Lafarge Canada Inc.

TRAFFIC OPERATIONS ASSESSMENT

PROPOSED INDUSTRIAL EXPANSION

1044 COLBORNE STREET WEST

COUNTY OF BRANT

August 2020

Disclaimer

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August 24th, 2020

Reference Number: 20348/200

Ms. Carol Siemiginowski
Lafarge Canada Inc.
6509 Airport Road
Mississauga, ON
L4V 1S7

Dear Ms. Siemiginowski:

RE: Traffic Operations Assessment
Proposed Industrial Expansion
1044 Colborne Street West, County of Brant

LEA Consulting Ltd. is please to present the findings of the Traffic Operations Assessment for the proposed industrial expansion at 1044 Colborne Street West in the County of Brant. This report concludes that the traffic associated with the proposed expansion will have minimum traffic impact to the immediate roadways.

Should you have any comments with our assumptions or have any concerns, please contact the undersigned.

Yours truly,

LEA CONSULTING LTD.

Sabrina Chan, M.Eng., P.Eng.,
Transportation Engineer

Natalie Tsui, B.A.Sc., EIT
Transportation Analyst

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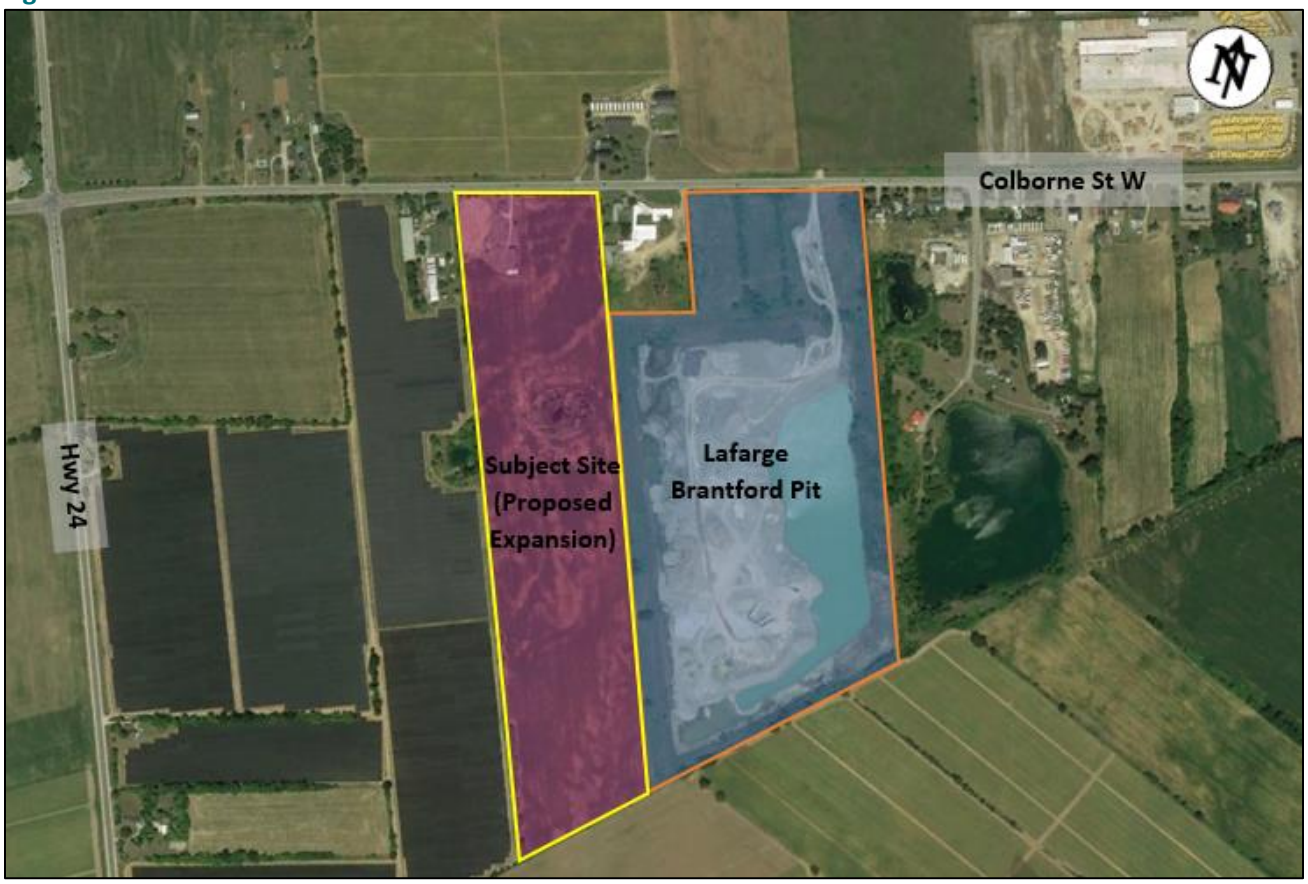
1 INTRODUCTION

LEA Consulting Ltd. (LEA) has been retained to undertake a Traffic Operations Assessment (TOA) for the proposed Brantford (Burford) pit expansion located at 1044 Colborne Street West in the County of Brant (herein referred to as the "subject site"). The subject site is located south of Colborne Street West (County Road 53), approximately 670m east of Highway 24 as illustrated in **Figure 1.1**. The proposed expansion is a continuation to the existing aggregate pit, operated by Lafarge Canada Inc**.**, and will utilize the existing site access on Colborne Street West of the adjacent Lafarge Brantford Pit. It is noted that the proposed expansion is not to expand operational capacity of the pit; but rather, to extend the life of the pit.

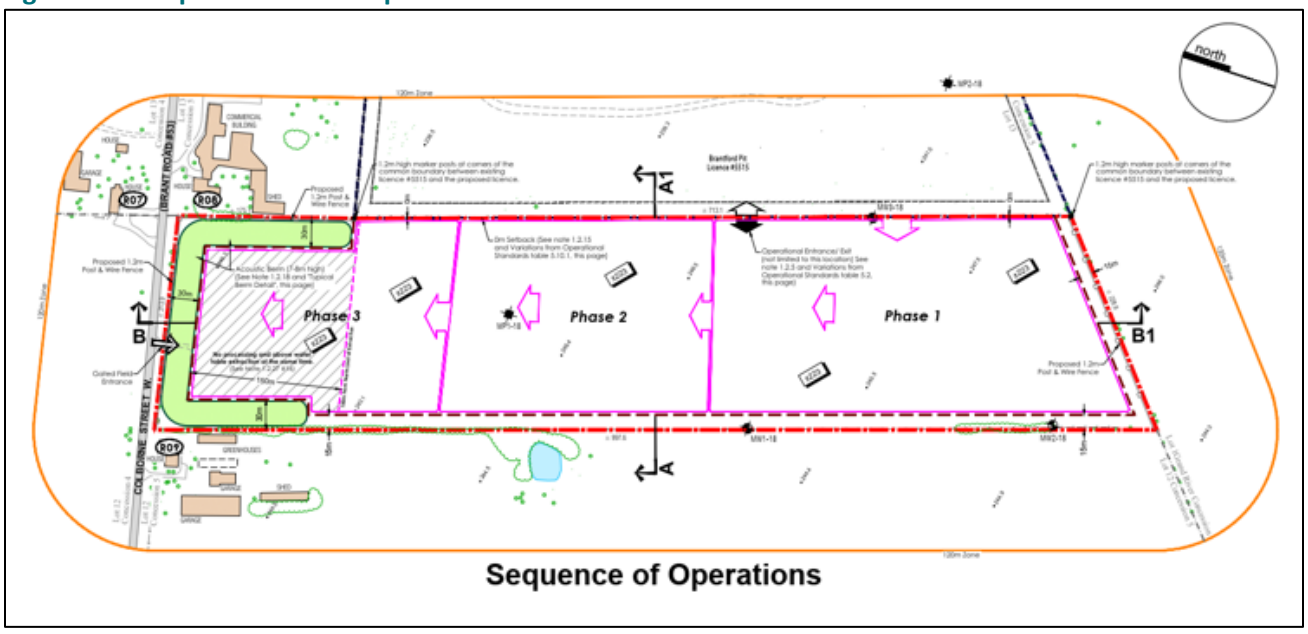
Figure 1.1: Site Location



1.1 PROPOSED EXPANSION

The proposed expansion involves continuing the operations from the existing adjacent Lafarge Brantford Pit on the agricultural lands at the subject site. Operations include extraction, processing, loading, and shipping. It is understood that the existing five (5) farm buildings located in the north quadrant of the subject site may be demolished. No permanent buildings or structures are proposed to be developed on the subject site. Temporary structures are proposed on the subject site, including a processing plant and acoustic barriers (i.e. berms). The extraction operations on the subject site will occur in three phases, beginning from the southern quadrant of the subject site and progress north towards Colborne Street West. Road access to the subject site will be available via the existing site access onto Colborne Street West at the Brantford Pit. The proposed operational plan is shown in **Figure 1.2**.

