number of truck loads per day by month is provided in **Table 2-2**.

Table 2-2 Expected Monthly Distribution of Trucks

Month	Monthly Proportion of Truck Traffic	Trucks Per Month	Working Days Per Month	Truck Loads Per Day
January	3.50%	742	25	30
February	1.33%	282	23	12
March	2.20%	467	27	17
April	5.50%	1167	25	47
May	9.90%	2100	25	84
June	13.86%	2940	26	113
July	11.00%	2333	25	93
August	14.09%	2989	26	115
September	12.27%	2603	25	104
October	8.80%	1867	25	75
November	11.70%	2482	25	99
December	5.85%	1241	26	48

In reviewing the trucking information, the expected proportion of truck traffic by day of the week is provided in **Figure 2-2**.

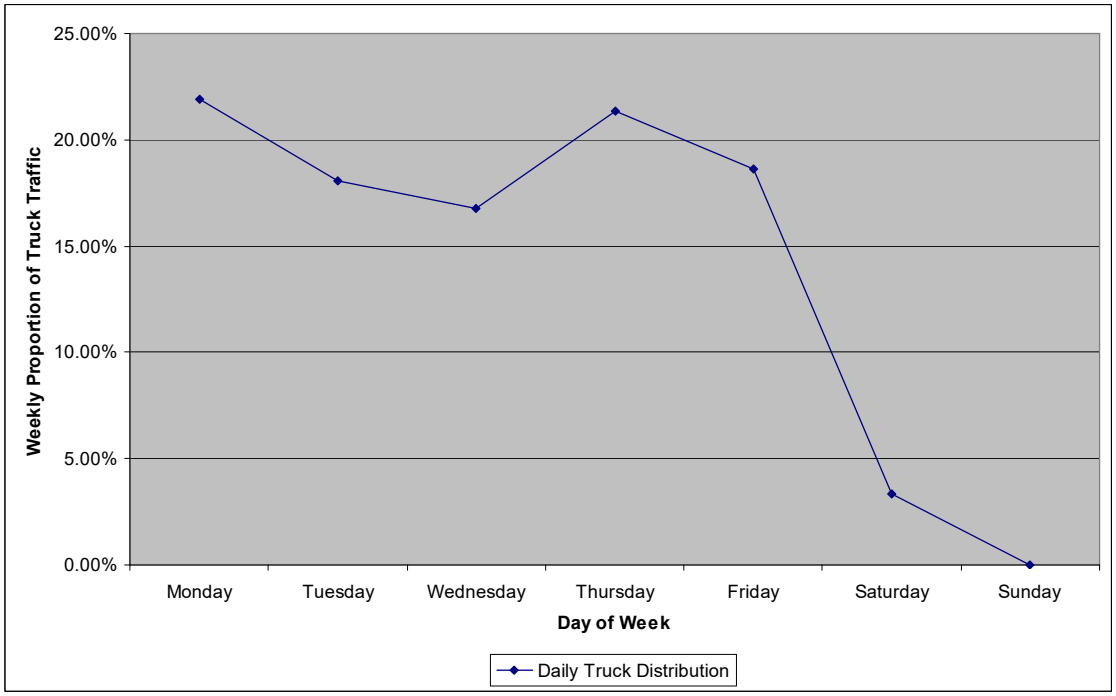

Figure 2-2 Weekly Truck Distribution

This is further refined based on historical truck arrivals at the Erin Pit to derive an hourly breakdown of expected traffic. The hourly distribution of truck traffic is provided in **Figure 2-3**.

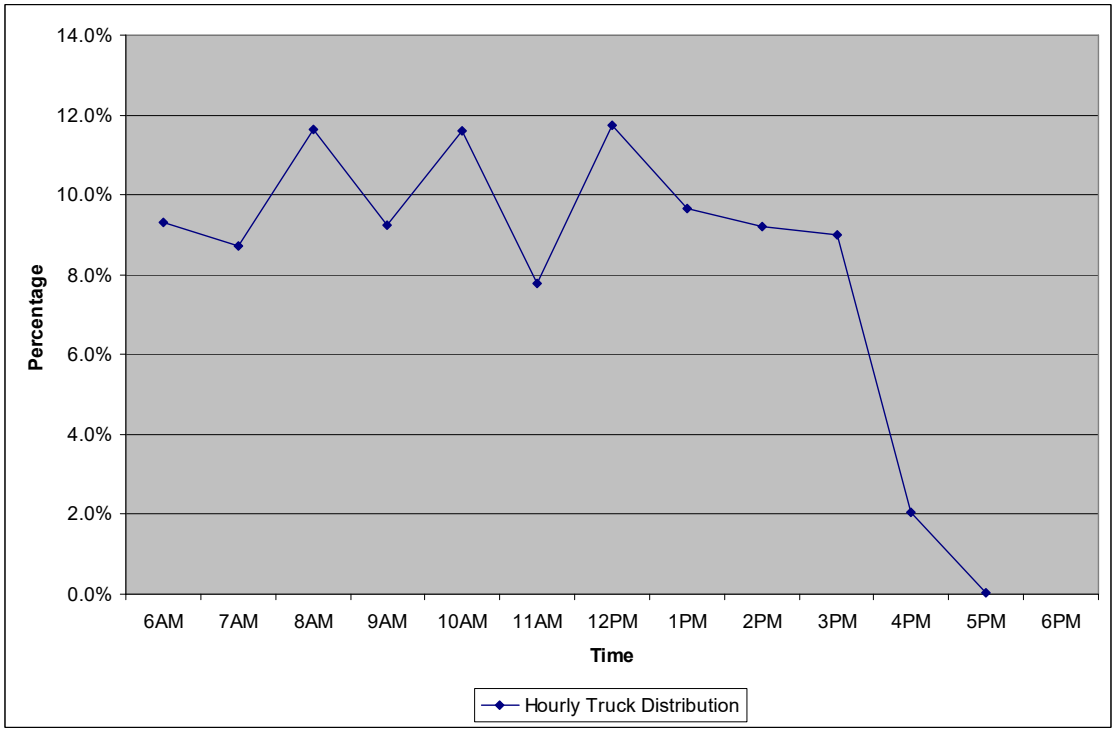

Figure 2-3 Hourly Distribution of Trucks

Based on this distribution, the expected number of truck trips (two-way) per hour is estimated in **Table 2-3**.

Table 2-3 Expected Hourly Distribution of Truck Trips by Month

Month	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM
January	6	6	6	6	6	4	8	6	6	6	2	0
February	2	2	2	2	2	2	2	2	2	2	0	0
March	4	2	4	4	4	2	4	4	4	4	0	0
April	8	8	10	8	10	8	12	10	8	8	2	0
May	16	14	20	16	20	14	20	16	16	16	4	0
June	22	20	26	20	26	18	26	22	20	20	4	0
July	18	16	22	18	22	14	22	18	18	16	4	0
August	22	20	26	22	26	18	26	22	22	20	4	0
September	20	18	24	20	24	16	24	20	20	18	4	0
October	14	14	18	14	18	12	18	14	14	14	4	0
November	18	18	24	18	22	16	24	20	18	18	4	0
December	8	8	12	8	12	8	12	10	8	8	2	0
Average	**13.17**	**12.17**	**16.17**	**13.0**	**16.0**	**11.0**	**16.5**	**13.67**	**13.0**	**12.5**	**2.83**	**0.0**

During the roadway peak hours (between 7:15 and 8:15 and 16:45 and 17:45), we anticipate the Hidden Quarry will have approximately 14 two-way trips (7 truck loads rounded) during the morning roadway peak period and less than 2 two-way trips (1 truck load) during the afternoon roadway peak period.

Operation of the pit is expected to remain consistent from year to year until shutdown of the quarry when the material is exhausted.

2.3. Fleet Origin, Loading and Queueing

James Dick currently has a fleet stationed at the Bolton Yard which will be maintained. There is the potential to move the fleet serving the Eramosa Quarry if a business case presents itself. Other users will most likely originate from the within the GTA and will most likely arrive from the east as identified in the *Revised Traffic Impact Study Eramosa Quarry, Township of Guelph-Eramosa*.

Trucks are encouraged to arrive after the quarry starts operating at 6:00 a.m., however, if a driver arrives earlier, the gates are typically opened 30 minutes in advance, and the driver allowed to park on-site in designated waiting/queuing areas.

Trucks arriving early will be strictly disciplined, including refusal to load. In the rare event where a truck arrives before the gates are opened, the entrance is designed to allow at least one truck length between the shoulder and the gate to allow an offending truck to get off the road. In practical terms there would actually be room for two or three trucks to line up abreast. Company policy is to refuse to load a truck that arrives early a second time.

3.0 Haul Route

3.1. Material Destination

3.1.1. Market Distribution

As the proposed quarry is going to replace an existing quarry, the catchment area is already known. Based on the existing market for James Dick Construction, the material is expected to go to the following locations as identified in **Table 3-1**.

Table 3-1 Aggregate Destination Areas

Location	Proportion
Local Industry	5%
Local Delivery / Halton Region	5%
Wellington / Caledon	25%
Acton / Georgetown / Brampton	10%
Milton / Mississauga / Brampton /Toronto	55%
Total	100%

Although Halton Region does not have specific Haul Routes, any road which is designated as a King's Highway can be used for trucking purposes. Since the site is located adjacent to Highway 7, a significant portion of traffic will use that roadway. However, the majority of the traffic will travel through the Town of Halton Hills. **Appendix C** illustrates the trucking restrictions within the Town and shows how traffic will be forced to use the King's Highway and Regional roads.

Based on this distribution of material, and the trucking restrictions within the Town of Halton Hills, the anticipated truck routes for traffic associated with the Eramosa Quarry are provided in **Appendix D** for reference. James Dick Construction discourages drivers from using 'shortcuts' and trucks that deviate from these designated haul routes can be ticketed by local authorities and will be subject to an internal disciplinary policy. In addition, James Dick is prepared to accept phone calls from residents to report drivers that do not use designated haul routes.

Once operation of the quarry begins, the Eramosa Quarry will generally serve markets to the east while the Guelph Quarry will serve markets to the west. As a result, existing James Dick truck traffic from the Guelph Quarry currently using Highway 7 to travel to markets to the east will be removed along Highway 7 between Guelph and the new Eramosa Quarry, including Rockwood.

3.1.2. Travel Distance

A calculation was undertaken to estimate the driving kilometres saved by operation of the Eramosa Quarry. As the currently operating Bolton Ready Mix plant is within the expected epicentre of the market to be serviced by the Eramosa Quarry, it was used a the destination of material. This calculation is undertaken using the three (3) closest amabel limestone quarries outside the Greater Toronto Area (GTA) and three (3) located within the west Greater Toronto Area (GTA). **Table 3-2** provides information relating to these quarries.

Table 3-2 Locations of Quarries Serving Bolton Ready Mix Plant

Quarry	Location	Distance to Bolton Ready Mix Plant	Difference from Eramosa Quarry	Two-Way Distance Difference
Eramosa Quarry	Township of Guelph-Eramosa	54.4 km	0 km	0 km
*Dufferin Acton	Town of Halton Hills	42.5 km	-11.9 km	-23.8 km
*Dufferin Milton	Town of Milton	43.5 km	-10.9 km	-21.8 km
*Nelson Burlington	City of Burlington	76.2 km	+21.8 km	+43.6 km
**Lafarge Dundas	City of Hamilton	94.2 km	+39.8 km	+79.6 km
**Georgian Duntroon	Township of Clearview	90.1 km	+35.7 km	+71.4 km
**MAQ Osprey	Township of Clearview	91.0 km	+36.6 km	+73.2 km

Note: *Quarry located within GTA; **Quarry located outside GTA

Assuming that the materials currently arrive to the Bolton Ready Mix Plant at a ratio of 95% from quarries outside of the GTA and the remaining 5% are from quarries within the GTA (based on information provided by James Dick Construction), are replaced by material from the Eramosa Quarry there will be a total savings of approximately 1,505, 282 km of truck trips within the Province of Ontario. The calculation is provided in **Appendix E** for reference.

3.2. Quarry Traffic Volumes

The following section analyses the volume of traffic predicted to be generated by the Eramosa Quarry.

3.2.1. Peak Hour Traffic Volume

Based on the *Revised Traffic Impact Study, Eramosa Quarry, Township of Guelph-Eramosa August 2015* prepared by Cole Engineering, estimates of the future (2023) total traffic around the site is presented in **Figure 3-1**.

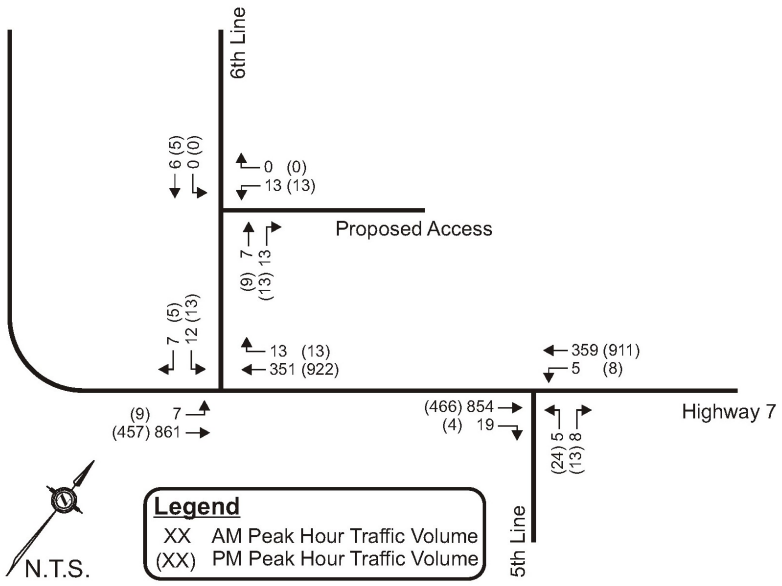

Figure 3-1 Peak Hour Future (2023) Total Traffic Volumes

Based on the projected traffic volumes, the new quarry is expected to generate a conservative maximum of 13 truck loads per peak hour at peak operation during the peak season. This represents a two-way total of approximately 2% of the peak hour traffic volume along Highway 7 and is not significant in the context of total traffic volumes and is well within the normal daily variation of traffic observed on a roadway.

3.2.2. Daily Traffic Volumes

The trips associated with the Eramosa Quarry will vary between the time of day as well as the month of the year. Based on the distribution of truck traffic identified in **Table 3-1**, the minimum and maximum daily traffic expected by route is provided in **Table 3-3**.

Table 3-3 Daily Truck Traffic Volumes from Eramosa Quarry

Direction	Via	Proportion	Maximum Daily Truck Traffic			Minimum Daily Truck Traffic		
			In	Out	Total	In	Out	Total
Local	Local	5%	6	6	12	1	1	2
North	Regional Road 25	25%	29	29	58	2	2	4
South	Regional Road 25	55%	63	63	126	5	5	10
	Guelph Line	5%	6	6	12	1	1	2
East	Highway 7	10%	10	10	20	1	1	2
West	Highway 7	0%	0	0	0	0	0	0
Total		100%	114	114	228	10	10	20

The traffic using Regional Road 25 south of Acton makes up the largest proportion of the quarry generated trips with an expected maximum of 63 truck loads (126 two-way trips) in a peak day.

3.3. Constraints

Generally, the routes expected to be utilized are regional and provincial roadways and are designed to accommodate truck traffic. However, Highway 7 travels through the Town of Acton, and directs all traffic through the downtown area. James Dick Construction recognizes that the turn on Highway 7 (at the Main Street / Mill Street intersection) is constrained and expects that minimal quarry traffic would utilize this route to service most local customers located along Highway 7. This movement is only expected to occur with 10% of the trucks associated with the Eramosa Quarry where due to the current haul routes, cannot use any roadways as a suitable by-pass due to truck restrictions. Although it is recognized as a route to be avoided if possible, there are currently no alternate truck routes that can be used to serve these local businesses. The customers located along Highway 7 are currently serviced by James Dick Construction's Guelph Quarry utilizing the same route that will be used by traffic from the Eramosa Quarry. Thus, traffic from the Eramosa Quarry will, in large part, supplant existing traffic from the Guelph Quarry.

3.3.1. Main Street / Mill Street Intersection

The Main Street / Mill Street intersection was evaluated using turning templates for the James Dick Construction Limited's fleet vehicle.

The westbound approach is the leg of concern with the potential of a truck, turning from the curb lane making a westbound right turn mounting the curb. This is due to two (2) substandard westbound lanes of 2.4 meters and 2.7 meters. Although each lane is not specifically designated as a right turn or through-left lane, based on their alignment within the intersection is assumed.

Using the existing lane configuration the truck turning movement from the curb lane is demonstrated in **Figure 3-2** and shows the vehicle mounting the curb. However, based on observations, although several trucks are observed to mount the curb while making the turning movement, many trucks also avoid mounting the curb by turning while straddling the two (2) westbound lanes. Turning while straddling the two (2) lanes, results in trucks avoiding the curb and still permitting southbound left turns concurrently. This is demonstrated in **Figure 3-3**.

A traffic analysis was undertaken for the Main Street / Mill Street intersection using Synchro 9 software with the results summarized in **Table 3-4** and detailed calculations provided in **Appendix F**.

Table 3-4 Main Street / Mill Street Intersection Existing Configuration – Level of Service

Key Movement	Lane Width	AM Peak LOS (v/c)	Midday Peak LOS (v/c)	PM Peak LOS (v/c)
EB left-through-right	4.3 m	C (0.27)	C (0.24)	C (0.29)
WB left-through	2.7 m	D (0.68)	D (0.62)	C (0.81)
WB right	2.4 m	B (0.16)	C (0.18)	B (0.50)
NB left-through	3.5 m	C (0.75)	B (0.23)	C (0.67)
NB right	3.0 m	B (<0.01)	B (0.08)	B (0.19)
SB left	3.4 m	A (0.61)	A (0.34)	B (0.27)
SB through-right	3.6 m	A (0.34)	A (0.19)	A (0.27)

In the existing configuration, the Main Street / Mill Street intersection operates at good levels of service and volume to capacity ratios. However, in an attempt to widen the westbound approach to allow trucks to make a turn from further away from the curb, the Synchro analysis was repeated with a shared

westbound left-through-right turn lane. The results are summarized in **Table 3-5** and detailed calculations provided in **Appendix G**.

Table 3-5 Main Street / Mill Street Intersection Modified Configuration – Level of Service

Key Movement	Lane Width	AM Peak LOS (v/c)	Midday Peak LOS (v/c)	PM Peak LOS (v/c)
EB left-through-right	4.3 m	C (0.23)	C (0.19)	B (0.23)
WB left-through-right	4.8 m	D (0.76)	D (0.76)	D (0.95)
NB left-through NB right	3.5 m 3.0 m	D (0.82) B (<0.01)	B (0.27) B (0.08)	D (0.86) C (0.22)
SB left SB through-right	3.4 m 3.6 m	B (0.66) A (0.36)	A (0.37) A (0.21)	C (0.73) B (0.32)

By combining the westbound right turn and through-left lanes (i.e. removing the line painting between the lanes), the westbound leg is expected to operate with level of service D and volume to capacity ratios ranging from 0.76 to 0.95. Additional capacity can be gained for the westbound leg by assigning more green time to the east-west phases.

3.4. Regional Road 25

The traffic impact on Regional Road 25 has been evaluated below.

3.4.1. Annual Average Daily Traffic Volumes

A comparison of the expected truck traffic in comparison to the Annual Average Daily Traffic (AADT) volumes is provided in **Table 3-6**. The AADT data was obtained from Halton Region.

Table 3-6 Daily Traffic Comparison

Roadway	AADT	Heavy Vehicles	Existing Heavy Vehicle Percentage	Eramosa Quarry Traffic	Future Heavy Vehicle Percentage
Regional Road 25	10461	732	7.0%	126	8.0%

During peak operation, the Eramosa Quarry will increase the heavy vehicle proportion of traffic along Regional Road 25 by approximately 15% or 1.0% of the overall roadway traffic. This is a very conservative assessment, as existing trips currently utilizing the haul routes were not removed from the analysis, and the analysis is undertaken for an average day of the peak month representing a 96th percentile analysis.

3.4.2. Collisions

The collisions along Regional Road 25 were also investigated and are summarized in **Table 3-7**.

Table 3-7 Regional 25 Road Collision Data

Year	Severity of Collision				Total
	Non-Reportable	Property Damage Only	Non-Fatal Injury	Fatality	
2010	0	1	1	0	**2**
2011	0	5	0	0	**5**
2012	1	2	0	0	**3**
2013	0	2	0	0	**2**
2014	0	1	1	0	**2**
Total	**1**	**11**	**2**	**0**	**14**
Proportion	**7%**	**79%**	**14%**	**0%**	**100%**

Regional Road 25 in the vicinity of the Town of Acton, have had a total of 14 collisions since 2010, averaging 2.8 collisions per year with the majority of collisions resulting only in property damage. Assuming a linear correlation between traffic volumes and collisions, the increase in traffic may result in the number of collisions increasing from 2.8 collisions per year to 2.86 collisions per year. This is an increase of significantly less than 1 collision per year and is annual variation in collisions in the area which range from two (2) to five (5) collisions per year. As a result, the increased traffic will not significantly impact roadway conditions.

4.0 Results and Conclusions

Based on our review of the expected operation of the proposed quarry and the expected haul routes, the Eramosa Quarry will not have significant impact on the haul routes it is expected to utilize. The findings and conclusions of the study are as follows:

- The Eramosa Quarry will provide on-site queuing space for trucks arriving to the site so they do not park within municipal right-of-ways with gates opening 30 minutes before the quarry opens;
- The Eramosa Quarry will utilize existing truck haul routes to move its product;
- The location of the Eramosa Quarry will reduce truck traffic from the Guelph Quarry to 0 in the Town of Rockwood and Town of Acton;
- Queuing for trucks will be accommodated on-site and off the street. Should drivers arrive before the gates open for the day, there is space for trucks to queue within the driveway throat, and off of 6th Line;
- Drivers arriving early multiple times will be disciplined as per James Dick Construction Limited's disciplinary policy;
- Based on the proposed license, the Eramosa Quarry is expected to produce a maximum total of 115 truck loads (230 two-way trips) a day during the peak operating season;

- During the off-peak season, the Eramosa Quarry is expected to produce approximately 20 two-way trips per day;
- The most significantly impacted roadway will be Regional Road 25, which will experience an increase in truck traffic of up to 1% of overall traffic per day, during the peak operating season;
- Generally Regional Road 25 experiences an average of 2.8 collisions per year. Taking into account the traffic associated with the Eramosa Quarry, this rate could increase to 2.86 collisions per year, or approximately one (1) additional collision during the life of the quarry;
- The westbound leg of the Main Street / Mill Street intersection can be modified to minimize trucks turning mounting the northeastern curb by combining the right turn and through-left turn lanes;
- The traffic introduced by the Eramosa Quarry is not permanent and will cease once the reserves of material have been exhausted; and,
- As the Eramosa Quarry is located close to the target market, there will be an annual reduction of approximately 1,585,282 kilometers of truck travel within the Province of Ontario, thereby increasing road safety in an overall sense.

In review of the *Haul Route Study - Terms of Reference*, we believe that there is sufficient justification to demonstrate that the additional truck traffic on the haul routes would be very low throughout the entire life of the Eramosa Quarry. As such, there will not be any appreciable negative effects on the expected haul routes and Sections 5 to 8 of the *Haul Route Study – Terms of Reference* need not be undertaken.

COLE ENGINEERING

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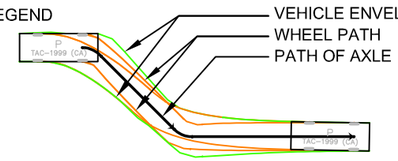
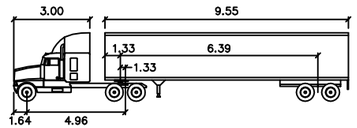
LEGEND



DESIGN VEHICLE

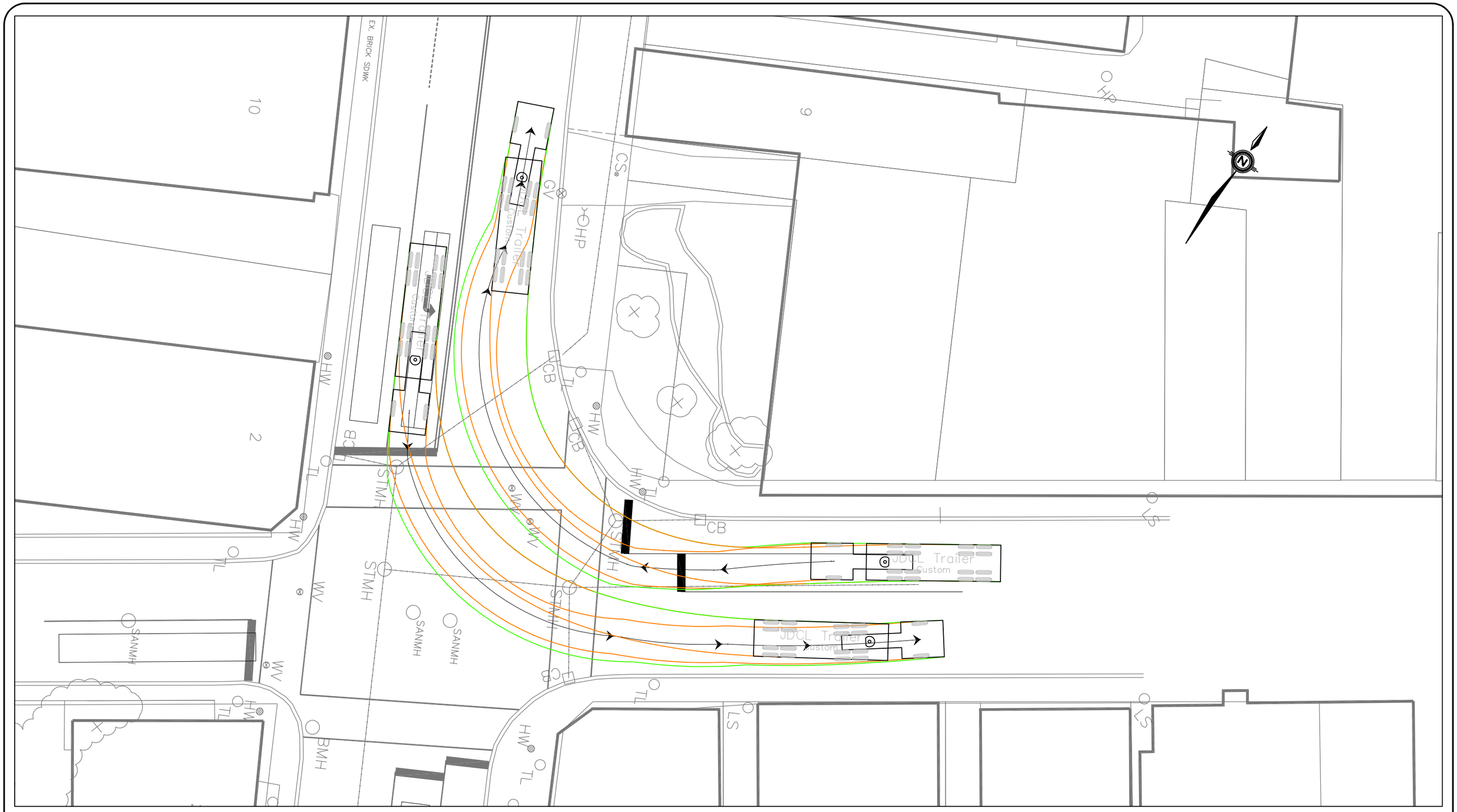


JDCL Trailer	meters
Tractor Width	: 2.60
Trailer Width	: 2.60
Tractor Track	: 2.60
Trailer Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 18.0
Articulating Angle	: 70.0

AUTOTURN ASSESSMENT - TURN FROM CURB LANE
MAIN STREET / MILL STREET INTERSECTION

ERAMOSA (HIDDEN) QUARRY
TOWNSHIP OF GUELPH-ERAMOSA
WELLINGTON COUNTY

DATE:	AUGUST, 2015	PROJECT No.:	TR12-0013
SCALE:	1:250	FIGURE No.:	3-2



COLE ENGINEERING

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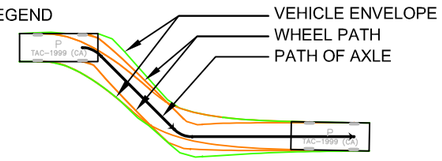
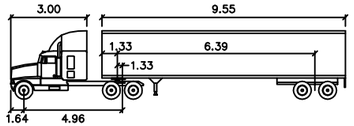
LEGEND



DESIGN VEHICLE



JDCL Trailer	meters
Tractor Width	: 2.60
Trailer Width	: 2.60
Tractor Track	: 2.60
Trailer Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 18.0
Articulating Angle	: 70.0

AUTOTURN ASSESSMENT - CONCURRENT TURNS
MAIN STREET / MILL STREET INTERSECTION

ERAMOSA (HIDDEN) QUARRY
TOWNSHIP OF GUELPH-ERAMOSA
WELLINGTON COUNTY

DATE:	AUGUST, 2015	PROJECT No.:	TR12-0013
SCALE:	1:250	FIGURE No.:	3-3

APPENDIX A
Haul Route Study Terms Of Reference

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telephone (705) 446-0515 **fax** (705) 446-2399 **web** www.rjburnside.com

BURNSIDE
[THE DIFFERENCE IS OUR PEOPLE]

October 10, 2014

Via: Email (kwingrove@get.on.ca)

Ms. Kim Wingrove
Chief Administrative Officer
Township of Guelph/Eramosa
8348 Wellington Road 124
P.O. Box 700
Rockwood ON N0B 2K0

Dear Ms. Wingrove:

Re: Haul Route Study - Terms of Reference
Proposed "Hidden Quarry" - James Dick Construction Ltd.
Project No.: 300032475.0000

This letter provides a Terms of Reference (TOR) for the above noted project, located on the west half of Lot 1, Concession 6 in the Township of Eramosa. This TOR is in response to comments received from staff at the Region of Halton, the Town of Milton and the Town of Halton Hills, requesting that a Haul Route Study be prepared by the applicant as part of the proposed Zoning By-Law Amendment application. A draft of this TOR was reviewed with representatives of the Township and the adjacent municipalities, at a meeting on September 9, 2014. This TOR has been revised in response to those discussions.

We acknowledge that the following TOR has been based on a TOR that has been used in previous haul route studies in the Region of Halton, as originally developed by Dillon Consulting Limited.

1.0 Introduction

James Dick Construction Ltd is proposing to develop a quarry on a site approximately 39.4 hectares (97.4 acres) in size, located in the northeast quadrant of Highway 7 and 6th Line. Approximately 24.8 hectares (61.3 acres) of the site is proposed to be used for extraction of aggregate material. The proposed quarry would extract up to 700,000 tonnes of aggregate material annually. The material will be shipped off-site via 6th Line and Highway 7, with an estimated 95 percent of the product travelling east on Highway 7 (according to the applicant's Traffic Impact Study).

The purpose of this TOR is to outline the requirements for a Haul Route Study for the subject development, to be reviewed by the Township of Guelph/Eramosa, the Region of Halton, the Town of Halton Hills and the Town of Milton. The Ministry of Transportation (MTO) has not requested this study; however, it would be expected that they will also be circulated for comment, considering the potential for impacts to Highway 7.

Figure 1 shows the location of the proposed quarry and the recommended study area for the haul route evaluation.

The primary concern associated with the project is the potential for significant heavy truck traffic beyond that already on any identified haul route(s) that would be generated by the quarry and the impact of that additional traffic movement on road operational concerns and traffic safety, and social features along the haul route(s).

2.0 Define Study Parameter Assumptions

Key assumptions regarding the project that are to be defined based on available information include:

- Assumed in-service data;
- Sizes of the trucks to be used;
- Volume of truck traffic to be generated;
- Location of truck queuing area(s);
- The distribution of truck traffic volumes among the potential haul routes (if more than 1 haul route is to be utilized);
- A description as to how truck volumes and truck tonnages might vary over the life of the project and by hours of the day, days of the week, and time of the year;
- Destinations of the material;
- Trucking base origins;
- Hours of facility operations, etc.;
- How the use of routes would be regulated/enforced; and
- Horizon year and intervals required for analysis (20 years in 10 year intervals).

3.0 Identification of a Haul Route(s) With The Study Area

The intention is to establish a haul route or routes which minimize travel through Acton and Georgetown. A reasonable route or routes to be considered are to be identified and described by the applicant based on input from the Town of Halton Hills, Town of Milton and Region of Halton, as well as the Township of Guelph/Eramosa.

4.0 Assessment of Truck Traffic Volumes

An assessment of the volumes of additional truck traffic on the route or routes will be carried out and reviewed by the Township in consultation with the Region of Halton, Town of Halton Hills, and Town of Milton. If the additional truck traffic on the route or routes would be so low throughout the entire life of the facility so as to not result in any appreciable negative effects, as determined by the Township, then the route or routes or portions of the route or routes in those directions would not need to be further assessed and the work identified in Sections 5 to 8 would not need to be carried out. Should that occur, the study would conclude with the preparation of the draft and final reports and their review as set out in Sections 10 and 11.

5.0 Describe Baseline Conditions

If the truck volumes are deemed by the Township to be sufficient to require further assessment, a description of baseline conditions for the route or routes is to be provided, including:

- Existing and proposed land uses;
- Identification of the locations of other existing, or proposed quarries, pits or other large truck generating land uses;
- Land use plans and designations including municipal official plans, the Greenbelt Plan; the Niagara Escarpment Plan; the Region of Halton Official Plan Amendment 38 and the Aggregate Resources Reference Manual (Halton Region);
- Relevant planning studies (Transportation Master Plans, Active Transportation Plans, Capital Planning studies);
- Social environment (residences, community features, recreational facilities, community function and character, schools and school bus routes, emergency vehicle access, etc.);
- Available information regarding air quality conditions;
- Available information about noise levels;
- Economic environment (location and type of business enterprises);
- General nature of Agriculture;
- Recreation uses (trail crossings, cycling uses, walking etc.);
- Cultural resources (built heritage, cultural landscape, archaeology);
- Road characterization (road classification, right-of-way widths, level of service (current and projected), weight restrictions, number of lanes, pavement structure, intersection configuration, road alignment (vertical and horizontal), reduced load designations, posted speed, truck route designation, watercourse crossings, culvert types, rail crossings, steep grades, visibility, etc.);
- Traffic volumes; and
- Five year vehicle collision history by link/intersection including wildlife.

The description of the baseline conditions will be used as the basis from which to assess the potential for change as a result of the use and possible improvement to the route or alternative routes where being considered.

6.0 Develop the Evaluation Approach

A Technical Advisory Committee (TAC) will be set up with representatives of Town of Halton Hills, Town of Milton, and Region of Halton, as well as the Township of Guelph/Eramosa to provide input on the evaluation approach. The County of Wellington will also be invited to attend.

If alternative routes are to be considered, the evaluation of the identified alternative routes is to be conducted in a systematic, comprehensive and traceable manner, based on a set of evaluation criteria and indicators. Similarly, if only one route is being evaluated with respect to impacts, it should also be evaluated in a systematic, comprehensive and traceable manner based on a set of evaluation criteria and indicators.

Typical criteria, where applicable, may include:

- Potential for disruption to sensitive land uses;
- Conformity with applicable plans and policies;
- Potential for impacts to residents;
- Potential for disruption to users of recreation facilities, community features and institutions;
- Potential property impacts;
- Potential for impact to business enterprises;
- Potential for impact to agricultural operations;
- Potential for impact to property values;
- Potential for disturbance to built heritage features or archaeological resources; and
- Potential for impact to transportation facilities (i.e., change in service level, change in road safety, impact on alternative transportation modes).

The monetary costs for mitigation work, to address haul route impacts, will be estimated for the alternative routes considered.

Both quantitative and qualitative data should be collected for the criteria noted where available. The criteria, and their relative importance, are to be confirmed through agency consultation prior to their application. It is expected that a meeting will be held with the TAC to achieve this confirmation and to generally confirm the results of the identification of baseline conditions.

The assessment of effects is to consider the potential increase in truck volumes, as a result of the quarry activity, over the anticipated future background traffic volume. This is to be considered for a proposed route or for each alternative route where applicable. As well, the assessment of the routes is to consider any needed improvements to the routes to support the increase in truck volumes (see next section).

7.0 Assess Road Improvements

Road improvements, if required, are to be identified for each route, to support the forecast traffic (existing plus growth due to other development and due to the quarry development). Improvement requirements, where required, may include road widenings, resurfacing, turning lanes, new crossings/grade separations, paved shoulders, signals, etc. and will be considered in the analysis completed to determine improvements to a proposed route or to compare the route options and impacts where applicable.

The route assessment is to be presented in a matrix format, describing the potential for effect for each indicator/alternative.

8.0 Comparatively Evaluate and Recommend the Preferred Route(s)

Where alternative routes are under consideration, on the basis of the collected data/assessment of effects for each of the alternative routes, the alternatives are to be comparatively evaluated. The preference would be to use a qualitative evaluation method, to be supported by a quantitative evaluation method, if the data type support one. In comparing the alternatives, the relative importance of the criteria is to be considered. The advantages and disadvantages of the alternative routes are to be compared and considered in the rationalization of the preferred route(s).

9.0 Describe Effects and Mitigation for the Preferred Route(s)

For the preferred haul route(s), provide a description of the potential effects that are expected to occur from the anticipated truck traffic volumes. This description of effects is to be based on the evaluation criteria, plus other more detailed criteria, if appropriate. Assess the overall acceptability of the route and the effects of increased truck traffic on the quality of life for the affected individuals/communities. The proponent is to demonstrate that the effects of the preferred alternative (with the proposed truck volumes) can be considered as being "reasonable" and "acceptable".

Any property requirements to support the preferred haul route(s) are to be described.

Mitigation measures to avoid or minimize effects shall be described. The method, to regulate/enforce the use of the prescribed route(s) by all trucks associated with the quarry, is to be described.

It is expected that a meeting will be held with the TAC to confirm the results of the haul route evaluation, identification of mitigation works and preliminary preferred route(s).

10.0 Prepare Draft and Final Evaluation Reports

A table of contents of the report is to be prepared and circulated to the Township of Guelph/Eramosa, Town of Milton, Town of Halton Hills, and the Region of Halton, prior to its completion. It will also be provided to Ministry of Transportation for their information.

A draft report is to be prepared, that describes the evaluation process, and circulated to the agencies noted above for comment.

The report is to be finalized, considering the comments received on the draft report.

The number of copies of the report will be set through the consultation process. Sufficient copies of the draft report and final report shall be provided to satisfy the circulation requirements of the agencies. Reports will be required in both hard copy and digital formats.

11.0 Public and Agency Consultation

The haul route study is being prepared as a support document to the rezoning process for the subject lands. It is expected that this document will be presented, and considered, as part of the ongoing public consultations and agency consultation that are part of the rezoning process.

The Township of Guelph/Eramosa, as the municipality leading this process, will direct the proponent as to the need for, and timing, for any additional formal public and/or agency consultations/meetings that may be required as this study is completed. It is requested that written acknowledgement be obtained from these agencies regarding their interest and/or concerns with this project and provided to the Township to the attention of Ms. Kelsey Lang, Planning Associate. All consultation related materials, including meeting minutes and comments received and responses are to be provided throughout the study process.

Closing Comments

This letter has provided a draft TOR for the completion of a haul route study by the proponent for the "Hidden Quarry" development. If there are any questions pertaining to this assignment please give us a call.

