

Appendix C-1

1172 COUNTY ROAD 20 KINGSVILLE, ON TRAFFIC IMPACT STATEMENT

Prepared by:



RC SPENCER ASSOCIATES INC.
Consulting Engineers

Windsor: 800 University Avenue W. – Windsor ON N9A 5R9

Leamington: 18 Talbot Street W. – Leamington ON N8H 1M4

Chatham-Kent: 49 Raleigh Street – Chatham ON N7M 2M6

London: 660 Inverness Avenue – London ON N6H 5R4

1172 COUNTY ROAD 20, KINGSVILLE, ON

TRAFFIC IMPACT STATEMENT (SEPTEMBER 2021)

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INTRODUCTION AND BACKGROUND

Dr. Christina Martin has initiated plans to redevelop a facility at 1172 County Road 20 in the Town of Kingsville. County Road 20 is an east / west arterial road which begins south of Windsor, follows the Detroit River, and turns east through the Town of Kingsville to its terminus at County Road 33 in Leamington. The area plan is illustrated on Figure 1.

The site currently accommodates a 2,350 sq. ft. building, which was previously the “Columbus Hall”. The developer is proposing renovations to the existing building and redevelopment of the site for a new veterinary clinic. The proposed site plan is illustrated on Figure 2.

According to information provided by the owner, it is reasonable to expect approximately 400 trips to / from the clinic within a month; this is equivalent to approximately 100 trips per week, or 20 trips per day, on average. The hours of operation are Mondays and Fridays (8:30 a.m. to 5:30 p.m.), Tuesdays and Thursdays (8:00 a.m. to 8:00 p.m.) and Wednesdays (8:30 a.m., to 2:30 p.m.). The veterinary clinic will not be open on weekends.

The purpose of this statement is to examine the potential traffic implications of the proposed development on area traffic operations, particularly on County Road 20.

TRAFFIC DATA COLLECTION

Average Annual Daily Traffic (AADT) counts were extracted from the County of Essex Interactive Mapping and are provided in Appendix A. These counts identify the number of vehicles passing a specified point, averaged over a 24-hour period.

The 2020 AADT count nearest the site was collected on County Road 20, east of County Road 23, which is approximately 2 km west of the proposed redevelopment site. The daily average for 2020 indicates that approximately 3,824 vehicles could pass by the site on any given day. When compared to historical AADT counts, it was determined that the 2020 volumes were much lower than the preceding years; this is likely the result of the traffic impact of COVID-19 on area roadways. According to the information in the Essex County ADT traffic volumes chart, traffic volumes over the past four years were:

- 2020 – 3,824;
- 2019 – 6,044;
- 2018 – 5,640; and
- 2017 – 5,338.

Therefore, to evaluate a “worst-case” scenario, it is the engineers’ opinion that the 2019 AADT volumes should be used as the baseline reference. In keeping with accepted factors for estimating peak hour traffic volumes, it was assumed that ten percent of the average daily traffic would reasonably represent existing traffic volumes at the proposed site access during the respective AM and PM peak hours.

TRIP GENERATION

Trip generation for the proposed development was estimated from the Institute of Transportation Engineers Trip Generation Manual (10th Edition). The dataset’s average rate was used instead of the fitted curve because the fitted curve equation does not go through the origin. The trip generation references are provided in Appendix B.

ITE Land Use Code 640 (Animal Hospital / Veterinary Clinic) is the most appropriate land use code for the proposed veterinary clinic. The corresponding AM peak hour average trip generation rate is 3.64 trips per 1000 sq. ft. GFA, with 67% entering and 33% exiting; the PM peak hour average rate is 3.53 trips per 1000 sq. ft. GFA, with 40% entering and 60% exiting. Accordingly, it is estimated that the clinic will generate approximately 9 trips during the AM peak hour, with 6 entering the site and 3 exiting the site, and 8 trips in the PM peak hour, with 3 entering the site and 5 exiting the site. It is understood that the existing building is currently vacant; therefore, there are no existing site generated trips to offset the forecasted site generated traffic volumes. These estimates are consistent with the information provided by the owner, as not all trips would coincide with the on-street peak hours.

CAPACITY AND LEVEL OF SERVICE ANALYSIS

Based on the assumptions stated above, a Synchro 10 analysis was carried out for the proposed site access at County Road 20. The forecasted site generated traffic volumes, existing traffic volumes, and summation projections can be found in Appendix C; the results are also illustrated in Figure 3. The corresponding Synchro results are provided in Appendix D.

It is anticipated that the site access at County Road 20 will be controlled by a southbound stop control, with one shared approach lane on each leg of the resulting tee intersection. When the site generated traffic is added to the County Road 20 traffic volumes, the critical southbound approach is expected to perform at a good LOS B in both peak hours. The corresponding average control delay for the southbound site egress is expected to be 11.4 seconds in the AM peak hour and 12.1 seconds in the PM peak hour. However, the control delay on County Road 20 is expected to be nominal; County Road 20 should experience no queuing.

LEFT TURN LANE WARRANTS

A left turn lane warrant analysis was completed for the site access at County Road 20. During both the AM and PM peak hours, the percentage of left turns is less than 1%. Since the speed limit on County Road 20 is 80 km/h, the analysis was completed for a 90 km/h design speed. The results are provided in Appendix E. As is illustrated, it does not meet warrants for the “Existing + Site Generated Traffic” scenario in either the AM or PM peak hours.

SIGHT LINE ANALYSIS

The site access intersection sight distance was calculated in accordance with the TAC Geometric Design Guide for Canadian Roads (2017). A passenger vehicle was selected as the design vehicle. The speed limit on County Road 20 is 80 km/h, so the analysis was completed for a 90 km/h design speed. As calculated in the Appendix F, the minimum intersection sight distance was determined to be 188m for the most critical left turn egress maneuver; minimum intersection sight distance for the right turn egress maneuver was determined to be 163m.

After observing the sight triangles illustrated on Figure 4, it is the engineer’s opinion that there is sufficient sight distance in both directions for safe egress from the access. However, it is the engineers’ recommendation that the developer and road authority should verify all sight lines within the boulevard areas to ensure that they are clear of obstructions.

CONCLUSIONS AND RECOMMENDATIONS

Dr. Christina Martin has initiated plans to redevelop a facility at 1172 County Road 20 in the Town of Kingsville. County Road 20 is an east / west arterial road which begins south of Windsor, follows the Detroit River, and turns east through the Town of Kingsville to its terminus at County Road 33 in Leamington. The site currently accommodates a 2,350 sq. ft. building, which was previously the “Columbus Hall”. The developer is proposing renovations to the existing building and redevelopment of the site for a new veterinary clinic.