Figure 1.2: Proposed Site and Operational Plan



Source: MHBC Planning Ltd. (February 2020)

1.2 STUDY AREA

The study area for this TOA has been determined by evaluating the size and scope of the proposed expansion and its anticipated transportation impact, as well as through confirmation with County of Brant Staff through the Terms of Reference prepared by LEA dated February 4, 2020. Correspondence for Terms of Reference can be found in **Appendix A**. The study area will involve the unsignalized intersection of Colborne Street West and the Site Access for the existing Lafarge Brantford Pit.

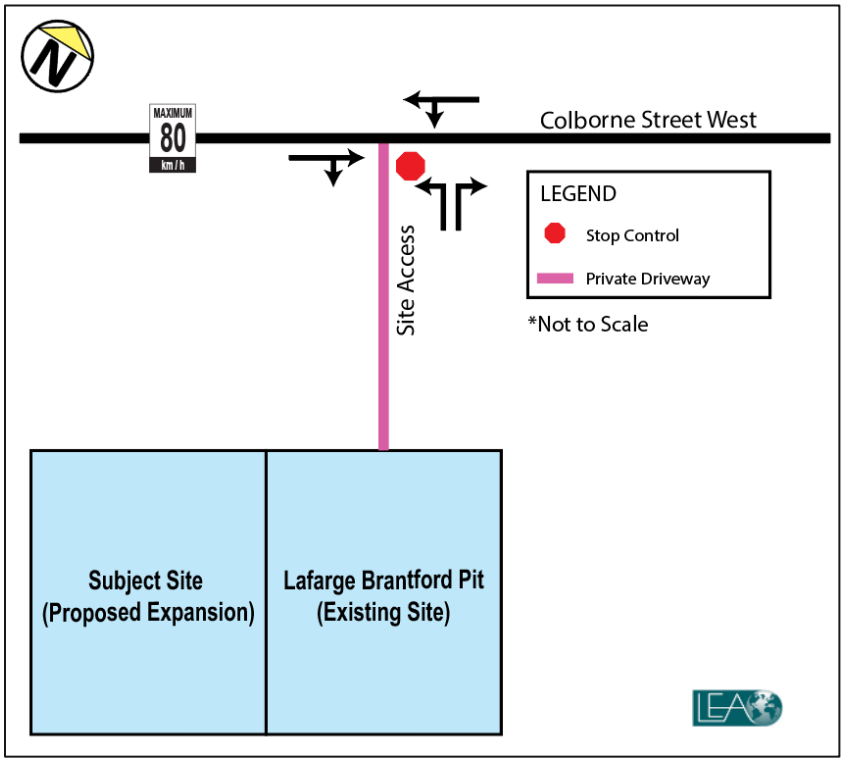
2 EXISTING CONDITIONS

This section will identify and assess the existing transportation conditions present in the study area, including the road, transit, cycling, and pedestrian networks.

2.1 ROAD NETWORK

The road network is under the jurisdiction of the County of Brant. The lane configuration and traffic control for the study area are shown in **Figure 2.1** and is described as follows.

Figure 2.1: Existing Lane Configuration and Traffic Control



Colborne Street West (County Road 53) is an east-west rural arterial roadway, operating with a two-lane cross-section (one lane per direction) in the study area. Within the County, Colborne Street West runs between Bishopsgate Road to the west and the eastern County limits to the east. The posted speed limit of Colborne Street West is 80km/h in the study area.

2.2 CYCLING NETWORK

There is no cycling infrastructure in the immediate vicinity of the subject site. **Figure 2.2** displays the surrounding cycling network. Approximately 4.8km west of the subject site is the Paris/Scotland Loop, a generally north-south shared roadway cycling route that connects the northwest and southwest portions of Brant County to the Community of Burford, and is accessible via Colborne Street West. Approximately 5.6km north of the subject site is the Paris/Falkland Loop, a shared roadway cycling route that circles the Community of Paris. Approximately 2.5km southeast of the subject site are multi-use trails including Brock's Route and the T.B. & H Trail, which connects to the City of Brantford. Overall, dedicated cycling infrastructure nearby the subject site is limited. However, it is typical for cyclists in rural areas to share the roadway with motorists.

Figure 2.2: Existing Cycling and Trail Networks

Source: County of Brant (February 2020)

2.3 PEDESTRIAN NETWORK

In the area surrounding the subject site, gravel shoulders are present on both sides of Colborne Street West. Sidewalks are not available within the study area. Overall, the area surrounding the subject site provides a low level of accessibility and amenities by walking.

2.4 TRAFFIC DATA COLLECTION

LEA collected turning movement counts (TMCs) for the intersection of Colborne Street West and the Lafarge Brantford Pit Site Access within the study area. Traffic volumes were collected on Wednesday, February 12, 2020 during the weekday AM peak period from 7:00 AM to 9:00 AM and the PM peak period from 4:00 PM to 6:00 PM. It is noted that, at the time of the survey, mining operation was paused for the season. Detailed TMCs are included in **Appendix B**.

2.5 EXISTING PIT OPERATIONS

The following is our understanding of the operations of the Brantford pit:

- The site is allowed to excavate an unlimited tonnage annually as per the existing license
- Between 6:00 AM to 7:00 AM from Monday to Saturday, shipping and loading operations will be the only operations at the pit during this time; and
- Between 7:00 AM to 7:00 PM from Monday to Saturday, the pit will be operating fully (extraction, processing, loading and shipping).