Yours truly,

R.J. Burnside & Associates Limited

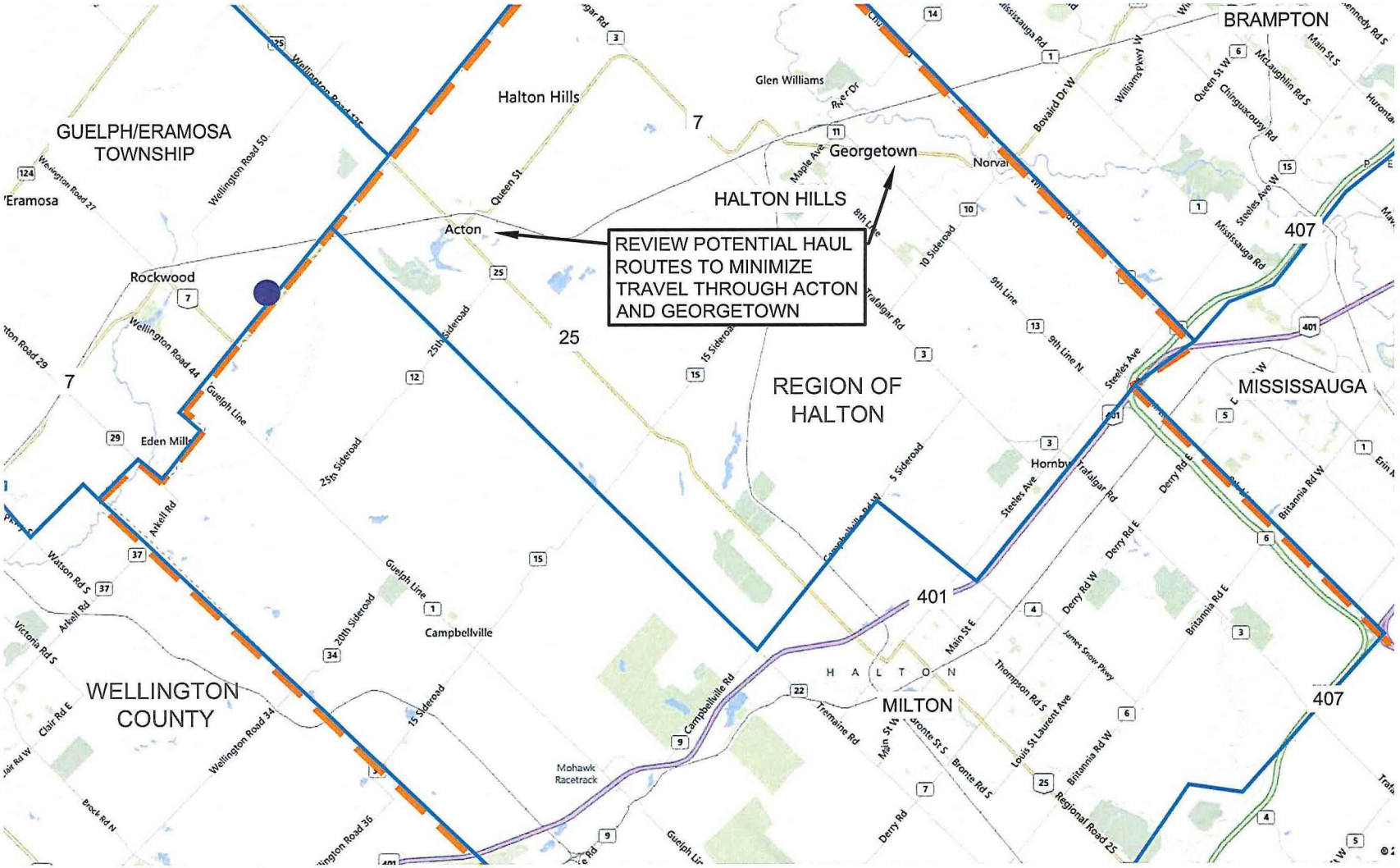
Henry Centen, P.Eng.
Senior Transportation Engineer
HC/DMcN:sj

Don McNalty, P.Eng.
Vice President, Public Sector

Enclosure(s) Figure 1 – Study Area

cc: Elizabeth Howson, Macaulay Shiomi Howson Ltd. (Via: Email - howson@mshplan.ca)
Kelsey Lane, Township of Guelph/Eramosa, (Via: Email - klang@get.on.ca)

141010_TOR_Haul_Route_Study_300032475
11/02/2015 10:56 AM



LEGEND

- SITE LOCATION
- REGION BOUNDARY
- MUNICIPAL BOUNDARY

BURNSIDE

Figure Title

HAUL ROUTE EVALUATION TERMS OF REFERENCE

STUDY AREA

Client

GUELPH/ERAMOSA TOWNSHIP

Drawn	Checked	Date	Figure No.
JBL	HC	14/09/05	1
Scale		Project No.	
NTS		300032475	

File: W:\032475_Haul_Route_Study_Area.dwg Date Plotted: September 5, 2014 - 1:41 PM

APPENDIX B
Erin Gravel Pit Truck Trip Generation

James Dick Erin Pit August 2011 Busiest Month Shipping by Hour of the Day

DATE	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	TOTAL
02-Aug	13	20	19	11	19	15	15	19	8	16	2			158
03-Aug	9	4	7	5	5	4	7	5	9	6	1			62
04-Aug	11	13	11	15	15	11	18	15	21	13	2			145
05-Aug	9	11	12	16	12	8	16	11	9	10	0			114
08-Aug	11	8	11	9	15	5	21	11	16	12	1			123
09-Aug	8	13	12	9	5	4	7	5	5	1	1			71
10-Aug	6	12	12	7	16	7	12	8	10	10	0			100
11-Aug	5	14	7	17	13	9	11	10	5	3	2			96
12-Aug	12	14	13	12	19	7	16	8	11	8	2			122
13-Aug	6	2	5	4	2	3	0	0	0	0	0			22
15-Aug	12	7	23	16	20	13	21	13	17	18	1			162
16-Aug	10	8	10	8	23	6	14	16	10	13	1			119
17-Aug	16	13	18	12	21	15	15	16	14	17	5			162
18-Aug	20	15	22	17	11	16	18	19	15	19	2			174
19-Aug	11	13	16	14	10	5	18	11	12	15	2			122
22-Aug	12	12	21	12	21	8	22	17	19	16	4	1		170
23-Aug	9	9	11	9	10	4	15	5	11	5	6			94
24-Aug	8	11	14	9	7	16	10	21	12	12	8			128
25-Aug	18	11	19	13	23	14	20	10	14	9	1			152
26-Aug	12	9	18	11	14	8	17	11	12	12	7			131
29-Aug	15	11	12	13	14	13	13	12	14	11	7			135
30-Aug	15	11	19	12	21	17	15	18	9	20	2			159
31-Aug	15	5	16	10	11	11	10	11	7	8	1			105
TOTAL	263	246	328	261	327	219	331	272	260	254	58	1		2826
%	9.3%	8.7%	11.6%	9.2%	11.6%	7.7%	11.7%	9.6%	9.2%	9.0%	2.1%	0.0%		100%

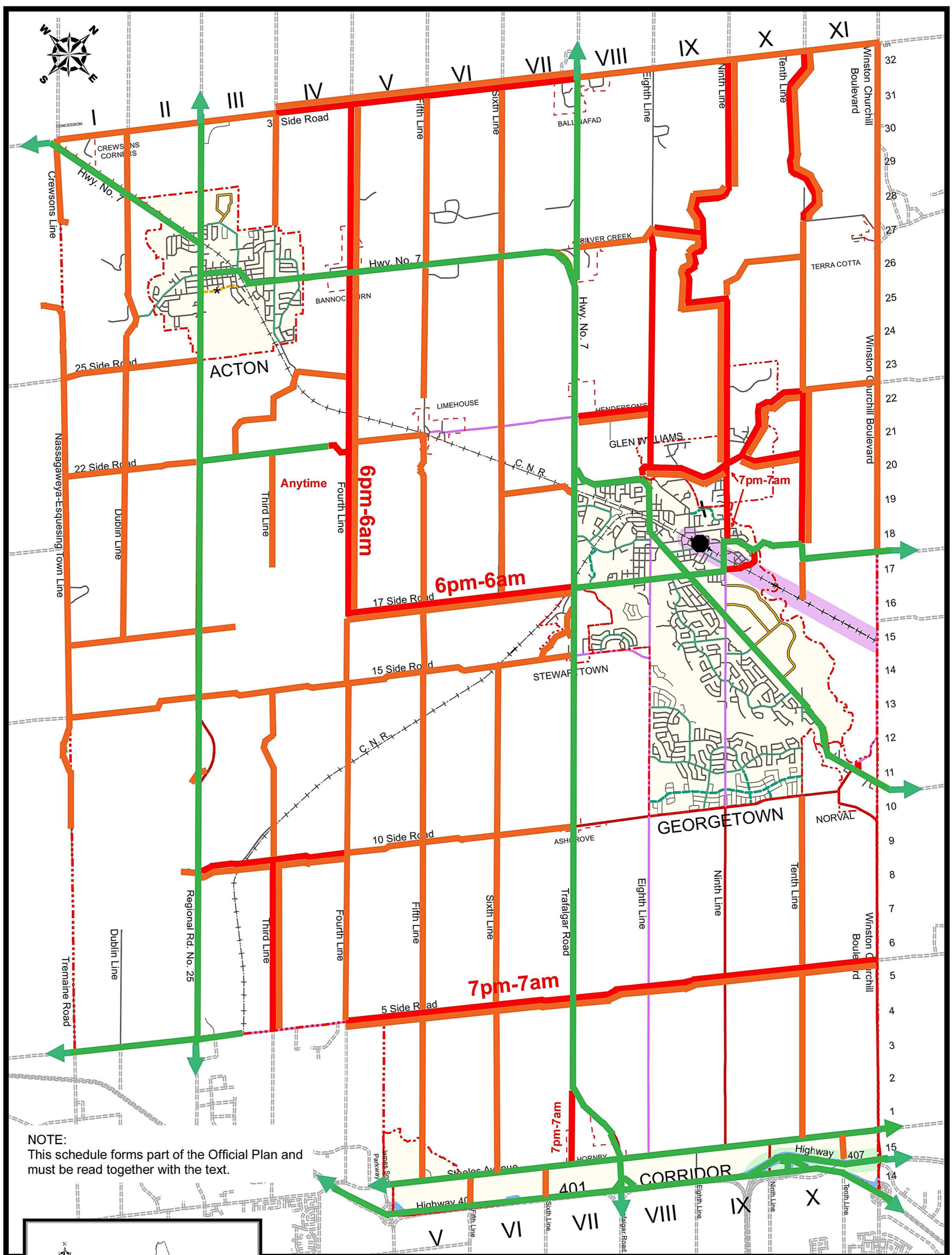
Busiest Hour 23 Trucks Shipped in one hour
% of Monthly Shipping 23/2826 0.814%

Total Monthly Tonnage Percentage for Erin Pit 2011

Jan-11	3.55%	
Feb-11	1.34%	
Mar-11	2.29%	
Apr-11	5.56%	
May-11	9.44%	
Jun-11	13.86%	
Jul-11	11.05%	
Aug-11	14.09%	Busiest Month
Sep-11	12.27%	
11-Oct	8.90%	
Nov-11	11.70%	
Dec-11	5.95%	
Total		

APPENDIX C
Town Of Halton Hills Trucking Restrictions

FUNCTIONAL PLAN OF MAJOR TRANSPORTATION FACILITIES



NOTE:
This schedule forms part of the Official Plan and must be read together with the text.

Truck Restrictions in the Town of Halton Hills

Based on Bylaw 84-1 Schedules 24 and 26

- **Heavy Traffic Prohibited (Anytime unless noted)**
- **Reduced Loads**
- **Commonly Used Unrestricted Haul Routes**

Kilometres
0 1 2 4 6 8

* Note: The exact alignment of Queen Street is conceptual and is to be determined through a Class Environmental Assessment in accordance with the policies of Section F6.4.1.10 of this Plan.

TOWN OF HALTON HILLS
Working Together Working for You!

Produced by:
TOWN OF HALTON HILLS
September 2006

APPENDIX D
Hidden Quarry Haul Route Analysis

Wellington/Caledon

25%

GUELPH/ERAMOSA TOWNSHIP

Local Industry

5%

HIDDEN QUARRY

Acton/Georgetown/Brampton

10%

7

Halton Hills

Glen Williams

Georgetown

HALTON HILLS

EVALUATE HAUL ROUTES
TO MINIMIZE HAULAGE
IN HALTON HILLS
EAST OF CTY. RD. 125

BRAMPTON

407

Rockwood

25

REGION OF HALTON

MISSISSAUGA

5%

Local Delivery/ Halton Region

Milton/Mississauga/Brampton/Toronto

55%

401

MILTON

WELLINGTON COUNTY

Campbellville

Mohawk Racetrack

Hidden Quarry Haul Route Analysis

Approximate Percentage of Traffic 5%

Concrete Plant / Depot Location

APPENDIX E
Eramosa Quarry Distance Comparison Calculations

Transportation Savings at Hidden Quarry

	Quarry	Distance to JDCL Bolton Ready Mix*	Difference from Test Case km	2-ways km	Average Additional km
Closest Amabel Quarries Outside GTA West	Georgian Duntroon	90.1	35.7	71.4	
	MAQ	91.0	36.6	73.2	74.7
	Lafarge Dundas	94.2	39.8	79.6	
Remaining Quarries in GTA West	Nelson Burlington	76.2	21.8	43.6	
	Dufferin Milton	43.5	-10.9	-21.8	-0.7
	Dufferin Acton	42.5	-11.9	-23.8	
Test Case	JDCL Hidden Quarry	54.4	0	0	

Bolton Ready Mix Plant was used because it is a real operation in the epicentre of the market that **Hidden** will serve (Halton, York and Peel) with close proximity to North Brampton, Caledon Whitebelt, Vaughan and the new GTA West Corridor.
All distances calculated with Google Maps door to door
Given the fact that average GTA west consumption is running on average at approximately 17 MT/Yr (Clayton Page 8)
Given that GTA current production (8MT/Yr) and licensed supplies are inadequate to meet demand
Therefore **Hidden Quarry** production will displace only Outside GTA production

Displaced Source	Weighting	Av. Additional km	Saved km per load	
Quarries Outside GTA	0.95	74.7	71.0	
Quarries in GTA	0.05	-0.7	0.0	
			71.0	Total Km saved per truck load

Hidden Production Level	Trucks/Annum	Km saved per truckload	Total Annual km saved
700000	21212	71.0	1,505,282.83

Hidden Quarry GHG Savings Calculation

Tonnes	**T/Truck**	**Trucks/Annum**	**Km/Yr**	**L/Km**	**L/Year**	**CO2 Equiv**	**Greenhouse Gas Savings**	
700,000.00	33.00	21,212.12	1,585,252.53	0.51	808,478.79	2.73	2,207,147.09	kg
							2,207.15	tonnes

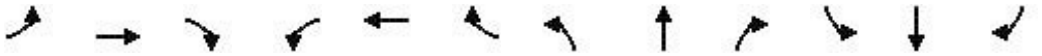
APPENDIX F

Existing Main Street / Mill Street Configuration

Level Of Service Calculations

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	73	21	117	38	194	137	174	5	370	355	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	2.7	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.97			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.96	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (prot)		1867			1494	1320		1546	1383	1634	1755	
Flt Permitted		0.95			0.73	1.00		0.68	1.00	0.43	1.00	
Satd. Flow (perm)		1780			1129	1320		1077	1383	734	1755	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	15	78	22	124	40	206	146	185	5	394	378	11
RTOR Reduction (vph)	0	13	0	0	0	123	0	0	3	0	1	0
Lane Group Flow (vph)	0	102	0	0	164	83	0	331	2	394	388	0
Heavy Vehicles (%)	8%	7%	2%	12%	5%	6%	20%	18%	9%	8%	8%	2%
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		18.5			18.5	35.2		35.8	35.8	56.5	56.5	
Effective Green, g (s)		18.5			18.5	35.2		35.8	35.8	56.5	56.5	
Actuated g/C Ratio		0.21			0.21	0.40		0.41	0.41	0.65	0.65	
Clearance Time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		378			240	534		443	569	649	1139	
v/s Ratio Prot						0.03				c0.12	0.22	
v/s Ratio Perm		0.06			c0.15	0.03		c0.31	0.00	0.28		
v/c Ratio		0.27			0.68	0.16		0.75	0.00	0.61	0.34	
Uniform Delay, d1		28.6			31.6	16.5		21.8	15.1	7.9	6.9	
Progression Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.4			7.8	0.1		11.0	0.0	1.6	0.8	
Delay (s)		29.0			39.3	16.6		32.7	15.1	9.5	7.7	
Level of Service		C			D	B		C	B	A	A	
Approach Delay (s)		29.0			26.7			32.4			8.6	
Approach LOS		C			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	71	10	90	67	233	4	176	107	242	181	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	2.7	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.99			1.00	0.85		1.00	0.85	1.00	0.98	
Flt Protected		1.00			0.97	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1874			1621	1320		1595	1396	1604	1629	
Flt Permitted		0.96			0.81	1.00		1.00	1.00	0.59	1.00	
Satd. Flow (perm)		1813			1347	1320		1589	1396	991	1629	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	9	73	10	93	69	240	4	181	110	249	187	21
RTOR Reduction (vph)	0	6	0	0	0	163	0	0	55	0	3	0
Lane Group Flow (vph)	0	86	0	0	162	77	0	185	55	249	205	0
Heavy Vehicles (%)	22%	6%	2%	3%	2%	6%	2%	18%	8%	10%	16%	5%
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		16.8			16.8	27.8		43.2	43.2	58.2	58.2	
Effective Green, g (s)		16.8			16.8	27.8		43.2	43.2	58.2	58.2	
Actuated g/C Ratio		0.19			0.19	0.32		0.50	0.50	0.67	0.67	
Clearance Time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		350			260	421		789	693	740	1089	
v/s Ratio Prot						0.02				c0.04	0.13	
v/s Ratio Perm		0.05			c0.12	0.04		0.12	0.04	c0.18		
v/c Ratio		0.24			0.62	0.18		0.23	0.08	0.34	0.19	
Uniform Delay, d1		29.7			32.2	21.4		12.5	11.5	5.8	5.5	
Progression Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.4			4.6	0.2		0.7	0.2	0.3	0.4	
Delay (s)		30.1			36.8	21.6		13.2	11.7	6.0	5.8	
Level of Service		C			D	C		B	B	A	A	
Approach Delay (s)		30.1			27.7			12.6			5.9	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	117	10	166	108	354	14	441	157	265	257	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	2.7	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.99			1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.97	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1945			1608	1346		1788	1449	1713	1761	
Flt Permitted		0.92			0.73	1.00		0.99	1.00	0.29	1.00	
Satd. Flow (perm)		1806			1210	1346		1767	1449	517	1761	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	23	118	10	168	109	358	14	445	159	268	260	22
RTOR Reduction (vph)	0	4	0	0	0	74	0	0	54	0	3	0
Lane Group Flow (vph)	0	147	0	0	277	284	0	459	105	268	279	0
Heavy Vehicles (%)	2%	4%	2%	4%	2%	4%	2%	5%	4%	3%	7%	2%
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		24.6			24.6	37.0		34.0	34.0	50.4	50.4	
Effective Green, g (s)		24.6			24.6	37.0		34.0	34.0	50.4	50.4	
Actuated g/C Ratio		0.28			0.28	0.43		0.39	0.39	0.58	0.58	
Clearance Time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		510			342	572		690	566	469	1020	
v/s Ratio Prot						0.07				c0.08	0.16	
v/s Ratio Perm		0.08			c0.23	0.14		c0.26	0.07	0.25		
v/c Ratio		0.29			0.81	0.50		0.67	0.19	0.57	0.27	
Uniform Delay, d1		24.4			29.0	18.2		21.8	17.4	11.3	9.1	
Progression Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.3			13.2	0.7		5.0	0.7	1.7	0.7	
Delay (s)		24.7			42.2	18.9		26.8	18.1	12.9	9.8	
Level of Service		C			D	B		C	B	B	A	
Approach Delay (s)		24.7			29.1			24.6			11.3	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX G

Modified Main Street / Mill Street Configuration

Level Of Service Calculations

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	73	21	117	38	194	137	174	5	370	355	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	4.8	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Frt		0.97			0.92			1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.98			0.98	1.00	0.95	1.00	
Satd. Flow (prot)		1867			1815			1546	1383	1634	1755	
Flt Permitted		0.93			0.86			0.68	1.00	0.40	1.00	
Satd. Flow (perm)		1743			1584			1077	1383	693	1755	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	15	78	22	124	40	206	146	185	5	394	378	11
RTOR Reduction (vph)	0	12	0	0	63	0	0	0	3	0	1	0
Lane Group Flow (vph)	0	103	0	0	307	0	0	331	2	394	388	0
Heavy Vehicles (%)	8%	7%	2%	12%	5%	6%	20%	18%	9%	8%	8%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		22.2			22.2			32.5	32.5	52.8	52.8	
Effective Green, g (s)		22.2			22.2			32.5	32.5	52.8	52.8	
Actuated g/C Ratio		0.26			0.26			0.37	0.37	0.61	0.61	
Clearance Time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		444			404			402	516	596	1065	
v/s Ratio Prot										c0.12	0.22	
v/s Ratio Perm		0.06			c0.19			c0.31	0.00	0.28		
v/c Ratio		0.23			0.76			0.82	0.00	0.66	0.36	
Uniform Delay, d1		25.7			29.9			24.7	17.1	9.9	8.6	
Progression Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.3			8.2			17.2	0.0	2.8	1.0	
Delay (s)		25.9			38.2			41.8	17.1	12.6	9.6	
Level of Service		C			D			D	B	B	A	
Approach Delay (s)		25.9			38.2			41.5			11.1	
Approach LOS		C			D			D			B	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	71	10	90	67	233	4	176	107	242	181	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	4.8	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Frt		0.99			0.92			1.00	0.85	1.00	0.98	
Flt Protected		1.00			0.99			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1874			1871			1595	1396	1604	1629	
Flt Permitted		0.95			0.90			0.99	1.00	0.58	1.00	
Satd. Flow (perm)		1786			1707			1589	1396	978	1629	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	9	73	10	93	69	240	4	181	110	249	187	21
RTOR Reduction (vph)	0	6	0	0	74	0	0	0	63	0	4	0
Lane Group Flow (vph)	0	86	0	0	328	0	0	185	47	249	204	0
Heavy Vehicles (%)	22%	6%	2%	3%	2%	6%	2%	18%	8%	10%	16%	5%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		22.0			22.0			37.5	37.5	53.0	53.0	
Effective Green, g (s)		22.0			22.0			37.5	37.5	53.0	53.0	
Actuated g/C Ratio		0.25			0.25			0.43	0.43	0.61	0.61	
Clearance Time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		451			431			684	601	678	992	
v/s Ratio Prot										c0.05	0.13	
v/s Ratio Perm		0.05			c0.19			0.12	0.03	c0.18		
v/c Ratio		0.19			0.76			0.27	0.08	0.37	0.21	
Uniform Delay, d1		25.5			30.1			15.9	14.6	8.0	7.6	
Progression Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.2			7.7			1.0	0.3	0.3	0.5	
Delay (s)		25.7			37.8			16.9	14.8	8.3	8.1	
Level of Service		C			D			B	B	A	A	
Approach Delay (s)		25.7			37.8			16.1			8.2	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	117	10	166	108	354	14	441	157	265	257	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	4.8	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Frt		0.99			0.92			1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.99			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1945			1894			1788	1449	1713	1761	
Flt Permitted		0.88			0.87			0.99	1.00	0.19	1.00	
Satd. Flow (perm)		1721			1667			1765	1449	345	1761	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	23	118	10	168	109	358	14	445	159	268	260	22
RTOR Reduction (vph)	0	3	0	0	54	0	0	0	61	0	4	0
Lane Group Flow (vph)	0	148	0	0	581	0	0	459	98	268	278	0
Heavy Vehicles (%)	2%	4%	2%	4%	2%	4%	2%	5%	4%	3%	7%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		32.0			32.0			26.4	26.4	43.0	43.0	
Effective Green, g (s)		32.0			32.0			26.4	26.4	43.0	43.0	
Actuated g/C Ratio		0.37			0.37			0.30	0.30	0.49	0.49	
Clearance Time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		633			613			535	439	368	870	
v/s Ratio Prot										c0.11	0.16	
v/s Ratio Perm		0.09			c0.35			c0.26	0.07	0.25		
v/c Ratio		0.23			0.95			0.86	0.22	0.73	0.32	
Uniform Delay, d1		19.0			26.7			28.5	22.6	16.1	13.2	
Progression Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.2			23.8			16.2	1.2	7.0	1.0	
Delay (s)		19.2			50.5			44.7	23.8	23.1	14.2	
Level of Service		B			D			D	C	C	B	
Approach Delay (s)		19.2			50.5			39.4			18.5	
Approach LOS		B			D			D			B	

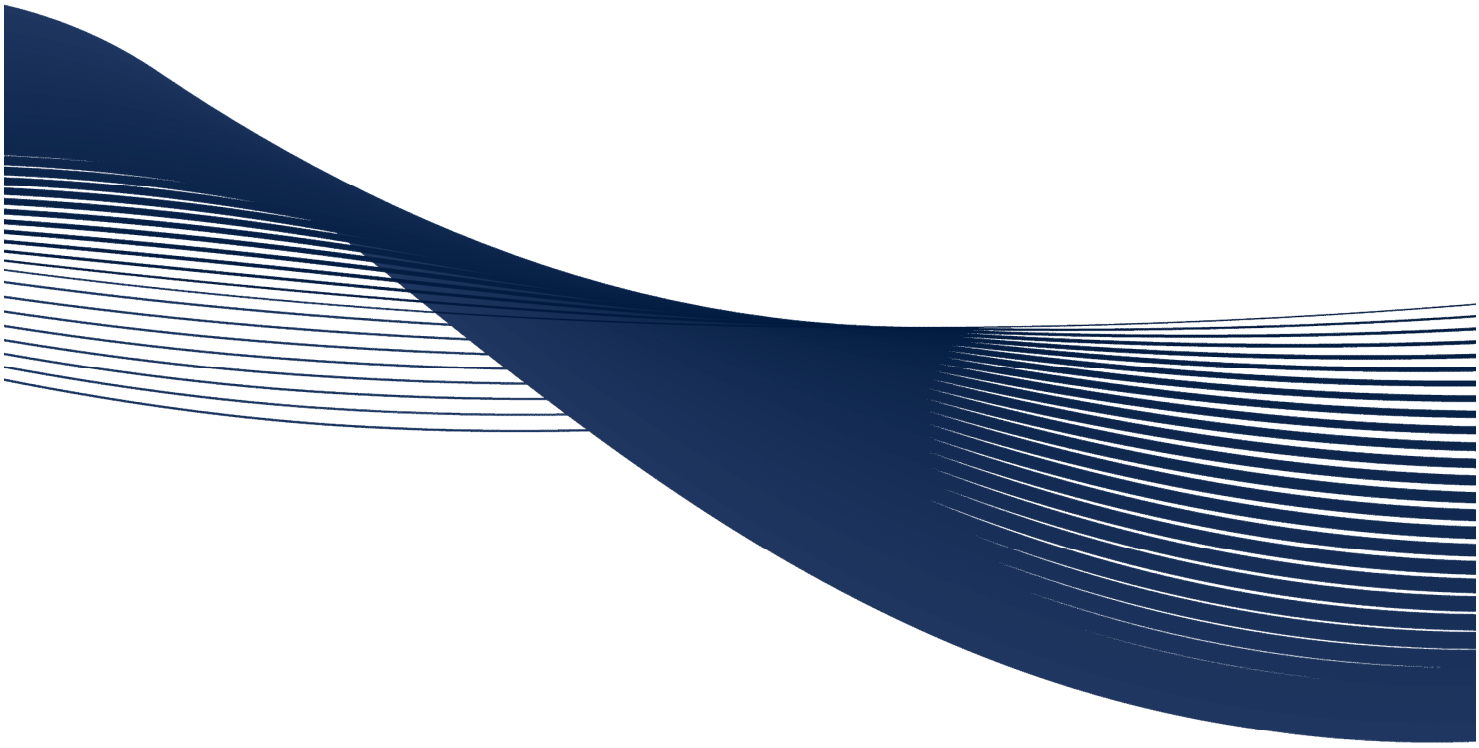
Intersection Summary			
HCM 2000 Control Delay	35.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	110.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

JAMES DICK CONSTRUCTION LIMITED

REVISED TRAFFIC IMPACT STUDY

Eramosa Quarry, Township of Guelph-Eramosa

Project No.:TR12-0013



APRIL 2016

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COLE ENGINEERING

April 22, 2016
Our Ref: TR12-0013

James Dick Construction Limited
P.O. Box 470
Bolton, ON L7E 5T4

Attention: **Mr. Greg Sweetnam, B.Sc.**
Vice President, Resources

Dear Mr. Sweetnam:

Re: **Revised Traffic Impact Study**
Eramosa Quarry
Township of Guelph-Eramosa

Cole Engineering Group Ltd. is pleased to submit this revised Traffic Impact Study in support of the proposed Eramosa Quarry, addressing comments received from the Ministry of Transportation (MTO), the Town of Halton Hills and R.J. Burnside. The study finds that the development, while assessed with a conservative truck volume of 38 two-way trips per hour, is expected to have no significant impact to the surrounding road network. The study also finds that the recommended access location is sufficient to serve the proposed development.

Yours truly,

COLE ENGINEERING GROUP LTD.

Joseph E. Gowrie, P.Eng.
Project Manager, Traffic

Encl.

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Statement of Conditions

This Report / Study (the "Work") has been prepared at the request of, and for the exclusive use of, the Owner / Client, and its affiliates (the "Intended User"). No one other than the Intended User has the right to use and rely on the Work without first obtaining the written authorization of Cole Engineering Group Ltd. and its Owner. Cole Engineering expressly excludes liability to any party except the intended User for any use of, and/or reliance upon, the work.

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APPENDICES

1.0 Study Background and Purpose

Cole Engineering Group Ltd. (Cole Engineering) was retained by James Dick Construction Limited (the "Owner") to undertake a Traffic Impact Study for the proposed Eramosa Quarry, dated April 23, 2012. Comments from the Ministry of Transportation (MTO) were received and this revised report addresses these comments. The subject lands are approximately 39.4 hectares (97 acres) in area and are generally located on the northeast quadrant of Highway 7 and 6th Line in the Township of Guelph-Eramosa (the "Township"), County of Wellington (the "County"). The general site location is provided in **Figure 1-1**.

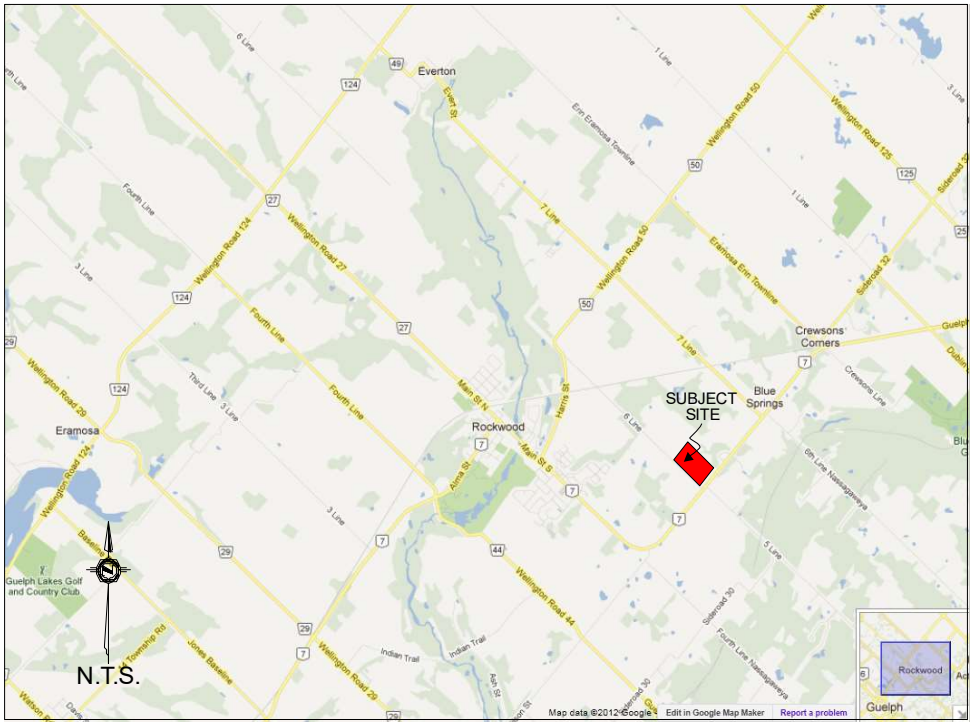


Figure 1-1 Proposed Site Location

James Dick Construction Limited has owned this property on the north side of Highway 7 for approximately 25 years. Currently, the site is comprised of vegetation, several old gravel pits, and a small pond / wetland. The current zoning for the site is Agricultural and Hazard. Along the southern portion of the site, there is a house currently occupied by a tenant. Lands to the south are zoned Rural and Industrial. The lands to the east are zoned Industrial and Agricultural. Some industrial development is evident along Highway 7. There are no buildings or structures within the proposed extraction boundaries. The site will be serviced via a full movement access onto 6th Line. The proposed site plan is provided in **Figure 1-2**.

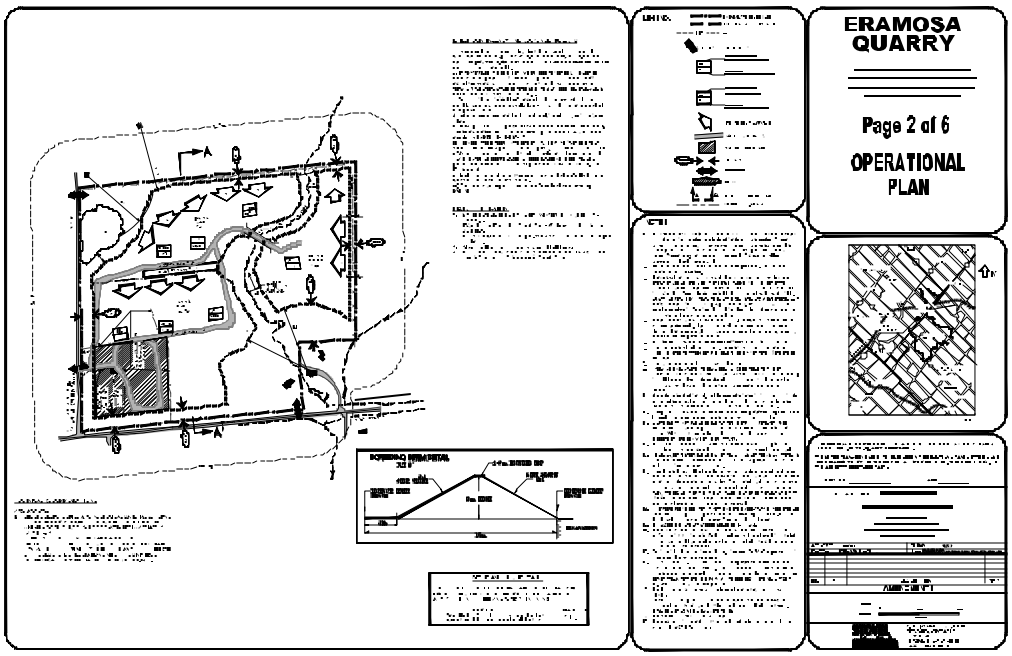


Figure 1-2 Proposed Site Plan

The purpose of the Study is to:

- Estimate the traffic generated by the proposed quarry;
- Confirm the operations at the proposed access;
- Confirm the sufficiency of the sight line distances; and,
- Identify operational traffic deficiencies and recommend mitigation measures to remedy the conditions such as road, intersection, and geometric improvements.

2.0 Study Approach

2.1. Study Area

Based on the review of the Site Plan and the surrounding area, the study area intersections for this analysis and includes the following:

- Highway 7 / 6th Line (existing);
- Highway 7 / 5th Line (existing); and,
- 6th Line / Proposed Site Access (future).

2.2. Horizon Year

Adhering to the Ministry of Transportation of Ontario Traffic Impact Study Guidelines requires an existing/opening year traffic analysis and a five (5) and ten (10) year post opening analysis. As such, a 2013, 2018 and 2023 traffic horizon is being assessed. At the request of the Town of Halton Hills (the "Town"), an additional 20 year traffic horizon (2033) is also being assessed which, in this case, is the expected closing year of the quarry.

A conservative growth rate of 2.5% per year was applied to all traffic movements within the study area as per discussions with Township staff.

3.0 Existing Traffic Conditions

3.1. Existing Road Network

As previously mentioned, the site is located north on the northeast quadrant of Highway 7 and 6th Line. The existing lane configurations are illustrated in **Figure 3-1.**

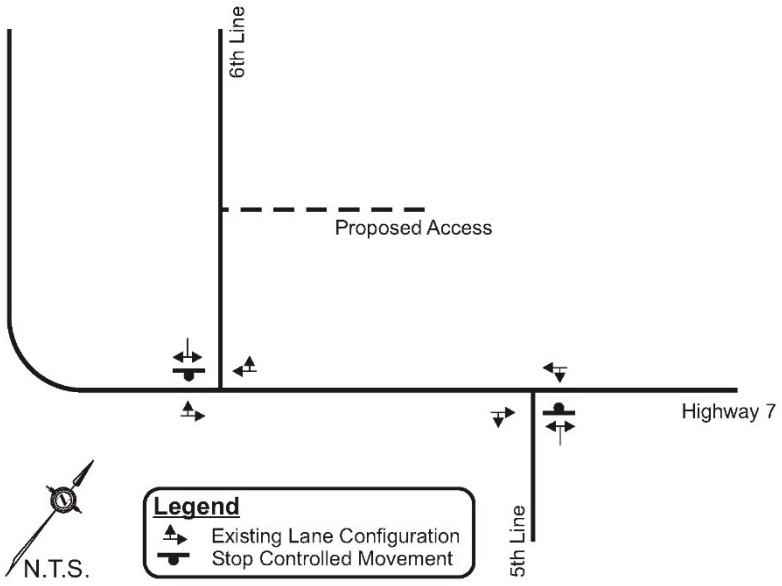


Figure 3-1 Existing Lane Configurations

The road network is detailed as follows:

Highway 7 is a 2-lane east-west provincial highway within the vicinity of the subject site and is under the jurisdiction of the Ministry of Transportation of Ontario (MTO).

6th Line is a 2-lane north-south gravel roadway under the jurisdiction of the Township of Guelph-Eramosa.

5th Line is a 2-lane north-south paved roadway under the jurisdiction of the Town of Milton.

3.2. Existing Traffic Assessment

The existing traffic volumes at the intersection of Hwy 7 / 6th Line was undertaken by Accu-Traffic Inc. (ATI) on behalf of Cole Engineering during the weekday morning peak period (7:00 a.m. – 9:00 a.m.) and weekday afternoon peak period (4:00 p.m. – 6:00 p.m.) on Tuesday, February 14, 2012. Existing traffic data is provided in **Appendix A** for reference. It should be noted that within the study area, Highway 7 is classified as an urban commuter road, which has higher traffic volumes during the summer than the winter. As such, the counted through traffic volumes along Highway 7 have been prorated by a summer seasonal peak hour factor of 1.33, based on MTO's *2008 Seasonal Variation Curves.*

3.3. Existing Traffic Conditions – Level of Service Analysis

Existing traffic volumes were analyzed using Synchro 9.1 software and are provided in **Figure 3-2.**

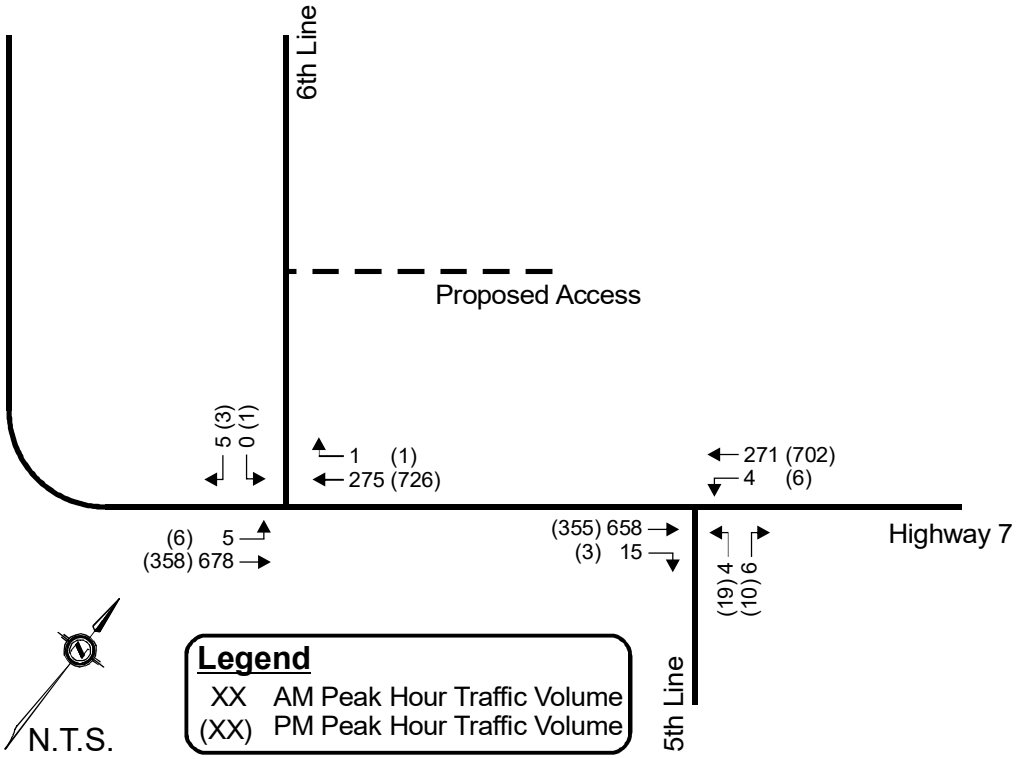


Figure 3-2 Existing Traffic Volumes

The results are summarized in **Table 3.1** and while detailed calculations are provided in **Appendix B**.

Table 3.1 – Existing Traffic Conditions – Levels of Service

Intersection	Key Movements	AM Peak Hour		PM Peak Hour	
		LOS (v/c)	95th Percentile Queue (m)	LOS (v/c)	95th Percentile Queue (m)
Highway 7 / 6th Line (Unsignalized)	EB left-through SB left-right	A (0.01) B (0.01)	0.1 0.3	A (0.01) C (0.02)	0.2 0.5
Highway 7 / 5th Line (Unsignalized)	WB left-through NB left-right	A (<0.01) C (0.03)	0.1 0.7	A (<0.01) C (0.10)	0.1 2.5

The results of the analysis indicates that all movements operate at good levels of service (LOS) during the weekday a.m. and p.m. peak periods with no movement nearing capacity. Under existing conditions, minimal queuing occurs within the study area intersections.

3.4. Left Turn Warrants

Left turn warrants were completed using the warrants from the *Geometric Design Guidelines for Ontario Highways* published by the MTO. Based on a design speed of 100 km/hr, the *Geometric Design Standards for Ontario Highway* published by the MTO suggests that a left turn lane with a storage length of 25 meters is warranted at the 6th Line / Highway 7 intersection. In addition, the 5th Line / Highway 7 intersection also requires a left turn lane with a storage length of approximately 25 meters. These left turn lanes will require a deceleration taper and parallel of 160 meters and 70 meters, respectively. The design charts are provided in **Appendix C**.

Due to the close proximity of the Highway 7 / 6th Line and Highway 7 / 5th Line intersections, it is recommended that a two-way-left-turn-lane be installed between the two (2) intersections for the following reasons:

- There is insufficient distance between the Highway 7 / 6th Line and Highway 7 / 5th Line intersections to construct standard tapers between the intersections; and,
- The two-way-left-turn-lane can serve as an acceleration lane for vehicles proceeding eastbound from 6th Line or westbound from 5th Line.

The existing traffic analysis was undertaken once more with the warranted left turn lanes and the results for the analysis are summarized in **Table 3.2**. The detailed calculations are provided in **Appendix D**.

Table 3.2 Existing Traffic with Left Turn Lanes – Level of Service

Intersection	Key Movements	AM Peak Hour		PM Peak Hour	
		LOS (v/c)	95th Percentile Queue (m)	LOS (v/c)	95th Percentile Queue (m)
Highway 7 / 6th Line (Unsignalized)	EB left SB left-right	A (0.01) B (0.01)	0.1 0.3	A (0.01) B (0.02)	0.2 0.4
Highway 7 / 5th Line (Unsignalized)	WB left NB left-right	A (<0.01) B (0.02)	0.1 0.5	A (<0.01) B (0.06)	0.1 1.5

The construction of the left turn lanes are expected to have minor improvements over existing levels of service with no movement operating above level of service B or with queues exceeding 2 meters.

4.0 Site Generated Traffic

4.1. Development Proposal

The proposed Eramosa Quarry is approximately 39.4 hectares (97 acres) in area and is proposed to be licensed to produce a maximum of 700,000 tonnes of aggregate per annum. The site will be serviced via a full movement access onto 6th Line.

4.2. Site Generated Traffic

4.2.1. Load Sizes

The number of trips forecasted in the analysis was derived using the James Dick Construction Ltd.'s fleet size. The information related to James Dick Construction Ltd.'s fleet if provided in **Table 4.1**.

Table 4.1 – Fleet Size

Vehicle Type	Payload	Number of Units
Tri-Axle Straight Truck	22.7 Tonnes	21
Tri-Axle Tractor Trailer	35.1 Tonnes	18
Quad-Axle Tractor Trailer	39.1 Tonnes	16
Tri-Axel Pony Pup Combination	41.4 Tonnes	30
Total	**35.0 Tonnes**	**85**

There is a fleet size of 85 vehicles with an average fleet size of 35 tonnes. To be conservative, a load size of 33 tonnes per truck was assumed in calculations.

4.2.2. Forecasted Traffic

The proposed quarry is applying for a license of 700,000 tonnes of aggregate and has a life expectancy of 20 years. Based on the fleet operated by James Dick Construction, each load will be approximately 33 tonnes resulting in a total of 21,213 truck loads per year. The quarry will only be operated from 6:00 a.m. to 6:00 p.m. Monday to Saturday, excluding public holidays, and have an average of 69 truck loads per day. It is important to note that the distribution of truck traffic varies throughout the year based on construction projects.

Operation of the Hidden Quarry is expected to be similar to the Erin Pit which has a license for 723,000 tonnes per annum. The Erin Pit data is provided in **Appendix E**. This is a good comparison due to its proximity as well as the similar license size to the Hidden Quarry. Using the data provided by James Dick Construction Ltd., the annual distribution of truck traffic for the Hidden Quarry is provided in **Figure 4-1**.

