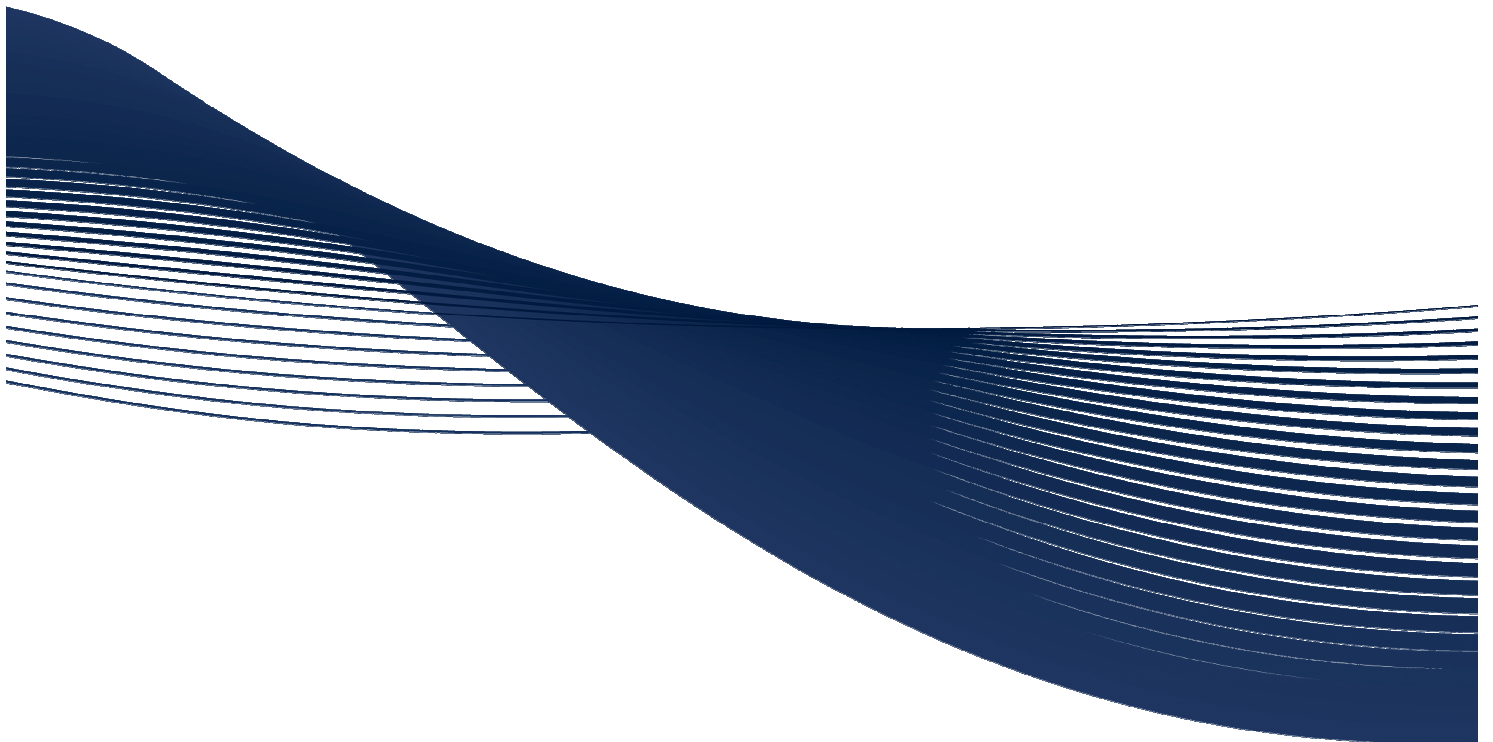


JAMES DICK CONSTRUCTION LIMITED

REVISED TRAFFIC IMPACT STUDY

Eramosa Quarry, Township of Guelph-Eramosa

Project No. TR12-0013



DECEMBER 2013

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December 3, 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

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PREPARED BY:

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Joseph E. Gowrie, P.Eng.
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Kim Nystrom
Principal

Issues and Revisions Registry

Identification	Date	Description of issued and/or revision
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
Revised Traffic Impact Study	December 3, 2013	For Submission

Statement of Conditions

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1.0 Study Background and Purpose

