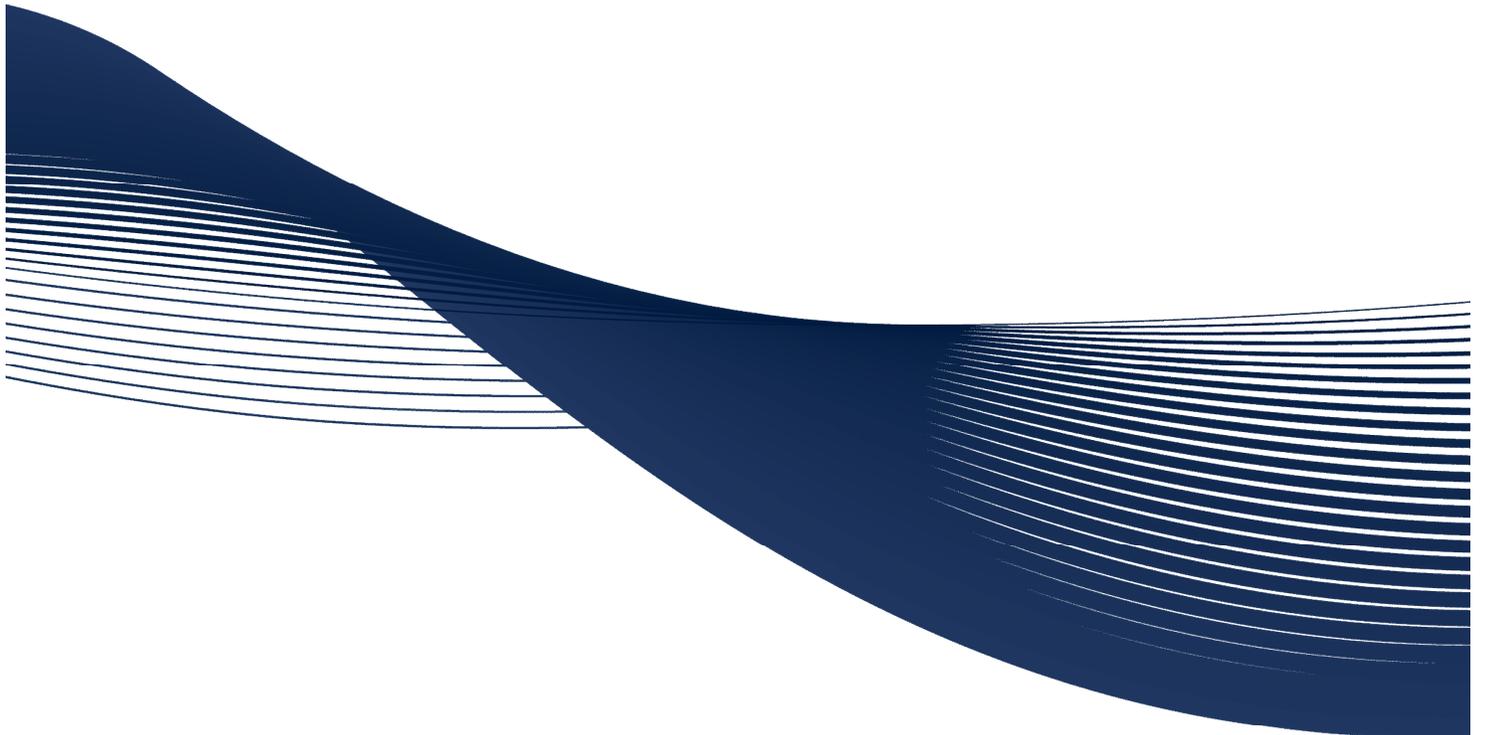


# JAMES DICK CONSTRUCTION LIMITED

REVISED TRAFFIC IMPACT STUDY

Eramosa Quarry, Township of Guelph-Eramosa

Project No.:TR12-0013



**COLE**  
ENGINEERING

APRIL 2016

## COLE ENGINEERING GROUP LTD.

HEAD OFFICE  
70 Valleywood Drive  
Markham, ON CANADA L3R 4T5

**T.** 905.940.6161 | 416.987.6161

**F.** 905.940.2064 | [www.ColeEngineering.ca](http://www.ColeEngineering.ca)

GTA WEST OFFICE  
150 Courtneypark Drive West, Unit C100  
Mississauga, ON CANADA L5W 1Y6

**T.** 905.364.6161

**F.** 905.364.6162

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.

S:\2012 Projects\TR\TR12-0013 JamesDick\_Hwy7-6Conc\_Eramosa\300-Design-Engineering\312-Deliverables\Project Deliverables\008\_Updated Burnside\TIS\FINAL Revised TIS 04 22 16.doc

### **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.

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.

## Table of Contents

<b>1.0</b>	<b>Study Background and Purpose .....</b>	<b>1</b>
<b>2.0</b>	<b>Study Approach.....</b>	<b>3</b>
<b>2.1.</b>	<b>Study Area.....</b>	<b>3</b>
<b>2.2.</b>	<b>Horizon Year .....</b>	<b>3</b>
<b>3.0</b>	<b>Existing Traffic Conditions .....</b>	<b>3</b>
<b>3.1.</b>	<b>Existing Road Network .....</b>	<b>3</b>
<b>3.2.</b>	<b>Existing Traffic Assessment .....</b>	<b>4</b>
<b>3.3.</b>	<b>Existing Traffic Conditions – Level of Service Analysis.....</b>	<b>5</b>
<b>3.4.</b>	<b>Left Turn Warrants.....</b>	<b>6</b>
<b>4.0</b>	<b>Site Generated Traffic.....</b>	<b>7</b>
<b>4.1.</b>	<b>Development Proposal.....</b>	<b>7</b>
<b>4.2.</b>	<b>Site Generated Traffic .....</b>	<b>7</b>
<b>4.2.1.</b>	<b>Load Sizes.....</b>	<b>7</b>
<b>4.2.2.</b>	<b>Forecasted Traffic .....</b>	<b>7</b>
<b>4.3.</b>	<b>Trip Distribution.....</b>	<b>10</b>
<b>4.4.</b>	<b>Existing Plus Site-Related Traffic.....</b>	<b>11</b>
<b>5.0</b>	<b>Traffic Growth .....</b>	<b>13</b>
<b>6.0</b>	<b>Future Total Traffic Conditions .....</b>	<b>13</b>
<b>6.1.</b>	<b>Future (2018) Total Traffic Conditions.....</b>	<b>13</b>
<b>6.2.</b>	<b>Future (2023) Total Traffic Conditions.....</b>	<b>14</b>
<b>6.3.</b>	<b>Future (2033) Total Traffic Conditions.....</b>	<b>16</b>
<b>7.0</b>	<b>Access Analysis.....</b>	<b>17</b>
<b>7.1.</b>	<b>Site Access Location and Sight Distance .....</b>	<b>17</b>
<b>7.2.</b>	<b>Safety Consideration.....</b>	<b>17</b>
<b>8.0</b>	<b>Conclusions.....</b>	<b>18</b>

## LIST OF FIGURES

Figure 1-1 Proposed Site Location .....	1
Figure 1-2 Proposed Site Plan .....	2
Figure 3-1 Existing Lane Configurations.....	4
Figure 3-2 Existing Traffic Volumes.....	5
Figure 4-1 2011 Erin Pit Monthly Distribution .....	8
Figure 4-2 Site Traffic Volumes .....	11
Figure 4-3 Existing Plus Site-Related Traffic Volumes.....	12
Figure 6-1 Future (2018) Total Traffic Volumes .....	13
Figure 6-2 Future (2023) Total Traffic Volumes .....	14
Figure 6-3 Future (2033) Total Traffic Volumes .....	16

## LIST OF TABLES

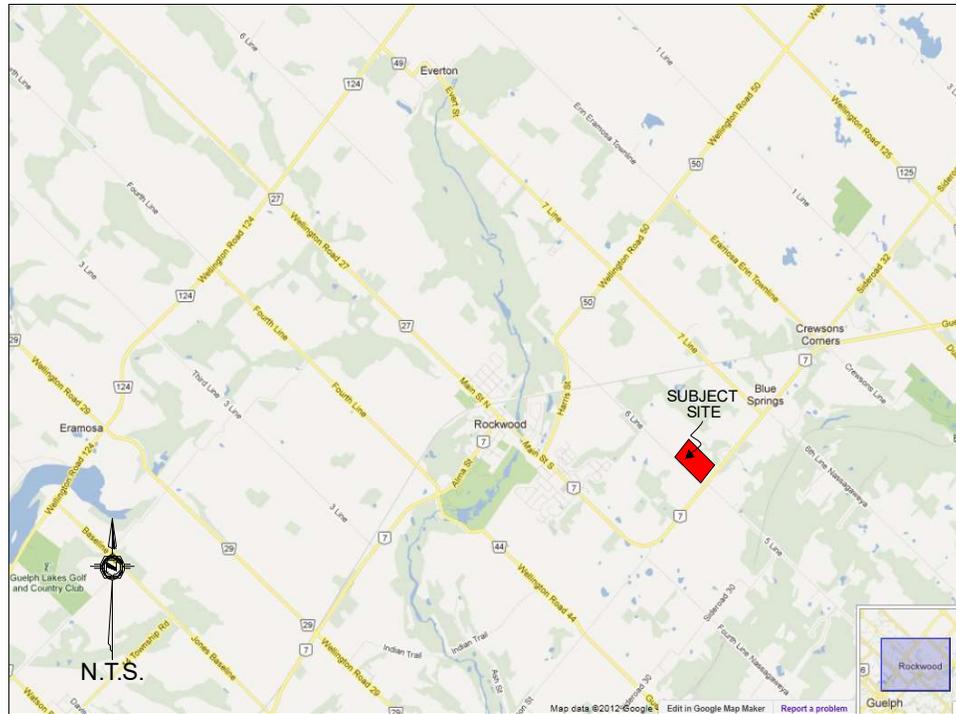
Table 3.1 – Existing Traffic Conditions – Levels of Service.....	5
Table 3.2 Existing Traffic with Left Turn Lanes – Level of Service.....	6
Table 4.1 – Fleet Size.....	7
Table 4.2 Expected Monthly Distribution of Trucks.....	8
Table 4.3 Hourly Distribution of Truck Loads.....	9
Table 4.4 – Aggregate Destination Areas.....	10
Table 4.5 – Trip Distribution .....	10
Table 4.6 – Existing Plus Site-Related Traffic Conditions – Levels of Service.....	12
Table 6.1 – Future (2018) Traffic Conditions – Levels of Service .....	14
Table 6.2 Future (2023) Total Traffic – Level of Service.....	15
Table 6.3 Future (2023) Total Traffic Queuing Study.....	15
Table 6.4 Future (2033) Total Traffic – Level of Service.....	16
Table 8.1 – OTM’s Minimum Advanced Placement of Condition B and C Warning Signs for Stopping .....	17

