

2509 Cedar Creek Road – Transportation Impact Study

Final Report

February 1, 2024

Prepared for:

Cedar Creek Holdings Inc. 130 Delta Park Blvd. Brampton, ON L6T5E7

Prepared by:

Stantec Consulting Ltd. 300W-675 Cochrane Drive Markham ON L3R 0B8

Project No. 161414214

Revision	Description	Author		Quality	Check	Independent Review		
00	Draft	R.Lei	2023-06-01	A.Mirhoseini	2023-06-01	K. Brousseau	2024-01-09	
01	Final	R.Lei	2024-01-16	A.Mirhoseini	2024-01-31	K. Brousseau	2024-02-01	

This document entitled 2509 Cedar Creek Road – Transportation Impact Study was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Cedar Creek Holdings Inc. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by	Rayher
Ray Lei, M.Sc., EIT.	(signature)
.	
	After
Reviewed by	Mirholeini
	(signature)
Arash Mirhoseini, M.Sc., P.E	ing., PMP.
Approved by	
	(signature)
Kevin Brousseau, L.E.T., C.I	Е.Т.

Table of Contents

7.0	SUMMARY AND CONCLUSIONS	19
6.2	SIGHT DISTANCE REVIEW	18
	6.1.2 Future Lane Configurations6.1.3 Future Total traffic operations	15 16
	6.1.1 Left-Turn Lane Warrant	
6.0 6.1	TRANSPORTATION IMPACT ASSESSMENT FUTURE TOTAL TRAFFIC OPERATIONS	15
5.1	FUTURE TOTAL TRAFFIC 2035	13
5.U 5.1		13 12
50		40
4.2	TRIP DISTRIBUTION AND ASSIGNMENT	10
4.1	SITE TRIP GENERATION	9
4.0	SITE TRIP FORECAST	
3.0	FUTURE BACKGROUND TRAFFIC	7
2.2	EXISTING TRAFFIC VOLUME	5
2.1	EXISTING ROADWAY NETWORK AND TRAFFIC CONTROL	5
2.0	EXISTING CONDITIONS	5
1.3	PROPOSED SITE	3
1.2	STUDY AREA	2
1.1	STUDY OBJECTIVE	1
1.0	INTRODUCTION	1

LIST OF TABLES

Table 1 - Trip Generation Rate	10
Table 2 – Site Trip Generation	10
Table 3 - Trip Distribution	11
Table 4 - Future Total 2033 Left-Turn Lane Warrant Analysis	15
Table 5 - Level of Service	17
Table 6 - Intersection Capacity Analysis - Future Total 2033	17
Table 7 - Intersection Sight Distance Summary	18

LIST OF FIGURES

2
4
3
3
7
3
9
1
2
3
4
6

LIST OF APPENDICES

APPENDIX A – CORRESPONDENCES

APPENDIX B – SITE PLAN

APPENDIX C – TRAFFIC DATA

APPENDIX D – PROXY SITE MEASUREMENTS AND CALCULATIONS

APPENDIX E – LEFT-TURN LANE WARRANT

APPENDIX F -SYNCHRO ANALYSIS FUTURE TOTAL

 \bigcirc

Introduction

1.0 INTRODUCTION

Stantec Consulting Ltd. ("Stantec") has been retained by Cedar Creek Holdings Inc. (the Client) to prepare a traffic study for the proposed industrial Plan of Subdivision located at 2509 Cedar Creek Road (RR97) in Ayr, Township of North Dumfries, Ontario. The site is proposed to comprise of seven (7) industrial Lots with a total area of 13.82 hectare and one (1) stormwater management Block with an area of 2.01 hectare.

The purpose of this Transportation Impact Study (TIS) is to assess the impacts of the inclusion of the proposed Access on Cedar Creek Road. The study is conducted in accordance with requirements outlined in the Region of Waterloo Transportation Impact Study Guidelines, July 2014 and Region of Waterloo's comments received on the Term of Reference submitted on December 8th, 2021 and follow up discussions attached in **Appendix A**.

A review of intersection operations was conducted for the intersection of Cedar Creek Road at the proposed Site Access inclusive of AM and PM peak hours for the ten-year future traffic horizon year of 2033that includes background growth applied to the network and site estimated trips.

1.1 STUDY OBJECTIVE

This report documents the data and methodology used in the Transportation Impact Study along with the assessment results including:

- Section 2.0 includes a review of the study area road network and existing weekday AM and PM peak hours traffic volumes.
- The future weekday AM and PM peak hours background traffic is estimated for 2033 in Section
 3.0 based upon a 3.5% per annum growth rate recommended by the Region of Waterloo.
- The increase in traffic generated by the proposed site based on the practices outlined in the ITE Trip Generation Manual, 11th Edition is presented in **Section 4.0**.
- Section 5.0 includes estimated future weekday AM and PM peak hours total traffic estimated for 2033.
- **Section 6.0** provides an assessment of the future total traffic conditions using Synchro 11 software. This section also includes warrant analysis and sight distance review results.
- A summary of study findings and recommendations is presented in **Section 7.0**.

Introduction

1.2 STUDY AREA

The Cedar Creek Road and proposed Site Access (unsignalized) intersection was assessed to determine the operational impacts of the proposed site as per instructions received from the Region.

The horizon year considered for the analysis of study area intersection is 2033 which represent a ten-year future horizon following study date as per instructions received from the Town as part of the preconsultation meeting discussions.

The analysis periods selected for this study are the weekday morning and afternoon peak hours as they are expected to represent the highest trips generated from the site considering its industrial land use. The location of the site and the selected study intersection are presented in **Figure 1**.



Figure 1 - Study Area and Study Intersection

Introduction

1.3 PROPOSED SITE

The site is proposed to comprise of seven (7) industrial Lots with a total area of 13.82 hectare of industrial land-use and one (1) stormwater management Block with an area of 2.01 hecatre. The owner/applicant is interested in utilizing the land for transport enterprise and/or transportation operations uses, which would include the storage of various vehicle fleets of various trucking enterprises. The property owner intends to use one (1) Lot for a trucking business operation. The Lot would be developed as a parking lot and used to store various vehicle fleets of various trucking enterprises. The remaining six (6) industrial lots would be for sale with similar potential uses and zoning. The proposed Site Access is on the west side of Cedar Creek Road and it ends with a cul-de-sac. All seven (7) industrial lots are connected to the proposed Site Access. The proposed Plan of Subdivision is included in **Appendix B** and also shown in **Figure 2**.

Introduction





Existing Conditions

2.0 EXISTING CONDITIONS

2.1 EXISTING ROADWAY NETWORK AND TRAFFIC CONTROL

The proposed site is vacant in the existing conditions. **Cedar Creek Road** is an east-west arterial road under the jurisdiction of Region of Waterloo that provides access to Highway 401 and regional road network. Cedar Creek Road operates with a two-lane cross section and a posted speed limit of 80 km/h.

2.2 EXISTING TRAFFIC VOLUME

The 2022 Turning Movement Counts ("TMC") of the intersection of Cedar Creek Road and Earl Thompson Road were provided by the Region of Waterloo which is used to estimate the traffic volumes at the intersection of Cedar Creek Road and proposed Site Access. **Appendix C** includes the collected traffic counts used in this study.

According to the Region of Waterloo's recommendation, an annual growth rate of 3.5% was applied to project the collected 2022 traffic counts to existing 2023 traffic volumes and traffic volumes in the future horizon year to account for increases resulting from general population and employment growth in the area.

The existing 2023 balanced traffic volumes for the AM and PM peak hours are illustrated in **Figure 3** and **Figure 4**.