According to information provided by the owner, it is reasonable to expect approximately 400 trips to / from the clinic within a month; this is equivalent to approximately 100 trips per week, or 20 trips per day, on average. The hours of operation are Mondays and Fridays (8:30 a.m. to 5:30 p.m.), Tuesdays and Thursdays (8:00 a.m. to 8:00 p.m.) and Wednesdays (8:30 a.m., to 2:30 p.m.). The veterinary clinic will not be open on weekends.

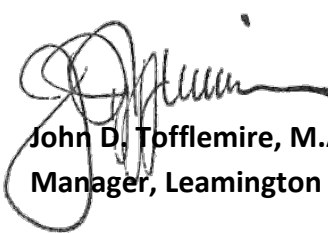
Using recent AADT traffic counts and applying the best available trip generation and distribution methodologies, an analysis was completed to measure the potential operational impact of the proposed redevelopment on area roadways, particularly on County Road 20. Based on the results of the analysis, it was concluded that:

- The addition of site generated traffic will result in no observable impact on County Road 20 traffic operations;
- An eastbound left turn lane is not warranted at the site access;
- There is sufficient sight distance in both directions for safe egress from the access; however, the developer and road authority should verify all sight lines on-site to ensure that boulevard areas within the right-of-way are clear of potential obstructions.


All of which is respectfully submitted,

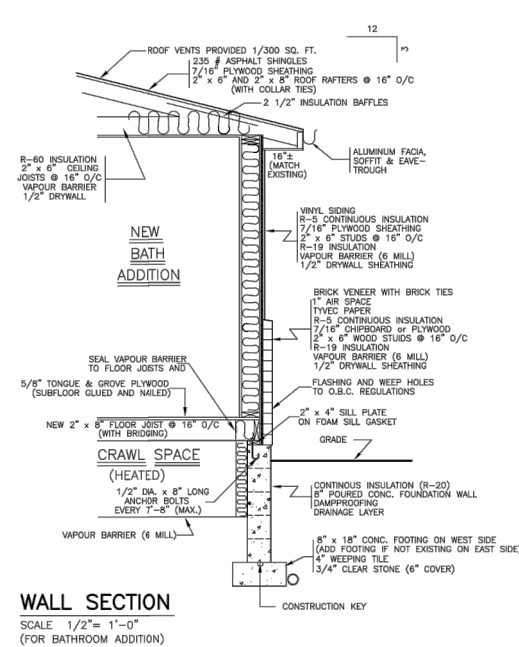
RC Spencer Associates Inc.




John D. Tofflemire, M.A.Sc., P.Eng.
Manager, Leamington Office



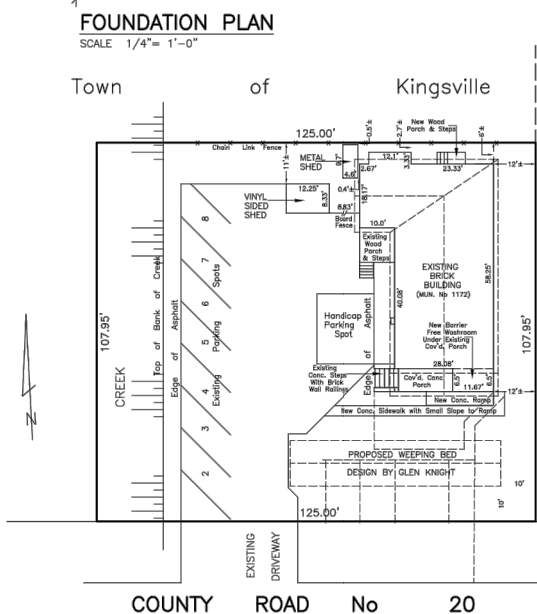
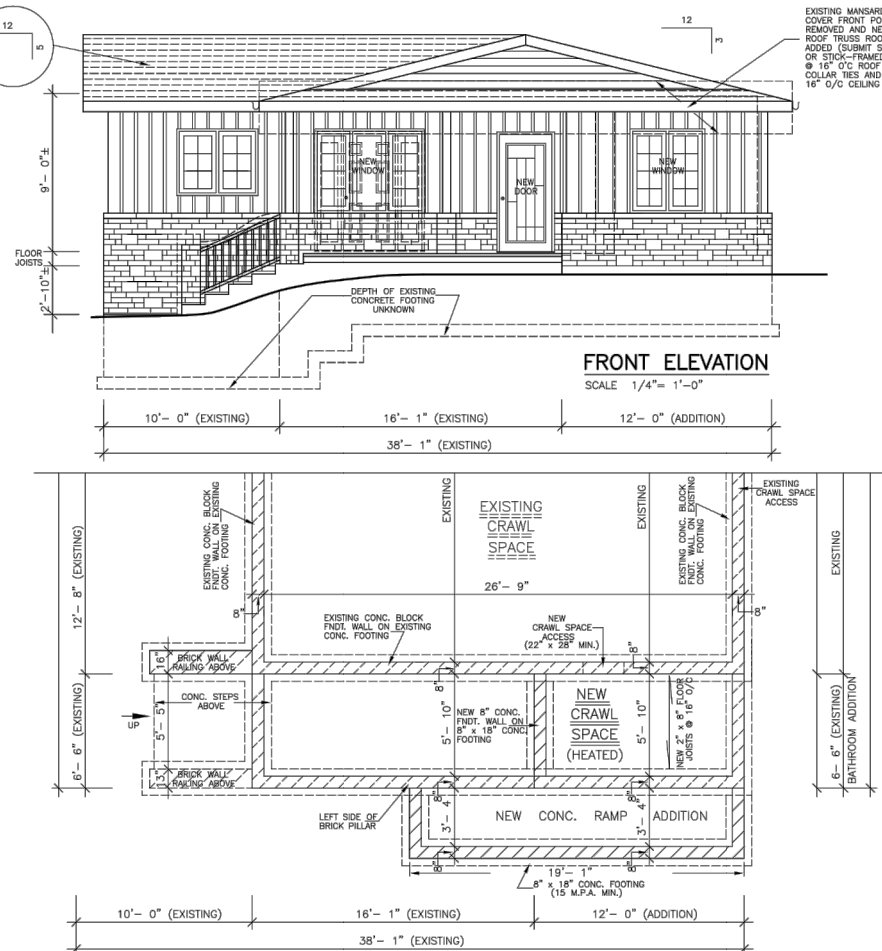

Aaron D. Blata, M.Eng., P.Eng., PTOE
Associate / Traffic Operations Project Engineer



WALL SECTION
SCALE 1/2"= 1'-0"
(FOR BATHROOM ADDITION)