## APPENDICES

Appendix A – Existing Traffic Data
Appendix B – Existing Traffic Level of Service Calculations
Appendix C – MTO Geometric Design Standards Manual Left Turn Warrant Design Charts
Appendix D – Existing Plus Site-Related Traffic Level of Service Calculations
Appendix E – Erin Gravel Pit Truck Trip Generation
Appendix F – Future (2018) Total Traffic Level of Service Calculations
Appendix G – Future (2023) Total Traffic Level of Service Calculations
Appendix H – 2023 SimTraffic Analysis
Appendix I – Future (2033) Total Traffic Level of Service Calculations
Appendix J – Statement of Limiting Conditions and Assumptions

## 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 6<sup>th</sup> 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 6<sup>th</sup> Line. The proposed site plan is provided in **Figure 1-2**.

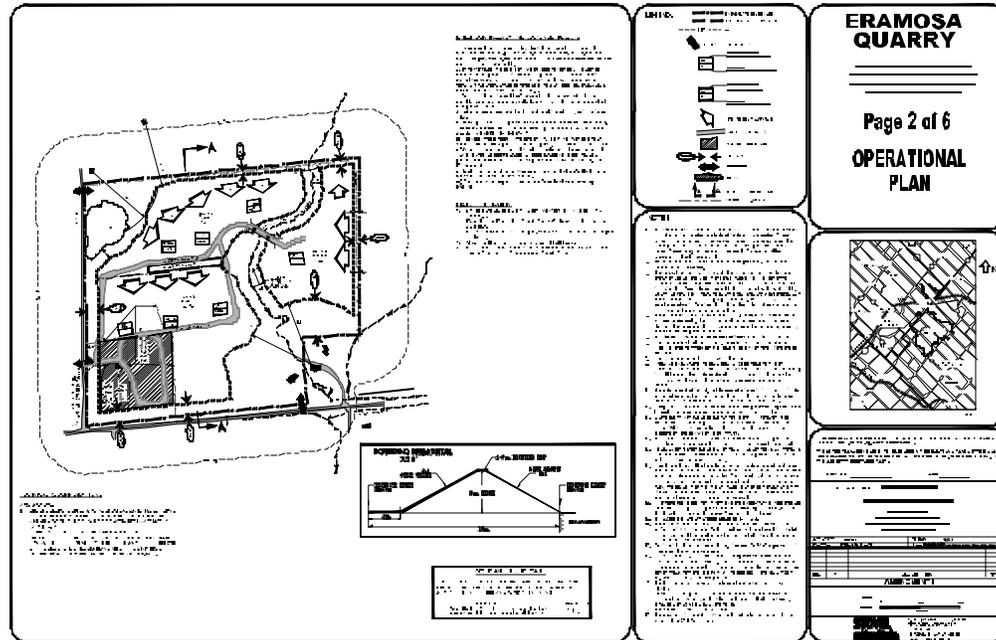


Figure 1-2 Proposed Site Plan

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

### 2.2. Horizon Year

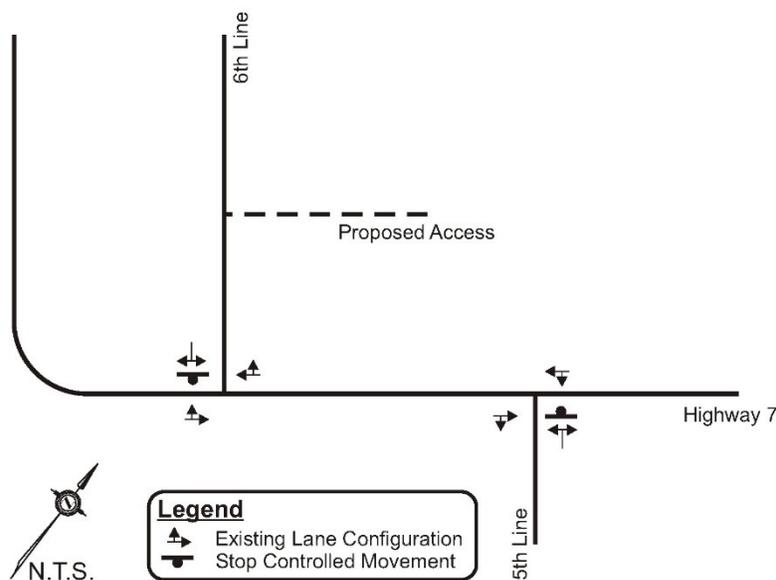
Adhering to the Ministry of Transportation of Ontario Traffic Impact Study Guidelines requires an existing/opening year traffic analysis and a five (5) and ten (10) year post opening analysis. As such, a 2013, 2018 and 2023 traffic horizon is being assessed. At the request of the Town of Halton Hills (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 6<sup>th</sup> 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).

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

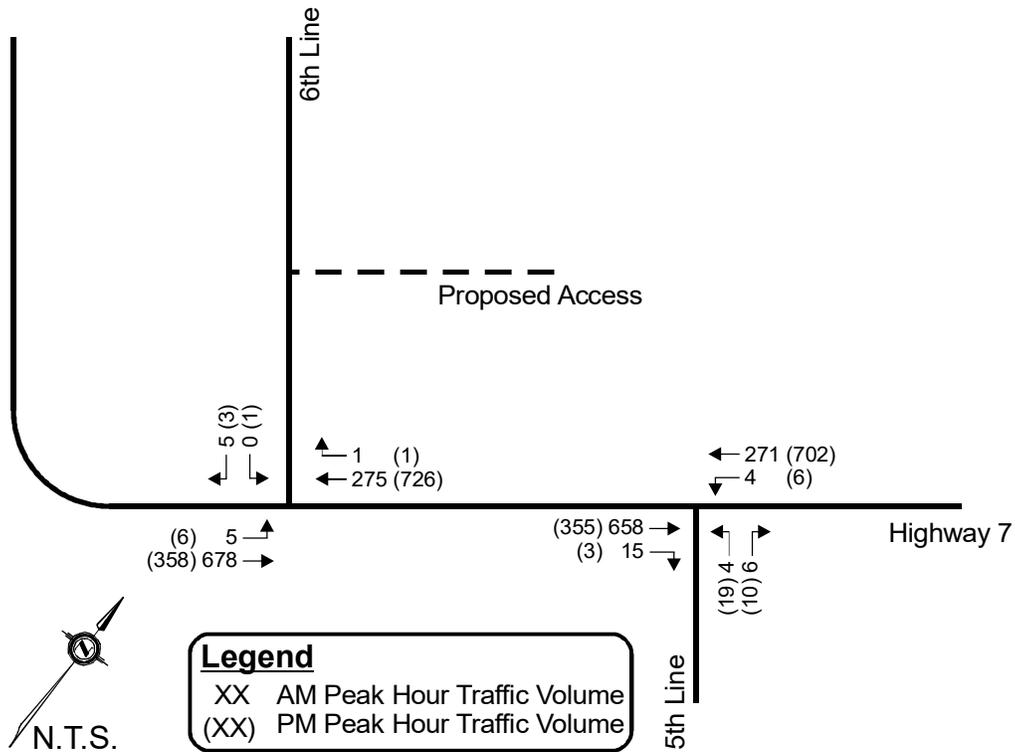
**5<sup>th</sup> Line** is a 2-lane north-south paved roadway under the jurisdiction of the Town of Milton.

### 3.2. Existing Traffic Assessment

The existing traffic volumes at the intersection of Hwy 7 / 6<sup>th</sup> 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)	95 <sup>th</sup> Percentile Queue (m)	LOS (v/c)	95 <sup>th</sup> Percentile Queue (m)
Highway 7 / 6 <sup>th</sup> 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 / 5 <sup>th</sup> 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 6<sup>th</sup> Line / Highway 7 intersection. In addition, the 5<sup>th</sup> 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 / 6<sup>th</sup> Line and Highway 7 / 5<sup>th</sup> 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 / 6<sup>th</sup> Line and Highway 7 / 5<sup>th</sup> 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 6<sup>th</sup> Line or westbound from 5<sup>th</sup> 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)	95 <sup>th</sup> Percentile Queue (m)	LOS (v/c)	95 <sup>th</sup> Percentile Queue (m)
Highway 7 / 6 <sup>th</sup> Line (Unsignalized)	EB left	A (0.01)	0.1	A (0.01)	0.2
	SB left-right	B (0.01)	0.3	B (0.02)	0.4
Highway 7 / 5 <sup>th</sup> Line (Unsignalized)	WB left	A (<0.01)	0.1	A (<0.01)	0.1
	NB left-right	B (0.02)	0.5	B (0.06)	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 6<sup>th</sup> 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 is provided in **Table 4.1**.

