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Traffic Impact Brief/Statement

September 4, 2024

Prepared for: Barry & Tamara McCamus
Prepared by: Tranplan Associates

Re: Proposed 5 Lot Plan of Subdivision – Hamlet of Ida, Township of Cavan-Monaghan, County of Peterborough, Traffic Impact Brief/Statement

Tranplan Associates has been retained by Barry and Tamara McCamus ("the Owners") to provide a traffic impact brief/statement in support of an application for a 5 Lot Plan of Subdivision in the Hamlet of Ida, in Township of Cavan-Monaghan, County of Peterborough. It is noted that a Traffic Brief Study[1] carried out by Tranplan Associates (hereinafter "Tranplan Study") in support for a 7 Lot Plan of Subdivision was submitted in August 2017, see **Technical Appendix A**. The Tranplan Study provided the following study conclusions and recommendations for the 7 Lot Subdivision:

- The present study road network operates at good Levels of Service (LoS)1 during weekday peak hour periods with residual capacity for future growth in traffic.
- During future 2027 total traffic peak hour conditions, all traffic movements at the site entrances to Sharpe Line will operate at LoS "A"
- Traffic movements during 2027 peak hour periods at the CR 10/Sharpe Line intersection are forecast to operate at LoS "B" or better. This is considered a very good LoS for peak hour traffic conditions. Drivers accessing CR 10 from Sharpe Line including traffic from the new subdivision will face little delay.

[1] "McCamus Residential Subdivision, Sharpe Line, Hamlet of Ida, Township of Cavan Monaghan, Traffic Study Brief, Prepared by: Tranplan Associates Prepared for: Barry & Tamara McCamus", August, 2017, see **Appendix A**

- No new auxiliary lanes will be required at the Sharpe Line/CR 10 intersection to support 2027 total peak hour traffic volumes that will include site traffic from the *McCamus Residential Subdivision*. The existing Sharpe Line/CR 10 intersection geometrics will support 2027 total peak hour volumes.
- An evaluation of collision frequency was carried out for the Sharpe Line/CR 10
- intersection. The analysis applied collision data supplied by the County. The analysis determined that the collision risk at this intersection falls within an acceptable domain.
- The residential lot entrances to Sharpe Line should be designed to current Township of Cavan Monaghan standards for such entrances to a local rural Township road.
- To meet Township requirements, the driveway/entrance to Lot 1 the most easterly lot, must be located 3 m from the western boundary of the lot. This will
- maximize driveway spacing from the CR 10/Sharpe Line intersection.
- Township requirements specify that the individual lot driveways for Lots 2 through 7 inclusive must be at least 3 m from the individual lot boundaries.
- As required, all signage and pavement markings should be constructed in accordance with the guidance provided in th*e Ontario Traffic Manual* (OTM) an*d the Manual of Uniform Traffic Control Devices of Canada* (MUTCDC).

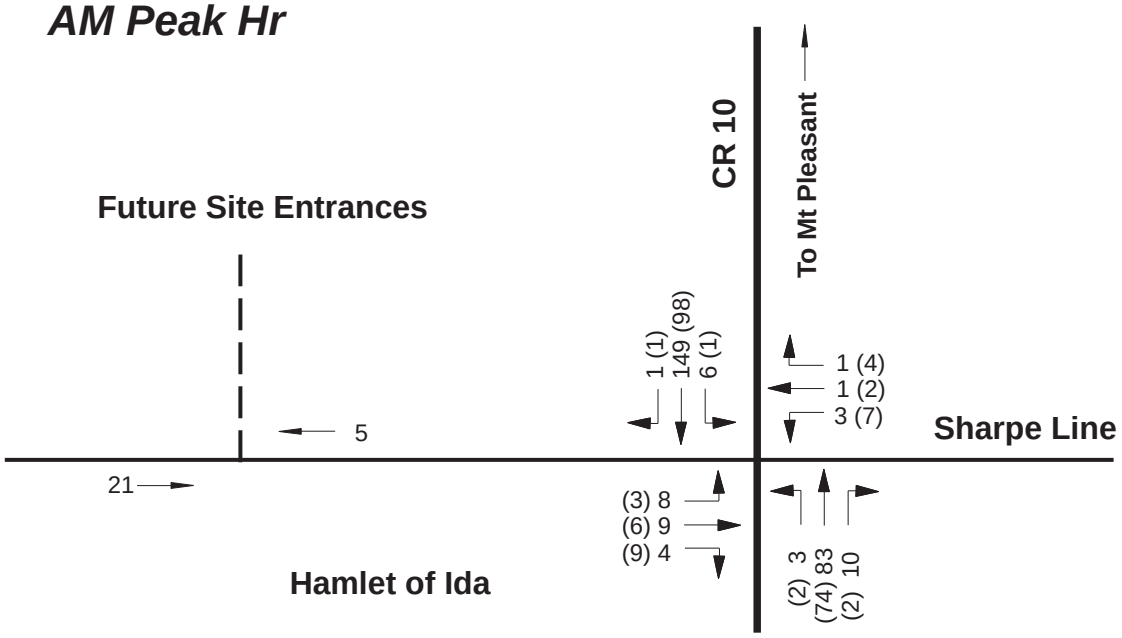
Since then, two easterly lots that formed the 7 lots have been sold (single family dwellings have been built on those two lots) and a new 5 Lot Plan of Subdivision is proposed. The Township of Cavan-Monaghan and the County of Peterborough requested a Traffic Brief/Traffic Impact Statement in support of the 5 Lot Plan of Subdivision Application.