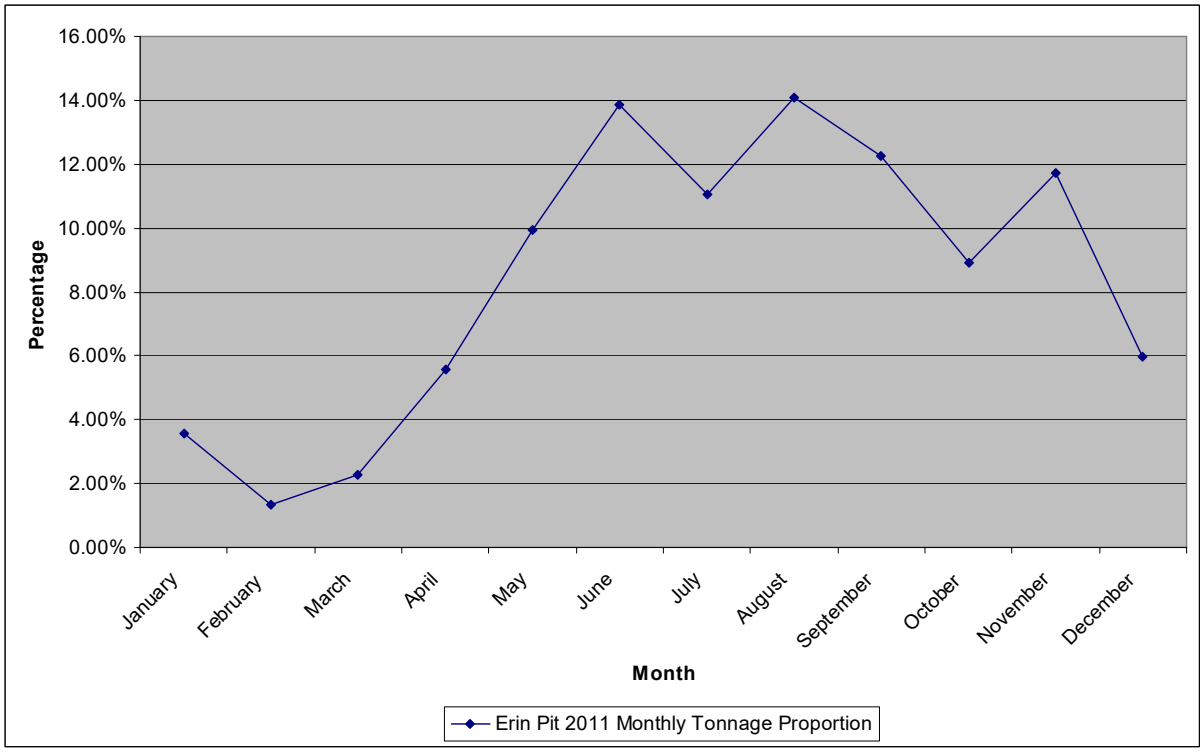


Figure 4-1 2011 Erin Pit Monthly Distribution

Based on the monthly variation of traffic, the quarry is expected to have an approximate total of 282 truck loads during the month of February and 2989 truck loads in the month of August. The expected number of truck loads by month is provided in **Table 4.2**.

Table 4.2 Expected Monthly Distribution of Trucks

Month	Monthly Proportion of Truck Traffic	Trucks Per Month
January	3.50%	742
February	1.33%	282
March	2.20%	467
April	5.50%	1167
May	9.90%	2100
June	13.86%	2940
July	11.00%	2333
August	14.09%	2989
September	12.27%	2603
October	8.80%	1867
November	11.70%	2482
December	5.85%	1241

The trips were then compared to the daily and hourly distribution of trips from the Erin Pit and forecasted in **Table 4.3**.

Table 4.3 Hourly Distribution of Truck Loads

DATE	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	TOTAL
Day 1	14	21	20	12	20	16	16	20	8	17	2	0	0	**166**
Day 2	10	4	7	5	5	4	7	5	10	6	1	0	0	**64**
Day 3	12	14	12	16	16	12	19	16	22	14	2	0	0	**155**
Day 4	10	12	13	17	13	8	17	12	10	11	0	0	0	**123**
Day 5	12	8	12	10	16	5	22	12	17	13	1	0	0	**128**
Day 6	8	14	13	10	5	4	7	5	5	1	1	0	0	**73**
Day 7	6	13	13	7	17	7	13	8	11	11	0	0	0	**106**
Day 8	5	15	7	18	14	10	12	11	5	3	2	0	0	**102**
Day 9	13	15	14	13	20	7	17	8	12	8	2	0	0	**129**
Day 10	6	2	5	4	2	3	0	0	0	0	0	0	0	**22**
Day 11	13	7	24	17	21	14	22	14	18	19	1	0	0	**170**
Day 12	11	8	11	8	24	6	15	17	11	14	1	0	0	**126**
Day 13	17	14	19	13	22	16	16	17	15	18	5	0	0	**172**
Day 14	21	16	23	18	12	17	19	20	16	20	2	0	0	**184**
Day 15	12	14	17	15	11	5	19	12	13	16	2	0	0	**136**
Day 16	13	13	22	13	22	8	23	18	20	17	4	1	0	**174**
Day 17	10	10	12	10	11	4	16	5	12	5	6	0	0	**101**
Day 18	9	12	15	10	7	17	11	22	13	13	9	0	0	**138**
Day 19	19	12	20	14	24	15	21	11	15	10	1	0	0	**162**
Day 20	13	10	19	12	15	8	18	12	13	13	7	0	0	**140**
Day 21	16	12	13	14	15	14	14	13	15	12	7	0	0	**145**
Day 22	16	12	20	13	22	18	16	19	10	21	2	0	0	**169**
Day 23	16	5	17	11	12	12	11	12	7	8	1	0	0	**112**
TOTAL	**282**	**263**	**348**	**280**	**346**	**230**	**351**	**289**	**278**	**270**	**59**	**1**	**0**	**2997**

Using this methodology, during the peak hour of the peak month the expected highest number of truck loads is 24 per hour. However, using the peak operation of the peak month results in an extremely conservative assessment. The 30th highest operational loads will be used for the purposes of analysis, which results in a total of 19 truck loads per hour.

Operation of the pit is expected to remain consistent from year to year until shutdown of the quarry when the material is exhausted.

4.3. Trip Distribution

As the proposed quarry is expected to displace material travelling east on Hwy 7 that is currently coming from an existing quarry, the catchment area is already known. Based on the existing market for James Dick Construction, the material is expected to go to the following locations as identified in **Table 4.4**.

Table 4.4 – Aggregate Destination Areas

Location	Proportion
Local Industry	5%
Local Delivery / Halton Region	5%
Wellington / Caledon	25%
Acton / Georgetown / Brampton	10%
Milton / Mississauga / Brampton /Toronto	55%
Total	100%

Using the information provided in **Table 4.4**, the trip distribution for the proposed development is provided in **Table 4.5.**

Table 4.5 – Trip Distribution

Direction (to / from)	Via	Distribution
North	Highway 7 6th Line	5% 0%
South	5th Line	0%
East	Highway 7	95%
West	--	--
Total		**100%**

The site traffic was assigned based on the above trip distribution and is illustrated in **Figure 4-2.**

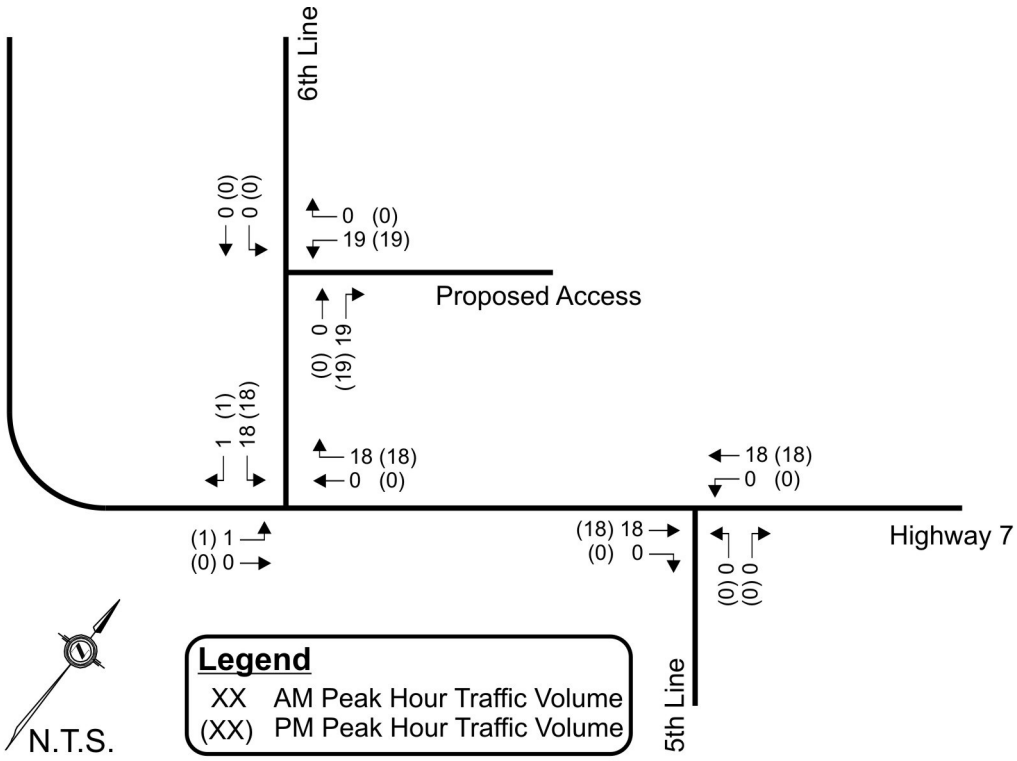


Figure 4-2 Site Traffic Volumes

4.4. Existing Plus Site-Related Traffic

The proposed development is anticipated to begin its operations in the 2013 horizon and as such an existing plus site related traffic condition was investigated. Existing plus site related traffic is illustrated in **Figure 4-3** and was assessed using *Synchro 9.1* software and includes the warranted left turn lanes.

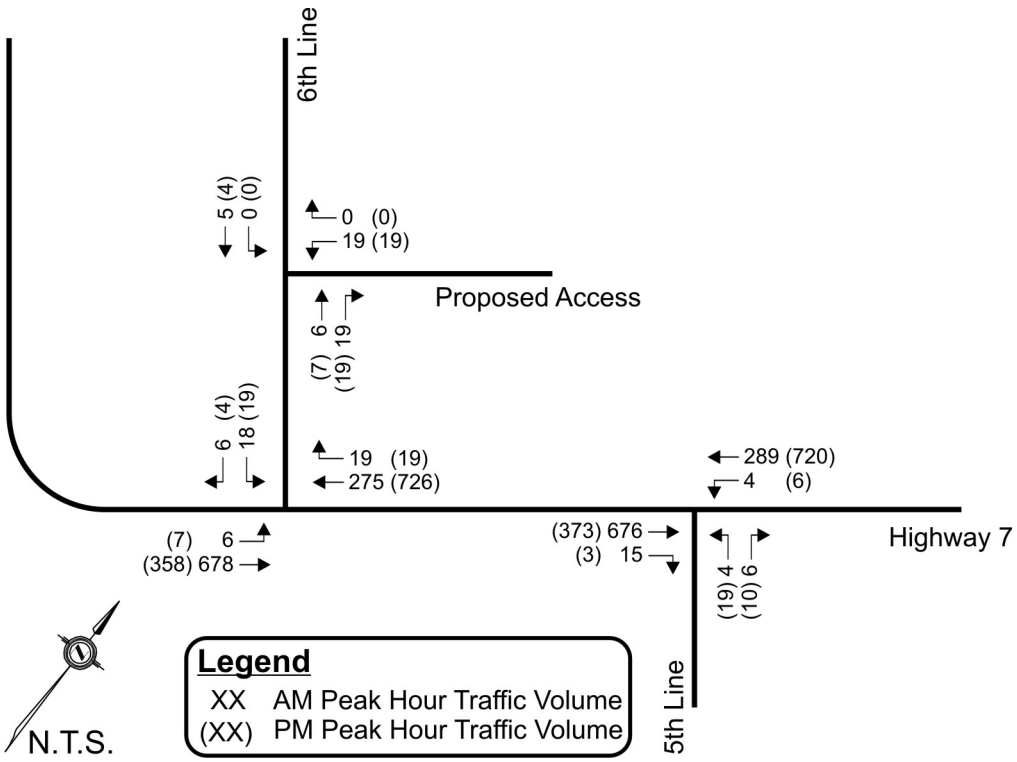


Figure 4-3 Existing Plus Site-Related Traffic Volumes

The detailed calculations are provided in **Appendix D** while summarized in **Table 4.6**.

Table 4.6 – Existing Plus Site-Related Traffic Conditions – Levels of Service

Intersection	Key Movements	AM Peak Hour		PM Peak Hour	
		LOS (v/c)	95th Percentile Queue (m)	LOS (v/c)	95th Percentile Queue (m)
Highway 7 / 6th Line (Unsignalized)	EB left SB left-right	A (0.01) C (0.11)	0.2 2.9	A (0.01) C (0.13)	0.2 3.4
Highway 7 / 5th Line (Unsignalized)	WB left NB left-right	A (<0.01) B (0.02)	0.1 0.5	A (0.01) B (0.06)	0.1 1.5
6th Line / Proposed Access (Unsignalized)	WB left-right	A (0.04)	0.9	A (0.0$)	1.0

In the existing plus site-related traffic condition, the study area is expected to operate at good LOS with no movements nearing capacity. Under existing plus site-related traffic conditions, minimal queuing occurs within the study area intersections.

5.0 Traffic Growth

Traffic growth within the study area consists of two (2) components: traffic generated due to other developments within / near the study area; and traffic growth outside of the study area. No major background developments were identified within the vicinity of the subject site. In addition, there is a 2.5% per annum growth rate applied to all movements within the study area which represents traffic growth from outside the study area.

6.0 Future Total Traffic Conditions

Future total traffic consists of traffic growth plus site-related traffic and includes the eastbound left turn at the 6th Line / Highway 7 and 5th Line / Highway 7 intersections.

6.1. Future (2018) Total Traffic Conditions

Future (2018) total traffic is illustrated in **Figure 6-1** and was analyzed using *Synchro 9.1* software with the analysis including the warranted left turn lanes.

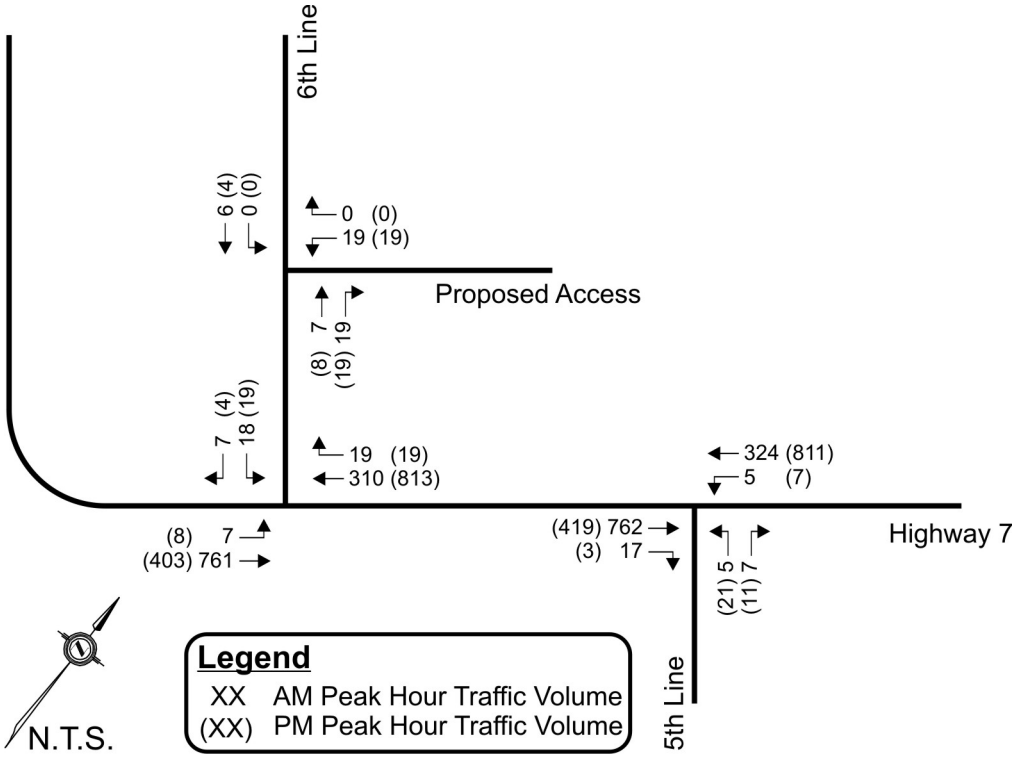


Figure 6-1 Future (2018) Total Traffic Volumes

The detailed calculations are provided in **Appendix E** and summarized in **Table 6.1**.

Table 6.1 – Future (2018) Traffic Conditions – Levels of Service

Intersection	Key Movements	AM Peak Hour		PM Peak Hour	
		LOS (v/c)	95th Percentile Queue (m)	LOS (v/c)	95th Percentile Queue (m)
Highway 7 / 6th Line (Unsignalized)	EB left SB left-right	A (0.01) C (0.13)	0.2 3.4	B (0.01) C (0.15)	0.3 3.9
Highway 7 / 5th Line (Unsignalized)	WB left NB left-right	A (0.01) B (0.03)	0.1 0.8	A (0.01) B (0.08)	0.1 1.9
6th Line / Proposed Access (Unsignalized)	WB left-right	A (0.04)	0.9	A (0.04)	1.0

In the future (2018) total traffic condition, the study area intersections are all anticipated to continue to operate at good LOS with no movement operating near capacity. Under future (2018) total traffic conditions, minimal queuing occurs within the study area intersections, with the longest queue expected to be the southbound left-right queue at the Highway 7 / 6th Line intersection.

6.2. Future (2023) Total Traffic Conditions

Future (2023) total traffic volumes are illustrated in **Figure 6-2** and were analyzed was analyzed using *Synchro 9.1* software.

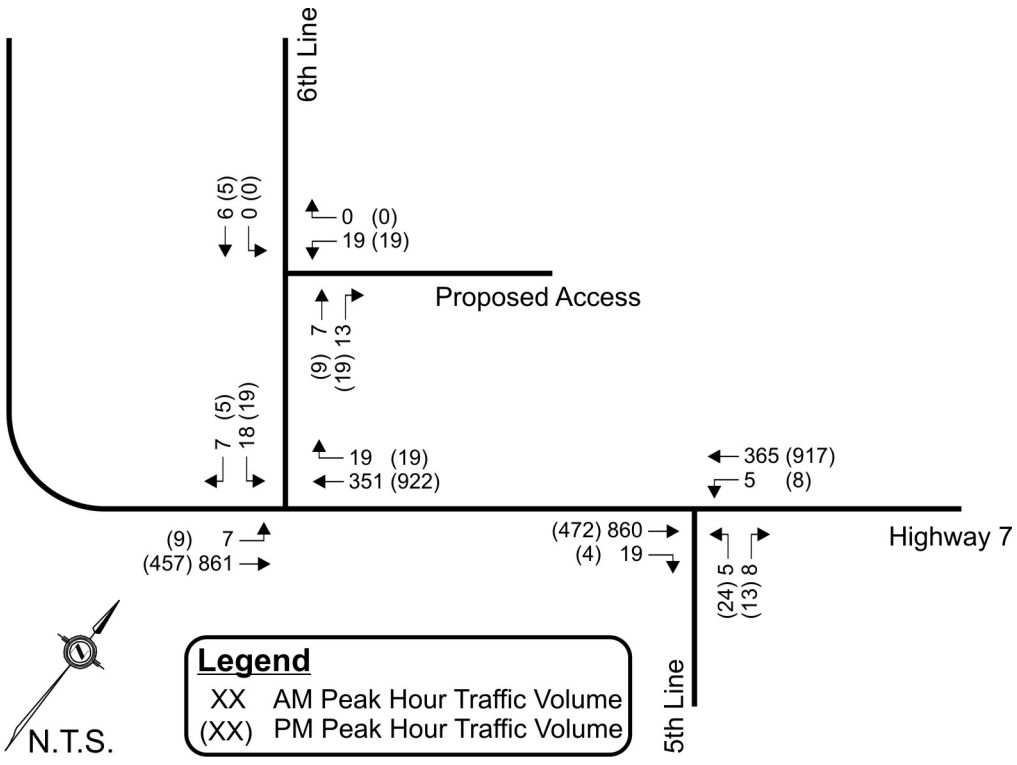


Figure 6-2 Future (2023) Total Traffic Volumes

The results of the analysis are summarized in **Table 6.2** and detailed calculations are provided in **Appendix G**.

Table 6.2 Future (2023) Total Traffic – Level of Service

Intersection	Key Movements	AM Peak Hour		PM Peak Hour	
		LOS (v/c)	95th Percentile Queue (m)	LOS (v/c)	95th Percentile Queue (m)
Highway 7 / 6th Line (Unsignalized)	EB left SB left-right	A (0.01) C (0.15)	0.2 3.9	B (0.02) C (0.18)	0.2 4.7
Highway 7 / 5th Line (Unsignalized)	WB left NB left-right	A (0.01) C (0.04)	0.2 1.0	A (0.01) C (0.10)	0.2 2.4
6th Line / Proposed Access (Unsignalized)	WB left-right	A (0.03)	0.6	A (0.04)	1.0

With the left turn lanes in place, the intersections are all expected to operate at good levels of service in the 2023 traffic horizon with no movement operating below a level of service C or experience volume/capacity ratios greater than 0.15.

A supplemental queuing analysis was completed using SimTraffic software to verify the queue lengths recommended by the *Geometric Design Guidelines for Ontario Highways* published by the MTO. The storage requirements are provided in **Table 6.3** and calculations provided in **Appendix H**.

Table 6.3 Future (2023) Total Traffic Queuing Study

Intersection	Key Movements	Storage Length	AM Peak Hour			PM Peak Hour		
			Avg. Queue	95th% Queue	Max Observed	Avg. Queue	95th% Queue	Max Observed
Highway 7 / 6th Line (Unsignalized)	EB left	25 m	0.9	5.6	10.2	1.7	6.7	6.1
Highway 7 / 5th Line (Unsignalized)	WB left	25 m	1.1	5.3	7.6	7.7	22.5	19.7

In the future (2023) total traffic horizon, the SimTraffic simulation software confirms that a storage length of 25 meters is suitable for the future left-turn movements.

6.3. Future (2033) Total Traffic Conditions

Future (2033) total traffic volumes are illustrated in **Figure 6-3** and was analyzed using *Synchro 9.1* software.

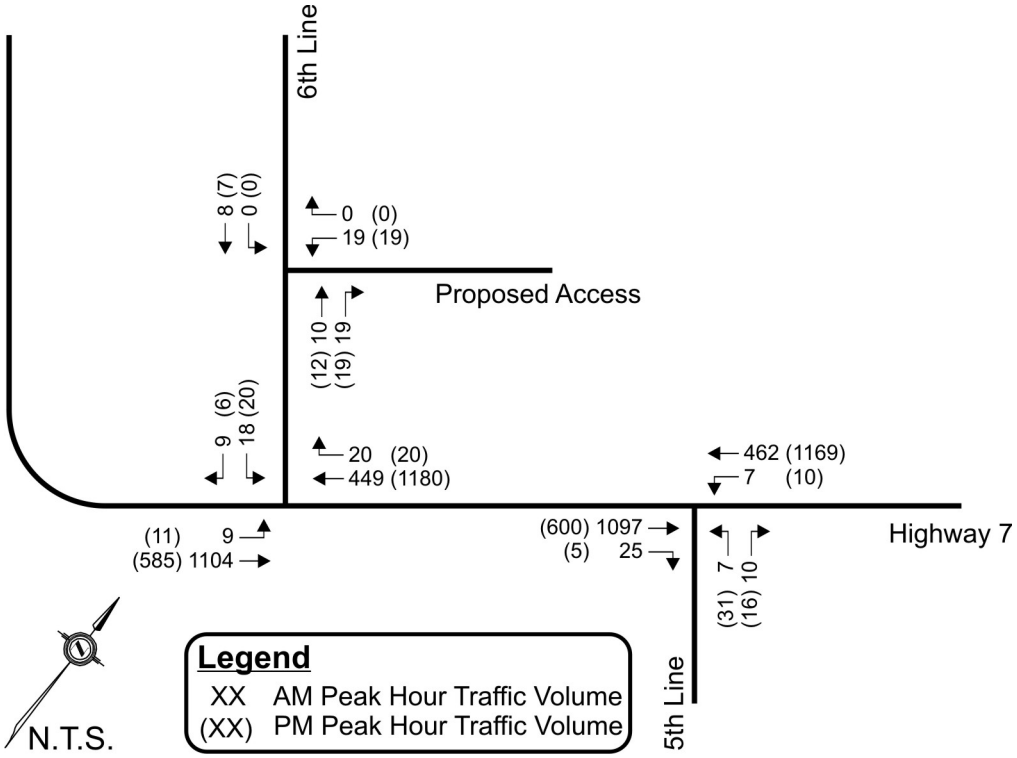


Figure 6-3 Future (2033) Total Traffic Volumes

The results of the analysis are summarized in **Table 6.4** and detailed calculations are provided in **Appendix I**.

Table 6.4 Future (2033) Total Traffic – Level of Service

Intersection	Key Movements	AM Peak Hour		PM Peak Hour	
		LOS (v/c)	95th Percentile Queue (m)	LOS (v/c)	95th Percentile Queue (m)
Highway 7 / 6th Line (Unsignalized)	EB left SB left-right	A (0.01) D (0.22)	0.3 6.0	B (0.02) D (0.26)	0.5
Highway 7 / 5th Line (Unsignalized)	WB left NB left-right	B (0.01) C (0.08)	0.9 1.9	A (0.01) C (0.16)	0.2 4.3
6th Line / Proposed Access (Unsignalized)	WB left-right	A (0.04)	0.9	A (0.04)	1.0

In the future (2033) total traffic condition, the study area intersections continue to operate at good levels of service with the two-way-left-turn lane in place with no 95th percentile queue expected greater than 4.3 meters.

7.0 Access Analysis

The site access is proposed to be located on the east side of 6th Line in the Township of Guelph-Eramosa. 6th Line is currently a rolling and unpaved gravelled roadway with a no exit sign posted at Highway 7.

7.1. Site Access Location and Sight Distance

A sight line assessment was undertaken to determine the preferred location of the site access. The required minimum Stopping Sight Distance (SSD) was determined based on the information provided in the *Geometric Design Manual for Ontario Highways* published by MTO. A design speed of 100 km/h (unposted speed of 80 km/h) was assumed for the unpaved gravelled roadway which requires a minimum stopping sight distance of 185 meters.

At present, there are ongoing discussions with the Town to modify the profile of 6th Line in the vicinity of the site access. The crest will be lowered to improve sight distance as well as reduce the grade on approach to the Highway 7 / 6th Line intersection, thereby improving safety on approach to the intersection, particularly during the winter months.

7.2. Safety Consideration

Along Highway 7 at the 6th Line intersection, there is a right turn taper of approximately 25 meters. In order to avoid the reduction in the capacity for the westbound through traffic due to slow moving westbound right turn truck traffic at this intersection, a westbound deceleration lane (taper 80 m and parallel 85 m), in the form of a taper and parallel lane should be provided. Moreover, as a precaution for the safety of drivers along Highway 7, it is recommended that truck entrance signs be provided approximately 335 meters from 6th Line. These signs will be provided based on a 80 km/h posted speed limit as per guidelines from the *Ontario Traffic Manual, Book 6; Warning Signs*. An oversized truck warning sign (Wc-108) is recommended. The eastbound traffic shall have a Wc-108L sign while the westbound traffic shall have a Wc-108R sign indicating that the truck entrance will be on the north side of Highway 7.

Similarly, truck entrance warning sign should be provided for through traffic on 6th Line for traffic approaching the proposed access. The truck entrance warning signs are classified as 'C' warning signage and the required advance placement for Highway 7 and 6th Line is based on the Ontario Traffic Manual's (OTM) posted road speed, as shown in **Table 7.1.**

Table 7.1 – OTM's Minimum Advanced Placement of Condition B and C Warning Signs for Stopping

Posted (Initial) Speed (km/h)	30	40	50	60	70	**80**	90	100
Minimum Advance Distance (m)	70	100	140	225	275	**335**	395	465

The minimum advance warning signage for the truck entrance along Highway 7 should be placed approximately 335 meters in advance of the 6th Line junction. Similarly, the minimum advance warning signage for the proposed access along 6th Line should be placed approximately 335 meters in advance of the proposed access.

8.0 Conclusions

From the analysis undertaken, our findings and conclusions are as follows:

- Existing traffic within the study area operates at good levels of service with no movements nearing capacity;
- The eastbound left turn lane at the Highway 7 / 6th Line intersection and westbound left turn lane at the Highway 7 / 5th Line intersection are warranted in the existing traffic condition;
- Due to the proximity of the 5th Line and 6th Line intersections, it is recommended that a continuous turning lane be provided between the two intersections to accommodate runout left turn lengths;
- The gravel pit is assessed with a conservative 38 truck trips (19 truck trips in / 19 truck trips out) during each of the analyzed peak periods;
- Employees of the future gravel pit are anticipated to arrive and depart outside of the roadway peak hours;
- The proposed gravel pit is anticipated to have no significant impact on the surrounding road network;
- The study area intersections are expected to operate at good levels of service in the existing plus site, future (2018) total traffic, future (2023) total traffic and future (2033) total traffic conditions;
- It is recommended that the crest on 6th Line be lowered to improve sight distance, as well as reduce the grade on approach to the Highway 7 / 6th Line intersection;
- It is recommended that deceleration lanes along Highway 7 be provided with an 80 meter taper and 85 meter parallel;
- It is recommended that oversized truck entrance signs be placed along Highway 7 in approach to 6th Line while standard truck entrance signs be placed on 6th Line; and,
- At the intersection of Highway 7 and 6th Line, a left turn lane of 25 meters with a deceleration tape of 160 meters and parallel of 70 meters is warranted due to background conditions.

APPENDIX A
Existing Traffic Data

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc.

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:15:00
To: 8:15:00

Municipality: Eramosa
Site #: 1202400002
Intersection: Hwy 7 & 5 Line
TFR File #: 5
Count date: 17-Feb-12

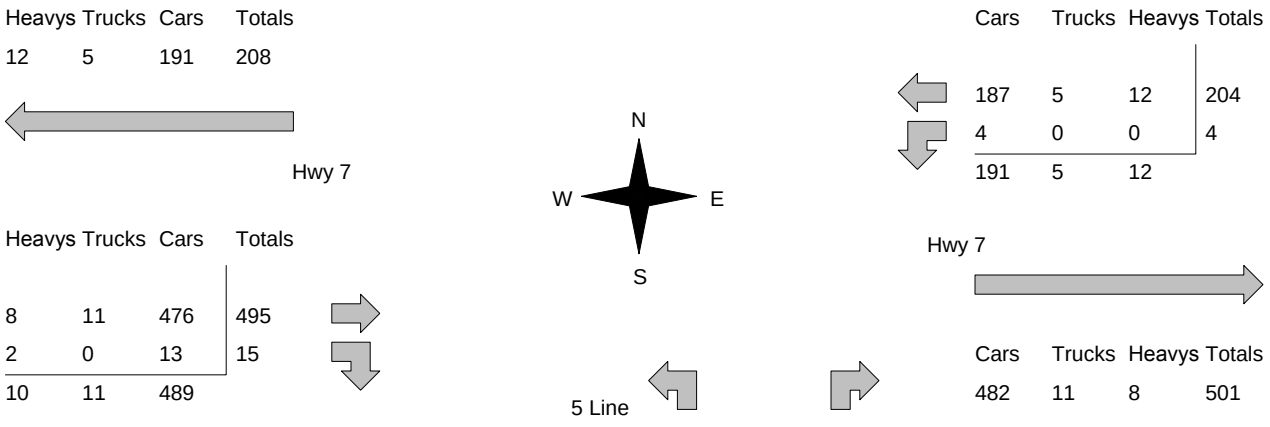
Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Hwy 7 runs W/E

East Leg Total: 709
East Entering: 208
East Peds: 0
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 0
West Entering: 510
West Leg Total: 718

Cars 17
Trucks 0
Heavys 2
Totals 19

Cars 4 6 10
Trucks 0 0 0
Heavys 0 0 0
Totals 4 6

Peds Cross: ⋈
South Peds: 0
South Entering: 10
South Leg Total: 29

Comments

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Fax: 1-888-711-3125

Accu-Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

Municipality: Eramosa
Site #: 1202400002
Intersection: Hwy 7 & 5 Line
TFR File #: 5
Count date: 17-Feb-12

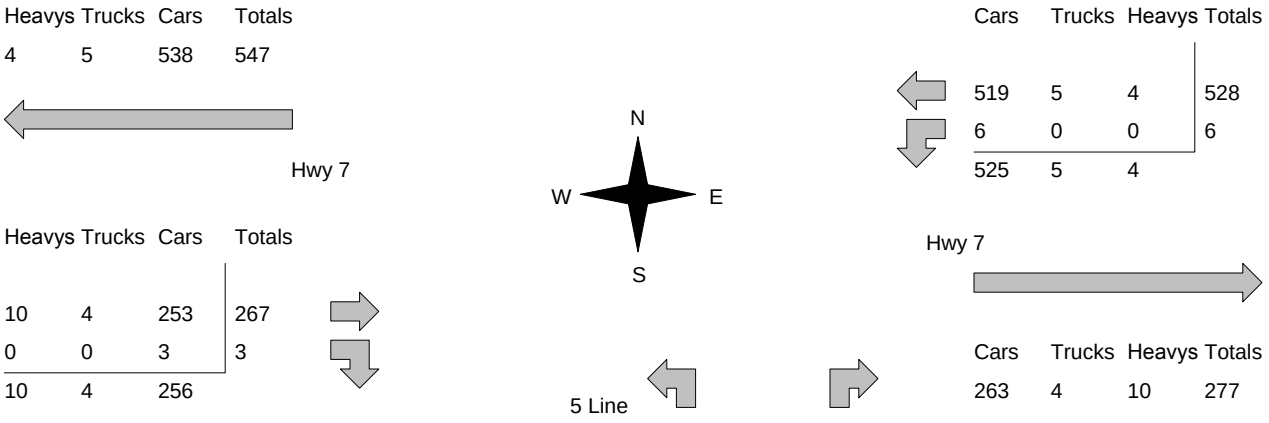
Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Hwy 7 runs W/E

East Leg Total: 811
East Entering: 534
East Peds: 0
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 0
West Entering: 270
West Leg Total: 817

Cars 9
Trucks 0
Heavys 0
Totals 9

Cars 19 10 29
Trucks 0 0 0
Heavys 0 0 0
Totals 19 10

Peds Cross: ⋈
South Peds: 0
South Entering: 29
South Leg Total: 38

Comments

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Fax: 1-888-711-3125

Accu-Traffic Inc.

Total Count Diagram

Municipality: Eramosa
Site #: 1202400002
Intersection: Hwy 7 & 5 Line
TFR File #: 5
Count date: 17-Feb-12

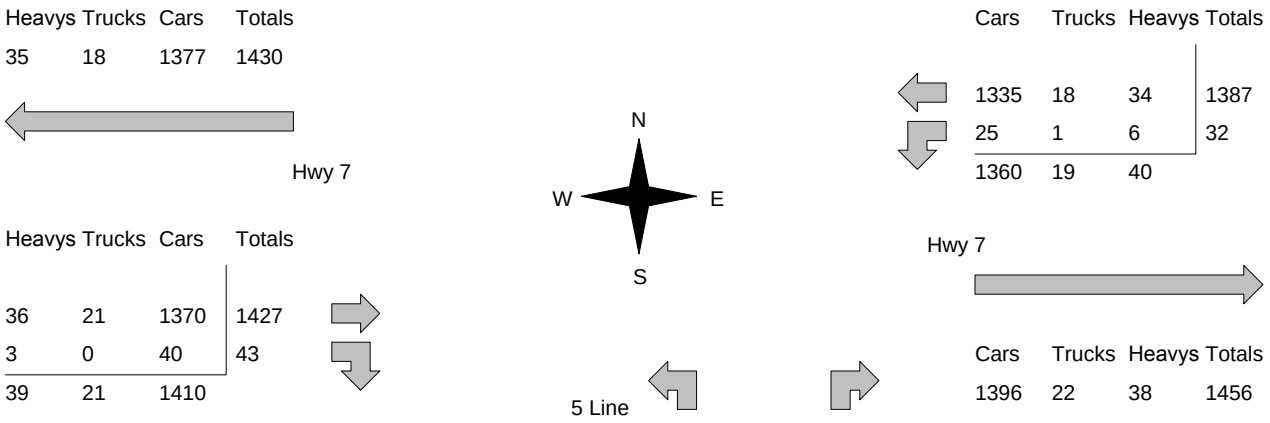
Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Hwy 7 runs W/E

East Leg Total: 2875
East Entering: 1419
East Peds: 0
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 0
West Entering: 1470
West Leg Total: 2900

Cars 65
Trucks 1
Heavys 9
Totals 75

Cars 42 26 68
Trucks 0 1 1
Heavys 1 2 3
Totals 43 29

Peds Cross: ⋈
South Peds: 1
South Entering: 72
South Leg Total: 147

Comments

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Fax: 1-888-711-3125

Accu-Traffic Inc.
Traffic Count Summary

Intersection: Hwy 7 & 5 Line | **Count Date:** 17-Feb-12 | **Municipality:** Eramosa

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	0	0	0	0	12
9:00:00	0	0	0	0	0	11
16:00:00	0	0	0	0	0	0
17:00:00	0	0	0	0	0	27
18:00:00	0	0	0	0	0	22
Totals:	0	0	0	0	0	72

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	3	0	9	12	0
9:00:00	5	0	6	11	1
16:00:00	0	0	0	0	0
17:00:00	19	0	8	27	0
18:00:00	16	0	6	22	0
Totals:	43	0	29	72	1

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	5	185	0	190	0	696
9:00:00	9	207	0	216	0	653
16:00:00	0	1	0	1	0	2
17:00:00	11	478	0	489	0	746
18:00:00	7	516	0	523	0	792
Totals:	32	1387	0	1419	0	2889

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	493	13	506	0
9:00:00	0	420	17	437	0
16:00:00	0	1	0	1	0
17:00:00	0	247	10	257	0
18:00:00	0	266	3	269	0
Totals:	0	1427	43	1470	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	18:00	18:00	18:00
Crossing Values:	0	3	5	0	19	16	16	16

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Fax: 1-888-711-3125

Accu-Traffic Inc.

Count Date: 17-Feb-12 Site #: 1202400002

Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Heavys - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00:21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15:18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Accu-Traffic Inc.
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Fax: 1-888-711-3125

Accu-Traffic Inc.

Count Date: 17-Feb-12 Site #: 1202400002

Interval Time	Passenger Cars - East Approach						Trucks - East Approach						Heavys - East Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		East Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	1	1	31	31	0	0	0	0	1	1	0	0	1	1	2	2	0	0	0	0
7:30:00	2	1	72	41	0	0	0	0	2	1	0	0	1	0	5	3	0	0	0	0
7:45:00	2	0	116	44	0	0	0	0	3	1	0	0	1	0	7	2	0	0	0	0
8:00:00	4	2	172	56	0	0	0	0	4	1	0	0	1	0	9	2	0	0	0	0
8:15:00	5	1	218	46	0	0	0	0	6	2	0	0	1	0	14	5	0	0	0	0
8:30:00	6	1	270	52	0	0	0	0	7	1	0	0	3	2	17	3	0	0	0	0
8:45:00	7	1	314	44	0	0	0	0	9	2	0	0	3	0	19	2	0	0	0	0
9:00:00	10	3	360	46	0	0	0	0	10	1	0	0	4	1	22	3	0	0	0	0
9:00:21	10	0	360	0	0	0	0	0	10	0	0	0	4	0	22	0	0	0	0	0
16:00:00	10	0	361	1	0	0	0	0	10	0	0	0	4	0	22	0	0	0	0	0
16:15:00	13	3	479	118	0	0	0	0	11	1	0	0	4	0	24	2	0	0	0	0
16:30:00	14	1	591	112	0	0	0	0	11	0	0	0	4	0	26	2	0	0	0	0
16:45:00	17	3	706	115	0	0	1	1	12	1	0	0	5	1	29	3	0	0	0	0
17:00:00	19	2	827	121	0	0	1	0	14	2	0	0	5	0	30	1	0	0	0	0
17:15:00	20	1	961	134	0	0	1	0	15	1	0	0	5	0	30	0	0	0	0	0
17:30:00	22	2	1096	135	0	0	1	0	15	0	0	0	5	0	32	2	0	0	0	0
17:45:00	23	1	1225	129	0	0	1	0	17	2	0	0	5	0	33	1	0	0	0	0
18:00:00	25	2	1335	110	0	0	1	0	18	1	0	0	6	1	34	1	0	0	0	0
18:15:00	25	0	1335	0	0	0	1	0	18	0	0	0	6	0	34	0	0	0	0	0
18:15:18	25	0	1335	0	0	0	1	0	18	0	0	0	6	0	34	0	0	0	0	0

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Count Date: 17-Feb-12 Site #: 1202400002

Interval Time	Passenger Cars - South Approach						Trucks - South Approach						Heavys - South Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		South Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	1	1	0	0	3	3	0	0	0	0	0	0	0	0	0	0	1	1	0	0
7:30:00	2	1	0	0	4	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
7:45:00	2	0	0	0	6	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0
8:00:00	3	1	0	0	8	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0
8:15:00	5	2	0	0	9	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
8:30:00	5	0	0	0	10	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0
8:45:00	6	1	0	0	11	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0
9:00:00	8	2	0	0	13	2	0	0	0	0	0	0	0	0	0	0	2	0	1	1
9:00:21	8	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0
16:00:00	8	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0
16:15:00	11	3	0	0	14	1	0	0	0	0	0	0	0	0	0	0	2	0	1	0
16:30:00	16	5	0	0	14	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0
16:45:00	21	5	0	0	15	1	0	0	0	0	1	1	1	1	0	0	2	0	1	0
17:00:00	26	5	0	0	20	5	0	0	0	0	1	0	1	0	0	0	2	0	1	0
17:15:00	29	3	0	0	22	2	0	0	0	0	1	0	1	0	0	0	2	0	1	0
17:30:00	35	6	0	0	22	0	0	0	0	0	1	0	1	0	0	0	2	0	1	0
17:45:00	40	5	0	0	25	3	0	0	0	0	1	0	1	0	0	0	2	0	1	0
18:00:00	42	2	0	0	26	1	0	0	0	0	1	0	1	0	0	0	2	0	1	0
18:15:00	42	0	0	0	26	0	0	0	0	0	1	0	1	0	0	0	2	0	1	0
18:15:18	42	0	0	0	26	0	0	0	0	0	1	0	1	0	0	0	2	0	1	0

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Accu-Traffic Inc.

