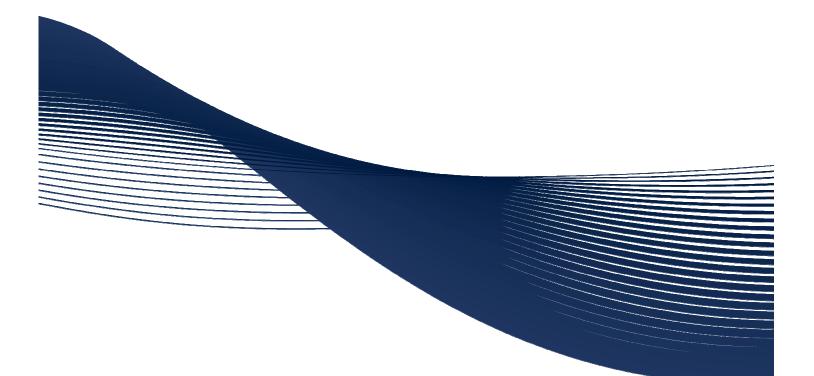
# JAMES DICK CONSTRUCTION LIMITED

**REVISED TRAFFIC IMPACT STUDY** 

Eramosa Quarry, Township of Guelph-Eramosa Project No. TR12-0013





NOVEMBER 2013

#### 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 GTA WEST OFFICE

150 Courtneypark Drive West, Unit C100 Mississauga, ON CANADA L5W 1Y6 **T.** 905.364.6161 **F.** 905.364.6162





November 1, 2013 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), dated May 28, 2013 and September 30, 2013. The study finds that the development is anticipated to generate 26 two-way trips per hour and 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.

Kim Nystrom, L.E.L Principal

JG:dps

Encl.



Joseph E. Gowrie, P.Eng. Transportation Engineer

\ldata\shared\2012 Projects\TR\TR12-0013 JamesDick\_Hwy7-6Conc\_Eramosa\300-Design-Engineering\312-Deliverables\Project Deliverables\001\_March 2012\2012 04 23 FINAL TIS doc



**PREPARED BY:** 

COLE ENGINEERING GROUP LTD.

Joseph E. Gowrie, P.Eng. Transportation Engineer

#### CHECKED BY:

#### COLE ENGINEERING GROUP LTD.

Kim Nystrom . Principal

#### **Issues and Revisions Registry**

Traffic Impact Study	April 23, 2012	For Submission
Revised Traffic Impact Study	July 31, 2013	For Submission
Revised Traffic Impact Study	November 1, 2013	For Submission



#### **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**

1.0	Study Background and Purpose	1
2.0	Study Approach	2
	2.1. Study Area	2
	2.2. Horizon Year	2
3.0	Existing Traffic Conditions	3
	3.1. Existing Road Network	
	3.2. Existing Traffic Assessment	
	3.3. Existing Traffic Conditions – Level of Service Analysis	4
4.0	Site Generated Traffic	5
	4.1. Development Proposal	5
	4.2. Site Generated Traffic	
	4.3. Trip Distribution	
	4.4. Existing Plus Site-Related Traffic	
5.0	Traffic Growth	9
6.0	Future Total Traffic Conditions	9
	6.1. Future (2018) Total Traffic Conditions	
	6.2. Future (2023) Total Traffic Conditions	
	6.2.1.       Without Left Turn Lane         6.2.2.       With Left Turn Lane	
7.0	Access Analysis	13
	7.1. Site Access Location and Sight Distance	13
	7.2. Safety Consideration	13
8.0	Conclusions	14

#### LIST OF FIGURES

Figure 1-1	Proposed Site Location	1
Figure 1-2	Conceptual Site Plan	2
	Existing Lane Configurations	
Figure 3-2	Existing Traffic Volumes	4
	Erin Pit 2011 Monthly Tonnage Proportion	
Figure 4-2	Hourly Truck Distribution	6
Figure 4-3	Site Traffic Volumes	7
Figure 4-4	Existing Plus Site-Related Traffic Volumes	8
Figure 6-1	Future (2018) Total Traffic Volumes	9
Figure 6-2	Future (2023) Total Traffic Volumes1	0

#### LIST OF TABLES

Table 3.1 – Existing Traffic Conditions – Levels of Service	4
Table 4.1 – Trip Distribution	7
Table 4.2 – Existing Plus Site-Related Traffic Conditions – Levels of Service	8
Table 6.1 – Future (2018) Traffic Conditions – Levels of Service	9
Table 6.2 – Future (2023) Total Traffic Conditions – Levels of Service	11
Table 6.3 - Future (2023) Total Traffic without Left Turn Lane SimTraffic Queuing Analysis	11
Table 6.4 – Future (2023) Total Traffic Conditions with Left Turn Lane– Levels of Service	. 12
Table 6.5 – Future (2023) Total Traffic with Left Turn Lane SimTraffic Queuing Analysis	. 13
Table 7.1 – OTM's Minimum Advanced Placement of Condition B and C Warning Signs for Stopping	.14

#### APPENDICES

- Appendix A Existing Traffic Data
- Appendix B Existing Traffic Level of Service Calculations
- Appendix C Erin Gravel Pit Truck Trip Generation
- Appendix D Existing Plus Site-Related Level of Service Calculations
- Appendix E Future (2018) Total Traffic Level of Service Calculations
- Appendix F Future (2023) Total Traffic Level of Service Calculations
- Appendix G 2023 SimTraffic Analysis Calculations
- Appendix H MTO Geometric Design Standards Manual Left Turn Warrant Design Charts
- Appendix I 2023 SimTraffic Analysis with Left Turn Lane Calculations
- Appendix J Future (2023) Total Traffic with Left Turn Lane Level of Service Calculations
- Appendix K 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**.



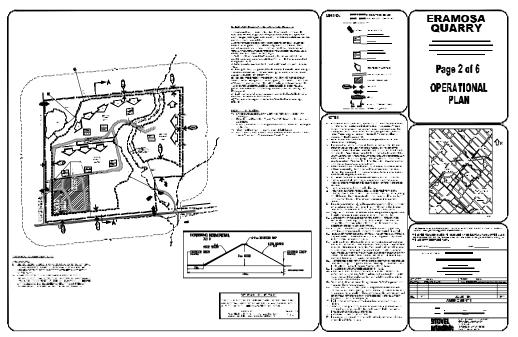


Figure 1-2 Proposed Site Plan

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

A five (5)-year horizon was selected to represent future traffic conditions. 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**.

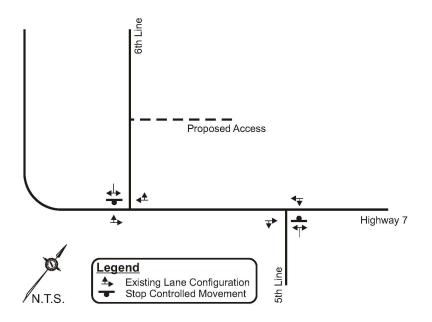


Figure 3-1 Existing Lane Configurations

The road network is detailed as follows:

**Highway 7** is a two (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 two (2)-lane north-south gravel roadway under the jurisdiction of the Township of Guelph-Eramosa.

5<sup>th</sup> Line is a two (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  $7/6^{th}$  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.

Township of Guelph-Eramosa

#### 3.3. Existing Traffic Conditions – Level of Service Analysis

Existing traffic volumes were analyzed using Synchro 6.0 software and are provided in Figure 3-2.

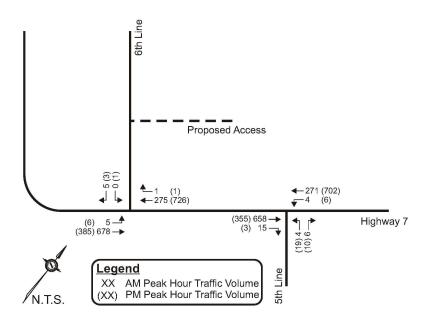


Figure 3-2 Existing Traffic Volumes

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

		AM Peak Hour		PM Peak Hour	
Intersection	Key Movements	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	EB left-through	A (0.01)	0.1	A (0.01)	0.2
(Unsignalized)	SB left-right	B (0.01)	0.3	C (0.02)	0.5
Highway 7 / 5 <sup>th</sup> Line	WB left-through	A (<0.01)	0.1	A (0.01)	0.1
(Unsignalized)	NB left-right	C (0.03)	0.7	C (0.10)	2.5

Table 3.1 – Existing Traffic Conditions – Levels of Service

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.

### 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

Trip generation for the proposed Eramosa Quarry was estimated using a first principles assessment using information from other James Dick Construction facilities and represents a worst-case traffic assessment. The proposed quarry will supply a maximum of 700,000 tonnes of aggregate per year. It was assumed that based on the fleet of vehicles of the Owners, the average load of each truck will be approximately 33 tonnes or 21,213 trucks per year. The proposed quarry is to operate from Monday to Saturday excluding public holidays. The facility is also to operate from 6:00 a.m. to 6:00 p.m.

The site generated traffic of this study was estimated using data from the Erin Pit which produces 723,000 tonnes of aggregate per year which makes it a suitable proxy site for the Eramosa Quarry. A summary of trips for the Erin Gravel Pit is provided in **Appendix C** for reference. Based on the data presented in **Figure 4-1**, the busiest month of operations is August.

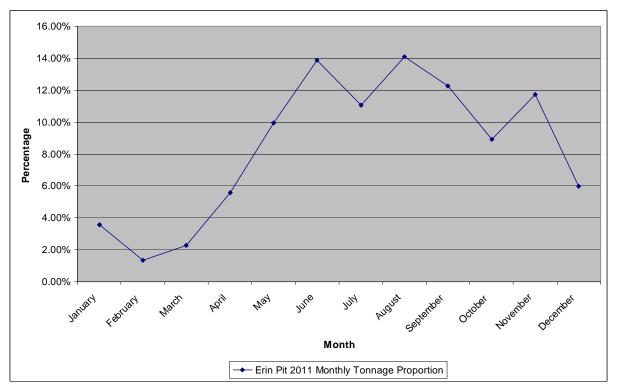


Figure 4-1 Erin Pit 2011 Monthly Tonnage Proportion

Applying the annual distribution of traffic as presented in **Figure 4-1** to the Eramosa Quarry, results in a peak of 107 trucks per day.

During the peak month, the trips to the site were further broken down to an hourly distribution using the information provided in **Figure 4-2**.

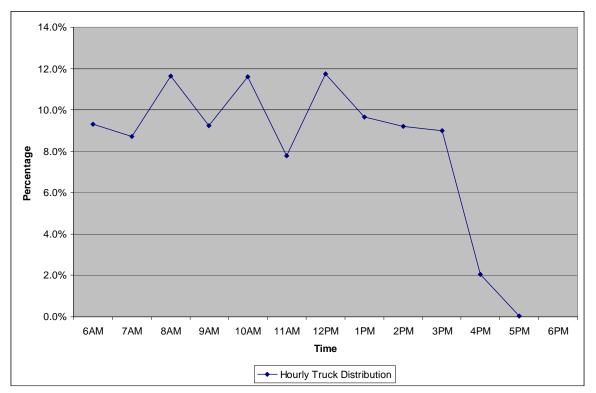


Figure 4-2 Hourly Truck Distribution

It is anticipated that the daily distribution of trucks arriving at the facility to be loaded will vary during certain hours of the day. For example, the first hour is anticipated to be the busiest hour of the day. This is because all trucks are arriving for the first load of the day. As the day wears on, trucks will become spread out as they service jobs that are varying distances from the quarry and the hourly trips will tend to even out. This trip generation pattern has been observed at other existing James Dick aggregate sites. It is anticipated that the morning peak hour, from 6:00 a.m. to 7:00 a.m., will involve approximately ten percent (10%) of daily trips. Thus, in the peak hour, approximately ten (10) trucks will be shipped on an average day. It has been observed that the hour from 7:00 a.m. to 8:00 a.m. is one of the lowest volume hours of the day. This is because the trucks loaded the previous peak hour are on their way to various job sites around the GTA. As such, it is anticipated that approximately five (5) to nine (9) percent of daily trips will be generated during this hour or approximately five (5) to nine (9) trucks arriving on an average day.

In the late afternoon, shipping drops off significantly, such that, trip generation is not significant during the p.m. peak. Most material has left the quarry prior to 4:00 p.m. due to the fact that it must arrive at the jobsite before the jobs shut down at 5:00 p.m. The last hour of the day sees only from one percent (1%) to 2.5% of the daily shipping taking place, or one (1) to three (3) trucks. On very busy days, this hourly peaking factor tends to even out and is less pronounced.



During the busiest hour of the day, 11.7% of the trucks, or 13 trucks, are expected to arrive at the facility. It is assumed that each truck loading interval is short in duration, therefore each truck trip will result in a total of two (2) trips per hour (one (1) inbound and one (1) outbound). Therefore, the proposed site will have 26 two-way (13 inbound and 13 outbound) trips during each of the analyzed peak hours. It is important to understand that this level of shipping is rarely likely to ever take place, but it provides a prudent upper limit to this analysis.

Because of the operating hours of the proposed facility, it is anticipated that the staff will arrive outside of the roadway peak hours.

#### 4.3. Trip Distribution

Based on review of the available haul routes and the anticipated destinations of the materials, the trip distribution for the proposed development is provided in **Table 4.1**.

Direction (to / from)	Via	Distribution		
North	Highway 7 6 <sup>th</sup> Line	5% 0%		
South	5 <sup>th</sup> Line	0%		
East	Highway 7	95%		
West				
Тс	100%			

Table 4.1 – Trip Distribution

The site traffic was assigned based on the above trip distribution and is illustrated in Figure 4-3.

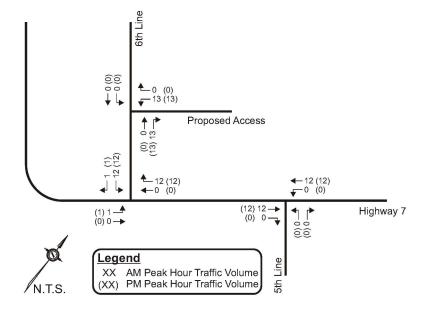


Figure 4-3 Site Traffic Volumes

#### 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 4-4** and was assessed using *Synchro 6.0* software.

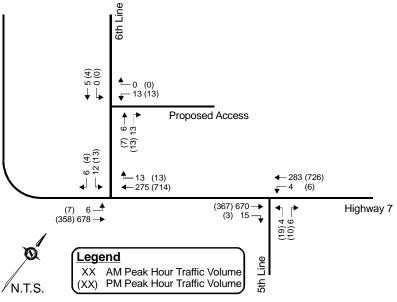


Figure 4-4 Existing Plus Site-Related Traffic Volumes

The detailed calculations are provided in **Appendix D** while summarized in **Table 4.2**.

		AM Peak Hour		PM Peak Hour	
Intersection	Key Movements	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) D (0.14)	0.2 3.6	A (0.01) D (0.18)	0.2 4.7
Highway 7 / 5 <sup>th</sup> Line (Unsignalized)	WB left-through NB left-right	A (<0.01) C (0.03)	0.1 0.8	A (0.01) C (0.10)	0.1 2.6
6 <sup>th</sup> Line / Proposed Access (Unsignalized)	WB left-right	A (0.03)	0.6	A (0.03)	0.6

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.

#### 6.1. Future (2018) Total Traffic Conditions

Future (2018) total traffic is illustrated in **Figure 6-1** and was analyzed using *Synchro 6.0* software.

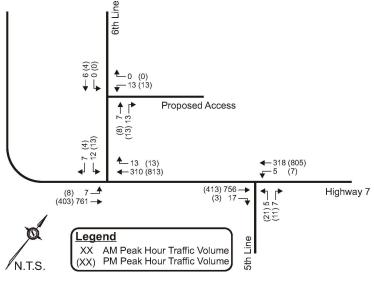


Figure 6-1 Future (2018) Total Traffic Volumes

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

		AM Pe	ak Hour	PM Peak Hour		
Intersection	Key Movements	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) D (0.17)	0.2 4.6	A (0.01) E (0.22)	0.3 6.0	
Highway 7 / 5 <sup>th</sup> Line (Unsignalized)	WB left-through NB left-right	A (0.01) C (0.05)	0.2 1.1	A (0.01) C (0.13)	0.1 3.5	
6 <sup>th</sup> Line / Proposed Access (Unsignalized)	WB left-right	A (0.03)	0.6	A (0.03)	0.6	



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. The 95<sup>th</sup> percentile queuing extends 6.0 meters, and experiences a delay of approximately 40.3 seconds during the p.m. peak period.