Traffic Forecasts

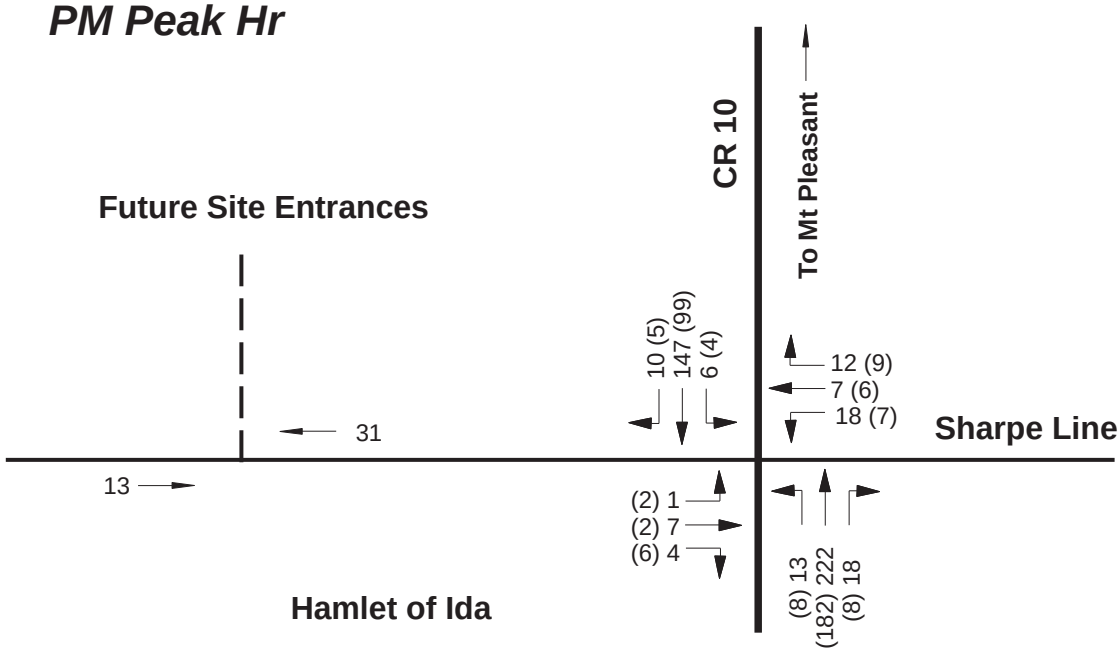
In addition to the reduced number of lots (from 7 to 5) proposed by the owners, we have been informed of two additional lots created (known as "Stewart Lots" to

Exhibit 1.1
Comparison of 2017 DHV and (2024 Observed)

AM Peak Hr



PM Peak Hr



the west of the proposed development as well as a Plan of Subdivision (known as "Cameron Subdivision") has been approved by the Township. Notwithstanding the additional developments, the traffic forecasts for the study site, as provided in the Tranplan Study is maintained for this update and is considered the "worst case" scenario.