**Table 4.1 – Fleet Size**

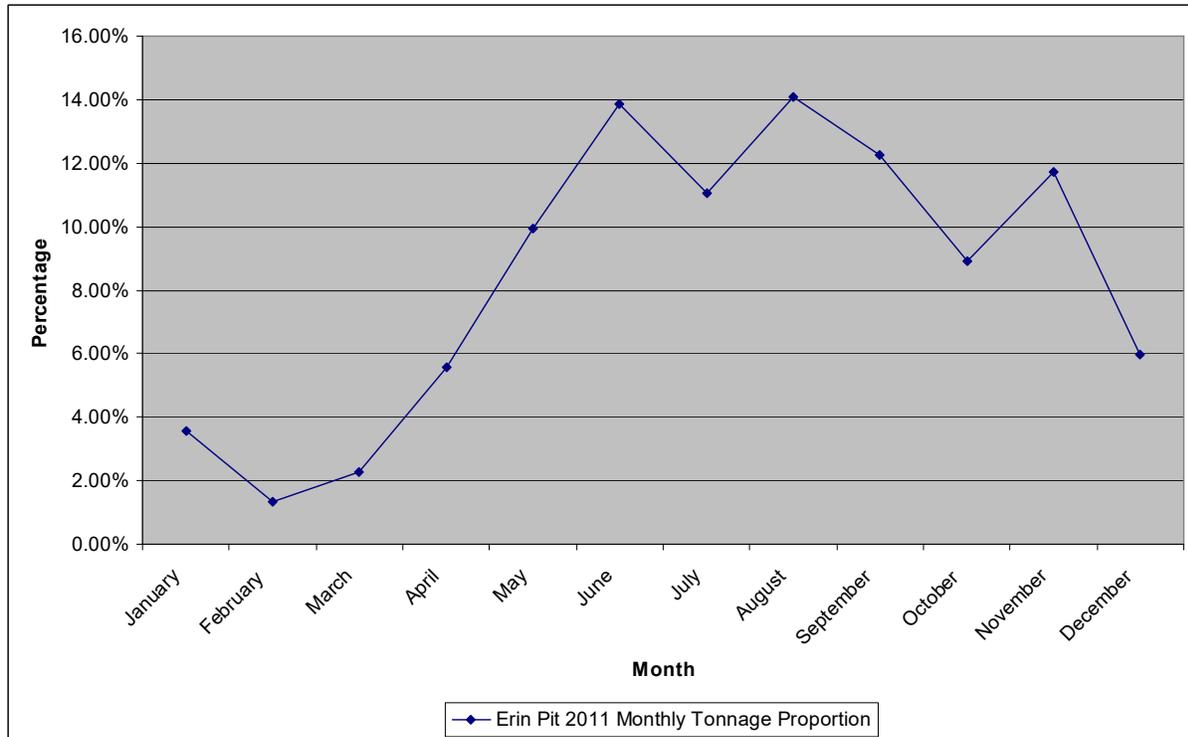
Vehicle Type	Payload	Number of Units
Tri-Axle Straight Truck	22.7 Tonnes	21
Tri-Axle Tractor Trailer	35.1 Tonnes	18
Quad-Axle Tractor Trailer	39.1 Tonnes	16
Tri-Axel Pony Pup Combination	41.4 Tonnes	30
<b>Total</b>	<b>35.0 Tonnes</b>	<b>85</b>

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

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 30<sup>th</sup> 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	5%
	6 <sup>th</sup> Line	0%
South	5 <sup>th</sup> Line	0%
East	Highway 7	95%
West	--	--
<b>Total</b>		<b>100%</b>

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

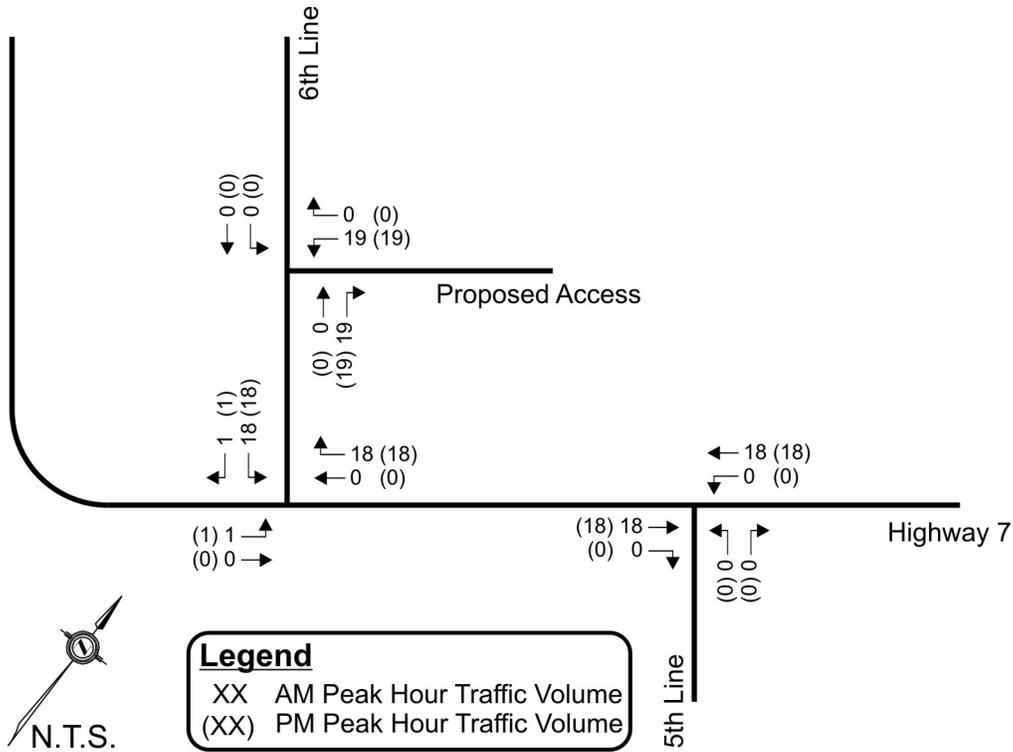
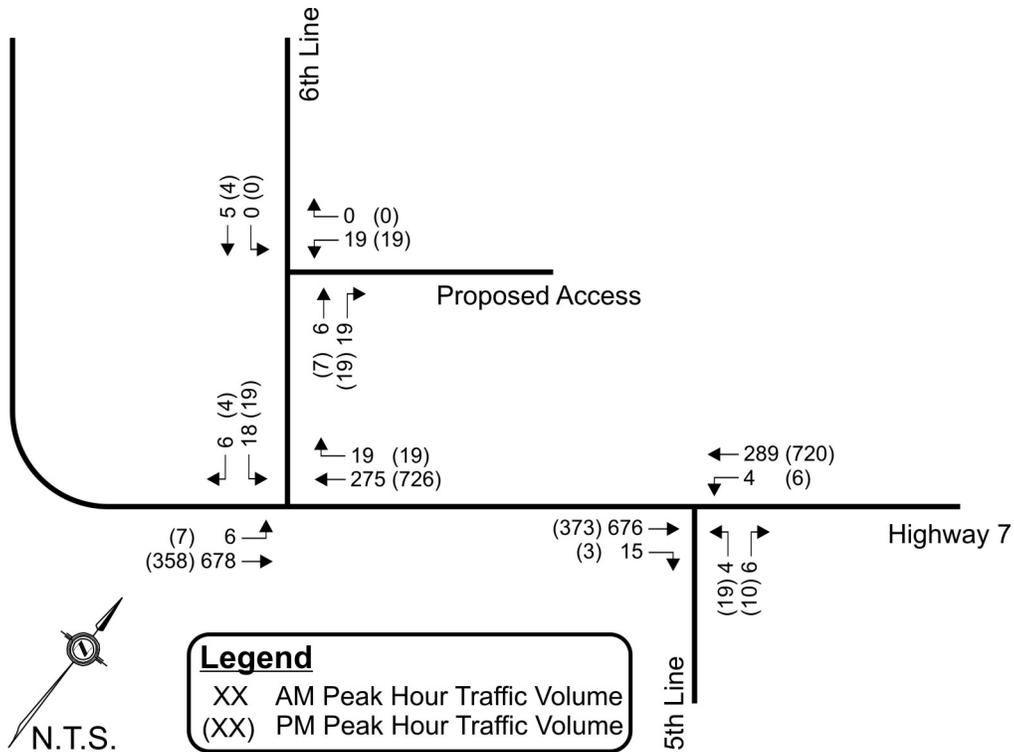


Figure 4-2 Site Traffic Volumes

#### 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.



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)	95 <sup>th</sup> Percentile Queue (m)	LOS (v/c)	95 <sup>th</sup> Percentile Queue (m)
Highway 7 / 6 <sup>th</sup> 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 / 5 <sup>th</sup> 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
6 <sup>th</sup> Line / Proposed Access (Unsignalized)	WB left-right	A (0.04)	0.9	A (0.05)	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