#### 6.2. Future (2023) Total Traffic Conditions

Future (2023) total traffic volumes are illustrated in **Figure 6-2** and were analyzed with and without a left turn lane.

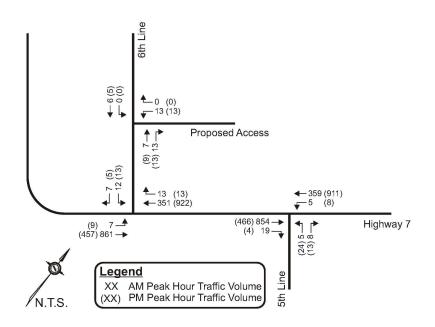


Figure 6-2 Future (2023) Total Traffic Volumes

#### 6.2.1. Without Left Turn Lane

The future (2023) total traffic volumes were analysed without an exclusive eastbound left turn lane at the Highway 7 /  $6^{th}$  Line intersection using *Synchro 6.0* software. The detailed calculations are provided in **Appendix F** and are summarized **Table 6.2**.



		AM Peak Hour		PM Peak Hour	
Intersection	Key Movements	LOS (v/c)	95 <sup>th</sup> Percentile Queue (m)	LOS (v/c)	95 <sup>th</sup> Percentile Queue (m)
Highway 7 / 6th Line	EB left-through	A (0.01)	0.2	A (0.01)	0.3
(Unsignalized)	SB left-right	E (0.22)	6.1	F (0.29)	8.4
Highway 7 / 5th Line	WB left-through	A (0.01)	0.2	A (0.01)	0.2
(Unsignalized)	NB left-right	C (0.06)	1.4	D (0.19)	5.2
6th Line / Proposed Access (Unsignalized)	WB left-right SB left-through	A (0.03)	0.6	A (0.03)	0.7

In the future (2023) total traffic condition, the study area intersections are expected to continue to operate at good LOS with no movements operating near capacity. Under future (2018) total traffic conditions, minimal queuing occurs within the study area intersections, with the southbound left-right queue at the highway 7 /  $6^{th}$  Line intersection having a modest increase in queue length. The 95<sup>th</sup> percentile queuing extends 6.1 meters and 8.4 meters, and experiences delays of approximately 39.5 and 54.1 seconds during the a.m. and p.m. peak periods, respectively.

In addition to the Synchro analysis, a queuing analysis was also undertaken using *SimTraffic* software. The results of the SimTraffic queuing assessment are summarized in **Table 6.3** and detailed calculations are provided in **Appendix G**.

Intersection	Key Movements		M Peak Ho tile Queue (m)		PM Peak Hour Percentile Queue Lengths (m)								
		50 <sup>th</sup>	95 <sup>th</sup>	Max.	50 <sup>th</sup>	95 <sup>th</sup>	Max.						
Highway 7 / 6 <sup>th</sup> Line (Unsignalized)	EB left-through SB left-right	0.9 9.6	6.1 24.1	12.8 30.5	1.1 10.6	7.0 25.6	16.0 34.5						
Highway 7 / 5 <sup>th</sup> Line (Unsignalized)	WB left-through NB left-right	2.6 3.3	15.9 9.8	34.6 8.6	2.1 7.5	11.5 15.6	21.9 19.4						
6 <sup>th</sup> Line / Proposed Access (Unsignalized)	WB left-right	7.5	15.0	19.6	7.5	19.6	15.0						

Table 6.3 - Future (2023) Total Traffic without Left Turn Lane SimTraffic Queuing Analysis

The SimTraffic analysis shows  $95^{th}$  percentile queue lengths of approximately one (1) vehicle for the eastbound left turn movement at the Highway 7 /  $6^{th}$  Line intersection.

#### 6.2.2. With Left Turn Lane

A left turn warrant analysis was undertaken at the intersection of Highway 7 and 6<sup>th</sup> Line. A factor of two (2) and three (3) was applied to empty trucks and loaded trucks, respectively to convert those vehicles to passenger car equivalents, resulting in left turn percentages of one percent (1%) and two percent (2%) during the a.m. and p.m. peak hours, respectively. 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 which will require a deceleration taper and parallel of 160 meters and 70 meters, respectively. The design charts are provided in **Appendix H**.

It should be noted that there is a minimal amount of left turning traffic expected from Highway 7 onto 6<sup>th</sup> Line. The left turn lane is warranted primarily as a result of background traffic turning onto 6<sup>th</sup> Line, as well as the high design speed along Highway 7.

The future (2023) total traffic analysis is also assessed with an exclusive left turn lane at the Highway 7 /  $6^{th}$  Line intersection using *Synchro 6.0* software. The results are summarized in **Table 6.4** and calculation sheets provided in **Appendix I**.

		AM Pe	eak Hour	PM Peak Hour			
Intersection	Key Movements	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 EB through SB left-right	A (0.01) (0.58) E (0.22)	0.2  6.1	B (0.01) (0.29) F (0.29)	0.3  8.4		
Highway 7 / 5 <sup>th</sup> Line (Unsignalized)	WB left-through NB left-right	A (0.01) C (0.06)	0.2 1.4	A (0.01) D (0.19)	0.2 5.2		
6 <sup>th</sup> Line / Proposed Access (Unsignalized)	WB left-right SB left-through	A (0.03)	0.6	A (0.03)	0.7		

Table 6.4 – Future (2023) Total Traffic Conditions with Left Turn Lane– Levels of Service

With the exclusive eastbound left turn left turn lane at the Highway 7 / 6<sup>th</sup> Line intersection, the study area intersections are expected to operate at very similar levels of service the scenario without the exclusive left turn lane.

The *SimTraffic* queuing analysis is repeated in the future (2023) total traffic condition with the exclusive left turn lane in place for the eastbound left turning movement. The analysis results are summarized in **Table 6.5** and the detailed analysis sheets provided in **Appendix J**.



Intersection	Key Movements		M Peak Ho tile Queue (m)		PM Peak Hour Percentile Queue Lengths (m)				
		50 <sup>th</sup>	95 <sup>th</sup>	Max.	50 <sup>th</sup>	95 <sup>th</sup>	Max.		
Highway 7 / 6 <sup>th</sup> Line (Unsignalized)	EB left SB left-right	1.1 10.2	6.2 25.3	13.1 34.7	1.0 11.1	5.4 2.3	9.5 34.7		
Highway 7 / 5 <sup>th</sup> Line (Unsignalized)	WB left-through NB left-right	2.8 3.3	16.5 9.9	34.7 10.5	2.1 7.3	11.3 15.2	19.2 21.9		
6 <sup>th</sup> Line / Proposed Access (Unsignalized)	WB left-right	7.5	19.6	15.0	7.5	19.6	15.0		

Table 6.5 – Future (2023) Total Traffic with Left Turn Lane SimTraffic Queuing Analysis

The *SimTraffic* analysis with the exclusive left turn lane at the Highway 7 / 6<sup>th</sup> Line intersection forecasts queues of similar length to that scenario without the exclusive left turn lane. The *SimTraffic* analysis also confirms that a storage length of 25 meters is sufficient to serve the movement.

#### 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  $6^{th}$  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 /  $6^{th}$  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 80m and parallel 85m), 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.** 

					0	0	0	
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 gravel pit is expected to generate 26 truck trips (13 truck trips in / 13 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 and future (2023) total traffic conditions;
- It is recommended that the crest 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 a westbound deceleration lane along Highway 7 at the 6<sup>th</sup> Line intersection 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-Tr	affic Inc.									
Morning Peak Diagram	Specified Period         One Hour Peak           From:         7:00:00         From:         7:15:00           To:         9:00:00         To:         8:15:00									
Municipality:EramosaSite #:1202400002Intersection:Hwy 7 & 5 LineTFR File #:5Count 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: X									
Heavys Trucks Cars Totals 12 5 191 208	Cars Trucks Heavys Totals 187 5 12 4 0 0 191 5 12									
W - W	E Hwy 7									
8 11 476 495 2 0 13 15 10 11 489 5 Line	Cars Trucks Heavys Totals 482 11 8 501									
West Peds:     0     Trucks     0     Trucks       West Entering:     510     Heavys     2     Heavys	ars4610Peds Cross: $\bowtie$ ks000South Peds:0ys000South Entering:10als46South Leg Total:29									
Comr	nents									
Com	nents									



Accu-Tr	affic Inc.
Afternoon Peak Diagram	Specified Period         One Hour Peak           From:         16:00:00         From:         16:45:00           To:         18:00:00         To:         17:45:00
Municipality:EramosaSite #:1202400002Intersection:Hwy 7 & 5 LineTFR File #:5Count 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: <sup>X</sup>
Heavys Trucks Cars Totals 4 5 538 547	Cars Trucks Heavys Totals
4	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
Heavys Trucks Cars Totals	Hwy 7
10 4 253 0 0 3 10 4 256 267 3 5 Line	S Cars Trucks Heavys Totals 263 4 10 277
West Peds:     0     Trucks     0     Truc       West Entering:     270     Heavys     0     Heavys	ars     19     10     29     Peds Cross:     ⋈       ks     0     0     0     South Peds:     0       ys     0     0     0     South Entering:     29       als     19     10     South Leg Total:     38
	nents



## **Total Count Diagram**

Municipality: Eramosa Weather conditions: Site #: 1202400002 Intersection: Hwy 7 & 5 Line Person(s) who counted: TFR File #: 5 Count date: 17-Feb-12 \*\* Non-Signalized Intersection \*\* Major Road: Hwy 7 runs W/E East Leg Total: 2875 East Entering: 1419 East Peds: 0 Peds Cross: X Cars Trucks Heavys Totals Heavys Trucks Cars Totals 35 18 1377 1430 1335 18 1387 34 Ν 1 6 25 32

N										23		0	52
		Н	lwy 7						$\checkmark$	1360	19	40	
eavys Trucks	Cars	Totals			١		► E		Hwy	7			
						S							$ \longrightarrow $
6 21	1370	1427	$\Box$										V
0	40	43				/	1	N		Cars	Truck	s Heavys	Totals
9 21	1410	1	$\checkmark$			5 Line				1396	22	38	1456
eds Cross:	Χ		Cars	65		Cars	42	26	68		Peds C	ross:	$\mathbb{X}$
/est Peds:	0		Trucks	1		Trucks	0	1	1		South I	Peds:	1
lest Entering:	1470	F	leavys	9		Heavys	1	2	3		South I	Entering:	72
Vest Leg Total:	: 2900		Totals	75		Totals	43	29	,		South I	_eg Total	147

Comments



## Accu-Traffic Inc. Traffic Count Summary

				Iran		ount 5	umn	nary				
Intersection:	Hwy 7 &	5 Line			Count E	<sup>Date:</sup> 17-Feb-12	2 Mu	<sup>inicipality:</sup> Er	amosa			
	North Include	n Appro es Cars, Ti	ach Tot rucks, & H	<b>als</b> eavys		North/South		Sout Include	<b>h Appro</b> es Cars, T	nach Tot	t <b>als</b> eavys	
Hour Ending	Left	Thru	Right	Grand Total	Total Peds	Total Approaches	Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00 8:00:00 9:00:00 16:00:00 17:00:00 18:00:00	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 12 11 0 27 22	7:00:0 8:00:0 9:00:0 16:00:0 17:00:0	0 3 0 5 0 0 0 19	0 0 0 0 0	0 9 6 0 8	0 12 11 0 27 22	0 0 1 0 0
Totals:	0 Fast	0	0 ach Tota	0	0	72		43 Wes	0	29 ach Tota	72 als	1
	Include	es Cars, Ti	rucks, & H	eavys		East/West		Include	es Cars, T	rucks, & H	ais eavys	
Hour Ending	Left	Thru	Right	Grand Total	Total Peds	Total Approaches	Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00 8:00:00 9:00:00 16:00:00 17:00:00 18:00:00	0 5 9 0 11 7	0 185 207 1 478 516	0 0 0 0 0	0 190 216 1 489 523	0 0 0 0 0		8:00:0	0 0 0 0 0 0 0 0	0 493 420 1 247 266	13 17 0 10	0 506 437 1 257 269	0 0 0 0 0
Totals: Hours En Crossing		1387 7:00 0	0 <b>Calc</b> 8:00 3	1419 ulated V 9:00 5	0 <b>/alues f</b> 16:00 0	2889 or Traffic Cr		0 18:00	<u>1427</u> eet 18:00 16		1470	0



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

	Passenger Cars - North Approach							Tru	cks - Nor	th Appro	ach			Heav	/ys - Nort	th Approa	ach		Pedestrians		
Interval	Lei	ft	Thi	ru	Rig	ght	Le	ft	Th	ru	Rig	ght	Le	ft	Th	ru	Rig	jht	North	Cross	
Time	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	
7:45:00		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	
8:15:00		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	
8:45:00		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	
9:00:21	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	
16:15:00		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	
16:45:00		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	
17:15:00		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	
17:45:00		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		
18:15:00 18:15:18		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		U	0	0	0	0	0	0	



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

		nger Cars -	proach			Tru	icks - Eas	st Approa	ach			Hea	avys - Eas	t Approa	ch		Pedestrians			
Interval	Le	ft	Thr	u	Rig	ht	Le	ft	Th	ru	Rig	jht	Le	ft	Th	ru	Rig	jht	East 0	Cross
Time	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	C	0 0	0		0	0	0	0	C
7:15:00	1	1	31	31	0	0	0	0	-	1	0	C	) 1	1	2	2	0	0	0	
7:30:00	2	1		41	0	0	0	0		1	0	C		0		3	0	0	0	
7:45:00	2	(	-	44	0	0	0	0		1	0	C		0		2	0	0	0	
8:00:00	4		2 172	56	0	0	0	0	-	1	0	C		0		2	0	0	0	
8:15:00	5	1		46	0	0	0	0	-	2	0	C		0		5	0	0	0	
8:30:00	6	1		52	0	0	0	0		1	0	C	-	2	17	3	0	0	0	
8:45:00	7	1		44	0	0	0	0		2		C	-	0		2	0	0	0	
9:00:00	10		360	46	0	0	0	0		1	0	C		1	22	3	0	0	0	
9:00:21	10	(		0	0	0	0	0	-	0	-	C		0		0	0	0	0	
16:00:00	10	(		1	0	0	0	0		0	0	C		0		0	0	0	0	
16:15:00	13		3 479	118	0	0	0	0		1	0	C		0		2	0	0	0	
16:30:00	14	1		112	0	0	0	0		0		0		0		2	0	0	0	
16:45:00	17		3 706	115	0	0	1	1	12	1	0	0		1	29	3	0	0	0	
17:00:00		2		121	0	0	1	0		2	0	0	-	0		1	0	0	0	
17:15:00	20	1		134	0	0	1	0		1	0	0		0		0	0	0	0	
17:30:00	22	2		135	0	0	1	0		0	-	0		0		2	0	0	0	
17:45:00	23	1		129	0	0	1	0		2		0		0		1	0	0	0	
18:00:00	25	2		110 0	0	0	1	0		1	0	0		1	34	1	0	0	0	
18:15:00 18:15:18	25 25		) 1335 ) 1335	0	0	0	1	0		0	_	(	-	0		0	0	0	0	
18:15:18	25	L L	1335	0	0	0		0	18	0	0	Ĺ	0 0	0	34	0	0	0	0	Ĺ



Pedestrians

South Cross

Incr

Cum

Right

Incr

Cum

#### Count Date: 17-Feb-12 Site #: 1202400002 Heavys - South Approach Passenger Cars - South Approach Trucks - South Approach Interval Left Thru Right Left Thru Right Left Thru Time Cum Incr 7:00:00 7:15:00 7:30:00 7:45:00 8:00:00 8:15:00 8:30:00 8:45:00 9:00:00 9:00:21 16:00:00 16:15:00 16:30:00 16:45:00 17:00:00 17:15:00 17:30:00 17:45:00 18:00:00 18:15:00 18:15:18