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

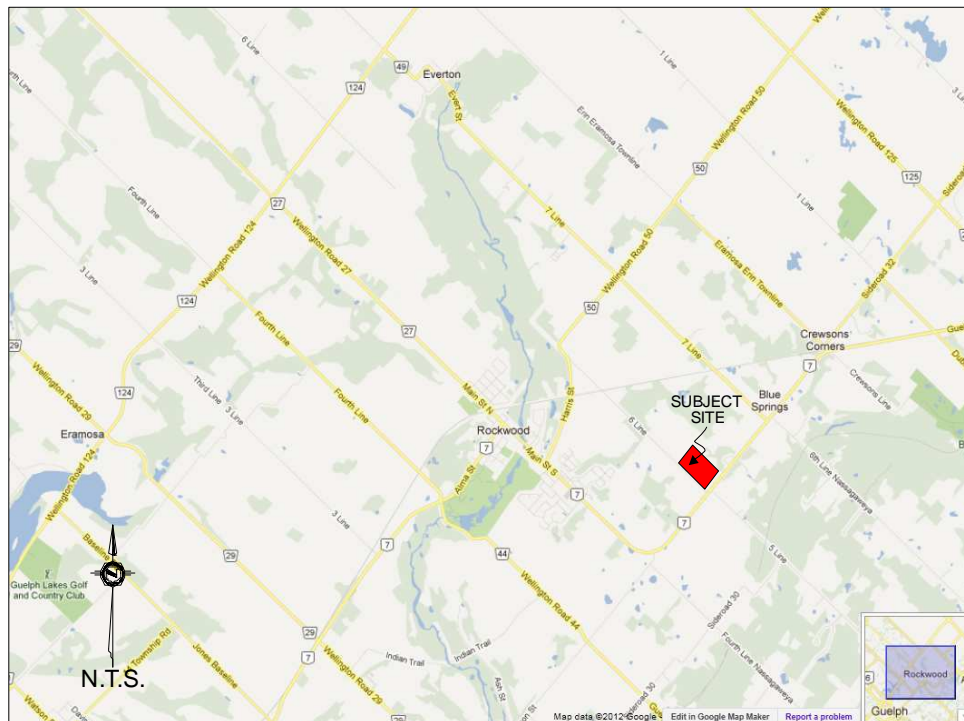


Figure 1-1 Proposed Site Location

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

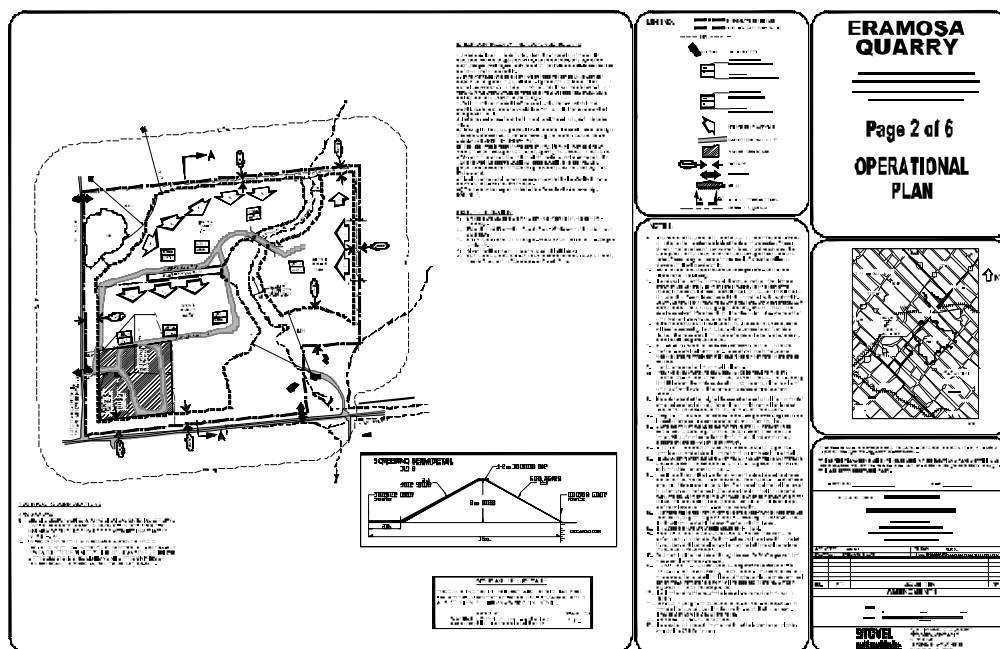


Figure 1-2 Proposed Site Plan

The purpose of the Study is to:

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

2.0 Study Approach

2.1. Study Area

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

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

2.2. Horizon Year

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 6th Line. The existing lane configurations are illustrated in **Figure 3-1**.

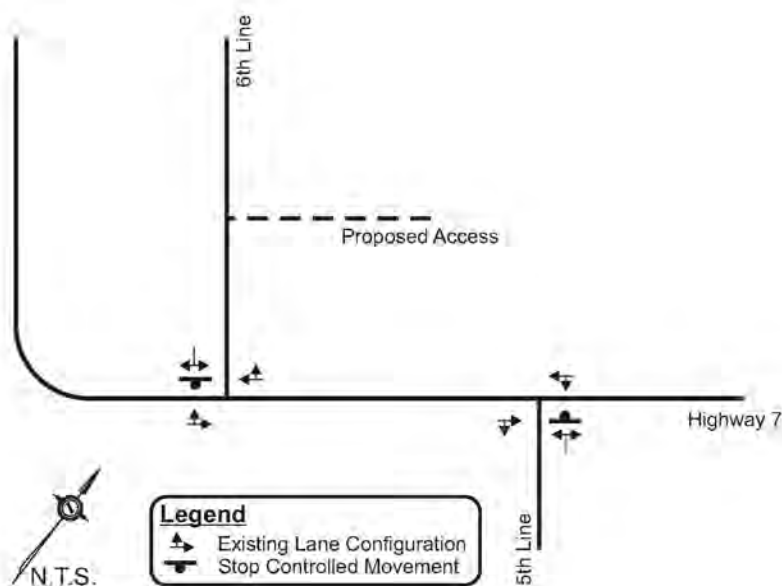


Figure 3-1 Existing Lane Configurations

The road network is detailed as follows:

Highway 7 is a 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).

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

5th 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 7/6th Line was undertaken by Accu-Traffic Inc. (ATI) on behalf of Cole Engineering during the weekday morning peak period (7:00 a.m. – 9:00 a.m.) and weekday afternoon peak period (4:00 p.m. – 6:00 p.m.) on Tuesday, February 14, 2012. Existing traffic data is provided in **Appendix A** for reference. It should be noted that within the study area, Highway 7 is classified as an urban commuter road, which has higher traffic volumes during the summer than the winter. As such, the counted through traffic volumes along Highway 7 have been prorated by a summer seasonal peak hour factor of 1.33, based on MTO's *2008 Seasonal Variation Curves*.

3.3. Existing Traffic Conditions – Level of Service Analysis

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

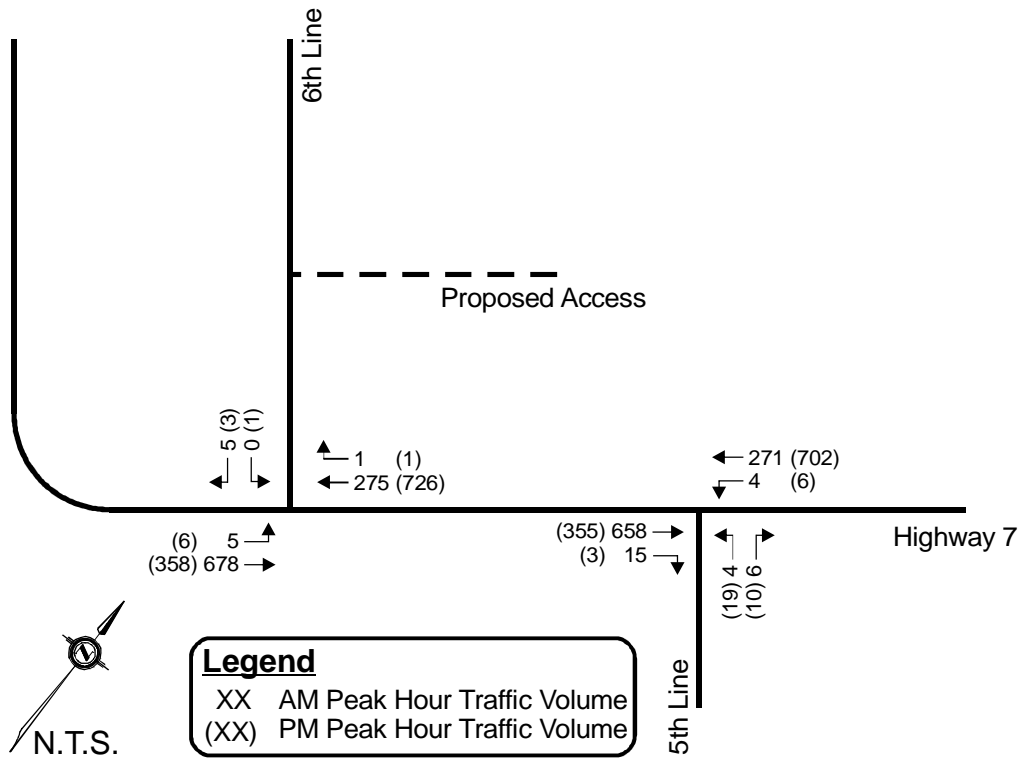


Figure 3-2 Existing Traffic Volumes

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

Table 3.1 – Existing Traffic Conditions – Levels of Service

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

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

4.0 Site Generated Traffic

4.1. Development Proposal

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

4.2. Site Generated Traffic

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.