Existing Conditions





Figure 4 - Existing Traffic Volumes in 2023 – PM Peak

Future BackGround Traffic

3.0 FUTURE BACKGROUND TRAFFIC

No development information adjacent to the site was identified to generate additional traffic in the future horizons. Thus, the future background 2033 traffic volumes at all study intersections were established by applying the annual growth rates listed in **Section 2.2** to the existing 2023 balanced traffic volumes.

The future background 2033 traffic volumes for the AM and PM peak hours are illustrated in **Figure 5** and **Figure 6**.



Figure 5 - Future Background Traffic Volumes in 2033 – AM Peak

Future BackGround Traffic



Figure 6 - Future Background Traffic Volumes in 2033 – PM Peak

site Trip Forecast

4.0 SITE TRIP FORECAST

4.1 SITE TRIP GENERATION

This section provides an estimation of the additional trips expected by the proposed site. The additional expected trips were estimated based on the trips generated by proposed land uses. The detailed site plan is not available at this stage of the project, therefore, the industrial-use developments on the west of the proposed site were used to estimate the future gross floor area (GFA) of the proposed site. **Figure 7** illustrates the location of the Proxy Site used to estimate the proposed building GFA.



Figure 7: Proxy Site Location

A GFA to land area ratio of 12.6% was calculated based on the measurements of Proxy Site. The detailed measurements and calculations are included in **Appendix D**. Based on the proposed site land

site Trip Forecast

area of 13.82 hectare for industrial land-use, it is estimated that the proposed site will contain 188,042 ft² GFA of industrial developments.

The vehicle trip generation for the proposed site during the weekday AM and PM peak hours has been calculated based on rates adopted from the Institute of Transportation Engineers ("ITE") Trip Generation Manual, 11th Edition similar land use codes (LUC). Trip generation rates used in this study based on the different land uses are presented in **Table 1**.

Table 1 - Trip Generation	Rate
---------------------------	------

		AM			PM				
Land use	Variable (x)	Fitted Curve Eqn./Average Rate	In	Out	Fitted Curve Eqn./Average Rate	In	Out		
LUC 110 General	1000 ft ² GFA	T = 0.68(X) + 3.81	88%	12%	Ln(T) = 0.72 Ln(X) + 0.38	14%	86%		
Light industrial		0.74			0.65				
LUC 150 Warehousing	1000 ft ² GFA	T = 0.12(X) + 23.62	77%	23%	T = 0.12(X) + 26.48	28%	72%		
warenousing		0.17			0.18				

It is assumed that 50% of the development will be General Light Industrial and the remaining 50% be Warehousing. **Table 2** provides the trip generation for full buildout based on the proposed site land use statistics. As a conservative approach, the maximum of total trips estimated based on the fitted curve equations and average rates from ITE Trip Generation Manual were used in trip generation calculations.

Table 2	– Site	Trip	Generation
---------	--------	------	------------

Residential Land	1000 ft ²		AM		РМ			
use	GFA	Trips In	Trips Out	Total	Trip In	Trips Out	Total	
LUC 110 General Light Industrial	94	61	8	69	9	53	62	
LUC 150 Warehousing	94	27	8	35	11	27	38	
Total Trips	188	88	16	104	20	80	100	

4.2 TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution of the site-generated traffic is estimated based on the turning movement counts at the Cedar Creek Road and Earl Thompson Road intersection due to the expected similarities in land-use and relative location to the major transportation corridors. The estimated trip distribution percentages are described in **Table 3**. The site-generated traffic volumes for the AM and PM peak hours are illustrated in **Figure 8** and **Figure 9**.

site Trip Forecast

Table 3 - Trip Distribution

To / From	А	м	PM	РМ		
	Inbound	Outbound	Inbound Outbour			
West of Cedar Creek Road	78%	81%	81%	75%		
East of Cedar Creek Road	22%	19%	19%	25%		
Total	100%	100%	100%	100%		



Figure 8 - Site Generated Traffic Volumes – AM Peak

 \bigcirc

site Trip Forecast



Figure 9 - Site Generated Traffic Volumes – PM Peak

Future Total Traffic

5.0 FUTURE TOTAL TRAFFIC

The future total traffic volumes were generated by adding the site generated trips to the future background traffic volumes.

5.1 FUTURE TOTAL TRAFFIC 2033

Figure 10 to Figure 11 show the future total traffic volumes for the AM and PM peak hours in 2033.



Figure 10 - Future Total Traffic Volumes in 2033 – AM Peak

Future Total Traffic



Figure 11 - Future Total Traffic Volumes in 2033 – PM Peak

Transportation Impact Assessment

6.0 TRANSPORTATION IMPACT ASSESSMENT

As the Cedar Creek Road and proposed Site Access is the only intersection within the study scope, the existing and future background conditions are not analyzed in this study. The impact of the site generated traffic volumes to the future total 2033 traffic operations is analyzed in this section.

6.1 FUTURE TOTAL TRAFFIC OPERATIONS

6.1.1 Left-Turn Lane Warrant

Based on Geometric Design Standards for Ontario Highway ("GDSOH"), a left-turn lane warrant analysis was conducted for the proposed intersection (i.e., Cedar Creek Road and Proposed Site Access) under future total 2033 conditions.

As noted in **Table 4**, the left-turn lane was warranted for the east approach of the intersections of Cedar Creek Road and proposed Site Access. Additional storage lane length of 15m for commercial vehicles was added on top of the warranted 25m storage lane length. The analysis sheets were attached in **Appendix E.**

Table 4 - Future Total 2033 Left-Turn Lane Warrant Analysis

Intersection	АМ		РМ							
Cedar Creek Road and Proposed Site Access	V _{opposing}	$V_{\text{advancing}}$	V_{left}	%LT	V_{opposing}	$V_{advancing}$	V_{left}	%LT	Warranted	Storage
East Approach	507	554	19	4%	612	600	4	1%	YES	40m
South Approach	0	16	13	81%	0	80	60	75%	NO	-

6.1.2 Future Lane Configurations

Based on the analysis results from **Section 6.1.1**, the lane configuration at Cedar Creek Road and proposed Site Access in 2033 is shown in **Figure 12**.

Transportation Impact Assessment



Figure 12 - Lane Configuration

6.1.3 Future Total traffic operations

The quality of intersection operations at unsignalized intersections is evaluated in terms of level of service (LOS) and volume to capacity (v/c) as defined by the Highway Capacity Manual 2000 (HCM). LOS is evaluated on the basis of average control delay per vehicle and includes deceleration delay, queue moveup time, stopped delay, and final acceleration delay. **Table 5** presents criteria for each LOS. For unsignalized intersections, the LOS ranges from LOS A for 10 seconds or less average delay to LOS F for average delay greater than 50 seconds.

Capacity is evaluated in terms of ratio of demand flow to capacity with an at-capacity condition represented by a v/c ratio of 1.00 (i.e. volume demand equals theoretical capacity).

Transportation Impact Assessment

LOS	Unsignalized Intersection-Control Delay					
А	≤10 sec					
В	10–15 sec					
С	15–25 sec					
D	25–35 sec					
Е	35–50 sec					
F	>50 sec					

Table 5 - Level of Service

The future total intersection level of service analysis was conducted using the Synchro 11 software package. Synchro analysis outputs based on the future total traffic volumes in 2033 are included in **Appendix F**. According to Region of Waterloo TIS guidelines, movements are considered critical under the following conditions:

- At intersections, overall or movements with LOS at E or F.
- At intersections, movements with estimated 95th percentile queue length over available storage.
- At intersections, movements with estimated 95th percentile queue length will block an existing access.
- exclusive turning lanes are inaccessible because of queue lengths in adjacent through lanes.