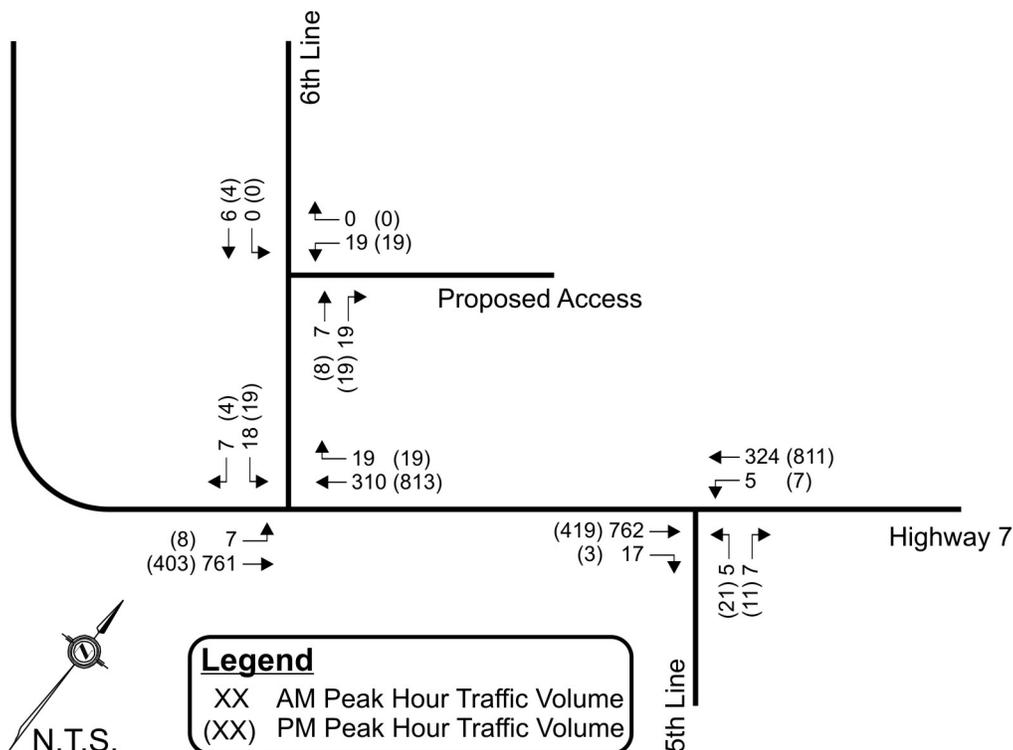
Traffic growth within the study area consists of two (2) components: traffic generated due to other developments within / near the study area; and traffic growth outside of the study area. No major background developments were identified within the vicinity of the subject site. In addition, there is 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 6<sup>th</sup> Line / Highway 7 and 5<sup>th</sup> 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.



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

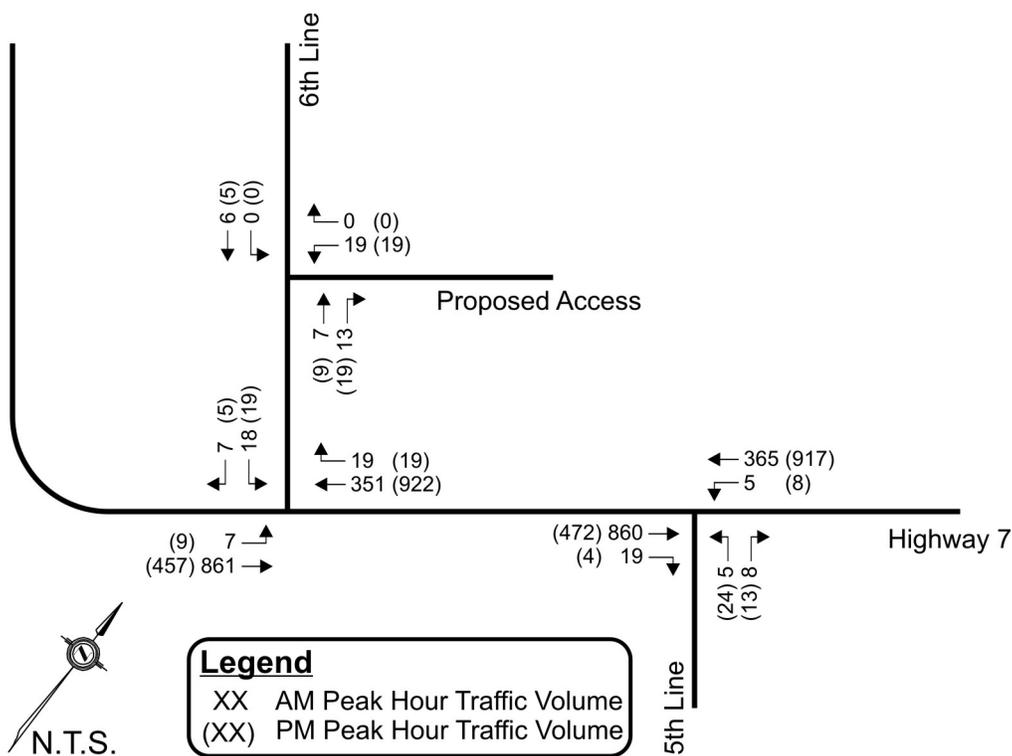
**Table 6.1 – Future (2018) Traffic Conditions – Levels of Service**

Intersection	Key Movements	AM Peak Hour		PM Peak Hour	
		LOS (v/c)	95 <sup>th</sup> Percentile Queue (m)	LOS (v/c)	95 <sup>th</sup> Percentile Queue (m)
Highway 7 / 6 <sup>th</sup> 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 / 5 <sup>th</sup> 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
6 <sup>th</sup> 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 / 6<sup>th</sup> 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.



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)	95 <sup>th</sup> Percentile Queue (m)	LOS (v/c)	95 <sup>th</sup> Percentile Queue (m)
Highway 7 / 6 <sup>th</sup> 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 / 5 <sup>th</sup> 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
6 <sup>th</sup> 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**.

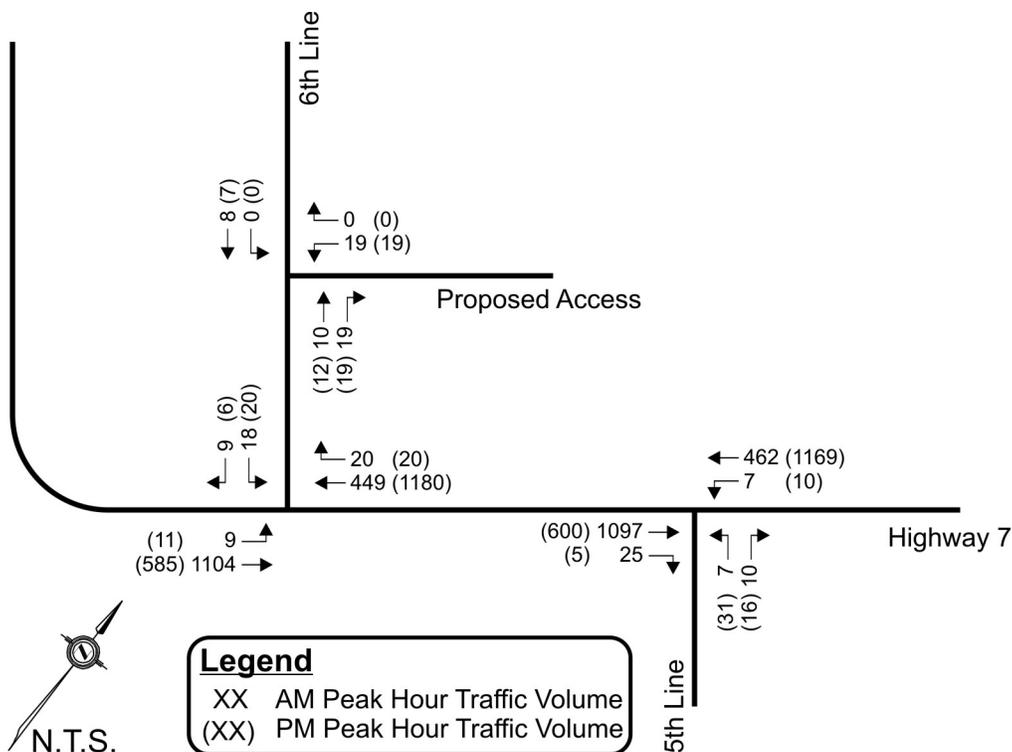
**Table 6.3 Future (2023) Total Traffic Queuing Study**

Intersection	Key Movements	Storage Length	AM Peak Hour			PM Peak Hour		
			Avg. Queue	95 <sup>th</sup> % Queue	Max Observed	Avg. Queue	95 <sup>th</sup> % Queue	Max Observed
Highway 7 / 6 <sup>th</sup> Line (Unsignalized)	EB left	25 m	0.9	5.6	10.2	1.7	6.7	6.1
Highway 7 / 5 <sup>th</sup> 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)	95 <sup>th</sup> Percentile Queue (m)	LOS (v/c)	95 <sup>th</sup> Percentile Queue (m)
Highway 7 / 6 <sup>th</sup> 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 / 5 <sup>th</sup> 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
6 <sup>th</sup> 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 95<sup>th</sup> 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 6<sup>th</sup> Line in the Township of Guelph-Eramosa. 6<sup>th</sup> 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 6<sup>th</sup> 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 / 6<sup>th</sup> Line intersection, thereby improving safety on approach to the intersection, particularly during the winter months.