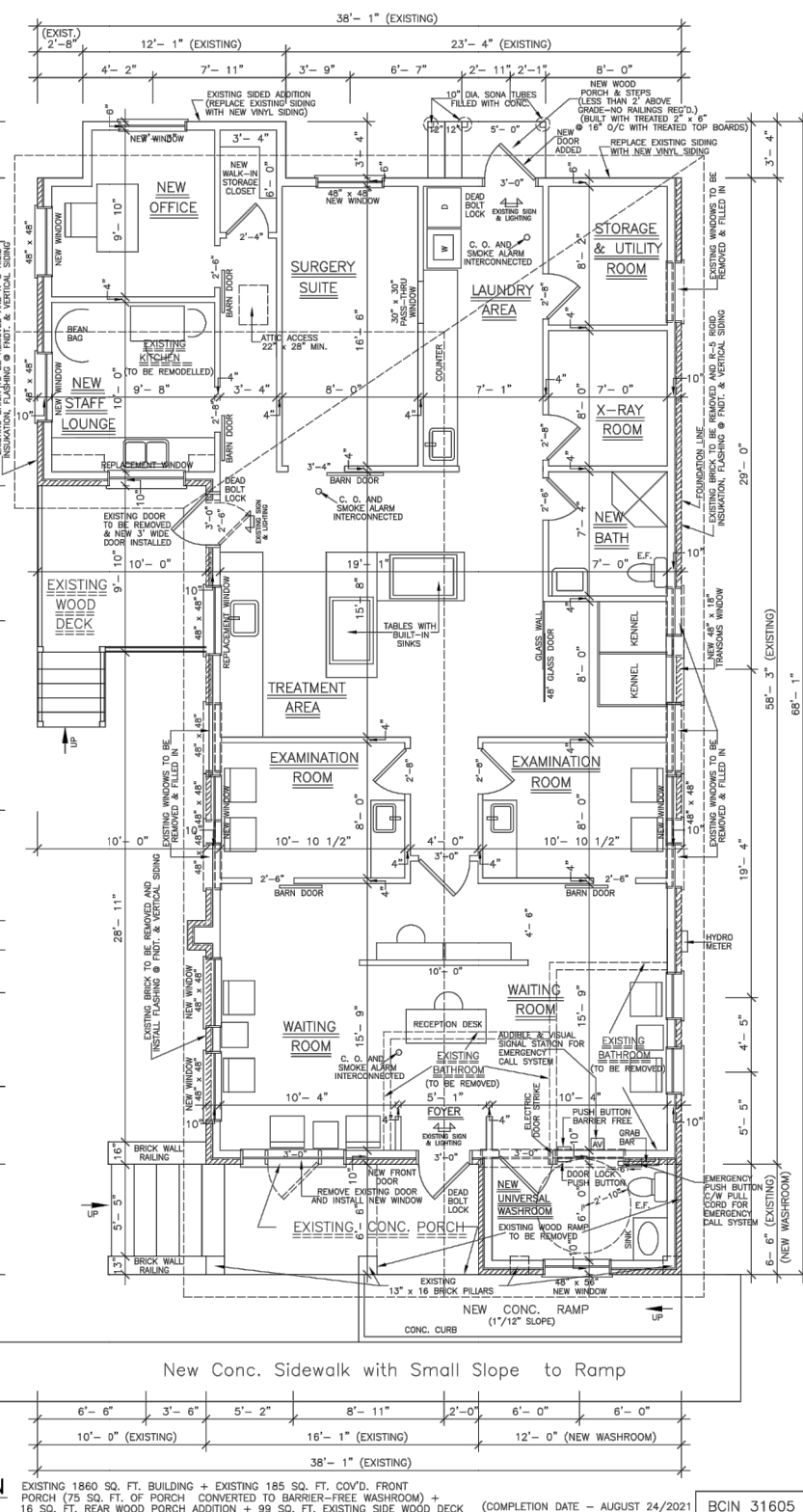
WOOD LINTEL SPANS		
1 STOREY		
max. 16' supported length		
SIZE	MAX. SPAN	
basement exterior walls	2" x 8" x 6'0"	
basement interior walls	2" x 8" x 7'4"	
main floor exterior walls	2" x 8" x 4'0"	
main floor interior walls	2" x 8" x 4'9"	
main floor exterior walls	2" x 8" x 7'9"	
main floor interior walls	2" x 8" x 11'0"	
main floor exterior walls	2" x 8" x 9'5"	
main floor interior walls	2" x 8" x 5'5"	
main floor exterior walls	2" x 8" x 6'7"	
main floor interior walls	2" x 8" x 7'8"	

ONTARIO BUILDING CODE DATA MATRIX - PARTS 3 & 9					O.B.C. REFERENCE	
1	PROJECT DESCRIPTION	<input type="checkbox"/> NEW <input type="checkbox"/> ALTERATION	<input type="checkbox"/> ADDITION <input type="checkbox"/> CHANGE OF LINE	<input checked="" type="checkbox"/> PART 11 11.1 to 11.4	<input checked="" type="checkbox"/> PART 3	<input checked="" type="checkbox"/> PART 9 1.1.2.3
2	GROUP D - VETERINARIAN OFFICE					9.10.2.1
3	BUILDING AREA EXISTING - 1935 SQ. FT. (TOTAL)					1.1.2.3
4	GROSS AREA EXISTING - 1935 SQ. FT. (TOTAL)					1.1.2.3
5	NUMBER OF STOREYS ABOVE GRADE - 1		BELOW GRADE - 0			9.10.8.1
6	NUMBER OF STREETS FIRE FIGHTER ACCESS - 1					9.10.20.3
7	BUILDING CLASSIFICATION-(EXISTING)-GROUP D-BUSINESS & PERSONAL SERVICES					9.10.8
8	SPRINKLER SYSTEM PROPOSED	<input type="checkbox"/> ENTIRE BUILDING ONLY <input type="checkbox"/> BASEMENT ONLY <input type="checkbox"/> IN LEU OF ROOF RATING <input checked="" type="checkbox"/> NOT REQUIRED				9.10.8
9	STANDPIPE REQUIRED	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO			N/A
10	FIRE ALARM REQUIRED	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO			9.10.18
11	WATER SERVICE/SUPPLY IS ADEQUATE	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO			N/A
12	HIGH BUILDING	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO			N/A
13	PERMITTED CONSTRUCTION ACTUAL CONSTRUCTION	<input checked="" type="checkbox"/> COMBUSTIBLE <input type="checkbox"/> COMBUSTIBLE	<input type="checkbox"/> NON-COMBUSTIBLE <input type="checkbox"/> NON-COMBUSTIBLE			9.10.8
14	MEZZANINE(S) AREA N/A					N/A
15	OCCUPANCY LOAD BASED ON	<input checked="" type="checkbox"/> m2/PERSON OCCUPANCY : (POST SIGN - MAX. OCCUPANCY - 4)			<input checked="" type="checkbox"/> DESIGN OF BUILDING	3.1.17.1
16	WASHROOMS - (2) - 1 STAFF & 1 BARRIER-FREE (UNIVERSAL)					
17	BARRIER FREE DESIGN	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO (EXPLAIN)			9.5.2
18	HAZARDOUS SUBSTANCE	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO			9.10.1.3(4)
19	REQUIRED FIRE RESISTANCE RATING (FRR)	HORIZONTAL ASSEMBLES FRR (HOURS) FLOORS : N/A ROOF : N/A MEZZANINE FLOOR : N/A FRR of Supporting Members	<input checked="" type="checkbox"/> NO (EXPLAIN) LISTED DESIGN No OF DESCRIPTION (S0-8) N/A N/A N/A N/A			9.10.8
20	SPATIAL SEPARATION	FRONT REAR WEST EAST	N/A N/A - EXISTING N/A - EXISTING N/A - EXISTING			9.10.14.4