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

Interval	Passenger Cars - West Approach								cks - We	or Abbi or			Heavys - West Approach							Pedestrians		
Interval	Let	ft	Thr	u	Rig	ht	Le	ft	Th	ru	Ri	ght	Le	eft	Th	ru	Rig	lht	West (	Cross		
Time	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr		
7:00:00	0	C		0	0	0	0	0	0	0	C	C	0 0	0	0	0	0	0	0	C		
7:15:00	0	C		114	2	2	0	0	1	1	C		0 0	0	1	1	0	0	0	0		
7:30:00	0	C		120	2	0	0	0	3		C		-	0	3	2		0	0	C		
7:45:00	0	C		126	3	1	0	0	5	2	C		-	0	6	3		0	0	C		
8:00:00	0	0		119	11	8	0	0		2	C		-	0	7	1	2	2	0	0		
8:15:00	0	0		111	15	4	0	0	12	5	C		-	0	9	2		0	0	0		
8:30:00	0	0		102	19	4	0	0	14	2	C		-	0	10	1	2	0	0	(		
8:45:00	0	0		95	22	3	0	0		1	C			0	13	3		0	0	(		
9:00:00	0	0		96	27	5	0	0		0	C			0	15	2		1	0	(		
9:00:21	0	0		0	27	0	0	0	15	0	0		-	0	15	0	-	0	0	(		
16:00:00	0	0		1 51	27 29	0	0	0	-	0	0			0	15 17	0		0	0			
16:15:00 16:30:00	0	0		51	33	2	0	0	15	0	C		-	0	21	2		0 0	0	(		
16:45:00	0	0		59 62	33	4	0	0		0	(		-	0	21	4		0	0	(		
17:00:00	0	0		62	35	2	0	0	10	1	(		-	0	23	2		0	0	(		
17:15:00	0	0		59	37	0	0	0		2	0		-	0	20	2		0	0	(		
17:30:00	0	0		65	37	0	0	0		<u> ۲</u>	0			0	31	2		0	0	(		
17:45:00	0	0		67	38	1	0	0	20	0	0			0	33	2		0	0	(		
18:00:00	0	0		61	40	2	0	0		1	C			0	36	3		0	0	(		
18:15:00	0	0		0	40	0	0	0		0	0			0	36	0		0	0	(		
18:15:18	0	0		0	40	0	0	0	21	0	C		-	0	36	0	-	0	0	(		
	•	•					Ŭ	Ū		, in the second se				, in the second se		Ŭ		Ū	•			



Accu-Tr	affic Inc.
Morning Peak Diagram	Specified Period         One Hour Peak           From:         7:00:00         From:         7:15:00           To:         9:00:00         To:         8:15:00
Municipality:EramosaSite #:1202400001Intersection:Hwy 7 & 6th LineTFR File #:3Count date:14-Feb-12	Weather conditions: Person(s) who counted:
** Non-Signalized Intersection **	Major Road: Hwy 7 runs W/E
North Leg Total: 11Heavys 303North Entering: 5Trucks 000North Peds: 0Cars 202Peds Cross: Image: 1Totals 50	Trucks 0 East Entering: 195
Heavys Trucks Cars Totals	th Line Cars Trucks Heavys Totals 0 0 1 1 181 3 10 194
Hwy 7	181 3 11
Heavys Trucks Cars Totals	– Hwy 7
2 0 3 5	s
9 9 481 499 <u>11 9 484</u>	Cars Trucks Heavys Totals 481 9 9 499
Peds Cross: X West Peds: 0	
West Entering: 504	
West Leg Total: 703	
Com	ments



Afternoon Peak DiagramSpecified Period From: 16:00:00 To: 18:00:00One Hour Peak From: 16:45:00 To: 17:45:00Municipality:Eramosa 1202400001Weather conditions:Itersections:Site #:1202400001 Intersection:Person(s) who counted:Itersections:
Site #: 1202400001
TFR File #:       3         Count date:       14-Feb-12
** Non-Signalized Intersection ** Major Road: Hwy 7 runs W/E
North Leg Total: 11 North Entering: 4 North Peds: 0 Peds Cross: $\bowtie$ Heavys 0 Trucks 0 Cars 3 Totals 3Heavys 0 0 0 4Heavys 0 Trucks 0 Cars 7 Totals 7East Leg Total: 783 East Entering: 528 East Peds: 0 Peds Cross: $X$ Heavys Trucks Cars 2Totals 31Totals 7East Peds: 0 Peds Cross: $X$ Heavys Trucks Cars 4Totals 31Totals 7Cars Fotals 7Trucks Heavys Totals S27Heavys Trucks Cars 4Totals 5Totals 252Totals 4Trucks Heavys Totals 5Totals 5Trucks Heavys Totals 254Heavys Trucks Cars 5Totals 254Totals 6Totals 6Trucks Heavys Totals 254Trucks Heavys Totals 249Trucks Heavys Totals 249
Peds Cross:       X         West Peds:       0         West Entering:       260         West Leg Total:       790    Comments



## **Total Count Diagram**

Site #:120Intersection:HwTFR File #:3	imosa )2400001 y 7 & 6th Line Feb-12		Weather cor Person(s) w		ed:
** Non-Signalized	Intersection **		Major Road:	Hwy 7 run	is W/E
North Leg Total: 35 North Entering: 17 North Peds: 0 Peds Cross: ⋈ Heavys Trucks Cars T	Heavys 4 Trucks 0 Cars 10 Totals 14	$ \begin{array}{c c} 1 & 5 \\ 0 & 0 \\ 2 & 12 \\ 3 & 6t \end{array} $	2 Tr	avys 5 rucks 0 Cars <u>13</u> rotals 18	East Leg Total: 2787 East Entering: 1364 East Peds: 0 Peds Cross: ∑ Cars Trucks Heavys Totals
33 11 1330 1	374 Hwy 7	W	E	· ·	0     1     4       320     11     29     1360       323     11     30
4 0 10 1	Totals 4 420	S	5		Cars Trucks Heavys Totals 373 14 36 1423
Peds Cross:XWest Peds:0West Entering:1434West Leg Total:2808					
		Comr	nents		



## Accu-Traffic Inc. Traffic Count Summary

				Iran		ount 5										
Intersection:	Hwy 7 &	6th Line	e		Count D	<sup>ate:</sup> 14-Feb-12	2	Munic	<sup>ipality:</sup> Era	amosa						
	North	n Appro	ach Tot	als					Sout	h Appro	ach Tot	als				
Hour Ending	Left	Thru	rucks, & H Right	eavys Grand Total	Total Peds	North/South Total Approaches	Hou Endin		Left	es Cars, T	rucks, & H	eavys Grand Total	Total Peds			
7:00:00 8:00:00 9:00:00 16:00:00 17:00:00	0 0 0 0 1	0 0 0 0	0 4 4 0 4	0 4 4 0 5	0 0 0 0	0 4 4 0 5	7:00 8:00 9:00 16:00 17:00	:00 :00 :00 :00 :00	0 0 0 0	0 0 0 0	0 0 0 0 0	0 0 0 0	0 0 0 0			
18:00:00	2	0	2	4	0	4	18:00		0	0	0	0	0			
Totals:	3 East	0 Approa	0	17			0 West	0 t Appro	0 ach Tota	0 als	0					
	Include	es Cars, Ti	rucks, & H	eavys	_	East/West			Include	es Cars, T	Trucks, & Heavys					
Hour Ending	Left	Thru	Right	Grand Total	Total Peds	Total Approaches	Hou Endin	r ng	Left	Thru	Right	Grand Total	Total Peds			
7:00:00 8:00:00 9:00:00 16:00:00 17:00:00 18:00:00		0 181 186 1 476 515	0 1 0 2 1	0 182 186 1 478 516	0 0 0 0 0	2 694 602 4 732 763	8:00 9:00 16:00	:00 :00 :00 :00	0 3 2 1 3 5	2 509 414 251 242	0 0 0 0 0	2 512 416 3 254 247	00000			
Totals: Hours En	0 ding:	1359	4 <b>Caic</b> 8:00	<u>1363</u> ulated V 9:00	0 <b>/alues f</b> 16:00	2797 or Traffic Cr	ossing	-	14 ajor Stre 18:00	<u>1420</u> <b>Set</b> 18:00	0	1434	0			
Hours En Crossing		7:00 0	8:00 0	9:00 0	16:00 0		17	:00 1	18:00 2	18:00 2	18:00 2					



		Passeng	er Cars -	North Ap	oproach			Tru	cks - Nortl	h Appro	ach			Hea	vys - Norl	h Approa	ach		Pedes	trians
Interval	Lef	t	Th	ru	Rig	ht	Le	ft	Thr	u	Rig	jht	Le	eft	Th	ru	Rig	lht	North	Cross
Time	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	1	1	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	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		1	0	0
8:30:00	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	0		0	0	0
8:45:00	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0		0	0	0
9:00:00	0	0	0	0	5	0	0	0		0	0	0		0	0	0		0	0	0
9:00:09	0	0	0	0	5	0	0	0		0	0	0	0	0	0	0		0	0	0
15:45:00	0	0	0	0	5	0	0	0		0	0	0		0	0	0		0	0	0
16:00:00	0	0	0	0	5	0	0	0		0	0	0	0	0	0	0		0	0	0
16:15:00	0	0	0	0	5	0	0	0		0	0	0		1	0	0		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	0	0		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	1	0	0	0	4	0	0	0
17:30:00	0	0	0	0	10	0	0	0		0	0	0		0	0	0		0	0	0
17:45:00	1	1	0	0	10	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	0	0		0	0	0
18:15:00	2	0	0	0	10	0	0	0		0	0	0		0	0	0		0	0	0
18:15:26	2	0	0	0	10	0	0	0		0	0	0		0	0	0		0	0	0



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

		Passen	ger Cars -	East Ap	proach			Tru	ıcks - Eas	st Approa	ach			Hea	vys - Eas	t Approa	ch		Pedes	trians
Interval	Le	ft	Thr	u	Right		Le	ft	Th	ru	Rig	ht	Le	ft	Thru		Right		East Cross	
Time	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	0
7:15:00	0	0	28	28	0	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	0	2	1	0	0	0	0
7:45:00	0	0	120	52	0	0	0	0	3	2	0	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	8	3	1	0	0	0 0
8:15:00	0	0	209	39	0	0	0	0	3	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	13	2	1	0	0	0
8:45:00	0	0	299	42	0	0	0	0	5	1	0	0	-	0	13	0	1	0	0	0 0
9:00:00	0	0	347	48	0	0	0	0	5	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	15	0	1	0	0	0
15:45:00	0	0	347	0	0	0	0	0	5	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	15	0	1	0	0	0
16:15:00	0	0	472	124	0	0	0	0	5	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	21	3	1	0	0	0
16:45:00	0	0	692	113	2	1	0	0	7	1	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	27	2	1	0	0	0 0
17:15:00	0	0	936	127	3	1	0	0	9	1	0	0		0	27	0	1	0	0	0
17:30:00	0	0	1083	147	3	0	0	0	11	2		0		0	27	0	1	0	0	0
17:45:00	0	0	1213	130	3	0	0	0	11	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	29	2	1	0	0	0
18:15:00	0	0	1320	1	3	0	0	0	11	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	0	29	0	1	0	0	0



|--|

							Tru	cks - Sou	th Appro	bach		Heavys - South Approach							Pedestrians		
Interval	L	eft	Th	ru	Rig	ght	Le	eft	Th	ru	Rig	ght	Le	ft	Th	ru	Rig	jht	South	Cross	
Time	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	
7:00:00	C	) (	0	0	0	0	0	0	0	0	0	C	0 0	0	0	0	0	0	0	0	
7:15:00	C	) (	0	0	0	0	0	0	0	0	0	C	0 0	0	0	0	0	0	0	0	
7:30:00	C	) (	0	0	0	0	0	0	0	0	0	C	0 0	0	0	0	0	0	0	0	
7:45:00	C	) (	-	0		0	0	0	0	0	-			0	0	-	0	0	0	0	
8:00:00	C		-	0		0	0	0	-	0	-			0	0		0	0	0	0	
8:15:00	C			0	-	0	0	0	-	0	-		-	0	0	-	0	0	0	0	
8:30:00	C		-	0		0	0	0	-	0	-		-	0	0	-	0	0	0	0 0	
8:45:00	C			0		0	0	0	-	0	-		-	0	0		0	0	0	0	
9:00:00	C		-	0	-	0	0	0	•	0	•		-	0	0	-	0	0	0	0	
9:00:09	C		-	0	-	0	0	0	-	0	-			0	0	-	0	0	0	0	
15:45:00	C		-	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	
16:15:00	C		_	0		0	0	0		0	-			0	0		0	0	0	0	
16:30:00	C		-	0		0	0	0	-	0	-		-	0	0		0	0	0	0	
16:45:00	C		-	0		0	0	0	-	0	-		-	0	0	-	0	0	0	0 0	
17:00:00	C		-	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	
17:30:00	C		-	0		0	0	0	-	0	-		-	0	0	-	0	0	0	0 0	
17:45:00	C		-	0		0	0	0	-	0	-		-	0	0		0	0	0	0	
18:00:00	C		-	0		0	0	0	-	0	-			0	0		0	0	0	0	
18:15:00	C		-	0		0	0	0		0	-			0	0		0	0	0	0	
18:15:26	C	) (	0 0	0	0	0	0	0	0	0	0	C	0 0	0	0	0	0	0	0	0	



## Accu-Traffic Inc.

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

		Passeng	ger Cars -	West Ap	proach			Tru	ıcks - We	st Approa	ach			Hear	vys - Wes	st Approa	ach		Pedes	trians
Interval	Lei	ft	Thi	ru	Rig	jht	Le	ft	Th	ru	Rig	ght	Le	ft	Th	ru	Rig	ht	West (	Cross
Time	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	C	0 0	0	0	0	0	0	0	0
7:15:00	0	0	121	119	0	0	0	0	2	2	0	C	0 0	0	2	2	0	0	0	0
7:30:00	0	0	231	110	0		0	0	3	1	0	C	0 0	0	4	2	0	0	0	0
7:45:00	0	0	371	140	0		0	0		1	0	C	-	0	6	2	0	0	0	0 0
8:00:00	2	2	494	123	0	0	0	0		3	0	C		1	10	4	0	0	0	0
8:15:00	3	1	602	108	0	0	0	0		4	0	C		1	11	1	0	0	0	0
8:30:00	3	0	697	95	0		0	0		0	0	C		0	13	2	0	0	0	0 0
8:45:00	3	0	785	88	0		0	0		0	0	C		0	17	4	0	0	0	0
9:00:00	3	0	894	109	0	0	0	0			0	C		0	19	2	0	0	0	0
9:00:09	3	0	895	1	0	0	0	0		0		C		0	19	0	0	0	0	0 0
15:45:00	3	0	895	0	0	0	0	0			0	C		0	19	0	0	0	0	0
16:00:00	3	0	896	1	0	0	0	0			0	C		1	19	0	0	0	0	0
16:15:00	3	0	944	48	0	0	0	0			0	C		1	22	3	0	0	0	0
16:30:00	4	1	1008	64	0		0	0		0	0	C		0	25	3	0	0	0	0
16:45:00	4	0	1066	58	0	0	0	0	-	1	0	0		0	28	3	0	0	0	0
17:00:00	5	1	1132	66	0	0	0	0		1	0	C		0	32	4	0	0	0	0
17:15:00	7	2	1189	57	0	0	0	0		0	0	C		0	32	0	0	0	0	0
17:30:00	10	3	1250	61	0		0	0		0	0	C		0	32	0	0	0	0	0 0
17:45:00	10	0	1314	64	0		0	0		0	0	0		0	33	1	0	0	0	0
18:00:00	10	0	1371	57	0		0	0		0	0	C		0	35	2	0	0	0	0
18:15:00	10	0	1371	0	0		0	0		0	0	0		0	35	0	0	0	0	0
18:15:26	10	0	1371	0	0	0	0	0	14	0	0	C	0 4	0	35	0	0	0	0	0