### 7.2. Safety Consideration

Along Highway 7 at the 6<sup>th</sup> 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 6<sup>th</sup> 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 6<sup>th</sup> 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 6<sup>th</sup> 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 6<sup>th</sup> Line junction. Similarly, the minimum advance warning signage for the proposed access along 6<sup>th</sup> 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 / 6<sup>th</sup> Line intersection and westbound left turn lane at the Highway 7 / 5<sup>th</sup> Line intersection are warranted in the existing traffic condition;
- Due to the proximity of the 5<sup>th</sup> Line and 6<sup>th</sup> 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 6<sup>th</sup> Line be lowered to improve sight distance, as well as reduce the grade on approach to the Highway 7 / 6<sup>th</sup> 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 6<sup>th</sup> Line while standard truck entrance signs be placed on 6<sup>th</sup> Line; and,
- At the intersection of Highway 7 and 6<sup>th</sup> 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**

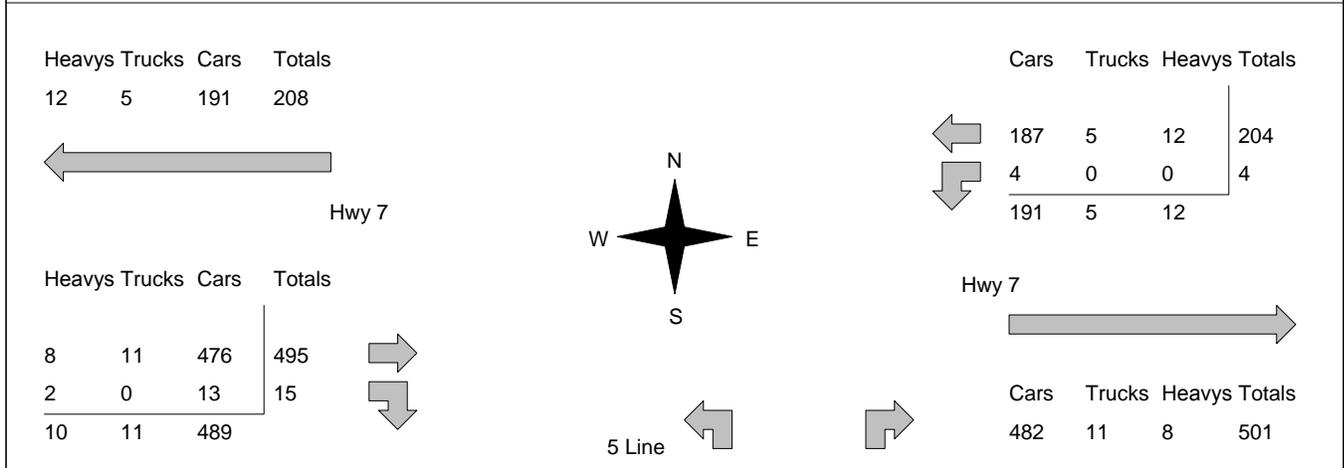
# Accu-Traffic Inc.

<b>Morning Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 7:00:00 <b>To:</b> 9:00:00	<b>One Hour Peak</b> <b>From:</b> 7:15:00 <b>To:</b> 8:15:00
-----------------------------	---	--

<b>Municipality:</b> Eramosa <b>Site #:</b> 1202400002 <b>Intersection:</b> Hwy 7 & 5 Line <b>TFR File #:</b> 5 <b>Count date:</b> 17-Feb-12	<b>Weather conditions:</b>  <b>Person(s) who counted:</b>
--	---

<b>** Non-Signalized Intersection **</b>	<b>Major Road:</b> 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	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Cars</td><td>17</td><td>6</td><td>10</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Heavys</td><td>2</td><td>0</td><td>0</td></tr> <tr><td>Totals</td><td>19</td><td>6</td><td></td></tr> </table>	Cars	17	6	10	Trucks	0	0	0	Heavys	2	0	0	Totals	19	6		Peds Cross: ∞ South Peds: 0 South Entering: 10 South Leg Total: 29
Cars	17	6	10															
Trucks	0	0	0															
Heavys	2	0	0															
Totals	19	6																

**Comments**

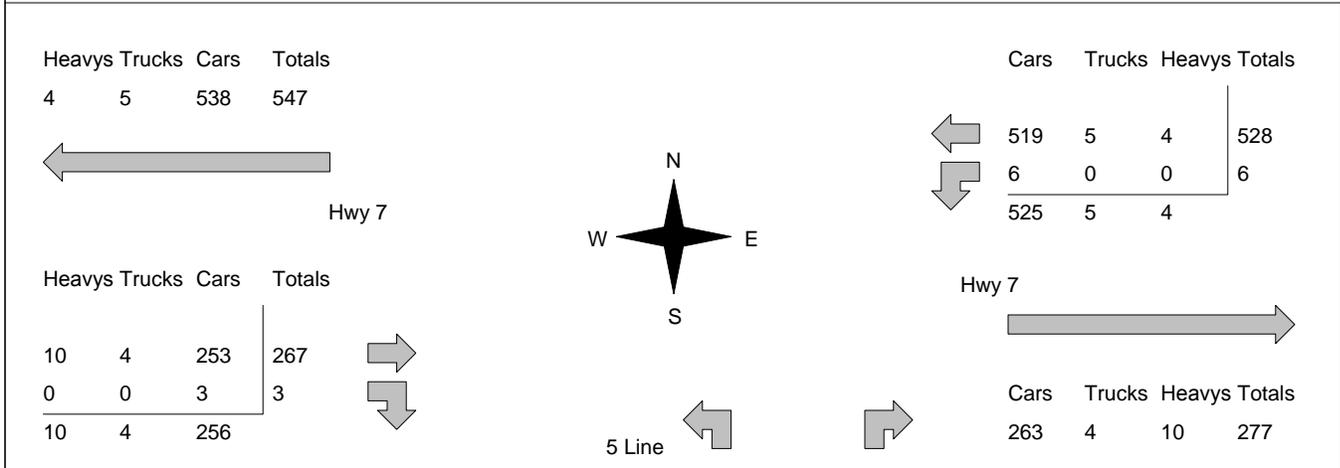
# Accu-Traffic Inc.

<b>Afternoon Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 16:00:00 <b>To:</b> 18:00:00	<b>One Hour Peak</b> <b>From:</b> 16:45:00 <b>To:</b> 17:45:00
-------------------------------	---	--

<b>Municipality:</b> Eramosa <b>Site #:</b> 1202400002 <b>Intersection:</b> Hwy 7 & 5 Line <b>TFR File #:</b> 5 <b>Count date:</b> 17-Feb-12	<b>Weather conditions:</b>  <b>Person(s) who counted:</b>
--	---

<b>** Non-Signalized Intersection **</b>	<b>Major Road:</b> 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	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>9</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Heavys</td><td>0</td></tr> <tr><td><b>Totals</b></td><td><b>9</b></td></tr> </table>	Cars	9	Trucks	0	Heavys	0	<b>Totals</b>	<b>9</b>	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>19</td><td>10</td><td>29</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td></tr> <tr><td><b>Totals</b></td><td><b>19</b></td><td><b>10</b></td><td></td></tr> </table>	Cars	19	10	29	Trucks	0	0	0	Heavys	0	0	0	<b>Totals</b>	<b>19</b>	<b>10</b>		Peds Cross: ∞ South Peds: 0 South Entering: 29 South Leg Total: 38
Cars	9																										
Trucks	0																										
Heavys	0																										
<b>Totals</b>	<b>9</b>																										
Cars	19	10	29																								
Trucks	0	0	0																								
Heavys	0	0	0																								
<b>Totals</b>	<b>19</b>	<b>10</b>																									

**Comments**

# 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

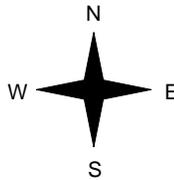
East Leg Total: 2875  
East Entering: 1419  
East Peds: 0  
Peds Cross: ∞

Heavys	Trucks	Cars	Totals
35	18	1377	1430



Hwy 7

Heavys	Trucks	Cars	Totals
36	21	1370	1427
3	0	40	43
39	21	1410	



5 Line

Cars	Trucks	Heavys	Totals
1335	18	34	1387
25	1	6	32
1360	19	40	



Hwy 7



Cars	Trucks	Heavys	Totals
1396	22	38	1456

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

# Accu-Traffic Inc.

## Traffic Count Summary

Intersection: Hwy 7 & 5 Line						Count Date: 17-Feb-12		Municipality: Eramosa					
North Approach Totals						North/South Total Approaches	South Approach Totals						
Includes Cars, Trucks, & Heavys					Total Peds		Includes Cars, Trucks, & Heavys					Total Peds	
Hour Ending	Left	Thru	Right	Grand Total									
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0	
8:00:00	0	0	0	0	0	12	8:00:00	3	0	9	12	0	
9:00:00	0	0	0	0	0	11	9:00:00	5	0	6	11	1	
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0	
17:00:00	0	0	0	0	0	27	17:00:00	19	0	8	27	0	
18:00:00	0	0	0	0	0	22	18:00:00	16	0	6	22	0	
<b>Totals:</b>	0	0	0	0	0	72		43	0	29	72	1	
East Approach Totals						East/West Total Approaches	West Approach Totals						
Includes Cars, Trucks, & Heavys					Total Peds		Includes Cars, Trucks, & Heavys					Total Peds	
Hour Ending	Left	Thru	Right	Grand Total									
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0	
8:00:00	5	185	0	190	0	696	8:00:00	0	493	13	506	0	
9:00:00	9	207	0	216	0	653	9:00:00	0	420	17	437	0	
16:00:00	0	1	0	1	0	2	16:00:00	0	1	0	1	0	
17:00:00	11	478	0	489	0	746	17:00:00	0	247	10	257	0	
18:00:00	7	516	0	523	0	792	18:00:00	0	266	3	269	0	
<b>Totals:</b>	32	1387	0	1419	0	2889		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	18:00	18:00			
Crossing Values:	0	3	5	0	19	16	16	16					