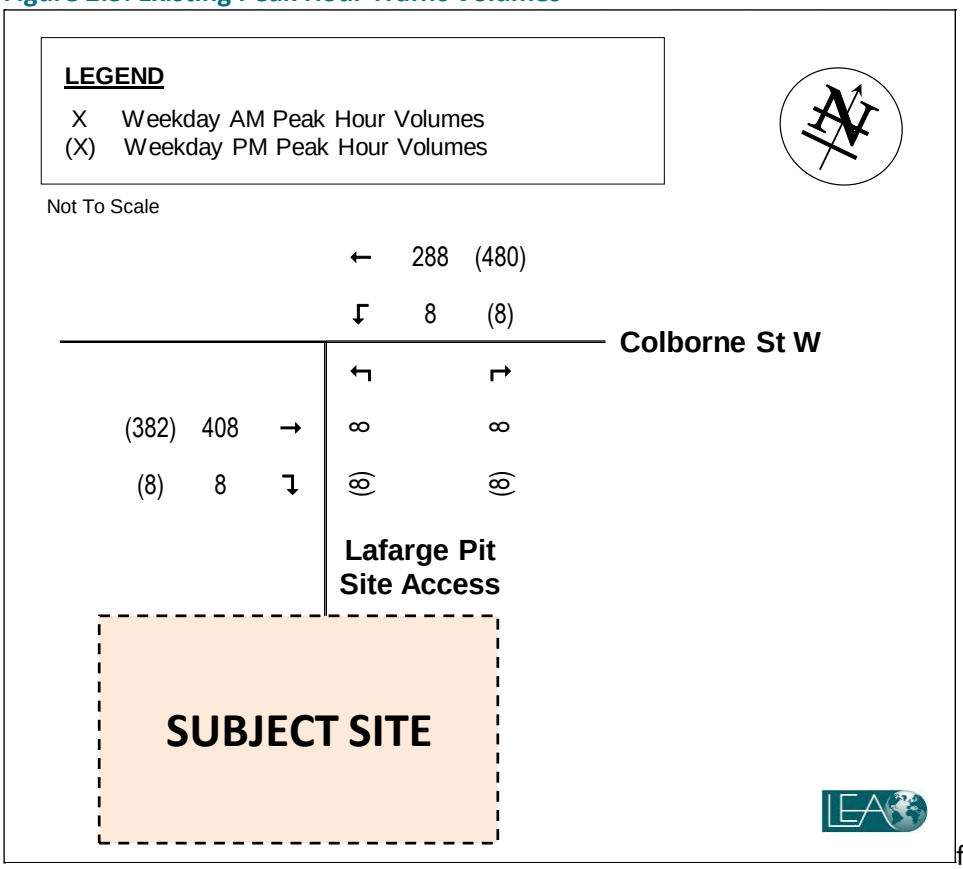
A 10-year history of the pit was reviewed to determine the truck traffic generated from the pit. It was found that, on average, the busiest months of the season had 7 trucks (14 passes) per hour during the peak period. The busiest single month in the 10-year history yielded a count of 16 trucks (32 passes), and is considered the “worst-case scenario.” It is our understanding based on discussions with Lafarge that, on average, trucks have an even east-west directional split.

2.6 EXISTING INTERSECTION CAPACITY ANALYSIS

Based on the operating hours of the pit (6:00 AM-7:00 PM) , it is expected that during the roadway peak hours (weekday AM and PM), truck volumes are the anticipated traffic travelling in and out of the subject site. To encapsulate the “worst-case scenario” for the existing site operations, the busiest single-month count of 16 trucks in the 10-year history was used for the inbound and outbound truck traffic, and is considered a conservative approach to the analysis. An even split between the eastbound and westbound direction was assumed based on discussions with the pit operator.

The existing traffic volumes utilized in the intersection capacity analyses for the weekday AM and PM peak hours are illustrated in **Figure 2.3**.

Figure 2.3: Existing Peak Hour Traffic Volumes



for

The intersection capacity analysis under existing conditions was conducted using Synchro 9.0 which incorporates the Highway Capacity Manual (HCM) 2000 methodology and adheres to the County of Brant Traffic Impact Study Guidelines, dated May 2014. The existing intersection capacity analysis has been conducted for the weekday AM and PM peak hours. It is noted that since all site traffic generated by the subject site during the studied peak hours is truck traffic, the heavy vehicle percentage for the inbound and outbound movements was adjusted to be 100%. Results are summarized in **Table 2.1** for the studied unsignalized intersection of the site access and Colborne Street West. Detailed capacity results are provided in **Appendix C.**

Table 2.1: Existing Intersection Capacity Analysis

Movement of Interest	AM Peak Hour				PM Peak Hour			
	Delay (s)	95th Queue (m)	V/C	LOS	Delay (s)	95th Queue (m)	V/C	LOS
Northbound Left-Right	17	1	0.06	C	21	2	0.07	C
Eastbound Through-Right	0	0	0.27	-	0	0	0.27	-
Westbound Through-Left	0	0	0.01	A	0	0	0.01	A

As evident in the above table, all inbound and outbound movements are operating with LOS C, which means the movement is operating with a delay between 15 and 25 seconds. Left turns into the subject site, from the westbound through-left movement, is noted to be operating with LOS A, with a delay of 10 seconds and less. Significant residual capacity is also noted for the movements. Under existing conditions, operating within acceptable parameters.

3 FUTURE CONDITIONS

As requested by County staff, a study horizon of five (5) and ten (10) years, until 2025 and 2030 respectively, is considered.

3.1 CORRIDOR GROWTH

The annual corridor growth along Colborne Street West has been determined to be 2% per annum as per Terms of Reference correspondence with the County of Brant Staff.

3.2 FUTURE PIT OPERATIONS

The following is our understanding of the expected operations of the pit post-expansion:

- The operating hours as noted in **Section 2.5** above will be maintained;
- The proposed total tonnage to be excavated annually from the subject site will not exceed 1,000,000 tonnes for the new license; and
- The pit expansion is to increase the longevity of the mining operation, and is not to increase operating capacity.

Truck passes are expected to increase at a rate of 2% per year, resulting in 18 and 20 truck passes during the peak hour in the 2025 and 2030 study horizon, based on the worst-case scenario. Therefore, a total of 20 truck passes is anticipated in 2030 study horizon .

The existing site access is to be maintained, and no changes to the access location or designed are proposed as part of the expansion plans. It is our understanding that an Access Review Study for the subject site was undertaken by Paradigm Transportation Solutions Limited (Paradigm) in March 2016, enclosed in **Appendix D**, for changes to the site operations proposed during that time. No particular concerns regarding the sight distance at the site access were noted within the study. As the site access location and design is to be maintained under the current proposal, the conclusions for the site access remains consistent for this submission.

3.3 FORECASTED SITE TRAFFIC

The subject site is not expected to increase traffic at the existing access. A worst-case scenario of 20 inbound and 20 outbound truck trips per hour, for a total of 40 two-way trips was analyzed. It is anticipated that the trucks will be travelling to and from the east and west, in the direction of Hwy 24 and the City of Brantford.

Figure 3.1 and **Figure 3.2** illustrates the 2025 and 2030 future traffic volumes respectively.