Table 6 summarized the analysis results for the intersections in future total 2033. During the AM and PM peak hours all unsignalized intersections in study area would expect to operate with acceptable levels of service with residual v/c ratio.

Table 6 - Intersection Capacity Analysis - Future Total 2033	Table 6 -	 Intersection 	Capacity	Analysis	- Future	Total 2033
--	-----------	----------------------------------	----------	----------	----------	-------------------

			AM Pe	ak H	lour		PM Pe	ak H	lour
Intersection	Movement	LOS	Delay (s)	v/c	Queue (m) 95th	LOS	Delay (s)	v/c	Queue (m) 95th
Dranged Site Assess & Coder Creek Deed	WBL	Α	8.6	0.02	1	А	9.5	0.00	0
Proposed Sile Access & Cedar Creek Road	NBLR	С	20.9	0.07	2	Е	36.7	0.42	15

As shown in **Table 6**, the shared northbound left-turn/right-turn movement is anticipated to operate above critical operation threshold with a LOS "E". However, the delay at this movement is only 1.7 seconds longer than the critical threshold (35 seconds) and it is generally understood that the HCM 2000 analysis method is over conservative when it comes to analysis of unsignalized intersections. Therefore, although the shared northbound left-turn/right-turn movement is anticipated to operate above critical operation threshold with a LOS "E", traffic operations at the intersection is not expected to experience excessive delay under the future total 2033 conditions.

Transportation Impact Assessment

6.2 SIGHT DISTANCE REVIEW

As noted from the Draft Site Plan, a new site access connected to Cedar Creek Road is proposed. The access intersection will be controlled by a stop sign to control traffic from the minor road. An intersection sight distance evaluation at the new intersection was conducted to confirm that there is sufficient sight distance for drivers turning left or right to minor or major streets. Based on TAC Geometric Design Guide for Canadian Roads ("TAC") Section 9.9.2.3, the applicable cases are as follows:

- Case B1 left turn from the minor road
- Case B2 right turn from the minor road
- Case F left turns from the major road

Intersection sight distance is calculated using equation 9.9.1 from the TAC Geometric Design Guide for Canadian Roads as outlined below:

$$ISD = 0.278 * V major * t_g$$

 $Where;$
 $ISD = Intersection Sight Distance$
 $V major = design speed of roadway (km/h)$
 $t_g = assumed time gap for vehicles to turn from stop onto roadway (s)$

The calculated and design sight distances are further summarized in Tables 9.9.4, Tables 9.9.6 and 9.9.12 of the TAC for vehicles turning left from a stop or turning left from the major road, respectively. **Table 7** contains a summary of the intersection sight distance requirements for each of the applicable cases. It is assumed that the design vehicle is combination truck due to estimated high heavy vehicle percentage at this intersection.

Case	Design Speed	tg	Stopping Sight Distance	Required Intersection Sight Distance	TAC Reference
B1	90km/h	11.5s	160m	290m	Table 9.9.4
B2	90km/h	10.5s	160m	265m	Table 9.9.6
F	90km/h	7.5s	160m	190m	Table 9.9.12

Table 7 - Intersection Sight Distance Summary

Cedar Creek Road: There is a clear sight line to the proposed Site Access to the west (approximately 350 m away) and a clear sight line to the east (approximately 500m away) based on the review of the Google Earth aerial view and street view. In addition, no vertical profile sight constraint was observed at the proposed site accesses. The proposed Site Access is expected to have adequate sight distance.

Summary and Conclusions

7.0 SUMMARY AND CONCLUSIONS

Based on the assessment herein, the following conclusions and recommendations are drawn:

- The proposed industrial-use development at 2509 Cedar Creek Road (RR97) occupies about 18.03 ha of land on the 200m east of the Cedar Creek Road and Earl Thompson Road intersection in Ayr, Township of North Dumfries, Ontario. The site proposes to build up to 13.82ha industrial land-use and 2.01 ha of stormwater management land-use. The owner/applicant is interested in utilizing the land for Transport Enterprise and/or Transportation Operations, which would include the storage of various vehicle fleets of various trucking enterprises. The property owner intends to use one (1) Lot for a trucking business operation. The lot would be developed as a parking lot and used to store various vehicle fleets of various trucking enterprises. The remaining six (6) industrial Lots would be for sale with potentially similar uses. A 10-year horizon and an annual growth rate of 3.5% were required by the Region of Waterloo. The only study area intersection considered in this study is the Cedar Creek Road and proposed Site Access.
- Because the proposed site is vacant under existing and future background conditions, traffic operation analysis is not performed for existing and future background conditions in this study.
- The detailed site plan is not available at this stage of the project. Therefore, a proxy site located at the immediate west of the proposed site was selected to determine the GFA of the proposed site. A GFA to land area ratio of 12.6% is used in this study.
- The site trip generation was estimated based on ITE trip generation 11th Edition. Trips were added to the road network and assigned to the surrounding road network. It is estimated that 104 (88 inbound and 16 outbound) and 100 (20 inbound and 80 outbound) trips are expected to be added to the local road network during the weekday AM and PM peak hours, respectively.
- Left-turn lane warrant analysis was conducted for intersections of Cedar Creek Road and proposed Site Access under future total 2033. Under future total 2033, a left-turn lane was warranted for at the west approach. The storge of westbound left-turn at Cedar Creek Road and proposed Site Access should be 40 meters.
- The future total analysis adopts the results of left-turn lane warrant for the intersection Cedar Creek Road and proposed Site Access. The shared northbound left-turn/right-turn movement is anticipated to operate above critical operation threshold with a LOS "E". However, the delay at this movement is 1.7 seconds longer than the critical threshold and it is generally understood that the HCM 2000 analysis method is over conservative when it comes to analysis of unsignalized intersections. Therefore, although the shared northbound left-turn/right-turn movement is anticipated to operate above critical operation threshold with a LOS "E", traffic operations at the intersection is not expected to experience excessive delay under the future total 2033 conditions.

Summary and Conclusions

• Based on TAC Geometric Design Guide for Canadian Roads (TAC) Section 9.9.2.3, a sight distance review for the new proposed access was conducted. The sight distance analysis results showed that provided distances shall be enough to provide a clear sight for turning vehicles.

APPENDIX A

Correspondences



From:	Mirhoseini, Arash
То:	Cheryl Marcy
Subject:	RE: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON
Date:	Thursday, January 26, 2023 2:32:00 PM
Attachments:	image001.jpg
	image003.jpg

Thank you Cheryl,

Best regards,

Arash Mirhoseini, M.Sc., P.Eng., PMP (he/him/his) Associate, Transportation Planning and Traffic Engineering Team Lead

Mobile: 416-722-8270 arash.mirhoseini@stantec.com



The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately. Please consider the environment before printing this email.

From: Cheryl Marcy <CMarcy@regionofwaterloo.ca>
Sent: January 26, 2023 1:07 PM
To: Mirhoseini, Arash <Arash.Mirhoseini@stantec.com>
Subject: FW: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON

Hi Arash,

Hope you're doing well.

I don't think we have provided the background growth rate for this TIS. Please use 3.5% for the 2033 (10 years) horizon year for Cedar Creek Road.

Please contact me if you have any questions or require more information.