## APPENDIX B Existing Traffic

	≯	+	+	×	1	~	
Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		ર્સ	¢Î,		¥		
Sign Control		Free	Free		Stop		
Grade		0%	0%		0%		
Volume (veh/h)	5	678	275	1	0	5	
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		
Median storage veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	317				1107	317	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	317				1107	317	
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	607	
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	607				
Volume to Capacity	0.01	0.19	0.01				
Queue Length 95th (m)	0.1	0.0	0.3				
Control Delay (s)	0.1	0.0	11.0				
Lane LOS	A	0.0	B				
Approach Delay (s)	0.1	0.0	11.0				
Approach LOS	5	0.0	B				
Intersection Summary							
Average Delay			0.2				
Intersection Capacity Ut	ilizatior	<u>ו</u>	51.9%	10	CU Leve	el of Service	
Analysis Period (min)		-	15			0.001100	
			10				

	-	$\rightarrow$	∢	-	1	1			
Movement	EBT	EBR	WBL	WBT	NBL	NBR			
Lane Configurations	4Î			ę	Y				
Sign Control	Free			Free	Stop				
Grade	0%			0%	0%				
Volume (veh/h)	658	15	4	271	4	6			
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				
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume			724		1016	716			
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol			724		1016	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	296	11						
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	15.8						
Lane LOS	0.0	A	C						
Approach Delay (s)	0.0	0.2	15.8						
Approach LOS			С						
Intersection Summary									
Average Delay			0.2						
Intersection Capacity Ut	ilizatior	1	47.5%	](	CU Leve	el of Servic	)	А	
Analysis Period (min)			15						
			-						

Movement         WBL         WBR         NBT         NBR         SBL         SBT           Lane Configurations         Y         Pree         Free         Free         Grade         0%		4	•	1	1	1	Ļ		
Sign Control         Stop         Free         Free           Grade         0% <th>Movement</th> <th>WBL</th> <th>WBR</th> <th>NBT</th> <th>NBR</th> <th>SBL</th> <th>SBT</th> <th></th> <th></th>	Movement	WBL	WBR	NBT	NBR	SBL	SBT		
Sign Control         Stop         Free         Free           Grade         0%         0%         0%           Volume (veh/h)         0         0         6         0         0           Peak Hour Factor         0.65         0.65         0.65         0.65         0.65           Hourly flow rate (vph)         0         0         9         0         0         8           Peak Hour Factor         0.65         0.65         0.65         0.65         0.65           Hourly flow rate (vph)         0         0         9         0         0         8           Pedestrians                  Walking Speed (m/s)                  Percent Blockage         Right turn flare (veh)         Median type         None               Wedian type         None           9 <td>Lane Configurations</td> <td>¥</td> <td></td> <td>ĥ</td> <td></td> <td></td> <td>થ</td> <td></td> <td></td>	Lane Configurations	¥		ĥ			થ		
Grade         0%         0%         0%           Volume (veh/h)         0         0         6         0         0         5           Peak Hour Factor         0.65         0.65         0.65         0.65         0.65           Hourly flow rate (vph)         0         0         9         0         0         8           Pedestrians         Lane Width (m)         Valking Speed (m/s)         Valking Speed (m/s)         Valking Speed (m/s)         Valking Speed (m/s)           Percent Blockage         Right turn flare (veh)         Valking Speed (m/s)         Valking Speed (m/s)         Valking Speed (m/s)           Median storage veh)         Upstream Signal (m)         VS. conflicting volume         Valking Speed (m/s)         Valking Speed (m/s)           pX, platoon unblocked         VC. unblocked vol         17         9         9         Valking Speed (m/s)           VC1, stage 1 conf vol         VC2, stage 2 conf vol         Valking Speed (m/s)         S         3.3         2.2           Vp oue free %         100         100         100         100         100         2.2           Valume Total         0         9         8         Valume S         Valume S         Valume S         Valume S         Valume S         Valum	-	Stop							
Peak Hour Factor       0.65       0.65       0.65       0.65       0.65         Hourly flow rate (vph)       0       0       9       0       0       8         Pedestrians				0%			0%		
Hourly flow rate (vph)       0       0       9       0       0       8         Pedestrians	Volume (veh/h)	0	0	6	0	0	5		
Pedestrians         Lane Width (m)         Walking Speed (m/s)         Percent Blockage         Right turn flare (veh)         Median type       None         Median type aignal (m)         pX, platoon unblocked         vC, conflicting volume         vC, conflicting volume         vC, stage 1 conf vol         vC1, stage 1 conf vol         vC2, stage 2 conf vol         vC1, stage 1 conf vol         vC2, stage 2 conf vol         vC1, stage 1 conf vol         vC2, stage 2 conf vol         vC1, stage 1 conf vol         vC1, stage 1 conf vol         vC2, stage 2 conf vol         vC1, stage 1 conf vol         vC2, stage 2 conf vol         vC2, stage 2 conf vol         vC1, stage 1 conf vol         vOume Total       0         volume Right       0	Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65		
Lane Width (m)         Walking Speed (m/s)         Percent Blockage         Right turn flare (veh)         Median storage veh)         Upstream signal (m)         pX, platoon unblocked         vC, conflicting volume       17         vC, stage 1 conf vol         vCL, stage 2 conf vol         vCL, stage 2 conf vol         vCL, stage 2 conf vol         vCL, stage 1 conf vol         vCL, stage 2 conf vol         vCL, stage 3         ft (s)       6.4         rt (s)       3.5         p0 queue free %       100         p0 queue free %       100         ibrection, Lane #       WB 1         VB 1       SB 1         Volume Total       0         0       0         Volume Right       0         0       0         Volume Right       0         0       0         Volume Cospacity       0.0         Control Delay (s)       0.0         0       0         Volume Left       0         0       0         Volume Kight       0         0       0.0         Control Delay	Hourly flow rate (vph)	0	0	9	0	0	8		
Walking Speed (m/s)         Percent Blockage         Right turn flare (veh)         Median storage veh)         Upstream signal (m)         pX, platoon unblocked         vC, conflicting volume 17       9         vC1, stage 1 conf vol         vC2, stage 2 conf vol         vC4, stage 1 conf vol         vC2, stage 2 conf vol         vC4, stage 1 conf vol         vC2, stage 2 conf vol         vC4, unblocked vol         vC4, stage 1 conf vol         vC4, stage 1 conf vol         vC4, stage 1 conf vol         vC4, stage 2 conf vol         vC4, unblocked vol         vC4, stage (s)         tF (s)       3.5         90 queue free %       100         p10 queue free %       100         cm capacity (veh/h)       1001         tG72       1611         Direction, Lane #       WB 1       SB 1         Volume Total       0       9         Volume Right       0       0         Volume Right       0       0         Volume Loft       0       0.0         Volume Right       0.0       0.0         Queue Length 95th (m)       0.0       0.0 <td>Pedestrians</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Pedestrians								
Percent Biockage         Right turn flare (veh)         Median type       None         Median type       None         Median storage veh)       Upstream signal (m)         pX, platoon unblocked       vC, conflicting volume         vC, conflicting volume       17       9       9         vCl, stage 1 conf vol       vC, conflicting volume       17       9       9         vCL, stage 2 conf vol       vCu, unblocked vol       17       9       9         vCL, stage 2 conf vol       vCu, unblocked vol       17       9       9         vCL, stage 2 conf vol       vCu, unblocked vol       17       9       9         vCL, stage 2 conf vol       vCu, unblocked vol       17       9       9         vCL, stage 2 conf vol       vC, stage 2 conf vol       vCu, unblocked vol       17       9       9         vCL, stage (s)       if (s)       6.2       4.1       tC, stage (s)       if (s)       4.1         tC, Stage (s)       if (s)       3.5       3.3       2.2       p0       pouloe free %       100       100       100       100       100       100       100       100       100       100       100       100       10       100	Lane Width (m)								
Right turn flare (veh)       Median type       None         Median storage veh)       Velocation unblocked       Velocation unblocked         pX, platoon unblocked       VC, conflicting volume       17       9       9         vC1, stage 1 conf vol       VC2, stage 2 conf vol       Velocation unblocked vol       17       9       9         vC2, stage 2 conf vol       Velocation unblocked vol       17       9       9       9         vC2, stage 2 conf vol       Velocation unblocked vol       17       9       9       9         vC2, stage 2 conf vol       Velocation unblocked vol       17       9       9       9         vC2, stage 2 conf vol       Velocation unblocked vol       17       9       9       9         vC1, stage 1 conf vol       0       17       9       9       9         vC2, stage 2 conf vol       Velocation unblocked vol       17       9       9         vC1, stage 2 conf vol       0       100       100       100         vC2, stage 2 conf vol       Velocation unblocked vol       100       100       100         vC3 stage 2 conf vol       0       100       100       100       100         veloue free %       100       100       100 <td>Walking Speed (m/s)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Walking Speed (m/s)								
Median storage veh)         None           Upstream signal (m)	Percent Blockage								
Median storage veh)       Upstream signal (m)         pX, platoon unblocked       vC, conflicting volume       17       9       9         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC4, unblocked vol       17       9       9         vC2, stage 2 conf vol       vC4, unblocked vol       17       9       9       9         vC4, stage 1 conf vol       vC4, unblocked vol       17       9       9       9         tC, single (s)       6.4       6.2       4.1       10       10       100         tC, stage (s)       tF (s)       3.5       3.3       2.2       p0 queue free %       100       100       100         cM capacity (veh/h)       1001       1072       1611       100       100       100         Direction, Lane #       WB 1       NB 1       SB 1       100       <	Right turn flare (veh)								
Upstream signal (m)       pX, platoon unblocked         vC, conflicting volume       17       9       9         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol         vCu, unblocked vol       17       9       9         tC, single (s)       6.4       6.2       4.1         tC, single (s)       6.4       6.2       4.1         tC, single (s)       6.4       6.2       4.1         tC, stage (s)       T       9       9         tF (s)       3.5       3.3       2.2         p0 queue free %       100       100       100         cM capacity (veh/h)       1001       1072       1611         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       0       9       8         Volume Left       0       0       0         cSH       1700       1611       Volume Capacity       0.0         Queue Length 95th (m)       0.0       0.0       0.0       0.0         Queue Length 95th (m)       0.0       0.0       0.0       0.0         Lane LOS       A       A       A       A         Approach LOS       A	Median type	None							
pX, platoon unblocked         vC, conflicting volume       17       9       9         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol         vCu, unblocked vol       17       9       9         tC, single (s)       6.4       6.2       4.1         tC, 2 stage (s)       tr       100       100         tF (s)       3.5       3.3       2.2         p0 queue free %       100       100       100         cM capacity (veh/h)       1001       1072       1611         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       0       9       8         Volume Right       0       0       0         Volume Right       0       0       0         Volume to Capacity       0.00       0.0       0.0         Control Delay (s)       0.0       0.0       0.0         Control Delay (s)       0.0       0.0       0.0         Lane LOS       A       Approach LOS       A         Approach LOS       A       A       Approach LOS       A         Intersection Capacity Utilization       6.7%       ICU Level of Service       A </td <td>Median storage veh)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Median storage veh)								
vC, conflicting volume       17       9       9         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC4, unblocked vol       17       9       9         vCu, unblocked vol       17       9       9       9       0       0       0         tC, single (s)       6.4       6.2       4.1       0       10       100       100       0	Upstream signal (m)								
vC1, stage 1 conf vol       vC2, stage 2 conf vol         vCu, unblocked vol       17       9       9         tC, single (s)       6.4       6.2       4.1         tC, 2 stage (s)       t       t       t         tF (s)       3.5       3.3       2.2       p0 queue free %       100       100         cM capacity (veh/h)       1001       1072       1611       1611       1611       1611         Direction, Lane #       WB 1       NB 1       SB 1       Volume Total       0       9       8         Volume Total       0       9       8       1611       1611       1700       1611         Volume Left       0       0       0       0       0       0       1611         Volume Right       0       0       0       0       0       1700       1611         Volume to Capacity       0.00       0.01       0.00       0.0       0.0       1611       1700       1611       1700       1611       1700       1611       1700       1611       1700       1611       1700       1611       1700       1611       1700       1611       1700       1611       1700       1611       1700 <td>pX, platoon unblocked</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	pX, platoon unblocked								
vC2, stage 2 conf vol       vCu, unblocked vol       17       9       9         tC, single (s)       6.4       6.2       4.1         tC, 2 stage (s)       ref       7       9         tF (s)       3.5       3.3       2.2         p0 queue free %       100       100       100         cM capacity (veh/h)       1001       1072       1611         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       0       9       8         Volume Left       0       0       0         Volume Right       0       0       0         Volume to Capacity       0.00       0.01       0.00         Queue Length 95th (m)       0.0       0.0       0.0         Lane LOS       A       Approach Delay (s)       0.0       0.0         Approach LOS       A       Approach LOS       A         Average Delay       0.0       0.0       0.0         Intersection Capacity Utilization       6.7%       ICU Level of Service       A	vC, conflicting volume	17	9			9			
vCu, unblocked vol       17       9       9         tC, single (s)       6.4       6.2       4.1         tC, 2 stage (s)       t       100       100         tF (s)       3.5       3.3       2.2         p0 queue free %       100       100       100         cM capacity (veh/h)       1001       1072       1611         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       0       9       8         Volume Right       0       0       0         vSH       1700       1611       1611         Volume to Capacity       0.0       0       0         Queue Length 95th (m)       0.0       0.0       0         Queue Length 95th (m)       0.0       0.0       0.0         Lane LOS       A       A       Approach Delay (s)       0.0       0.0         Approach LOS       A       A       A       A       A         Intersection Summary       0.0       0.0       0.0       A         Intersection Capacity Utilization       6.7%       ICU Level of Service       A	vC1, stage 1 conf vol								
tC, single (s)       6.4       6.2       4.1         tC, 2 stage (s)	vC2, stage 2 conf vol								
tC, 2 stage (s)         tF (s)       3.5       3.3       2.2         p0 queue free %       100       100       100         cM capacity (veh/h)       1001       1072       1611         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       0       9       8         Volume Left       0       0       0         Volume Right       0       0       0         Volume to Capacity       0.00       0.01       0.00         Queue Length 95th (m)       0.0       0.0       0.0         Queue Length 95th (m)       0.0       0.0       0.0         Lane LOS       A       Approach Delay (s)       0.0       0.0         Approach LOS       A       Approach LOS       A         Average Delay       0.0       0.0       ICU Level of Service       A	vCu, unblocked vol	17	9			9			
tF (s)       3.5       3.3       2.2         p0 queue free %       100       100       100         cM capacity (veh/h)       1001       1072       1611         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       0       9       8         Volume Left       0       0       0         Volume Right       0       0       0         Volume to Capacity       0.00       0.01       0.00         Queue Length 95th (m)       0.0       0.0       0.0         Queue Length 95th (m)       0.0       0.0       0.0         Lane LOS       A       Approach Delay (s)       0.0       0.0         Approach LOS       A       A       Approach LOS       A         Intersection Summary       0.0       0.0       ICU Level of Service       A	tC, single (s)	6.4	6.2			4.1			
p0 queue free %       100       100       100         cM capacity (veh/h)       1001       1072       1611         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       0       9       8         Volume Left       0       0       0         Volume Right       0       0       0         CSH       1700       1611         Volume to Capacity       0.00       0.0         Queue Length 95th (m)       0.0       0.0         Queue Length 95th (m)       0.0       0.0         Lane LOS       A         Approach Delay (s)       0.0       0.0         Approach LOS       A         Intersection Summary       0.0         Average Delay       0.0         Intersection Capacity Utilization       6.7%	tC, 2 stage (s)								
cM capacity (veh/h)       1001       1072       1611         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       0       9       8         Volume Left       0       0       0         Volume Right       0       0       0         CSH       1700       1700       1611         Volume to Capacity       0.00       0.01       0.00         Queue Length 95th (m)       0.0       0.0       0.0         Control Delay (s)       0.0       0.0       0.0         Lane LOS       A       Approach Delay (s)       0.0       0.0         Approach LOS       A       Approach LOS       A       A         Average Delay       0.0       0.0       10.0       10.0         Intersection Capacity Utilization       6.7%       ICU Level of Service       A	tF (s)	3.5	3.3			2.2			
Direction, Lane #         WB 1         NB 1         SB 1           Volume Total         0         9         8           Volume Left         0         0         0           Volume Right         0         0         0           CSH         1700         1611         0           Volume to Capacity         0.00         0.00         0.00           Queue Length 95th (m)         0.0         0.0         0.0           Control Delay (s)         0.0         0.0         0.0           Lane LOS         A         Approach Delay (s)         0.0         0.0           Approach LOS         A         Approach LOS         A         Approach LOS         A           Average Delay         0.0         0.0         0.0         0.0         0.0	p0 queue free %	100	100			100			
Volume Total         0         9         8           Volume Left         0         0         0           Volume Right         0         0         0           CSH         1700         1611           Volume to Capacity         0.00         0.01           Queue Length 95th (m)         0.0         0.0           Control Delay (s)         0.0         0.0           Lane LOS         A           Approach Delay (s)         0.0         0.0           Intersection Summary         0.0           Average Delay         0.0           Intersection Capacity Utilization         6.7%	cM capacity (veh/h)	1001	1072			1611			
Volume Left       0       0       0         Volume Right       0       0       0         cSH       1700       1700       1611         Volume to Capacity       0.00       0.01       0.00         Queue Length 95th (m)       0.0       0.0       0.0         Control Delay (s)       0.0       0.0       0.0         Lane LOS       A       Approach Delay (s)       0.0       0.0         Approach LOS       A       A       Approach LOS       A         Intersection Summary       0.0       0.0       ICU Level of Service       A	Direction, Lane #	WB 1	NB 1	SB 1					
Volume Right         0         0         0           cSH         1700         1700         1611           Volume to Capacity         0.00         0.01         0.00           Queue Length 95th (m)         0.0         0.0         0.0           Control Delay (s)         0.0         0.0         0.0           Lane LOS         A         Approach Delay (s)         0.0         0.0           Approach LOS         A         A         Approach LOS         A           Intersection Summary         0.0         0.0         ICU Level of Service         A	Volume Total	0	9	8					
cSH       1700       1700       1611         Volume to Capacity       0.00       0.01       0.00         Queue Length 95th (m)       0.0       0.0       0.0         Control Delay (s)       0.0       0.0       0.0         Lane LOS       A	Volume Left	0	0	0					
Volume to Capacity         0.00         0.01         0.00           Queue Length 95th (m)         0.0         0.0         0.0           Control Delay (s)         0.0         0.0         0.0           Lane LOS         A	Volume Right	0	0	0					
Queue Length 95th (m)         0.0         0.0         0.0           Control Delay (s)         0.0         0.0         0.0           Lane LOS         A         A           Approach Delay (s)         0.0         0.0         0.0           Approach LOS         A         A           Intersection Summary         0.0         0.0           Average Delay         0.0         0.0           Intersection Capacity Utilization         6.7%         ICU Level of Service         A		1700	1700						
Control Delay (s)       0.0       0.0       0.0         Lane LOS       A       A         Approach Delay (s)       0.0       0.0         Approach LOS       A         Intersection Summary       0.0         Average Delay       0.0         Intersection Capacity Utilization       6.7%       ICU Level of Service	Volume to Capacity	0.00	0.01	0.00					
Control Delay (s)       0.0       0.0       0.0         Lane LOS       A       A         Approach Delay (s)       0.0       0.0         Approach LOS       A         Intersection Summary       0.0         Average Delay       0.0         Intersection Capacity Utilization       6.7%       ICU Level of Service	Queue Length 95th (m)	0.0	0.0	0.0					
Approach Delay (s)       0.0       0.0       0.0         Approach LOS       A       Intersection Summary         Average Delay       0.0         Intersection Capacity Utilization       6.7%       ICU Level of Service			0.0	0.0					
Approach LOS     A       Intersection Summary       Average Delay       0.0       Intersection Capacity Utilization       6.7%       ICU Level of Service		А							
Intersection Summary Average Delay 0.0 Intersection Capacity Utilization 6.7% ICU Level of Service A	Approach Delay (s)	0.0	0.0	0.0					
Average Delay     0.0       Intersection Capacity Utilization     6.7%       ICU Level of Service     A	Approach LOS	А							
Intersection Capacity Utilization 6.7% ICU Level of Service A	Intersection Summary							 	
	Average Delay			0.0					
	Intersection Capacity U	tilization	n	6.7%	10	CU Leve	el of Service	А	
				15					