Tranplan Associates undertook a traffic count program at Sharpe Line and County Road 10 intersection on July 22, 2024, see **Technical Appendix B**, to compare the current traffic data with the previous (2017) data and the future 2027 forecasts. It is noted that the adjusted 2017 DHV used for study analysis was much higher than 2024 July counts, see enclosed Exhibit 1.1. Furthermore, the two Stewart Lots (assuming each lot with its own driveway on Sharpe Line) and the Cameron Subdivision (15 lots with subdivision access on County Road 10) add no significant traffic on Sharpe Line west of County Road 10. As such, the forecast future 2027 traffic data from the Tranplan Study remains the basis for the traffic impact analysis.

Traffic Impacts

Based on the foregoing, since the projected traffic volumes for the study site and the adjacent study intersections are lower than the initial forecasts, there will be no significant additional impact on the area road network compared to what was previously reported in the Tranplan Study. The traffic impacts (along with the recommendations from the study) identified in the Tranplan Study is still valid and remains relevant.

If you should require further information on the study, please do not hesitate to contact us at your convenience.

Yours truly,

Seo-Woon Im, B.E.S.
Senior Transportation Planner
Tranplan Associates

TECHNICAL APPENDIX

APPENDIX A: Tranplan August 2017

Traffic Study Brief

McCamus Residential Subdivision
Sharpe Line, Hamlet of Ida

Township of Cavan Monaghan

Traffic Study Brief

Prepared by:
Tranplan Associates
PO Box 455
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Prepared for:
Barry & Tamara McCamus
Per Richard J. Taylor, B.A. LL.B.
August, 2017

August 15, 2017

Richard J. Taylor, B.A., LL.B.
Barrister, Solicitor, Notary Public
193 Dalhousie Street
Peterborough, K9J 7X7

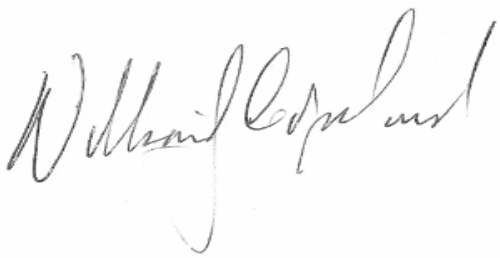
Dear Sir:

RE: Traffic Study for The Proposed McCamus Residential Subdivision To Be Located on Sharpe Line, Hamlet of Ida, Township Cavan Monaghan, County of Peterborough

Tranplan Associates is pleased to present the results of the traffic study carried out to assess the potential traffic impacts of the proposed *McCamus Residential Subdivision* (7 Lots) to be located on Sharpe Line in the Hamlet of Ida, Ontario just west of Peterborough County Road (CR) 10. The future traffic volumes forecast to be generated by the seven lot subdivision can be accommodated on adjacent roads and intersections. Drivers entering and exiting the individual residences and passing through the intersection of Sharpe Line and CR 10 will face acceptable levels of delay.

The existing CR 10/Sharpe Line intersection will support future site and background traffic. No auxiliary turning lanes or right turn tapers will be required at this intersection. The individual residential driveways to each of the seven proposed lots, should be constructed to current Township standards. These entrances will provide acceptable access to Sharpe Line. Tranplan Associates is pleased to have the opportunity to work with your study team on this project. If you should require any further information on the study analyses or reporting, please contact me at your convenience

Yours truly,



William Copeland, P.Eng.

TABLE OF CONTENTS

LIST OF TABLES

1. INTRODUCTION

1.1 Background

Tranplan Associates is pleased to present the results of a traffic study to determine the impact of a proposed *McCamus Residential Subdivision (7 lots)* to be located in the Hamlet of Ida, Ontario. The subdivision will be located on what is essentially a green field site. It will be comprised of seven individual lots fronting on the north side of Sharpe Line immediately west of Peterborough County Road (CR) 10 in the Township of Cavan Monaghan (see *Exhibit 1 - Key Map* following report text). Each lot will have direct access to Sharpe Line via its own driveway.

The proposed layout of the subdivision and its facilities is illustrated in *Exhibit 2 – Preliminary Site Plan*. The general locations of the new site entrance driveways along Sharpe Line are illustrated in *Exhibit 3 - Site Access Context*. It is noted that there is existing residential development along the south side of Sharpe Line similar to that proposed for the study site.