Thanks, Cheryl Marcy, C.E.T. Transportation Planner

Regional Municipality of Waterloo

Planning, Development and Legislative Services 150 Frederick Street, 8th Floor Kitchener, ON N2G 4J3

Phone: 226-753-1093 cmarcy@regionofwaterloo.ca

Confidentiality Notice: This email correspondence (including any attachments) may contain information which is confidential and/or exempt from disclosure under applicable law, and is intended only for the use of the designated recipient(s) listed above. Any unauthorized use or disclosure is strictly prohibited. If you are not the intended recipient, or have otherwise received this message by mistake, please notify the sender by replying via email, and destroy all copies of this original correspondence (including any attachments). Thank you.

From: Mirhoseini, Arash <<u>Arash.Mirhoseini@stantec.com</u>>
Sent: January 6, 2023 9:52 AM
To: Cheryl Marcy <<u>CMarcy@regionofwaterloo.ca</u>>
Subject: RE: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON

****EXTERNAL ALERT**** This email originated from outside the Region of Waterloo.

Hi Cheryl,

Hope you enjoyed your holidays and happy new year!

We are wondering if there is any traffic count is available along Cedar Creed Road (TMC or ATR) that can be provided to us for the subject study? The preference is to have a TMC report for the intersection of Cedar Creek Road and Earl Thompson Road or its intersection with Cochran Drive or a ATR between there two intersections but any other available data can also be very helpful. If no data is available we will plan to conduct a TMC in short time.

Thank you.

Best regards,

Arash Mirhoseini, M.Sc., P.Eng., PMP (he/him/his) Associate, Transportation Planning and Traffic Engineering Team Lead

Mobile: 416-722-8270 arash.mirhoseini@stantec.com





The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written

authorization. If you are not the intended recipient, please delete all copies and notify us immediately. Please consider the environment before printing this email.

From: Cheryl Marcy <<u>CMarcy@regionofwaterloo.ca</u>>
Sent: November 30, 2022 1:36 PM
To: Mirhoseini, Arash <<u>Arash.Mirhoseini@stantec.com</u>>
Subject: FW: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON

Hi Arash,

I followed up with the MTO last week and confirmed that this property falls outside of the MTO permit control area, as such, MTO review/permits are not required.

After further discussion with Region staff on the study scope, the number of study intersections can be reduced. The study would only need to include the operation of the proposed access to Cedar Creek Road.

Please contact me if you have any questions or require more information on the study requirements.

Thanks, Cheryl Marcy, C.E.T. Transportation Planner

Regional Municipality of Waterloo Planning, Development and Legislative Services 150 Frederick Street, 8th Floor Kitchener, ON N2G 4J3

Phone: 226-753-1093 <u>cmarcy@regionofwaterloo.ca</u>

Confidentiality Notice: This email correspondence (including any attachments) may contain information which is confidential and/or exempt from disclosure under applicable law, and is intended only for the use of the designated recipient(s) listed above. Any unauthorized use or disclosure is strictly prohibited. If you are not the intended recipient, or have otherwise received this message by mistake, please notify the sender by replying via email, and destroy all copies of this original correspondence (including any attachments). Thank you.

From: Mirhoseini, Arash <<u>Arash.Mirhoseini@stantec.com</u>>
Sent: November 30, 2022 11:49 AM
To: Cheryl Marcy <<u>CMarcy@regionofwaterloo.ca</u>>
Subject: RE: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON

****EXTERNAL ALERT**** This email originated from outside the Region of Waterloo.

Hi Cheryl,

Hope you are doing well! I really appreciate it if you could update us on any progress with MTO coordination for the subject TIS. Please feel free to give me a call if we need to discuss.

Thank you in advance,

Best regards,

Arash Mirhoseini, M.Sc., P.Eng., PMP (he/him/his) Associate, Transportation Planning and Traffic Engineering Team Lead

Mobile: 416-722-8270 arash.mirhoseini@stantec.com





The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately. Please consider the environment before printing this email.

From: Cheryl Marcy <<u>CMarcy@regionofwaterloo.ca</u>>
Sent: November 9, 2022 11:15 AM
To: Mirhoseini, Arash <<u>Arash.Mirhoseini@stantec.com</u>>
Subject: FW: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON

Hi Arash,

I just wanted to check in with you before our meeting at 1:30pm. Typically, with the pre-study meetings we do some quick introductions then you'll be able to introduce your project and show a concept plan. We'll work through the Pre-Study Conference Form and discuss what will be required for the report.

If there's any questions we can't answer I'll follow-up with you after the meeting.

Thanks, Cheryl Marcy, C.E.T. Transportation Planner

Regional Municipality of Waterloo Planning, Development and Legislative Services 150 Frederick Street, 8th Floor Kitchener, ON N2G 4J3

Phone: 226-753-1093 cmarcy@regionofwaterloo.ca

Confidentiality Notice: This email correspondence (including any attachments) may contain information which is confidential and/or exempt from disclosure under applicable law, and is intended only for the use of the designated recipient(s) listed above. Any unauthorized use or disclosure is strictly prohibited. If you are not the intended recipient, or have otherwise received this message by mistake, please notify the sender by replying via email, and destroy all copies of this original correspondence (including any attachments). Thank you.

From: Mirhoseini, Arash <<u>Arash.Mirhoseini@stantec.com</u>>
Sent: October 26, 2022 5:30 PM
To: Cheryl Marcy <<u>CMarcy@regionofwaterloo.ca</u>>
Subject: RE: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON

****EXTERNAL ALERT**** This email originated from outside the Region of Waterloo.

Hi Cheryl,

I just confirmed that the access road will remain private and will not be transferred to the municipality.

Best regards,

Arash Mirhoseini, M.Sc., P.Eng., PMP (he/him/his) Associate, Transportation Planning and Traffic Engineering Team Lead

Mobile: 416-722-8270 arash.mirhoseini@stantec.com





The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately. Please consider the environment before printing this email.

From: Mirhoseini, Arash

Sent: October 25, 2022 2:22 PM

To: Cheryl Marcy <<u>CMarcy@regionofwaterloo.ca</u>>

Subject: RE: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON

Cheryl,

I will confirm this with the project team and will get back to you promptly.

Best regards,

Arash Mirhoseini, M.Sc., P.Eng., PMP (he/him/his) Associate, Transportation Planning and Traffic Engineering Team Lead

Mobile: 416-722-8270 arash.mirhoseini@stantec.com





The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately. Please consider the environment before printing this email.

From: Cheryl Marcy <<u>CMarcy@regionofwaterloo.ca</u>>
Sent: October 25, 2022 2:14 PM
To: Mirhoseini, Arash <<u>Arash.Mirhoseini@stantec.com</u>>
Subject: RE: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON

Thanks Arash.

It is my understanding that this will be a private access, not a municipal street. Please confirm.

Thanks, Cheryl Marcy, C.E.T. Transportation Planner

Regional Municipality of Waterloo Planning, Development and Legislative Services 150 Frederick Street, 8th Floor Kitchener, ON N2G 4J3

Phone: 226-753-1093

cmarcy@regionofwaterloo.ca

Confidentiality Notice: This email correspondence (including any attachments) may contain information which is confidential and/or exempt from disclosure under applicable law, and is intended only for the use of the designated recipient(s) listed above. Any unauthorized use or disclosure is strictly prohibited. If you are not the intended recipient, or have otherwise received this message by mistake, please notify the sender by replying via email, and destroy all copies of this original correspondence (including any attachments). Thank you.