	٦	-	+	•	1	1		
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		ę	ĥ		- M			
Sign Control		Free	Free		Stop			
Grade		0%	0%		0%			
Volume (veh/h)	6	358	726	1	1	3		
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			
Median storage veh)								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume	782				1179	781		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	782				1179	781		
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	326					
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	16.3					
Lane LOS	A		С					
Approach Delay (s)	0.2	0.0	16.3					
Approach LOS			С					
Intersection Summary								
Average Delay			0.2					
Intersection Capacity Ut	ilizatior	1	50.4%	](	CU Leve	el of Servio	e	А
Analysis Period (min)			15					
			-					

	-	$\mathbf{r}$	<	+	1	1		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	4			<del>با</del>	Y			
Sign Control	Free			Free	Stop			
Grade	0%			0%	0%			
Volume (veh/h)	355	3	6	702	19	10		
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			
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 %			99		92	98		
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	303					
Volume to Capacity	0.22	0.01	0.10					
Queue Length 95th (m)	0.0	0.1	2.5					
Control Delay (s)	0.0	0.1	18.2					
Lane LOS		А	С					
Approach Delay (s)	0.0	0.1	18.2					
Approach LOS			С					
Intersection Summary								
Average Delay			0.6					
Intersection Capacity Ut	ilizatior	า	54.0%	](	CU Leve	el of Servi	ice	;
Analysis Period (min)			15					
· · · · · · · · · · · · · · · · · · ·								

	4	•	Ť	۲	1	Ļ
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	¥		ĥ			ę
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	0	7	0	0	4
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60
Hourly flow rate (vph)	0	0	12	0	0	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	18	12			12	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	18	12			12	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	999	1069			1607	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	12	7			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1607			
Volume to Capacity	0.00	0.01	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	Α					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	А					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Ut	tilization	1	6.7%	IC	CU Leve	el of Servi
Analysis Period (min)			15			

APPENDIX C Erin Gravel Pit Truck Trip Generation

TOTAL	158	62	145	114	123	71	100	96	122	22	162	119	162	174	122	170	94	128	152	131	135	159	105	2826	100%	
6PM																										
5PM																-								-	0.0%	
4PM	2	-	N	0	-	-	0	N	2	0	-	-	5	0	0	4	9	8	-	7	7	N	-	58	2.1%	
3PM	16	9	13	10	12	-	10	ო	8	0	18	13	17	19	15	16	5	12	<b>б</b>	12	1	20	8	254	9.0%	
2PM	8	6	21	6	16	ъ	10	ъ	1	0	17	10	14	15	12	19	=	12	14	12	14	ი	7	260	9.2%	
1PM	19	ъ	15	1	11	ъ	8	10	8	0	13	16	16	19	=	17	2	21	10	1	12	18	=	272	9.6%	
12PM	15	7	18	16	21	7	12	11	16	0	21	14	15	18	18	22	15	10	20	17	13	15	10	331	11.7%	
11AM	15	4	11	8	ъ	4	7	<b>б</b>	7	ო	13	9	15	16	2	8	4	16	14	8	13	17	=	219	7.7%	
10AM	19	5	15	12	15	5	16	13	19	N	20	23	21	1	10	21	10	7	23	14	14	21	=	327	11.6%	bur
9AM	1	5	15	16	6	6	7	17	12	4	16	8	12	17	14	12	6	6	13	1	13	12	10	261	9.2%	ed in one ho
8AM	19	7	11	12	11	12	12	7	13	S	23	10	18	53	16	21	=	14	19	18	12	19	16	328	11.6%	23 Trucks Shipped in one hour 0.814%
7AM	20	4	13	1	ø	13	12	14	14	N	7	ω	13	15	13	12	6	11	11	<b>б</b>	1	11	2	246	8.7%	23 Tr 23/2826
6AM	13	6	1	6	1	80	9	5	12	9	12	10	16	20	11	12	6	8	18	12	15	15	15	263	9.3%	
DATE	02-Aug	03-Aug	04-Aug	05-Aug	08-Aug	09-Aug	10-Aug	11-Aug	12-Aug	13-Aug	15-Aug	16-Aug	17-Aug	18-Aug	19-Aug	22-Aug	23-Aug	24-Aug	25-Aug	26-Aug	29-Aug	30-Aug	31-Aug	TOTAL	%	Busiest Hour % of Monthly Shipping

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

## 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		
Total		

# APPENDIX D Existing Plus Site Related Traffic

	≯	+	Ļ	×	1	~		
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		ę	ĥ		Y			
Sign Control		Free	Free		Stop			
Grade		0%	0%		0%			
Volume (veh/h)	6	678	275	13	12	6		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.65	0.65		
Hourly flow rate (vph)	7	779	316	15	18	9		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type					None			
Median storage veh)								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume	331				1117	324		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	331				1117	324		
tC, single (s)	4.6				7.4	6.9		
tC, 2 stage (s)								
tF (s)	2.7				4.4	3.9		
p0 queue free %	99				88	98		
cM capacity (veh/h)	1003				150	590		
Direction, Lane #	EB 1	WB 1	SB 1					
Volume Total	786	331	28					
Volume Left	7	0	18					
Volume Right	0	15	9					
cSH	1003	1700	200					
Volume to Capacity	0.01	0.19	0.14					
Queue Length 95th (m)	0.2	0.0	3.6					
Control Delay (s)	0.2	0.0	25.9					
Lane LOS	A		D					
Approach Delay (s)	0.2	0.0	25.9					
Approach LOS			D					
Intersection Summary								
Average Delay			0.8					
Intersection Capacity Ut	ilizatior	1 I	52.7%	IC	CU Leve	el of Servio	e /	A
Analysis Period (min)			15					

	-	$\rightarrow$	4	+	1	1		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	4Î			ę	W.			
Sign Control	Free			Free	Stop			
Grade	0%			0%	0%			
Volume (veh/h)	670	15	4	283	4	6		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Hourly flow rate (vph)	720	16	4	304	4	6		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type					None			
Median storage veh)								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume			737		1041	728		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol			737		1041	728		
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	98		
cM capacity (veh/h)			878		256	426		
Direction, Lane #	EB 1	WB 1	NB 1					
Volume Total	737	309	11				 	
Volume Left	0	4	4					
Volume Right	16	0	6					
cSH	1700	878	336					
Volume to Capacity	0.43	0.00	0.03					
Queue Length 95th (m)	0.0	0.1	0.8					
Control Delay (s)	0.0	0.2	16.1					
Lane LOS		A	С					
Approach Delay (s)	0.0	0.2	16.1					
Approach LOS			С					
Intersection Summary								
Average Delay			0.2					
Intersection Capacity Ut	ilization	1	48.2%	10	CULeve	el of Service	А	
Analysis Period (min)	•	15						
			10					

	4	•	1	۲	1	Ļ			
Movement	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations	¥		4Î			ę			
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Volume (veh/h)	13	0	6	13	0	5			
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65			
Hourly flow rate (vph)	20	0	9	20	0	8			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type	None								
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume	27	19			29				
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	27	19			29				
tC, single (s)	7.4	6.2			4.1				
tC, 2 stage (s)									
tF (s)	4.4	3.3			2.2				
p0 queue free %	97	100			100				
cM capacity (veh/h)	787	1059			1584				
Direction, Lane #	WB 1	NB 1	SB 1						
Volume Total	20	29	8						
Volume Left	20	0	0						
Volume Right	0	20	0						
cSH	787	1700	1584						
Volume to Capacity	0.03	0.02	0.00						
Queue Length 95th (m)	0.6	0.0	0.0						
Control Delay (s)	9.7	0.0	0.0						
Lane LOS	А								
Approach Delay (s)	9.7	0.0	0.0						
Approach LOS	А								
Intersection Summary									
Average Delay			3.4						
Intersection Capacity U	tilizatior	n –	13.3%	IC	CU Leve	el of Servic	e	А	
Analysis Period (min)			15						

	≯	+	Ļ	•	1	~	
Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		÷٩	el el		Y		
Sign Control		Free	Free		Stop		
Grade		0%	0%		0%		
Volume (veh/h)	7	358	726	13	13	4	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.60	0.60	
Hourly flow rate (vph)	8	385	781	14	22	7	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type					None		
Median storage veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	795				1188	788	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	795				1188	788	
tC, single (s)	4.2				7.3	6.5	
tC, 2 stage (s)							
tF (s)	2.3				4.3	3.5	
p0 queue free %	99				84	98	
cM capacity (veh/h)	776				138	357	
Direction, Lane #	EB 1	WB 1	SB 1				
Volume Total	392	795	28				
Volume Left	8	0	22				
Volume Right	0	14	7				
cSH	776	1700	162				
Volume to Capacity	0.01	0.47	0.18				
Queue Length 95th (m)	0.2	0.0	4.7				
Control Delay (s)	0.3	0.0	32.0				
Lane LOS	A		D				
Approach Delay (s)	0.3	0.0	32.0				
Approach LOS			D				
Intersection Summary							
Average Delay			0.8				
Intersection Capacity Ut	ilizatior	۱	51.2%	10	CU Leve	el of Servi	ce A
Analysis Period (min)			15				

	-	$\mathbf{r}$	4	-	1	1	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	4Î			ę	¥		
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	367	3	6	714	19	10	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	
Hourly flow rate (vph)	378	3	6	736	20	10	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type					None		
Median storage veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume			381		1128	380	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			381		1128	380	
tC, single (s)			4.1		6.4	6.2	
tC, 2 stage (s)					<u> </u>		
tF (s)			2.2		3.5	3.3	
p0 queue free %			99		91	98	
cM capacity (veh/h)			1188		227	672	
Direction, Lane #	EB 1	WB 1	NB 1				
Volume Total	381	742	30				
Volume Left	0	6	20				
Volume Right	3	0	10				
cSH	1700	1188	294				
Volume to Capacity	0.22	0.01	0.10				
Queue Length 95th (m)	0.0	0.1	2.6				
Control Delay (s)	0.0	0.1	18.6				
Lane LOS		A	С				
Approach Delay (s)	0.0	0.1	18.6				
Approach LOS			С				
Intersection Summary							
Average Delay			0.6				
Intersection Capacity Ut	ilizatior	۱	54.7%	IC	CU Leve	el of Servio	e
Analysis Period (min)			15				
- , , ,							

	1	•	1	1	1	Ļ		
Movement	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations	¥		ĥ			<u>स</u>		
Sign Control	Stop		Free			Free		
Grade	0%		0%			0%		
Volume (veh/h)	13	0	7	13	0	4		
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60		
Hourly flow rate (vph)	22	0	12	22	0	7		
Pedestrians		-			-	-		
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	None							
Median storage veh)								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume	29	22			33			
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	29	22			33			
tC, single (s)	7.4	6.2			4.1			
tC, 2 stage (s)								
tF (s)	4.4	3.3			2.2			
p0 queue free %	97	100			100			
cM capacity (veh/h)	784	1054			1578			
Direction, Lane #	WB 1	NB 1	SB 1					
Volume Total	22	33	7					
Volume Left	22	0	0					
Volume Right	0	22	0					
cSH	784	1700	1578					
Volume to Capacity	0.03	0.02	0.00					
Queue Length 95th (m)		0.02	0.00					
Control Delay (s)	9.7	0.0	0.0					
Lane LOS	A	0.0	0.0					
Approach Delay (s)	9.7	0.0	0.0					
Approach LOS	A	0.0	0.0					
Intersection Summary								
Average Delay			3.4					
	tilization			14		of Sonvice	٨	
Intersection Capacity U	unzauor		13.3%	I.		el of Service	А	
Analysis Period (min)			15					