Figure 3.1: 2025 Future Peak Hour Traffic Volumes

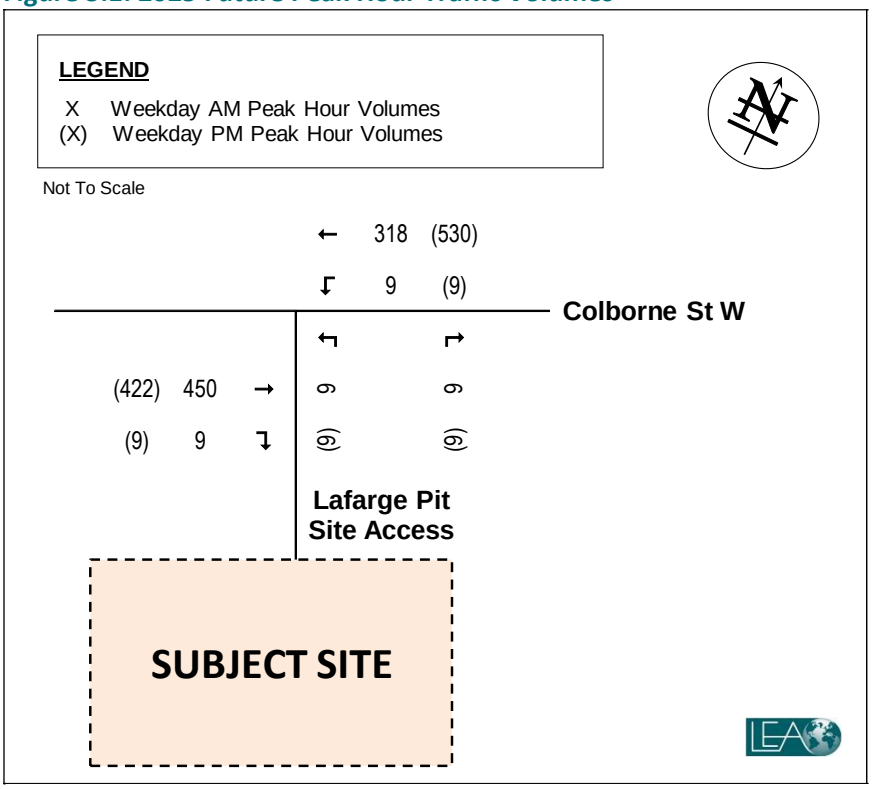
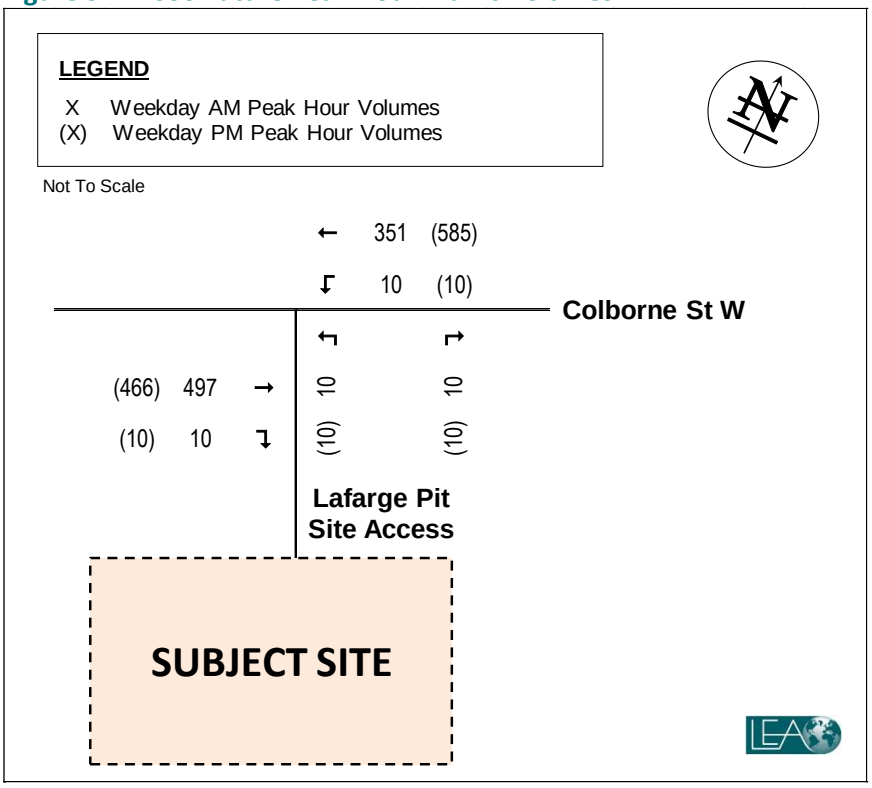


Figure 3.2: 2030 Future Peak Hour Traffic Volumes



3.4 FUTURE INTERSECTION CAPACITY ANALYSIS

An intersection capacity analysis was conducted for the intersections within the study area under the 2025 and 2030 future total traffic conditions. Results are summarized in **Table 3.1** for the studied unsignalized intersection of the site access and Colborne Street West. Detailed capacity results are provided in **Appendix E.**

Table 3.1: Future Intersection Capacity Analysis

Movement of Interest	AM Peak Hour				PM Peak Hour			
	Delay (s)	95th Queue (m)	V/C	LOS	Delay (s)	95th Queue (m)	V/C	LOS
Study Horizon: 2025								
Northbound Left-Right	19	2	0.07	C	23	2	0.09	C
Eastbound Through-Right	0	0	0.30	-	0	0	0.29	-
Westbound Through-Left	0	0	0.01	A	0	0	0.01	A
Study Horizon: 2030								
Northbound Left-Right	21	2	0.09	C	28	4	0.13	D
Eastbound Through-Right	0	0	0.33	-	0	0	0.33	-
Westbound Through-Left	1	0	0.02	A	1	0	0.02	A

Under the future total conditions for both study horizons, all outbound truck traffic will be operating similarly to the existing conditions with acceptable delay. Movements are expected to operate with a LOS of D or better, which means that movements operate with a delay of 35 seconds and less.

A maximum increase of seven seconds to the delay and 0.04 to the V/C is anticipated for the outbound traffic as a result of the future growth from 2025 to 2030. The eastbound and westbound movements also operate with minimal delay. Therefore, the proposed subject site is not anticipated to significantly impact the area's transportation network.

4 PARKING AND LOADING REVIEW

4.1 PARKING

Vehicular parking for the proposed expansion is subject to the minimum requirements specified in Brant County's Zoning By-law 61-16. As per Brant County's By-law, a minimum of two (2) parking spaces are required to be provided for the overall mining operations.

It is our understanding that the existing office building for the adjacent aggregate mining pit will also be used for the proposed expansion. As a result, it is anticipated that any parking requirements related to the proposed expansion will be accommodated by the existing office building and parking supply.

4.2 LOADING

Loading requirements for the subject site is determined by Brant County's Zoning By-law 61-16. Since the sole building on the subject site is 12 m^2, a loading space is not required as the building is less than 250 m^2 as per the By-law.

5 CONCLUSIONS

- An expansion of the existing Lafarge Brantford (Burford) aggregate mining pit is proposed at 1044 Colborne Street West, approximately 670 m east of Hwy 24, in the Count of Brant. The pit expansion is not to increase the operational capacity, but rather to increase the longevity of the pit.
- Under existing conditions, the existing site is expected to have a worst-case scenario of 16 inbound and 16 outbound truck trips during the studied peak hours.
- Given the current worst-case scenario, future traffic conditions yield a potential increase to 20 truck trips entering and exiting the subject site per hour. This equals to 40 two-way trips during the studied peak hours.
- Under future traffic conditions for the 2025 and 2030 study horizon, the site access is expected to be operating with ample residual capacity and with acceptable delay. The proposed expansion is not expected to significantly impact Colborne Street West.
- The existing site access is to be maintained in its location and design. The conclusions from the March 2016 Paradigm report regarding sightlines for the access remain valid for the proposed expansion.
- A minimum of two (2) parking spaces is required to be provided. It is our understanding that the parking supply will be satisfied by the parking supply at the existing office building.

APPENDIX A

Terms of Reference

Natalie Tsui

From: Julie Tot <julie.tot@brant.ca>
Sent: Tuesday, February 18, 2020 2:09 PM
To: John Nhan
Cc: Sabrina Chan; Natalie Tsui; Doug Lyons; Ruchika Angrish; Don Cunningham
Subject: RE: TOA Terms of Reference - Lafarge Brantford (Burford) Pit
Attachments: AADT Map.pdf

Good afternoon John,

This email is provided in response to the recent submission of the "Traffic Operation Assessment" letter prepared by LEA Consulting Ltd, dated February 4, 2020, for the proposed LaFarge Burford Pit expansion located at 1044 Colborne Street West. Having reviewed the document, the following comments are provided by the County.

- General Corridor Growth Rate – The growth rate to be used along Colborne Street West shall be 2% annually. Attached is the historical AADT information for this section of roadway.
- Road Network Improvements – No road network improvements are identified in the County's 5-year forecast. It should be noted that the intersection of Rest Acre Road (Highway 24) and Colborne Street West is under the jurisdiction of the Ministry of Transportation.
- Below is a summary of the 10 year (2010 – 2019) reported collision history for Colborne Street West between Rest Acres Road and McGregor Avenue is summarized as follows:
  - 3 collisions in 2010 – 2 rear end collisions going westbound, 1 right angle collision at McGregor Avenue.
  - 1 collision in 2011 – V1 passing V2 and sideswiped V1, both going eastbound.
  - 1 collision in 2013 – V1 struck deer.
  - 1 collision in 2015 – V1 eastbound struck V2 westbound.
  - 2 collisions in 2016 – a. V1 slid off road, b. V1 struck bicycle.
  - 1 collision in 2018 – V1 rear-ended V2.
- Background Developments – Any background development that would proceed during this time frame noted below would not exceed the 2% growth rate being applied to the background traffic.
- Trip Generation, Distribution & Assignment – Trip generation for this type of land use, will need to take into consideration the quantity of material being extracted (1,000,000 tonnes/year) the number of trucks, employees, hours of operation and the days of operations that will impact the adjacent roadway, Colborne Street West. The 10 year history of the pit, should be reflected in order to determine the month(s) of the year that are the busiest in order to determine the distribution patterns.
- Future traffic scenarios shall be five (5) year 2025 and ten (10) year 2030.