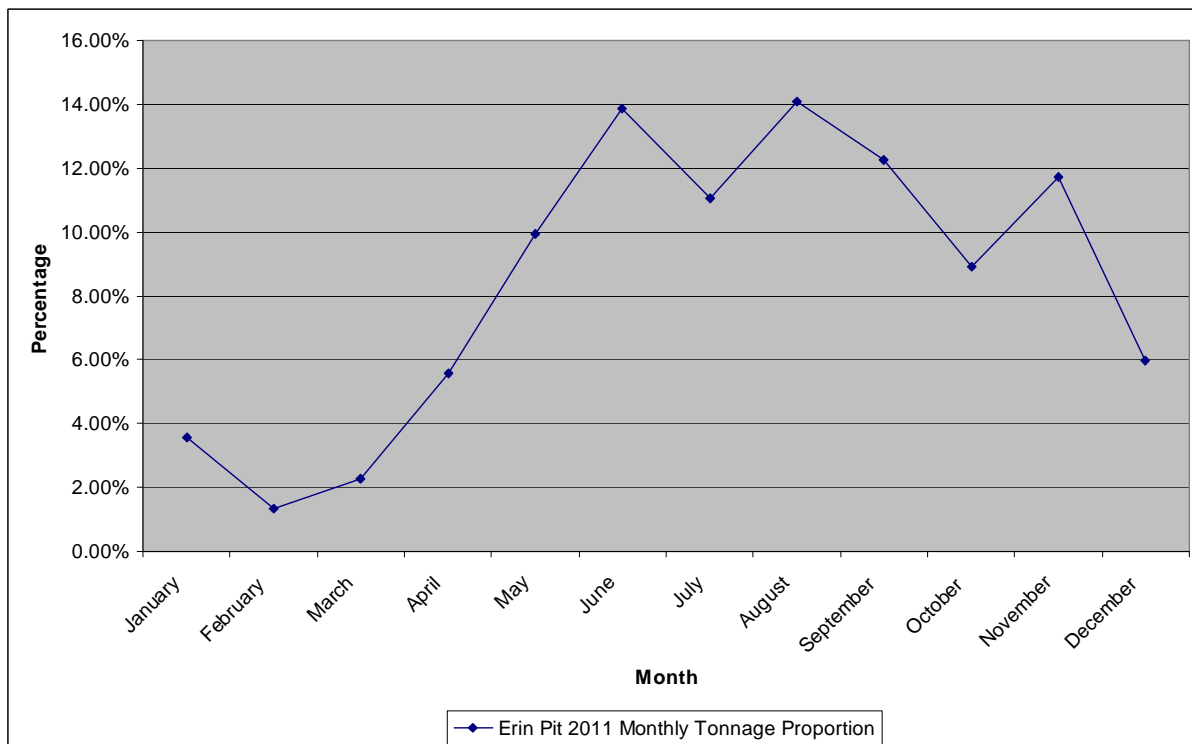


Figure 4-1 Erin Pit 2011 Monthly Tonnage Proportion

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**.

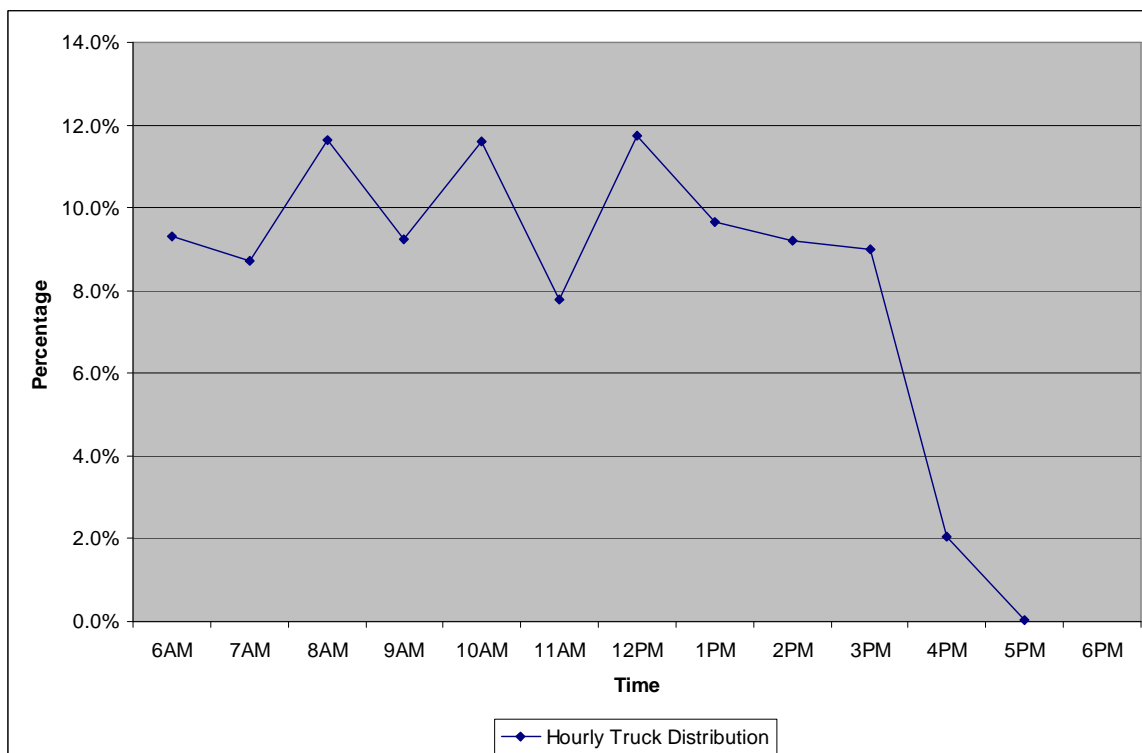


Figure 4-2 Hourly Truck Distribution

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**.