NOTES:
AREA OF LOT = 13,494 SQ. FT.
AREA OF EXISTING BUILDING & COV'D. FRONT PORCH & EXISTING WOOD DECK = 2111 SQ. FT.
COVERAGE OF LOT = 15.64 %

FLOOR PLAN
SCALE 1/4"= 1'-0"



BCIN 31605

RC SPENCER ASSOCIATES INC.
Consulting Engineers
Windsor: 800 University Avenue W. - Windsor ON N9A 5R9
Leamington: 18 Talbot Street W. - Leamington ON N8H 1M4
Chatham-Kent: 49 Raleigh Street - Chatham ON N7M 2M6

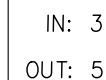
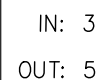
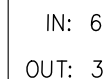
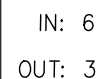
Professional Engineers
Ontario

DESIGN	A.D.B.
CHECKED	J.T.
DRAWN	M.C.A.
CHECKED	A.D.B.
DATE	SEPTEMBER 2021
SCALE	N.T.S.

1172 COUNTY ROAD 20, KINGSVILLE - TIS

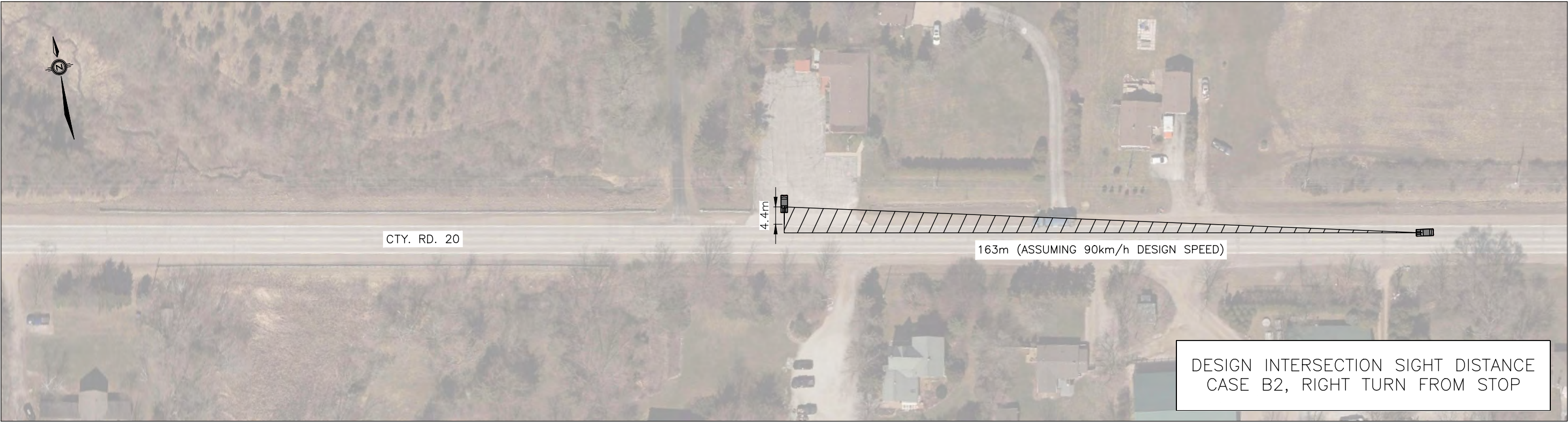
SITE PLAN

PROJECT NO.	21-1189
FIGURE NO.	2
OF	4







DESIGN INTERSECTION SIGHT DISTANCE
CASE B1, LEFT TURN FROM STOP



DESIGN INTERSECTION SIGHT DISTANCE
CASE B2, RIGHT TURN FROM STOP

			<div><div><div><div>RC SPENCER ASSOCIATES INC.</div><div>Consulting Engineers</div><div>Windsor: 800 University Avenue W. – Windsor ON N9A 5R9 Leamington: 18 Talbot Street W. – Leamington ON N8H 1M4 Chatham-Kent: 49 Raleigh Street – Chatham ON N7M 2M6</div></div></div><div><div></div><div>Professional Engineers Ontario</div></div></div>						DESIGN A.D.B.	1172 COUNTY ROAD 20, KINGSVILLE – TIS	PROJECT NO. 21–1189
									CHECKED J.T.		
									DRAWN M.C.A.	SIGHT LINE ANALYSIS: SITE ACCESS AT COUNTY ROAD 20	FIGURE NO. 4
									CHECKED A.D.B.		
				1.	COMPLETED REPORT FIGURES	21 SEPT 2021	M.C.A.	A.D.B.	DATE SEPTEMBER 2021		
				NO.	REVISION	DATE	BY	APP	SCALE N.T.S.		OF 4

Appendix A

TRAFFIC DATA COLLECTION

**Essex County ADT – County Road 20 between
County Road 23 and McCain Side Road**

County of Essex Mapping



Legend

- Traffic Volume
- Windsor Airport
- Greenway Trail
 - ... Chrysler Canada Greenway
 - ... Cypher Systems Greenway
 - ... Rotary (1918) Centennial Hub
- Streets (100,000-20,000)
 - <all other values>
 - PROVINCE OF ONTARIO
 - COUNTY CONNECTING LINK
 - COUNTY OF ESSEX
- Street
 - Municipal Boundary
 - <all other values>
 - Pelee Island
- Lakes

Notes

Enter Map Description

THIS MAP IS NOT TO BE USED FOR NAVIGATION
Copyright the Corporation of the County of Essex, 2019. Data herein is provided by the Corporation of the County of Essex on an 'as is' basis. Assessment parcel provided by Teranet Enterprises Inc. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