## APPENDIX E Future (2018) Total Traffic

MovementEBLEBTWBTWBRSBLSBRLane ConfigurationsImage: Control freeFreeImage: Control freeImage: Control freeStopGrade0%0%0%0%	
Sign Control Free Free Stop	
Sign Control Free Free Stop	
Volume (veh/h) 7 761 310 13 12 7	
Peak Hour Factor 0.87 0.87 0.87 0.87 0.65 0.65	
Hourly flow rate (vph) 8 875 356 15 18 11	
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type None	
Median storage veh)	
Upstream signal (m)	
pX, platoon unblocked	
vC, conflicting volume 371 1255 364	
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol 371 1255 364	
tC, single (s) 4.5 7.4 6.9	
tC, 2 stage (s)	
tF (s) 2.6 4.4 3.9	
p0 queue free % 99 85 98	
cM capacity (veh/h) 994 120 551	
Direction, Lane # EB 1 WB 1 SB 1	
Volume Total 883 371 29	
Volume Left 8 0 18	
Volume Right 0 15 11	
cSH 994 1700 169	
Volume to Capacity 0.01 0.22 0.17	
Queue Length 95th (m) 0.2 0.0 4.6	
Control Delay (s) 0.2 0.0 30.7	
Lane LOS A D	
Approach Delay (s) 0.2 0.0 30.7	
Approach LOS D	
Intersection Summary	
Average Delay 0.9	
Intersection Capacity Utilization 58.2% ICU Level of Service B	
Analysis Period (min) 15	

	-	$\rightarrow$	•	-	1	1			
Movement	EBT	EBR	WBL	WBT	NBL	NBR			
Lane Configurations	¢Î			ų	Y				
Sign Control	Free			Free	Stop				
Grade	0%			0%	0%				
Volume (veh/h)	756	17	5	318	5	7			
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93			
Hourly flow rate (vph)	813	18	5	342	5	8			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type					None				
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume			831		1175	822			
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol			831		1175	822			
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		97	98			
cM capacity (veh/h)			810		212	377			
Direction, Lane #	EB 1	WB 1	NB 1						
Volume Total	831	347	13						
Volume Left	0	5	5						
Volume Right	18	0	8						
cSH	1700	810	285						
Volume to Capacity	0.49	0.01	0.05						
Queue Length 95th (m)	0.0	0.2	1.1						
Control Delay (s)	0.0	0.2	18.2						
Lane LOS		А	С						
Approach Delay (s)	0.0	0.2	18.2						
Approach LOS			С						
Intersection Summary									
Average Delay			0.3						
Intersection Capacity Ut	ilizatior	1	53.1%	10	CU Leve	el of Serv	се	А	
Analysis Period (min)			15						
			-						

	4	•	1	1	1	ţ			
Movement	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations	Y		eî.			ŧ			
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Volume (veh/h)	13	0	7	13	0	6			
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65			
Hourly flow rate (vph)	20	0	11	20	0	9			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type	None								
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume	30	21			31				
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	30	21			31				
tC, single (s)	7.4	6.2			4.1				
tC, 2 stage (s)									
tF (s)	4.4	3.3			2.2				
p0 queue free %	97	100			100				
cM capacity (veh/h)	783	1057			1582				
Direction, Lane #	WB 1	NB 1	SB 1						
Volume Total	20	31	9						
Volume Left	20	0	0						
Volume Right	0	20	0						
cSH	783	1700	1582						
Volume to Capacity	0.03	0.02	0.00						
Queue Length 95th (m)		0.0	0.0						
Control Delay (s)	9.7	0.0	0.0						
Lane LOS	Α								
Approach Delay (s)	9.7	0.0	0.0						
Approach LOS	А								
Intersection Summary									
Average Delay			3.2						
Intersection Capacity U	tilizatior	1	13.3%	IC	CU Leve	el of Service	;	А	
Analysis Period (min)			15						

Movement         EBL         EBT         WBT         WBR         SBL         SBR           Lane Configurations         Image: state st
Sign Control         Free         Free         Stop           Grade         0%         0%         0%           Volume (veh/h)         8         403         813         13         13         4           Peak Hour Factor         0.93         0.93         0.93         0.60         0.60           Hourly flow rate (vph)         9         433         874         14         22         7           Pedestrians         Lane Width (m)         Walking Speed (m/s)         Percent Blockage         Right turn flare (veh)         None           Median type         None         None         None         VC, conflicting volume         888         1332         881           vC1, stage 1 conf vol         vC2, stage 2 conf vol         VCu, unblocked vol         888         1332         881           tC, single (s)         4.2         7.3         6.5         5         5           tF (s)         2.3         4.3         3.5         5         9         80         98           cM capacity (veh/h)         718         110         314         314         314
Sign Control         Free         Free         Stop           Grade         0%         0%         0%           Volume (veh/h)         8         403         813         13         13         4           Peak Hour Factor         0.93         0.93         0.93         0.60         0.60           Hourly flow rate (vph)         9         433         874         14         22         7           Pedestrians         Lane Width (m)         Walking Speed (m/s)         Volume (veh)         None         Volume (veh)           Percent Blockage         Right turn flare (veh)         None         Volume (veh)         None           Median storage veh)         Upstream signal (m)         None         VC, conflicting volume         888         1332         881           VC1, stage 1 conf vol         VC2, stage 2 conf vol         VC2, stage 2 conf vol         VC2, stage 2 conf vol         VC2, stage (s)         T           tF (s)         2.3         4.3         3.5         90         98         98           cM capacity (veh/h)         718         110         314         314         314
Volume (veh/h)840381313134Peak Hour Factor $0.93$ $0.93$ $0.93$ $0.60$ $0.60$ Hourly flow rate (vph)9433 $874$ 14227Pedestrians
Peak Hour Factor       0.93       0.93       0.93       0.93       0.60         Hourly flow rate (vph)       9       433       874       14       22       7         Pedestrians
Hourly flow rate (vph)       9       433       874       14       22       7         Pedestrians       Lane Width (m)       Walking Speed (m/s)       Fercent Blockage       Fercent Blockage       Fercent Blockage         Right turn flare (veh)       Median type       None       None         Median storage veh)       Upstream signal (m)       Fercent Blockage       Fercent Blockage         VC, conflicting volume       888       1332       881         vC1, stage 1 conf vol       VC2, stage 2 conf vol       VC4.       Fercent Blockage         vC2, stage 2 conf vol       VC4.       7.3       6.5         tC, single (s)       4.2       7.3       6.5         tF (s)       2.3       4.3       3.5         p0 queue free %       99       80       98         cM capacity (veh/h)       718       110       314
PedestriansLane Width (m)Walking Speed (m/s)Percent BlockageRight turn flare (veh)Median typeNoneMedian storage veh)Upstream signal (m)pX, platoon unblockedvC, conflicting volume8881332881vC1, stage 1 conf volvC2, stage 2 conf volvC4, unblocked vol8881332881tC, single (s)4.2r, 2 stage (s)tF (s)2.3et f (s)2.3et f (s)998098cM capacity (veh/h)718110314
Lane Width (m) Walking Speed (m/s) Percent Blockage Right turn flare (veh) Median type None Median storage veh) Upstream signal (m) pX, platoon unblocked vC, conflicting volume 888 1332 881 vC1, stage 1 conf vol vC2, stage 2 conf vol vC2, stage 2 conf vol vC4, single (s) 4.2 7.3 6.5 tC, 2 stage (s) tF (s) 2.3 4.3 3.5 p0 queue free % 99 80 98 cM capacity (veh/h) 718 110 314
Walking Speed (m/s)Percent BlockageRight turn flare (veh)Median typeNoneMedian storage veh)Upstream signal (m)pX, platoon unblockedvC, conflicting volume8881332881vC1, stage 1 conf volvC2, stage 2 conf volvCu, unblocked vol8881332881tC, single (s)4.2r, stage (s)tF (s)2.3p0 queue free %998098cM capacity (veh/h)718110314
Percent BlockageRight turn flare (veh)Median typeNoneMedian storage veh)Upstream signal (m)pX, platoon unblockedvC, conflicting volume8881332881vC1, stage 1 conf volvC2, stage 2 conf volvCu, unblocked vol8881332881tC, single (s)4.2r, stage (s)tF (s)2.3p0 queue free %998098cM capacity (veh/h)718t110314
Right turn flare (veh)NoneMedian typeNoneMedian storage veh)Upstream signal (m)pX, platoon unblockedVC, conflicting volumevC, conflicting volume8881332881vC1, stage 1 conf volVC, stage 2 conf volvC2, stage 2 conf volVCu, unblocked volvCu, unblocked vol8881332881tC, single (s)4.27.36.5tC, 2 stage (s)VCUtF (s)2.3tF (s)998098cM capacity (veh/h)718110314
Median typeNoneMedian storage veh)Upstream signal (m)pX, platoon unblocked732vC, conflicting volume8881332881vC1, stage 1 conf volvC2, stage 2 conf volvCu, unblocked vol8881332881tC, single (s)4.2tF (s)2.3tF (s)2.3p0 queue free %998098cM capacity (veh/h)718110314
Median storage veh)Upstream signal (m)pX, platoon unblockedvC, conflicting volume8881332881vC1, stage 1 conf volvC2, stage 2 conf volvCu, unblocked vol8881332881tC, single (s)4.27.36.5tC, 2 stage (s)tF (s)2.34.33.5p0 queue free %998098cM capacity (veh/h)718
Upstream signal (m)         pX, platoon unblocked         vC, conflicting volume       888       1332       881         vC1, stage 1 conf vol         vC2, stage 2 conf vol         vCu, unblocked vol       888       1332       881         tC, single (s)       4.2       7.3       6.5         tC, 2 stage (s)       t       t       t         tF (s)       2.3       4.3       3.5         p0 queue free %       99       80       98         cM capacity (veh/h)       718       110       314
pX, platoon unblocked         vC, conflicting volume       888       1332       881         vC1, stage 1 conf vol         vC2, stage 2 conf vol       700       700         vCu, unblocked vol       888       1332       881         tC, single (s)       4.2       7.3       6.5         tC, 2 stage (s)       700       700       700         tF (s)       2.3       4.3       3.5         p0 queue free %       99       80       98         cM capacity (veh/h)       718       110       314
vC, conflicting volume       888       1332       881         vC1, stage 1 conf vol
vC1, stage 1 conf vol         vC2, stage 2 conf vol         vCu, unblocked vol       888         1332       881         tC, single (s)       4.2         tF (s)       2.3         p0 queue free %       99         80       98         cM capacity (veh/h)       718
vC2, stage 2 conf vol         vCu, unblocked vol       888       1332       881         tC, single (s)       4.2       7.3       6.5         tC, 2 stage (s)       7.3       3.5         tF (s)       2.3       4.3       3.5         p0 queue free %       99       80       98         cM capacity (veh/h)       718       110       314
vCu, unblocked vol       888       1332       881         tC, single (s)       4.2       7.3       6.5         tC, 2 stage (s)       5       5         tF (s)       2.3       4.3       3.5         p0 queue free %       99       80       98         cM capacity (veh/h)       718       110       314
tC, single (s)       4.2       7.3       6.5         tC, 2 stage (s)
tC, 2 stage (s)         tF (s)       2.3       4.3       3.5         p0 queue free %       99       80       98         cM capacity (veh/h)       718       110       314
tF (s)2.34.33.5p0 queue free %998098cM capacity (veh/h)718110314
p0 queue free %         99         80         98           cM capacity (veh/h)         718         110         314
cM capacity (veh/h) 718 110 314
Direction, Lane # EB 1 WB 1 SB 1
Volume Total 442 888 28
Volume Left 9 0 22
Volume Right 0 14 7
cSH 718 1700 130
Volume to Capacity 0.01 0.52 0.22
Queue Length 95th (m) 0.3 0.0 6.0
Control Delay (s) 0.4 0.0 40.3
Lane LOS A E
Approach Delay (s) 0.4 0.0 40.3
Approach LOS E
Intersection Summary
Average Delay 1.0
Intersection Capacity Utilization 56.0% ICU Level of Service B
Analysis Period (min) 15

	-	$\rightarrow$	-	-	1	1			
Movement	EBT	EBR	WBL	WBT	NBL	NBR			
Lane Configurations	4Î			र्भ	Y				
Sign Control	Free			Free	Stop				
Grade	0%			0%	0%				
Volume (veh/h)	413	3	7	805	21	11			
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97			
Hourly flow rate (vph)	426	3	7	830	22	11			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type					None				
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume			429		1272	427			
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol			429		1272	427			
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		88	98			
cM capacity (veh/h)			1141		186	632			
,									
Direction, Lane #	EB 1	WB 1	NB 1						
Volume Total	429	837	33						
Volume Left	0	7	22						
Volume Right	3	0	11						
cSH	1700	1141	245						
Volume to Capacity	0.25	0.01	0.13						
Queue Length 95th (m)	0.0	0.1	3.5						
Control Delay (s)	0.0	0.2	22.0						
Lane LOS	0.0	A	C						
Approach Delay (s)	0.0	0.2	22.0						
Approach LOS			С						
Intersection Summary									
Average Delay			0.7						
Intersection Capacity Ut	ilizatior	า	60.6%	10	CU Leve	el of Servio	e	В	
Analysis Period (min)			15						
· · · ·									

	4	•	1	1	1	Ļ			
Movement	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations	Y		eî.			÷Î			
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Volume (veh/h)	13	0	8	13	0	4			
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60			
Hourly flow rate (vph)	22	0	13	22	0	7			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type	None								
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume	31	24			35				
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	31	24			35				
tC, single (s)	7.4	6.2			4.1				
tC, 2 stage (s)									
tF (s)	4.4	3.3			2.2				
p0 queue free %	97	100			100				
cM capacity (veh/h)	782	1052			1576				
Direction, Lane #	WB 1	NB 1	SB 1						
Volume Total	22	35	7						
Volume Left	22	0	0						
Volume Right	0	22	0						
cSH	782	1700	1576						
Volume to Capacity	0.03	0.02	0.00						
Queue Length 95th (m)	0.6	0.0	0.0						
Control Delay (s)	9.7	0.0	0.0						
Lane LOS	А								
Approach Delay (s)	9.7	0.0	0.0						
Approach LOS	А								
Intersection Summary									
Average Delay			3.3						
Intersection Capacity Ut	tilization	l	13.3%	10	CU Leve	el of Servic	е	А	
Analysis Period (min)			15						
- , , ,									

## APPENDIX F Future (2023) Total Traffic

	≯	+	+	*	1			
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		÷٩	ĥ		- M			
Sign Control		Free	Free		Stop			
Grade		0%	0%		0%			
Volume (veh/h)	7	861	351	13	12	7		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.65	0.65		
Hourly flow rate (vph)	8	990	403	15	18	11		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type					None			
Median storage veh)								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume	418				1417	411		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	418				1417	411		
tC, single (s)	4.5				7.4	6.9		
tC, 2 stage (s)								
tF (s)	2.6				4.4	3.9		
p0 queue free %	99				80	98		
cM capacity (veh/h)	952				93	516		
Direction, Lane #	EB 1	WB 1	SB 1					
Volume Total	998	418	29					
Volume Left	8	0	18					
Volume Right	0	15	11					
cSH	952	1700	133					
Volume to Capacity	0.01	0.25	0.22					
Queue Length 95th (m)	0.2	0.0	6.1					
Control Delay (s)	0.2	0.0	39.5					
Lane LOS	А		E					
Approach Delay (s)	0.2	0.0	39.5					
Approach LOS			E					
Intersection Summary								
Average Delay			1.0					
Intersection Capacity Ut Analysis Period (min)	ilizatior	۱	63.7%	IC	CU Leve	el of Service	В	

	-	$\rightarrow$	•	-	1	1			
Movement	EBT	EBR	WBL	WBT	NBL	NBR			
Lane Configurations	4Î			ę	Y				
Sign Control	Free			Free	Stop				
Grade	0%			0%	0%				
Volume (veh/h)	854	19	5	359	5	8			
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93			
Hourly flow rate (vph)	918	20	5	386	5	9			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type					None				
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume			939		1325	928			
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol			939		1325	928			
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		97	97			
cM capacity (veh/h)			738		172	327			
Direction, Lane #	EB 1	WB 1	NB 1						
Volume Total	939	391	14						
Volume Left	0	5	5						
Volume Right	20	0	9						
cSH	1700	738	243						
Volume to Capacity	0.55	0.01	0.06						
Queue Length 95th (m)	0.0	0.2	1.4						
Control Delay (s)	0.0	0.2	20.7						
Lane LOS		А	С						
Approach Delay (s)	0.0	0.2	20.7						
Approach LOS			С						
Intersection Summary									
Average Delay			0.3						
Intersection Capacity Ut	ilization	h	58.7%	10		el of Servio	0	В	
Analysis Period (min)	inzatioi	-	15					U	