Table 4.1 – Trip Distribution

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

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

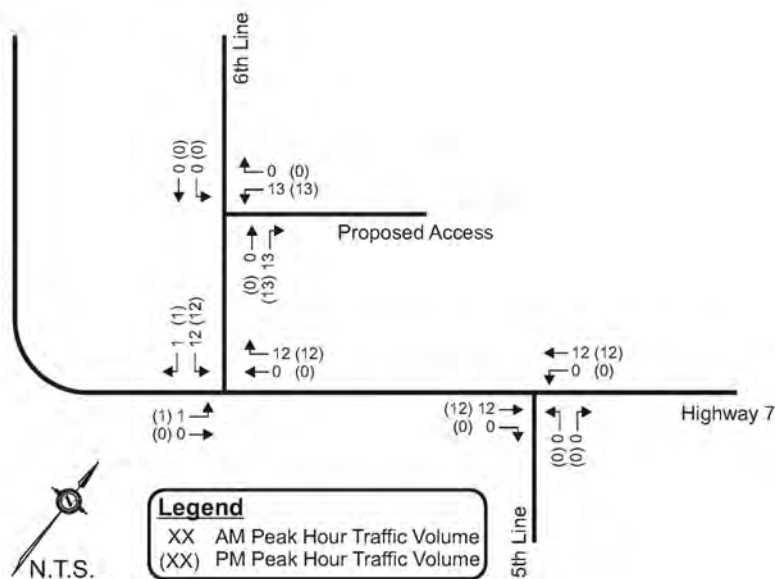
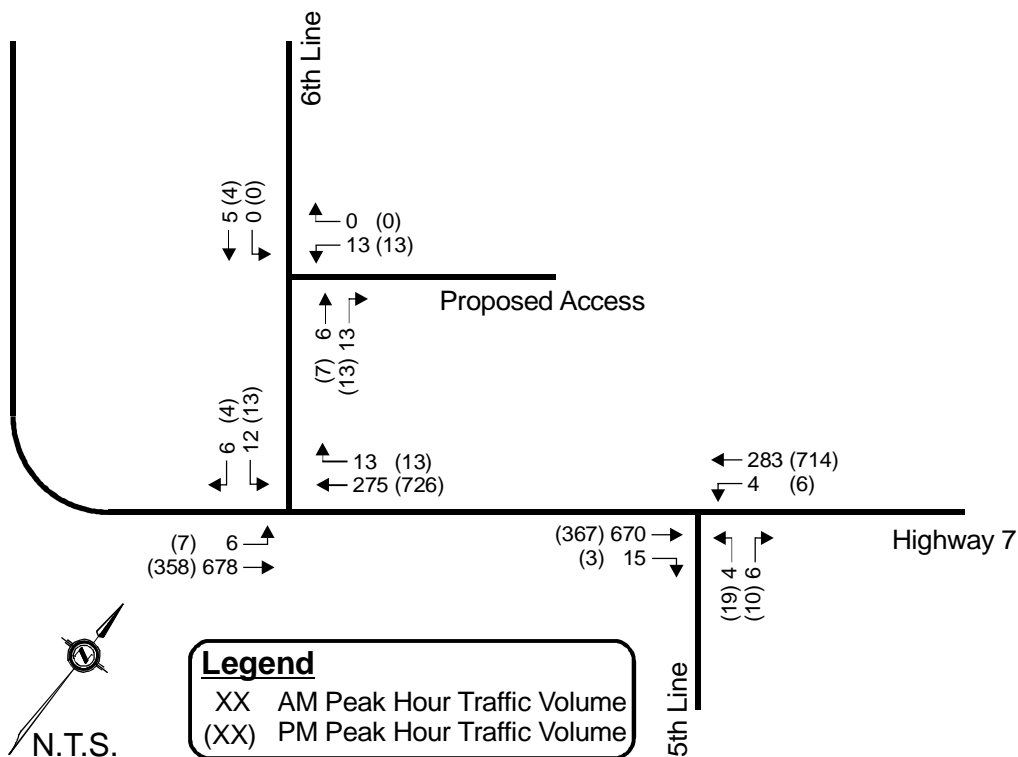


Figure 4-3 Site Traffic Volumes

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.



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

Table 4.2 – Existing Plus Site-Related Traffic Conditions – Levels of Service

Intersection	Key Movements	AM Peak Hour		PM Peak Hour	
		LOS (v/c)	95 th Percentile Queue (m)	LOS (v/c)	95 th Percentile Queue (m)
Highway 7 / 6 th Line (Unsignalized)	EB left-through	A (0.01)	0.2	A (0.01)	0.2
	SB left-right	D (0.14)	3.6	D (0.18)	4.7
Highway 7 / 5 th Line (Unsignalized)	WB left-through	A (<0.01)	0.1	A (0.01)	0.1
	NB left-right	C (0.03)	0.8	C (0.10)	2.6
6 th 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.

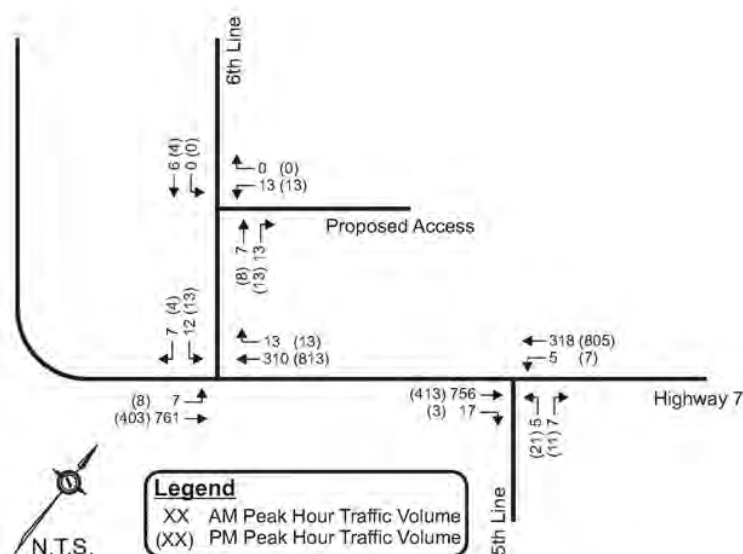


Figure 6-1 Future (2018) Total Traffic Volumes

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

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

Intersection	Key Movements	AM Peak Hour		PM Peak Hour	
		LOS (v/c)	95 th Percentile Queue (m)	LOS (v/c)	95 th Percentile Queue (m)
Highway 7 / 6 th 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 th 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 th 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 / 6th Line intersection. The 95th 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.

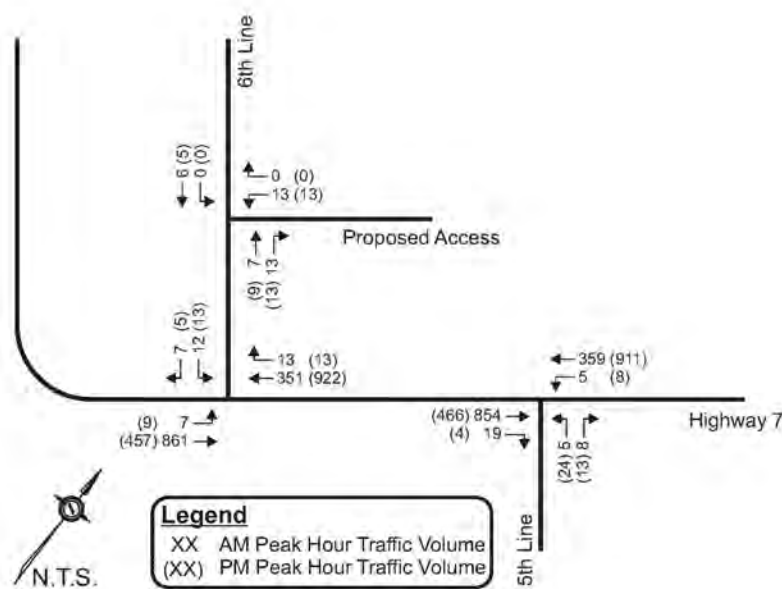


Figure 6-2 Future (2023) Total Traffic Volumes

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 / 6th Line intersection using *Synchro 6.0* software. The detailed calculations are provided in **Appendix F** and are summarized **Table 6.2**.