From: Mirhoseini, Arash <<u>Arash.Mirhoseini@stantec.com</u>>
Sent: October 25, 2022 1:31 PM
To: Cheryl Marcy <<u>CMarcy@regionofwaterloo.ca</u>>
Subject: RE: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON

****EXTERNAL ALERT**** This email originated from outside the Region of Waterloo.

Thank you Cheryl for your response,

My availability for the week of November 7th is as follows:

- Monday November 7th 9:00 AM to 3:30 PM 4:00 PM to 5:00 PM
- Tuesday November 8th 10:30 AM to 1:30 PM 3:00 PM to 5:00 PM
- Wednesday November 9th 9:00 AM to 3:30 PM 4:00 PM to 5:00 PM
- Thursday November 10th 10:00 AM to 2:30 PM 4:00 PM to 5:00 PM
- Friday November 11th 9:00 AM to 12:00 PM 2:30 PM to 4:30 PM

Please feel free to arrange the call based on the review team's availability and if it will be out of above times, I still can rearrange some of my other calls and meetings.

Best regards,

Arash Mirhoseini, M.Sc., P.Eng., PMP (he/him/his) Associate, Transportation Planning and Traffic Engineering Team Lead

Mobile: 416-722-8270 arash.mirhoseini@stantec.com





The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately. Please consider the environment before printing this email. From: Cheryl Marcy <<u>CMarcy@regionofwaterloo.ca</u>>
Sent: October 25, 2022 1:22 PM
To: Mirhoseini, Arash <<u>Arash.Mirhoseini@stantec.com</u>>
Subject: RE: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON

Hi Arash,

Jason forwarded your email on to me. I'll check with the MTO if they would like to be involved in this TIS.

Would you please let me know your availability for a pre-study meeting the week of November 7? I'll set up a meeting with Region, Township and possibly MTO staff to discuss this TIS.

Please contact me if you have any questions or require more information.

Cheryl Marcy, C.E.T. Transportation Planner

Regional Municipality of Waterloo Planning, Development and Legislative Services 150 Frederick Street, 8th Floor Kitchener, ON N2G 4J3

Phone: 226-753-1093 cmarcy@regionofwaterloo.ca

Confidentiality Notice: This email correspondence (including any attachments) may contain information which is confidential and/or exempt from disclosure under applicable law, and is intended only for the use of the designated recipient(s) listed above. Any unauthorized use or disclosure is strictly prohibited. If you are not the intended recipient, or have otherwise received this message by mistake, please notify the sender by replying via email, and destroy all copies of this original correspondence (including any attachments). Thank you.

From: Mirhoseini, Arash <<u>Arash.Mirhoseini@stantec.com</u>>
Sent: October 19, 2022 12:10 PM
To: Jason Wigglesworth <<u>JWigglesworth@regionofwaterloo.ca</u>>; Matthew Colley
<<u>MColley@regionofwaterloo.ca</u>>
Cc: Luo, Zheng <<u>Zheng.Luo@stantec.com</u>>

Subject: Pre-Study Meeting Request - 2509 Cedar Creed Road (Regional Road 97), Ayr, ON

****EXTERNAL ALERT**** This email originated from outside the Region of Waterloo.

Hi Jason and Matthew,

Hope you are doing well and enjoying these colorful fall days!

Stantec TPTE team has been retained to prepare a traffic study for a proposed development at 2509 Cedar Creek Road (RR97) in Ayr, Township of North Dumfries, ON. This study will be required as part of site Plan of Condominium submittal package. To be able to start this task, we would like to request the Region for a pre-study meeting to discuss and agree on the traffic study procedure and its requirements. Based on the site location and its close proximity to Highway 401, we expect the Town and MTO will also be part of the study review and approval team.

Attached please find the pre-study checklist, a draft ToR that includes our initial proposed scope, study area, assumptions and methodology along with the latest site preliminary plan that includes proposed lots and access road network. I also attached the records of site pre-submission consultation meetings minutes with the Region and the Township for information. I really appreciate if we can have this pre-study meeting scheduled based on your schedule availability.

Please review and feel free to contact me should you have any queries or concerns.

Best regards,

Arash Mirhoseini, M.Sc., P.Eng., PMP (he/him/his) Associate, Transportation Planning and Traffic Engineering Team Lead

Mobile: 416-722-8270 arash.mirhoseini@stantec.com





The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately. Please consider the environment before printing this email.

Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

APPENDIX B Site Plan





Lots/Blocks	Land Use	Area (ha)
Lot 1	Industrial	2.021
Lot 2	Industrial	1.966
Lot 3	Industrial	1.966
Lot 4	Industrial	1.967
Lot 5	Industrial	1.967
Lot 6	Industrial	1.967
Lot 7	Industrial	1.966
Block 8	Stormwater Management Facility	2.011
Block 9	Street A	2.202
TOTAL		18.033ha

1st Submission for Draft Plan		TR	MD	2024.01.12
Revision		Ву	Appd	YYYY.MM.DE
File Name: 161414214_R-DP_CONDO	JJ	JJ	MD	2022.08.16
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DE

APPENDIX C Traffic Data











Therefore, vehicles entering from the west = 296



		2.10
Afternoon Peak Diagram	Count Period Peak Hour From: 3:00 PM From: 4:00 PM To: 6:00 PM To: 5:00 PM	
Municipality: North Dumfries Intersection: Cedar Creek Rd @ Earl Thompson Rd Control: Signalized Major Road: Cedar Creek Rd	Weather conditions: GeoID: 17009 Clear/Dry GeoID: 17009 Count Date: Wednesday, 01-Ju Person(s) who counted: Cam	n-22
North Leg Total: 0 % Trks 0% 0% 0% North Entering: 0 Heavys 0 0 0 North Peds: 0 Trucks 0 0 0 Peds Cross: ⋈ Cars 0 0 0	Heavys0East Leg Total:844Trucks0East Entering:415Cars0East Peds:0Total0Peds Cross:X	
Heavys Trucks Cars Total 81 8 503 592	na Total Cars Trucks Heavys % Trks 0 0 0 0 0% 393 327 6 60 17% 22 24 340 40 55	
Cedar Creek Rd w 🚽	E 340 10 65	
% Trks Heavys Trucks Cars Total 0% 0 0 0 0 17% 55 6 303 364	Cedar Creek Rd	
Earl Thompson	Rd ← ↑ ↑ → 62 429	
Peds Cross: X West Peds: 0 Heavys 29 West Entering: 458 Trucks 6 West leg Total: 1,050 Cars 81 Total 116 V	Total 199 0 65 Cars 176 0 57 233 South Peds: 0 Trucks 2 0 1 3 South Peds: 0 Heavys 21 0 7 28 South leg Total: 380 % Trks 12% 0% 12% Image: Construction of the second	
Com	nments	
To determine total vehicles entering the intersection durin Total Entering = West leg total entering + South Example 1: Therefore, total vehicles entering intersection	ing afternoon peak hour, add all leg totals entering. h leg total entering + East leg total entering + North leg total entering section = 1,137	
Example 2: Total vehicles entering from the west = eastbo Therefore, vehicles entering from the	ound left turn + eastbound through + eastbound right turn e west = 458	