If you have any questions, please do not hesitate to contact me.

Regards,

Julie Tot, C.Tech
Development Engineering Reviewer

Development Services Department
County of Brant
66 Grand River Street North, Paris, ON, N3L 2M2

T 519.442.6324 x 3049 | F 519.442.3049 www.brant.ca

From: Don Cunningham
Sent: February 5, 2020 12:09 PM
To: John Nhan <jnhan@lea.ca>
Cc: Sabrina Chan <SChan@lea.ca>; Natalie Tsui <NTsui@lea.ca>; Julie Tot <julie.tot@brant.ca>; Doug Lyons <doug.lyons@brant.ca>; Ruchika Angrish <ruchika.angrish@brant.ca>
Subject: RE: TOA Terms of Reference - Lafarge Brantford (Burford) Pit

Hi John,

We are confirming receipt of your email below c/w attachment. County staff will contact you once our review of same has been completed.

If you have any questions, please do not hesitate to contact me.

Regards,

Don Cunningham
Manager of Development Engineering Review

Development Services Department
County of Brant
66 Grand River Street North, Paris, ON, N3L 2M2

T 519.442.6324 x 3017 | F 519.442.3461 | www.brant.ca

From: John Nhan [mailto:jnhan@lea.ca]
Sent: February-04-20 5:28 PM
To: Don Cunningham
Cc: Sabrina Chan; Natalie Tsui
Subject: TOA Terms of Reference - Lafarge Brantford (Burford) Pit

Hi Don,

LEA has been retained to prepare a Traffic Operations Assessment for the proposed industrial expansion at 1044 Colborne Street West in the County of Brant. The proposal is an expansion of the existing aggregate mining operations of the adjacent Lafarge Brantford (Burford) Pit. Please find attached our Terms of Reference for your review.

Please let me know if you have any questions or concerns with our work plan.

Thanks,

John Nhan, B.Eng., EIT
Transportation Designer
LEA Consulting Ltd.
625 Cochrane Drive, 9th Floor | Markham, ON | L3R 9R9
T: 905 470 0015 ext. 355 **E:** jnhan@lea.ca **W:** www.LEA.ca

APPENDIX B

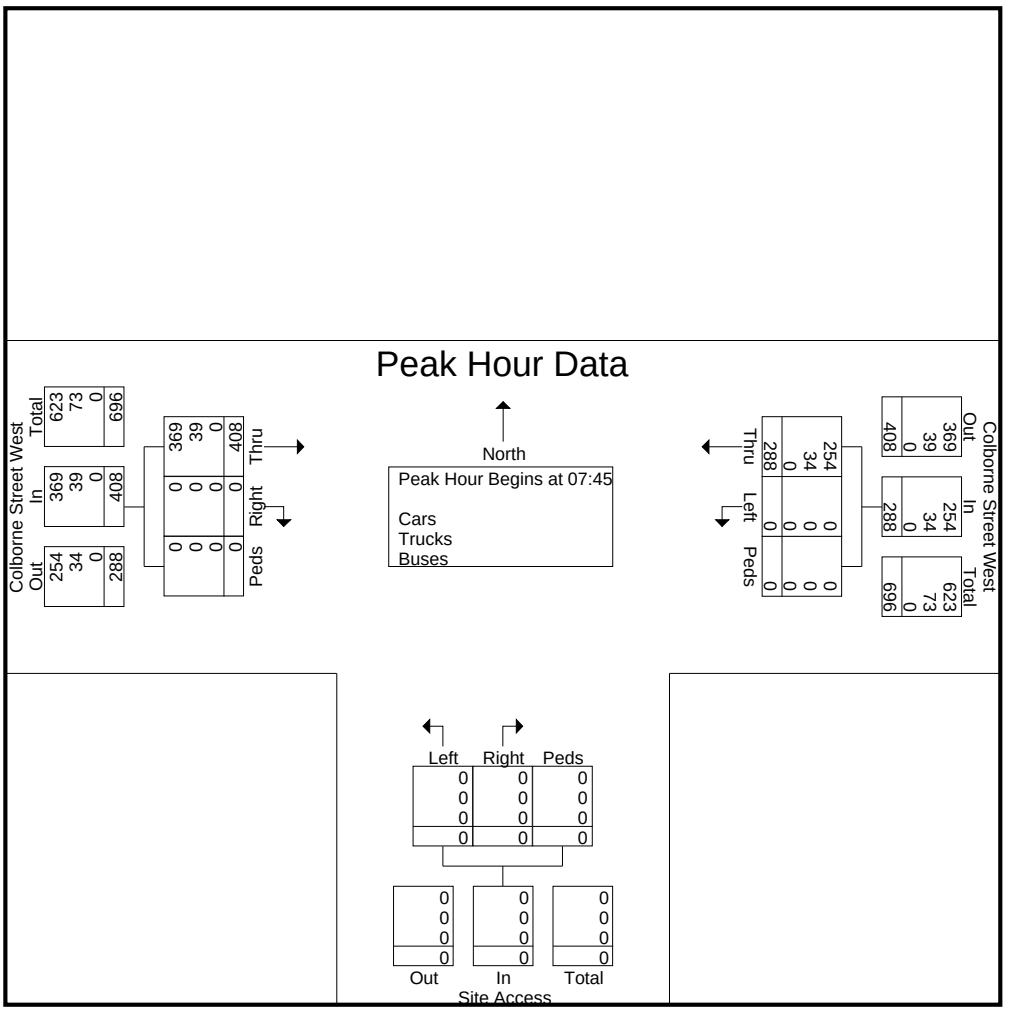
Existing Traffic Data

LEA Consulting Ltd.

625 Cochrane Drive, 9th Floor
Markham, ON L3R 9R9

File Name : SiteAccess&ColborneStW-AM
Site Code : 02034819
Start Date : 2020-02-12
Page No : 3

	Colborne Street West Westbound				Site Access Northbound				Colborne Street West Eastbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45													
07:45	0	**83**	0	**83**	0	0	0	0	96	0	0	96	179
08:00	0	67	0	67	0	0	0	0	**124**	0	0	**124**	**191**
08:15	0	76	0	76	0	0	0	0	99	0	0	99	175
08:30	0	62	0	62	0	0	0	0	89	0	0	89	151
Total Volume	0	288	0	288	0	0	0	0	408	0	0	408	696
% App. Total	0	100	0		0	0	0		100	0	0		
PHF	.000	.867	.000	.867	.000	.000	.000	.000	.823	.000	.000	.823	.911
Cars	0	254	0	254	0	0	0	0	369	0	0	369	623
% Cars	0	88.2	0	88.2	0	0	0	0	90.4	0	0	90.4	89.5
Trucks	0	34	0	34	0	0	0	0	39	0	0	39	73
% Trucks	0	11.8	0	11.8	0	0	0	0	9.6	0	0	9.6	10.5
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0