0 923.99 1,848.0 Meters

1: 55,433



9/17/2021

Appendix B

ITE TRIP GENERATION MANUAL – 10TH EDITION REFERENCES

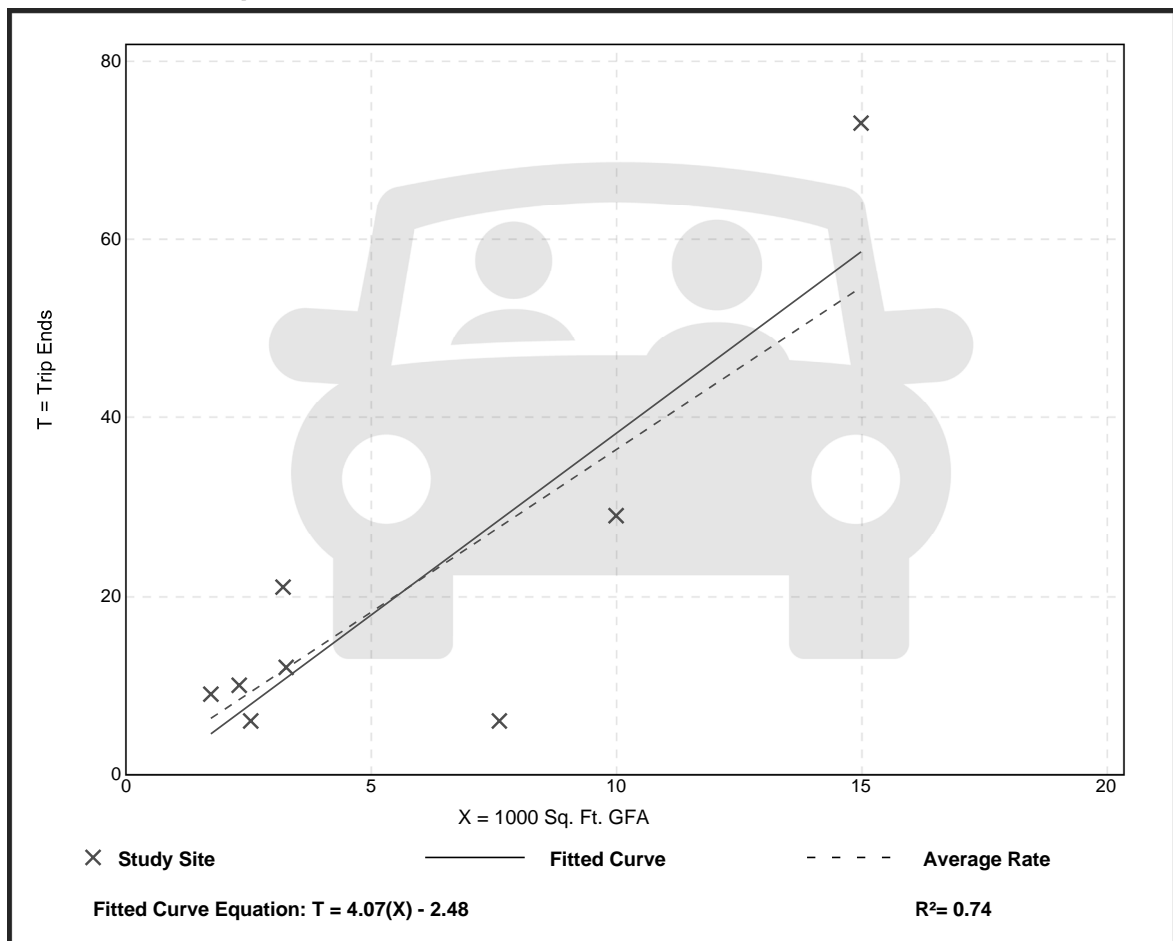
Animal Hospital/Veterinary Clinic (640)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
 On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 7 and 9 a.m.
 Setting/Location: General Urban/Suburban
 Number of Studies: 8
 Avg. 1000 Sq. Ft. GFA: 6
 Directional Distribution: 67% entering, 33% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.64	0.79 - 6.56	1.78

Data Plot and Equation



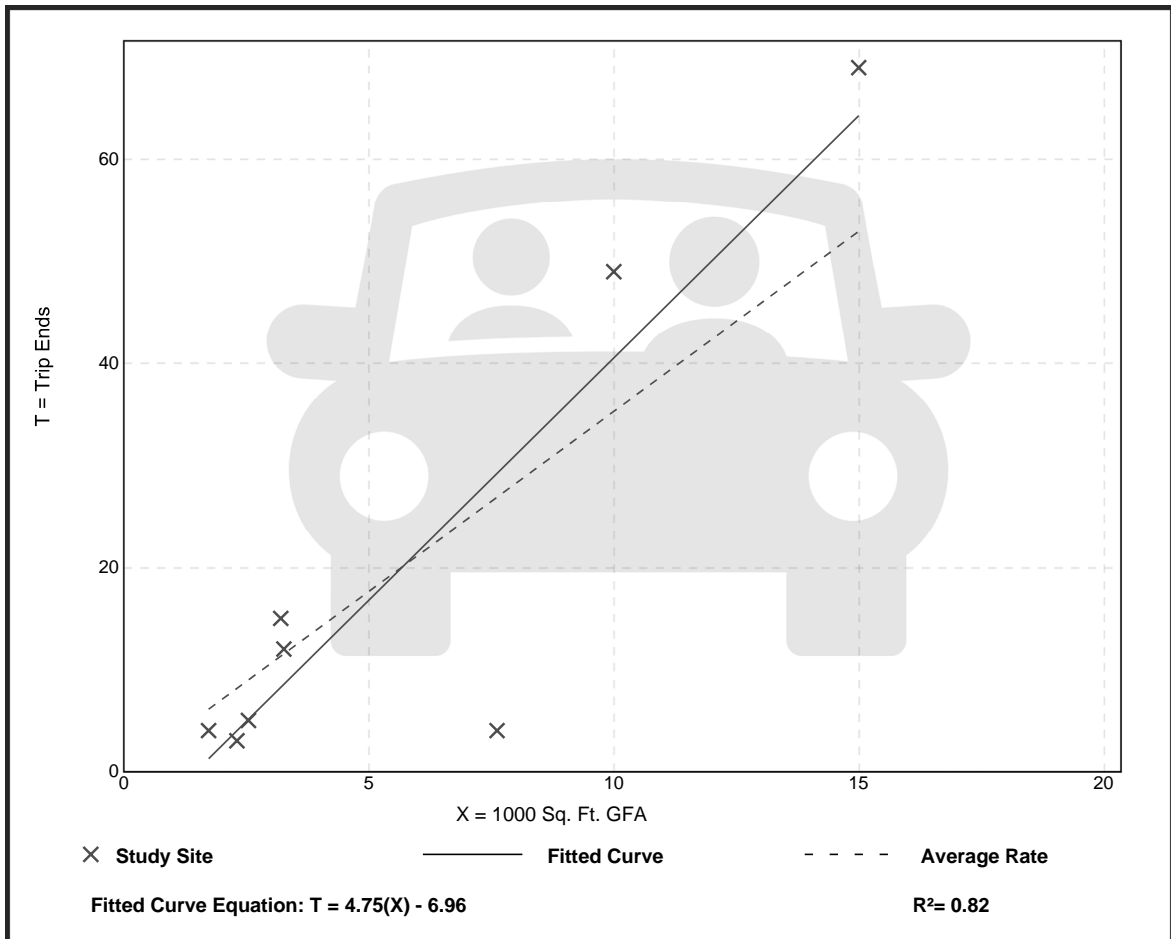
Animal Hospital/Veterinary Clinic (640)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 8
Avg. 1000 Sq. Ft. GFA: 6
Directional Distribution: 40% entering, 60% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.53	0.53 - 4.90	1.80