Total Count Diagram Weather conditions: Municipality: North Dumfries Intersection: Cedar Creek Rd @ Earl Thompson Rd Clear/Dry GeoID: 17009 Control: Signalized Count Date: Wednesday, 01-Jun-22 Major Road: Cedar Creek Rd Person(s) who counted: Cam North Leg Total: 0 East Leg Total: 5,171 North Entering: 0 0% 0% 0% East Entering: 2,715 % Trks Heavys ſ North Peds: 0 0 East Peds: 0 0 0 0 Trucks Heavys Peds Cross: 0 0 0 0 Peds Cross: X Trucks Cars 0 **Bicycles Entering:** 0 **Bicycles Entering:** 0 Cars 0 0 0 0 Total 0 **Buggies Entering:** 0 Total 0 0 **Buggies Entering:** 0 na Heavys Trucks Cars Total Total Cars Trucks Heavvs % Trks 0 714 85 2,496 3,295 0 0 0 0% 2,466 1,843 52 571 25% 249 202 10 37 19% 2,045 62 608 Cedar Creek Rd Cedar Creek Rd % Trks Trucks Heavys Cars Total 0% 0 0 0 0 27% 543 47 1,580 2,170 26% 149 23 480 652 Cars Trucks Heavys Total 692 2,060 1,813 57 2,456 70 586 Earl Thompson Rd X Peds Cross: Peds Cross: Total 829 286 Χ 0 West Peds: 0 186 653 0 233 886 South Peds: 0 Heavys Cars West Entering: 2,822 Trucks 33 Trucks 33 0 10 43 South Entering: 1,115 West leg Total: 6.117 Cars 682 Heavys 143 0 43 186 South leg Total: 2.016 901 19% **Bicycles Entering:** 0 Total % Trks 21% 0% **Bicycles Entering:** 1 **Buggies Entering:** 0 **Buggies Entering:** 0 Comments

To determine total vehicles entering the intersection, add all leg totals entering.

Example 1: Total Entering = West leg total entering + South leg total entering + East leg total entering + North leg total entering Therefore, total vehicles entering intersection = 6,652

Example 2:

Total vehicles entering from the west = eastbound left turn + eastbound through + eastbound right turn Therefore, vehicles entering from the west = **2,822**

Notes: None



Estimated Daily Traffic 1.740000 Total Factor = Monthly Factor Daily Factor 1 24 Hour Factor 1.74 1 х х = Weather conditions: Municipality: North Dumfries Intersection: Cedar Creek Rd @ Earl Thompson Rd Clear/Dry GeoID: 17009 **Control:** Signalized Count Date: Wednesday, 01-Jun-22 Major Road: Cedar Creek Rd Person(s) who counted: Cam 0 0% 0% 0% Heavys 8,998 North Leg Total: % Trks East Leg Total: ſ North Entering: 0 0 0 0 0 East Entering: 4,724 Heavys Trucks 0 North Peds: N/A Trucks 0 0 0 0 Cars East Peds: N/A n Peds Cross: Cars 0 0 0 0 Total Peds Cross: X 0 0 0 Total na Heavys Trucks Cars Total Total Cars Trucks Heavvs % Trks 1,242 148 4,343 5,733 0 0 0 0 0% 4,291 3,207 90 994 25% 433 351 17 64 19% 3,558 108 1,058 Cedar Creek Rd Cedar Creek Rd % Trks Trucks Total Heavys Cars 0% 0 0 0 0 27% 945 82 2,749 3,776 26% 259 40 835 1,134 Cars Trucks Heavys Total 1,204 122 3,584 3,155 1,020 4,273 99 Earl Thompson Rd Peds Cross: X Peds Cross: Ν Total 1,442 0 498 West Peds: N/A 324 1,136 0 405 1,542 South Peds: N/A Heavys Cars West Entering: 4,910 Trucks 57 Trucks 57 0 17 75 South Entering: 1,940 West leg Total: 10,644 1,187 Cars Heavys 249 0 75 324 South leg Total: 3,508 1.568 19% Total % Trks 21% 0% Comments To determine the EDT (Estimated Daily Traffic), add all four leg totals and divide by two. This will give you the approximate number of vehicles entering and exiting the intersection in a 24-hour period (West leg total + South leg total + East leg total + North leg total) EDT = 11,574 Example: 2

REGIONAL MUNICIPALITY OF WATERLOO TURNING MOVEMENT COUNT Region of Waterloo Peak Hour Factor By Movement Weather conditions: Municipality: North Dumfries Intersection: Cedar Creek Rd @ Earl Thompson Rd Clear/Dry GeoID: 17009 Control: Signalized Count Date: Wednesday, 01-Jun-22 Major Road: Cedar Creek Rd Person(s) who counted: Cam North Approach PHF East Approach PHF AM Peak: 0.00 AM Peak: 0.81 Mid-day Peak: 0.00 Movement Mid-day Peak: 0.89 PM Peak: 0.00 PM 0.00 0.00 0.00 PM Peak: 0.95 MID 0.00 0.00 0.00 0.00 0.00 0.00 AM na AM AM Peak Hour MID Mid-day Peak Hour AM MID PM Movement 0.00 0.00 ΡM PM Peak Hour 0.00 0.86 0.95 0.94 0.53 0.79 0.63 Cedar Creek Rd Cedar Creek Rd ΡM MID AM Movement 0.00 0.00 0.00 0.89 0.91 0.89 0.81 0.89 0.65 Earl Thompson Rd West Approach PHF 0.86 0.00 0.72 AM South Approach PHF AM Peak: 0.79 0.85 0.00 0.63 MID AM Peak: 0.94 ΡM Mid-dav Peak: 0.95 0.51 Mid-day Peak: 0.75 0.71 0.00 PM Peak: 0.87 PM Peak: 0.65 Movement Comments

Intersection: Cedar Creek Rd @ Earl Thompson I GeoID: 17009 Municipality: North Dumfries Major Road: Cedar Creek Rd

Intersection Control: Signalized Date: Wednesday, 01-Jun-22 Name: Cam Weather: Clear/Dry