Count Date: 17-Feb-12 Site #: 1202400002

Interval Time	Passenger Cars - West Approach						Trucks - West Approach						Heavys - West Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		West Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	114	114	2	2	0	0	1	1	0	0	0	0	1	1	0	0	0	0
7:30:00	0	0	234	120	2	0	0	0	3	2	0	0	0	0	3	2	0	0	0	0
7:45:00	0	0	360	126	3	1	0	0	5	2	0	0	0	0	6	3	0	0	0	0
8:00:00	0	0	479	119	11	8	0	0	7	2	0	0	0	0	7	1	2	2	0	0
8:15:00	0	0	590	111	15	4	0	0	12	5	0	0	0	0	9	2	2	0	0	0
8:30:00	0	0	692	102	19	4	0	0	14	2	0	0	0	0	10	1	2	0	0	0
8:45:00	0	0	787	95	22	3	0	0	15	1	0	0	0	0	13	3	2	0	0	0
9:00:00	0	0	883	96	27	5	0	0	15	0	0	0	0	0	15	2	3	1	0	0
9:00:21	0	0	883	0	27	0	0	0	15	0	0	0	0	0	15	0	3	0	0	0
16:00:00	0	0	884	1	27	0	0	0	15	0	0	0	0	0	15	0	3	0	0	0
16:15:00	0	0	935	51	29	2	0	0	15	0	0	0	0	0	17	2	3	0	0	0
16:30:00	0	0	994	59	33	4	0	0	16	1	0	0	0	0	21	4	3	0	0	0
16:45:00	0	0	1056	62	35	2	0	0	16	0	0	0	0	0	23	2	3	0	0	0
17:00:00	0	0	1118	62	37	2	0	0	17	1	0	0	0	0	26	3	3	0	0	0
17:15:00	0	0	1177	59	37	0	0	0	19	2	0	0	0	0	28	2	3	0	0	0
17:30:00	0	0	1242	65	37	0	0	0	20	1	0	0	0	0	31	3	3	0	0	0
17:45:00	0	0	1309	67	38	1	0	0	20	0	0	0	0	0	33	2	3	0	0	0
18:00:00	0	0	1370	61	40	2	0	0	21	1	0	0	0	0	36	3	3	0	0	0
18:15:00	0	0	1370	0	40	0	0	0	21	0	0	0	0	0	36	0	3	0	0	0
18:15:18	0	0	1370	0	40	0	0	0	21	0	0	0	0	0	36	0	3	0	0	0

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Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:15:00
To: 8:15:00

Municipality: Eramosa
Site #: 1202400001
Intersection: Hwy 7 & 6th Line
TFR File #: 3
Count date: 14-Feb-12

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

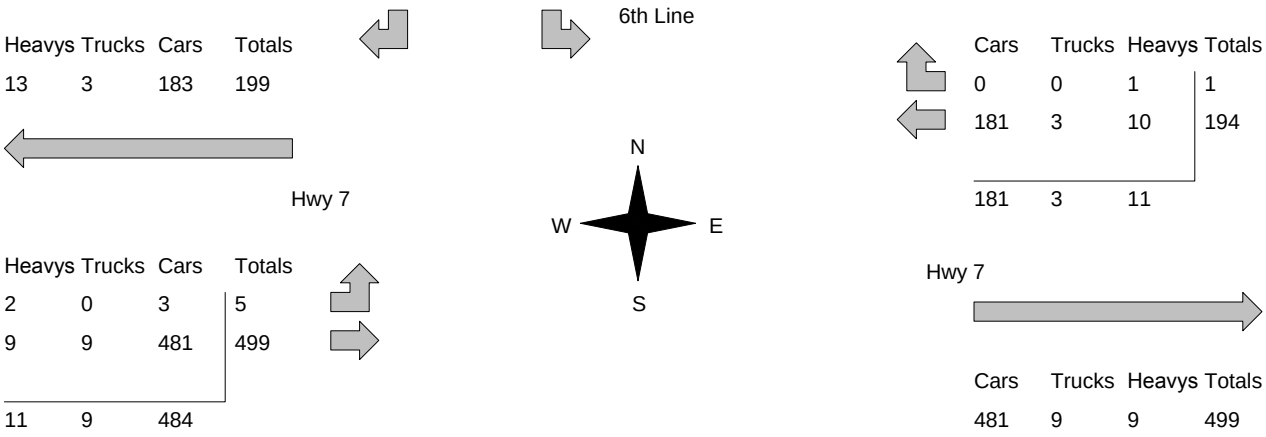
Major Road: Hwy 7 runs W/E

North Leg Total: 11
North Entering: 5
North Peds: 0
Peds Cross: ⋈

Heavys	3	0	3
Trucks	0	0	0
Cars	2	0	2
Totals	5	0	

Heavys	3
Trucks	0
Cars	3
Totals	6

East Leg Total: 694
East Entering: 195
East Peds: 0
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 0
West Entering: 504
West Leg Total: 703

Comments

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Accu-Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

Municipality: Eramosa
Site #: 1202400001
Intersection: Hwy 7 & 6th Line
TFR File #: 3
Count date: 14-Feb-12

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

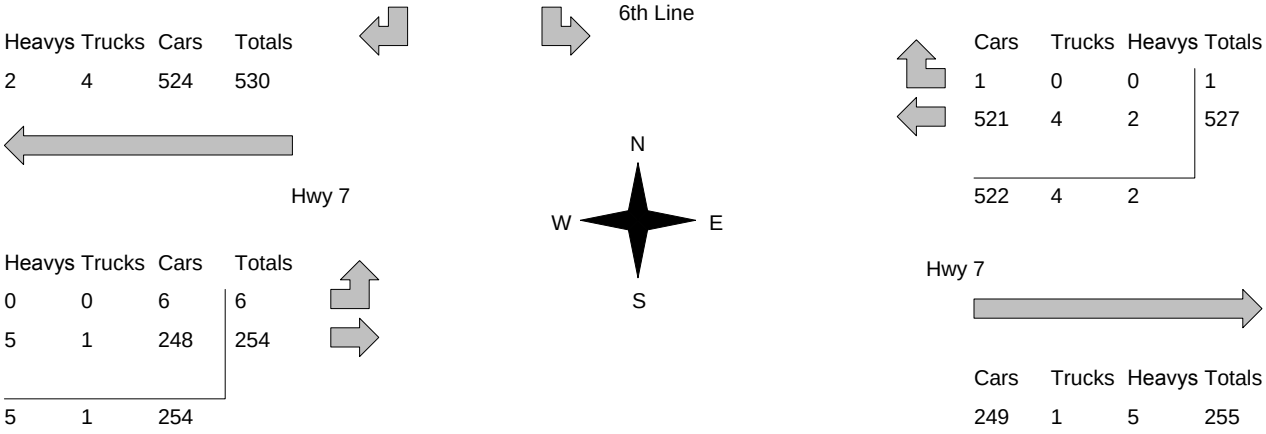
Major Road: Hwy 7 runs W/E

North Leg Total: 11
North Entering: 4
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	0	0	0
Cars	3	1	4
Totals	3	1	

Heavys	0
Trucks	0
Cars	7
Totals	7

East Leg Total: 783
East Entering: 528
East Peds: 0
Peds Cross: ⧖



Heavys	Trucks	Cars	Totals
2	4	524	530

Cars	Trucks	Heavys	Totals
1	0	0	1
521	4	2	527
522	4	2	

Heavys	Trucks	Cars	Totals
0	0	6	6
5	1	248	254
5	1	254	

Cars	Trucks	Heavys	Totals
249	1	5	255

Peds Cross: ⧖
West Peds: 0
West Entering: 260
West Leg Total: 790

Comments

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Total Count Diagram

Municipality: Eramosa
Site #: 1202400001
Intersection: Hwy 7 & 6th Line
TFR File #: 3
Count date: 14-Feb-12

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

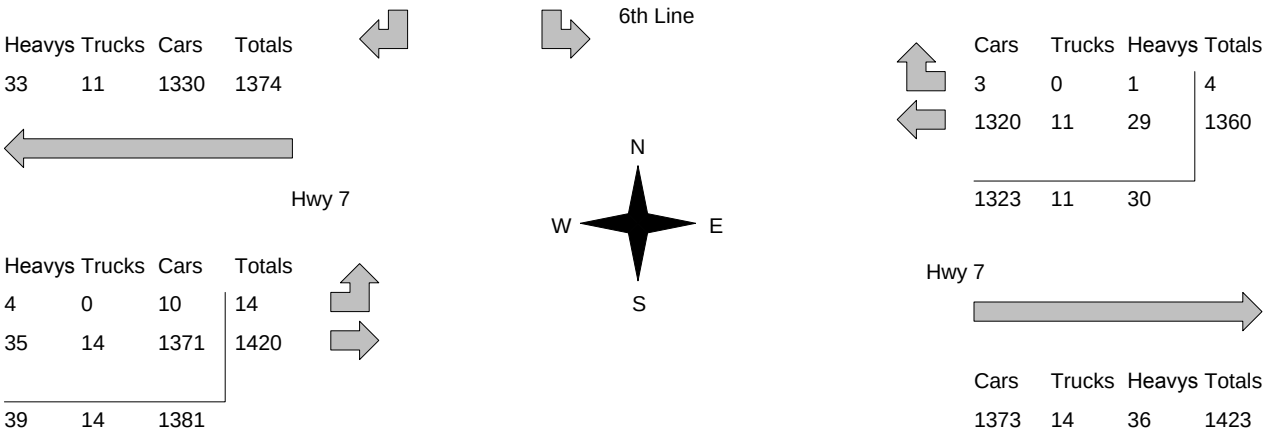
Major Road: Hwy 7 runs W/E

North Leg Total:	35		
North Entering:	17		
North Peds:	0		
Peds Cross:	⋈		

Heavys	4	1	5
Trucks	0	0	0
Cars	10	2	12
Totals	14	3	

Heavys	5		
Trucks	0		
Cars	13		
Totals	18		

East Leg Total:	2787		
East Entering:	1364		
East Peds:	0		
Peds Cross:	⧖		



Peds Cross:	⧖
West Peds:	0
West Entering:	1434
West Leg Total:	2808

Comments

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Accu-Traffic Inc.
Traffic Count Summary

Intersection: Hwy 7 & 6th Line | **Count Date:** 14-Feb-12 | **Municipality:** Eramosa

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	0	4	4	0
9:00:00	0	0	4	4	0
16:00:00	0	0	0	0	0
17:00:00	1	0	4	5	0
18:00:00	2	0	2	4	0
Totals:	3	0	14	17	0

North/South Total Approaches: 17

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	0	0	0	0
9:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0
17:00:00	0	0	0	0	0
18:00:00	0	0	0	0	0
	0	0	0	0	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	181	1	182	0
9:00:00	0	186	0	186	0
16:00:00	0	1	0	1	0
17:00:00	0	476	2	478	0
18:00:00	0	515	1	516	0
Totals:	0	1359	4	1363	0

East/West Total Approaches: 2797

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	2	0	2	0
8:00:00	3	509	0	512	0
9:00:00	2	414	0	416	0
16:00:00	1	2	0	3	0
17:00:00	3	251	0	254	0
18:00:00	5	242	0	247	0
	14	1420	0	1434	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	18:00	18:00	18:00
Crossing Values:	0	0	0	0	1	2	2	2

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Accu-Traffic Inc.

Count Date: 14-Feb-12 Site #: 1202400001

Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Heavys - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
8:00:00	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0
8:15:00	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	3	1	0	0
8:30:00	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	0	3	0	0	0
8:45:00	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
9:00:00	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
9:00:09	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
15:45:00	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
16:00:00	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
16:15:00	0	0	0	0	5	0	0	0	0	0	0	0	1	1	0	0	4	1	0	0
16:30:00	0	0	0	0	6	1	0	0	0	0	0	0	1	0	0	0	4	0	0	0
16:45:00	0	0	0	0	7	1	0	0	0	0	0	0	1	0	0	0	4	0	0	0
17:00:00	0	0	0	0	8	1	0	0	0	0	0	0	1	0	0	0	4	0	0	0
17:15:00	0	0	0	0	10	2	0	0	0	0	0	0	1	0	0	0	4	0	0	0
17:30:00	0	0	0	0	10	0	0	0	0	0	0	0	1	0	0	0	4	0	0	0
17:45:00	1	1	0	0	10	0	0	0	0	0	0	0	1	0	0	0	4	0	0	0
18:00:00	2	1	0	0	10	0	0	0	0	0	0	0	1	0	0	0	4	0	0	0
18:15:00	2	0	0	0	10	0	0	0	0	0	0	0	1	0	0	0	4	0	0	0
18:15:26	2	0	0	0	10	0	0	0	0	0	0	0	1	0	0	0	4	0	0	0

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Accu-Traffic Inc.

Count Date: 14-Feb-12 Site #: 1202400001

Interval Time	Passenger Cars - East Approach						Trucks - East Approach						Heavys - East Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		East Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	28	28	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
7:30:00	0	0	68	40	0	0	0	0	1	1	0	0	0	0	2	1	0	0	0	0
7:45:00	0	0	120	52	0	0	0	0	3	2	0	0	0	0	5	3	1	1	0	0
8:00:00	0	0	170	50	0	0	0	0	3	0	0	0	0	0	8	3	1	0	0	0
8:15:00	0	0	209	39	0	0	0	0	3	0	0	0	0	0	11	3	1	0	0	0
8:30:00	0	0	257	48	0	0	0	0	4	1	0	0	0	0	13	2	1	0	0	0
8:45:00	0	0	299	42	0	0	0	0	5	1	0	0	0	0	13	0	1	0	0	0
9:00:00	0	0	347	48	0	0	0	0	5	0	0	0	0	0	15	2	1	0	0	0
9:00:09	0	0	347	0	0	0	0	0	5	0	0	0	0	0	15	0	1	0	0	0
15:45:00	0	0	347	0	0	0	0	0	5	0	0	0	0	0	15	0	1	0	0	0
16:00:00	0	0	348	1	0	0	0	0	5	0	0	0	0	0	15	0	1	0	0	0
16:15:00	0	0	472	124	0	0	0	0	5	0	0	0	0	0	18	3	1	0	0	0
16:30:00	0	0	579	107	1	1	0	0	6	1	0	0	0	0	21	3	1	0	0	0
16:45:00	0	0	692	113	2	1	0	0	7	1	0	0	0	0	25	4	1	0	0	0
17:00:00	0	0	809	117	2	0	0	0	8	1	0	0	0	0	27	2	1	0	0	0
17:15:00	0	0	936	127	3	1	0	0	9	1	0	0	0	0	27	0	1	0	0	0
17:30:00	0	0	1083	147	3	0	0	0	11	2	0	0	0	0	27	0	1	0	0	0
17:45:00	0	0	1213	130	3	0	0	0	11	0	0	0	0	0	27	0	1	0	0	0
18:00:00	0	0	1319	106	3	0	0	0	11	0	0	0	0	0	29	2	1	0	0	0
18:15:00	0	0	1320	1	3	0	0	0	11	0	0	0	0	0	29	0	1	0	0	0
18:15:26	0	0	1320	0	3	0	0	0	11	0	0	0	0	0	29	0	1	0	0	0

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Count Date: 14-Feb-12 Site #: 1202400001

Interval Time	Passenger Cars - South Approach						Trucks - South Approach						Heavys - South Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		South Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00:09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15:26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc.

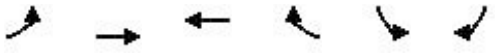
Count Date: 14-Feb-12 Site #: 1202400001

Interval Time	Passenger Cars - West Approach						Trucks - West Approach						Heavys - West Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		West Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
7:00:00	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	121	119	0	0	0	0	2	2	0	0	0	0	2	2	0	0	0	0
7:30:00	0	0	231	110	0	0	0	0	3	1	0	0	0	0	4	2	0	0	0	0
7:45:00	0	0	371	140	0	0	0	0	4	1	0	0	0	0	6	2	0	0	0	0
8:00:00	2	2	494	123	0	0	0	0	7	3	0	0	1	1	10	4	0	0	0	0
8:15:00	3	1	602	108	0	0	0	0	11	4	0	0	2	1	11	1	0	0	0	0
8:30:00	3	0	697	95	0	0	0	0	11	0	0	0	2	0	13	2	0	0	0	0
8:45:00	3	0	785	88	0	0	0	0	11	0	0	0	2	0	17	4	0	0	0	0
9:00:00	3	0	894	109	0	0	0	0	12	1	0	0	2	0	19	2	0	0	0	0
9:00:09	3	0	895	1	0	0	0	0	12	0	0	0	2	0	19	0	0	0	0	0
15:45:00	3	0	895	0	0	0	0	0	12	0	0	0	2	0	19	0	0	0	0	0
16:00:00	3	0	896	1	0	0	0	0	12	0	0	0	3	1	19	0	0	0	0	0
16:15:00	3	0	944	48	0	0	0	0	12	0	0	0	4	1	22	3	0	0	0	0
16:30:00	4	1	1008	64	0	0	0	0	12	0	0	0	4	0	25	3	0	0	0	0
16:45:00	4	0	1066	58	0	0	0	0	13	1	0	0	4	0	28	3	0	0	0	0
17:00:00	5	1	1132	66	0	0	0	0	14	1	0	0	4	0	32	4	0	0	0	0
17:15:00	7	2	1189	57	0	0	0	0	14	0	0	0	4	0	32	0	0	0	0	0
17:30:00	10	3	1250	61	0	0	0	0	14	0	0	0	4	0	32	0	0	0	0	0
17:45:00	10	0	1314	64	0	0	0	0	14	0	0	0	4	0	33	1	0	0	0	0
18:00:00	10	0	1371	57	0	0	0	0	14	0	0	0	4	0	35	2	0	0	0	0
18:15:00	10	0	1371	0	0	0	0	0	14	0	0	0	4	0	35	0	0	0	0	0
18:15:26	10	0	1371	0	0	0	0	0	14	0	0	0	4	0	35	0	0	0	0	0

APPENDIX B

Existing Traffic

Level Of Service Calculations



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	678	275	1	0	5
Future Volume (Veh/h)	5	678	275	1	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.65	0.65
Hourly flow rate (vph)	6	779	316	1	0	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	317				1108	316
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	317				1108	316
tC, single (s)	4.5				6.4	6.8
tC, 2 stage (s)						
tF (s)	2.6				3.5	3.8
p0 queue free %	99				100	99
cM capacity (veh/h)	1057				231	608

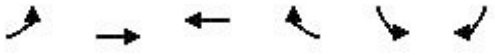
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	785	317	8
Volume Left	6	0	0
Volume Right	0	1	8
cSH	1057	1700	608
Volume to Capacity	0.01	0.19	0.01
Queue Length 95th (m)	0.1	0.0	0.3
Control Delay (s)	0.2	0.0	11.0
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	11.0
Approach LOS			B

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		49.7%	ICU Level of Service
Analysis Period (min)		15	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	658	15	4	271	4	6
Future Volume (Veh/h)	658	15	4	271	4	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	708	16	4	291	4	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			724		1015	716
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			724		1015	716
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	99
cM capacity (veh/h)			888		265	434

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	724	295	10
Volume Left	0	4	4
Volume Right	16	0	6
cSH	1700	888	346
Volume to Capacity	0.43	0.00	0.03
Queue Length 95th (m)	0.0	0.1	0.7
Control Delay (s)	0.0	0.2	15.7
Lane LOS		A	C
Approach Delay (s)	0.0	0.2	15.7
Approach LOS			C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	358	726	1	1	3
Future Volume (Veh/h)	6	358	726	1	1	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.60	0.60
Hourly flow rate (vph)	6	385	781	1	2	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	782				1178	782
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	782				1178	782
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	99
cM capacity (veh/h)	845				211	398

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	391	782	7
Volume Left	6	0	2
Volume Right	0	1	5
cSH	845	1700	318
Volume to Capacity	0.01	0.46	0.02
Queue Length 95th (m)	0.2	0.0	0.5
Control Delay (s)	0.2	0.0	16.6
Lane LOS	A		C
Approach Delay (s)	0.2	0.0	16.6
Approach LOS			C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

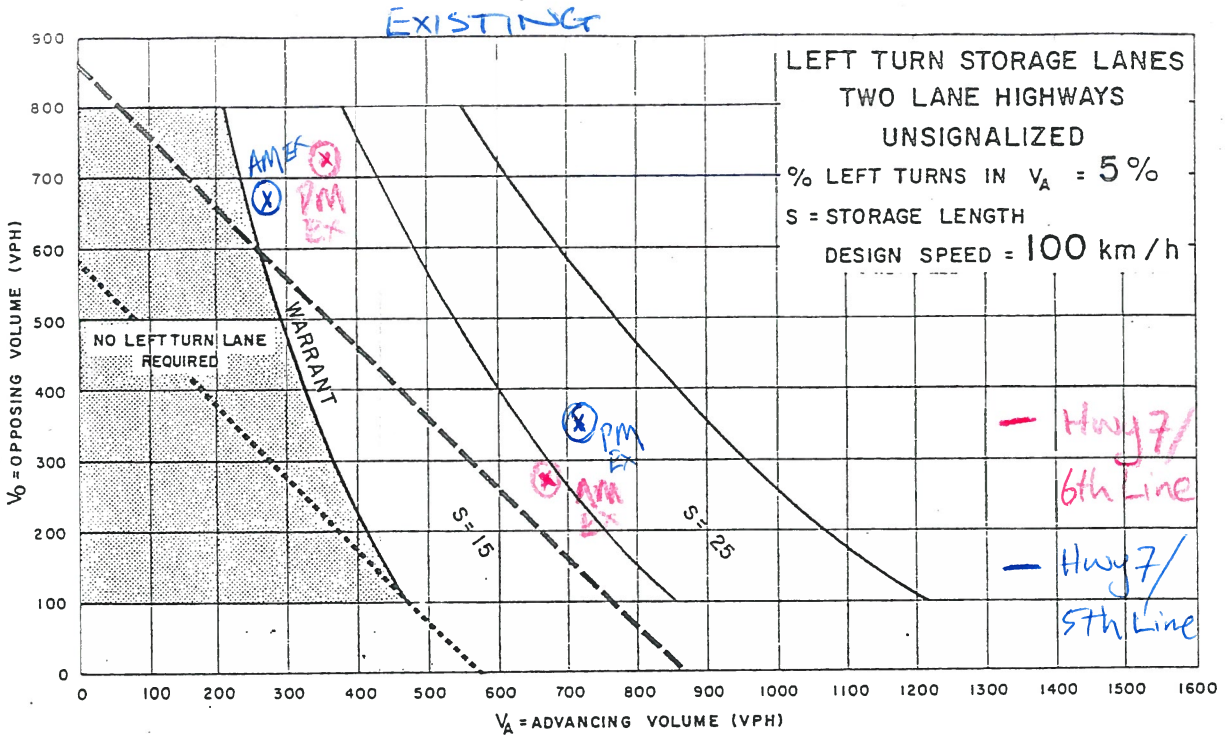
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	355	3	6	702	19	10
Future Volume (Veh/h)	355	3	6	702	19	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	366	3	6	724	20	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			369		1104	368
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			369		1104	368
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		91	99
cM capacity (veh/h)			1201		235	682

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	369	730	30
Volume Left	0	6	20
Volume Right	3	0	10
cSH	1700	1201	300
Volume to Capacity	0.22	0.00	0.10
Queue Length 95th (m)	0.0	0.1	2.5
Control Delay (s)	0.0	0.1	18.3
Lane LOS		A	C
Approach Delay (s)	0.0	0.1	18.3
Approach LOS			C

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization		51.7%	ICU Level of Service A
Analysis Period (min)		15	

APPENDIX C

Mto Geometric Design Standards Manual Left Turn Warrant Design Charts



TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

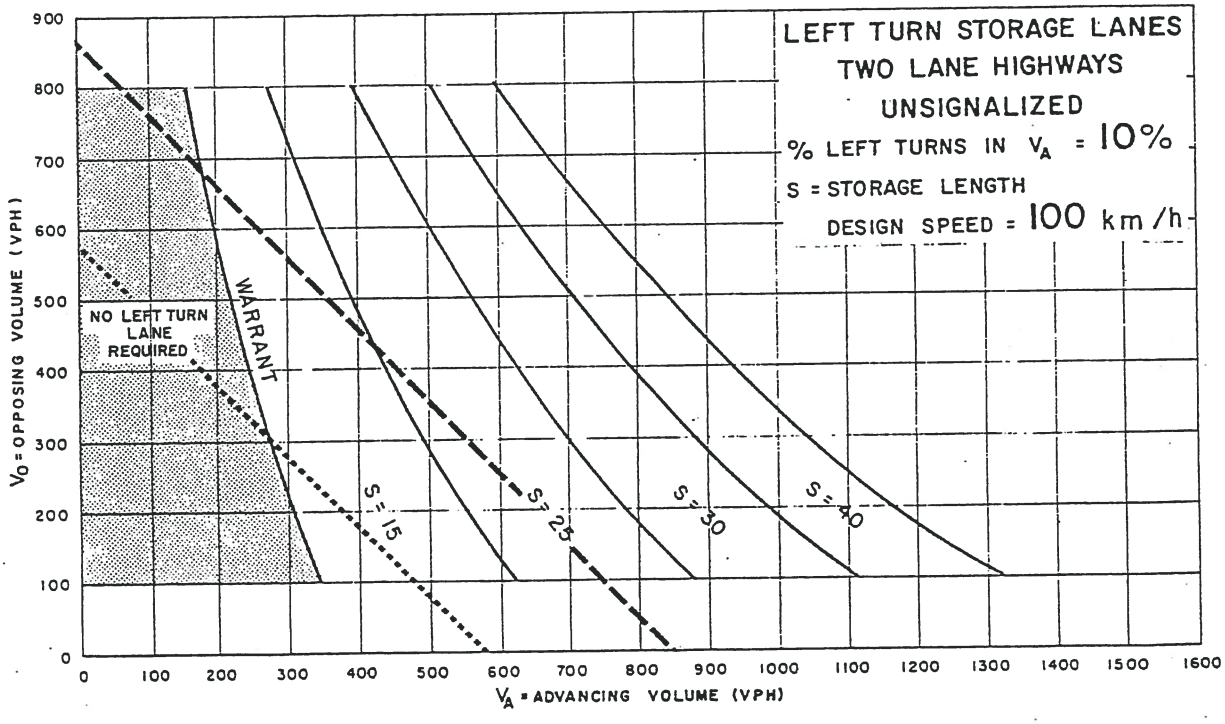
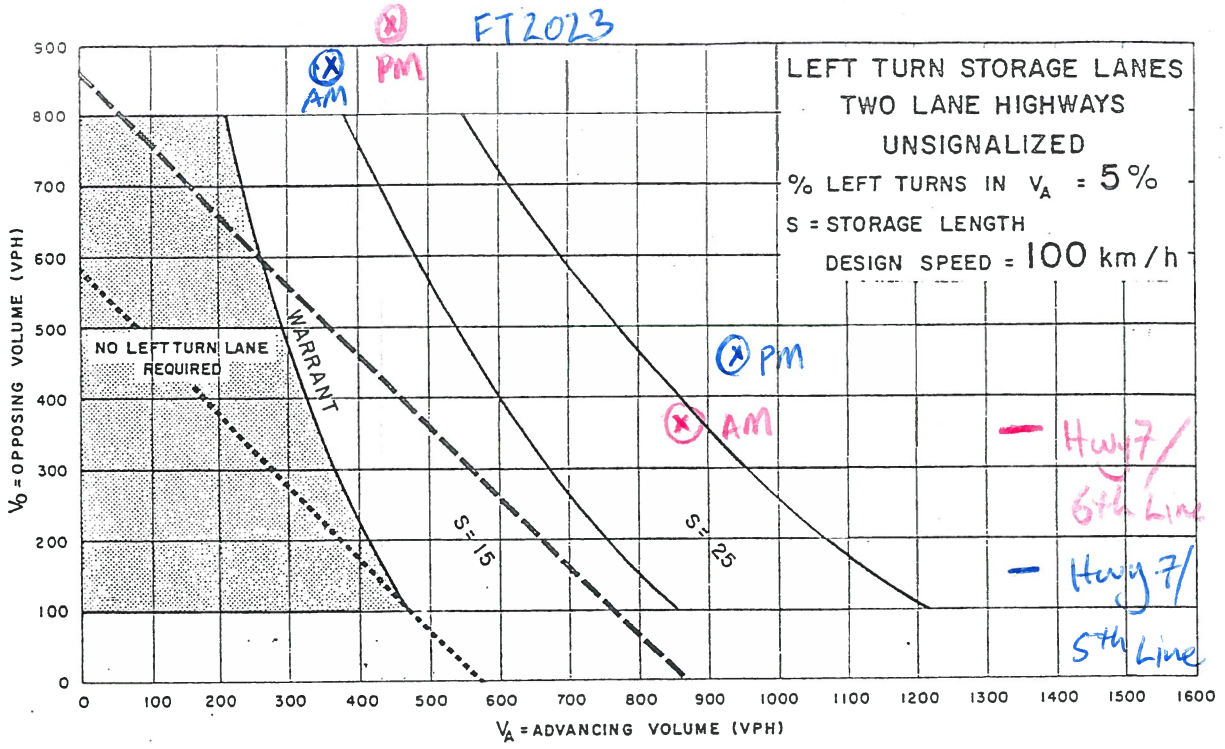


Figure EA-22



TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

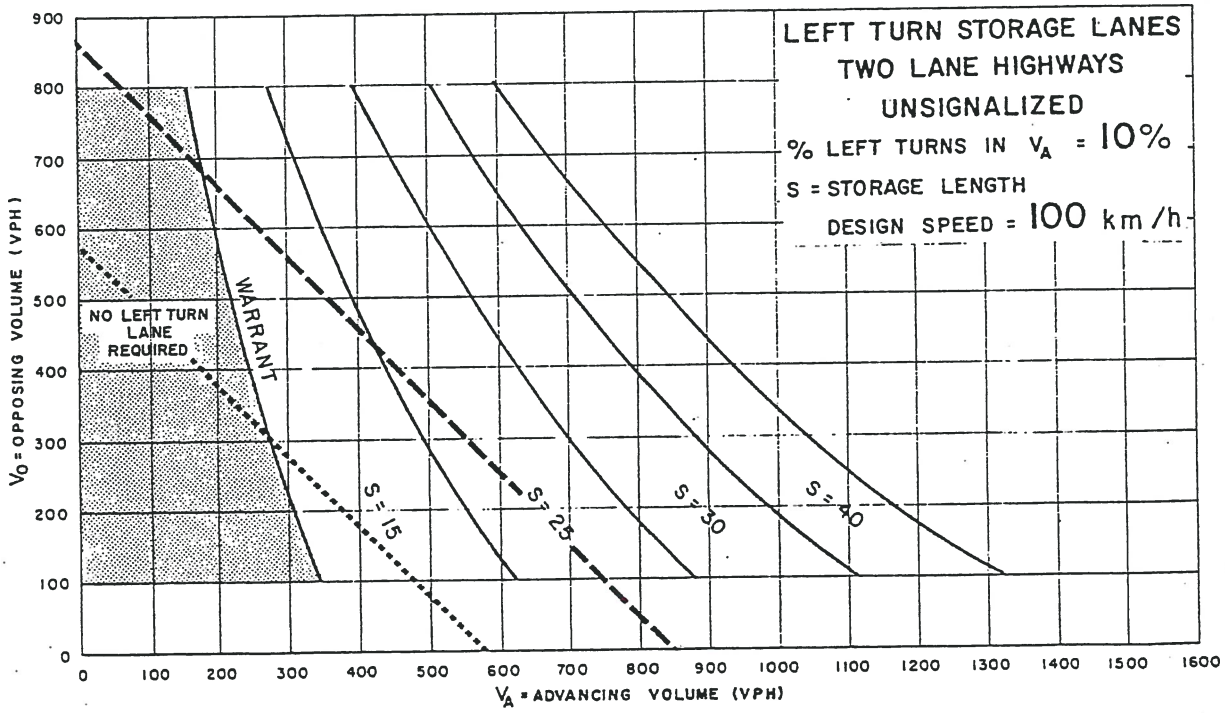
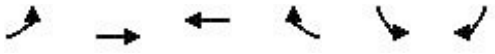


Figure EA-22

APPENDIX D

Existing Plus Site Related Traffic

Level Of Service Calculations



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	678	275	1	0	5
Future Volume (Veh/h)	5	678	275	1	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.65	0.65
Hourly flow rate (vph)	6	779	316	1	0	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	317				1108	316
vC1, stage 1 conf vol					316	
vC2, stage 2 conf vol					791	
vCu, unblocked vol	317				1108	316
tC, single (s)	4.5				6.4	6.8
tC, 2 stage (s)					5.4	
tF (s)	2.6				3.5	3.8
p0 queue free %	99				100	99
cM capacity (veh/h)	1057				411	608

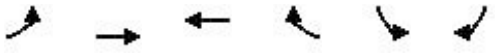
Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	6	779	317	8
Volume Left	6	0	0	0
Volume Right	0	0	1	8
cSH	1057	1700	1700	608
Volume to Capacity	0.01	0.46	0.19	0.01
Queue Length 95th (m)	0.1	0.0	0.0	0.3
Control Delay (s)	8.4	0.0	0.0	11.0
Lane LOS	A			B
Approach Delay (s)	0.1		0.0	11.0
Approach LOS				B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	658	15	4	271	4	6
Future Volume (Veh/h)	658	15	4	271	4	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	708	16	4	291	4	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage veh)	2					
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			724		1015	716
vC1, stage 1 conf vol					716	
vC2, stage 2 conf vol					299	
vCu, unblocked vol			724		1015	716
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			888		449	434

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	724	4	291	10
Volume Left	0	4	0	4
Volume Right	16	0	0	6
cSH	1700	888	1700	440
Volume to Capacity	0.43	0.00	0.17	0.02
Queue Length 95th (m)	0.0	0.1	0.0	0.5
Control Delay (s)	0.0	9.1	0.0	13.4
Lane LOS		A		B
Approach Delay (s)	0.0	0.1		13.4
Approach LOS				B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	358	726	1	1	3
Future Volume (Veh/h)	6	358	726	1	1	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.60	0.60
Hourly flow rate (vph)	6	385	781	1	2	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	782				1178	782
vC1, stage 1 conf vol					782	
vC2, stage 2 conf vol					397	
vCu, unblocked vol	782				1178	782
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	99
cM capacity (veh/h)	845				408	398

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	6	385	782	7
Volume Left	6	0	0	2
Volume Right	0	0	1	5
cSH	845	1700	1700	401
Volume to Capacity	0.01	0.23	0.46	0.02
Queue Length 95th (m)	0.2	0.0	0.0	0.4
Control Delay (s)	9.3	0.0	0.0	14.1
Lane LOS	A			B
Approach Delay (s)	0.1		0.0	14.1
Approach LOS				B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	355	3	6	702	19	10
Future Volume (Veh/h)	355	3	6	702	19	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	366	3	6	724	20	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage veh)	2					
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			369		1104	368
vC1, stage 1 conf vol					368	
vC2, stage 2 conf vol					736	
vCu, unblocked vol			369		1104	368
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	99
cM capacity (veh/h)			1201		429	682

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	369	6	724	30
Volume Left	0	6	0	20
Volume Right	3	0	0	10
cSH	1700	1201	1700	490
Volume to Capacity	0.22	0.00	0.43	0.06
Queue Length 95th (m)	0.0	0.1	0.0	1.5
Control Delay (s)	0.0	8.0	0.0	12.8
Lane LOS		A		B
Approach Delay (s)	0.0	0.1		12.8
Approach LOS				B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX E
Erin Gravel Pit Truck Trip Generation

James Dick Erin Pit August 2011 Busiest Month Shipping by Hour of the Day

DATE	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	TOTAL
02-Aug	13	20	19	11	19	15	15	19	8	16	2			158
03-Aug	9	4	7	5	5	4	7	5	9	6	1			62
04-Aug	11	13	11	15	15	11	18	15	21	13	2			145
05-Aug	9	11	12	16	12	8	16	11	9	10	0			114
08-Aug	11	8	11	9	15	5	21	11	16	12	1			123
09-Aug	8	13	12	9	5	4	7	5	5	1	1			71
10-Aug	6	12	12	7	16	7	12	8	10	10	0			100
11-Aug	5	14	7	17	13	9	11	10	5	3	2			96
12-Aug	12	14	13	12	19	7	16	8	11	8	2			122
13-Aug	6	2	5	4	2	3	0	0	0	0	0			22
15-Aug	12	7	23	16	20	13	21	13	17	18	1			162
16-Aug	10	8	10	8	23	6	14	16	10	13	1			119
17-Aug	16	13	18	12	21	15	15	16	14	17	5			162
18-Aug	20	15	22	17	11	16	18	19	15	19	2			174
19-Aug	11	13	16	14	10	5	18	11	12	15	2			122
22-Aug	12	12	21	12	21	8	22	17	19	16	4	1		170
23-Aug	9	9	11	9	10	4	15	5	11	5	6			94
24-Aug	8	11	14	9	7	16	10	21	12	12	8			128
25-Aug	18	11	19	13	23	14	20	10	14	9	1			152
26-Aug	12	9	18	11	14	8	17	11	12	12	7			131
29-Aug	15	11	12	13	14	13	13	12	14	11	7			135
30-Aug	15	11	19	12	21	17	15	18	9	20	2			159
31-Aug	15	5	16	10	11	11	10	11	7	8	1			105
TOTAL	263	246	328	261	327	219	331	272	260	254	58	1		2826
%	9.3%	8.7%	11.6%	9.2%	11.6%	7.7%	11.7%	9.6%	9.2%	9.0%	2.1%	0.0%		100%

Busiest Hour 23 Trucks Shipped in one hour
% of Monthly Shipping 23/2826 0.814%

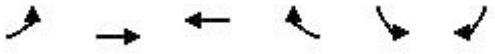
Total Monthly Tonnage Percentage for Erin Pit 2011

Jan-11	3.55%	
Feb-11	1.34%	
Mar-11	2.29%	
Apr-11	5.56%	
May-11	9.44%	
Jun-11	13.86%	
Jul-11	11.05%	
Aug-11	14.09%	Busiest Month
Sep-11	12.27%	
11-Oct	8.90%	
Nov-11	11.70%	
Dec-11	5.95%	
Total		

APPENDIX F

Future (2018) Total Traffic

Level Of Service Calculations



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	761	310	19	18	7
Future Volume (Veh/h)	7	761	310	19	18	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.65	0.65
Hourly flow rate (vph)	8	875	356	22	28	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	378				1258	367
vC1, stage 1 conf vol					367	
vC2, stage 2 conf vol					891	
vCu, unblocked vol	378				1258	367
tC, single (s)	4.5				7.4	6.9
tC, 2 stage (s)					6.4	
tF (s)	2.6				4.4	3.9
p0 queue free %	99				89	98
cM capacity (veh/h)	988				253	549

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	8	875	378	39
Volume Left	8	0	0	28
Volume Right	0	0	22	11
cSH	988	1700	1700	298
Volume to Capacity	0.01	0.51	0.22	0.13
Queue Length 95th (m)	0.2	0.0	0.0	3.4
Control Delay (s)	8.7	0.0	0.0	18.9
Lane LOS	A			C
Approach Delay (s)	0.1		0.0	18.9
Approach LOS				C

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	762	17	5	324	5	7
Future Volume (Veh/h)	762	17	5	324	5	7
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	819	18	5	348	5	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage veh)	2					
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			837		1186	828
vC1, stage 1 conf vol					828	
vC2, stage 2 conf vol					358	
vCu, unblocked vol			837		1186	828
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	98
cM capacity (veh/h)			806		396	374

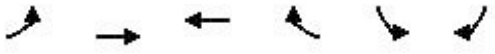
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	837	5	348	13
Volume Left	0	5	0	5
Volume Right	18	0	0	8
cSH	1700	806	1700	382
Volume to Capacity	0.49	0.01	0.20	0.03
Queue Length 95th (m)	0.0	0.1	0.0	0.8
Control Delay (s)	0.0	9.5	0.0	14.8
Lane LOS		A		B
Approach Delay (s)	0.0	0.1		14.8
Approach LOS				B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	0	7	19	0	6
Future Volume (Veh/h)	19	0	7	19	0	6
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65
Hourly flow rate (vph)	29	0	11	29	0	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	34	26			40	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	34	26			40	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	96	100			100	
cM capacity (veh/h)	778	1050			1570	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	29	40	9
Volume Left	29	0	0
Volume Right	0	29	0
cSH	778	1700	1570
Volume to Capacity	0.04	0.02	0.00
Queue Length 95th (m)	0.9	0.0	0.0
Control Delay (s)	9.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.8	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	403	813	19	19	4
Future Volume (Veh/h)	8	403	813	19	19	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.60	0.60
Hourly flow rate (vph)	9	433	874	20	32	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	894				1335	884
vC1, stage 1 conf vol					884	
vC2, stage 2 conf vol					451	
vCu, unblocked vol	894				1335	884
tC, single (s)	4.2				7.3	6.5
tC, 2 stage (s)					6.3	
tF (s)	2.3				4.4	3.5
p0 queue free %	99				87	98
cM capacity (veh/h)	715				254	313

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	9	433	894	39
Volume Left	9	0	0	32
Volume Right	0	0	20	7
cSH	715	1700	1700	263
Volume to Capacity	0.01	0.25	0.53	0.15
Queue Length 95th (m)	0.3	0.0	0.0	3.9
Control Delay (s)	10.1	0.0	0.0	21.1
Lane LOS	B			C
Approach Delay (s)	0.2		0.0	21.1
Approach LOS				C

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	419	3	7	811	21	11
Future Volume (Veh/h)	419	3	7	811	21	11
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	432	3	7	836	22	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage veh)	2					
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			435		1284	434
vC1, stage 1 conf vol					434	
vC2, stage 2 conf vol					850	
vCu, unblocked vol			435		1284	434
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		94	98
cM capacity (veh/h)			1135		377	627

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	435	7	836	33
Volume Left	0	7	0	22
Volume Right	3	0	0	11
cSH	1700	1135	1700	435
Volume to Capacity	0.26	0.01	0.49	0.08
Queue Length 95th (m)	0.0	0.1	0.0	1.9
Control Delay (s)	0.0	8.2	0.0	14.0
Lane LOS		A		B
Approach Delay (s)	0.0	0.1		14.0
Approach LOS				B

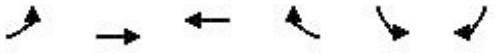
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	0	8	19	0	4
Future Volume (Veh/h)	19	0	8	19	0	4
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60
Hourly flow rate (vph)	32	0	13	32	0	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	36	29			45	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	36	29			45	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	96	100			100	
cM capacity (veh/h)	777	1046			1563	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	32	45	7
Volume Left	32	0	0
Volume Right	0	32	0
cSH	777	1700	1563
Volume to Capacity	0.04	0.03	0.00
Queue Length 95th (m)	1.0	0.0	0.0
Control Delay (s)	9.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.8	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX G
Future (2023) Total Traffic
Level Of Service Calculations



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	861	351	19	18	7
Future Volume (Veh/h)	7	861	351	19	18	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.65	0.65
Hourly flow rate (vph)	8	990	403	22	28	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	425				1420	414
vC1, stage 1 conf vol					414	
vC2, stage 2 conf vol					1006	
vCu, unblocked vol	425				1420	414
tC, single (s)	4.5				7.4	6.9
tC, 2 stage (s)					6.4	
tF (s)	2.6				4.4	3.9
p0 queue free %	99				87	98
cM capacity (veh/h)	946				218	513

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	8	990	425	39
Volume Left	8	0	0	28
Volume Right	0	0	22	11
cSH	946	1700	1700	261
Volume to Capacity	0.01	0.58	0.25	0.15
Queue Length 95th (m)	0.2	0.0	0.0	3.9
Control Delay (s)	8.8	0.0	0.0	21.2
Lane LOS	A			C
Approach Delay (s)	0.1		0.0	21.2
Approach LOS				C