Data Plot and Equation



Proposed Site Development Trip Generation and Distribution

Project: 1172 County Road 20 Traffic Impact Study

Site: Kingsville, Ontario

Assumed Land Use (1): Animal Hospital / Veterinary Clinic - ITE No. 640

Average Vehicle Trip Ends vs.: 1000 sq. ft. GFA

ITE Trip Generation Data collected on a: Weekday

AM Peak Hour:

3.64

 = Average Rate

67
33

 % Entering
% Exiting

PM Peak Hour:

3.53

 = Average Rate

40
60

 % Entering
% Exiting

Assumed Land Use (1): Animal Hospital / Veterinary Clinic - ITE No. 640				
	1000 sq. ft. GFA	Trips Generated	Trips Entering	Trips Exiting
AM Peak	2.35	9	6	3
PM Peak	2.35	8	3	5

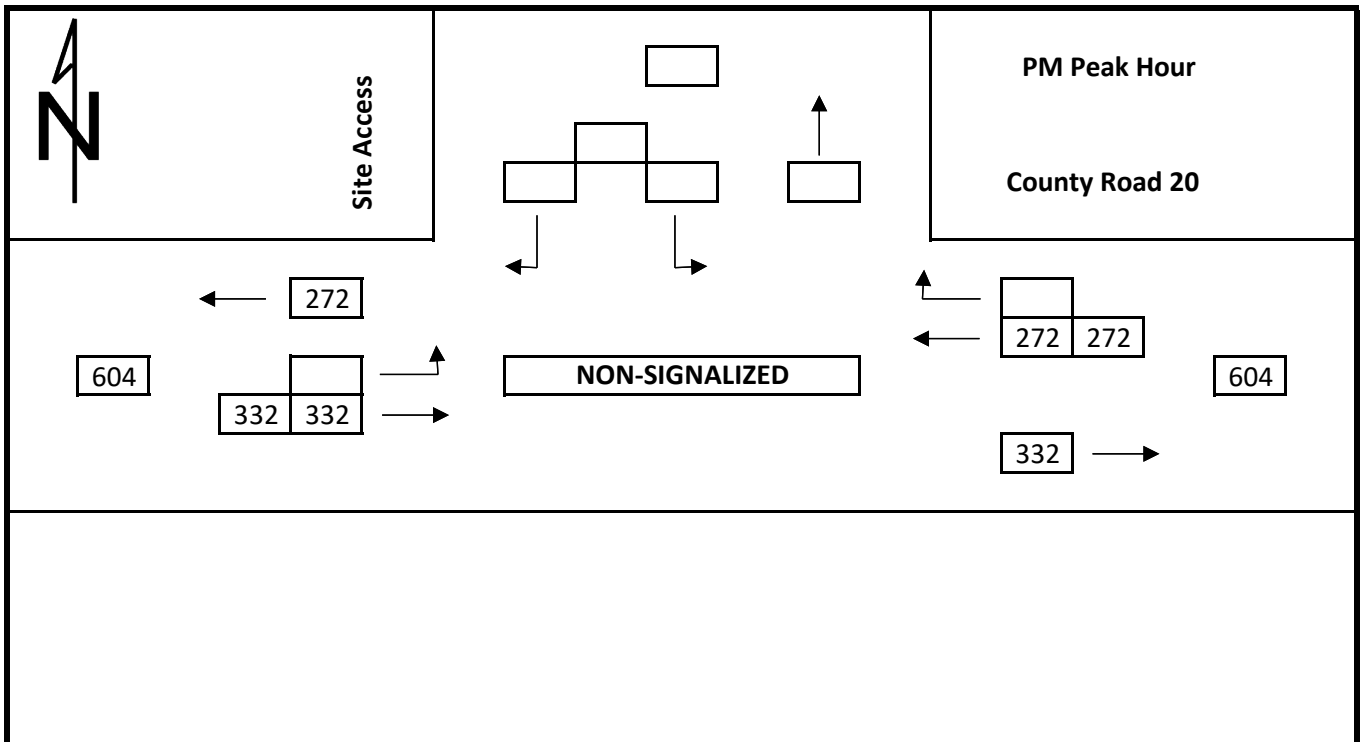
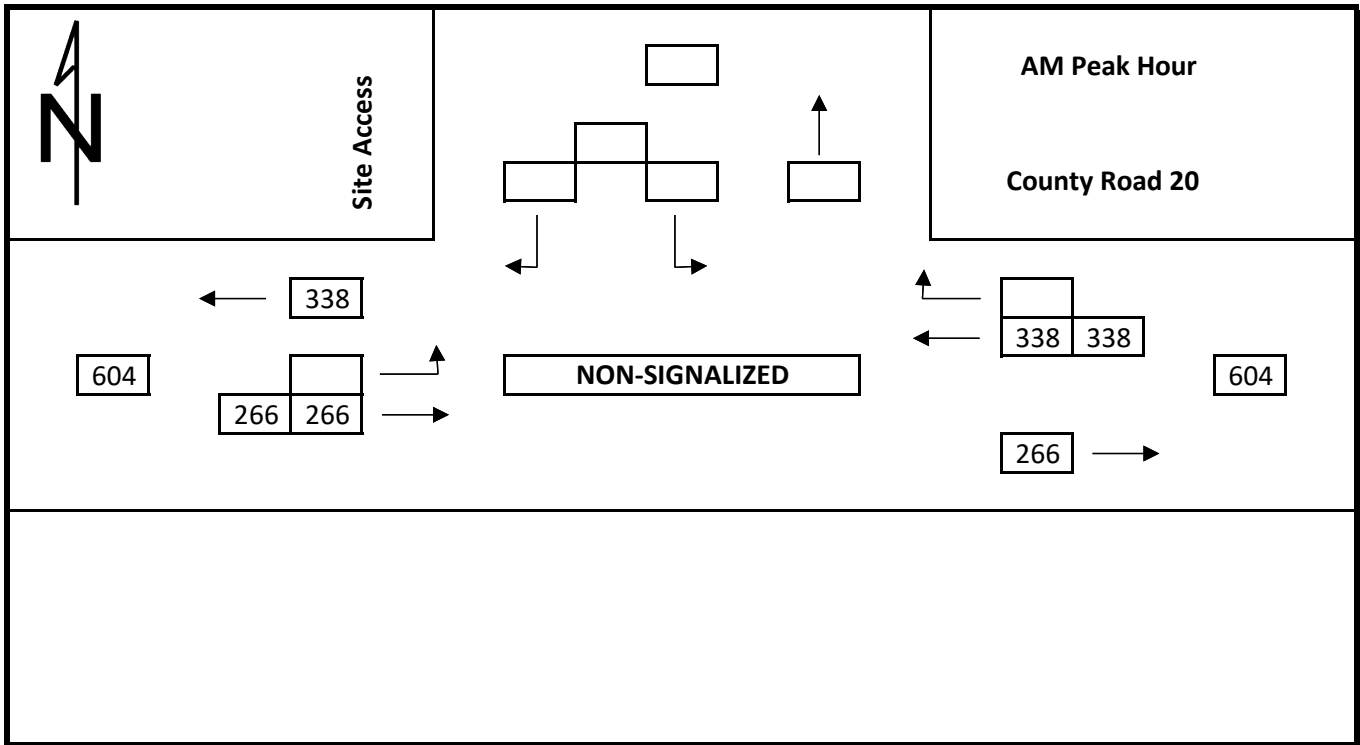
Total Trips		
	Trips Entering	Trips Exiting
AM Peak	6	3
PM Peak	3	5