			EA	STBOUN	ID	WE	ESTBOU	ND	NOF	RTHBO	JND	SC	OUTHBO	UND		
A	nnroad	ch Control	9	Signalize	Ч	S	Signalize	d	s	ianalize	d		N/A			
	ppiout	on Control	•	Jignanze	4	,	ignuize	4	0	ignaiize	ū		N/A			
															TOTAL	TOTAL HOUR
7:30	to	7:45	0	74	38	8	91	0	31	0	6	0	0	0	248	
7:45	to	8:00	0	79	58	20	98	0	27	0	9	0	0	0	291	
8:00	to	8:15	0	57	32	9	65	0	33	0	4	0	0	0	200	
8:15	to	8:30	0	72	22	5	84	0	22	0	7	0	0	0	212	951
8:30	to	8:45	0	52	22	/	96	0	19	0	13	0	0	0	209	912
8:45	10	9:00	0	60	29	8	72	0	26	0	9	0	0	0	204	825
9.00	to	9.10	0	41 56	23 14	12	04 81	0	20	0	/ 15	0	0	0	204	800
9.10	to	9.30	0	66 66	8	10	61	0	17	0	11	0	0	0	173	773
9:45	to	10:00	Ő	52	15	3	74	0	16	0	10	0	0	0	170	739
10:00	to	10:15	0	46	11	5	60	0	15	0	4	0	0	0	141	688
10:15	to	10:30	0	51	11	7	58	0	12	0	3	0	0	0	142	626
AM	Peak	Hour														
7:30	to	8:30	0	282	150	42	338	0	113	0	26	0	0	0	951	
# of	ftruck	s in peak	0	4	2	1	7	0	4	0	1	0	0	0	19	
# of I	heavie	s in peak	0	68	16	4	68	0	20	0	5	0	0	0	181	
% h	eavie	es (Total)	0%	26%	12%	12%	22%	0%	21%	0%	23%	0%	0%	0%	21%	
12:00	to	12:15	0	58	15	16	68	0	20	0	16	0	0	0	193	
12:15	to	12:30	0	66	12	8	64	0	15	0	7	0	0	0	172	
12:30	to	12:45	0	61	16	10	62	0	20	0	12	0	0	0	181	
12:45	to	13:00	0	54	14	6	65	0	13	0	5	0	0	0	157	703
13:00	to	13:15	0	60	18	11	72	0	15	0	8	0	0	0	184	694
13:15	to	13:30	0	52	12	6	70	0	18	0	6	0	0	0	164	686
13:30	to	13:45	0	61	12	11 E	55	0	14	0	/ F	0	0	0	160	665
Midda		k Hour	0	02	10	5	01	0	10	0	5	0	0	0	107	075
12:00	to	13:00	0	239	57	40	259	0	68	0	40	0	0	0	703	
# of	ftruck	s in peak	0	6	2	2	5	0	2	0	2	0	0	0	19	
# of I	neavie	s in peak	0	71	18	3	72	0	23	0	4	0	0	0	191	
% h	eavie	s (Total)	0%	32%	35%	13%	30%	0%	37%	0%	15%	0%	0%	0%	30%	
									1							
15:00	to	15:15	0	84	22	7	77	0	25	0	7	0	0	0	222	
15:15	to	15:30	0	/1	22	1	72	0	18	0	9	0	0	0	199	
15:30	to to	15:45	0	87	26	6 5	80	0	31	0	10	0	0	0	240	996
15.45	to	16:15	0	102	29 20	5 1	09 105	0	62	0	4 12	0	0	0	225	000 078
16:15	to	16:30	0	85	23 21	6	94	0	30	0	12	0	0	0	247	1 026
16:30	to	16:45	0 0	99	27	7	99	0	70	0	32	0	0	0	334	1,120
16:45	to	17:00	0	78	17	5	95	Õ	37	0	10	0	Ō	0	242	1,137
17:00	to	17:15	0	83	20	9	101	0	59	0	16	0	0	0	288	1,111
17:15	to	17:30	0	88	18	8	90	0	37	0	3	0	0	0	244	1,108
17:30	to	17:45	0	82	11	3	61	0	14	0	4	0	0	0	175	949
17:45	to	18:00	0	55	12	4	62	0	21	0	4	0	0	0	158	865
	reak	HOUR	0	261	04	22	202	^	100	Δ	6F	Δ	0	Δ	1 1 2 7	
10.00 # ^f	iU F truck	s in neak	0	6	34 2	Δ	6	0	2	0	1	0	0	0	21	
# of H	neavie	s in peak	0	55	24	5	60	0	21	0	7	0	0	0	172	
" c/ i	eavie	s (Total)	0%	17%	28%	41%	17%	0%	12%	0%	. 12%	0%	0%	0%	17%	

Intersection: Cedar Creek Rd @ Earl Thompson R GeoID: 17009 Municipality: North Dumfries Major Road: Cedar Creek Rd

Intersection Control: Signalized Date: Wednesday, 01-Jun-22 Name: Cam Weather: Clear/Dry

				PEDEST	RIAN CROSSI	NG		
					Crossin	g Approach		
	Time		East App.	West App.	North App.	South App.	TOTAL	TOTAL HOUR
7:30	to	7:45	0	0	0	0	0	
7:45	to	8:00	0	0	0	0	0	
8:00	to	8:15	0	0	0	0	0	
8:15	to	8:30	0	0	0	0	0	0
8:30	to	8:45	0	0	0	0	0	0
8:45	to	9:00	0	0	0	0	0	0
9:00	to	9:15	0	0	0	0	0	0
9:15	to	9:30	0	0	0	0	0	0
9:30	to	9:45	0	0	0	0	0	0
9:45	to	10:00	0	0	0	0	0	0
10:00	to	10:15	0	0	0	0	0	0
10:15	to	10:30	0	0	0	0	0	0
AM	Peak I	Hour					0	
7:30	to	8:30	0	0	0	0	0	
12:00	to	12:15	0	0	0	0	0	
12:15	to	12:30	0	0	0	0	0	
12:30	to	12:45	0	0	0	0	0	
12:45	to	13:00	0	0	0	0	0	0
13:00	to	13:15	0	0	0	0	0	0
13:15	to	13:30	0	0	0	0	0	0
13:30	to	13:45	0	0	0	0	0	0
13:45	to	14:00	0	0	0	0	0	0
Midda	y Pea	k Hour					0	
12:00	to	13:00	0	0	0	0	0	
			-		_	-	_	
15:00	to	15:15	0	0	0	0	0	
15:15	to	15:30	0	0	0	0	0	
15:30	to	15:45	0	0	0	0	0	
15:45	to	16:00	0	0	0	0	0	0
16:00	to	16:15	0	0	0	0	0	0
16:15	to	16:30	0	0	0	0	0	0
16:30	to	16:45	0	0	0	0	0	0
16:45	to	17:00	0	0	0	0	0	0
17:00	to	17:15	0	0	0	0	0	0
17:15	to	17:30	0	0	0	0	0	0
17:30	to	17:45	0	0	0	0	0	0
17:45	to	18:00	0	0	0	0	0	0
PM	Peak I	Hour					0	
16:00	to	17:00	0	0	0	0	0	

APPENDIX D

Proxy Site Measurements and Calculations





Proxy Site area measurement		
Lot	GFA sqm	Land Area sqm
1	2905	21775
2	1299	13225
3	647	5170
4	547	5204
5	995	5200
Total	6393	50574
GFA to Land Area Ratio	12.6%	

APPENDIX E

Left-Turn Lane Warrant



Cedar Creek Rd and Site Access-FT 2033-AM-East Approach



Cedar Creek Rd and Site Access-FT 2033-PM-East Approach







APPENDIX F

Synchro Analysis Report – Future Total



	-	7	1	-	1	1	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	î,		5	+	¥		_
Traffic Volume (veh/h)	438	69	19	535	13	3	
Future Volume (Veh/h)	438	69	19	535	13	3	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	438	69	19	535	13	3	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None			None			
Median storage veh)							
Upstream signal (m)	157						
pX, platoon unblocked	-		0.69		0.69	0.69	
vC, conflicting volume			507		1046	472	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			58		840	8	
tC, single (s)			4.2		6.6	6.4	
tC, 2 stage (s)							
tF (s)			2.3		3.7	3.5	
p0 queue free %			98		94	100	
cM capacity (veh/h)			1022		210	700	
Direction, Lane #	EB 1	WB 1	WB 2	NB 1			
Volume Total	507	19	535	16			
Volume Left	0	19	0	13			
Volume Right	69	0	0	3			
cSH	1700	1022	1700	242			
Volume to Capacity	0.30	0.02	0.31	0.07			
Queue Length 95th (m)	0.0	0.4	0.0	1.6			
Control Delay (s)	0.0	8.6	0.0	20.9			
Lane LOS	0.0	Α	0.0	 C			
Approach Delay (s)	0.0	0.3		20.9			
Approach LOS				C			
Intersection Summary							
Average Delay			0.5				
Intersection Canacity Utiliz	zation		42 4%			of Service	e
Analysis Period (min)			15				,