Table 6.2 – Future (2023) Total Traffic Conditions – Levels of Service

Intersection	Key Movements	AM Peak Hour		PM Peak Hour	
		LOS (v/c)	95 th Percentile Queue (m)	LOS (v/c)	95 th Percentile Queue (m)
Highway 7 / 6 th Line (Unsignalized)	EB left-through SB left-right	A (0.01) E (0.22)	0.2 6.1	A (0.01) F (0.29)	0.3 8.4
Highway 7 / 5 th 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 th 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 / 6th Line intersection having a modest increase in queue length. The 95th 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**.

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

Intersection	Key Movements	AM Peak Hour			PM Peak Hour		
		Percentile Queue Lengths (m)			Percentile Queue Lengths (m)		
		50 th	95 th	Max.	50 th	95 th	Max.
Highway 7 / 6 th 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 th 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 th Line / Proposed Access (Unsignalized)	WB left-right	7.5	15.0	19.6	7.5	19.6	15.0

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

6.2.2. With Left Turn Lane

A left turn warrant analysis was undertaken at the intersection of Highway 7 and 6th 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 6th Line. The left turn lane is warranted primarily as a result of background traffic turning onto 6th 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 / 6th Line intersection using *Synchro 6.0* software. The results are summarized in **Table 6.4** and calculation sheets provided in **Appendix I**.

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

Intersection	Key Movements	AM Peak Hour		PM Peak Hour	
		LOS (v/c)	95 th Percentile Queue (m)	LOS (v/c)	95 th Percentile Queue (m)
Highway 7 / 6 th Line (Unsignalized)	EB left	A (0.01)	0.2	B (0.01)	0.3
	EB through	-- (0.58)	--	-- (0.29)	--
	SB left-right	E (0.22)	6.1	F (0.29)	8.4
Highway 7 / 5 th Line (Unsignalized)	WB left-through	A (0.01)	0.2	A (0.01)	0.2
	NB left-right	C (0.06)	1.4	D (0.19)	5.2
6 th Line / Proposed Access (Unsignalized)	WB left-right SB left-through	A (0.03)	0.6	A (0.03)	0.7

With the exclusive eastbound left turn lane at the Highway 7 / 6th 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**.

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

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

The *SimTraffic* analysis with the exclusive left turn lane at the Highway 7 / 6th 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 6th Line in the Township of Guelph-Eramosa. 6th Line is currently a rolling and unpaved gravelled roadway with a no exit sign posted at Highway 7.

7.1. Site Access Location and Sight Distance

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

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

7.2. Safety Consideration

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

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

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

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

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

8.0 Conclusions

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

- Existing traffic within the study area operates at good levels of service with no movements nearing capacity;
- The 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 / 6th Line intersection;
- It is recommended that a westbound deceleration lane along Highway 7 at the 6th 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 6th Line while standard truck entrance signs be placed on 6th Line; and,
- At the intersection of Highway 7 and 6th Line, a left turn lane of 25 meters with a deceleration tape of 160 meters and parallel of 70 meters is warranted due to background conditions.

APPENDIX A
Existing Traffic Data

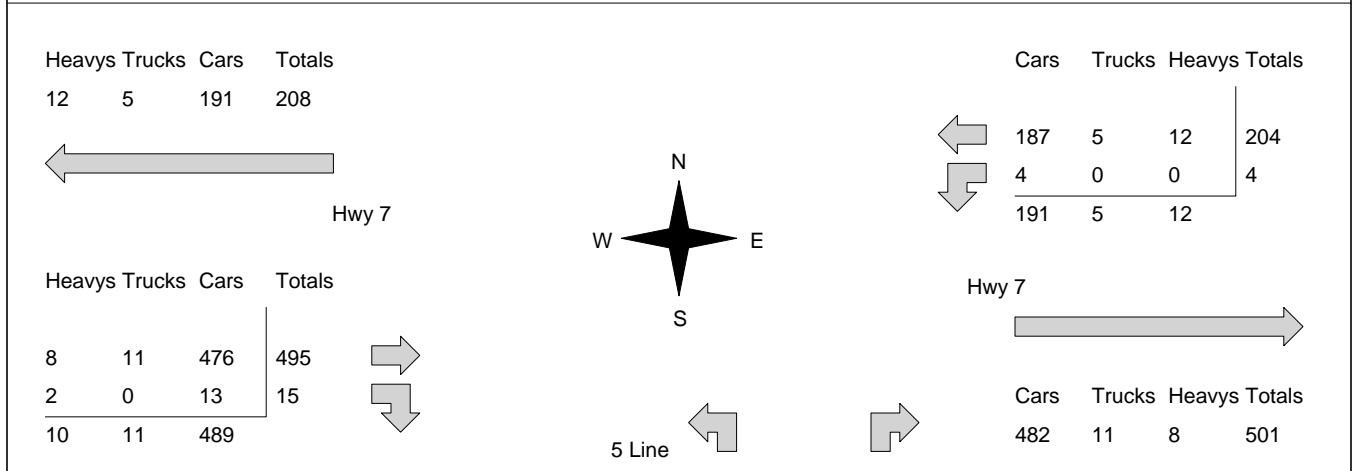
Accu-Traffic Inc.

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

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

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

	East Leg Total: 709 East Entering: 208 East Peds: 0 Peds Cross: ∞
--	--



Peds Cross: ∞ West Peds: 0 West Entering: 510 West Leg Total: 718	<table style="width: 100%;"> <tr><td>Cars</td><td>17</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Heavys</td><td>2</td></tr> <tr><td>Totals</td><td>19</td></tr> </table>	Cars	17	Trucks	0	Heavys	2	Totals	19	<table style="width: 100%;"> <tr><td>Cars</td><td>4</td><td>6</td><td>10</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Totals</td><td>4</td><td>6</td><td></td></tr> </table>	Cars	4	6	10	Trucks	0	0	0	Heavys	0	0	0	Totals	4	6		Peds Cross: ∞ South Peds: 0 South Entering: 10 South Leg Total: 29
Cars	17																										
Trucks	0																										
Heavys	2																										
Totals	19																										
Cars	4	6	10																								
Trucks	0	0	0																								
Heavys	0	0	0																								
Totals	4	6																									