	4	•	†	1	1	Ļ			
Movement	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations	Y		eî.			Ł			
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Volume (veh/h)	13	0	7	13	0	6			
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65			
Hourly flow rate (vph)	20	0	11	20	0	9			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type	None								
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume	30	21			31				
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	30	21			31				
tC, single (s)	7.4	6.2			4.1				
tC, 2 stage (s)									
tF (s)	4.4	3.3			2.2				
p0 queue free %	97	100			100				
cM capacity (veh/h)	783	1057			1582				
Direction, Lane #	WB 1	NB 1	SB 1						
Volume Total	20	31	9						
Volume Left	20	0	0						
Volume Right	0	20	0						
cSH	783	1700	1582						
Volume to Capacity	0.03	0.02	0.00						
Queue Length 95th (m)	0.6	0.0	0.0						
Control Delay (s)	9.7	0.0	0.0						
Lane LOS	А								
Approach Delay (s)	9.7	0.0	0.0						
Approach LOS	А								
Intersection Summary									
Average Delay			3.2						
Intersection Capacity U	tilization	1	13.3%	IC	CU Leve	el of Servic	e	А	
Analysis Period (min)			15						

	≯	+	+	•	1	4			
Movement	EBL	EBT	WBT	WBR	SBL	SBR			
Lane Configurations		ę	ĥ		Y				
Sign Control		Free	Free		Stop				
Grade		0%	0%		0%				
Volume (veh/h)	9	457	922	13	13	5			
Peak Hour Factor	0.93	0.93	0.93	0.93	0.60	0.60			
Hourly flow rate (vph)	10	491	991	14	22	8			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type					None				
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume	1005				1509	998			
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	1005				1509	998			
tC, single (s)	4.2				7.3	6.4			
tC, 2 stage (s)									
tF (s)	2.3				4.3	3.5			
p0 queue free %	99				74	97			
cM capacity (veh/h)	655				83	273			
Direction, Lane #	EB 1	WB 1	SB 1						
Volume Total	501	1005	30						
Volume Left	10	0	22						
Volume Right	0	14	8						
cSH	655	1700	102						
Volume to Capacity	0.01	0.59	0.29						
Queue Length 95th (m)	0.3	0.0	8.4						
Control Delay (s)	0.4	0.0	54.1						
Lane LOS	A	0.0	64.1 F						
Approach Delay (s)	0.4	0.0	54.1						
Approach LOS	5.1	0.0	F						
Intersection Summary									
Average Delay			1.2						
Intersection Capacity Ut	ilizatior	า	62.1%	10	CU Leve	el of Servic	е	В	
Analysis Period (min)			15						
, ( ,			-						

	-	$\rightarrow$	-	-	1	1		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	4Î			ર્શ	¥			
Sign Control	Free			Free	Stop			
Grade	0%			0%	0%			
Volume (veh/h)	466	4	8	911	24	13		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly flow rate (vph)	480	4	8	939	25	13		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type					None			
Median storage veh)								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume			485		1438	482		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol			485		1438	482		
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		83	98		
cM capacity (veh/h)			1089		147	588		
Direction, Lane #	EB 1	WB 1	NB 1					
Volume Total	485	947	38					
Volume Left	0	8	25					
Volume Right	4	0	13					
cSH	1700	1089	200					
Volume to Capacity	0.29	0.01	0.19					
Queue Length 95th (m)	0.0	0.2	5.2					
Control Delay (s)	0.0	0.2	27.2					
Lane LOS		А	D					
Approach Delay (s)	0.0	0.2	27.2					
Approach LOS			D					
Intersection Summary								
Average Delay			0.8					
Intersection Capacity Ut	ilizatior	า	67.3%	IC	CU Leve	el of Servi	ce C	
Analysis Period (min)			15					

	4	*	1	1	1	ţ			
Movement	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations	Y		¢Î			Ł			
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Volume (veh/h)	13	0	9	13	0	5			
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60			
Hourly flow rate (vph)	22	0	15	22	0	8			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type	None								
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume	34	26			37				
vC1, stage 1 conf vol	01	20			01				
vC2, stage 2 conf vol									
vCu, unblocked vol	34	26			37				
tC, single (s)	7.4	6.2			4.1				
tC, 2 stage (s)		0.2							
tF (s)	4.4	3.3			2.2				
p0 queue free %	97	100			100				
cM capacity (veh/h)	779	1050			1574				
,			05.4		1074				
Direction, Lane #	WB 1	NB 1	SB 1	_	_	_	_	_	
Volume Total	22	37	8						
Volume Left	22	0	0						
Volume Right	0	22	0						
cSH	779	1700	1574						
Volume to Capacity	0.03	0.02	0.00						
Queue Length 95th (m)	0.7	0.0	0.0						
Control Delay (s)	9.8	0.0	0.0						
Lane LOS	Α								
Approach Delay (s)	9.8	0.0	0.0						
Approach LOS	A								
Intersection Summary									
Average Delay			3.2						
Intersection Capacity Ut	ilization	1	13.3%	IC	CU Leve	of Service	•	А	
Analysis Period (min)			15						

APPENDIX G 2023 SimTraffic Analysis Calculations

### Summary of All Intervals

		-		
Run Number	1	2	3	Avg
Start Time	7:20	7:20	7:20	7:20
End Time	8:30	8:30	8:30	8:30
Total Time (min)	70	70	70	70
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intvls	1	1	1	1
Vehs Entered	1413	1509	1442	1456
Vehs Exited	1417	1523	1453	1464
Starting Vehs	54	49	41	45
Ending Vehs	50	35	30	37
Denied Entry Before	1	0	0	0
Denied Entry After	2	1	0	1
Travel Distance (km)	2376	2541	2431	2449
Travel Time (hr)	38.0	40.9	39.2	39.3
Total Delay (hr)	5.3	6.1	5.7	5.7
Total Stops	79	66	73	72
Fuel Used (I)	536.4	531.6	533.8	534.0

## Interval #0 Information Seeding

Start Time	7:20	
End Time	7:30	
Total Time (min)	10	
Volumes adjusted by P	HF, Growth Factors.	
No data recorded this in	nterval.	

### Interval #1 Information Recording

Start Time	7:30
End Time	8:30
Total Time (min)	60
Volumes adjusted by F	PHF, Growth Factors.

Run Number	1	2	3	Avg	
Vehs Entered	1413	1509	1442	1456	
Vehs Exited	1417	1523	1453	1464	
Starting Vehs	54	49	41	45	
Ending Vehs	50	35	30	37	
Denied Entry Before	1	0	0	0	
Denied Entry After	2	1	0	1	
Travel Distance (km)	2376	2541	2431	2449	
Travel Time (hr)	38.0	40.9	39.2	39.3	
Total Delay (hr)	5.3	6.1	5.7	5.7	
Total Stops	79	66	73	72	
Fuel Used (I)	536.4	531.6	533.8	534.0	

### 1: Highway 7 & 6th Line Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Total Delay (hr)	0.0	1.7	0.1	0.0	0.1	0.0	2.0
Delay / Veh (s)	5.5	6.4	1.0	0.0	25.2	9.1	5.0
Travel Dist (km)	5.0	614.3	33.5	1.0	2.9	1.5	658.1
Travel Time (hr)	0.1	10.7	0.6	0.0	0.2	0.1	11.7
Avg Speed (kph)	54	59	63	41	15	23	58

#### 2: Highway 7 & 5th Line Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Total Delay (hr)	0.3	0.0	0.0	0.5	0.0	0.0	0.8
Delay / Veh (s)	1.1	0.1	10.0	4.4	10.2	6.3	2.1
Travel Dist (km)	78.9	1.6	4.6	417.0	1.9	4.2	508.2
Travel Time (hr)	1.3	0.0	0.1	6.3	0.1	0.1	7.9
Avg Speed (kph)	60	35	57	67	31	35	64

### 3: Proposed Access & 6th Line Performance by movement

N		NDT		ODT	A 11
Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0
Delay / Veh (s)	4.0	0.4	0.4	0.1	1.7
Travel Dist (km)	3.0	1.8	2.2	5.2	12.2
Travel Time (hr)	0.1	0.0	0.1	0.1	0.3
Avg Speed (kph)	26	41	29	53	37

#### **Total Network Performance**

Total Delay (hr)	5.7
Delay / Veh (s)	14.0
Travel Dist (km)	2449.1
Travel Time (hr)	39.3
Avg Speed (kph)	63

#### Intersection: 1: Highway 7 & 6th Line

Movement	EB	SB	
Directions Served	LT	LR	
Maximum Queue (m)	12.8	30.5	
Average Queue (m)	0.9	9.6	
95th Queue (m)	6.1	24.1	
Link Distance (m)	628.6	152.4	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

#### Intersection: 2: Highway 7 & 5th Line

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	34.6	8.6
Average Queue (m)	2.6	3.3
95th Queue (m)	15.9	9.8
Link Distance (m)	1056.2	405.2
Upstream Blk Time (%	)	
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Intersection: 3: Proposed Access & 6th Line

Movement	WB
Directions Served	LR
Maximum Queue (m)	15.0
Average Queue (m)	7.5
95th Queue (m)	19.6
Link Distance (m)	149.8
Upstream Blk Time (%)	)
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### **Nework Summary**

Network wide Queuing Penalty: 0

## Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intvls	1	1	1	1
Vehs Entered	1637	1565	1619	1608
Vehs Exited	1632	1555	1620	1603
Starting Vehs	43	34	46	41
Ending Vehs	48	44	45	46
Denied Entry Before	0	0	4	1
Denied Entry After	0	0	3	1
Travel Distance (km)	2779	2652	2737	2723
Travel Time (hr)	45.1	43.2	44.5	44.3
Total Delay (hr)	7.0	6.5	7.1	6.9
Total Stops	89	124	100	103
Fuel Used (I)	499.8	534.9	504.6	513.1

## Interval #0 Information Seeding

Start Time	4:20	
End Time	4:30	
Total Time (min)	10	
Volumes adjusted by P	HF, Growth Factors.	
No data recorded this i	nterval.	

## Interval #1 Information Recording

Start Time	4:30
End Time	5:30
Total Time (min)	60
Volumes adjusted by I	PHF, Growth Factors.

Run Number	1	2	3	Avg	
Vehs Entered	1637	1565	1619	1608	
Vehs Exited	1632	1555	1620	1603	
Starting Vehs	43	34	46	41	
Ending Vehs	48	44	45	46	
Denied Entry Before	0	0	4	1	
Denied Entry After	0	0	3	1	
Travel Distance (km)	2779	2652	2737	2723	
Travel Time (hr)	45.1	43.2	44.5	44.3	
Total Delay (hr)	7.0	6.5	7.1	6.9	
Total Stops	89	124	100	103	
Fuel Used (I)	499.8	534.9	504.6	513.1	

## 1: Highway 7 & 6th Line Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Total Delay (hr)	0.0	0.4	0.5	0.0	0.2	0.0	1.2
Delay / Veh (s)	5.7	3.0	1.9	4.6	32.5	12.7	2.8
Travel Dist (km)	3.3	316.1	82.6	1.1	3.7	1.4	408.2
Travel Time (hr)	0.1	5.1	1.7	0.1	0.3	0.1	7.2
Avg Speed (kph)	53	63	56	31	12	22	59

#### 2: Highway 7 & 5th Line Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Total Delay (hr)	0.1	0.0	0.0	2.7	0.1	0.0	3.0
Delay / Veh (s)	0.6	0.1	10.0	10.1	17.7	6.4	7.0
Travel Dist (km)	42.3	0.6	9.5	1014.8	10.5	5.4	1083.1
Travel Time (hr)	0.7	0.0	0.2	16.8	0.4	0.2	18.1
Avg Speed (kph)	64	36	58	62	29	36	61

#### 3: Proposed Access & 6th Line Performance by movement

Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0
Delay / Veh (s)	4.0	0.6	0.4	0.1	1.6
Travel Dist (km)	3.4	1.4	3.5	6.7	15.1
Travel Time (hr)	0.1	0.0	0.1	0.1	0.4
Avg Speed (kph)	27	41	28	57	37

#### **Total Network Performance**

Total Delay (hr)	6.9
Delay / Veh (s)	15.4
Travel Dist (km)	2722.6
Travel Time (hr)	44.3
Avg Speed (kph)	62

## Intersection: 1: Highway 7 & 6th Line

Movement	EB	SB	
Directions Served	LT	LR	
Maximum Queue (m)	16.0	34.5	
Average Queue (m)	1.1	10.6	
95th Queue (m)	7.0	25.6	
Link Distance (m)	628.6	152.4	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

### Intersection: 2: Highway 7 & 5th Line

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	21.9	19.4
Average Queue (m)	2.1	7.5
95th Queue (m)	11.5	15.6
Link Distance (m)	1056.2	405.2
Upstream Blk Time (%	)	
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Intersection: 3: Proposed Access & 6th Line

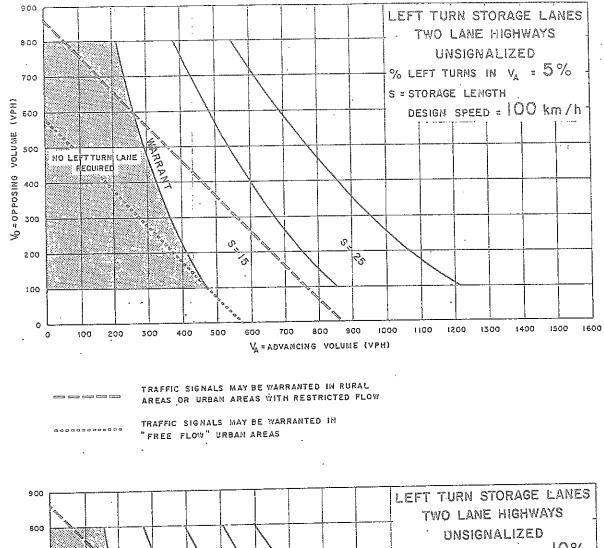
Movement	WB
Directions Served	LR
Maximum Queue (m)	15.0
Average Queue (m)	7.5
95th Queue (m)	19.6
Link Distance (m)	149.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### **Nework Summary**

Network wide Queuing Penalty: 0

## APPENDIX H MTO Geometric Design Standards Manual Left Turn Warrant Design Charts

AT-GRADE INTERSECTIONS



% LEFT TURNS IN  $V_A = 10\%$ 700 S = STORAGE LENGTH VO=OPPOSING VOLUME { VPH } DESIGN SPEED = 100 km/h NARRAN NO LEFT TURN S<sub>2</sub> ړي ∉ S. ŧñ 200 ò رۍ کې 5 100 Ø 1400 15 60 1600 1100 1200 1300 1000 800 900 400 500 600 700 300 100 200 0 VARANCING VOLUME (VPN)

#### Figure El-22

EA-23

APPENDIX I 2023 SimTraffic Analysis With Left Turn Lane Calculations HCM Unsignalized Intersection Capacity ArFalturie (2023) Total Traffic AM - with Left Turn Lane 1: Highway 7 & 6th Line

	≯	-	-	•	1	~			
Movement	EBL	EBT	WBT	WBR	SBL	SBR			
Lane Configurations	ሻ	<b>†</b>	¢Î,		¥				
Sign Control		Free	Free		Stop				
Grade		0%	0%		0%				
Volume (veh/h)	7	861	351	13	12	7			
Peak Hour Factor	0.87	0.87	0.87	0.87	0.65	0.65			
Hourly flow rate (vph)	8	990	403	15	18	11			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type					None				
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume	418				1417	411			
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	418				1417	411			
tC, single (s)	4.5				7.4	6.9			
tC, 2 stage (s)									
tF (s)	2.6				4.4	3.9			
p0 queue free %	99				80	98			
cM capacity (veh/h)	952				93	516			
Direction, Lane #	EB 1	EB 2	WB 1	SB 1					
Volume Total	8	990	418	29					
Volume Left	8	0	0	18					
Volume Right	0	0	15	11					
cSH	952	1700	1700	133					
Volume to Capacity	0.01	0.58	0.25	0.22					
Queue Length 95th (m)	0.2	0.0	0.0	6.1					
Control Delay (s)	8.8	0.0	0.0	39.5					
Lane LOS	A			E					
Approach Delay (s)	0.1		0.0	39.5					
Approach LOS				Е					
Intersection Summary									
Average Delay			0.8						
Intersection Capacity Uti	lization		57.8%	(	CU Leve	el of Servio	e	3	
Analysis Period (min)			15						
,									