This traffic study has been requested by the County of Peterborough as part of the planning approval process for the proposed subdivision. Discussions have been held with the study team and the County to establish the scope of the traffic study. Tranplan Associates staff have completed three site visits to collect peak hour traffic counts, observe current traffic operations, measure existing road cross-sections, review adjacent land uses and measure sight lines from the general location of each driveway along Sharpe Line.

Traffic analyses completed for this study include intersection capacity analysis of the intersection of Sharpe Line and CR 10. Additional analyses included auxiliary lane warrant calculations for weekday AM and PM peak hour periods. These calculations assessed the need for northbound and southbound left turn lanes as well as northbound and southbound right turn lane/tapers on CR 10. The analyses were based on future AM and PM peak hour volumes for a 10 year planning horizon to 2027. The total traffic volumes used in the analyses included traffic generated by full development of the *McCamus Residential Subdivision* combined with growth in background traffic from 2017 to 2027.

1.2 Principal Findings

The principal findings derived from the study analyses include the following:

- The present study road network operates at good Levels of Service (LoS)[1] during weekday peak hour periods with residual capacity for future growth in traffic.
- During future 2027 total traffic peak hour conditions, all traffic movements at the site entrances to Sharpe Line will operate at LoS “A”
- Traffic movements during 2027 peak hour periods at the CR 10/Sharpe Line intersection are forecast to operate at LoS “B" or better. This is considered a very good LoS for peak

[1] See Technical Appendix – Intersection Capacity Analysis for definitions of Levels of Service.

hour traffic conditions. Drivers accessing CR 10 from Sharpe Line including traffic from the new subdivision will face little delay.

- No new auxiliary lanes will be required at the Sharpe Line/CR 10 intersection to support 2027 total peak hour traffic volumes that will include site traffic from the *McCamus Residential Subdivision*. The existing Sharpe Line/CR 10 intersection geometrics will support 2027 total peak hour volumes.
- An evaluation of collision frequency was carried out for the Sharpe Line/CR 10 intersection. The analysis applied collision data supplied by the County. The analysis determined that the collision risk at this intersection falls within an acceptable domain
- The individual site entrances from Sharpe Line to the new subdivision should be designed to meet current Township standards for rural residential driveways accessing a local Township road.

The following sections of the Study Report contain the documentation and details of the analyses to support the principal findings of the study.

2. EXISTING CONDITIONS

This Section describes the roadway network, traffic volumes, operational analysis results and other notable characteristics under the baseline conditions.

2.1 The Study Site

The proposed *McCamus Residential Subdivision* will be located in the geographic Township of Cavan now part of the amalgamated Township of Cavan Monaghan. The subdivision will located on the north side of Sharpe Line immediately west of CR 10 in the Hamlet of Ida, Ontario (see *Exhibit 1*). The subdivision will be located on a green-field site as illustrated in *Exhibit 3*. The proposed plan of subdivision will contain 7 individual lots for single unit residential housing.

Each of the seven lots will have its own driveway accessing the north side of Sharpe Line as illustrated in *Exhibit 2*. Additional development information for the study site is contained in related planning documentation that will be submitted with this traffic report for the necessary planning approvals.

2.2 Adjacent Land Use

Lands on the south side of Sharpe Line opposite the study site have been subdivided into rural residential homes. *Exhibit 3 – Site Access Context* illustrates this section of Sharpe Line. Cora Drive a local street runs south from Sharpe Line just west of the study site. It provides local access to an additional 16 homes. Older residential homes in the Hamlet run along Sharpe Line east of CR 10 and south along CR 10. Beyond the study site and the Hamlet, lands are in agricultural use. The *North Cavan Public School* is located on the east side of CR 10 about 1 km north of Sharpe Line.

2.3 Access to the Study Site

2.3.1 Peterborough County Road 10

Regional access to the *McCamus Residential Subdivision* will be provided by County Road (CR) 10. This road is under the jurisdiction of the County of Peterborough. CR 10 is a north/south rural collector road that is part of the County road network. The CR 10 travel corridor links rural communities in the west-central part of the County to the Highway 7 and Highway 115 corridors (see *Exhibit 1*). It also provides access to farms, rural residences, and recreational areas such as *Emily Provincial Park* at the north end of the corridor.