Comments

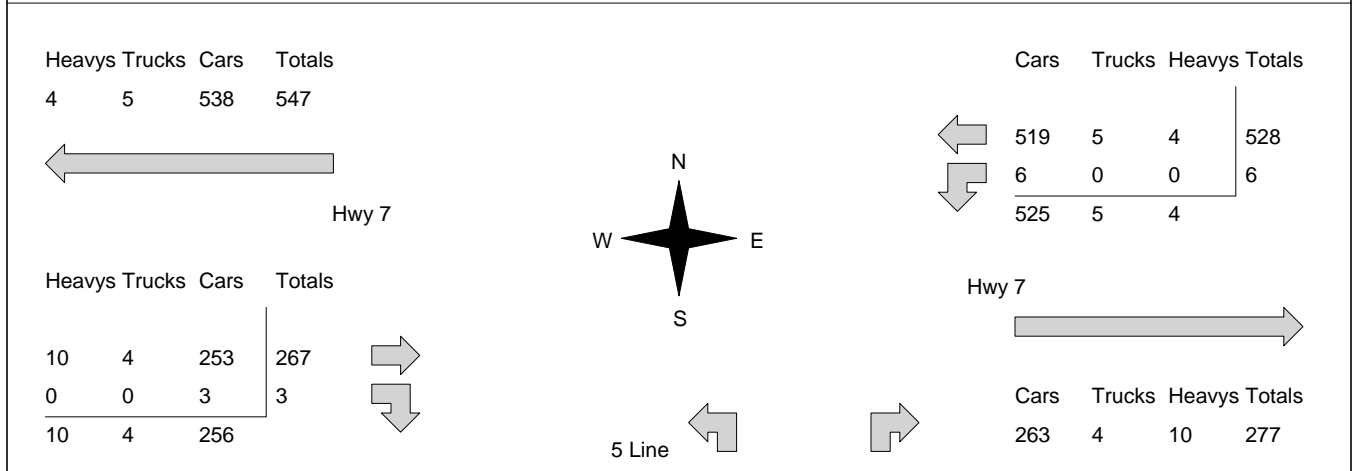
Accu-Traffic Inc.

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

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

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

	East Leg Total: 811 East Entering: 534 East Peds: 0 Peds Cross: ∞
--	--



Peds Cross: ∞ West Peds: 0 West Entering: 270 West Leg Total: 817	<table style="width: 100%;"> <tr><td>Cars</td><td>9</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Heavys</td><td>0</td></tr> <tr><td style="border-top: 1px solid black;">Totals</td><td style="border-top: 1px solid black;">9</td></tr> </table>	Cars	9	Trucks	0	Heavys	0	Totals	9	<table style="width: 100%;"> <tr><td>Cars</td><td>19</td><td>10</td><td>29</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Heavys</td><td>0</td><td>0</td><td>0</td></tr> <tr><td style="border-top: 1px solid black;">Totals</td><td style="border-top: 1px solid black;">19</td><td style="border-top: 1px solid black;">10</td><td></td></tr> </table>	Cars	19	10	29	Trucks	0	0	0	Heavys	0	0	0	Totals	19	10		Peds Cross: ∞ South Peds: 0 South Entering: 29 South Leg Total: 38
Cars	9																										
Trucks	0																										
Heavys	0																										
Totals	9																										
Cars	19	10	29																								
Trucks	0	0	0																								
Heavys	0	0	0																								
Totals	19	10																									

Comments

Accu-Traffic Inc.

Total Count Diagram

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

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 7 runs W/E

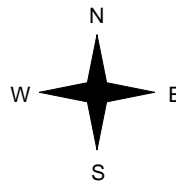
East Leg Total: 2875
East Entering: 1419
East Peds: 0
Peds Cross: ∞

Heavys	Trucks	Cars	Totals
35	18	1377	1430



Hwy 7

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



5 Line



Cars	65
Trucks	1
Heavys	9
Totals	75

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

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



Hwy 7



Cars	Trucks	Heavys	Totals
1396	22	38	1456

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

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

Comments



Accu-Traffic Inc. Traffic Count Summary

Intersection: Hwy 7 & 5 Line						Count Date: 17-Feb-12		Municipality: Eramosa					
North Approach Totals						North/South Total Approaches	South Approach Totals						
Includes Cars, Trucks, & Heavys					Total Peds		Includes Cars, Trucks, & Heavys					Total Peds	
Hour Ending	Left	Thru	Right	Grand Total		Hour Ending	Left	Thru	Right	Grand Total			
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0	
8:00:00	0	0	0	0	0	12	8:00:00	3	0	9	12	0	
9:00:00	0	0	0	0	0	11	9:00:00	5	0	6	11	1	
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0	
17:00:00	0	0	0	0	0	27	17:00:00	19	0	8	27	0	
18:00:00	0	0	0	0	0	22	18:00:00	16	0	6	22	0	
Totals:	0	0	0	0	0	72		43	0	29	72	1	
East Approach Totals						East/West Total Approaches	West Approach Totals						
Includes Cars, Trucks, & Heavys					Total Peds		Includes Cars, Trucks, & Heavys					Total Peds	
Hour Ending	Left	Thru	Right	Grand Total		Hour Ending	Left	Thru	Right	Grand Total			
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0	
8:00:00	5	185	0	190	0	696	8:00:00	0	493	13	506	0	
9:00:00	9	207	0	216	0	653	9:00:00	0	420	17	437	0	
16:00:00	0	1	0	1	0	2	16:00:00	0	1	0	1	0	
17:00:00	11	478	0	489	0	746	17:00:00	0	247	10	257	0	
18:00:00	7	516	0	523	0	792	18:00:00	0	266	3	269	0	
Totals:	32	1387	0	1419	0	2889		0	1427	43	1470	0	
Calculated Values for Traffic Crossing Major Street													
Hours Ending:	7:00	8:00	9:00	16:00		17:00	18:00	18:00	18:00	18:00			
Crossing Values:	0	3	5	0		19	16	16	16				

Accu-Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:15:00

To: 8:15:00

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

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 7 runs W/E

North Leg Total: 11
North Entering: 5
North Peds: 0
Peds Cross: \times

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



Heavys	3
Trucks	0
Cars	3
Totals	6

East Leg Total: 694
East Entering: 195
East Peds: 0
Peds Cross: \times

Heavys	Trucks	Cars	Totals
13	3	183	199



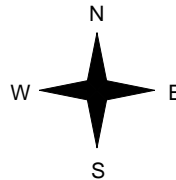
6th Line



Cars	Trucks	Heavys	Totals
0	0	1	1
181	3	10	194
181	3	11	



Hwy 7



Heavys	Trucks	Cars	Totals
2	0	3	5
9	9	481	499
11	9	484	



Hwy 7



Cars	Trucks	Heavys	Totals
481	9	9	499

Peds Cross: \times
West Peds: 0
West Entering: 504
West Leg Total: 703

Comments

Accu-Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 16:00:00

To: 18:00:00

One Hour Peak

From: 16:45:00

To: 17:45:00

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

Weather conditions:

Person(s) who counted:

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

Major Road: Hwy 7 runs W/E

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

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



Heavys	0
Trucks	0
Cars	7
Totals	7

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

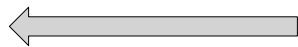
Heavys	Trucks	Cars	Totals
2	4	524	530



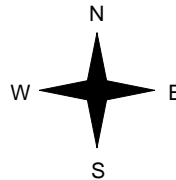
6th Line



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



Hwy 7



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



Hwy 7



Cars	Trucks	Heavys	Totals
249	1	5	255

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

Comments

Accu-Traffic Inc.