HCM Unsignalized Intersection Capacity Arfalturie (2023) Total Traffic AM - with Left Turn Lane 2: Highway 7 & 5th Line

	-	$\mathbf{r}$	4	-	1	1			
Movement	EBT	EBR	WBL	WBT	NBL	NBR			
Lane Configurations	4Î			ę	Y				
Sign Control	Free			Free	Stop				
Grade	0%			0%	0%				
Volume (veh/h)	854	19	5	359	5	8			
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93			
Hourly flow rate (vph)	918	20	5	386	5	9			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type					None				
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume			939		1325	928			
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol			939		1325	928			
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		97	97			
cM capacity (veh/h)			738		172	327			
Direction, Lane #	EB 1	WB 1	NB 1						
Volume Total	939	391	14						
Volume Left	0	5	5						
Volume Right	20	0	9						
cSH	1700	738	243						
Volume to Capacity	0.55	0.01	0.06						
Queue Length 95th (m)	0.0	0.2	1.4						
Control Delay (s)	0.0	0.2	20.7						
Lane LOS		А	С						
Approach Delay (s)	0.0	0.2	20.7						
Approach LOS			С						
Intersection Summary									
Average Delay			0.3						
Intersection Capacity Uti	ilization		58.7%	10	CU Leve	el of Servi	ce	В	
Analysis Period (min)			15						

HCM Unsignalized Intersection Capacity Arfalturie (2023) Total Traffic AM - with Left Turn Lane 3: Proposed Access & 6th Line

	4	•	Ť	1	1	Ļ	
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	¥		4Î			ę	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Volume (veh/h)	13	0	7	13	0	6	
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65	
Hourly flow rate (vph)	20	0	11	20	0	9	
Pedestrians		-			-	-	
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None						
Median storage veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	30	21			31		
vC1, stage 1 conf vol					•••		
vC2, stage 2 conf vol							
vCu, unblocked vol	30	21			31		
tC, single (s)	7.4	6.2			4.1		
tC, 2 stage (s)							
tF (s)	4.4	3.3			2.2		
p0 queue free %	97	100			100		
cM capacity (veh/h)	783	1057			1582		
Direction, Lane #	WB 1	NB 1	SB 1	_	_	_	_
Volume Total	20	31	9	_	_	_	_
Volume Left	20	0	9				
	20	20	0				
Volume Right cSH	783	20 1700	1582				
Volume to Capacity	0.03	0.02	0.00				
Queue Length 95th (m)		0.0	0.0				
Control Delay (s)	9.7	0.0	0.0				
Lane LOS	A 9.7	0.0	0.0				
Approach Delay (s)		0.0	0.0				
Approach LOS	A						
Intersection Summary							
Average Delay			3.2				
Intersection Capacity U	tilization		13.3%	10	CU Leve	l of Servi	ce
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Arfalturie (2023) Total Traffic PM - with Left Turn Lane 1: Highway 7 & 6th Line

	≯	-	-	•	1	~			
Movement	EBL	EBT	WBT	WBR	SBL	SBR			
Lane Configurations	ሻ	<b>†</b>	¢Î,		Y				
Sign Control		Free	Free		Stop				
Grade		0%	0%		0%				
Volume (veh/h)	9	457	922	13	13	5			
Peak Hour Factor	0.93	0.93	0.93	0.93	0.60	0.60			
Hourly flow rate (vph)	10	491	991	14	22	8			
Pedestrians									
Lane Width (m)									
Walking Speed (m/s)									
Percent Blockage									
Right turn flare (veh)									
Median type					None				
Median storage veh)									
Upstream signal (m)									
pX, platoon unblocked									
vC, conflicting volume	1005				1509	998			
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	1005				1509	998			
tC, single (s)	4.2				7.3	6.4			
tC, 2 stage (s)									
tF (s)	2.3				4.3	3.5			
p0 queue free %	99				74	97			
cM capacity (veh/h)	655				83	273			
Direction, Lane #	EB 1	EB 2	WB 1	SB 1					
Volume Total	10	491	1005	30					
Volume Left	10	0	0	22					
Volume Right	0	0	14	8					
cSH	655	1700	1700	102					
Volume to Capacity	0.01	0.29	0.59	0.29					
Queue Length 95th (m)	0.3	0.0	0.0	8.4					
Control Delay (s)	10.6	0.0	0.0	54.1					
Lane LOS	В			F					
Approach Delay (s)	0.2		0.0	54.1					
Approach LOS				F					
Intersection Summary									
Average Delay			1.1						
Intersection Capacity Uti	lization		62.1%	10	CU Leve	el of Servic	е	В	
Analysis Period (min)			15						
			-						

HCM Unsignalized Intersection Capacity Arfalturie (2023) Total Traffic PM - with Left Turn Lane 2: Highway 7 & 5th Line

	-	$\mathbf{r}$	4	-	1	1		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	¢Î			ę	Y			
Sign Control	Free			Free	Stop			
Grade	0%			0%	0%			
Volume (veh/h)	466	4	8	911	24	13		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly flow rate (vph)	480	4	8	939	25	13		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type					None			
Median storage veh)								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume			485		1438	482		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol			485		1438	482		
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		83	98		
cM capacity (veh/h)			1089		147	588		
Direction, Lane #	EB 1	WB 1	NB 1					
Volume Total	485	947	38					
Volume Left	0	8	25					
Volume Right	4	0	13					
cSH	1700	1089	200					
Volume to Capacity	0.29	0.01	0.19					
Queue Length 95th (m)	0.0	0.2	5.2					
Control Delay (s)	0.0	0.2	27.2					
Lane LOS		Α	D					
Approach Delay (s)	0.0	0.2	27.2					
Approach LOS			D					
Intersection Summary								
Average Delay			0.8					
Intersection Capacity Uti	lization		67.3%	10	CU Leve	el of Service	С	
Analysis Period (min)			15					

HCM Unsignalized Intersection Capacity Arfalturie (2023) Total Traffic PM - with Left Turn Lane 3: Proposed Access & 6th Line

	4	•	1	1	1	Ļ				
Movement	WBL	WBR	NBT	NBR	SBL	SBT				
Lane Configurations	Y		eî			÷٩				
Sign Control	Stop		Free			Free				
Grade	0%		0%			0%				
Volume (veh/h)	13	0	9	13	0	5				
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60				
Hourly flow rate (vph)	22	0	15	22	0	8				
Pedestrians										
Lane Width (m)										
Walking Speed (m/s)										
Percent Blockage										
Right turn flare (veh)										
Median type	None									
Median storage veh)										
Upstream signal (m)										
pX, platoon unblocked										
vC, conflicting volume	34	26			37					
vC1, stage 1 conf vol										
vC2, stage 2 conf vol										
vCu, unblocked vol	34	26			37					
tC, single (s)	7.4	6.2			4.1					
tC, 2 stage (s)										
tF (s)	4.4	3.3			2.2					
p0 queue free %	97	100			100					
cM capacity (veh/h)	779	1050			1574					
Direction, Lane #	WB 1	NB 1	SB 1							
Volume Total	22	37	8							
Volume Left	22	0	0							
Volume Right	0	22	0							
cSH	779	1700	1574							
Volume to Capacity	0.03	0.02	0.00							
Queue Length 95th (m)	0.7	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			3.2							
Intersection Capacity Ut	ilization		13.3%	10	CU Leve	el of Servic	e	A	٩	
Analysis Period (min)			15							
, ,										

## APPENDIX J Future (2023) Total Traffic With Left Turn Lane

Level of Service Calculations

## Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	7:20	7:20	7:20	7:20
End Time	8:30	8:30	8:30	8:30
Total Time (min)	70	70	70	70
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intvls	1	1	1	1
Vehs Entered	1413	1509	1442	1456
Vehs Exited	1417	1523	1453	1464
Starting Vehs	54	49	41	45
Ending Vehs	50	35	30	37
Denied Entry Before	1	0	0	0
Denied Entry After	2	1	0	1
Travel Distance (km)	2375	2541	2431	2449
Travel Time (hr)	38.0	40.9	39.2	39.4
Total Delay (hr)	5.3	6.1	5.7	5.7
Total Stops	81	70	72	75
Fuel Used (I)	533.8	531.2	528.2	531.1

## Interval #0 Information Seeding

Start Time	7:20
End Time	7:30
Total Time (min)	10
Volumes adjusted by F	PHF, Growth Factors.
No data recorded this	interval.

## Interval #1 Information Recording

Start Time	7:30
End Time	8:30
Total Time (min)	60
Volumes adjusted by F	PHF, Growth Factors.

Run Number	1	2	3	Avg	
Vehs Entered	1413	1509	1442	1456	
Vehs Exited	1417	1523	1453	1464	
Starting Vehs	54	49	41	45	
Ending Vehs	50	35	30	37	
Denied Entry Before	1	0	0	0	
Denied Entry After	2	1	0	1	
Travel Distance (km)	2375	2541	2431	2449	
Travel Time (hr)	38.0	40.9	39.2	39.4	
Total Delay (hr)	5.3	6.1	5.7	5.7	
Total Stops	81	70	72	75	
Fuel Used (I)	533.8	531.2	528.2	531.1	

## 1: Highway 7 & 6th Line Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Total Delay (hr)	0.0	1.7	0.1	0.0	0.1	0.0	2.0
Delay / Veh (s)	6.9	6.4	1.0	0.0	30.4	9.2	5.1
Travel Dist (km)	5.0	614.4	33.5	1.0	2.8	1.5	658.2
Travel Time (hr)	0.1	10.7	0.6	0.0	0.2	0.1	11.7
Avg Speed (kph)	56	59	63	41	13	23	58

#### 2: Highway 7 & 5th Line Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Total Delay (hr)	0.3	0.0	0.0	0.5	0.0	0.0	0.8
Delay / Veh (s)	1.0	0.1	12.0	4.4	10.3	6.2	2.0
Travel Dist (km)	78.7	1.6	4.6	417.0	1.9	4.2	508.0
Travel Time (hr)	1.3	0.0	0.1	6.3	0.1	0.1	7.9
Avg Speed (kph)	60	35	55	66	31	35	64

#### 3: Proposed Access & 6th Line Performance by movement

Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0
Delay / Veh (s)	4.0	0.6	0.3	0.1	1.7
Travel Dist (km)	3.0	1.8	2.2	5.2	12.2
Travel Time (hr)	0.1	0.0	0.1	0.1	0.3
Avg Speed (kph)	26	41	29	53	37

#### **Total Network Performance**

Total Delay (hr)	5.7
Delay / Veh (s)	14.0
Travel Dist (km)	2449.0
Travel Time (hr)	39.4
Avg Speed (kph)	63

#### Intersection: 1: Highway 7 & 6th Line

Movement	EB	SB
Directions Served	L	LR
Maximum Queue (m)	13.1	34.7
Average Queue (m)	1.1	10.2
95th Queue (m)	6.2	25.3
Link Distance (m)		150.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	25.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Intersection: 2: Highway 7 & 5th Line

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	34.7	10.5
Average Queue (m)	2.9	3.3
95th Queue (m)	16.5	9.9
Link Distance (m)	1056.2	405.0
Upstream Blk Time (%	5)	
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Intersection: 3: Proposed Access & 6th Line

Movement	WB
Directions Served	LR
Maximum Queue (m)	15.0
Average Queue (m)	7.5
95th Queue (m)	19.6
Link Distance (m)	149.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### **Nework Summary**

Network wide Queuing Penalty: 0

## Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	4:20	4:20	4:20	4:20
End Time	5:30	5:30	5:30	5:30
Total Time (min)	70	70	70	70
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intvls	1	1	1	1
Vehs Entered	1637	1565	1619	1608
Vehs Exited	1632	1555	1620	1603
Starting Vehs	43	34	46	41
Ending Vehs	48	44	45	46
Denied Entry Before	0	0	4	1
Denied Entry After	0	0	3	1
Travel Distance (km)	2779	2652	2737	2723
Travel Time (hr)	45.1	43.3	44.5	44.3
Total Delay (hr)	7.0	6.6	7.1	6.9
Total Stops	88	127	97	104
Fuel Used (I)	496.3	533.9	504.4	511.6

## Interval #0 Information Seeding

Start Time	4:20	
End Time	4:30	
Total Time (min)	10	
Volumes adjusted by F	PHF, Growth Factors.	
No data recorded this i	interval.	

## Interval #1 Information Recording

Start Time	4:30
End Time	5:30
Total Time (min)	60
Volumes adjusted by I	PHF, Growth Factors.

Run Number	1	2	3	Avg	
Vehs Entered	1637	1565	1619	1608	
Vehs Exited	1632	1555	1620	1603	
Starting Vehs	43	34	46	41	
Ending Vehs	48	44	45	46	
Denied Entry Before	0	0	4	1	
Denied Entry After	0	0	3	1	
Travel Distance (km)	2779	2652	2737	2723	
Travel Time (hr)	45.1	43.3	44.5	44.3	
Total Delay (hr)	7.0	6.6	7.1	6.9	
Total Stops	88	127	97	104	
Fuel Used (I)	496.3	533.9	504.4	511.6	

## 1: Highway 7 & 6th Line Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Total Delay (hr)	0.0	0.4	0.5	0.0	0.2	0.0	1.3
Delay / Veh (s)	10.1	3.0	1.9	4.7	38.4	13.2	2.9
Travel Dist (km)	3.3	316.2	82.6	1.1	3.6	1.3	408.2
Travel Time (hr)	0.1	5.1	1.7	0.1	0.3	0.1	7.3
Avg Speed (kph)	51	63	56	31	11	21	58

#### 2: Highway 7 & 5th Line Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Total Delay (hr)	0.1	0.0	0.0	2.7	0.1	0.0	3.0
Delay / Veh (s)	0.6	0.1	10.1	10.1	18.0	6.5	7.0
Travel Dist (km)	42.2	0.6	9.5	1014.8	10.5	5.4	1083.0
Travel Time (hr)	0.7	0.0	0.2	16.8	0.4	0.2	18.1
Avg Speed (kph)	64	37	58	62	29	35	61

#### 3: Proposed Access & 6th Line Performance by movement

Movement	WBL	NBT	NBR	SBT	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0
Delay / Veh (s)	4.0	0.8	0.4	0.1	1.6
Travel Dist (km)	3.4	1.4	3.5	6.7	15.0
Travel Time (hr)	0.1	0.0	0.1	0.1	0.4
Avg Speed (kph)	27	40	28	57	37

#### **Total Network Performance**

Total Delay (hr)	6.9
Delay / Veh (s)	15.5
Travel Dist (km)	2722.5
Travel Time (hr)	44.3
Avg Speed (kph)	62

#### Intersection: 1: Highway 7 & 6th Line

Movement	EB	WB	SB
			-
Directions Served	L	TR	LR
Maximum Queue (m)	9.5	4.1	34.7
Average Queue (m)	1.0	0.1	11.1
95th Queue (m)	5.4	2.3	26.6
Link Distance (m)		66.3	150.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)	25.0		
Storage Blk Time (%)			
Queuing Penalty (veh)			

#### Intersection: 2: Highway 7 & 5th Line

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	21.9	19.2
Average Queue (m)	2.1	7.3
95th Queue (m)	11.3	15.2
Link Distance (m)	1056.2	405.0
Upstream Blk Time (%	)	
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Intersection: 3: Proposed Access & 6th Line

Movement	WB
Directions Served	LR
Maximum Queue (m)	15.0
Average Queue (m)	7.5
95th Queue (m)	19.6
Link Distance (m)	149.8
Upstream Blk Time (%)	)
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

## **Nework Summary**

Network wide Queuing Penalty: 0

# APPENDIX K 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.

Copyright 2010
 Cole Engineering Group Ltd.