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	860	19	5	365	5	8
Future Volume (Veh/h)	860	19	5	365	5	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	925	20	5	392	5	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage veh)	2					
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			945		1337	935
vC1, stage 1 conf vol					935	
vC2, stage 2 conf vol					402	
vCu, unblocked vol			945		1337	935
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	97
cM capacity (veh/h)			734		352	325

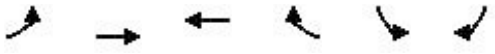
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	945	5	392	14
Volume Left	0	5	0	5
Volume Right	20	0	0	9
cSH	1700	734	1700	334
Volume to Capacity	0.56	0.01	0.23	0.04
Queue Length 95th (m)	0.0	0.2	0.0	1.0
Control Delay (s)	0.0	9.9	0.0	16.3
Lane LOS		A		C
Approach Delay (s)	0.0	0.1		16.3
Approach LOS				C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	0	7	19	0	6
Future Volume (Veh/h)	19	0	7	19	0	6
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65
Hourly flow rate (vph)	29	0	11	29	0	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	34	26			40	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	34	26			40	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	96	100			100	
cM capacity (veh/h)	778	1050			1570	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	29	40	9
Volume Left	29	0	0
Volume Right	0	29	0
cSH	778	1700	1570
Volume to Capacity	0.04	0.02	0.00
Queue Length 95th (m)	0.9	0.0	0.0
Control Delay (s)	9.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.8	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	457	922	19	19	5
Future Volume (Veh/h)	9	457	922	19	19	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.60	0.60
Hourly flow rate (vph)	10	491	991	20	32	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1011				1512	1001
vC1, stage 1 conf vol					1001	
vC2, stage 2 conf vol					511	
vCu, unblocked vol	1011				1512	1001
tC, single (s)	4.2				7.3	6.4
tC, 2 stage (s)					6.3	
tF (s)	2.3				4.4	3.5
p0 queue free %	98				85	97
cM capacity (veh/h)	652				219	272

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	10	491	1011	40
Volume Left	10	0	0	32
Volume Right	0	0	20	8
cSH	652	1700	1700	228
Volume to Capacity	0.02	0.29	0.59	0.18
Queue Length 95th (m)	0.4	0.0	0.0	4.7
Control Delay (s)	10.6	0.0	0.0	24.2
Lane LOS	B			C
Approach Delay (s)	0.2		0.0	24.2
Approach LOS				C

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	472	4	8	917	24	13
Future Volume (Veh/h)	472	4	8	917	24	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	487	4	8	945	25	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage veh)	2					
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			491		1450	489
vC1, stage 1 conf vol					489	
vC2, stage 2 conf vol					961	
vCu, unblocked vol			491		1450	489
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		92	98
cM capacity (veh/h)			1083		333	583

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	491	8	945	38
Volume Left	0	8	0	25
Volume Right	4	0	0	13
cSH	1700	1083	1700	391
Volume to Capacity	0.29	0.01	0.56	0.10
Queue Length 95th (m)	0.0	0.2	0.0	2.4
Control Delay (s)	0.0	8.3	0.0	15.2
Lane LOS		A		C
Approach Delay (s)	0.0	0.1		15.2
Approach LOS				C

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	0	9	19	0	5
Future Volume (Veh/h)	19	0	9	19	0	5
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60
Hourly flow rate (vph)	32	0	15	32	0	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	39	31			47	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	39	31			47	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	96	100			100	
cM capacity (veh/h)	773	1043			1560	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	32	47	8
Volume Left	32	0	0
Volume Right	0	32	0
cSH	773	1700	1560
Volume to Capacity	0.04	0.03	0.00
Queue Length 95th (m)	1.0	0.0	0.0
Control Delay (s)	9.9	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.9	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX H
2023 SimTraffic Analysis

Intersection: 1: Highway 7 & 6th Line

Movement	EB	EB	SB
Directions Served	L	T	LR
Maximum Queue (m)	10.2	3.0	26.4
Average Queue (m)	0.9	0.1	9.9
95th Queue (m)	5.6	2.1	24.5
Link Distance (m)		193.0	162.4
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)	25.0		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: 5th Line & Highway 7

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (m)	7.6	10.4
Average Queue (m)	1.1	2.6
95th Queue (m)	5.3	9.0
Link Distance (m)		167.9
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	25.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: 6th Line & Access

Movement	WB
Directions Served	LR
Maximum Queue (m)	19.2
Average Queue (m)	7.3
95th Queue (m)	20.7
Link Distance (m)	129.9
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: Highway 7 & 6th Line

Movement	EB	SB
Directions Served	L	LR
Maximum Queue (m)	6.1	22.3
Average Queue (m)	1.7	9.0
95th Queue (m)	6.7	25.1
Link Distance (m)		162.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	25.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: 5th Line & Highway 7

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (m)	6.1	11.4
Average Queue (m)	1.2	7.4
95th Queue (m)	5.8	15.2
Link Distance (m)		167.9
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	25.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: 6th Line & Access

Movement	WB
Directions Served	LR
Maximum Queue (m)	19.7
Average Queue (m)	7.7
95th Queue (m)	22.5
Link Distance (m)	129.9
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

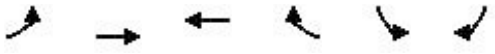
Network Summary

Network wide Queuing Penalty: 0

APPENDIX I

Future (2033) Total Traffic

Level Of Service Calculations



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	1104	449	20	18	9
Future Volume (Veh/h)	9	1104	449	20	18	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.65	0.65
Hourly flow rate (vph)	10	1269	516	23	28	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	539				1816	528
vC1, stage 1 conf vol					528	
vC2, stage 2 conf vol					1289	
vCu, unblocked vol	539				1816	528
tC, single (s)	4.5				7.4	6.9
tC, 2 stage (s)					6.4	
tF (s)	2.6				4.4	3.9
p0 queue free %	99				82	97
cM capacity (veh/h)	848				151	443

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	10	1269	539	42
Volume Left	10	0	0	28
Volume Right	0	0	23	14
cSH	848	1700	1700	194
Volume to Capacity	0.01	0.75	0.32	0.22
Queue Length 95th (m)	0.3	0.0	0.0	6.0
Control Delay (s)	9.3	0.0	0.0	28.6
Lane LOS	A			D
Approach Delay (s)	0.1		0.0	28.6
Approach LOS				D

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1097	25	7	462	7	10
Future Volume (Veh/h)	1097	25	7	462	7	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1180	27	8	497	8	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage veh)	2					
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			1207		1706	1194
vC1, stage 1 conf vol					1194	
vC2, stage 2 conf vol					513	
vCu, unblocked vol			1207		1706	1194
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	95
cM capacity (veh/h)			585		265	230

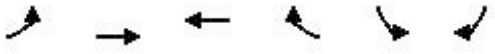
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1207	8	497	19
Volume Left	0	8	0	8
Volume Right	27	0	0	11
cSH	1700	585	1700	244
Volume to Capacity	0.71	0.01	0.29	0.08
Queue Length 95th (m)	0.0	0.3	0.0	1.9
Control Delay (s)	0.0	11.2	0.0	21.0
Lane LOS		B		C
Approach Delay (s)	0.0	0.2		21.0
Approach LOS				C

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	0	10	19	0	8
Future Volume (Veh/h)	19	0	10	19	0	8
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65
Hourly flow rate (vph)	29	0	15	29	0	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	42	30			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	42	30			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	96	100			100	
cM capacity (veh/h)	770	1045			1564	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	29	44	12
Volume Left	29	0	0
Volume Right	0	29	0
cSH	770	1700	1564
Volume to Capacity	0.04	0.03	0.00
Queue Length 95th (m)	0.9	0.0	0.0
Control Delay (s)	9.9	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.9	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	585	1180	20	20	6
Future Volume (Veh/h)	11	585	1180	20	20	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.60	0.60
Hourly flow rate (vph)	12	629	1269	22	33	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1291				1933	1280
vC1, stage 1 conf vol					1280	
vC2, stage 2 conf vol					653	
vCu, unblocked vol	1291				1933	1280
tC, single (s)	4.2				7.3	6.4
tC, 2 stage (s)					6.3	
tF (s)	2.3				4.3	3.5
p0 queue free %	98				79	95
cM capacity (veh/h)	514				157	188

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	12	629	1291	43
Volume Left	12	0	0	33
Volume Right	0	0	22	10
cSH	514	1700	1700	163
Volume to Capacity	0.02	0.37	0.76	0.26
Queue Length 95th (m)	0.5	0.0	0.0	7.7
Control Delay (s)	12.2	0.0	0.0	34.8
Lane LOS	B			D
Approach Delay (s)	0.2		0.0	34.8
Approach LOS				D

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	600	5	10	1169	31	16
Future Volume (Veh/h)	600	5	10	1169	31	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	619	5	10	1205	32	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage veh)	2					
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			624		1846	622
vC1, stage 1 conf vol					622	
vC2, stage 2 conf vol					1225	
vCu, unblocked vol			624		1846	622
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		87	97
cM capacity (veh/h)			967		249	491

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	624	10	1205	48
Volume Left	0	10	0	32
Volume Right	5	0	0	16
cSH	1700	967	1700	298
Volume to Capacity	0.37	0.01	0.71	0.16
Queue Length 95th (m)	0.0	0.2	0.0	4.3
Control Delay (s)	0.0	8.8	0.0	19.4
Lane LOS		A		C
Approach Delay (s)	0.0	0.1		19.4
Approach LOS				C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	0	12	19	0	7
Future Volume (Veh/h)	19	0	12	19	0	7
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60
Hourly flow rate (vph)	32	0	20	32	0	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	48	36			52	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	48	36			52	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	96	100			100	
cM capacity (veh/h)	763	1037			1554	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	32	52	12
Volume Left	32	0	0
Volume Right	0	32	0
cSH	763	1700	1554
Volume to Capacity	0.04	0.03	0.00
Queue Length 95th (m)	1.0	0.0	0.0
Control Delay (s)	9.9	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.9	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX J
Statement Of Limiting Conditions And Assumptions

Statement of Limiting Conditions and Assumptions

1. This Report/Study (the "Work") has been prepared at the request of, and for the exclusive use of, the Owner, and its affiliates (the "Intended Users"). No one other than the Intended Users has the right to use and rely on the Work without first obtaining the written authorization of Cole Engineering Group Ltd. (Cole Engineering) and its Owner.

2. Cole Engineering expressly excludes liability to any party except the Intended Users for any use of, and/or reliance upon, the Work.

3. Cole Engineering notes that the following assumptions were made in completing the Work:

   a) the land use description(s) supplied to us are correct;
   b) the surveys and data supplied to Cole Engineering by the Owner are accurate;
   c) market timing, approval delivery and secondary source information is within the control of Parties other than Cole Engineering; and
   d) there are no encroachments, leases, covenants, binding agreements, restrictions, pledges, charges, liens or special assessments outstanding, or encumbrances which would significantly affect the use or servicing.

   Investigations have not been carried out to verify these assumptions. Cole Engineering deems the sources of data and statistical information contained herein to be reliable, but we extend no guarantee of accuracy in these respects.

4. Cole Engineering accepts no responsibility for legal interpretations, questions of survey, opinion of title, hidden or inconspicuous conditions of the property, toxic wastes or contaminated materials, soil or sub-soil conditions, environmental, engineering or other factual and technical matters disclosed by the Owner, the Client, or any public agency, which by their nature, may change the outcome of the Work. Such factors, beyond the scope of this Work, could affect the findings, conclusions and opinions rendered in the Work. We have made disclosure of related potential problems that have come to our attention. Responsibility for diligence with respect to all matters of fact reported herein rests with the Intended Users.

5. Cole Engineering practices engineering in the general areas of infrastructure and transportation. It is not qualified to and is not providing legal or planning advice in this Work.

6. The legal description of the property and the area of the site were based upon surveys and data supplied to us by the Owner. The plans, photographs, and sketches contained in this report are included solely to aide in visualizing the location of the property, the configuration and boundaries of the site, and the relative position of the improvements on the said lands.

7. We have made investigations from secondary sources as documented in the Work, but we have not checked for compliance with by-laws, codes, agency and governmental regulations, etc., unless specifically noted in the Work.

8. Because conditions, including capacity, allocation, economic, social, and political factors change rapidly and, on occasion, without notice or warning, the findings of the Work expressed herein, are as of the date of the Work and cannot necessarily be relied upon as of any other date without subsequent advice from Cole Engineering.

9. The value of proposed improvements should be applied only with regard to the purpose and function of the Work, as outlined in the body of this Work. Any cost estimates set out in the Work are based on construction averages and subject to change.

10. Neither possession of the Work, nor a copy of it, carries the right of publication. All copyright in the Work is reserved to Cole Engineering. The Work shall not be disclosed, produced or reproduced, quoted from, or referred to, in whole or in part, or published in any manner, without the express written consent of Cole Engineering and the Owner.

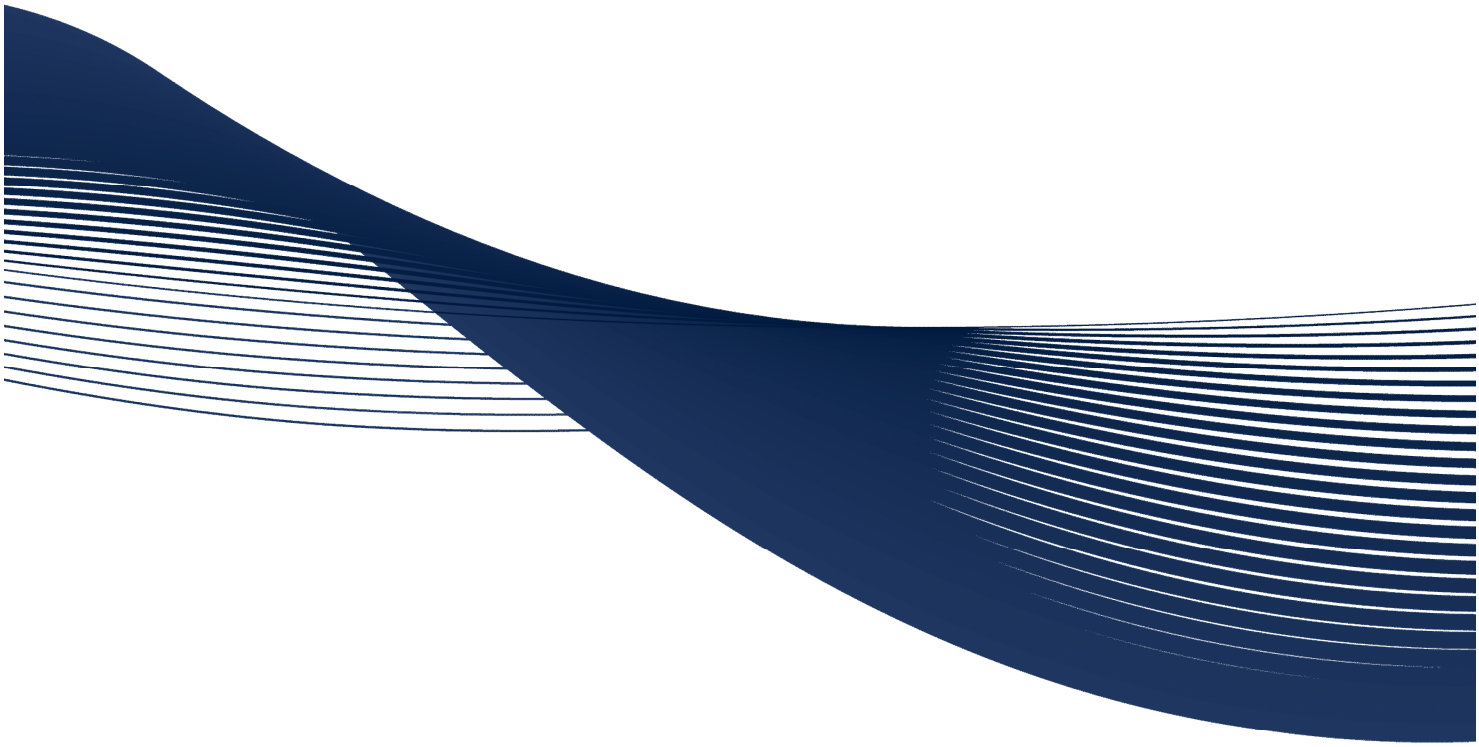
11. The Work is only valid if it bears the professional engineer's seal and original signature of the author, and if considered in its entirety. Responsibility for unauthorized alteration to the Work is denied.

JAMES DICK CONSTRUCTION LIMITED

REVISED HAUL ROUTE STUDY

Eramosa Quarry, Township of Guelph-Eramosa

Project No.: TR12-0013



May 2016

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COLE ENGINEERING

Experience Enhancing Excellence

May 10, 2016
Our Ref: TR12-0013

James Dick Construction Ltd.
P.O. Box 470
Bolton, ON L7E 5T4

Attention: Mr. Greg Sweetnam, B.Sc.
Vice President, Resources

Dear Mr. Sweetnam:

Re: Revised Haul Route Study
Eramosa Quarry (Hidden Quarry)
Township of Guelph-Eramosa

Cole Engineering Group Ltd. is pleased to submit this Haul Route Study for the proposed Eramosa Quarry in the Township of Guelph-Eramosa.

Our study finds that the proposed quarry will have minimal impact on the surrounding road network with a design hour of 38 truck trips during the a.m. peak period dispersed over several haul routes. This design hour represents the 30th busiest hour, or 88th percentile, of the year and is suitable for calculation purposes.

This study has also reviewed the existing traffic and collision history along Regional Road 25, the expected major route of the Eramosa Quarry and finds that Steps 5 through 8 of the *Haul Route Study – Terms of Reference* are not required.

Should you have any questions regarding the study, please do not hesitate to contact the undersigned.

Yours truly,

COLE ENGINEERING GROUP LTD.

LICENSED PROFESSIONAL ENGINEER
J. E. GOWRIE
100134878
05/10/16
PROVINCE OF ONTARIO

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Statement of Conditions

This Report / Study (the "Work") has been prepared at the request of, and for the exclusive use of, the Owner / Client, and its affiliates (the "Intended User"). No one other than the Intended User has the right to use and rely on the Work without first obtaining the written authorization of Cole Engineering Group Ltd. and its Owner. Cole Engineering expressly excludes liability to any party except the intended User for any use of, and/or reliance upon, the work.

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Appendix I – Modified Main Street / Mill Street Configuration Level of Service Calculations
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1.0 Introduction

Cole Engineering Group Ltd. (Cole Engineering) has prepared this Haul Route study on behalf of James Dick Construction Ltd. (the "Owner") for the proposed Hidden Quarry (Eramosa Quarry). The subject lands are approximately 39.4 hectares (97 acres) in area and are located on the northeast quadrant of the Highway 7 and 6th Line intersection (west half of Lot 1, Concession 6) in the Township of Guelph/Eramosa. The site location is identified in **Figure 1-1**.

The study has been requested by the Region of Halton, Town of Milton and Town of Halton Hills and its purpose is to identify the operating characteristics of the facility and the expected haul routes to and from the proposed quarry. The *Haul Route Study – Terms of Reference Proposed "Hidden Quarry" – James Dick Construction Ltd. (Terms of Reference)* which is provided in **Appendix A**.

2.0 Operating Characteristics

2.1. Fleet Size

The number of trips forecasted in the analysis was derived using the James Dick Construction Ltd.'s fleet size. The information related to James Dick Construction Ltd.'s fleet if provided in **Table 2.1**.

Table 2.1 Fleet Size

Vehicle Type	Payload	Number of Units
Tri-Axle Straight Truck	22.7 Tonnes	21
Tri-Axle Tractor Trailer	35.1 Tonnes	18
Quad-Axle Tractor Trailer	39.1 Tonnes	16
Tri-Axel Pony Pup Combination	41.4 Tonnes	30
Total	**35.0 Tonnes**	**85**

There is a fleet size of 85 vehicles with an average haul size of 35 tonnes. To be conservative, a load size of 33 tonnes per truck was assumed in calculations.

2.2. Truck Traffic

The proposed quarry is applying for a license of 700,000 tonnes of aggregate and has a life expectancy of 20 years. Based on the fleet operated by James Dick Construction, each load will be approximately 33 tonnes resulting in a total of 21,213 truck loads per year. The quarry will only be operated from 6:00 a.m. to 6:00 p.m. Monday to Saturday, excluding public holidays, and have an average of 69 truck loads per day. It is important to note that the distribution of truck traffic varies throughout the year based on construction projects.

Operation of the Hidden Quarry is expected to be similar to the Erin Pit which has a license for 723,000 tonnes per annum. The Erin Pit data is provided in **Appendix B**. This is a good comparison due to its proximity as well as the similar license size to the Hidden Quarry. Using the data provided by James Dick Construction Ltd., the annual distribution of truck traffic for the Hidden Quarry is provided in **Figure 2-1**.

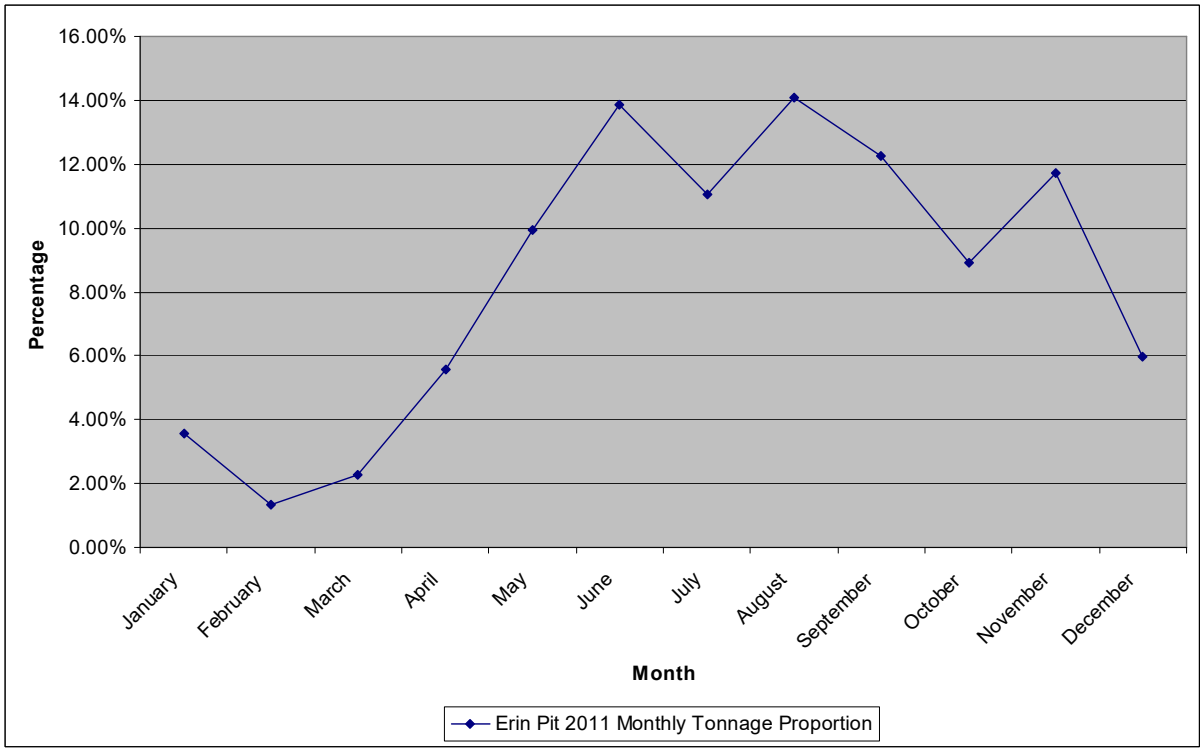

Figure 2-1 2011 Erin Pit Monthly Distribution

Based on the monthly variation of traffic, the quarry is expected to have an approximate total of 282 truck loads during the month of February and 2989 truck loads in the month of August. The expected number of truck loads by month is provided in **Table 2.2**.

Table 2.2 Expected Monthly Distribution of Trucks

Month	Monthly Proportion of Truck Traffic	Trucks Per Month
January	3.50%	742
February	1.33%	282
March	2.20%	467
April	5.50%	1167
May	9.90%	2100
June	13.86%	2940
July	11.00%	2333
August	14.09%	2989
September	12.27%	2603
October	8.80%	1867
November	11.70%	2482
December	5.85%	1241

The trips were then compared to the daily and hourly distribution of trips from the Erin Pit and forecasted in **Table 2.3**.

Table 2.3 Hourly Distribution of Truck Loads

DATE	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	TOTAL
Day 1	14	21	20	12	20	16	16	20	8	17	2	0	0	**166**
Day 2	10	4	7	5	5	4	7	5	10	6	1	0	0	**64**
Day 3	12	14	12	16	16	12	19	16	22	14	2	0	0	**155**
Day 4	10	12	13	17	13	8	17	12	10	11	0	0	0	**123**
Day 5	12	8	12	10	16	5	22	12	17	13	1	0	0	**128**
Day 6	8	14	13	10	5	4	7	5	5	1	1	0	0	**73**
Day 7	6	13	13	7	17	7	13	8	11	11	0	0	0	**106**
Day 8	5	15	7	18	14	10	12	11	5	3	2	0	0	**102**
Day 9	13	15	14	13	20	7	17	8	12	8	2	0	0	**129**
Day 10	6	2	5	4	2	3	0	0	0	0	0	0	0	**22**
Day 11	13	7	24	17	21	14	22	14	18	19	1	0	0	**170**
Day 12	11	8	11	8	24	6	15	17	11	14	1	0	0	**126**
Day 13	17	14	19	13	22	16	16	17	15	18	5	0	0	**172**
Day 14	21	16	23	18	12	17	19	20	16	20	2	0	0	**184**
Day 15	12	14	17	15	11	5	19	12	13	16	2	0	0	**136**
Day 16	13	13	22	13	22	8	23	18	20	17	4	1	0	**174**
Day 17	10	10	12	10	11	4	16	5	12	5	6	0	0	**101**
Day 18	9	12	15	10	7	17	11	22	13	13	9	0	0	**138**
Day 19	19	12	20	14	24	15	21	11	15	10	1	0	0	**162**
Day 20	13	10	19	12	15	8	18	12	13	13	7	0	0	**140**
Day 21	16	12	13	14	15	14	14	13	15	12	7	0	0	**145**
Day 22	16	12	20	13	22	18	16	19	10	21	2	0	0	**169**
Day 23	16	5	17	11	12	12	11	12	7	8	1	0	0	**112**
TOTAL	**282**	**263**	**348**	**280**	**346**	**230**	**351**	**289**	**278**	**270**	**59**	**1**	**0**	**2997**

Using this methodology, during the peak hour of the peak month the expected highest number of truck loads is 24 per hour. However, using the peak operation of the peak month results in an extremely conservative assessment. The 30th highest operational loads will be used for the purposes of analysis, which results in a total of 19 truck loads per hour.

Operation of the pit is expected to remain consistent from year to year until shutdown of the quarry when the material is exhausted.

2.3. Fleet Origin, Loading and Queueing

James Dick currently has a fleet stationed at the Bolton Yard which will be maintained. There is the potential to move the fleet serving the Eramosa Quarry if a business case presents itself. Other users will most likely originate from the within the GTA and will most likely arrive from the east as identified in the *Revised Traffic Impact Study Eramosa Quarry, Township of Guelph-Eramosa*.

Trucks are encouraged to arrive after the quarry starts operating at 6:00 a.m., however, if a driver arrives earlier, there is space for two (2) trucks to queue off of 6th Line in front of the gates. The gates are typically opened 30 minutes in advance, and if there are any trucks queueing or arriving before the start of plant operations, the drivers will be directed to park on-site in designated waiting/queuing areas where three (3) trucks can be temporarily stored side by side.

Trucks arriving early will be strictly disciplined, including refusal to load. In the rare event where a truck arrives before the gates are opened, the entrance is designed to allow at least one truck length between the shoulder and the gate to allow an offending truck to get off the road. In practical terms there would actually be room for two or three trucks to line up abreast. Company policy is to refuse to load a truck that arrives early a second time.

3.0 Material Destination

3.1. Market Distribution

As the proposed quarry is expected to displace material travelling east on Hwy 7 that is currently coming from an existing quarry, the catchment area is already known. As the quarry is located to the east of Rockwood, it is expected that the James Dick Construction traffic will be reduced to almost zero through Rockwood with only local deliveries travelling to Rockwood in the future. James Dick Construction truck traffic through Acton will generally remain unchanged as the Guelph Quarry currently uses that route to deliver material.

Based on the existing market for James Dick Construction, the material is expected to go to the following locations as identified in **Table 3.1**.

Table 3.1 Aggregate Destination Areas

Location	Proportion
Local Industry	5%
Local Delivery / Halton Region	5%
Wellington / Caledon	25%
Acton / Georgetown / Brampton	10%
Milton / Mississauga / Brampton /Toronto	55%
Total	100%

Although Halton Region does not have specific Haul Routes, any road which is designated as a King's Highway can be used for trucking purposes. Since the site is located adjacent to Highway 7, a significant portion of traffic will use that roadway. However, the majority of the traffic will travel through the Town of Halton Hills. **Appendix C** illustrates the trucking restrictions within the Town and shows how traffic will be forced to use the King's Highway and Regional roads.

Based on this distribution of material, and the trucking restrictions within the Town of Halton Hills, the anticipated truck routes for traffic associated with the Eramosa Quarry are provided in **Appendix D** for reference. James Dick Construction discourages drivers from using 'shortcuts' and trucks that deviate from these designated haul routes can be ticketed by local authorities and will be subject to an internal

disciplinary policy. In addition, James Dick is prepared to accept phone calls from residents to report drivers that do not use designated haul routes.

Once operation of the quarry begins, the Eramosa Quarry will generally serve markets to the east while the Guelph Quarry will serve markets to the west. As a result, existing James Dick truck traffic from the Guelph Quarry currently using Highway 7 to travel to markets to the east will be removed along Highway 7 between Guelph and the new Eramosa Quarry, including Rockwood.

3.2. Travel Distance

A calculation was undertaken to estimate the driving kilometres saved by operation of the Eramosa Quarry. As the currently operating Bolton Ready Mix plant is within the expected epicentre of the market to be serviced by the Eramosa Quarry, it was used as the destination of material. This calculation is undertaken using the three (3) closest amabel limestone quarries outside the Greater Toronto Area (GTA) and three (3) located within the west Greater Toronto Area (GTA). **Table 3.2** provides information relating to these quarries.

Table 3.2 Locations of Quarries Serving Bolton Ready Mix Plant

Quarry	Location	Distance to Bolton Ready Mix Plant	Difference from Eramosa Quarry	Two-Way Distance Difference
Eramosa Quarry	Township of Guelph-Eramosa	54.4 km	0 km	0 km
*Dufferin Acton	Town of Halton Hills	42.5 km	-11.9 km	-23.8 km
*Dufferin Milton	Town of Milton	43.5 km	-10.9 km	-21.8 km
*Nelson Burlington	City of Burlington	76.2 km	+21.8 km	+43.6 km
**Lafarge Dundas	City of Hamilton	94.2 km	+39.8 km	+79.6 km
**Georgian Duntroon	Township of Clearview	90.1 km	+35.7 km	+71.4 km
**MAQ Osprey	Township of Clearview	91.0 km	+36.6 km	+73.2 km

Note: *Quarry located within GTA; **Quarry located outside GTA

Assuming that the materials currently arrive to the Bolton Ready Mix Plant at a ratio of 95% from quarries outside of the GTA and the remaining 5% are from quarries within the GTA (based on information provided by James Dick Construction), are replaced by material from the Eramosa Quarry there will be a total savings of approximately 1,505, 282 km of truck trips within the Province of Ontario. The calculation is provided in **Appendix E** for reference.

4.0 Quarry Traffic Volumes

The following section analyses the volume of traffic predicted to be generated by the Eramosa Quarry.

4.1. Peak Hour Traffic Volume

Based on the *Revised Traffic Impact Study, Eramosa Quarry, Township of Guelph-Eramosa April 2016* prepared by Cole Engineering, estimates of the future (2023) total traffic around the site is presented in **Figure 4-1**.

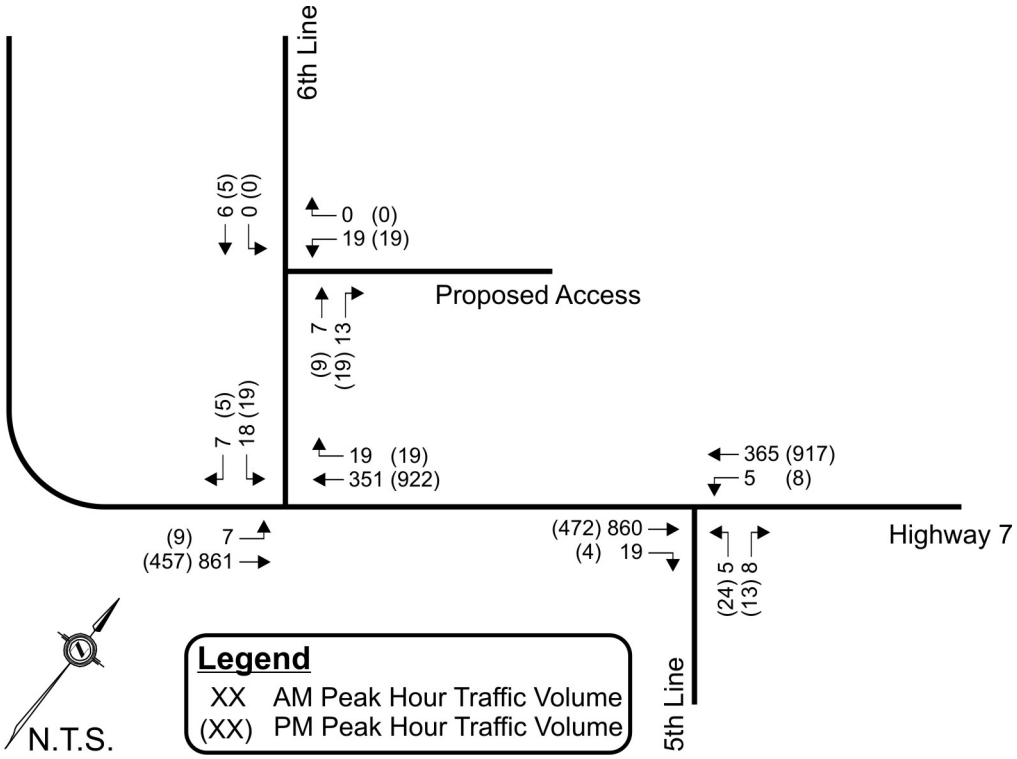

Figure 4-1 Peak Hour Future (2023) Total Traffic Volumes

Based on the projected traffic volumes, the new quarry is expected to generate a conservative 19 truck loads per peak hour at peak operation during the peak season. This represents a two-way total of approximately 2% of the peak hour traffic volume along Highway 7 and is not significant in the context of total traffic volumes and is well within the normal daily variation of traffic observed on a roadway.

4.2. Daily Traffic Volumes

The trips associated with the Eramosa Quarry will vary between the time of day as well as the month of the year. Based on the distribution of truck traffic identified in **Table 3.1**, the minimum and maximum daily traffic expected by route is provided in **Table 4.1**.

Table 4.1 Daily Truck Traffic Volumes from Eramosa Quarry

Direction	Via	Proportion	Maximum Daily Truck Traffic			Minimum Daily Truck Traffic		
			In	Out	Total	In	Out	Total
Local	Local	5%	9	9	18	1	1	2
North	Regional Road 25	25%	46	46	92	4	4	8
South	Regional Road 25	55%	101	101	202	9	9	18
	Guelph Line	5%	9	9	18	1	1	2
East	Highway 7	10%	18	18	36	2	2	4
West	Highway 7	0%	0	0	0	0	0	0
Total		100%	183	183	366	17	17	34

The traffic using Regional Road 25 south of Acton makes up the largest proportion of the quarry generated trips with an expected maximum of 101 truck loads (202 two-way trips) in a peak day. This will occur on approximately 2 days of the year as it represents a design hour in the order of the 99th percentile of plant operations.

The existing Guelph Quarry traffic travelling through Acton was recorded for the month of October 2015 and the summary is provided in **Table 4.2**.

Table 4.2 Existing Guelph Quarry Trips Traveling through Acton

Date	Number of Truck Trips
October 1, 2015	2
October 2, 2015	3
October 5, 2015	2
October 6, 2015	3
October 8, 2015	4
October 9, 2015	9
October 13, 2015	16
October 14, 2015	2
October 15, 2015	2
October 19, 2015	2
October 20, 2015	1
October 21, 2015	4
October 23, 2015	1
Average	**3.92**

These truck trips detailed in **Table 4.2** will no longer be travelling through Acton from the Guelph Quarry and as such, will decrease the net impact of the Eramosa Quarry through Acton.

5.0 Haul Routes

Generally, the routes expected to be utilized are regional and provincial roadways and are designed to accommodate truck traffic. However, Highway 7 travels through the Town of Acton, and directs all traffic through the downtown area. This section evaluates all potential haul routes through Halton Region and includes: Highway 7, Main Street, Regional Road 25 and Guelph Line.

5.1. Highway 7

5.1.1. Collision Review

There are four major intersections that were evaluated using SYNCHRO 9.0 software assessing the LOS of each intersection through the existing conditions.

5.1.1.1 Highway 7 / Eramosa Townline Road

Collision information was obtained from the Ministry of Transportation for the intersection of Highway 7 / Eramosa Milton Townline, which is provided in **Appendix F** and summarized in **Table 5.1**.

Table 5.1 Highway 7 / Eramosa Milton Townline

Year	Impact Type						
	Rear End	Sideswipe	Turn Movement	Angle	SMV	Other	Total
2010	0	0	0	0	0	0	0
2011	0	1	0	1	1	0	3
2012	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2014	0	0	1	0	0	0	1
2015	0	0	0	0	0	0	0
Total	**0**	**1**	**1**	**1**	**1**	**0**	**4**

The data was summarized and provided, but did not specify the location or exact condition in which the collision occurred. However, since 2010, there were 3 collisions or an average of 0.7 collisions per year. Generally, the collisions are uniform across the conditions meaning that there is no trend among the collision data.

The collision rate was calculated and compared with the critical collision rate in order to assess the collision data. The collision rate for the intersection of Highway 7 / Eramosa Milton Townline is 0.23 annual collisions per million entering vehicles and the critical collision rate for the intersection is 1.01 annual collision per million entering vehicles; detailed calculations are provided in **Appendix H**. Therefore, the collision rate is below the critical collision rate for the intersection.

5.1.1.2 Highway 7 / Trafalgar Road

Collision information was obtained from the Ministry of Transportation for the intersection of Highway 7 / Trafalgar Road, which is provided in **Appendix F** and summarized in **Table 5.2**.

Table 5.2 Highway 7 / Trafalgar Road

Year	Impact Type						
	Rear End	Sideswipe	Turn Movement	Angle	SMV	Other	Total
2010	0	0	0	0	3	0	3
2011	0	0	0	0	0	0	0
2012	0	0	1	0	0	0	1
2013	0	1	0	0	1	0	2
2014	0	1	0	1	2	0	4
2015	0	0	0	0	1	1	2
Total	**0**	**2**	**1**	**1**	**7**	**1**	**12**

The data was summarized and provided, but did not specify the location or exact condition in which the collision occurred. However, since 2010, there were 12 collisions or an average of 2 collisions per year. Generally, the majority of collisions are single vehicle collisions, which typically results from the drivers misjudging speed.

The collision rate was calculated and compared with the critical collision rate in order to assess the collision data. The collision rate for the intersection of Highway 7 / Trafalgar Road is 0.28 annual collisions per million entering vehicles and the critical collision rate for the intersection is 2.37 annual collision per million entering vehicles; detailed calculations are provided in Appendix H. Therefore, the collision rate is below the critical collision rate for the intersection.

5.1.1.3 Highway 7 / Mountainview Road

Collision information was obtained from the Ministry of Transportation for the intersection of Highway 7 / Mountainview Road, which is provided in **Appendix F** and summarized in **Table 5.3**.

Table 5.3 Highway 7 / Mountainview Road Collision Review

Year	Impact Type						
	Rear End	Sideswipe	Turn Movement	Angle	SMV	Other	Total
2010	0	0	0	0	1	0	1
2011	0	0	0	0	2	0	2
2012	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**3**	**0**	**3**

The data was summarized and provided, but did not specify the location or exact condition in which the collision occurred. However, since 2010, there were 3 collisions or an average of 0.5 collisions per year. Generally, the majority of collisions are rear ends or turning collisions, which typically results from the drivers misjudging speed or intended direction of opposing traffic through the intersection.

The collision rate was calculated and compared with the critical collision rate in order to assess the collision data. The collision rate for the intersection of Highway 7 / Mountainview Road is 0.17 annual collisions per million entering vehicles and the critical collision rate for the intersection is 0.81 annual collision per million entering vehicles; detailed calculations are provided in **Appendix G**. Therefore, the collision rate is below the critical collision rate for the intersection.

5.1.2. Observation

After site observation and video analysis of the provincial Highway 7 we noted several points of interest. We recommend an eastbound turning lane into the 6th line where the proposed entrance to Hidden Quarry would be located, due to the high speeds of vehicle traffic in the area. This would mitigate the interactions between truck traffic and daily traffic flow on Highway 7 around the Hidden Quarry.

Guelph Street as a section of Highway 7 crosses Credit River which operates with chevrons along the Eastbound section, we recommend that chevrons also be installed along the Westbound section of Guelph Street. Overall, it was observed that where Highway 7 has a two lane cross section, the lanes are generally wide allowing for the haul route to operate acceptably without shoulder space.

5.2. Main Street

5.2.1. Main Street / Mill Street Intersection

James Dick Construction recognizes that the turn on Highway 7 (at the Main Street / Mill Street intersection) is constrained and expects that minimal quarry traffic would utilize this route to service most local customers located along Highway 7. The existing lane configurations and traffic volumes at this intersection are presented in **Figure 5-1**.

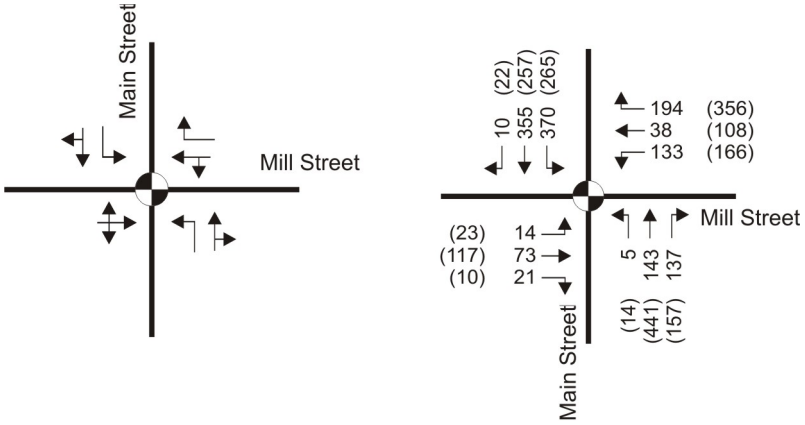

Figure 5-1 Main Street / Mill Street Intersection Existing Lane Configuration and Traffic Volumes

A traffic analysis was undertaken for the Main Street / Mill Street intersection using Synchro 9 software with the results summarized in **Table 5.4** and detailed calculations provided in **Appendix H**.