Total Count Diagram

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

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 7 runs W/E

North Leg Total: 35
North Entering: 17
North Peds: 0
Peds Cross: \times

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



Heavys	5
Trucks	0
Cars	13
Totals	18

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

Heavys	Trucks	Cars	Totals
33	11	1330	1374



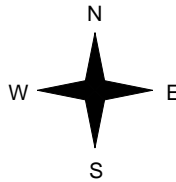
6th Line



Cars	Trucks	Heavys	Totals
3	0	1	4
1320	11	29	1360
1323	11	30	



Hwy 7



Heavys	Trucks	Cars	Totals
4	0	10	14
35	14	1371	1420
39	14	1381	



Hwy 7



Cars	Trucks	Heavys	Totals
1373	14	36	1423

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

Comments



Accu-Traffic Inc.

Traffic Count Summary

Intersection: Hwy 7 & 6th Line

Count Date: 14-Feb-12

Municipality: Eramosa

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	0	4	4	0	4	8:00:00	0	0	0	0	0
9:00:00	0	0	4	4	0	4	9:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	1	0	4	5	0	5	17:00:00	0	0	0	0	0
18:00:00	2	0	2	4	0	4	18:00:00	0	0	0	0	0
Totals:	3	0	14	17	0	17		0	0	0	0	0
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	2	7:00:00	0	2	0	2	0
8:00:00	0	181	1	182	0	694	8:00:00	3	509	0	512	0
9:00:00	0	186	0	186	0	602	9:00:00	2	414	0	416	0
16:00:00	0	1	0	1	0	4	16:00:00	1	2	0	3	0
17:00:00	0	476	2	478	0	732	17:00:00	3	251	0	254	0
18:00:00	0	515	1	516	0	763	18:00:00	5	242	0	247	0
Totals:	0	1359	4	1363	0	2797		14	1420	0	1434	0
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	7:00	8:00	9:00	16:00		17:00	18:00	18:00	18:00			
Crossing Values:	0	0	0	0		1	2	2	2			

APPENDIX B

Existing Traffic

Level Of Service Calculations

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

Existing Traffic AM



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↷	
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		B			
Approach Delay (s)	0.1	0.0	11.0			
Approach LOS			B			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization		51.9%		ICU Level of Service		A
Analysis Period (min)			15			










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

Existing Traffic AM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	↗
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		A	C			
Approach Delay (s)	0.0	0.2	15.8			
Approach LOS			C			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			47.5%	ICU Level of Service	A	
Analysis Period (min)			15			

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

Existing Traffic AM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
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	0.65
Hourly flow rate (vph)	0	0	9	0	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	17	9			9	
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)						
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			
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	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			6.7%		ICU Level of Service	A
Analysis Period (min)			15			

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

Existing Traffic PM



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↷	
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		C			
Approach Delay (s)	0.2	0.0	16.3			
Approach LOS			C			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization		50.4%		ICU Level of Service		A
Analysis Period (min)			15			










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

Existing Traffic PM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶	↷
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		A	C			
Approach Delay (s)	0.0	0.1	18.2			
Approach LOS			C			
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			54.0%	ICU Level of Service	A	
Analysis Period (min)			15			

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

Existing Traffic PM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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	A					
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	A
Analysis Period (min)			15			

APPENDIX C
Erin Gravel Pit Truck Trip Generation

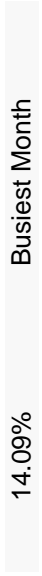
James Dick Erin Pit August 2011 Busiest Month Shipping by Hour of the Day

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

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

Total Monthly Tonnage Percentage for Erin Pit 2011

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



Busiest Month

APPENDIX D
Existing Plus Site Related Traffic
Level Of Service Calculations

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











Existing + Site Traffic AM



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
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 Utilization		52.7%		ICU Level of Service		A
Analysis Period (min)			15			










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

Existing + Site Traffic AM

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
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	C			
Approach Delay (s)	0.0	0.2	16.1			
Approach LOS			C			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization		48.2%		ICU Level of Service		A
Analysis Period (min)			15			

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

Existing + Site Traffic AM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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	A					
Approach Delay (s)	9.7	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)			15			

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

Existing + Site Traffic PM



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
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 Utilization		51.2%		ICU Level of Service		A
Analysis Period (min)			15			










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

Existing + Site Traffic PM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶	↷
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)						
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	C			
Approach Delay (s)	0.0	0.1	18.6			
Approach LOS			C			
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			54.7%	ICU Level of Service	A	
Analysis Period (min)			15			

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

Existing + Site Traffic PM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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)	0.6	0.0	0.0			
Control Delay (s)	9.7	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	9.7	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)			15			

APPENDIX E
Future (2018) Total Traffic
Level Of Service Calculations

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

Future Total Traffic AM
 2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
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			










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

Future Total Traffic AM
2017

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	↗
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		A	C			
Approach Delay (s)	0.0	0.2	18.2			
Approach LOS			C			
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			53.1%	ICU Level of Service	A	
Analysis Period (min)			15			

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

Future Total Traffic AM
2017

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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	A					
Approach Delay (s)	9.7	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)			15			

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

Future Total Traffic PM
 2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
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	0.93	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)						
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						
vCu, unblocked vol	888				1332	881
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				80	98
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			










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

Future Total Traffic PM
2017

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↘	↗
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		A	C			
Approach Delay (s)	0.0	0.2	22.0			
Approach LOS			C			
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization		60.6%		ICU Level of Service		B
Analysis Period (min)			15			

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

Future Total Traffic PM
 2017

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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	A					
Approach Delay (s)	9.7	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)			15			

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

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

Future Total Traffic AM
 2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↷	
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	A		E
Approach Delay (s)	0.2	0.0	39.5
Approach LOS			E

Intersection Summary			
Average Delay		1.0	
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		










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

Future Total Traffic AM
2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶	↷
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		A	C			
Approach Delay (s)	0.0	0.2	20.7			
Approach LOS			C			
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization		58.7%		ICU Level of Service		B
Analysis Period (min)			15			

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

Future Total Traffic AM
2022

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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	A					
Approach Delay (s)	9.7	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)			15			

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

Future Total Traffic PM
 2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
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		F			
Approach Delay (s)	0.4	0.0	54.1			
Approach LOS			F			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization		62.1%		ICU Level of Service		B
Analysis Period (min)			15			










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

Future Total Traffic PM
2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	↗
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		A	D			
Approach Delay (s)	0.0	0.2	27.2			
Approach LOS			D			
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			67.3%	ICU Level of Service	C	
Analysis Period (min)			15			

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

Future Total Traffic PM
2022

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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 Utilization		13.3%		ICU Level of Service		A
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 (l)	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 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 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 (l)	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

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)	

Network 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 (l)	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 PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:30
End Time	5:30
Total Time (min)	60
Volumes adjusted by 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 (l)	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)		