Movement EBT EBR WBL WBT NBL NBR Lane Configurations 5 1 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Lane Configurations Image: Configuration in the image: Configuratin the image: Configuration in the image: Configuration in the im
Traffic Volume (veh/h) 596 16 4 596 60 20 Future Volume (Veh/h) 596 16 4 596 60 20 Sign Control Free Stop 0% 0% 0% Grade 0% 0% 0% 0% 0% Peak Hour Factor 1.00 1.00 1.00 1.00 1.00 1.00 Hourly flow rate (vph) 596 16 4 596 60 20 Pedestrians
Future Volume (Veh/h) 596 16 4 596 60 20 Sign Control Free Stop 0%
Sign Control Free Free Stop Grade 0% 0% 0% 0% Peak Hour Factor 1.00 1.00 1.00 1.00 1.00 1.00 Hourly flow rate (vph) 596 16 4 596 60 20 Pedestrians
Grade 100 1100 100 0% Grade 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% Peak Hour Factor 1.00
Peak Hour Factor 1.00 1.00 1.00 1.00 1.00 1.00 Hourly flow rate (vph) 596 16 4 596 60 20 Pedestrians Lane Width (m) Walking Speed (m/s) Percent Blockage 100
Hourly flow rate (vph) 596 16 4 596 60 20 Pedestrians Lane Width (m) Walking Speed (m/s) Percent Blockage Right turn flare (veh) Median type None None None Median type None None Mone Median type None 0.66 0.66 0.66 V, platoon unblocked 0.66 0.66 0.66 0.66 VC, conflicting volume 612 1208 604 vC2, stage 1 conf vol vC2, stage 2 conf vol vC4, unblocked vol 152 1057 139 tC, single (s) 4.5 6.5 6.3 100 62 97 tK (s) 2.6 3.6 3.4 90 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 581 581 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Total 612 4 596 80 156 581
Picking New York (kpin) 0.00 10 4 0.00 0.0 10 4 0.00 10
Lane Width (m) Walking Speed (m/s) Percent Blockage Right turn flare (veh) Median type None Median storage veh) Upstream signal (m) 157 pX, platoon unblocked 0.66 0.66 vC, conflicting volume 612 1208 604 vC1, stage 1 conf vol vC2, stage 2 conf vol vC4, stage 1 conf vol vC2, stage 2 conf vol vCu, unblocked vol 152 1057 139 tC, single (s) 4.5 6.5 6.3 tC, stage (s) 100 62 97 tF (s) 2.6 3.6 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 0 20 CSH 1700 805 1700 191 <td< td=""></td<>
Walking Speed (m/s) Percent Blockage Right turn flare (veh) Median type None Median storage veh) Upstream signal (m) 157 pX, platoon unblocked 0.66 0.66 vC, conflicting volume 612 1208 vC1, stage 1 conf vol vC2, stage 2 conf vol vC4, unblocked vol vC2, stage 2 conf vol 152 1057 vCu, unblocked vol 152 1057 tF (s) 2.6 3.6 p0 queue free % 100 62 tF (s) 2.6 3.6 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Right 16 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
Percent Blockage None None Right turn flare (veh) Median storage veh) Upstream signal (m) 157 Median storage veh) Upstream signal (m) 157 pX, platoon unblocked 0.66 0.66 0.66 vC, conflicting volume 612 1208 604 vC1, stage 1 conf vol vC2, stage 2 conf vol vC2, stage 2 conf vol vC4, unblocked vol 152 1057 139 tC, single (s) 4.5 6.5 6.3 6.5 6.3 6.2 97 tC, single (s) 2.6 3.6 3.4 90 90 612 97 60 97 60 62 97 60 62 97 651 581
Right turn flare (veh) None None Median type None None Median storage veh) Upstream signal (m) 157 pX, platoon unblocked 0.66 0.66 0.66 vC, conflicting volume 612 1208 604 vC1, stage 1 conf vol vC2, stage 2 conf vol vC4, unblocked vol 152 1057 139 tC, single (s) 4.5 6.5 6.3 6.3 4.5 6.5 6.3 tC, single (s) 2.6 3.6 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 581 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 0 Volume Total 612 4 596 80 0 20<
Median type None None Median storage veh) Upstream signal (m) 157 pX, platoon unblocked 0.66 0.66 0.66 vC, conflicting volume 612 1208 604 vC1, stage 1 conf vol vC2, stage 2 conf vol vC2, stage 2 conf vol vC2, stage 2 conf vol vC2, stage 2 conf vol 152 1057 139 tC, single (s) 4.5 6.5 6.3 tC, 2 stage (s) t 100 62 97 tF (s) 2.6 3.6 3.4 90 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 581 581 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 VOlume Left 0 4 0 60 Volume Right 16 0 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m)<
Median storage veh) Indite Indite Indite Median storage veh) 157
Upstream signal (m) 157 pX, platoon unblocked 0.66 0.66 0.66 vC, conflicting volume 612 1208 604 vC1, stage 1 conf vol vC2, stage 2 conf vol vC2, stage 2 conf vol vC2, stage 2 conf vol vCu, unblocked vol 152 1057 139 tC, single (s) 4.5 6.5 6.3 tC, 2 stage (s) t 100 62 97 tF (s) 2.6 3.6 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 20 cSH 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
pX, platoon unblocked 0.66 0.66 0.66 vC, conflicting volume 612 1208 604 vC1, stage 1 conf vol vc2, stage 2 conf vol vc2, stage 2 conf vol vc2, stage 2 conf vol vCu, unblocked vol 152 1057 139 tC, single (s) 4.5 6.5 6.3 tC, 2 stage (s) t t t tF (s) 2.6 3.6 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Right 16 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
vC, conflicting volume 612 1208 604 vC1, stage 1 conf vol vC2, stage 2 conf vol vC2, stage 2 conf vol vCu, unblocked vol 152 1057 139 tC, single (s) 4.5 6.5 6.3 tC, stage (s) tF (s) 2.6 3.6 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Right 16 0 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
vC1, stage 1 conf vol 012 1206 004 vC2, stage 2 conf vol vCu, unblocked vol 152 1057 139 tC, single (s) 4.5 6.5 6.3 tC, 2 stage (s) t 2.6 3.6 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4 0
vC1, stage 1 coll vol vC2, stage 2 conf vol vC2, stage 2 conf vol 152 1057 139 vC, single (s) 4.5 6.5 6.3 tC, single (s) 4.5 6.5 6.3 tC, 2 stage (s) 100 62 97 tF (s) 2.6 3.6 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 20 cSH Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
vCu, unblocked vol 152 1057 139 tC, single (s) 4.5 6.5 6.3 tC, 2 stage (s) t 100 62 97 tF (s) 2.6 3.6 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4 14
VCu, unblocked vol 132 1037 139 tC, single (s) 4.5 6.5 6.3 tC, 2 stage (s) 100 62 97 tF (s) 2.6 3.6 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4 14
tC, single (s) 4.3 6.3 0.3 tC, 2 stage (s) tF (s) 2.6 3.6 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4 14
tF (s) 2.6 3.6 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4 0 0
If (s) 2.0 3.0 3.4 p0 queue free % 100 62 97 cM capacity (veh/h) 805 156 581 Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 20 cSH CSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 20 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
Direction, Lane # EB 1 WB 1 WB 2 NB 1 Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
Volume Total 612 4 596 80 Volume Left 0 4 0 60 Volume Right 16 0 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
Volume Left 0 4 0 60 Volume Right 16 0 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
Volume Right 16 0 0 20 cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
cSH 1700 805 1700 191 Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
Volume to Capacity 0.36 0.00 0.35 0.42 Queue Length 95th (m) 0.0 0.1 0.0 14.4
Queue Length 95th (m) 0.0 0.1 0.0 14.4
5 ()
Control Delay (s) 0.0 9.5 0.0 36.7
Lane LOS A E
Approach Delay (s) 0.0 0.1 36.7
Approach LOS E
Intersection Summary
Average Delay 23
Intersection Canacity I Itilization 48.8% ICI I evel of Service
Analysis Period (min) 15