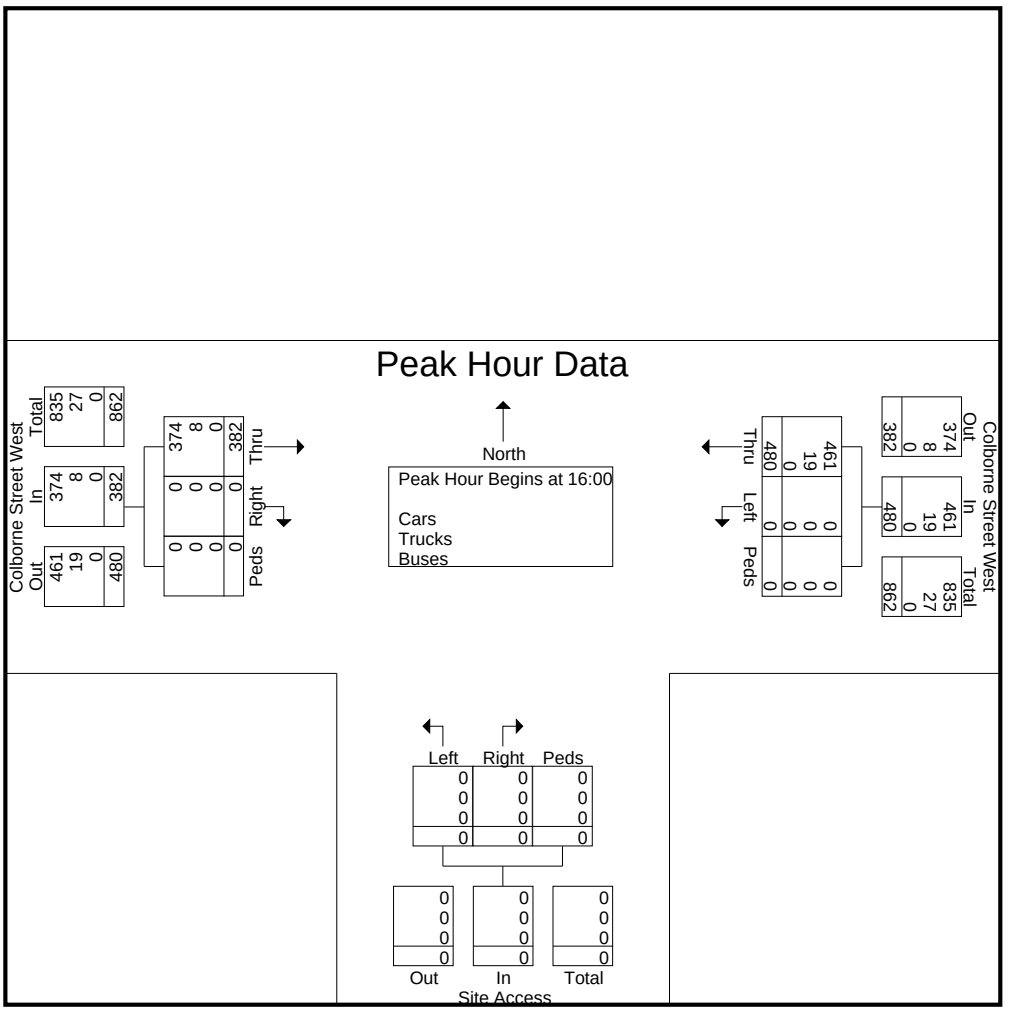


LEA Consulting Ltd.

625 Cochrane Drive, 9th Floor
Markham, ON L3R 9R9

File Name : SiteAccess&ColborneStW-PM
Site Code : 02034819
Start Date : 2020-02-12
Page No : 3

	Colborne Street West Westbound				Site Access Northbound				Colborne Street West Eastbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 16:00													
16:00	0	126	0	126	0	0	0	0	96	0	0	96	222
16:15	0	96	0	96	0	0	0	0	73	0	0	73	169
16:30	0	**142**	0	**142**	0	0	0	0	**110**	0	0	**110**	**252**
16:45	0	116	0	116	0	0	0	0	103	0	0	103	219
Total Volume	0	480	0	480	0	0	0	0	382	0	0	382	862
% App. Total	0	100	0		0	0	0		100	0	0		
PHF	.000	.845	.000	.845	.000	.000	.000	.000	.868	.000	.000	.868	.855
Cars	0	461	0	461	0	0	0	0	374	0	0	374	835
% Cars	0	96.0	0	96.0	0	0	0	0	97.9	0	0	97.9	96.9
Trucks	0	19	0	19	0	0	0	0	8	0	0	8	27
% Trucks	0	4.0	0	4.0	0	0	0	0	2.1	0	0	2.1	3.1
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0



APPENDIX C

Intersection Capacity Analysis Results – Existing Traffic Conditions

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	408	8	8	288	8	8
Future Volume (Veh/h)	408	8	8	288	8	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	448	9	9	316	9	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			457		786	452
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			457		786	452
tC, single (s)			5.1		7.4	7.2
tC, 2 stage (s)						
tF (s)			3.1		4.4	4.2
p0 queue free %			99		96	98
cM capacity (veh/h)			735		250	446

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	457	325	18
Volume Left	0	9	9
Volume Right	9	0	9
cSH	1700	735	320
Volume to Capacity	0.27	0.01	0.06
Queue Length 95th (m)	0.0	0.3	1.4
Control Delay (s)	0.0	0.4	16.9
Lane LOS		A	C
Approach Delay (s)	0.0	0.4	16.9
Approach LOS			C

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	382	8	8	480	8	8
Future Volume (Veh/h)	382	8	8	480	8	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	444	9	9	558	9	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			453		1024	448
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			453		1024	448
tC, single (s)			5.1		7.4	7.2
tC, 2 stage (s)						
tF (s)			3.1		4.4	4.2
p0 queue free %			99		95	98
cM capacity (veh/h)			738		173	449

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	453	567	18
Volume Left	0	9	9
Volume Right	9	0	9
cSH	1700	738	249
Volume to Capacity	0.27	0.01	0.07
Queue Length 95th (m)	0.0	0.3	1.9
Control Delay (s)	0.0	0.3	20.6
Lane LOS		A	C
Approach Delay (s)	0.0	0.3	20.6
Approach LOS			C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX D

Paradigm Access Review (March 2016)

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07 March 2016
Project: 160010

David Cook
Lands Manager, South West Ontario
Lafarge Canada
1773 Dumfries Road
Cambridge ON N1R 5S5

Dear Mr. Cook:

RE: ASPAHALT/CONCRETE RECYCLING AT BURFORD PIT, BRANT COUNTY, ON ACCESS REVIEW STUDY

This letter has been prepared on behalf of Lafarge Canada which currently operates an aggregate extraction operation at 1018 Colborne St West in the County of Brant. The County has requested that a traffic review be provided for the proposed changes to the site operations. This letter report has been prepared to fulfill that requirement. **Figure 1** illustrates subject site location at 1018 Colborne St West. The property is referred to as the Burford Pit.

Existing Conditions

Colborne Street West is a two-lane rural arterial roadway providing an east-west route through Brantford and providing a connection west to Hwy 403 and Woodstock. The posted speed limit is 80 km/h in the immediate area of the pit. Weekday peak hour traffic volumes are approximately 650 vehicles per hour (vph) in the AM peak hour and 800 vph in the PM peak hour, which indicate moderate traffic conditions on the roadway.

The subject lands have street frontage on Colborne Street West. All vehicular access is via a single existing two-way driveway connection to Colborne Street West. Land uses in the immediate area of the development consist primarily of agricultural/ industrial developments that have separate driveway connections to Colborne Street West.

The existing property is an aggregate extraction facility where raw sand and gravel are extracted for construction material purposes. It is approximately 29.4 ha, of which, 21.7 ha is licensed for aggregate extraction. There is no permanent building on the site. The facility uses portable processing plants to process the aggregate as required. The owner/development has confirmed that the site is in operation from Spring to Fall from 7:00 AM to 5:00 PM during weekdays. Since there was no traffic entering and exiting the site during the study period, no existing traffic count data were collected. The owner/developer provided traffic entering and exiting the site during the peak months based on site

loading activity. These data were used for estimating traffic volumes at the site driveway. The data indicate that there were approximately 19 inbound and 19 outbound trips in the AM peak hour and 7 inbound and 7 outbound trips in the PM peak hour. **Figure 2** shows the existing weekday AM and PM peak hour traffic volumes, respectively, at the Colborne Street West and the site driveway intersection.

The operation of Colborne Street West and the site driveway intersection was evaluated with the existing turning movement volumes using Synchro 8. **Table 1** summarizes the existing intersection operations, noting the existing LOS, V/C ratios and 95th percentile queues experienced at the intersection, for the AM and PM peak hours. The analyses indicate that the Colborne Street West and the site driveway intersection operates within acceptable levels of service during both AM and PM peak periods.