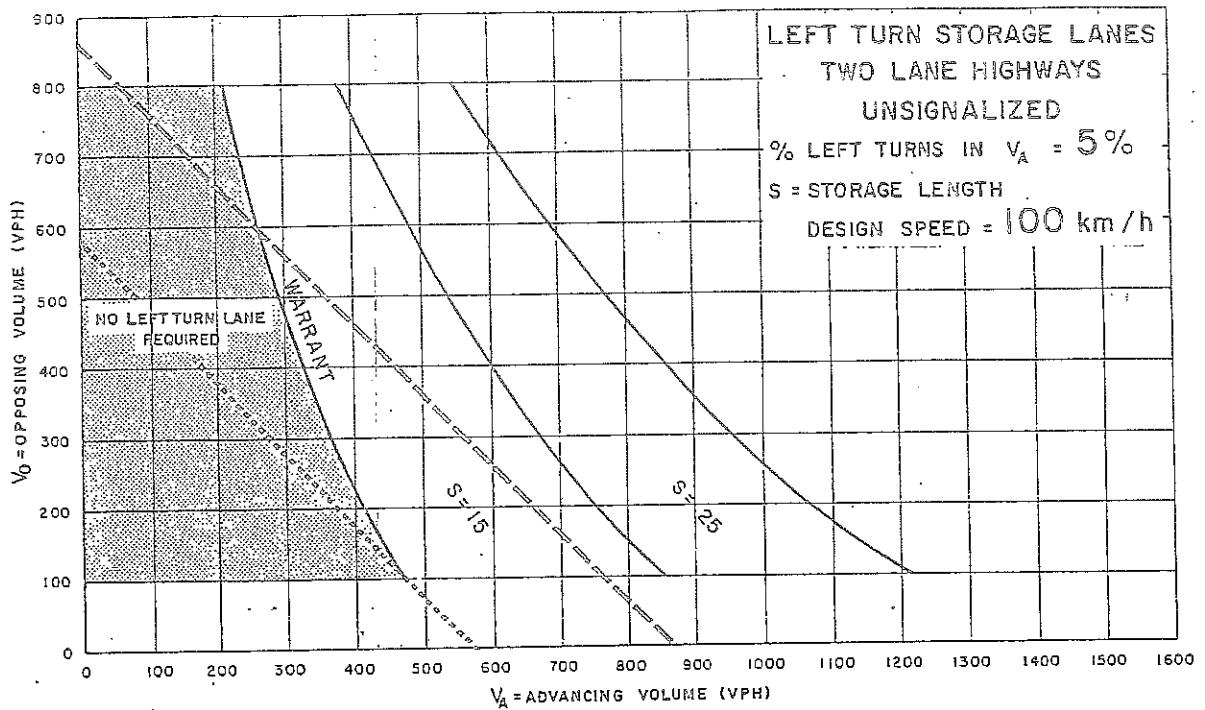
Intersection: 3: Proposed Access & 6th Line

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)	

Network Summary

Network wide Queuing Penalty: 0

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



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

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

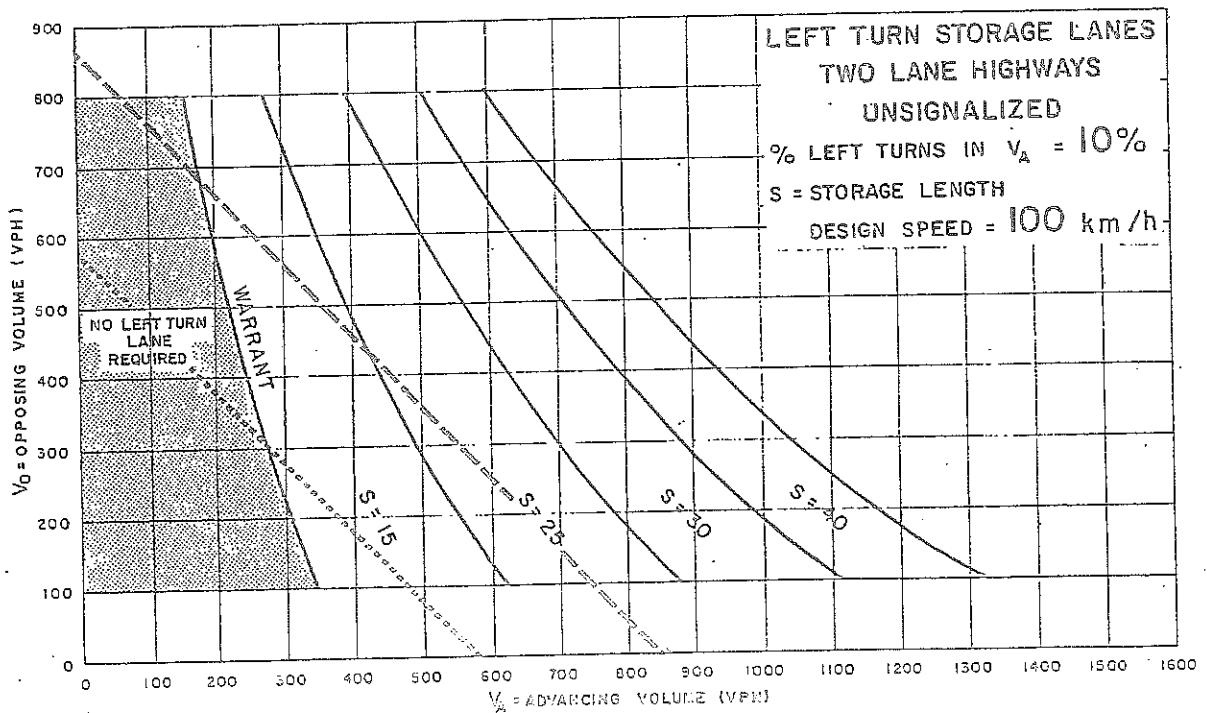
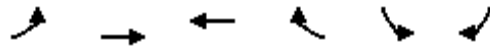


Figure EA-22

APPENDIX I

2023 SimTraffic Analysis With Left Turn Lane Calculations

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



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↗		↙	↘
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				E

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization	57.8%		ICU Level of Service B
Analysis Period (min)		15	

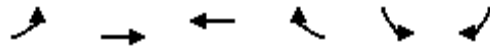
HCM Unsignalized Intersection Capacity Analysis (2023) Total Traffic AM - with Left Turn Lane 2: Highway 7 & 5th Line

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶	↷
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		A	C			
Approach Delay (s)	0.0	0.2	20.7			
Approach LOS			C			
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			58.7%	ICU Level of Service	B	
Analysis Period (min)			15			

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

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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	A					
Approach Delay (s)	9.7	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)			15			

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



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↗		↘	↘
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	B			F
Approach Delay (s)	0.2		0.0	54.1
Approach LOS				F

Intersection Summary			
Average Delay		1.1	
Intersection Capacity Utilization	62.1%		ICU Level of Service B
Analysis Period (min)		15	

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

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↘
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		A	D			
Approach Delay (s)	0.0	0.2	27.2			
Approach LOS			D			
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			67.3%	ICU Level of Service	C	
Analysis Period (min)			15			

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

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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 Utilization		13.3%		ICU Level of Service		A
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 (l)	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 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 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 (l)	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 (%)		
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)	

Network 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 (l)	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 PHF, Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:30
End Time	5:30
Total Time (min)	60
Volumes adjusted by 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 (l)	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)	

Network 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.