The general cross-section of CR 10 In the vicinity of the entrance to the study site is illustrated in *Exhibit 4 – CR 10/Sharpe Line Intersection*. The road cross-section is comprised of a 7.3 m asphalt road platform in a rural open-ditch cross-section. South of Sharpe Line the CR 10 includes paved shoulders. North of Sharpe Line the shoulders are gravel. The posted speed on this section of CR 10 is 60 kph. A design speed of 80 kph was assumed in assessing existing and potential future geometrics for any improvements to CR 10. Based on the Tranplan Associates traffic counts and County data, CR 30 is estimated to carry a 2017 average daily traffic (ADT) volume of about 4,200

to 4,300 vehicles per day (vpd). Based on current TAC criteria, CR 10 is functioning as a rural collector road.

2.3.2 Sharpe Line

Sharpe Line is a local road under the jurisdiction of the Township of Cavan Monaghan. It runs from the western part of the County easterly to Highway 7 on the west side of Peterborough (see *Exhibit 1*). It provides connectivity to CR 10, as well as direct access to farms and rural residences along its corridor west of the City of Peterborough.

In the vicinity of the study site Sharpe Line has a rural open ditch cross-section with a 5.5 m all-weather platform with 0.5 - 0.8 m gravel shoulders. The general cross-section of Sharpe Line in the vicinity of the study site is illustrated in *Exhibit 4*. In the immediate vicinity of the study site Sharpe Line has a posted speed of 50 kph. Based on Tranplan Associates count data, Sharpe Line, west of CR 10 is estimated to have an ADT of 400 to 500 vpd. Based on current TAC criteria, Sharpe Line is functioning as a local rural road.

2.3.3 The Intersection of Sharpe Line and County Road 10

All four approaches to the Sharpe Line/CR 10 intersection are single lane with shared right-left and through movements. There are no auxiliary turning lanes on any of the approaches. The northbound paved shoulder (south approach) sometimes functions as a quasi-right turn taper. The approaches to the intersection are illustrated in *Exhibit 4*. Sharpe Line as the minor approaches to the intersection are STOP-controlled.

Highway Capacity Manual (HCM) capacity analyses based on the 2017 DHV (see *Exhibit 5*) show that all intersection movements operate at Level of Service (LoS) "B" or better. Drivers accessing the CR 10 corridor from Sharpe Line will experience acceptable delay. There is considerable residual capacity to accommodate future growth in background traffic. Detail printouts of the 2017 capacity analysis are included in the *Technical Appendix – Intersection Capacity Analyses*. This is a good LoS for peak hour conditions.

The County supplied the study team with available collision data for the intersection. This data covered the time period from 2009 to 2013 inclusive (5 years). There was one recorded collision within 500 m of the intersection in the data. This collision occurred north of the intersection on CR 10. There were no recorded collisions at the intersection itself. No particular operational issues were observed at the intersection during the site visits. Based on the data supplied by the County, the intersection presently operates at an acceptable level of collision risk.

2.4 Current Traffic Data

Weekday AM and PM peak period traffic counts were collected at the Sharpe Line/CR 10 intersection. The counts provided weekday turning movement volumes at the intersection as well as the volumes on Sharpe Line travelling along the frontage of the proposed subdivision. The counts were carried out on Tuesday May 30, 2017. The County supplied additional background traffic data for CR 10 in the vicinity of Sharpe Line. Based on this County data, seasonal adjustment factors were developed and applied to the May, 2017 Tranplan Associates counts to bring the

observed volumes up to summer 2017 volumes. These 2017 design hour volumes (DHV) are illustrated in *Exhibit 5 – 2017 Design Hour Volumes*. These DHV were subsequently applied to the study analyses.

3. THE PROPOSED DEVELOPMENT

This Section describes the proposed changes to the subject site and the development of the site generated traffic.

3.1 Trip Generation Forecasts

Present plans for the *McCamus Residential Subdivision* include 7 new building lots for single family dwelling units. The layout of the proposed subdivision with its individual lots fronting on Sharpe Line is illustrated in *Exhibit 2*. Site trip generation forecasts were computed based on rates taken from the current Institute of Transportation Engineers (ITE) *Trip Generation Manual* (9th ed.). The selected land use was *Single-Family Detached Housing* (LU 210). *Table 1* following, summarizes the site trip generation for the proposed residential development.

Table 1: Forecast Site Trip Generation (vph)

	Units	AM Peak Hour			PM Peak Hour		
		In[A]	Out	**Total**	In[A]	Out	**Total**
McCamus Subdivision (ITE LU 210)	7	1	4	**5**	4	3	**7**

A – In/out distribution split based on ITE surveys for LU 210.