TABLE 1: EXISTING TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Colborne Street W (Hwy 53) & Site Dwy	TWSC	LOS Delay V/C Q					A 10 0.01 0.0			**A** **0**	C 16 0.06 0.2			**C** **16**					1
PM Peak Hour	Colborne Street W (Hwy 53) & Site Dwy	TWSC	LOS Delay V/C Q					A 10 0.01 0.0			**A** **0**	C 17 0.03 0.1			**C** **17**					0.2

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control

Collision data for this section of Colborne Street West between Rest Acres Road and McGregor Avenue was obtained from County of Brant. The data indicate that there was one side swipe collision and one deer collision during the last 3 years. Both collisions occurred near Rest Acres Road, west of the site.

Desktop assessments of the available sight distance at the sight driveway did not reveal any particular concerns as this section of Colborne Street West is straight and relatively flat. It is noted that there appears to be tree canopy encroaching into the right-of-way west of the site driveway that should be trimmed to the ROW limit. This should be verified in when full foliage is present.

Development Plan

The development plan is based on adding an asphalt/concrete recycling operation to the existing extraction facility. The owner/development will use the existing facility to crush the concrete and asphalt as they become available. The facility will continue to use portable plants to process the material as required. There will not be any physical changes to the property or driveway connections.

The owner has confirmed that there will not be any significant changes to the traffic entering and exiting the site. The trucks that are expected to bring in the asphalt/concrete material to the site are in turn expected to take the raw/recycled asphalt/concrete back and vice-versa. The asphalt/concrete recycling component is not expected to create any net new trips to/from the site.

This information and a very modest annual growth rate of 2% was used to estimate the peak hour traffic volumes generated by the development for year 2021. The estimates show that the

development is expected to generate approximately 21 inbound and 21 outbound trips in the AM peak hour and 8 inbound and 8 outbound trips in the PM peak hour.

The owner has provided an even directional split (50% east/50%west) at the site. The trips forecast to be generated by the development were assigned to the road network based on this travel information.

Assessment of Traffic Impact

An annual growth rate of 2% was applied to the existing traffic to estimate 2021 horizon year peak hour traffic volumes at the Colborne Street West and site driveway intersection. The 2% growth rate is very conservative and assumed to include both generalized traffic growth in the vicinity of the site and trips generated by other planned developments in the study area. **Figure 3** shows the 2021 traffic forecast for the weekday AM and PM peak hours, respectively (attached).

The operation of Colborne Street West and the site driveway was analyzed for the AM and PM peak hours with the estimated 2021 future traffic volumes using Synchro 8. **Table 2** summarizes the traffic analysis results for the 2021 horizon year. The analyses indicate that the intersection is forecast to operate within acceptable level of service condition during both AM and PM peak hours.

TABLE 2: 2021 TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Colborne Street W (Hwy 53) & Site Dwy	TWSC	LOS Delay V/C Q					A 10 0.02 0.1			**A** **0**	C 17 0.07 0.2			**C** **17**					1
PM Peak Hour	Colborne Street W (Hwy 53) & Site Dwy	TWSC	LOS Delay V/C Q					A 10 0.01 0.0			**A** **0**	C 19 0.03 0.1			**C** **19**					0.2

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control

Remedial Measures

The need for a westbound auxiliary left-turn lane on Colborne Street West at the site driveways has been assessed using the left-turn lane warrant nomographs provided in Chapter 5, Appendix A of the Ministry of Transportation (MTO) Geometric Design Standards for Ontario Highways (the MTO Manual). **Figure 4** illustrates the warrant analysis for the 2021 horizon year. The analysis indicates that an auxiliary lane with 15 m of storage is warranted for the PM peak hour. However, it should be noted that the warrant assumes a 5% turning volume. During PM peak hour the site is forecast to generate about 4 left turning vehicles from Colborne Street West which is less than 1%. Considering the low number of turning vehicles and the low through traffic volumes, it is recommended that an auxiliary left turn lane is not be required on Colborne Street West at Site Driveway for acceptable level of service operation.

Conclusions

The proposed changes to the existing development to add an asphalt/concrete recycling component is not forecast to generate significant amount of new traffic to and from the site. The site activity with the asphalt/concrete recycling and the existing aggregate operation is forecast to generate about 42 AM peak hour trips and 16 PM peak hour trips. This traffic is not expected to have noticeable impact on the existing traffic operations along Colborne Street West (Highway 53).

The access and egress to the development will be provided by the existing two-way driveway connection to Colborne Street West. This driveway is well-separated from the other driveways in the immediate area and has sufficient sight distance in both directions along Colborne Street West to enable vehicles turning from the site onto Colborne Street West to view the oncoming traffic. It is noted that the tree canopy may be impacting sight lines to the west and should be reviewed at a time when the trees have a full leaf canopy.

Overall this review has not identified any traffic problems related to the proposed addition of the asphalt/concrete recycling function to the site and recommends that the planning application be approved without any conditions to off-site improvements.

Yours very truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED

Jim Mallett
M.A.Sc., P.Eng., PTOE
President

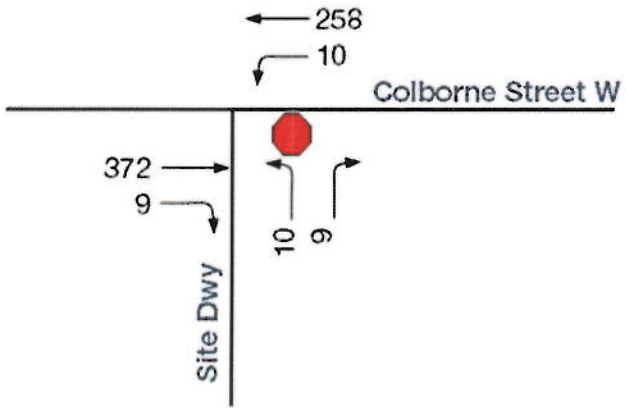
paradigm TRANSPORTATION SOLUTIONS LIMITED

Study Area and Development

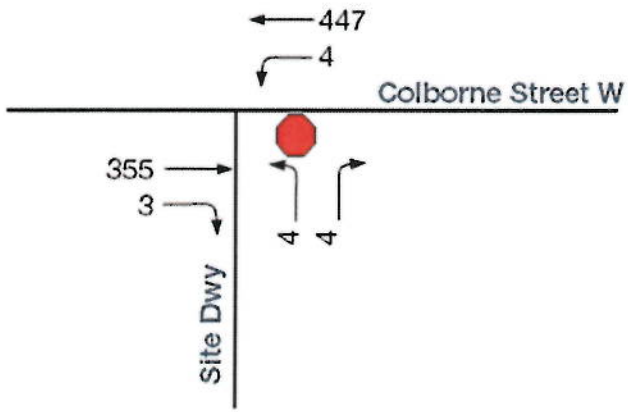
Burford Pit Access Review Study, Brantford
160010

Figure 1

Existing Traffic Volumes - AM Peak Hour



Existing Traffic Volumes - AM Peak Hour



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Existing Traffic Volumes

Burford Pit Access Review Study, Brantford
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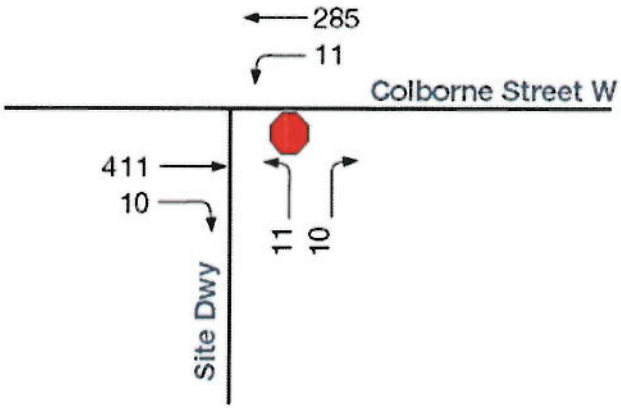
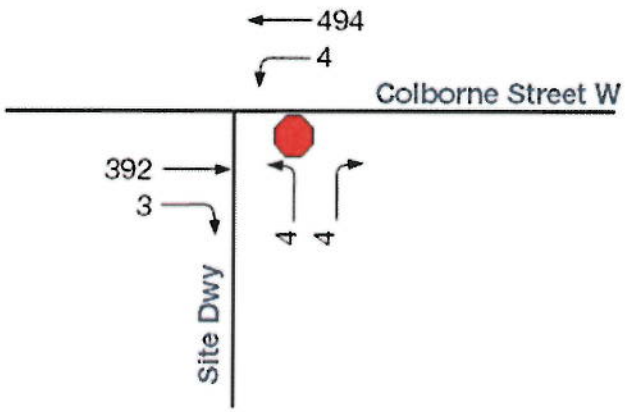
Figure 2