Appendix C

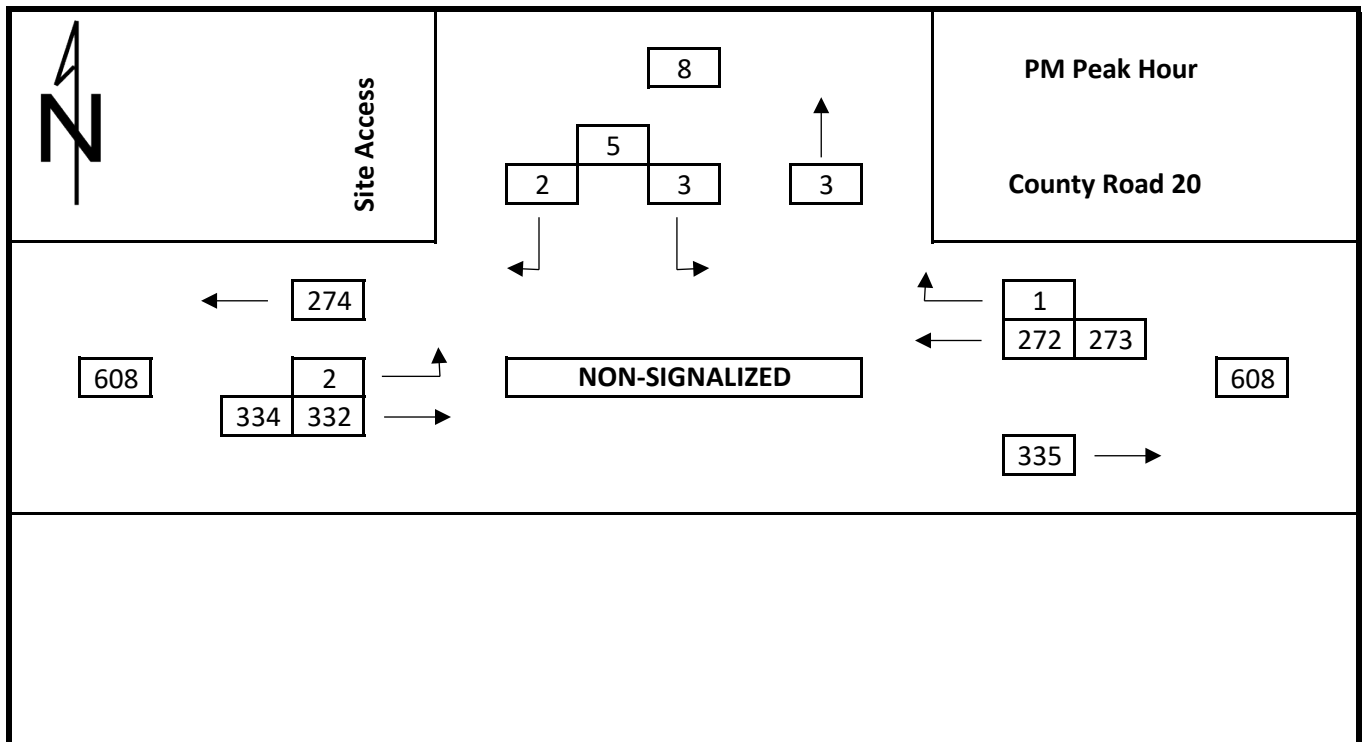
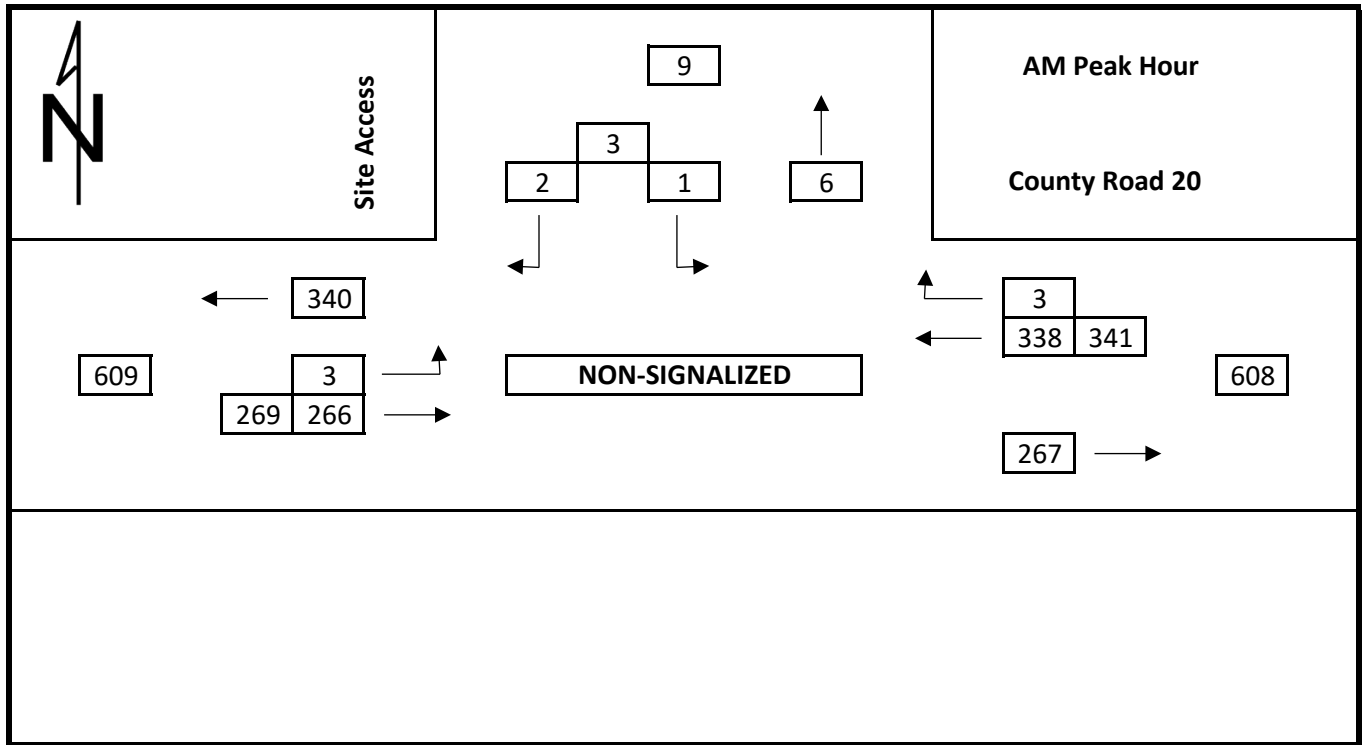
TRAFFIC PROJECTION FIGURES