Table 5.4 Main Street / Mill Street Intersection Existing Configuration – Level of Service

Key Movement	Lane Width	AM Peak LOS (v/c)	Midday Peak LOS (v/c)	PM Peak LOS (v/c)
EB left-through-right	4.3 m	C (0.27)	C (0.24)	C (0.29)
WB left-through	2.7 m	D (0.68)	D (0.62)	C (0.81)
WB right	2.4 m	B (0.16)	C (0.18)	B (0.50)
NB left-through	3.5 m	C (0.75)	B (0.23)	C (0.67)
NB right	3.0 m	B (<0.01)	B (0.08)	B (0.19)
SB left	3.4 m	A (0.61)	A (0.34)	B (0.27)
SB through-right	3.6 m	A (0.34)	A (0.19)	A (0.27)

In the existing configuration, the Main Street / Mill Street intersection operates at good levels of service and volume to capacity ratios. However, in an attempt to widen the westbound approach to allow trucks to make a turn from further away from the curb, the Synchro analysis was repeated with a shared westbound left-through-right turn lane. The results are summarized in **Table 5.5** and detailed calculations provided in **Appendix I**.

Table 5.5 Main Street / Mill Street Intersection Modified Configuration – Level of Service

Key Movement	Lane Width	AM Peak LOS (v/c)	Midday Peak LOS (v/c)	PM Peak LOS (v/c)
EB left-through-right	4.3 m	C (0.23)	C (0.19)	B (0.23)
WB left-through-right	4.8 m	D (0.76)	D (0.76)	D (0.95)
NB left-through	3.5 m	D (0.82)	B (0.27)	D (0.86)
NB right	3.0 m	B (<0.01)	B (0.08)	C (0.22)
SB left	3.4 m	B (0.66)	A (0.37)	C (0.73)
SB through-right	3.6 m	A (0.36)	A (0.21)	B (0.32)

By combining the westbound right turn and through-left lanes (i.e. removing the line painting between the lanes), the westbound leg is expected to operate with level of service D and volume to capacity ratios ranging from 0.76 to 0.95. Additional capacity can be gained for the westbound leg by assigning more green time to the east-west phases.

5.2.2. Collision Review

Collision information was obtained from the Ministry of Transportation for the intersection of Main Street / Mill Street, which is provided in Appendix F and summarized in **Table 5.6**.

Table 5.6 Main Street / Mill Street Collision Data

Year	Impact Type						
	Rear End	Sideswipe	Turn Movement	Angle	SMV	Other	Total
2010	3	0	0	1	2	0	6
2011	1	0	2	0	3	1	7
2012	4	1	2	1	7	0	15
2013	3	1	1	1	4	0	10
2014	4	0	1	0	4	0	9
2015	0	0	1	0	0	0	1
Total	**15**	**2**	**7**	**3**	**20**	**1**	**48**

The data was summarized and provided, but did not specify the location or exact condition in which the collision occurred. However, since 2010, there were 48 collisions or an average of 8 collisions per year. Generally, the majority of collisions are rear ends or turning collisions, which typically results from the drivers misjudging speed or intended direction of opposing traffic through the intersection.

The collision rate was calculated and compared with the critical collision rate in order to asses the collision data. The collision rate for the intersection of Main Street / Mill Street is 2.71 annual collisions per million entering vehicles and the critical collision rate for the intersection is 9.14 annual collision per million entering vehicles; detailed calculations are provided in Appendix H. Therefore, the collision rate is below the critical collision rate for the intersection.

5.2.3. Observations

Upon a site visit there were a few key areas of note which were made apparent within observation notes. It was observed that through the town of Acton, Highway 7 incorporates some on-street parking for local traffic. The trucks using the haul and making the East to North right turn straddled the right turn and through-left turn lanes when queuing (as shown in **Figure 5-2**), which allows the trucks to make the turn without mounting the curb or inhibiting opposing lane movements as shown in **Figure 5-3**.

Figure 5-2 Queued Truck Waiting to Make East to North Right Turn in Acton

The truck queuing is It was also observed that the South East corner pedestrian head was hidden behind a building overhang, for the Southbound pedestrian crossing.

5.2.3.1 James Dick Construction Design Vehicle

James Dick Construction recognizes that the turn on Highway 7 (at the Main Street / Mill Street intersection) is constrained and expects that minimal quarry traffic would utilize this route to service most local customers located along Highway 7. This movement is only expected to occur with 10% of the trucks associated with the Eramosa Quarry where due to the current haul routes, cannot use any roadways as a suitable by-pass due to truck restrictions. Although it is recognized as a route to be avoided if possible, there are currently no alternate truck routes that can be used to serve these local businesses.

The westbound approach is the leg of concern with the potential of a truck, turning from the curb lane making a westbound right turn mounting the curb. This is due to two (2) substandard westbound lanes of 2.4 meters and 2.7 meters. Although each lane is not specifically designated as a right turn or through-left lane, based on their alignment within the intersection is assumed.

The Main Street / Mill Street intersection was evaluated using turning templates for the James Dick Construction Limited's fleet vehicle. Using the existing lane configuration, the truck turning movement from the curb lane is demonstrated in **Figure 5-4** and shows the vehicle mounting the curb. However, based on observations, although several trucks are observed to mount the curb while making the turning movement, many trucks also avoid mounting the curb by turning while straddling the two (2) westbound lanes. Turning while straddling the two (2) lanes, results in trucks avoiding the curb and still permitting southbound left turns concurrently. This is demonstrated in **Figure 5-5**.

Figure 5-3 Truck Making East to North Right Turn in Acton

5.2.3.2 WB-20 Design Vehicle

As Main Street is a connecting link and a designated haul route, the Main Street / Mill Street intersection was assessed using turning templates for a WB-20 design vehicle which is the largest tractor trailer combination design vehicle for the *Transportation Association of Canada* (TAC). As illustrated in **Figure** 5-6, the WB-20 can complete an eastbound to northbound right turn by maneuvering from the outside lane which utilizes the entire receiving lane.

In **Figure 5-7**, a compound curve is introduced to the northeast corner curb which vastly improves the maneuvering of the tractor-trailer; however, implementation of this solution requires the relocation of several hand wells, signal poles, and catch basins as well as still requiring modification to the existing building on the northeast quadrant and the existing parkette.

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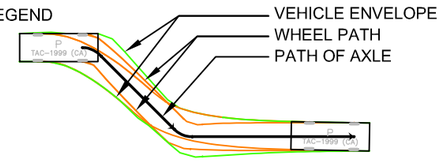
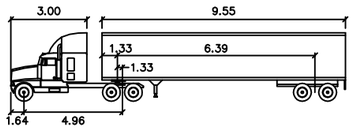
LEGEND



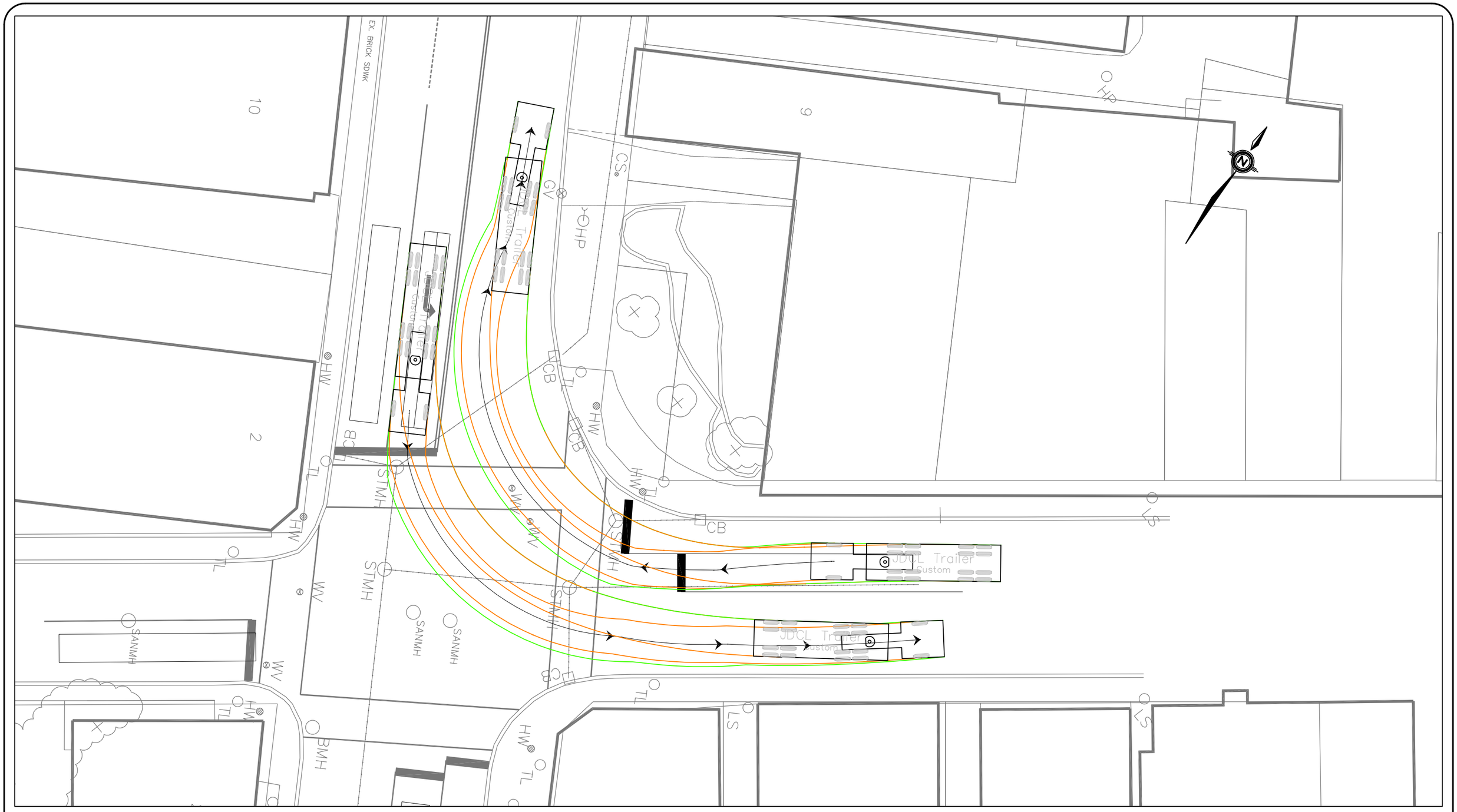
DESIGN VEHICLE



JDCL Trailer	meters
Tractor Width	: 2.60
Trailer Width	: 2.60
Tractor Track	: 2.60
Trailer Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 18.0
Articulating Angle	: 70.0

AUTOTURN ASSESSMENT - TURN FROM CURB LANE
MAIN STREET / MILL STREET INTERSECTION
ERAMOSA (HIDDEN) QUARRY
TOWNSHIP OF GUELPH-ERAMOSA
WELLINGTON COUNTY

DATE:	MAY, 2016	PROJECT No.:	TR12-0013
SCALE:	1:250	FIGURE No.:	5-4



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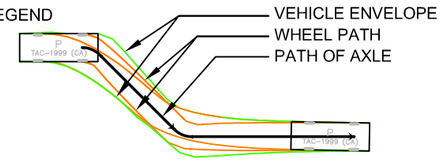
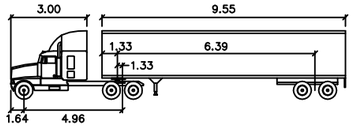
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND



DESIGN VEHICLE



JDCL Trailer	meters
Tractor Width	: 2.60
Trailer Width	: 2.60
Tractor Track	: 2.60
Trailer Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 18.0
Articulating Angle	: 70.0

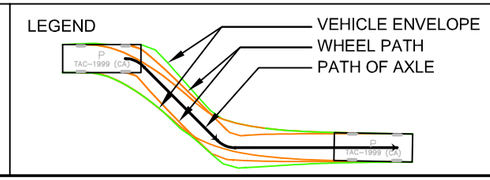
AUTOTURN ASSESSMENT - CONCURRENT TURNS MAIN STREET / MILL STREET INTERSECTION

ERAMOSA (HIDDEN) QUARRY
TOWNSHIP OF GUELPH-ERAMOSA
WELLINGTON COUNTY

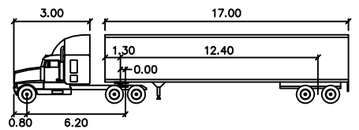
DATE:	MAY, 2016	PROJECT No.:	TR12-0013
SCALE:	1:250	FIGURE No.:	5-5

COLE ENGINEERING
70 VALLEYWOOD DRIVE, MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND



DESIGN VEHICLE

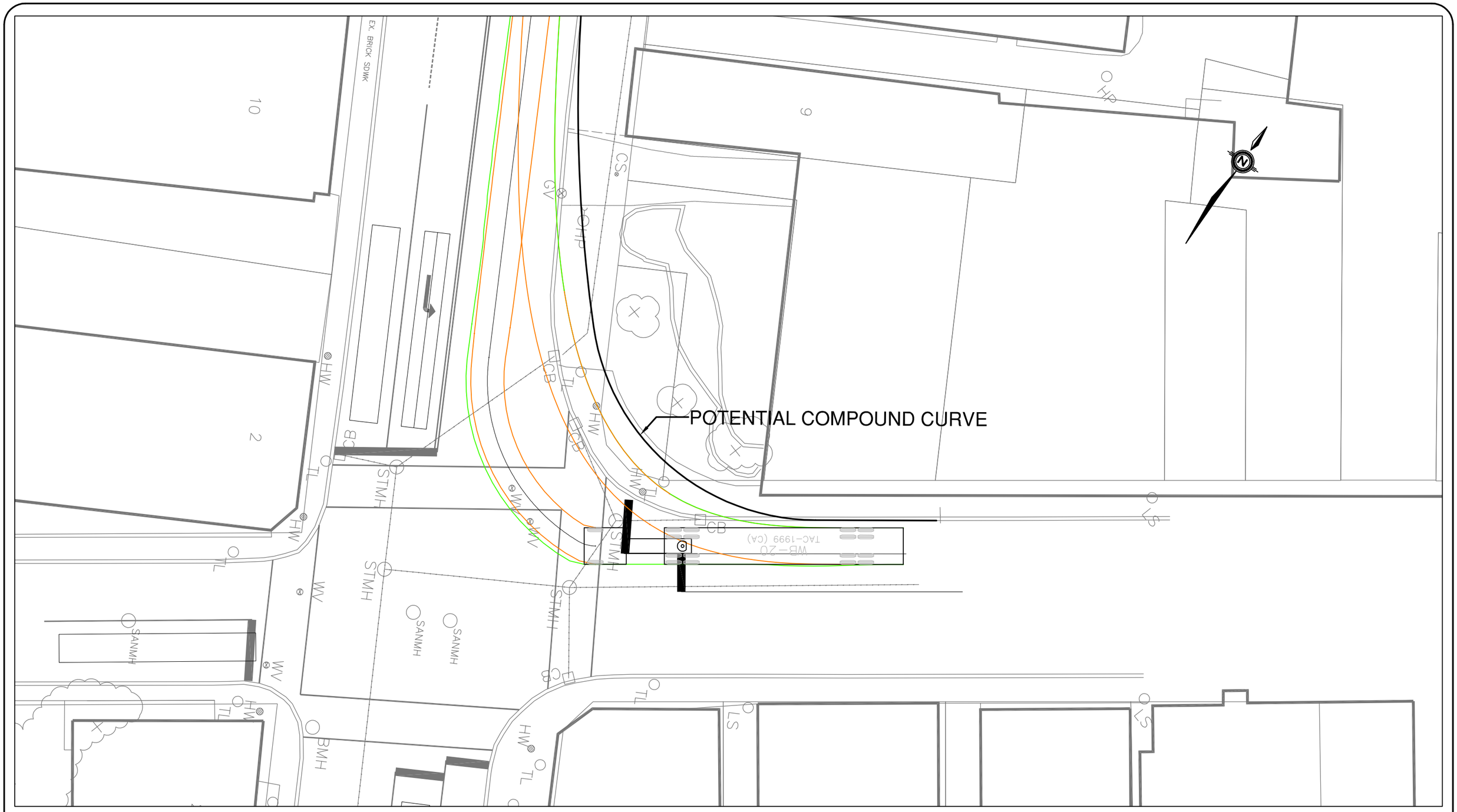


WB–20	meters
Tractor Width	: 2.60
Trailer Width	: 2.60
Tractor Track	: 2.60
Trailer Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 28.3
Articulating Angle	: 70.0

AUTOTURN ASSESSMENT - WB-20 DESIGN VEHICLE RIGHT TURN FROM OUTSIDE LANE

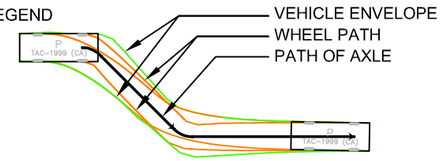
ERAMOSA (HIDDEN) QUARRY
TOWNSHIP OF GUELPH-ERAMOSA
WELLINGTON COUNTY

DATE:	MAY, 2016	PROJECT No.:	TR12-0013
SCALE:	1:250	FIGURE No.:	5-6

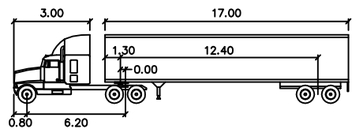


COLE ENGINEERING
70 VALLEYWOOD DRIVE, MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND



DESIGN VEHICLE



WB–20	meters
Tractor Width	: 2.60
Trailer Width	: 2.60
Tractor Track	: 2.60
Trailer Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 28.3
Articulating Angle	: 70.0

AUTOTURN ASSESSMENT - WB-20 DESIGN VEHICLE
MAIN STREET / MILL STREET MODIFICATION

ERAMOSA (HIDDEN) QUARRY
TOWNSHIP OF GUELPH-ERAMOSA
WELLINGTON COUNTY

DATE:	MAY, 2016	PROJECT No.:	TR12-0013
SCALE:	1:250	FIGURE No.:	5-7

5.2.4. Concluding Design Summary

Upon reviewing proposed design alternatives, regarding the various conditions of Mill Street / Main Street configuration, the Highway Traffic Act Policy outlines a wide range of right turn design alternatives that alter the impact of the Guelph Quarry and Hidden Quarry Traffic on the intersection. These design conditions include, existing lane geometry, LOS calculations and analysis, current truck operating practices and behaviours at this intersection. With these parameters in place, we found that there were some geometric constraints which exist at the Mill Street / Main Street intersection which are currently handling large volumes of traffic within good levels of services. Upon analysis, the changes that could be made to the intersection appear to result in either a decrease in safety or a decrease in expected existing LOS. The conclusion of the current design analysis revealed that the existing lane configuration and design is a compromise between safety and efficiency. As such we recommend the merging of the west bound right turn lane with the through left turn lane on Mill Street, this option provides an optimal situation for safety by allowing space for turning vehicles and distance from the vehicle to the curb.

5.3. Regional Road 25

5.3.1. Key Intersections

The James Snow Parkway / Regional Road 25 is a major 4 lane intersection located north of Provincial Highway 401. The detailed calculation sheets are provided in **Appendix J**. The existing lane configurations and traffic volumes at this intersection are presented in **Figure 5-8**.

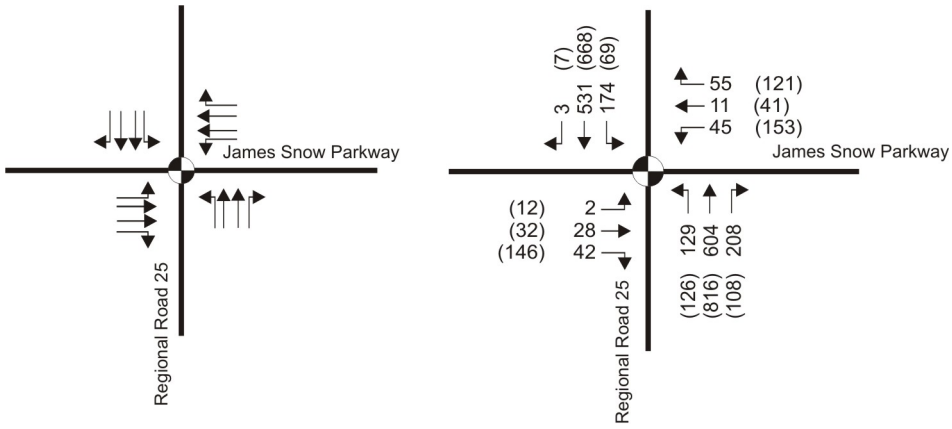


Figure 5-8 James Snow Parkway / Regional Road 25 Existing Lane Configuration and Traffic Volumes

The James Snow Parkway / Regional Road 25 intersection was evaluated using SYNCHRO 9.0 software assessing the LOS of each turning movement through the existing conditions and the results summarized in Table 5.7.

Table 5.7 James Snow Parkway / Regional Road 25 – Level of Service

Key Movement	AM Peak LOS (v/c)	Midday Peak LOS (v/c)	PM Peak LOS (v/c)
Overall	B (0.42)	B (0.38)	B (0.42)
EB left	C (0.01)	C (0.01)	C (0.01)
EB through	C (0.07)	C (0.03)	C (0.07)
EB right	C (0.03)	C (0.04)	C (0.03)
WB left	C (0.30)	C (0.57)	C (0.30)
WB through	C (0.03)	C (0.03)	C (0.03)
WB right	C (0.04)	C (0.05)	C (0.04)
NB left	C (0.48)	C (0.41)	C (0.48)
NB through	B (0.44)	A (0.31)	B (0.44)
NB right	B (0.14)	A (0.09)	B (0.14)
SB left	C (0.50)	C (0.51)	C (0.50)
SB through-right	B (0.35)	B (0.33)	B (0.35)

Within existing conditions, the James Snow Parkway / Regional Road 25 intersection operates at acceptable levels of service and volume to capacity ratios.

5.3.2. Collision Review

Collision information was obtained from the Region of Halton for the intersection of James Snow Parkway / Regional Road 25, which is provided in **Appendix F** and summarized in **Table 5.7**.

Table 5.7 - James Snow Parkway / Regional Road 25

Year	Impact Type						
	Rear End	Sideswipe	Turn Movement	Angle	SMV	Other	Total
2010	0	0	0	0	0	0	0
2011	1	0	1	0	0	0	2
2012	1	2	0	0	0	0	3
2013	0	0	1	0	2	0	3
2014	1	0	0	1	0	0	2
2015	0	0	1	1	0	1	3
Total	**3**	**2**	**3**	**2**	**2**	**1**	**13**

The data was summarized and provided, but did not specify the location or exact condition in which the collision occurred. However, since 2011, there were 13 collisions or an average of 2.6 collisions per year. Generally, the majority of collisions are rear ends or turning collisions, which typically results from the drivers misjudging speed or intended direction of opposing traffic through the intersection.

The collision rate was calculated and compared with the critical collision rate in order to asses the collision data. The collision rate for the intersection of James Snow Parkway / Regional Road 25 is 0.30 annual collisions per million entering vehicles and the critical collision rate for the intersection is 0.45 annual collision per million entering vehicles; detailed calculations are provided in **Appendix G**. Therefor, the collision rate is below the critical collision rate for the intersection.

5.3.3. Observation

Regional Road 25 was observed to operate very well as a haul route due the widthe of the two lane cross sections throughout the length of the route. It was noted the relative rise of topographic variation of the route as well as the meandering which exists as some sections of the route. There was also key notes with regards to a potential bottleneck between 5 sideroad and

5.4. Guelph Line

5.4.1. Key Intersections

Only two intersections were evaluated using SYNCHRO 9.0 software assessing the LOS of each turning movement through the existing conditions. The Guelph Line / 20th Sideroad is a 2 lane intersection located north of Provincial Highway 401. The Guelph Line / 20th Sideroad intersection lane configurations and traffic volumes are provided in **Figure 5-9**.

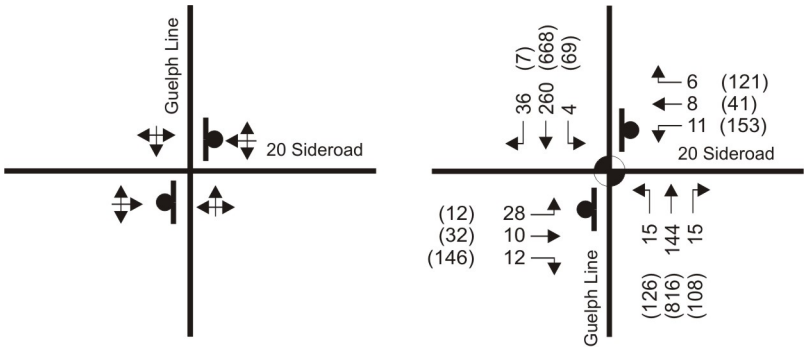


Figure 5-9 Guelph Line / 20th Sideroad Existing Lane Configuration and Traffic Volumes

The Guelph Line / 32nd Sideroad intersection is a two lane unsignalized intersection located east of Highway 7. The Guelph Line / 32nd Sideroad intersection lane configurations and traffic volumes are provided in **Figure 5-10**.

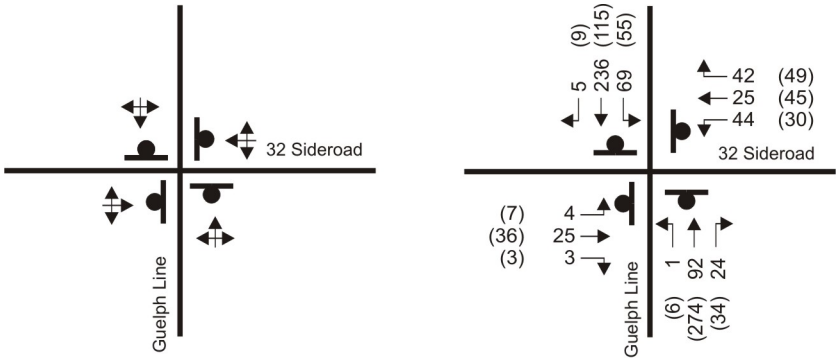


Figure 5-10 Guelph Line / 32nd Sideroad Existing Lane Configuration and Traffic Volumes

The results of the analysis are summarized in **Table 5.8** and detailed calculation sheets are provided in **Appendix I**.

Table 5.8 Guelph Line – Level of Service

Intersection	Key Movement	AM Peak LOS (v/c)	Midday Peak LOS (v/c)	PM Peak LOS (v/c)
Guelph Line / 20th Sideroad (unsignalized)	Overall	-	-	-
	EB left-through-right	B (0.07)	B (0.07)	B (0.05)
	WB left-through-right	B (0.26)	B (0.03)	C (0.24)
	NB left	A (<0.01)	A (<0.01)	A (<0.01)
	NB through-right	(0.19)	(0.08)	(0.11)
	SB left	A (0.01)	A (0.01)	A (0.04)
	SB through-right	(0.10)	(0.09)	(0.23)
Guelph Line / Regional Road 25 (unsignalized)	Overall	-	-	-
	EB left-through-right	B (0.08)	B (0.04)	C (0.13)
	WB left-through-right	B (0.23)	B (0.07)	C (0.28)
	NB left-through-right	A (<0.01)	A (<0.01)	A (<0.01)
	SB left-through-right	A (0.06)	A (0.01)	A (0.05)

In the existing condition, each intersection operates at excellent levels of service.

5.4.2. Collision Review

Collision information was obtained from the Region of Halton for the intersection of Guelph Line / Eramosa - Milton Townline, which is provided in **Appendix F** and summarized in **Table 5.9**.

Table 5.9 Guelph Line / Eramosa - Milton Townline

Year	Impact Type						
	Rear End	Sideswipe	Turn Movement	Angle	SMV	Other	Total
2010	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2013	0	0	0	0	1	0	1
2014	0	0	0	0	0	0	0
2015	0	0	0	0	1	0	1
Total	**0**	**0**	**0**	**0**	**1**	**0**	**1**

The data was summarized and provided, but did not specify the location or exact condition in which the collision occurred. However, since 2011, there were 2 collision or an average of 0.3 collisions per year. The only collisions were both Single Motor Vehicle Collision (SMV), which typically results from the drivers misjudging speed or intended direction of opposing traffic through the intersection.

The collision rate was calculated and compared with the critical collision rate in order to assess the collision data. The collision rate for the intersection of Guelph Line / Eramosa - Milton Townline is 0.08 annual collisions per million entering vehicles and the critical collision rate for the intersection is 0.45 annual collision per million entering vehicles; detailed calculations are provided in Appendix H. Therefore, the collision rate is below the critical collision rate for the intersection.

5.4.3. Annual Average Daily Traffic Volumes

A comparison of the expected truck traffic in comparison to the Annual Average Daily Traffic (AADT) volumes is provided in **Table 5.10**. The AADT data was obtained from Halton Region.

Table 5.10 Daily Traffic Comparison

Roadway	AADT	Heavy Vehicles	Existing Heavy Vehicle Percentage	Eramosa Quarry Traffic	Future Heavy Vehicle Percentage
Regional Road 25	10461	732	7.0%	202	8.8%

During peak operation, the Eramosa Quarry will increase the heavy vehicle proportion of traffic along Regional Road 25 by approximately 28% or 2.0% of the overall roadway traffic during the peak summer operation of the quarry. This is a very conservative assessment, as existing trips currently utilizing the haul routes were not removed from the analysis, and the analysis is undertaken for an average day of the peak month representing a 96th percentile analysis.

5.4.4. Collisions

The collisions along Regional Road 25 at Station 12509 was also investigated and are summarized in **Table 5.11.**

Table 5.11 Regional 25 Road Collision Data

Year	Severity of Collision				Total
	Non-Reportable	Property Damage Only	Non-Fatal Injury	Fatality	
2010	0	1	1	0	**2**
2011	0	5	0	0	**5**
2012	1	2	0	0	**3**
2013	0	2	0	0	**2**
2014	0	1	1	0	**2**
Total	**1**	**11**	**2**	**0**	**14**
Proportion	**7%**	**79%**	**14%**	**0%**	**100%**

Regional Road 25 in the vicinity of the Town of Acton, have had a total of 14 collisions since 2010, averaging 2.8 collisions per year with the majority of collisions resulting only in property damage. The collision rate was calculated and compared with the critical collision rate in order to assess the collision data. The collision rate for the intersection of Regional Road is 0.73 annual collisions per million entering vehicles and the critical collision rate for the intersection is 3.46 annual collision per million entering vehicles; detailed calculations are provided in Appendix G. Therefore, the collision rate is below the critical collision rate for the intersection. As a result, the increased traffic will not significantly impact roadway conditions.

5.4.5. Observations

It was noted that Guelph Line is a generally narrow two-lane roadway with narrow shoulders. In addition to there being seasonal load restrictions, it is recommended that vehicles proceed to Regional Road 25 which has wider lanes and four-lane sections throughout the majority of its length through Halton Region as this will result in safer conditions should there be a truck breakdown.

5.5. Collision Analysis Summary

Concluding the collisions analysis of each major intersection and roadway involved in the Haul Route Study it has been found that each intersection operates within good levels of service and well below the critical collision rate calculated for each intersection. Therefore, the approval of the Hidden Quarry will have little to no impact on existing traffic operations and expected safety on the current chosen haul route.

6.0 Consideration of Available Haul Routes

With consideration of existing routes there were two proposed alternatives for future Haul Routes to and from Hidden Quarry to the 407 ramp on the 401 East. These routes are extending through Highway 7 branching off between the Guelph line and Regional Road 25 eventually connecting with Highway 401 to the south of Milton. As outlined in **Table 6.1**, each route was analyzed through specific conditions and standards in order to ascertain the preferred Haul Route option.

Table 6.1 Evaluation of Haul Routes from Hidden Quarry to 407 ramp on 401 East

Criteria	Highway 7 – Former 401 Regional Road 25 – Former 401	Highway 7 – Sideroad 32 – Guelph Line – Highway 401
Load Restriction	No	Yes – Seasonal
Left Turning Movement	1	2
Right Turning Movement	1	3
Distance	Closest	9 Km further Round Trip
Intersection – Through	21	10
Intersection – Stop Sign	0	2
Intersection – Signalized	5	3
Accident Below Critical	Yes	Yes
Pavement Conditions	Fair Condition	Fair Condition
Jurisdiction	Provincial – HWY – Regional Road	Provincial – HWY – Regional Road
GHG Analysis	Best	Worst

Using Regional Road 25 the Haul route would operate within more acceptable standards in terms of safety and LOS expected within Halton Region. This route does not limit haul load restrictions and requires less maneuvering thus reducing the amount of interaction that the Haul vehicles will have with daily traffic flows.

7.0 Results and Conclusions

Based on our review of the expected operation of the proposed quarry and the expected haul routes, the Eramosa Quarry will not have significant impact on the haul routes it is expected to utilize. The findings and conclusions of the study are as follows:

- The Eramosa Quarry will provide on-site queuing space for trucks arriving to the site so they do not park within municipal right-of-ways with gates opening 30 minutes before the quarry opens;
- The Eramosa Quarry will utilize existing truck haul routes to move its product;
- The location of the Eramosa Quarry will reduce truck traffic from the Guelph Quarry to 0 in the Town of Rockwood and Town of Acton;
- Queuing for trucks will be accommodated on-site and off the street. Should drivers arrive before the gates open for the day, there is space for trucks to queue within the driveway throat, and off of 6th Line;
- Drivers arriving early multiple times will be disciplined as per James Dick Construction Limited's disciplinary policy;
- Based on the proposed license, the Eramosa Quarry is expected to produce a maximum total of 184 truck loads (368 two-way trips) on the peak day of the peak operating season;
- During the off-peak season, the Eramosa Quarry is expected to produce approximately 20 two-way trips per day;
- The most significantly impacted roadway will be Regional Road 25, which will experience an increase in truck traffic of up to 2% of the overall truck traffic per day and 1% of overall traffic per day, during the peak operating season;
- Generally Regional Road 25 experiences an average of 2.8 collisions per year. Taking into account the traffic associated with the Eramosa Quarry, this rate could increase to 2.86 collisions per year, or approximately two (2) additional collision during the life of the quarry;
- The westbound leg of the Main Street / Mill Street intersection can be modified to minimize trucks turning mounting the northeastern curb by combining the right turn and through-left turn lanes;
- The traffic introduced by the Eramosa Quarry is not permanent and will cease once the reserves of material have been exhausted; and,
- As the Eramosa Quarry is located close to the target market, there will be an annual reduction of approximately 1,585,282 kilometers of truck travel within the Province of Ontario, thereby increasing road safety in an overall sense.

In review of the *Haul Route Study - Terms of Reference*, we believe that there is sufficient justification to demonstrate that the additional truck traffic on the haul routes would be very low throughout the entire life of the Eramosa Quarry. As such, there will not be any appreciable negative effects on the expected haul routes and Sections 5 to 8 of the *Haul Route Study – Terms of Reference* need not be undertaken.

APPENDIX A
Haul Route Study Terms Of Reference

R.J. Burnside & Associates Limited 3 Ronell Crescent Collingwood ON L9Y 4J6 CANADA
telephone (705) 446-0515 **fax** (705) 446-2399 **web** www.rjburnside.com

BURNSIDE
[THE DIFFERENCE IS OUR PEOPLE]

October 10, 2014

Via: Email (kwingrove@get.on.ca)

Ms. Kim Wingrove
Chief Administrative Officer
Township of Guelph/Eramosa
8348 Wellington Road 124
P.O. Box 700
Rockwood ON N0B 2K0

Dear Ms. Wingrove:

Re: Haul Route Study - Terms of Reference
Proposed "Hidden Quarry" - James Dick Construction Ltd.
Project No.: 300032475.0000

This letter provides a Terms of Reference (TOR) for the above noted project, located on the west half of Lot 1, Concession 6 in the Township of Eramosa. This TOR is in response to comments received from staff at the Region of Halton, the Town of Milton and the Town of Halton Hills, requesting that a Haul Route Study be prepared by the applicant as part of the proposed Zoning By-Law Amendment application. A draft of this TOR was reviewed with representatives of the Township and the adjacent municipalities, at a meeting on September 9, 2014. This TOR has been revised in response to those discussions.

We acknowledge that the following TOR has been based on a TOR that has been used in previous haul route studies in the Region of Halton, as originally developed by Dillon Consulting Limited.

1.0 Introduction

James Dick Construction Ltd is proposing to develop a quarry on a site approximately 39.4 hectares (97.4 acres) in size, located in the northeast quadrant of Highway 7 and 6th Line. Approximately 24.8 hectares (61.3 acres) of the site is proposed to be used for extraction of aggregate material. The proposed quarry would extract up to 700,000 tonnes of aggregate material annually. The material will be shipped off-site via 6th Line and Highway 7, with an estimated 95 percent of the product travelling east on Highway 7 (according to the applicant's Traffic Impact Study).

The purpose of this TOR is to outline the requirements for a Haul Route Study for the subject development, to be reviewed by the Township of Guelph/Eramosa, the Region of Halton, the Town of Halton Hills and the Town of Milton. The Ministry of Transportation (MTO) has not requested this study; however, it would be expected that they will also be circulated for comment, considering the potential for impacts to Highway 7.

Figure 1 shows the location of the proposed quarry and the recommended study area for the haul route evaluation.

The primary concern associated with the project is the potential for significant heavy truck traffic beyond that already on any identified haul route(s) that would be generated by the quarry and the impact of that additional traffic movement on road operational concerns and traffic safety, and social features along the haul route(s).

2.0 Define Study Parameter Assumptions

Key assumptions regarding the project that are to be defined based on available information include:

- Assumed in-service data;
- Sizes of the trucks to be used;
- Volume of truck traffic to be generated;
- Location of truck queuing area(s);
- The distribution of truck traffic volumes among the potential haul routes (if more than 1 haul route is to be utilized);
- A description as to how truck volumes and truck tonnages might vary over the life of the project and by hours of the day, days of the week, and time of the year;
- Destinations of the material;
- Trucking base origins;
- Hours of facility operations, etc.;
- How the use of routes would be regulated/enforced; and
- Horizon year and intervals required for analysis (20 years in 10 year intervals).

3.0 Identification of a Haul Route(s) With The Study Area

The intention is to establish a haul route or routes which minimize travel through Acton and Georgetown. A reasonable route or routes to be considered are to be identified and described by the applicant based on input from the Town of Halton Hills, Town of Milton and Region of Halton, as well as the Township of Guelph/Eramosa.

4.0 Assessment of Truck Traffic Volumes

An assessment of the volumes of additional truck traffic on the route or routes will be carried out and reviewed by the Township in consultation with the Region of Halton, Town of Halton Hills, and Town of Milton. If the additional truck traffic on the route or routes would be so low throughout the entire life of the facility so as to not result in any appreciable negative effects, as determined by the Township, then the route or routes or portions of the route or routes in those directions would not need to be further assessed and the work identified in Sections 5 to 8 would not need to be carried out. Should that occur, the study would conclude with the preparation of the draft and final reports and their review as set out in Sections 10 and 11.

5.0 Describe Baseline Conditions

If the truck volumes are deemed by the Township to be sufficient to require further assessment, a description of baseline conditions for the route or routes is to be provided, including:

- Existing and proposed land uses;
- Identification of the locations of other existing, or proposed quarries, pits or other large truck generating land uses;
- Land use plans and designations including municipal official plans, the Greenbelt Plan; the Niagara Escarpment Plan; the Region of Halton Official Plan Amendment 38 and the Aggregate Resources Reference Manual (Halton Region);
- Relevant planning studies (Transportation Master Plans, Active Transportation Plans, Capital Planning studies);
- Social environment (residences, community features, recreational facilities, community function and character, schools and school bus routes, emergency vehicle access, etc.);
- Available information regarding air quality conditions;
- Available information about noise levels;
- Economic environment (location and type of business enterprises);
- General nature of Agriculture;
- Recreation uses (trail crossings, cycling uses, walking etc.);
- Cultural resources (built heritage, cultural landscape, archaeology);
- Road characterization (road classification, right-of-way widths, level of service (current and projected), weight restrictions, number of lanes, pavement structure, intersection configuration, road alignment (vertical and horizontal), reduced load designations, posted speed, truck route designation, watercourse crossings, culvert types, rail crossings, steep grades, visibility, etc.);
- Traffic volumes; and
- Five year vehicle collision history by link/intersection including wildlife.

The description of the baseline conditions will be used as the basis from which to assess the potential for change as a result of the use and possible improvement to the route or alternative routes where being considered.

6.0 Develop the Evaluation Approach

A Technical Advisory Committee (TAC) will be set up with representatives of Town of Halton Hills, Town of Milton, and Region of Halton, as well as the Township of Guelph/Eramosa to provide input on the evaluation approach. The County of Wellington will also be invited to attend.

If alternative routes are to be considered, the evaluation of the identified alternative routes is to be conducted in a systematic, comprehensive and traceable manner, based on a set of evaluation criteria and indicators. Similarly, if only one route is being evaluated with respect to impacts, it should also be evaluated in a systematic, comprehensive and traceable manner based on a set of evaluation criteria and indicators.

Typical criteria, where applicable, may include:

- Potential for disruption to sensitive land uses;
- Conformity with applicable plans and policies;
- Potential for impacts to residents;
- Potential for disruption to users of recreation facilities, community features and institutions;
- Potential property impacts;
- Potential for impact to business enterprises;
- Potential for impact to agricultural operations;
- Potential for impact to property values;
- Potential for disturbance to built heritage features or archaeological resources; and
- Potential for impact to transportation facilities (i.e., change in service level, change in road safety, impact on alternative transportation modes).

The monetary costs for mitigation work, to address haul route impacts, will be estimated for the alternative routes considered.

Both quantitative and qualitative data should be collected for the criteria noted where available. The criteria, and their relative importance, are to be confirmed through agency consultation prior to their application. It is expected that a meeting will be held with the TAC to achieve this confirmation and to generally confirm the results of the identification of baseline conditions.

The assessment of effects is to consider the potential increase in truck volumes, as a result of the quarry activity, over the anticipated future background traffic volume. This is to be considered for a proposed route or for each alternative route where applicable. As well, the assessment of the routes is to consider any needed improvements to the routes to support the increase in truck volumes (see next section).

7.0 Assess Road Improvements

Road improvements, if required, are to be identified for each route, to support the forecast traffic (existing plus growth due to other development and due to the quarry development). Improvement requirements, where required, may include road widenings, resurfacing, turning lanes, new crossings/grade separations, paved shoulders, signals, etc. and will be considered in the analysis completed to determine improvements to a proposed route or to compare the route options and impacts where applicable.

The route assessment is to be presented in a matrix format, describing the potential for effect for each indicator/alternative.

8.0 Comparatively Evaluate and Recommend the Preferred Route(s)

Where alternative routes are under consideration, on the basis of the collected data/assessment of effects for each of the alternative routes, the alternatives are to be comparatively evaluated. The preference would be to use a qualitative evaluation method, to be supported by a quantitative evaluation method, if the data type support one. In comparing the alternatives, the relative importance of the criteria is to be considered. The advantages and disadvantages of the alternative routes are to be compared and considered in the rationalization of the preferred route(s).

9.0 Describe Effects and Mitigation for the Preferred Route(s)

For the preferred haul route(s), provide a description of the potential effects that are expected to occur from the anticipated truck traffic volumes. This description of effects is to be based on the evaluation criteria, plus other more detailed criteria, if appropriate. Assess the overall acceptability of the route and the effects of increased truck traffic on the quality of life for the affected individuals/communities. The proponent is to demonstrate that the effects of the preferred alternative (with the proposed truck volumes) can be considered as being "reasonable" and "acceptable".