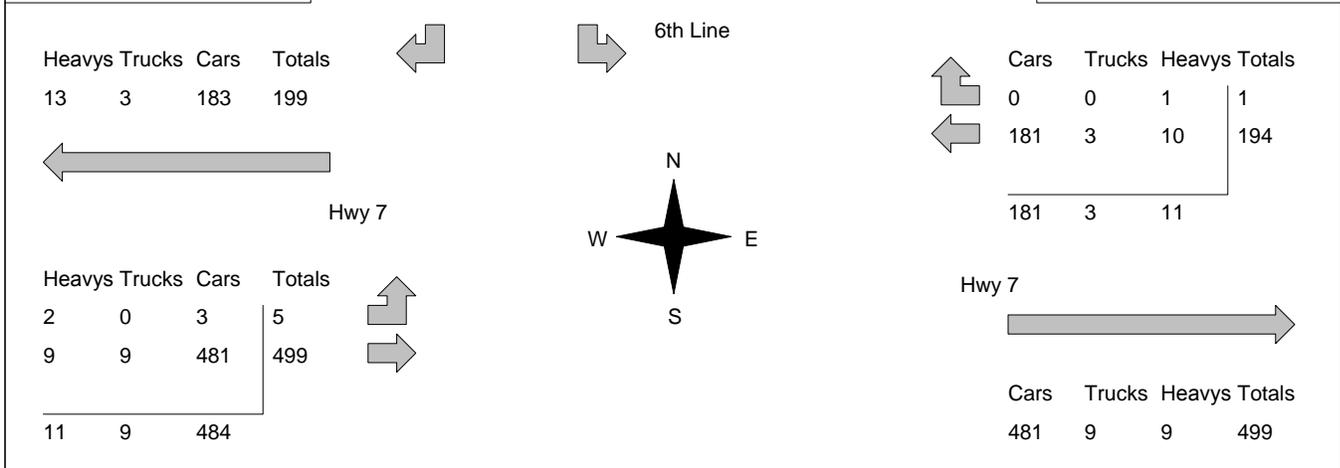
# Accu-Traffic Inc.

<b>Morning Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 7:00:00 <b>To:</b> 9:00:00	<b>One Hour Peak</b> <b>From:</b> 7:15:00 <b>To:</b> 8:15:00
-----------------------------	---	--

<b>Municipality:</b> Eramosa <b>Site #:</b> 1202400001 <b>Intersection:</b> Hwy 7 & 6th Line <b>TFR File #:</b> 3 <b>Count date:</b> 14-Feb-12	<b>Weather conditions:</b>  <b>Person(s) who counted:</b>
--	---

<b>** Non-Signalized Intersection **</b>	<b>Major Road:</b> Hwy 7 runs W/E
--	-----------------------------------

North Leg Total: 11 North Entering: 5 North Peds: 0 Peds Cross: ☒	<table style="border-collapse: collapse;"> <tr><td>Heavys</td><td>3</td><td>0</td><td>3</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Cars</td><td>2</td><td>0</td><td>2</td></tr> <tr><td>Totals</td><td>5</td><td>0</td><td></td></tr> </table>	Heavys	3	0	3	Trucks	0	0	0	Cars	2	0	2	Totals	5	0			<table style="border-collapse: collapse;"> <tr><td>Heavys</td><td>3</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Cars</td><td>3</td></tr> <tr><td>Totals</td><td>6</td></tr> </table>	Heavys	3	Trucks	0	Cars	3	Totals	6	East Leg Total: 694 East Entering: 195 East 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																											



Peds Cross: ☒ West Peds: 0 West Entering: 504 West Leg Total: 703	
--	--

**Comments**

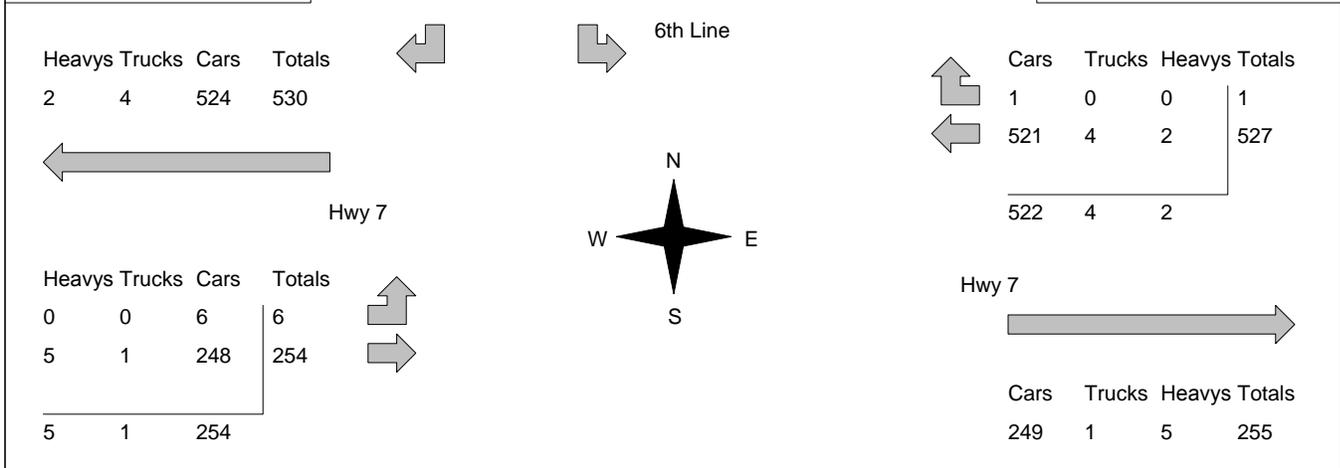
# Accu-Traffic Inc.

<b>Afternoon Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 16:00:00 <b>To:</b> 18:00:00	<b>One Hour Peak</b> <b>From:</b> 16:45:00 <b>To:</b> 17:45:00
-------------------------------	---	--

<b>Municipality:</b> Eramosa <b>Site #:</b> 1202400001 <b>Intersection:</b> Hwy 7 & 6th Line <b>TFR File #:</b> 3 <b>Count date:</b> 14-Feb-12	<b>Weather conditions:</b>  <b>Person(s) who counted:</b>
--	---

<b>** Non-Signalized Intersection **</b>	<b>Major Road:</b> Hwy 7 runs W/E
--	-----------------------------------

North Leg Total: 11 North Entering: 4 North Peds: 0 Peds Cross: ☒	<table style="margin: auto;"> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Cars</td><td>3</td><td>1</td><td>4</td></tr> <tr><td>Totals</td><td>3</td><td>1</td><td></td></tr> </table>	Heavys	0	0	0	Trucks	0	0	0	Cars	3	1	4	Totals	3	1			<table style="margin: auto;"> <tr><td>Heavys</td><td>0</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Cars</td><td>7</td></tr> <tr><td>Totals</td><td>7</td></tr> </table>	Heavys	0	Trucks	0	Cars	7	Totals	7	East Leg Total: 783 East Entering: 528 East 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																											



Peds Cross: ☒ West Peds: 0 West Entering: 260 West Leg Total: 790	
--	--

Comments

# Accu-Traffic Inc.

## 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:  $\times$

Heavys	4	1	5
Trucks	0	0	0
Cars	10	2	12
<b>Totals</b>	<b>14</b>	<b>3</b>	



Heavys	5
Trucks	0
Cars	13
<b>Totals</b>	<b>18</b>

East Leg Total: 2787  
East Entering: 1364  
East Peds: 0  
Peds Cross:  $\times$

Heavys	Trucks	Cars	Totals
33	11	1330	1374



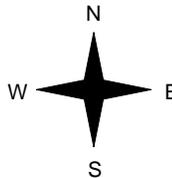
6th Line



Cars	Trucks	Heavys	Totals
3	0	1	4
1320	11	29	1360
<b>1323</b>	<b>11</b>	<b>30</b>	



Hwy 7



Heavys	Trucks	Cars	Totals
4	0	10	14
35	14	1371	1420
<b>39</b>	<b>14</b>	<b>1381</b>	



Hwy 7



Cars	Trucks	Heavys	Totals
1373	14	36	1423

Peds Cross:  $\times$   
West Peds: 0  
West Entering: 1434  
West Leg Total: 2808

### Comments

# Accu-Traffic Inc.

## Traffic Count Summary

Intersection: Hwy 7 & 6th Line						Count Date: 14-Feb-12		Municipality: Eramosa					
North Approach Totals						South Approach Totals							
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds	North/South Total Approaches	Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds	
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total		
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0	
8:00:00	0	0	4	4	0	4	8:00:00	0	0	0	0	0	
9:00:00	0	0	4	4	0	4	9:00:00	0	0	0	0	0	
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0	
17:00:00	1	0	4	5	0	5	17:00:00	0	0	0	0	0	
18:00:00	2	0	2	4	0	4	18:00:00	0	0	0	0	0	
<b>Totals:</b>	<b>3</b>	<b>0</b>	<b>14</b>	<b>17</b>	<b>0</b>	<b>17</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
East Approach Totals						West Approach Totals							
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds	East/West Total Approaches	Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds	
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total		
7:00:00	0	0	0	0	0	2	7:00:00	0	2	0	2	0	
8:00:00	0	181	1	182	0	694	8:00:00	3	509	0	512	0	
9:00:00	0	186	0	186	0	602	9:00:00	2	414	0	416	0	
16:00:00	0	1	0	1	0	4	16:00:00	1	2	0	3	0	
17:00:00	0	476	2	478	0	732	17:00:00	3	251	0	254	0	
18:00:00	0	515	1	516	0	763	18:00:00	5	242	0	247	0	
<b>Totals:</b>	<b>0</b>	<b>1359</b>	<b>4</b>	<b>1363</b>	<b>0</b>	<b>2797</b>		<b>14</b>	<b>1420</b>	<b>0</b>	<b>1434</b>	<b>0</b>	
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	18:00			
Crossing Values:	0	0	0	0		1	2	2	2				