The proposed development is forecast to generate a total of 5 new vehicle trips during the weekday AM peak hour and 7 new vehicle trips during the weekday PM peak hour. Since the proposed development is a residential subdivision, no trip volume reductions were made for "linked trips", "diverted trips" or "pass-by" trips.

It is noted that the forecast future traffic volumes will be, on the average about 1 vehicle every 10 minutes. This will have little impact on present traffic operations in existing travel corridors.

3.2 Site Trip Distribution

The proposed subdivision can attract future residents with employment destinations in various parts of the County, the City of Peterborough, the Highway 115 corridor and the City of Kawartha Lakes. There are three potential "Gateways" that traffic can arrive/depart to/from the study site as follows:

- CR 10 North
- CR 10 South
- Sharpe Line East

Travel to Sharpe Line West was not included since travel west along this section of Sharpe Line will limited. In addition, using only the above 3 "gateways" assigns all site traffic to the Sharpe Line/CR 10 intersection as a worst case scenario.

The distribution percentage distributions to each of these gateways were derived from the observed travel patterns to/from each of the gateways during each of the two weekday peak hour periods. These observations were then weighted, considering relative attractiveness of potential work/shopping origin/destinations. The resulting assumed trip distributions are summarized in *Table 2* following.

Table 2: Site Trip Distribution

Gateway	AM Peak Hr	PM Peak Hour
CR 10 North	40%	30%
CR 10 South	20%	45%
Sharpe Line East	40%	25%
Total	***100%***	***100%***

There was some observed difference in the distribution of travel between the AM and PM peak hour periods. Some of this can be attributed to the different make up of trip purposes in each of the peak hour periods. The AM peak hour is comprised mostly of work trips and school trips. However, there is a greater mix of other trip purposes in the PM peak hour.

4. FUTURE CONDITIONS

This Section summarizes the assumptions used to develop future year traffic volumes, the operational analysis results and associated impacts to the transportation infrastructure.

4.1 Future Background Traffic

Future background traffic forecasts were developed for a 10 year planning horizon to 2027. It is assumed that site build out will occur over the next few years. The 10 year planning horizon will allow for planning approvals, build out of the study site and time for additional growth in background traffic. A 2% annual traffic growth rate is commonly applied to background traffic forecasts for traffic studies in Peterborough County. While it tends to overstate the historic growth rates in the County, it is considered appropriate for use in these traffic studies. The 2% per year (compounded) traffic growth factor was applied to the observed 2017 design hour volumes as illustrated in *Exhibit 5* to forecast 2027 weekday AM and PM background peak hour volumes. These background volumes are intended to represent somewhat higher summer peak periods of traffic demand.

4.2 Future Total Traffic

The 2027 total weekday AM and PM peak hour volumes for the study road network were computed by adding the new subdivision traffic to 2027 background traffic. The new site traffic was distributed to the study road network based on the assumptions described in *Section 3.2*. The resulting total peak hour volumes are illustrated in *Exhibit 6 - 2027 Total Peak Hour Volumes*. Specific site traffic volumes are noted in this exhibit.

4.3 Site Traffic Impacts

Detailed intersection capacity analyses were carried out to assess the impact of future site traffic on the study intersection. This was done using current 2010 HCM intersection capacity analyses procedures as contained in *Trafficware's Synchro 8* software. The analyses were based on the 2027 total weekday peak hour volumes as illustrated in *Exhibit 6*. The results are contained in *Table 3* following.

Table 3: Summary - Intersection Capacity Analyses

Intersection of Sharpe Line and County Road 10 (unsignalized)						
	AM Peak Hour – Critical Movement			**PM Peak Hour – Critical Movement**		
	LoS (Delay)	**Vol/Cap**	**Queue[A]**	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**
2017 Design Hr Vol	EB-LTR "A/B" (10.7s)	0.04	0 veh	WB-LTR "B" (12.2s)	0.07	0 veh
2027 Total Peak Hr	EB-LTR "B" (11.3s)	0.05	0 veh	EB-LTR: "B" (13.8s)	0.11	1 veh

A – Queue is the 95th percentile vehicle queue length measured in vehicles.