Any property requirements to support the preferred haul route(s) are to be described.

Mitigation measures to avoid or minimize effects shall be described. The method, to regulate/enforce the use of the prescribed route(s) by all trucks associated with the quarry, is to be described.

It is expected that a meeting will be held with the TAC to confirm the results of the haul route evaluation, identification of mitigation works and preliminary preferred route(s).

10.0 Prepare Draft and Final Evaluation Reports

A table of contents of the report is to be prepared and circulated to the Township of Guelph/Eramosa, Town of Milton, Town of Halton Hills, and the Region of Halton, prior to its completion. It will also be provided to Ministry of Transportation for their information.

A draft report is to be prepared, that describes the evaluation process, and circulated to the agencies noted above for comment.

The report is to be finalized, considering the comments received on the draft report.

The number of copies of the report will be set through the consultation process. Sufficient copies of the draft report and final report shall be provided to satisfy the circulation requirements of the agencies. Reports will be required in both hard copy and digital formats.

11.0 Public and Agency Consultation

The haul route study is being prepared as a support document to the rezoning process for the subject lands. It is expected that this document will be presented, and considered, as part of the ongoing public consultations and agency consultation that are part of the rezoning process.

The Township of Guelph/Eramosa, as the municipality leading this process, will direct the proponent as to the need for, and timing, for any additional formal public and/or agency consultations/meetings that may be required as this study is completed. It is requested that written acknowledgement be obtained from these agencies regarding their interest and/or concerns with this project and provided to the Township to the attention of Ms. Kelsey Lang, Planning Associate. All consultation related materials, including meeting minutes and comments received and responses are to be provided throughout the study process.

Closing Comments

This letter has provided a draft TOR for the completion of a haul route study by the proponent for the "Hidden Quarry" development. If there are any questions pertaining to this assignment please give us a call.

Yours truly,

R.J. Burnside & Associates Limited

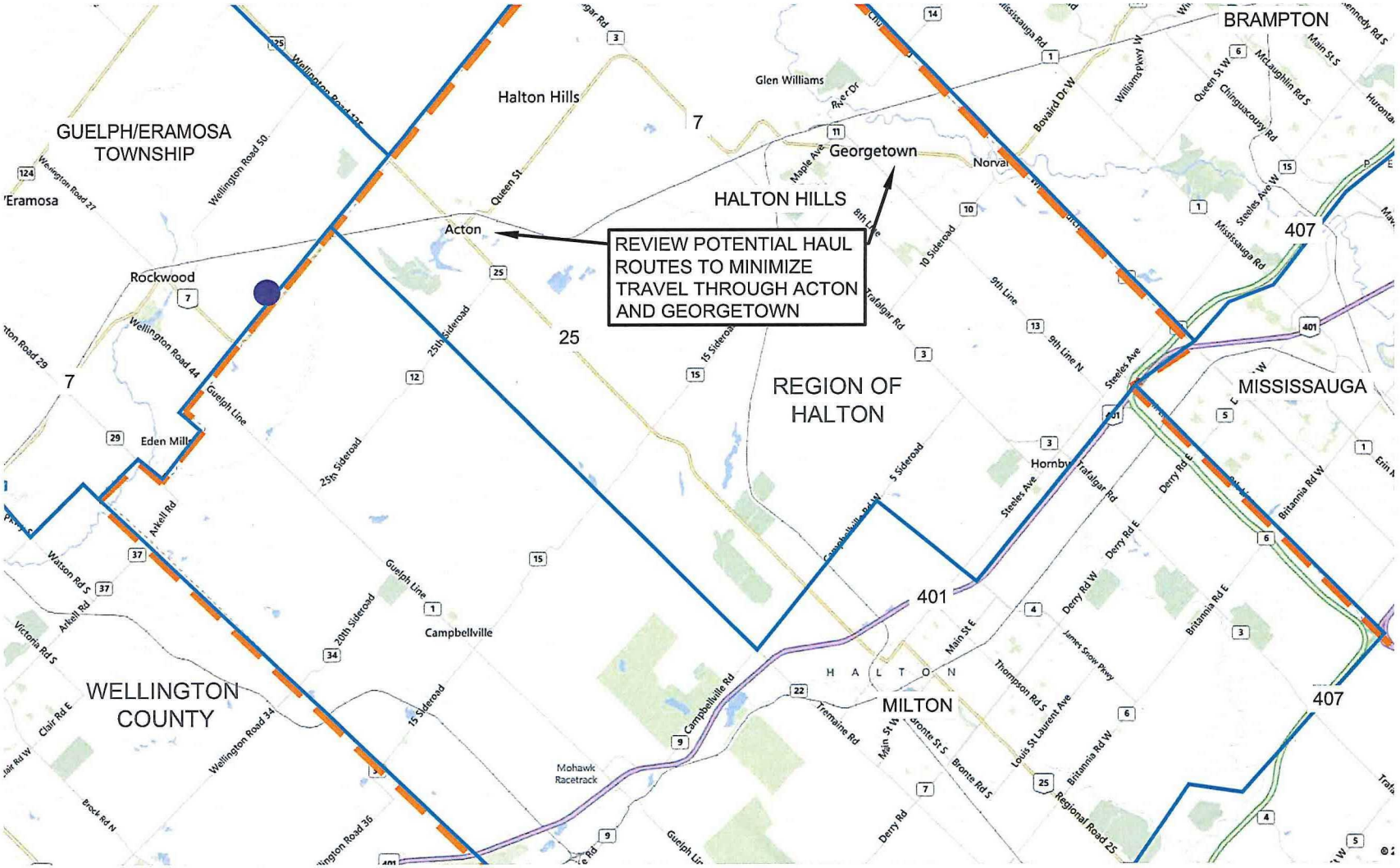
Henry Centen, P.Eng.
Senior Transportation Engineer
HC/DMcN:sj

Don McNalty, P.Eng.
Vice President, Public Sector

Enclosure(s) Figure 1 – Study Area

cc: Elizabeth Howson, Macaulay Shiomi Howson Ltd. (Via: Email - howson@mshplan.ca)
Kelsey Lane, Township of Guelph/Eramosa, (Via: Email - klang@get.on.ca)

141010_TOR_Haul_Route_Study_300032475
11/02/2015 10:56 AM



LEGEND

- SITE LOCATION
- REGION BOUNDARY
- MUNICIPAL BOUNDARY

BURNSIDE

Figure Title

HAUL ROUTE EVALUATION TERMS OF REFERENCE

STUDY AREA

Client

GUELPH/ERAMOSA TOWNSHIP

Drawn	Checked	Date	Figure No.
JBL	HC	14/09/05	1
Scale		Project No.	
NTS		300032475	

File: W:\032475_Haul_Route_Study_Area.dwg Date Plotted: September 5, 2014 - 1:41 PM

APPENDIX B
Erin Gravel Pit Truck Trip Generation

James Dick Erin Pit August 2011 Busiest Month Shipping by Hour of the Day

DATE	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM	TOTAL
02-Aug	13	20	19	11	19	15	15	19	8	16	2			158
03-Aug	9	4	7	5	5	4	7	5	9	6	1			62
04-Aug	11	13	11	15	15	11	18	15	21	13	2			145
05-Aug	9	11	12	16	12	8	16	11	9	10	0			114
08-Aug	11	8	11	9	15	5	21	11	16	12	1			123
09-Aug	8	13	12	9	5	4	7	5	5	1	1			71
10-Aug	6	12	12	7	16	7	12	8	10	10	0			100
11-Aug	5	14	7	17	13	9	11	10	5	3	2			96
12-Aug	12	14	13	12	19	7	16	8	11	8	2			122
13-Aug	6	2	5	4	2	3	0	0	0	0	0			22
15-Aug	12	7	23	16	20	13	21	13	17	18	1			162
16-Aug	10	8	10	8	23	6	14	16	10	13	1			119
17-Aug	16	13	18	12	21	15	15	16	14	17	5			162
18-Aug	20	15	22	17	11	16	18	19	15	19	2			174
19-Aug	11	13	16	14	10	5	18	11	12	15	2			122
22-Aug	12	12	21	12	21	8	22	17	19	16	4	1		170
23-Aug	9	9	11	9	10	4	15	5	11	5	6			94
24-Aug	8	11	14	9	7	16	10	21	12	12	8			128
25-Aug	18	11	19	13	23	14	20	10	14	9	1			152
26-Aug	12	9	18	11	14	8	17	11	12	12	7			131
29-Aug	15	11	12	13	14	13	13	12	14	11	7			135
30-Aug	15	11	19	12	21	17	15	18	9	20	2			159
31-Aug	15	5	16	10	11	11	10	11	7	8	1			105
TOTAL	263	246	328	261	327	219	331	272	260	254	58	1		2826
%	9.3%	8.7%	11.6%	9.2%	11.6%	7.7%	11.7%	9.6%	9.2%	9.0%	2.1%	0.0%		100%

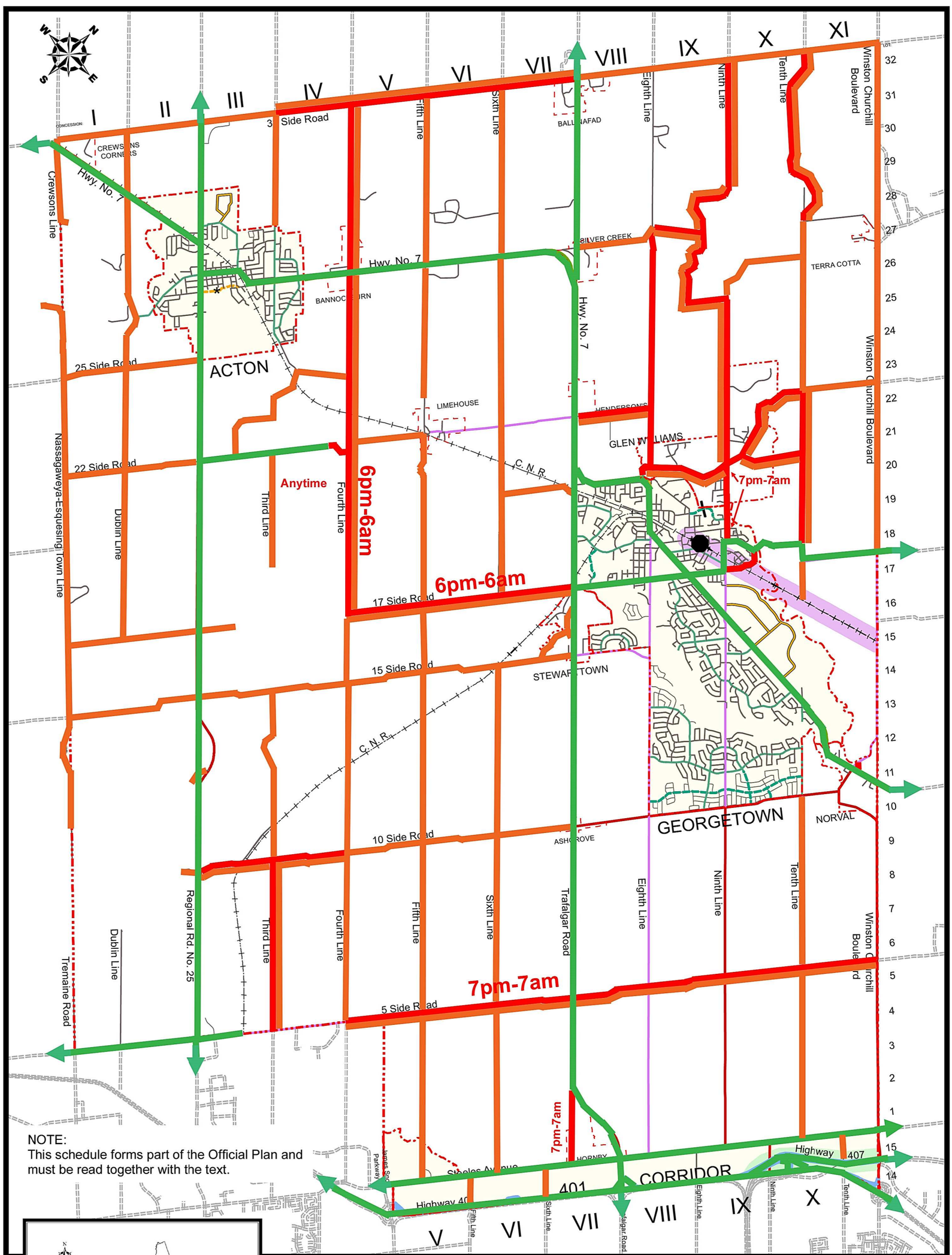
Busiest Hour 23 Trucks Shipped in one hour
% of Monthly Shipping 23/2826 0.814%

Total Monthly Tonnage Percentage for Erin Pit 2011

Jan-11	3.55%	
Feb-11	1.34%	
Mar-11	2.29%	
Apr-11	5.56%	
May-11	9.44%	
Jun-11	13.86%	
Jul-11	11.05%	
Aug-11	14.09%	Busiest Month
Sep-11	12.27%	
11-Oct	8.90%	
Nov-11	11.70%	
Dec-11	5.95%	
Total		

APPENDIX C
Town Of Halton Hills Trucking Restrictions

FUNCTIONAL PLAN OF MAJOR TRANSPORTATION FACILITIES



NOTE:
This schedule forms part of the Official Plan and must be read together with the text.

Truck Restrictions in the Town of Halton Hills

Based on Bylaw 84-1 Schedules 24 and 26

- **Heavy Traffic Prohibited (Anytime unless noted)**
- **Reduced Loads**
- **Commonly Used Unrestricted Haul Routes**

Kilometres
0 1 2 4 6 8

* Note: The exact alignment of Queen Street is conceptual and is to be determined through a Class Environmental Assessment in accordance with the policies of Section F6.4.1.10 of this Plan.

TOWN OF HALTON HILLS
Working Together Working for You!

Produced by:
TOWN OF HALTON HILLS
September 2006

APPENDIX D
Hidden Quarry Haul Route Analysis

Wellington/Caledon

25%

GUELPH/ERAMOSA TOWNSHIP

Local Industry

5%

HIDDEN QUARRY

Acton/Georgetown/Brampton

10%

7

Halton Hills

Glen Williams

Georgetown

HALTON HILLS

EVALUATE HAUL ROUTES
TO MINIMIZE HAULAGE
IN HALTON HILLS
EAST OF CTY. RD. 125

BRAMPTON

407

Rockwood

25

REGION OF HALTON

MISSISSAUGA

5%

Local Delivery/ Halton Region

Milton/Mississauga/Brampton/Toronto

55%

401

MILTON

WELLINGTON COUNTY

Campbellville

Mohawk Racetrack

Hidden Quarry Haul Route Analysis

Approximate Percentage of Traffic 5%

Concrete Plant / Depot Location

APPENDIX E
Eramosa Quarry Distance Comparison Calculations

Transportation Savings at Hidden Quarry

	Quarry	Distance to JDCL Bolton Ready Mix*	Difference from Test Case km	2-ways km	Average Additional km
Closest Amabel Quarries Outside GTA West	Georgian Duntroon	90.1	35.7	71.4	
	MAQ	91.0	36.6	73.2	74.7
	Lafarge Dundas	94.2	39.8	79.6	
Remaining Quarries in GTA West	Nelson Burlington	76.2	21.8	43.6	
	Dufferin Milton	43.5	-10.9	-21.8	-0.7
	Dufferin Acton	42.5	-11.9	-23.8	
Test Case	JDCL Hidden Quarry	54.4	0	0	

Bolton Ready Mix Plant was used because it is a real operation in the epicentre of the market that **Hidden** will serve (Halton, York and Peel) with close proximity to North Brampton, Caledon Whitebelt, Vaughan and the new GTA West Corridor.
All distances calculated with Google Maps door to door
Given the fact that average GTA west consumption is running on average at approximately 17 MT/Yr (Clayton Page 8)
Given that GTA current production (8MT/Yr) and licensed supplies are inadequate to meet demand
Therefore **Hidden Quarry** production will displace only Outside GTA production

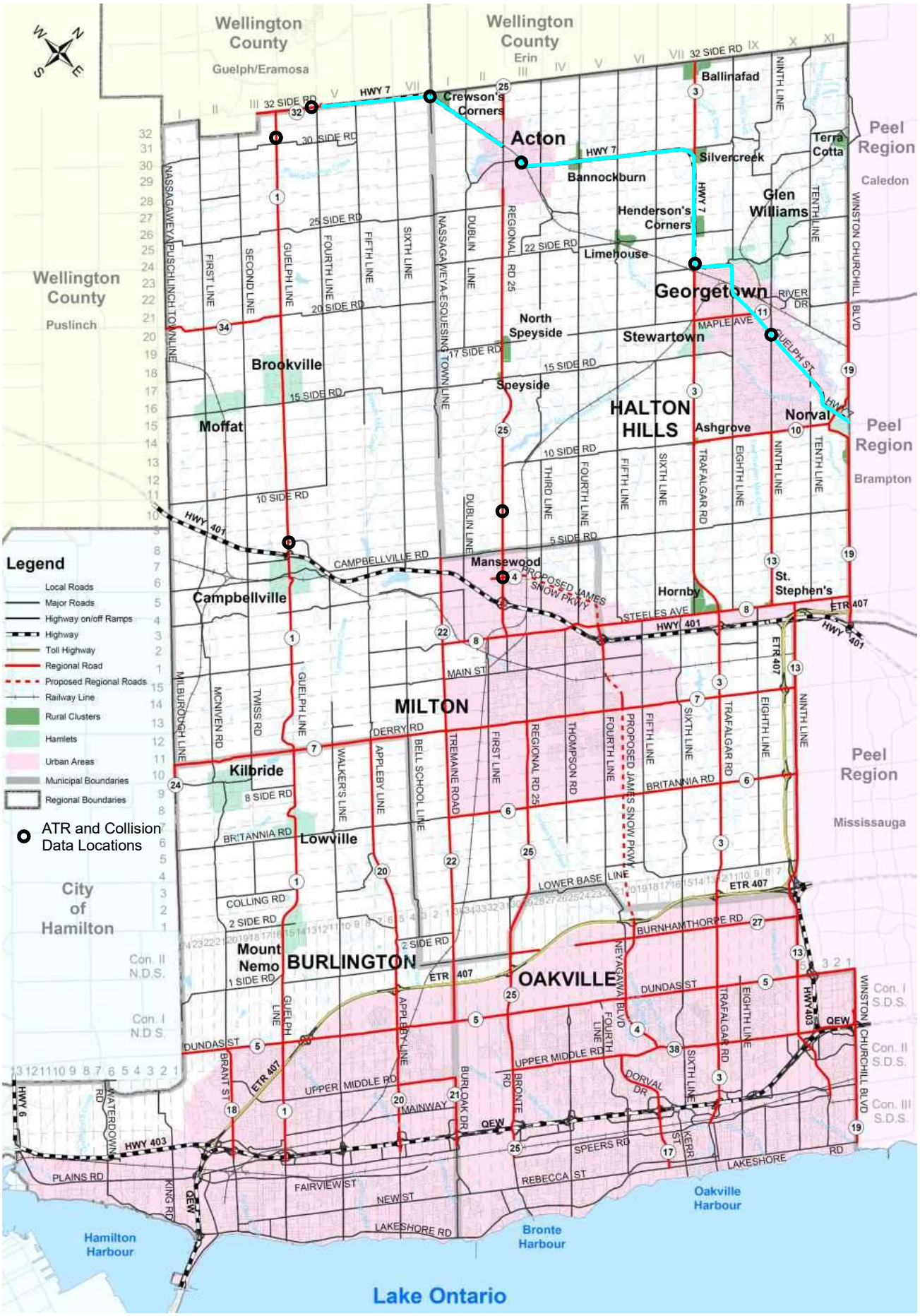
Displaced Source	Weighting	Av. Additional km	Saved km per load	
Quarries Outside GTA	0.95	74.7	71.0	
Quarries in GTA	0.05	-0.7	0.0	
			71.0	Total Km saved per truck load

Hidden Production Level	Trucks/Annum	Km saved per truckload	Total Annual km saved
700000	21212	71.0	1,505,282.83

Hidden Quarry GHG Savings Calculation

Tonnes	**T/Truck**	**Trucks/Annum**	**Km/Yr**	**L/Km**	**L/Year**	**CO2 Equiv**	**Greenhouse Gas Savings**	
700,000.00	33.00	21,212.12	1,585,252.53	0.51	808,478.79	2.73	2,207,147.09	kg
							2,207.15	tonnes

APPENDIX F
Collision Data



Not to Scale

Halton ATR and Collision Data Locations

COLE ENGINEERING

LHRS	OFFSET	MICROFILM	DATE	TIME OF ACCIDENT	DAY	CLASS	VEHNO	MAINLINE/RAMP	FATAL COUNT	INITIAL IMPACT	LIGHT	LOCATION	DIRECTION OF TRAVEL	ALIGNMENT	ENVIRONMENTAL	RD SURFACE COND	DRIVER ACTION	DRIVER COND	VEHICLE TYPE	VEH MAN	EVENT 1	EVENT 2	EVENT 3	RAMP NO
14505	0	41461399	04-Feb-14	1345	Tue	Injury	1	W	0	Turning	Daylight	AtIntSect	N	StrLvl	Clear	Dry	Disobey Traf Cont	Normal	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14505	0.4	10361263	20-Jun-11	435	Mon	PDOnly	1	W	0	SnglVeh	Dark	NonIntSect	E	StrHil	Clear	Dry	Driving properly	Normal	Auto+Stn Wagon	Gng Ahead	Animal-wild	& -	&--	0
14505	0.7	10361560	14-Jun-11	1730	Tue	PDOnly	1	E	0	SideSwipe	Daylight	NonIntSect	E	StrHil	Clear	Dry	Lane Change	Normal	Motorcycle	Gng Ahead	Other motor veh.	& -	&--	0
14505	1.3	10571110	24-Jan-11	800	Mon	PDOnly	1	E	0	Angle	Daylight	AtIntSect	S	StrLvl	Clear	LooseSnow	Lost control	Normal	Auto+Stn Wagon	Gng Ahead	Skidding/ Sliding	& Other motor veh.	&--	0
14510	0	10020791	03-Feb-11	1145	Thu	PDOnly	1	W	0	RearEnd	Daylight	IntSectRel	E	StrLvl	Snow	Slush	Speed Too Fast	Normal	Passenger Van	Slwg/Stpg	Skidding/ Sliding	& Other motor veh.	&--	0
14510	0	10212378	23-Mar-11	1530	Wed	PDOnly	1	W	0	Turning	Daylight	AtIntSect	S	StrLvl	Snow	LooseSnow	Lost control	Normal	Auto+Stn Wagon	Slwg/Stpg	Other motor veh.	& -	&--	0
14510	0	10800923	19-Nov-11	1735	Sat	Injury	1	W	0	Turning	Dark	IntSectRel	W	CrvLvl	Clear	Dry	Improper turn	Inattentive	Auto+Stn Wagon	Turn Left	Other motor veh.	& -	&--	0
14510	0	20182056	07-Apr-12	1819	Sat	PDOnly	1	W	0	SnglVeh	Daylight	AtIntSect	W	CrvHil	Clear	Dry	Driving properly	Normal	Pick Up Truck	Gng Ahead	Load spill	& -	&--	0
14510	0	30090450	07-Mar-13	2130	Thu	Injury	1	W	0	Turning	Dark Artificial	AtIntSect	N	CrvLvl	Clear	Wet	Disobey Traf Cont	Inattentive	Auto+Stn Wagon	Turn Left	Other motor veh.	& -	&--	0
14510	0	30220461	29-May-13	1520	Wed	PDOnly	1	W	0	SnglVeh	Daylight	AtIntSect	E	CrvLvl	Clear	Dry	Lost control	Fatigue	Delivery Van	Gng Ahead	Pole-utility	& -	&--	0
14510	0	41610417	04-Apr-14	1230	Fri	PDOnly	1	W	0	SnglVeh	Daylight	AtIntSect	N	CrvLvl	Rain	Wet	Speed Too Fast	Normal	Truck-Tractor	Turn Left	Skidding/ Sliding	& Jack knifing	&-Curb	0
14510	0	41642070	31-May-14	715	Sat	PDOnly	1	W	0	RearEnd	Daylight	AtIntSect	E	CrvLvl	Clear	Dry	Following Close	Normal	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	0	41630693	01-Jun-14	1200	Sun	Injury	1	W	0	RearEnd	Daylight	IntSectRel	W	StrLvl	Clear	Dry	Lost control	Normal	Motorcycle	Gng Ahead	Skidding/ Sliding	& Other motor veh.	&--	0
14510	0.1	1030696	01-Dec-10	2025	Wed	PDOnly	1	W	0	SnglVeh	Dark Artificial	PrvDrv	E	StrLvl	Clear	Wet	Speed Too Fast	Normal	Auto+Stn Wagon	Gng Ahead	Ran off road	& Ditch	&--	0
14510	0.1	20541264	03-Sep-12	38	Mon	PDOnly	1	W	0	RearEnd	Dark Artificial	IntSectRel	W	StrLvl	Clear	Dry	Lost control	Normal	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	0.1	20420560	12-Sep-12	1650	Wed	PDOnly	1	W	0	RearEnd	Daylight	NonIntSect	W	StrLvl	Clear	Dry	Following Close	Inattentive	Pick Up Truck	Slwg/Stpg	Other motor veh.	& -	&--	0
14510	0.1	41430288	11-Jan-14	505	Sat	PDOnly	1	W	0	SnglUnat	Dark	NonIntSect	S	CrvHil	Rain	Ice	Speed Too Fast	Normal	Tow Truck	Gng Ahead	Skidding/ Sliding	& Unattended veh.	&--	0
14510	0.2	10331023	09-Jun-11	520	Thu	PDOnly	1	W	0	SnglVeh	Dawn	NonIntSect	W	StrLvl	Clear	Dry	Driving properly	Normal	Auto+Stn Wagon	Gng Ahead	Animal-domestic	& Animal-wild	&--	0
14510	0.2	20391938	21-Jan-12	1200	Sat	Injury	1	W	0	SnglVeh	Daylight	NonIntSect	S	CrvLvl	Clear	Wet	Lost control	Normal	Auto+Stn Wagon	Gng Ahead	Cable guide rail	& Ditch	&-Fence barrier	0
14510	0.4	10181636	05-Mar-11	2042	Sat	Injury	1	W	0	Approach	Dark	NonIntSect	E	CrvLvl	Snow	Ice	Lost control	Normal	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	0.4	10722338	19-Dec-11	1717	Mon	Injury	1	W	0	RearEnd	Dark	NonIntSect	E	StrHil	Rain	Wet	Following Close	Inattentive	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	0.5	30331937	01-Mar-13	902	Fri	PDOnly	1	E	0	SnglVeh	Daylight	NonIntSect	E	StrHil	Clear	Dry	Speed Too Fast	Normal	Auto+Stn Wagon	Gng Ahead	Skidding/ Sliding	& Snow pile	&--	0
14510	1	10330591	23-May-11	500	Mon	PDOnly	1	W	0	SnglVeh	Dawn	NonIntSect	W	StrLvl	Clear	Dry	Oth-DrAct	Drinking	Auto+Stn Wagon	Gng Ahead	Ran off road	& Ditch	&--	0
14510	1	10331024	18-Jun-11	1100	Sat	PDOnly	1	W	0	SnglVeh	Daylight	NonIntSect	E	StrLvl	Clear	Dry	Driving properly	Normal	Auto+Stn Wagon	Gng Ahead	Animal-wild	& -	&--	0
14510	1	20181691	08-Mar-12	835	Thu	Injury	1	W	0	Angle	Daylight	IntSectRel	N	StrLvl	Rain	Wet	Fail to Yield	Normal	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	1	30781884	09-Dec-13	615	Mon	Injury	1	W	0	SnglVeh	Dark	NonIntSect	W	StrLvl	Snow	LooseSnow	Driving properly	Normal	Auto+Stn Wagon	Gng Ahead	Skidding/ Sliding	& Ditch	&-Pole-utility	0
14510	1	41692760	04-Jul-14	1745	Fri	Injury	1	W	0	Turning	Daylight	AtIntSect	S	StrLvl	Clear	Dry	Improper turn	Normal	Auto+Stn Wagon	Turn Left	Other motor veh.	& -	&--	0
14510	1.1	30600149	15-Nov-13	1600	Fri	Injury	1	W	0	RearEnd	Daylight	NonIntSect	N	StrLvl	Clear	Dry	Speed Too Fast	Normal	Pick Up Truck	Slwg/Stpg	Other motor veh.	& Other motor veh.	&--	0

LHRS	OFFSET	MICROFILM	DATE	TIME OF ACCIDENT	DAY	CLASS	VEHNO	MAINLINE/RAMP	FATAL COUNT	INITIAL IMPACT	LIGHT	LOCATION	DIRECTION OF TRAVEL	ALIGNMENT	ENVIRONMENTAL	RD SURFACE COND	DRIVER ACTION	DRIVER COND	VEHICLE TYPE	VEH MAN	EVENT 1	EVENT 2	EVENT 3	RAMP NO
14510	1.1	41632607	28-May-14	827	Wed	PDOnly	1	W	0	RearEnd	Daylight	IntSectRel	S	StrLvl	Clear	Dry	Following Close	Normal	Auto+Stn Wagon	Slwg/Stpg	Other motor veh.	& -	&--	0
14510	1.3	30132363	21-Apr-13	1245	Sun	Injury	1	W	0	RearEnd	Daylight	NonIntSect	N	StrLvl	Clear	Dry	Speed Exceed Lim	Fatigue	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	1.5	160603	06-Feb-10	1235	Sat	PDOnly	1	W	0	SnglVeh	Daylight	NonIntSect	E	StrLvl	Clear	Dry	Following Close	Normal	Auto+Stn Wagon	Gng Ahead	Ran off road	& Ditch	&--	0
14510	1.5	20162135	03-Apr-12	1719	Tue	PDOnly	1	W	0	Turning	Daylight	PrvDrv	W	StrLvl	Clear	Dry	Following Close	Inattentive	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	1.5	20722395	28-Sep-12	839	Fri	PDOnly	1	W	0	RearEnd	Daylight	PrvDrv	S	StrLvl	Clear	Dry	Driving properly	Normal	Auto+Stn Wagon	Stopped	Other motor veh.	& -	&--	0
14510	1.7	42062678	11-Nov-14	2200	Tue	PDOnly	1	W	0	SnglVeh	Dark Artificial	NonIntSect	W	StrLvl	Rain	Wet	Driving properly	Normal	Auto+Stn Wagon	Gng Ahead	Animal-wild	& -	&--	0
14510	2	20261631	03-Jul-12	909	Tue	PDOnly	1	W	0	SideSwipe	Daylight	NonIntSect	E	StrLvl	Clear	Dry	Lane Change	Inattentive	Passenger Van	Change Lane	Other motor veh.	& -	&--	0
14510	2	20511971	15-Oct-12	2213	Mon	PDOnly	1	W	0	SnglVeh	Dark	NonIntSect	E	StrLvl	Clear	Dry	Driving properly	Normal	Auto+Stn Wagon	Gng Ahead	Animal-wild	& -	&--	0
14510	2	20562264	28-Nov-12	1846	Wed	PDOnly	1	W	0	SnglVeh	Dark	NonIntSect	W	StrLvl	Snow	Wet	Driving properly	Normal	Auto+Stn Wagon	Gng Ahead	Animal-wild	& -	&--	0
14510	3.5	20421203	02-Sep-12	2337	Sun	PDOnly	1	W	0	SnglVeh	Dark	IntSectRel	N	StrLvl	Clear	Dry	Lost control	Normal	Passenger Van	Turn Right	Other fixed object	& -	&--	0
14510	3.5	42022374	01-Sep-14	818	Mon	PDOnly	1	W	0	SnglVeh	Daylight	AtIntSect	S	CrvHil	Fog	Wet	Speed Too Fast	Inattentive	Pick Up Truck	Turn Left	Animal-wild	& Pole-utility	&--	0
14510	3.5	51661084	01-May-15	1145	Fri	Injury	1	E	0	Turning	Daylight	AtIntSect	S	StrLvl	Clear	Dry	Improper turn	Inattentive	Auto+Stn Wagon	Turn Left	Other motor veh.	& -	&--	0
14510	4.1	130651	26-Jan-10	840	Tue	PDOnly	1	E	0	RearEnd	Daylight	NonIntSect	W	StrLvl	Rain	Ice	Speed Too Fast	Normal	Auto+Stn Wagon	Gng Ahead	Skidding/ Sliding	& Other motor veh.	&--	0
14510	4.5	440657	23-Jun-10	1335	Wed	PDOnly	1	W	0	SnglVeh	Daylight	PrvDrv	E	StrLvl	Clear	Dry	Oth-DrAct	Normal	Auto+Stn Wagon	Oth-VehMan	Other Event	& -	&--	0
14510	4.9	10201786	23-Mar-11	533	Wed	PDOnly	1	E	0	Turning	Dark	PrvDrv	W	StrLvl	Snow	Slush	Driving properly	Normal	Truck-Dump	Gng Ahead	Other motor veh.	& -	&--	0
14510	5.1	30171547	06-Apr-13	1218	Sat	Injury	1	W	0	Angle	Daylight	IntSectRel	S	StrLvl	Clear	Dry	Disobey Traf Cont	Inattentive	Bicycle	Gng Ahead	Other motor veh.	& -	&--	0
14510	5.2	41731326	04-Aug-14	1900	Mon	PDOnly	1	W	0	RearEnd	Daylight	PrvDrv	W	StrLvl	Clear	Dry	Following Close	Inattentive	Pick Up Truck	Slwg/Stpg	Other motor veh.	& -	&--	0
14510	5.9	20361071	24-Aug-12	1205	Fri	Injury	1	W	0	SnglVeh	Daylight	NonIntSect	W	StrLvl	Clear	Dry	Lost control	Normal	Auto+Stn Wagon	Gng Ahead	Pole-sign/park.meter	& Ditch	&-Rollover	0
14510	6.4	292686	05-Jun-10	1930	Sat	Injury	1	E	0	RearEnd	Daylight	AtIntSect	E	StrLvl	Clear	Dry	Lane Change	Inattentive	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	6.4	30501925	01-Oct-13	1605	Tue	PDOnly	1	E	0	RearEnd	Daylight	IntSectRel	W	StrLvl	Clear	Dry	Following Close	Normal	Auto+Stn Wagon	Slwg/Stpg	Other motor veh.	& -	&--	0
14510	6.5	20421204	08-Sep-12	1635	Sat	Injury	1	W	0	Turning	Daylight	IntSectRel	E	StrLvl	Clear	Dry	Speed Too Fast	Normal	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	6.6	20091011	20-Mar-12	1030	Tue	Injury	1	W	0	RearEnd	Daylight	NonIntSect	E	StrLvl	Clear	Dry	Disobey Traf Cont	Inattentive	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	7.7	30060331	21-Feb-13	1719	Thu	Injury	1	E	0	SnglVeh	Dark Artificial	NonIntSect	E	StrLvl	Clear	Dry	Driving properly	Oth-DrCnd	Auto+Stn Wagon	Gng Ahead	Other Event	& -	&--	0
14510	7.8	471967	25-Jul-10	9999	Sun	Injury	1	W	0	Angle	Daylight	AtIntSect	N	StrLvl	Clear	Dry	Fail to Yield	Inattentive	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	7.8	30141904	08-Feb-13	1548	Fri	Injury	1	W	0	SideSwipe	Dusk	AtIntSect	W	StrLvl	Snow	PackSnow	Lost control	Normal	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14510	8.3	1171365	12-May-10	2300	Wed	Injury	1	W	0	RearEnd	Dark	NonIntSect	W	StrLvl	Clear	Dry	Driving properly	Inattentive	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14530	0.6	41511894	09-Mar-14	1600	Sun	PDOnly	1	E	0	SnglVeh	Daylight	NonIntSect	E	StrLvl	Clear	Dry	Lost control	Impair Drugs	Auto+Stn Wagon	Gng Ahead	Ran off road	& Other fixed object	&--	0

LHRS	OFFSET	MICROFILM	DATE	TIME OF ACCIDENT	DAY	CLASS	VEHNO	MAINLINE/RAMP	FATAL COUNT	INITIAL IMPACT	LIGHT	LOCATION	DIRECTION OF TRAVEL	ALIGNMENT	ENVIRONMENTAL	RD SURFACE COND	DRIVER ACTION	DRIVER COND	VEHICLE TYPE	VEH MAN	EVENT 1	EVENT 2	EVENT 3	RAMP NO
14530	1.1	252024	15-May-10	1230	Sat	PDOnly	1	E	0	SnglVeh	Daylight	NonIntSect	E	StrLvl	Clear	Dry	Driving properly	Normal	Auto+Stn Wagon	Gng Ahead	Animal-wild	& -	&--	0
14530	1.1	30342481	05-Jul-13	2200	Fri	PDOnly	1	E	0	SnglVeh	Dark	NonIntSect	W	StrHil	Fog	Dry	Driving properly	Normal	Auto+Stn Wagon	Gng Ahead	Animal-wild	& -	&--	0
14530	1.6	20580281	30-Aug-12	835	Thu	Injury	1	W	0	Turning	Daylight	IntSectRel	E	StrLvl	Clear	Dry	Improper passing	Normal	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14530	1.6	30412405	01-Aug-13	1000	Thu	PDOnly	1	W	0	SideSwipe	Daylight	AtIntSect	N	StrLvl	Clear	Dry	Fail to Yield	Normal	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14530	1.6	42061788	16-Nov-14	1200	Sun	PDOnly	1	W	0	Angle	Daylight	IntSectRel	S	StrLvl	Snow	Wet	Fail to Yield	Inattentive	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& -	&--	0
14530	1.7	41692835	10-Jul-14	659	Thu	PDOnly	1	W	0	SideSwipe	Daylight	NonIntSect	W	StrLvl	Clear	Dry	Improper passing	Normal	Auto+Stn Wagon	Overtak ng	Cyclist	& -	&--	0
14530	1.7	42081142	12-Dec-14	458	Fri	Fatal	1	W	1	SnglVeh	Dark	NonIntSect	W	StrHil	Clear	Wet	Lost control	Med Defect	Truck-Tractor	FromRd Side	Ran off road	& Ditch	&--	0
14530	1.7	51722995	01-Jun-15	2315	Mon	Injury	1	W	0	SnglVeh	Dark	NonIntSect	W	StrLvl	Clear	Dry	Driving properly	Normal	Auto+Stn Wagon	Gng Ahead	Skidding/ Sliding	& Ran off road	&-Rollover	0
14530	2.2	51832486	15-Jul-15	742	Wed	Injury	1	W	0	Approach	Daylight	NonIntSect	E	StrLvl	Clear	Dry	Oth-DrAct	Fatigue	Auto+Stn Wagon	Gng Ahead	Other motor veh.	& Other motor veh.	&--	0
14530	2.4	60460	05-Jan-10	2200	Tue	PDOnly	1	E	0	SnglVeh	Dark	NonIntSect	E	StrLvl	Clear	Wet	Driving properly	Normal	Pick Up Truck	Gng Ahead	Animal-wild	& -	&--	0
14530	2.6	340489	12-Jun-10	523	Sat	PDOnly	1	W	0	SnglVeh	Dark	NonIntSect	E	StrLvl	Clear	Dry	Driving properly	Inattentive	Auto+Stn Wagon	Gng Ahead	Skidding/ Sliding	& Rollover	&--	0
14535	0	321933	30-Apr-10	2140	Fri	Injury	1	W	0	SnglVeh	Dark	PrvDrv	W	StrLvl	Clear	Dry	Lost control	Impaired+.08	Auto+Stn Wagon	Gng Ahead	Ran off road	& Rollover	&--	0
14535	0	10042212	06-Jan-11	1130	Thu	PDOnly	1	W	0	SnglVeh	Dark	NonIntSect	W	StrLvl	Snow	LooseSnow	Speed Too Fast	Normal	Passenger Van	Gng Ahead	Skidding/ Sliding	& Ditch	&--	0
14535	0	10702514	21-Nov-11	1914	Mon	PDOnly	1	W	0	SnglVeh	Dark	NonIntSect	W	StrLvl	Clear	Dry	Driving properly	Normal	Auto+Stn Wagon	Gng Ahead	Debris on road	& -	&--	0

APPENDIX G
Collision Rate Analysis

Collision Rate Calculations for the Intersection of Highway 7 and Eramosa Townline

Collision Rate (CR)

$$CR = \frac{Nx10^6}{AADTxtx365}$$

where:

N = number of collisions during time t

AADT = Average Annual Daily Traffic (entering)

t = observation period (years)

N = 4

AADT = **8100** (Total)

t = 6

$$CR = \frac{54x10^6}{29259x13x365}$$

CR= 0.23

Critical Collision Rate (R_c)

$$R_c = R_a + k\sqrt{\frac{R_a}{M}} + \frac{1}{2M}$$

where:

R_a = average collision rate for the intersection (total number of collisions divided by the total entering volume in millions for the entire analysis period)

M = vehicle volume entering the study intersection (in millions, total for the entrie analysis period)

K = constant: (1.28 for 90 percent confidence, 1.65 for 95 percent confidence, 2.33 for 99 percent confidence)

R_a = 0.666667

M = 17.739

k = 1.65

$$R_c = 4.153846 + 1.65\sqrt{\frac{4.153846}{138.834}} + \frac{1}{2(138.834)}$$

Rc= 1.01

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Collision Rate Calculations for the Intersection of Highway 7 and Trafalgar Road

Collision Rate (CR)

$$CR = \frac{Nx10^6}{AADTxtx365}$$

where:
N = number of collisions during time t
AADT = Average Annual Daily Traffic (entering)
t = observation period (years)

N = 12

AADT = **19300** (Total)
t = 6

$$CR = \frac{21x10^6}{39840x5x365}$$

CR = 0.28

Critical Collision Rate (R_c)

$$R_c = R_a + k\sqrt{\frac{R_a}{M}} + \frac{1}{2M}$$

where:
R_a = average collision rate for the intersection (total number of collisions divided by the total entering volume in millions for the entire analysis period)
M = vehicle volume entering the study intersection (in millions, total for the entrie analysis period)
K = constant: (1.28 for 90 percent confidence, 1.65 for 95 percent confidence, 2.33 for 99 percent confidence)

R_a = 2
M = 42.267
k = 1.65

$$R_c = 4.2 + 1.65\sqrt{\frac{4.2}{72.708}} + \frac{1}{2(72.708)}$$

R_c = 2.37

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Collision Rate Calculations for the Intersection of Mill Street and Main Street

Collision Rate (CR)

$$CR = \frac{Nx10^6}{AADTxtx365}$$

where:

N = number of collisions during time t

AADT = Average Annual Daily Traffic (entering)

t = observation period (years)

N = 48

AADT = **8100** (Total)

t = 6

$$CR = \frac{54x10^6}{29259x13x365}$$

CR= 2.71

Critical Collision Rate (R_c)

$$R_c = R_a + k\sqrt{\frac{R_a}{M}} + \frac{1}{2M}$$

where:

R_a = average collision rate for the intersection (total number of collisions divided by the total entering volume in millions for the entire analysis period)

M = vehicle volume entering the study intersection (in millions, total for the entrie analysis period)

K = constant: (1.28 for 90 percent confidence, 1.65 for 95 percent confidence, 2.33 for 99 percent confidence)