## **APPENDIX B**

### **Existing Traffic**

Level Of Service Calculations

HCM Unsignalized Intersection Capacity Analysis  
 1: Highway 7 & 6th Line

Existing Traffic  
 AM Peak Hour



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			
<b>Intersection Summary</b>						
Average Delay			0.2			
Intersection Capacity Utilization			49.7%		ICU Level of Service	A
Analysis Period (min)			15			

# HCM Unsignalized Intersection Capacity Analysis

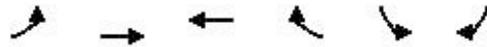
## 2: 5th Line & Highway 7

Existing Traffic  
AM Peak Hour

						
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			

HCM Unsignalized Intersection Capacity Analysis  
 1: Highway 7 & 6th Line

Existing Traffic  
 PM Peak Hour



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

# HCM Unsignalized Intersection Capacity Analysis

## 2: 5th Line & Highway 7

Existing Traffic  
PM Peak Hour



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
<b>Direction, Lane #</b>						
	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			
<b>Intersection Summary</b>						
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**

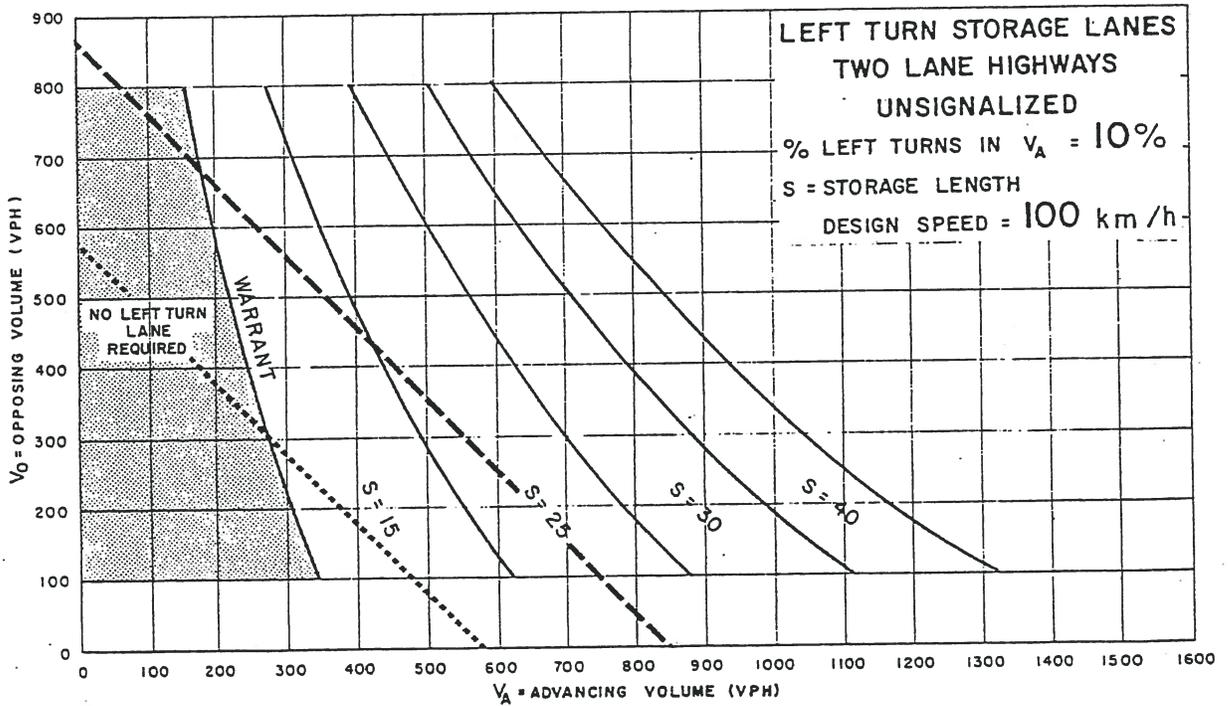
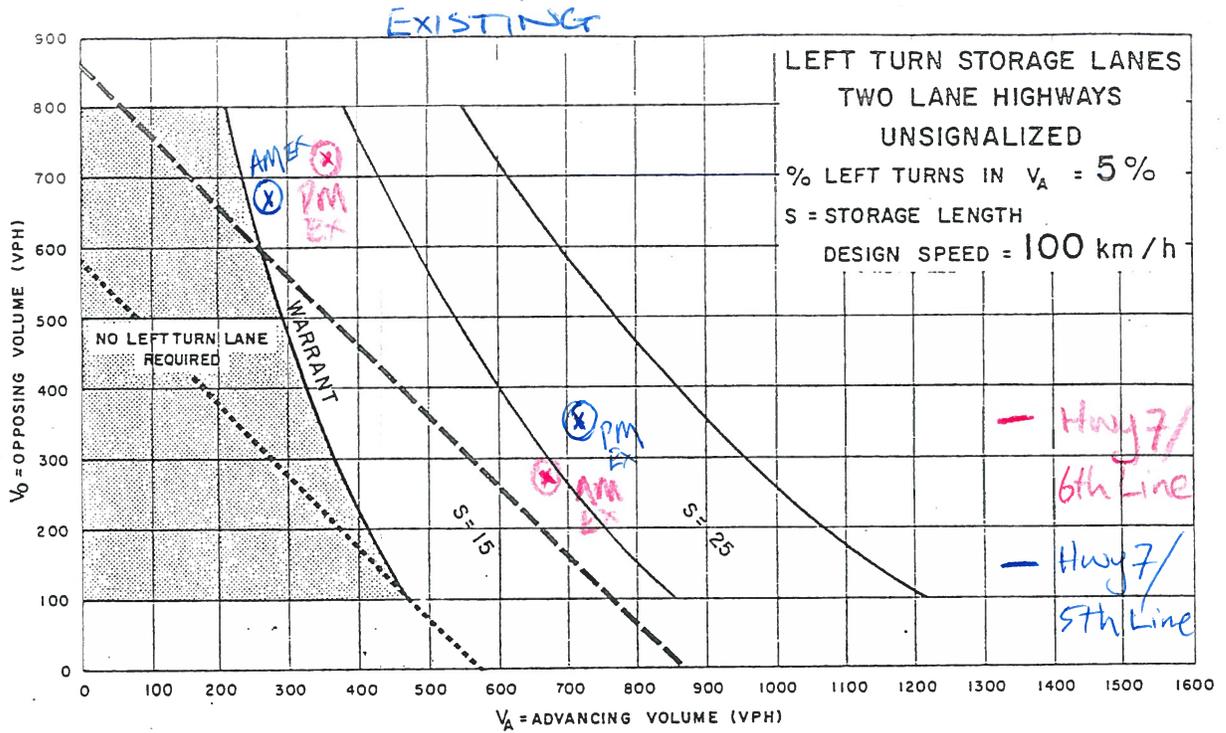