Site Access at County Road 20

Existing Traffic Counts
Site Access at County Road 20






Existing + Site Generated Traffic
Site Access at County Road 20






Appendix D

DETAILED SYNCHRO RESULTS

Site Access at County Road 20

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	3	266	338	3	1	2
Future Vol, veh/h	3	266	338	3	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	289	367	3	1	2
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	370	0	-	0	664	369
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	295	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1189	-	-	-	426	677
Stage 1	-	-	-	-	699	-
Stage 2	-	-	-	-	755	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1189	-	-	-	425	677
Mov Cap-2 Maneuver	-	-	-	-	425	-
Stage 1	-	-	-	-	697	-
Stage 2	-	-	-	-	755	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.1	0		11.4		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1189	-	-	-	565	
HCM Lane V/C Ratio	0.003	-	-	-	0.006	
HCM Control Delay (s)	8	0	-	-	11.4	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	332	272	1	3	2
Future Vol, veh/h	2	332	272	1	3	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	361	296	1	3	2
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	297	0	-	0	662	297
Stage 1	-	-	-	-	297	-
Stage 2	-	-	-	-	365	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1264	-	-	-	427	742
Stage 1	-	-	-	-	754	-
Stage 2	-	-	-	-	702	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1264	-	-	-	426	742
Mov Cap-2 Maneuver	-	-	-	-	426	-
Stage 1	-	-	-	-	752	-
Stage 2	-	-	-	-	702	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		12.1		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1264	-	-	-	513	
HCM Lane V/C Ratio	0.002	-	-	-	0.011	
HCM Control Delay (s)	7.9	0	-	-	12.1	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0	

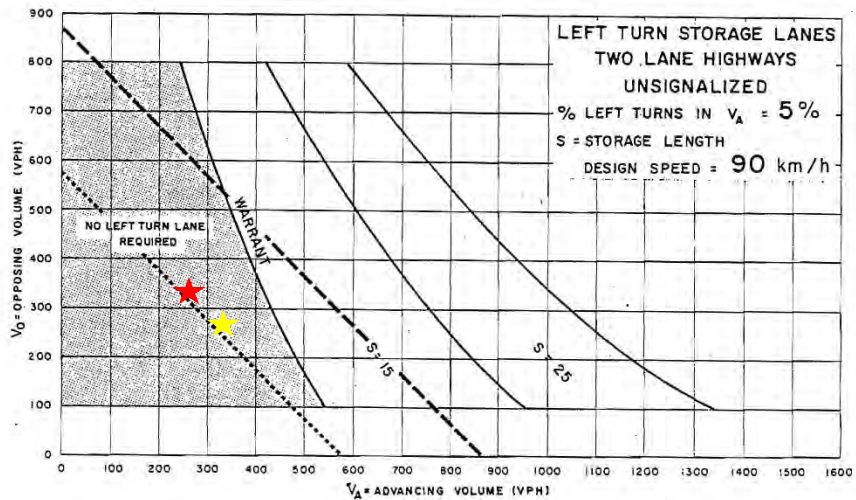
Appendix E

LEFT TURN LANE WARRANTS

Site Access at County Road 20

Site Access at County Road 20 – Eastbound Left Turn Lane Warrants

Existing + Site Generated Traffic – AM & PM Peak Hours



AM Peak Hour



PM Peak Hour

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

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

Peak Period	Approaching Volume	Opposing Volume	# Left Turns	% Left Turns	Storage Required (m)
AM	338	266	3	1	0
PM	272	332	1	1	0

Appendix F

SIGHT LINE CALCULATIONS

Site Access at County Road 20

21-1189: 1172 County Road 20, Kingsville, ON - Sight Line Analysis

Design Intersection Sight Distance (TAC Geometric Design Guide for Canadian Roads)

Design Speed: 90km/h (Posted Speed Limit = 80km/h)

Table 9.9.3: Time Gap for Case B1, Left Turn from Stop

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	7.5
Single-unit truck	9.5
Combination truck (WB 19 and WB 20)	11.5
Longer truck	To be established by road authority

Intersection Stopping Distance (**ISD**) = $0.278 V_{\text{major}} t_g$

Where:

ISD = intersection sight distance (m)
(length of the leg of sight triangle along the major road)
 V_{major} = design speed of the major road (km/h)
 t_g = time gap for minor road vehicle to enter the major road (s)

ISD_{passenger car} (left turn from stop) = $0.278 \times 90 \times 7.5 = \mathbf{188 \text{ m}}$

Table 9.9.5: Time Gap for Case B2—Right Turn from Stop and Case B3—Crossing Maneuver

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road
Passenger car	6.5
Single-unit truck	8.5
Combination truck (WB 19 and WB 20)	10.5

ISD_{passenger car} (right turn from stop) = $0.278 \times 90 \times 6.5 = \mathbf{163 \text{ m}}$