R_a = 8

M = 17.739

k = 1.65

$$R_c = 4.153846 + 1.65\sqrt{\frac{4.153846}{138.834}} + \frac{1}{2(138.834)}$$

Rc= 9.14

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Collision Rate Calculations for the Intersection of Highway 7 and Mountain View Road

Collision Rate (CR)

$$CR = \frac{Nx10^6}{AADTxtx365}$$

where:

N = number of collisions during time t

AADT = Average Annual Daily Traffic (entering)

t = observation period (years)

N = 3

AADT = **8100** (Total)

t = 6

$$CR = \frac{54x10^6}{29259x13x365}$$

CR= 0.17

Critical Collision Rate (R_c)

$$R_c = R_a + k\sqrt{\frac{R_a}{M}} + \frac{1}{2M}$$

where:

R_a = average collision rate for the intersection (total number of collisions divided by the total entering volume in millions for the entire analysis period)

M = vehicle volume entering the study intersection (in millions, total for the entrie analysis period)

K = constant: (1.28 for 90 percent confidence, 1.65 for 95 percent confidence, 2.33 for 99 percent confidence)

R_a = 0.5

M = 17.739

k = 1.65

$$R_c = 4.153846 + 1.65\sqrt{\frac{4.153846}{138.834}} + \frac{1}{2(138.834)}$$

Rc= 0.81

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Collision Rate Calculations for the Intersection of Regional Road 25

Collision Rate (CR)

$$CR = \frac{Nx10^6}{AADTxtx365}$$

where:

N = number of collisions during time t

AADT = Average Annual Daily Traffic (entering)

t = observation period (years)

N = 14

AADT = **10461** (Total)

t = 5

$$CR = \frac{54x10^6}{29259x13x365}$$

CR= 0.73

Critical Collision Rate (R_c)

$$R_c = R_a + k\sqrt{\frac{R_a}{M}} + \frac{1}{2M}$$

where:

R_a = average collision rate for the intersection (total number of collisions divided by the total entering volume in millions for the entire analysis period)

M = vehicle volume entering the study intersection (in millions, total for the entrie analysis period)

K = constant: (1.28 for 90 percent confidence, 1.65 for 95 percent confidence, 2.33 for 99 percent confidence)

R_a = 2.8

M = 19.09133

k = 1.65

$$R_c = 4.153846 + 1.65\sqrt{\frac{4.153846}{138.834}} + \frac{1}{2(138.834)}$$

Rc= 3.46

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Collision Rate Calculations for the Intersection of Regional Road 25 and James Snow Parkway

Collision Rate (CR)

$$CR = \frac{Nx10^6}{AADTxtx365}$$

where:
N = number of collisions during time t
AADT = Average Annual Daily Traffic (entering)
t = observation period (years)

N = 13

AADT = **23487** (Total)
t = 5

$$CR = \frac{13x10^6}{23487x13x365}$$

CR= 0.30

Critical Collision Rate (R_c)

$$R_c = R_a + k\sqrt{\frac{R_a}{M}} + \frac{1}{2M}$$

where:
R_a = average collision rate for the intersection (total number of collisions divided by the total entering volume in millions for the entire analysis period)
M = vehicle volume entering the study intersection (in millions, total for the entrie analysis period)
K = constant: (1.28 for 90 percent confidence, 1.65 for 95 percent confidence, 2.33 for 99 percent confidence)

R_a = 2.6
M = 42.86378
k = 1.65

$$R_c = 2.6 + 1.65\sqrt{\frac{2.6}{42.86378}} + \frac{1}{2(42.86378)}$$

Rc= 3.02

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Collision Rate Calculations for the Intersection of Guelph Line and Eramosa-Milton Townline (SR32)

Collision Rate (CR)

$$CR = \frac{Nx10^6}{AADTxtx365}$$

where:
N = number of collisions during time t
AADT = Average Annual Daily Traffic (entering)
t = observation period (years)

N =	1	
AADT =	6838	Eramosa-Milton
	6838	(Total)
t =	5	

$$CR = \frac{1x10^6}{6838x1x365}$$

CR= 0.08

Critical Collision Rate (R_c)

$$R_c = R_a + k\sqrt{\frac{R_a}{M}} + \frac{1}{2M}$$

where:
R_a = average collision rate for the intersection (total number of collisions divided by the total entering volume in millions for the entire analysis period)
M = vehicle volume entering the study intersection (in millions, total for the entrie analysis period)
K = constant: (1.28 for 90 percent confidence, 1.65 for 95 percent confidence, 2.33 for 99 percent confidence)

R_a =	0.2
M =	12.47935
k =	1.65

$$R_c = 1 + 1.65\sqrt{\frac{1}{2.49587}} + \frac{1}{2(2.49587)}$$

Rc= 0.45

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Collision Rate Calculations for the RR 25 section located between SR 22 and SR 25

Collision Rate (CR)

$$CR = \frac{Nx10^6}{AADTxtx365}$$

where:
N = number of collisions during time t
AADT = Average Annual Daily Traffic (entering)
t = observation period (years)

N = 13
AADT = 9472 BTWN SR 22 and SR 25

9472 (Total)
t = 5

$$CR = \frac{13x10^6}{9472x1x365}$$

CR= 0.75

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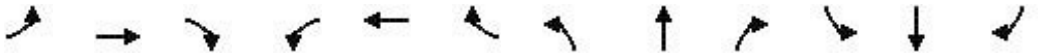
APPENDIX H

Existing Main Street / Mill Street Configuration

Level Of Service Calculations

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	73	21	117	38	194	137	174	5	370	355	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	2.7	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.97			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.96	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (prot)		1867			1494	1320		1546	1383	1634	1755	
Flt Permitted		0.95			0.73	1.00		0.68	1.00	0.43	1.00	
Satd. Flow (perm)		1780			1129	1320		1077	1383	734	1755	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	15	78	22	124	40	206	146	185	5	394	378	11
RTOR Reduction (vph)	0	13	0	0	0	123	0	0	3	0	1	0
Lane Group Flow (vph)	0	102	0	0	164	83	0	331	2	394	388	0
Heavy Vehicles (%)	8%	7%	2%	12%	5%	6%	20%	18%	9%	8%	8%	2%
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		18.5			18.5	35.2		35.8	35.8	56.5	56.5	
Effective Green, g (s)		18.5			18.5	35.2		35.8	35.8	56.5	56.5	
Actuated g/C Ratio		0.21			0.21	0.40		0.41	0.41	0.65	0.65	
Clearance Time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		378			240	534		443	569	649	1139	
v/s Ratio Prot						0.03				c0.12	0.22	
v/s Ratio Perm		0.06			c0.15	0.03		c0.31	0.00	0.28		
v/c Ratio		0.27			0.68	0.16		0.75	0.00	0.61	0.34	
Uniform Delay, d1		28.6			31.6	16.5		21.8	15.1	7.9	6.9	
Progression Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.4			7.8	0.1		11.0	0.0	1.6	0.8	
Delay (s)		29.0			39.3	16.6		32.7	15.1	9.5	7.7	
Level of Service		C			D	B		C	B	A	A	
Approach Delay (s)		29.0			26.7			32.4			8.6	
Approach LOS		C			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	71	10	90	67	233	4	176	107	242	181	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	2.7	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.99			1.00	0.85		1.00	0.85	1.00	0.98	
Flt Protected		1.00			0.97	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1874			1621	1320		1595	1396	1604	1629	
Flt Permitted		0.96			0.81	1.00		1.00	1.00	0.59	1.00	
Satd. Flow (perm)		1813			1347	1320		1589	1396	991	1629	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	9	73	10	93	69	240	4	181	110	249	187	21
RTOR Reduction (vph)	0	6	0	0	0	163	0	0	55	0	3	0
Lane Group Flow (vph)	0	86	0	0	162	77	0	185	55	249	205	0
Heavy Vehicles (%)	22%	6%	2%	3%	2%	6%	2%	18%	8%	10%	16%	5%
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		16.8			16.8	27.8		43.2	43.2	58.2	58.2	
Effective Green, g (s)		16.8			16.8	27.8		43.2	43.2	58.2	58.2	
Actuated g/C Ratio		0.19			0.19	0.32		0.50	0.50	0.67	0.67	
Clearance Time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		350			260	421		789	693	740	1089	
v/s Ratio Prot						0.02				c0.04	0.13	
v/s Ratio Perm		0.05			c0.12	0.04		0.12	0.04	c0.18		
v/c Ratio		0.24			0.62	0.18		0.23	0.08	0.34	0.19	
Uniform Delay, d1		29.7			32.2	21.4		12.5	11.5	5.8	5.5	
Progression Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.4			4.6	0.2		0.7	0.2	0.3	0.4	
Delay (s)		30.1			36.8	21.6		13.2	11.7	6.0	5.8	
Level of Service		C			D	C		B	B	A	A	
Approach Delay (s)		30.1			27.7			12.6			5.9	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	117	10	166	108	354	14	441	157	265	257	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	2.7	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.99			1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.97	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1945			1608	1346		1788	1449	1713	1761	
Flt Permitted		0.92			0.73	1.00		0.99	1.00	0.29	1.00	
Satd. Flow (perm)		1806			1210	1346		1767	1449	517	1761	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	23	118	10	168	109	358	14	445	159	268	260	22
RTOR Reduction (vph)	0	4	0	0	0	74	0	0	54	0	3	0
Lane Group Flow (vph)	0	147	0	0	277	284	0	459	105	268	279	0
Heavy Vehicles (%)	2%	4%	2%	4%	2%	4%	2%	5%	4%	3%	7%	2%
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		24.6			24.6	37.0		34.0	34.0	50.4	50.4	
Effective Green, g (s)		24.6			24.6	37.0		34.0	34.0	50.4	50.4	
Actuated g/C Ratio		0.28			0.28	0.43		0.39	0.39	0.58	0.58	
Clearance Time (s)		6.0			6.0	4.0		6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		510			342	572		690	566	469	1020	
v/s Ratio Prot						0.07				c0.08	0.16	
v/s Ratio Perm		0.08			c0.23	0.14		c0.26	0.07	0.25		
v/c Ratio		0.29			0.81	0.50		0.67	0.19	0.57	0.27	
Uniform Delay, d1		24.4			29.0	18.2		21.8	17.4	11.3	9.1	
Progression Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.3			13.2	0.7		5.0	0.7	1.7	0.7	
Delay (s)		24.7			42.2	18.9		26.8	18.1	12.9	9.8	
Level of Service		C			D	B		C	B	B	A	
Approach Delay (s)		24.7			29.1			24.6			11.3	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX I

Modified Main Street / Mill Street Configuration

Level Of Service Calculations

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	73	21	117	38	194	137	174	5	370	355	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	4.8	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Frt		0.97			0.92			1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.98			0.98	1.00	0.95	1.00	
Satd. Flow (prot)		1867			1815			1546	1383	1634	1755	
Flt Permitted		0.93			0.86			0.68	1.00	0.40	1.00	
Satd. Flow (perm)		1743			1584			1077	1383	693	1755	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	15	78	22	124	40	206	146	185	5	394	378	11
RTOR Reduction (vph)	0	12	0	0	63	0	0	0	3	0	1	0
Lane Group Flow (vph)	0	103	0	0	307	0	0	331	2	394	388	0
Heavy Vehicles (%)	8%	7%	2%	12%	5%	6%	20%	18%	9%	8%	8%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		22.2			22.2			32.5	32.5	52.8	52.8	
Effective Green, g (s)		22.2			22.2			32.5	32.5	52.8	52.8	
Actuated g/C Ratio		0.26			0.26			0.37	0.37	0.61	0.61	
Clearance Time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		444			404			402	516	596	1065	
v/s Ratio Prot										c0.12	0.22	
v/s Ratio Perm		0.06			c0.19			c0.31	0.00	0.28		
v/c Ratio		0.23			0.76			0.82	0.00	0.66	0.36	
Uniform Delay, d1		25.7			29.9			24.7	17.1	9.9	8.6	
Progression Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.3			8.2			17.2	0.0	2.8	1.0	
Delay (s)		25.9			38.2			41.8	17.1	12.6	9.6	
Level of Service		C			D			D	B	B	A	
Approach Delay (s)		25.9			38.2			41.5			11.1	
Approach LOS		C			D			D			B	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	71	10	90	67	233	4	176	107	242	181	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	4.8	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Frt		0.99			0.92			1.00	0.85	1.00	0.98	
Flt Protected		1.00			0.99			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1874			1871			1595	1396	1604	1629	
Flt Permitted		0.95			0.90			0.99	1.00	0.58	1.00	
Satd. Flow (perm)		1786			1707			1589	1396	978	1629	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	9	73	10	93	69	240	4	181	110	249	187	21
RTOR Reduction (vph)	0	6	0	0	74	0	0	0	63	0	4	0
Lane Group Flow (vph)	0	86	0	0	328	0	0	185	47	249	204	0
Heavy Vehicles (%)	22%	6%	2%	3%	2%	6%	2%	18%	8%	10%	16%	5%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		22.0			22.0			37.5	37.5	53.0	53.0	
Effective Green, g (s)		22.0			22.0			37.5	37.5	53.0	53.0	
Actuated g/C Ratio		0.25			0.25			0.43	0.43	0.61	0.61	
Clearance Time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		451			431			684	601	678	992	
v/s Ratio Prot										c0.05	0.13	
v/s Ratio Perm		0.05			c0.19			0.12	0.03	c0.18		
v/c Ratio		0.19			0.76			0.27	0.08	0.37	0.21	
Uniform Delay, d1		25.5			30.1			15.9	14.6	8.0	7.6	
Progression Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.2			7.7			1.0	0.3	0.3	0.5	
Delay (s)		25.7			37.8			16.9	14.8	8.3	8.1	
Level of Service		C			D			B	B	A	A	
Approach Delay (s)		25.7			37.8			16.1			8.2	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

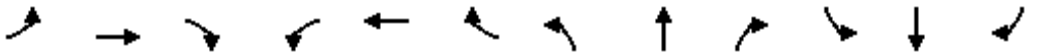
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	117	10	166	108	354	14	441	157	265	257	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	4.3	3.7	3.7	4.8	2.4	3.7	3.5	3.0	3.4	3.6	3.7
Total Lost time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Lane Util. Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Frt		0.99			0.92			1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.99			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1945			1894			1788	1449	1713	1761	
Flt Permitted		0.88			0.87			0.99	1.00	0.19	1.00	
Satd. Flow (perm)		1721			1667			1765	1449	345	1761	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	23	118	10	168	109	358	14	445	159	268	260	22
RTOR Reduction (vph)	0	3	0	0	54	0	0	0	61	0	4	0
Lane Group Flow (vph)	0	148	0	0	581	0	0	459	98	268	278	0
Heavy Vehicles (%)	2%	4%	2%	4%	2%	4%	2%	5%	4%	3%	7%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		32.0			32.0			26.4	26.4	43.0	43.0	
Effective Green, g (s)		32.0			32.0			26.4	26.4	43.0	43.0	
Actuated g/C Ratio		0.37			0.37			0.30	0.30	0.49	0.49	
Clearance Time (s)		6.0			6.0			6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0			3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		633			613			535	439	368	870	
v/s Ratio Prot										c0.11	0.16	
v/s Ratio Perm		0.09			c0.35			c0.26	0.07	0.25		
v/c Ratio		0.23			0.95			0.86	0.22	0.73	0.32	
Uniform Delay, d1		19.0			26.7			28.5	22.6	16.1	13.2	
Progression Factor		1.00			1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.2			23.8			16.2	1.2	7.0	1.0	
Delay (s)		19.2			50.5			44.7	23.8	23.1	14.2	
Level of Service		B			D			D	C	C	B	
Approach Delay (s)		19.2			50.5			39.4			18.5	
Approach LOS		B			D			D			B	

Intersection Summary			
HCM 2000 Control Delay	35.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	110.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX J

Existing Key Intersection

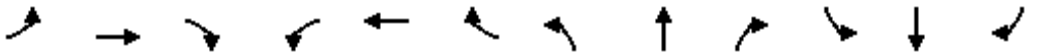
Level Of Service Calculations



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	28	42	45	11	55	129	604	208	174	531	3
Future Volume (vph)	2	28	42	45	11	55	129	604	208	174	531	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	6.4	6.4	4.0	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3536	
Flt Permitted	0.75	1.00	1.00	0.74	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1396	3539	1583	1372	3539	1583	1770	3539	1583	1770	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	30	46	49	12	60	140	657	226	189	577	3
RTOR Reduction (vph)	0	0	40	0	0	53	0	0	131	0	1	0
Lane Group Flow (vph)	2	30	6	49	12	7	140	657	95	189	579	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			
Actuated Green, G (s)	8.2	8.2	8.2	8.2	8.2	8.2	11.2	28.6	28.6	14.5	31.9	
Effective Green, g (s)	8.2	8.2	8.2	8.2	8.2	8.2	11.2	28.6	28.6	14.5	31.9	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12	0.12	0.16	0.42	0.42	0.21	0.47	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	6.4	6.4	4.0	6.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	168	426	190	165	426	190	291	1488	665	377	1658	
v/s Ratio Prot		0.01			0.00		0.08	c0.19		c0.11	c0.16	
v/s Ratio Perm	0.00		0.00	c0.04		0.00			0.06			
v/c Ratio	0.01	0.07	0.03	0.30	0.03	0.04	0.48	0.44	0.14	0.50	0.35	
Uniform Delay, d1	26.3	26.5	26.4	27.3	26.4	26.4	25.8	14.0	12.1	23.6	11.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	0.1	0.1	1.0	0.0	0.1	1.3	1.0	0.5	1.1	0.6	
Delay (s)	26.4	26.6	26.4	28.3	26.4	26.5	27.0	15.0	12.6	24.6	12.0	
Level of Service	C	C	C	C	C	C	C	B	B	C	B	
Approach Delay (s)		26.5			27.2			16.1			15.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

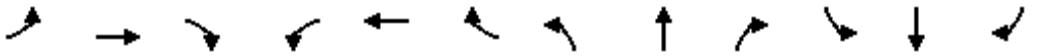
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	15	57	105	12	78	68	530	124	66	536	3
Future Volume (vph)	2	15	57	105	12	78	68	530	124	66	536	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	6.4	6.4	4.0	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3536	
Flt Permitted	0.75	1.00	1.00	0.75	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1394	3539	1583	1390	3539	1583	1770	3539	1583	1770	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	16	62	114	13	85	74	576	135	72	583	3
RTOR Reduction (vph)	0	0	53	0	0	73	0	0	63	0	0	0
Lane Group Flow (vph)	2	16	9	114	13	12	74	576	72	72	586	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			
Actuated Green, G (s)	9.8	9.8	9.8	9.8	9.8	9.8	6.9	36.1	36.1	5.4	34.6	
Effective Green, g (s)	9.8	9.8	9.8	9.8	9.8	9.8	6.9	36.1	36.1	5.4	34.6	
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.14	0.10	0.53	0.53	0.08	0.51	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	6.4	6.4	4.0	6.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	200	510	228	200	510	228	179	1878	840	140	1799	
v/s Ratio Prot		0.00			0.00		c0.04	0.16		0.04	c0.17	
v/s Ratio Perm	0.00		0.01	c0.08		0.01			0.05			
v/c Ratio	0.01	0.03	0.04	0.57	0.03	0.05	0.41	0.31	0.09	0.51	0.33	
Uniform Delay, d1	24.9	25.0	25.0	27.1	25.0	25.1	28.7	8.9	7.8	30.0	9.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	0.0	0.1	3.7	0.0	0.1	1.6	0.4	0.2	3.2	0.5	
Delay (s)	25.0	25.0	25.1	30.8	25.0	25.2	30.2	9.4	8.0	33.2	10.3	
Level of Service	C	C	C	C	C	C	C	A	A	C	B	
Approach Delay (s)		25.1			28.2			11.1			12.8	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	28	42	45	11	55	129	604	208	174	531	3
Future Volume (vph)	2	28	42	45	11	55	129	604	208	174	531	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	6.4	6.4	4.0	6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3536	
Flt Permitted	0.75	1.00	1.00	0.74	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1396	3539	1583	1372	3539	1583	1770	3539	1583	1770	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	30	46	49	12	60	140	657	226	189	577	3
RTOR Reduction (vph)	0	0	40	0	0	53	0	0	131	0	1	0
Lane Group Flow (vph)	2	30	6	49	12	7	140	657	95	189	579	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			
Actuated Green, G (s)	8.2	8.2	8.2	8.2	8.2	8.2	11.2	28.6	28.6	14.5	31.9	
Effective Green, g (s)	8.2	8.2	8.2	8.2	8.2	8.2	11.2	28.6	28.6	14.5	31.9	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12	0.12	0.16	0.42	0.42	0.21	0.47	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	6.4	6.4	4.0	6.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	168	426	190	165	426	190	291	1488	665	377	1658	
v/s Ratio Prot		0.01			0.00		0.08	c0.19		c0.11	c0.16	
v/s Ratio Perm	0.00		0.00	c0.04		0.00			0.06			
v/c Ratio	0.01	0.07	0.03	0.30	0.03	0.04	0.48	0.44	0.14	0.50	0.35	
Uniform Delay, d1	26.3	26.5	26.4	27.3	26.4	26.4	25.8	14.0	12.1	23.6	11.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	0.1	0.1	1.0	0.0	0.1	1.3	1.0	0.5	1.1	0.6	
Delay (s)	26.4	26.6	26.4	28.3	26.4	26.5	27.0	15.0	12.6	24.6	12.0	
Level of Service	C	C	C	C	C	C	C	B	B	C	B	
Approach Delay (s)		26.5			27.2			16.1			15.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	4	260	36	15	144	15	28	48	54	11	8	6
Future Volume (Veh/h)	4	260	36	15	144	15	28	48	54	11	8	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	283	39	16	157	16	30	52	59	12	9	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	173			322			511	516	302	573	527	165
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	173			322			511	516	302	573	527	165
tC, single (s)	4.2			4.3			7.1	6.5	6.2	7.5	6.6	6.4
tC, 2 stage (s)												
tF (s)	2.3			2.4			3.5	4.0	3.3	3.8	4.1	3.5
p0 queue free %	100			99			93	89	92	96	98	99
cM capacity (veh/h)	1351			1143			454	453	737	315	434	835

Direction, Lane #	SE 1	SE 2	NW 1	NW 2	NE 1	SW 1
Volume Total	4	322	16	173	141	28
Volume Left	4	0	16	0	30	12
Volume Right	0	39	0	16	59	7
cSH	1351	1700	1143	1700	540	417
Volume to Capacity	0.00	0.19	0.01	0.10	0.26	0.07
Queue Length 95th (m)	0.1	0.0	0.3	0.0	8.3	1.7
Control Delay (s)	7.7	0.0	8.2	0.0	14.0	14.3
Lane LOS	A		A		B	B
Approach Delay (s)	0.1		0.7		14.0	14.3
Approach LOS					B	B

Intersection Summary				
Average Delay	3.7			
Intersection Capacity Utilization	30.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	2	116	10	18	128	9	15	11	21	7	7	2
Future Volume (Veh/h)	2	116	10	18	128	9	15	11	21	7	7	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	126	11	20	139	10	16	12	23	8	8	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	149			137			320	324	132	343	325	144
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	149			137			320	324	132	343	325	144
tC, single (s)	4.6			4.2			7.2	6.7	6.2	7.1	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.7			2.3			3.6	4.2	3.3	3.5	4.1	3.3
p0 queue free %	100			99			97	98	98	99	99	100
cM capacity (veh/h)	1186			1423			607	559	923	583	565	909

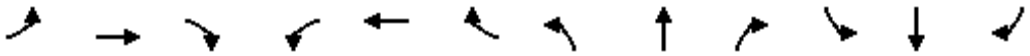
Direction, Lane #	SE 1	SE 2	NW 1	NW 2	NE 1	SW 1
Volume Total	2	137	20	149	51	18
Volume Left	2	0	20	0	16	8
Volume Right	0	11	0	10	23	2
cSH	1186	1700	1423	1700	701	598
Volume to Capacity	0.00	0.08	0.01	0.09	0.07	0.03
Queue Length 95th (m)	0.0	0.0	0.3	0.0	1.9	0.7
Control Delay (s)	8.0	0.0	7.6	0.0	10.5	11.2
Lane LOS	A		A		B	B
Approach Delay (s)	0.1		0.9		10.5	11.2
Approach LOS					B	B

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	23.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	4	145	33	50	346	11	41	23	28	3	12	5
Future Volume (Veh/h)	4	145	33	50	346	11	41	23	28	3	12	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	158	36	54	376	12	45	25	30	3	13	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	388			194			680	680	176	698	692	382
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	388			194			680	680	176	698	692	382
tC, single (s)	4.4			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			96			87	93	96	99	96	99
cM capacity (veh/h)	1056			1367			341	359	854	312	354	670

Direction, Lane #	SE 1	SE 2	NW 1	NW 2	NE 1	SW 1
Volume Total	4	194	54	388	100	21
Volume Left	4	0	54	0	45	3
Volume Right	0	36	0	12	30	5
cSH	1056	1700	1367	1700	422	390
Volume to Capacity	0.00	0.11	0.04	0.23	0.24	0.05
Queue Length 95th (m)	0.1	0.0	1.0	0.0	7.3	1.4
Control Delay (s)	8.4	0.0	7.7	0.0	16.1	14.7
Lane LOS	A		A		C	B
Approach Delay (s)	0.2		0.9		16.1	14.7
Approach LOS					C	B

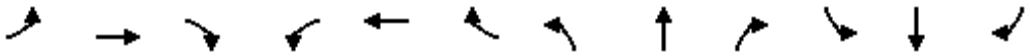
Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	44.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	4	25	3	44	25	42	1	92	24	69	236	5
Future Volume (Veh/h)	4	25	3	44	25	42	1	92	24	69	236	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	27	3	48	27	46	1	100	26	75	257	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	584	538	260	541	527	113	262			126		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	584	538	260	541	527	113	262			126		
tC, single (s)	7.1	6.5	6.2	7.2	6.7	6.2	4.1			4.3		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.3	2.2			2.4		
p0 queue free %	99	94	100	88	93	95	100			94		
cM capacity (veh/h)	369	428	784	403	413	940	1314			1356		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	34	121	127	337
Volume Left	4	48	1	75
Volume Right	3	46	26	5
cSH	437	518	1314	1356
Volume to Capacity	0.08	0.23	0.00	0.06
Queue Length 95th (m)	2.0	7.2	0.0	1.4
Control Delay (s)	13.9	14.0	0.1	2.1
Lane LOS	B	B	A	A
Approach Delay (s)	13.9	14.0	0.1	2.1
Approach LOS	B	B		

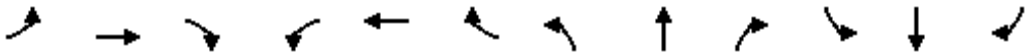
Intersection Summary				
Average Delay	4.7			
Intersection Capacity Utilization	42.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	7	19	0	15	20	15	1	83	10	19	71	7
Future Volume (Veh/h)	7	19	0	15	20	15	1	83	10	19	71	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	21	0	16	22	16	1	90	11	21	77	8
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	248	226	81	231	224	96	85			101		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	248	226	81	231	224	96	85			101		
tC, single (s)	7.1	6.5	6.2	7.3	6.5	6.3	4.1			4.3		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.7	4.0	3.4	2.2			2.3		
p0 queue free %	99	97	100	98	97	98	100			99		
cM capacity (veh/h)	672	666	985	663	659	947	1524			1408		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	29	54	102	106
Volume Left	8	16	1	21
Volume Right	0	16	11	8
cSH	668	726	1524	1408
Volume to Capacity	0.04	0.07	0.00	0.01
Queue Length 95th (m)	1.1	1.9	0.0	0.4
Control Delay (s)	10.6	10.4	0.1	1.6
Lane LOS	B	B	A	A
Approach Delay (s)	10.6	10.4	0.1	1.6
Approach LOS	B	B		

Intersection Summary				
Average Delay	3.6			
Intersection Capacity Utilization	22.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	36	3	30	44	49	6	274	34	55	115	9
Future Volume (Veh/h)	7	36	3	30	44	49	6	274	34	55	115	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	39	3	33	48	53	7	298	37	60	125	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	658	599	130	603	586	316	135			335		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	658	599	130	603	586	316	135			335		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	90	100	91	88	93	100			95		
cM capacity (veh/h)	307	392	925	362	396	729	1462			1236		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	50	134	342	195
Volume Left	8	33	7	60
Volume Right	3	53	37	10
cSH	388	470	1462	1236
Volume to Capacity	0.13	0.28	0.00	0.05
Queue Length 95th (m)	3.5	9.3	0.1	1.2
Control Delay (s)	15.6	15.7	0.2	2.8
Lane LOS	C	C	A	A
Approach Delay (s)	15.6	15.7	0.2	2.8
Approach LOS	C	C		

Intersection Summary				
Average Delay	4.8			
Intersection Capacity Utilization	47.7%	ICU Level of Service	A	
Analysis Period (min)	15			

COLE ENGINEERING

Joseph E. Gowrie, P.Eng.
Project Manager

Joseph Gowrie, P.Eng. is a Transportation Engineer with eight years of traffic engineering and transportation planning related experiences in the private and public sectors. He is familiar with transportation planning and engineering methodologies and has worked on projects of varying scales from secondary plans to traffic impact studies and parking studies. Joseph has undertaken traffic forecasting, transportation modelling (Macro/Micro Simulation), operational and corridor analysis, passenger travel demand analysis, pedestrian and vehicular movement analysis, parking analysis, collision analysis, capacity analysis, traffic calming, traffic signal control optimization, advanced traffic management analysis, report writing, client contact, and proposal writing. Joseph is intimately familiar with various window-based softwares, such as Synchro, SimTraffic, HCS2000, AutoCAD, CorelDraw and Microsoft Office.

EXPERIENCE

Transportation Planning

Pedestrian Facilities

OTM Book 15 - Pedestrian Protection and Control, Ontario Traffic Council, Ministry of Transportation Ontario. Traffic Analyst involved in the production of The OTM Book 15, Pedestrian Protection and Control that is the primary document used by the MTO and municipalities in Ontario and contains information on legal requirements, standards, best practices, procedures, guidelines and recommendations for the planning, justification, design, timing and operations of pedestrian safety and controls. Book 15 brings together the application of all signing, devices and markings pertaining to pedestrian control and protection that are provided in different books of the OTM and considers others identified through a jurisdictional scan. The Book is based on the fundamental principles behind pedestrian control and protection, including right-of-way conflict resolution between pedestrians and other road users, speed and size differences between road users, the need for special protection of certain classes of pedestrians (e.g., school children, the elderly, persons with limited mobility). The development of Book 15 considered signing, devices and markings targeted at pedestrians themselves, as well as other road users that impact the safety of pedestrians, e.g., vehicles, bicycles, in-line skaters. *Completion Date: 2011*

Traffic

Optimization of a Traffic Network in Downtown Toronto with Associated In-Service Road Safety Review, City of Toronto. Transportation Analyst on this project focusing on the analysis and co-ordination of traffic signals at 20 intersections in Downtown Toronto in a study area bounded by Queen Street to the north, Church Street to the west, Front Street to the south and Bay Street to the west. *Completion April 2007*

18106 and 18110 Yonge Street EMS and Bus Depot Expansion, York Region, Town of East Gwillimbury. Project Manager responsible for preparing and delivering a Traffic Impact Study and Site Circulation review for the expansion of a York Region Transit bus storage facility and new Emergency Medical Service station. As part of the project, we attended the Site Plan Review Committee and Public Information Centre. *Completion Date: July 2015*

Eramosa Quarry, James Dick Construction, Town of Guelph-Eramosa. Project Manager responsible for the completion of a comprehensive traffic Impact study and Haul Route Study in support of a new quarry. Safety analysis was instrumental in achieving and obtaining approval for the site access and included sight line analysis, undertaking turning lane warrants and a collision analysis of Regional Road 25 south of Acton. *Completion Date: Ongoing*

EDUCATION

- B.Eng., Civil Engineering, Ryerson University, 2007

PROFESSIONAL AFFILIATIONS

- Professional Engineers of Ontario (PEO)
- Ontario Society of Professional Engineers (OSPE)

TRAINING / CERTIFICATIONS

- Workplace Hazardous Materials Information System (WHMIS)
- Accessibility for Ontarians with Disabilities Act (AODA)
- Basic Occupational Health & Safety Training (OHSA)
- Registry, Appraisal and Qualification System (RAQS) Approved

Burlington GO Station, Metrolinx, City of Burlington. Transportation Engineer responsible for undertaking and providing an "Operations Review" of the Burlington GO Stations parking lots and Kiss 'N Ride facility. As part of the works, I managed a team of four (4) analysts/engineers and observe traffic operations and recommend improvements to improve traffic flow. Three design options were developed and presented to Metrolinx and the preferred design solution constructed. *Completion Date: October 2014*

Vaughan Health Care Campus (VHCC), City of Vaughan, City of Vaughan. Transportation Engineer responsible for undertaking the transportation analysis for build out of the 82 acres associated with the Vaughan Health Care Campus. The project entailed undertaking developing the roadway layout to best serve the Mackenzie Vaughan Hospital, the City of Vaughan and the Cedar Fair Entertainment Company and include the option of integration of York Region Transit (YRT). The project included significant amounts of data collection analysis (including seasonal traffic), traffic forecasting, as well as capacity analysis and a phasing plan for required roadway improvements. In addition, approvals were required from the municipality, the Region of York and the Ministry of Transportation of Ontario (MTO). *Completion Date: May 2014*

Vaughan Health Campus of Care, The Vaughan Health Care Foundation, City of Vaughan. Transportation Analyst responsible for undertaking analysis, preparing the transportation report and presentations to stakeholders and municipal groups. The project involved assessing the feasibility of the Major Mackenzie Drive / Jane Street land as the future hospital site. *Completion Date: 2009*

Highway 401 / Keele Street Provincial Campus, Ontario Realty Corporation, City of Toronto. Transportation Analyst responsible for obtaining traffic data, undertaking analysis, recommending roadway / transit improvements, various transportation demand management (TDM) measures as well as co-ordinating surveys of the three major stakeholder groups. Project involved a comprehensive transportation assessment (including capacity analysis, parking analysis, and transportation demand management) for a plan of subdivision for the Highway 401 / Keele Street Provincial Campus. Future tenants on the site include the Government of Ontario, Humber River Regional Hospital and the Forensic Science and Coroner's Complex. *Completion Date: 2011*

Traffic Signal Coordination for Lawrence Avenue East Corridor, City of Toronto. Traffic Engineer responsible for data collection for the Traffic Signal Co-ordination Project for Lawrence Avenue East Corridor from the DVP to Kingston Road. The project included 32 signalized intersections. The project scope included; base model development as well as the calibration of the base model, review of cycle lengths, review of control area boundaries, optimization of splits and offsets for the corridor. The Cost and Benefit Analysis of the future savings was also conducted. *Completion Date: January 2014*

Hi-Lands of Bolton Residential Development, John Spina, Town of Calendon. Project Manager responsible for securing access to Caledon-King Townline Road in the Town of Caledon. Access for the development was proposed in the generally existing location for the previous Montessori school driveway; however, due to the operating characteristics of vehicles in the area, the driveway did not meet safe stopping sight distance. Speed surveys were undertaken and a sight line analysis was undertaken. Ultimately, traffic signals were used to mitigate the sightline deficiencies and a settlement reached before going to the Ontario Municipal Bard (OMB). *Completion Date: July 2015*

The Vaccines Division of Sanofi-Aventis Group Traffic Impact Study and Pedestrian Safety Review, Sanofi Pasteur, City of Toronto. Transportation Analyst responsible for a Transportation Impact Study in support of a proposed building expansion and associated re-zoning. After completion of the Traffic Impact Study, investigation of the pedestrian facilities were reviewed at the request of Sanofi Pasteur in addition to traffic modelling

using Synchro Software to forecast the impact of the installation of security gates on traffic within the site. *Completion Date: 2013*

Ontario Provincial Police Lindsay Detachment, Ontario Realty Corporation, Lindsay. Transportation Engineer responsible for undertaking traffic analysis while using a first principles approach to derive the future trips to/from the site. The project involved the relocation of the Lindsay OPP Detachment. Additional duties included meeting with the MTO to determine to review a number of issues related to the location of the access on Highway 35. *Completion Date: 2012*

59 Codrington Street and 81 Mulcaster Street, Salter Pilon Architecture Inc., City of Barrie. Transportation Analyst responsible for a Traffic Impact Brief and Parking Study for the expansion of an office building occupied by the Canada Revenue Agency (CRA). After completion of the Traffic Impact Brief, an access design requiring the restricting the movements to right-in / right-out was completed to the satisfaction of the City and Fire Services. *Completion Date: 2010*

#1 High School, Halton District School Board, Town of Milton. Transportation Analyst responsible for a Parking Study for a new high school at Fourth Line and Louis St. Laurent in Milton. Conducted on behalf of the Halton District School Board, the study involved collecting and analyzing parking demand data from numerous existing high schools in Halton Region and other jurisdictions, in order to develop an appropriate parking supply for the new school. *Completion Date: 2009*

Whistling Wood Yoga Retreat, Salmona Tregunno Inc., Town of Milton. Transportation Analyst responsible for undertaking of analysis and preparing the report / documentation for Traffic Impact Study for a proposed Whistling Woods - Yoga Retreat and Spa located on 4th Line in Milton. The study includes collecting traffic data and conducting intersection analysis for the study area using SYNCHRO software. In addition to the traffic analysis, a sight line assessment will be undertaken to comment on / recommend the proposed access location for the proposed development. *Completion Date: 2009*

8861 Sheppard Avenue Proposed Place of Worship, Shiva-Shakti Cultural Sabha Canada, City of Toronto. Project Manager responsible for client relations and the preparation of a Traffic Impact Study for a proposed place of worship located on Sheppard Avenue in the Toronto. *Completion Date: 2015*

West Oak Trails Catholic School, Halton Catholic District School Board, Town of Oakville. Transportation Engineer responsible for preparing the Traffic Impact Study for the new elementary school. As part of the approvals process a Pavement Marking and Signage Plan was prepared for Colonel Williams Parkway to include bike lanes, on-street parking lanes, an exclusive left turn lane and transition to a continuous two-way-left-turn-lane. *Completion Date: January 2012*

Châteaux of Caledon, John Spina, Town of Calendon. Transportation Analyst responsible for undertaking supplemental analysis in support of the Châteaux of Caledon residential subdivision. Analysis included the potential inclusion of lay-by parking lanes on a widened Old Church Road. Also as part of the analysis, a study was undertaken to determine whether a roundabout was feasible at the new intersection created by the subdivision and Old Church Road though capacity analysis, warrant analysis and through preliminary design of the roundabout. *Completion Date: January 2012*

École Secondaire Catholique, Conseil Scolaire de District Catholique Centre-Sud, Town of Oakville. Transportation Engineer responsible for preparing the Pavement Marking and Signage Plan was prepared for Grand Oak Trail to include bike lanes, on-street parking lanes, and exclusive turning lanes. *Completion Date: July 2012*

Armadale Public School, York Region District School Board, City of Markham. Transportation Analyst responsible for a study which identified operational deficiencies on local roads and intersections due to expansion of the school. On-site circulation was also reviewed and improvements were recommended to mitigate identified deficiencies. *Completion Date: 2008*

Milliken Mills Public School, York Region District School Board, City of Markham. Transportation Analyst responsible for an operational study to assess and review the impacts of the existing school. Vehicular on-site circulation for staff, buses and parent pick up and drop off was also examined. Mitigating measures include the provision of an addition access driveway and consolidated drop off loop. *Completion Date: 2007*

Shelburne North Residential Subdivision, Vandyk Group of Companies, Town of Shelburne. Transportation Engineer involved in completing the traffic portion required in obtaining the Plan of Subdivision for the Vandyk – Shelburne North Subdivision. The primary access of the development is located on Highway 10 and required approvals from the Town and MTO. Additional works in support of the development required a culvert twinning and was responsible for completing and co-ordinating the detour plan for all approval agencies involved including Police, Fire and School Boards. *Completion Date: February 2012*

Drynoch Estates / Oak Ridges Farm Co-Tenancy (Yonge West MESP), Metrus Developments, Town of Richmond Hill. Transportation Analyst responsible for a Transportation Assessment of a 400 ha residential development in the Oak Ridges area of Richmond Hill which included the provision of an arterial road link from Stouffville Road to the King-Vaughan Road. *Completion Date: 2007*

Bond Lake Development (Yonge East MESP), Lebovic Homes, Town of Richmond Hill. Transportation Analyst responsible for a Transportation Assessment of a 300 ha residential development east of Yonge Street and north of Stouffville Road in Richmond Hill. The project included the Bayview Avenue extension from Stouffville Road northerly to Bloomington Road. *Completion Date: 2008*

Durham Gravel Pit, The Murray Group, Municipality of West Grey. Transportation Analyst responsible for the completion of a comprehensive traffic Impact study for the development of a new quarry. Site lines analysis was instrumental in achieving and obtaining approval for the site access. *Completion Date: 2008*

Bayview Montessori, Times Group (Sciberras), Town of Richmond Hill. Transportation Analyst responsible for the completion of a comprehensive Traffic Impact and Parking study for the redevelopment of a new mixed use development. *Completion Date: 2008*

Madison Victoria Street, Victoria Whitby Ltd., Town of Whitby. Transportation Analyst responsible for the completion of a comprehensive Traffic Impact and Parking Study for the development of a new commercial retail plaza. *Completion Date: 2008*

Liberty Development Corporation, Thornhill City Centre. Transportation Analyst responsible for the completion of a comprehensive Traffic Impact and Parking study for the development of two residential condominium towers. Obtaining approval for a reduced parking provision was instrumental to the undertaking. *Completion Date: 2009*

Vaughan Mills Hotels, Aloft Hotels Inc., City of Vaughan. Transportation Analyst responsible for the completion of a comprehensive Traffic Impact and Parking study for the redevelopment of a new hotel. Instrumental to the analysis was securing set access via the abutting road network. *Completion Date: 2008*

Rockwell Road, Liberty Development, City of Markham. Transportation Analyst responsible for the data collection and analysis to support a parking reduction for the proposed new mixed use development. *Completion Date: 2008*

Parking

Humber River Regional Hospital, City of Toronto. Transportation Analyst responsible for the data collection and analysis to determine the ultimate parking requirement for the three (3) hospital site parking requirements. Then used that data to forecast the parking requirements for the future hospital site located at 1201 Wilson Avenue in the City of Toronto. *Completion Date: October 2009*

1850 Albion Road, Kishor, City of Toronto. Transportation Analyst responsible for the data collection and analysis to support a parking reduction for a proposed new restaurant. *Completion Date: 2008*

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Commission des affaires municipales de l'Ontario

ACKNOWLEDGMENT OF EXPERT'S DUTY

Case Number	Municipality

1. My name is JOSEPH EZEKIEL GOWRIE (*name*)
   I live at the 32-435 MARKHAM ROAD (*municipality*)
   in the CITY OF TORONTO (*county or region*)
   in the PROVINCE OF ONTARIO (*province*)

2. I have been engaged by or on behalf of..... (*name of party/parties*) to provide evidence in relation to the above-noted Board proceeding.

3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:

   a. to provide opinion evidence that is fair, objective and non-partisan;

   b. to provide opinion evidence that is related only to matters that are within my area of expertise; and

   c. to provide such additional assistance as the Board may reasonably require, to determine a matter in issue.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date 04/18/16 .....
Signature