Figure EA-22

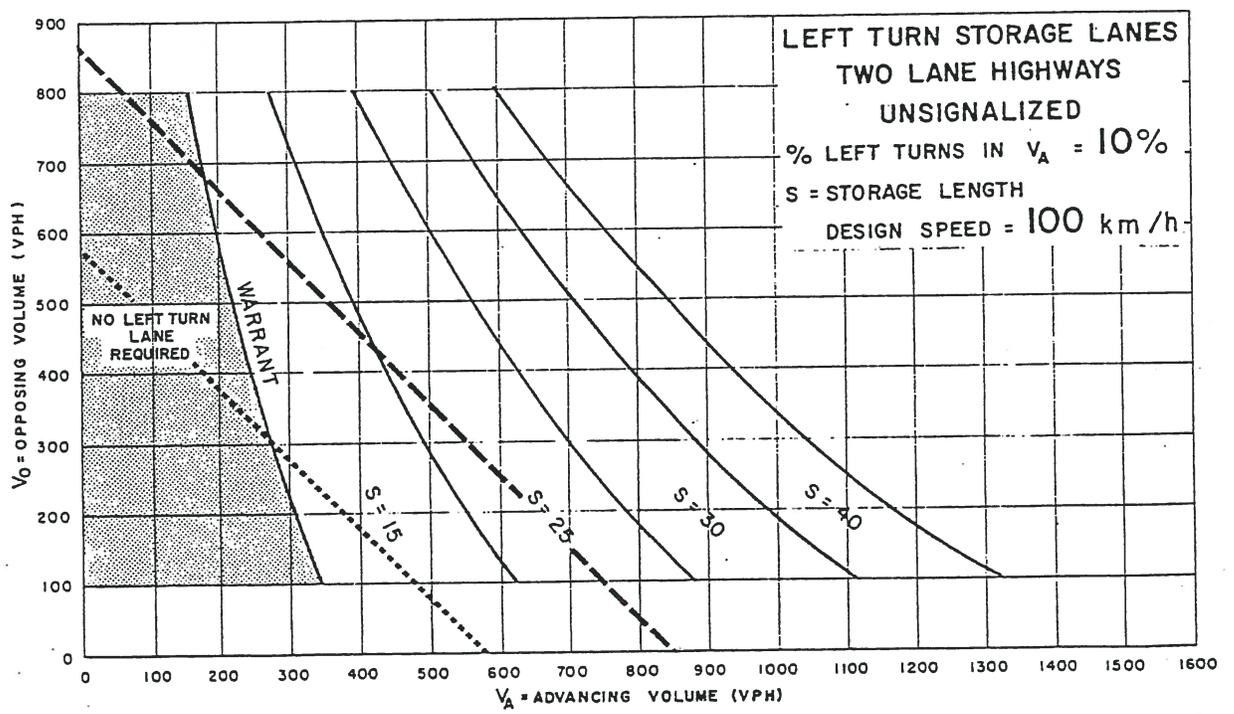
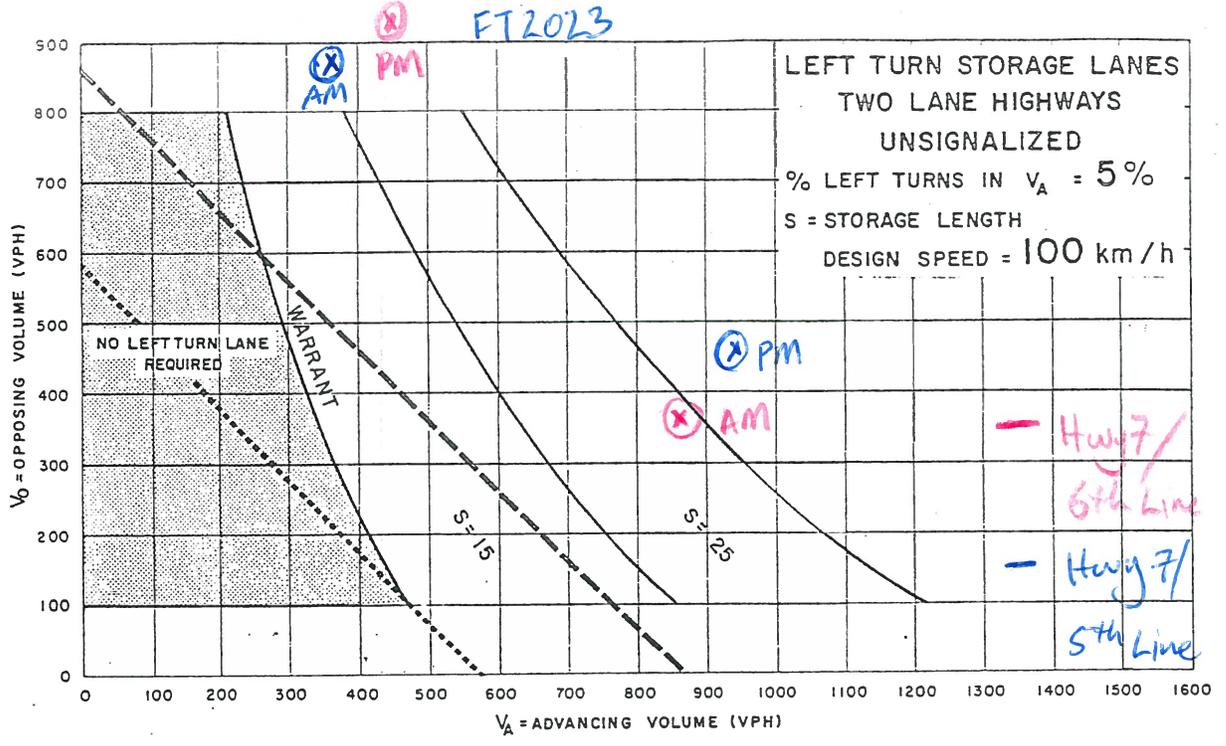


Figure EA-22

**APPENDIX D**  
**Existing Plus Site Related Traffic**  
Level Of Service Calculations

HCM Unsignalized Intersection Capacity Analysis  
 1: Highway 7 & 6th Line

Existing Traffic with Left Turn Lanes  
 AM Peak Hour



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	

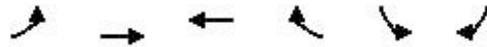
HCM Unsignalized Intersection Capacity Analysis  
2: 5th Line & Highway 7

Existing Traffic with Left Turn Lanes  
AM Peak Hour

	→	↘	↙	←	↖	↗
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
vC1, stage 1 conf vol						716
vC2, stage 2 conf vol						299
vCu, unblocked vol			724			1015
tC, single (s)			4.1			6.4
tC, 2 stage (s)						5.4
tF (s)			2.2			3.5
p0 queue free %			100			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			

HCM Unsignalized Intersection Capacity Analysis  
1: Highway 7 & 6th Line

Existing Traffic with Left Turn Lanes  
PM Peak Hour



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			

HCM Unsignalized Intersection Capacity Analysis  
2: 5th Line & Highway 7

Existing Traffic with Left Turn Lanes  
PM Peak Hour

						
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
<b>TOTAL</b>	<b>263</b>	<b>246</b>	<b>328</b>	<b>261</b>	<b>327</b>	<b>219</b>	<b>331</b>	<b>272</b>	<b>260</b>	<b>254</b>	<b>58</b>	<b>1</b>		<b>2826</b>
<b>%</b>	<b>9.3%</b>	<b>8.7%</b>	<b>11.6%</b>	<b>9.2%</b>	<b>11.6%</b>	<b>7.7%</b>	<b>11.7%</b>	<b>9.6%</b>	<b>9.2%</b>	<b>9.0%</b>	<b>2.1%</b>	<b>0.0%</b>		<b>100%</b>

Busiest Hour: 23-Aug  
 % of Monthly Shipping: 23/2826 = 0.814%  
 23 Trucks Shipped in one hour

## 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%
Sep-11	12.27%
11-Oct	8.90%
Nov-11	11.70%
Dec-11	5.95%
Total	



Busiest Month

**APPENDIX F**  
**Future (2018) Total Traffic**  
Level Of Service Calculations

HCM Unsignalized Intersection Capacity Analysis  
 1: Highway 7 & 6th Line

Future (2018) Total Traffic  
 AM Peak Hour



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
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis  
2: 5th Line & Highway 7

Future (2018) Total Traffic  
AM Peak Hour

						
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			

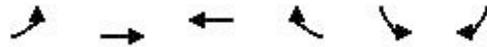
HCM Unsignalized Intersection Capacity Analysis  
3: 6th Line & Access

Future (2018) Total Traffic  
AM Peak Hour

						
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			

HCM Unsignalized Intersection Capacity Analysis  
 1: Highway 7 & 6th Line

Future (2018) Total Traffic  
 PM Peak Hour



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

HCM Unsignalized Intersection Capacity Analysis  
2: 5th Line & Highway 7

Future (2018) Total Traffic  
PM Peak Hour

	→	↘	↙	←	↖	↗
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			434
vC1, stage 1 conf vol						434
vC2, stage 2 conf vol						850
vCu, unblocked vol			435			434
tC, single (s)			4.1			6.2
tC, 2 stage (s)						5.4
tF (s)			2.2			3.3
p0 queue free %			99			98
cM capacity (veh/h)			1135			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			

HCM Unsignalized Intersection Capacity Analysis  
3: 6th Line & Access

Future (2018) Total Traffic  
PM Peak Hour

						
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						
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

HCM Unsignalized Intersection Capacity Analysis  
 1: Highway 7 & 6th Line

Future (2023) Total Traffic  
 AM Peak Hour



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			

HCM Unsignalized Intersection Capacity Analysis  
2: 5th Line & Highway 7

Future (2023) Total Traffic  
AM Peak Hour

						
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			

HCM Unsignalized Intersection Capacity Analysis  
3: 6th Line & Access

Future (2023) Total Traffic  
AM Peak Hour

						
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			

HCM Unsignalized Intersection Capacity Analysis  
 1: Highway 7 & 6th Line

Future (2023) Total Traffic  
 PM Peak Hour



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	

HCM Unsignalized Intersection Capacity Analysis  
2: 5th Line & Highway 7

Future (2023) Total Traffic  
PM Peak Hour

						
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					

HCM Unsignalized Intersection Capacity Analysis  
3: 6th Line & Access

Future (2023) Total Traffic  
PM Peak Hour

						
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						
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	
<b>Direction, Lane #</b>						
	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					
<b>Intersection Summary</b>						
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)	

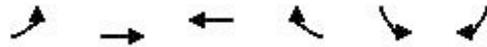
Network Summary

Network wide Queuing Penalty: 0
---------------------------------

**APPENDIX I**  
**Future (2033) Total Traffic**  
Level Of Service Calculations

HCM Unsignalized Intersection Capacity Analysis  
 1: Highway 7 & 6th Line

Future (2033) Total Traffic  
 AM Peak Hour



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						
Median storage veh						
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			

HCM Unsignalized Intersection Capacity Analysis  
2: 5th Line & Highway 7

Future (2033) Total Traffic  
AM Peak Hour

						
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					

HCM Unsignalized Intersection Capacity Analysis  
3: 6th Line & Access

Future (2033) Total Traffic  
AM Peak Hour

						
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			

HCM Unsignalized Intersection Capacity Analysis  
 1: Highway 7 & 6th Line

Future (2033) Total Traffic  
 PM Peak hour



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			

# HCM Unsignalized Intersection Capacity Analysis

## 2: 5th Line & Highway 7

Future (2033) Total Traffic  
PM Peak hour

						
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
vC1, stage 1 conf vol						622
vC2, stage 2 conf vol						1225
vCu, unblocked vol			624			1846
tC, single (s)			4.1			6.4
tC, 2 stage (s)						5.4
tF (s)			2.2			3.5
p0 queue free %			99			87
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					

HCM Unsignalized Intersection Capacity Analysis  
3: 6th Line & Access

Future (2033) Total Traffic  
PM Peak hour

						
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.