2021 Traffic Forecast - AM Peak Hour



2021 Traffic Forecast - AM Peak Hour



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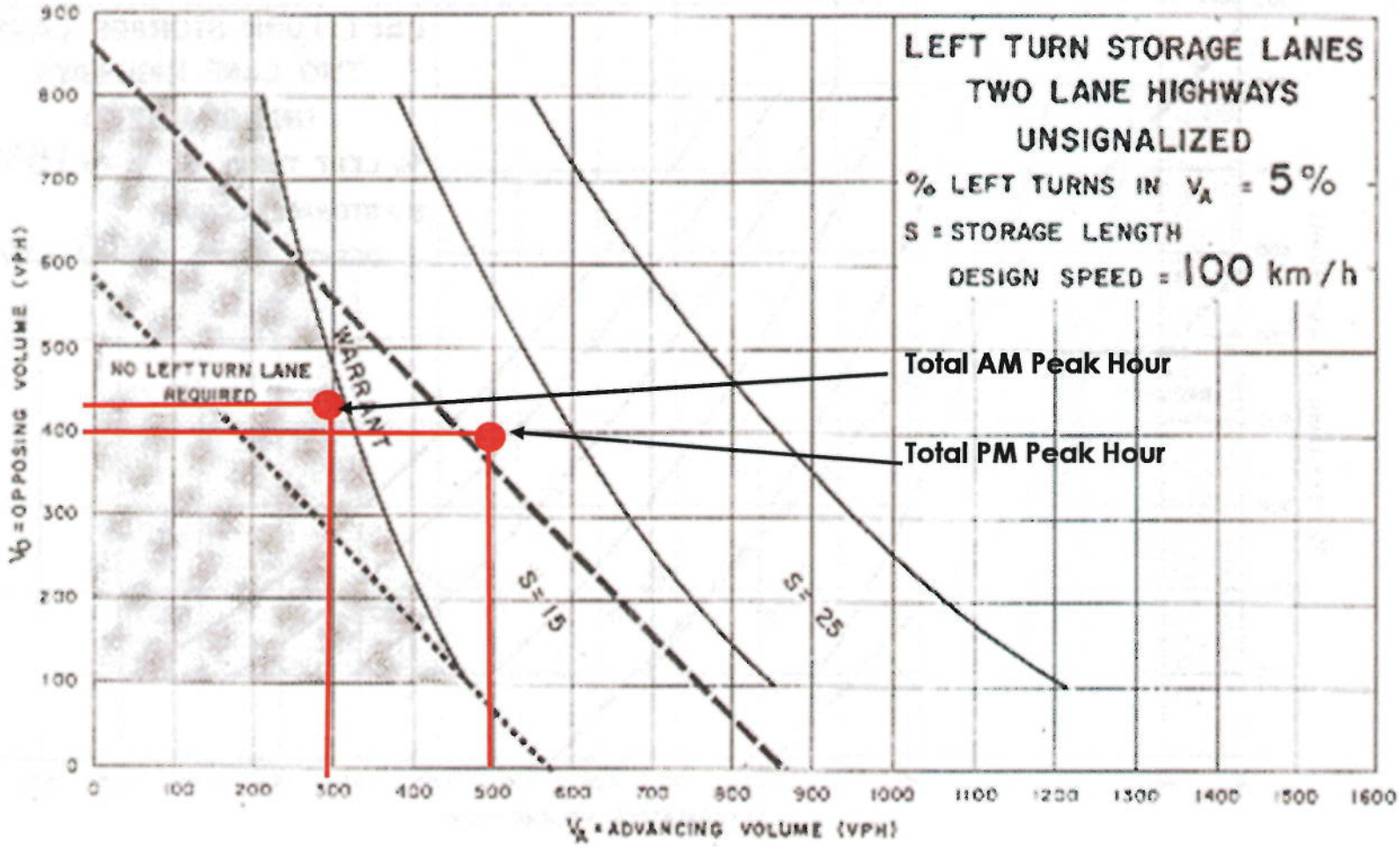
2021 Traffic Forecasts

Burford Pit Access Review Study, Brantford
160010

Figure 3



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Left-Turn Warrant

Colborne Street West at Site Driveway

APPENDIX E

Intersection Capacity Analysis Results – Future Traffic Conditions

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	450	9	9	318	9	9
Future Volume (Veh/h)	450	9	9	318	9	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	495	10	10	349	10	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			505		869	500
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			505		869	500
tC, single (s)			5.1		7.4	7.2
tC, 2 stage (s)						
tF (s)			3.1		4.4	4.2
p0 queue free %			99		95	98
cM capacity (veh/h)			700		219	416

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	505	359	20
Volume Left	0	10	10
Volume Right	10	0	10
cSH	1700	700	287
Volume to Capacity	0.30	0.01	0.07
Queue Length 95th (m)	0.0	0.3	1.8
Control Delay (s)	0.0	0.5	18.5
Lane LOS		A	C
Approach Delay (s)	0.0	0.5	18.5
Approach LOS			C

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	422	9	9	530	9	9
Future Volume (Veh/h)	422	9	9	530	9	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	491	10	10	616	10	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			501		1132	496
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			501		1132	496
tC, single (s)			5.1		7.4	7.2
tC, 2 stage (s)						
tF (s)			3.1		4.4	4.2
p0 queue free %			99		93	98
cM capacity (veh/h)			703		145	419

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	501	626	20
Volume Left	0	10	10
Volume Right	10	0	10
cSH	1700	703	216
Volume to Capacity	0.29	0.01	0.09
Queue Length 95th (m)	0.0	0.3	2.4
Control Delay (s)	0.0	0.4	23.4
Lane LOS		A	C
Approach Delay (s)	0.0	0.4	23.4
Approach LOS			C

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	497	10	10	351	10	10
Future Volume (Veh/h)	497	10	10	351	10	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	546	11	11	386	11	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			557		960	552
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			557		960	552
tC, single (s)			5.1		7.4	7.2
tC, 2 stage (s)						
tF (s)			3.1		4.4	4.2
p0 queue free %			98		94	97
cM capacity (veh/h)			664		190	386

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	557	397	22
Volume Left	0	11	11
Volume Right	11	0	11
cSH	1700	664	255
Volume to Capacity	0.33	0.02	0.09
Queue Length 95th (m)	0.0	0.4	2.2
Control Delay (s)	0.0	0.5	20.5
Lane LOS		A	C
Approach Delay (s)	0.0	0.5	20.5
Approach LOS			C

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	466	10	10	585	10	10
Future Volume (Veh/h)	466	10	10	585	10	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	542	12	12	680	12	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			554		1252	548
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			554		1252	548
tC, single (s)			5.1		7.4	7.2
tC, 2 stage (s)						
tF (s)			3.1		4.4	4.2
p0 queue free %			98		90	97
cM capacity (veh/h)			666		120	388

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	554	692	24
Volume Left	0	12	12
Volume Right	12	0	12
cSH	1700	666	183
Volume to Capacity	0.33	0.02	0.13
Queue Length 95th (m)	0.0	0.4	3.5
Control Delay (s)	0.0	0.5	27.6
Lane LOS		A	D
Approach Delay (s)	0.0	0.5	27.6
Approach LOS			D

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15