During future Total 2027 peak hour conditions the CR 10/Sharpe Line intersection is forecast to operate at LoS "B". This is considered to be a good LoS for AM and PM peak hour periods. It will have considerable residual capacity with a volume/capacity (v/c) ratio of 0.11 (11%) or less. In

reviewing *Table 3,* it is noted that the combined growth in background traffic plus new site traffic will only increase average driver delay by about 1.5 seconds in the PM peak hour. Drivers entering the CR 10 corridor from Sharpe Line will experience little delay. Based on the low v/c ratios, there will be considerable residual capacity in the CR 10 traffic stream to accommodate traffic from the proposed subdivision. Site traffic will have an acceptable level of impact on the CR 10 corridor. There will be residual capacity in the corridor for growth in traffic beyond the 2027 study planning horizon. Detailed printouts of the capacity analyses for the CR 10/Sharpe Line 2027 peak hour conditions are included in the *Technical Appendix - Intersection Capacity Analyses*.

No specific capacity analysis was carried out for the individual site entrance intersections with Sharpe Line. Referring to *Exhibit 5*, forecast peak hour 2-way volumes on Sharpe Line will be 55 to 60 vph or about 1 vehicle per minute. The individual peak hour turning movement volumes into individual driveways will range from 1 to 2 vph. These movements will operate at LoS "A". Drivers entering the Sharpe Line corridor will face little delay.

4.4 Auxiliary Lane Warrant Analyses

A left turn lane warrant assessment was carried out to determine the need for both northbound and southbound left turn lanes on CR 10 at Sharpe Line. Current *Ministry of Transportation Ontario* (MTO) criteria, standards, and process for this warrant analysis were applied to the intersection. The analysis was based on total 2027 total peak hour volumes as illustrated in *Exhibit 6*. Left turn warrant nomographs from the current MTO manual *Geometric Design Standards for Ontario Highways* (GDSOH) were used for the analysis. Based on MTO criteria, there is no warrant for either a northbound or southbound left turn lane on CR 10 at Sharpe Line. The warrant nomographs used in this analysis are included in the *Technical Appendix – Auxiliary Lane Warrant Analyses.*

The MTO GDSOH manual does not provide a specific warrant procedure for assessing the need for right turn lanes. Northbound and southbound right turn lane warrant analyses were carried out for the CR 10/Sharpe Line intersection based on 2027 total peak hour volumes. The analyses were based on the current *Virginia Department of Transportation* (VDOT) right turn lane warrant procedure. This right turn lane warrant methodology has been used in a number of other traffic studies in Peterborough County and found acceptable. No warrant was found for either a northbound or southbound right turn lane or a right turn taper at the CR 10/Sharpe Line intersection. The existing northbound and southbound right turn "rounding" should be checked against current County standards for County road intersections with local township rural roads.

A copy of the VDOT calculation sheet/nomographs used for the right turn warrant analyses are provided in the *Technical Appendix – Auxiliary Lane Warrant Analysis*.

4.5 Future Site Access

Access to the *McCamus Residential Subdivision* will be provided by individual driveways to each house as illustrated in *Exhibit 2*. Potential access to the subdivision was reviewed with Township

staff. The Township will permit one driveway per site accessing Sharpe Line subject to the following conditions:

- The entrance to the most easterly lot (Lot 1) adjacent to CR 10 must be located 3 m from the west boundary of the Lot to maximize its distance from the intersection of CR 10 and Sharpe Line (see *Exhibit 2*)
- The entrances to the remaining Lots 2 through 7 inclusive can be located along the individual lot frontage but must be 3 m from the lot boundary.
- The individual driveway entrances to Sharpe Line should be constructed to current *Township of Cavan Monaghan* standards for residential driveways accessing a local Township road.

As part of the site visits, *Intersection Sight Distances* (ISD) were measured to the east and to the west along Sharpe Line from the range of site entrance locations along Sharpe Line. The ISD were measured following the procedures laid out in the MTO publication *Commercial Site Access Policy and Standard Designs*. Based on the posted speed of 50 kph, a design speed of 70 kph was used to assess the available sight lines. Clear sight lines will be available to the CR 10/Sharpe Line intersection looking to the east for all site entrances. To the west, sight lines from the most westerly driveway location on Lot 7 extend for more than 200 m. This 200 m sight distance is at the upper limit of the TAC design domain[2] for an ISD based on a 70 kph design speed. It is noted that the required *Stopping Sight Distance* (SSD) for 70 kph is 110 m.

4.6 Emergency Services Access

Each lot in the *McCamus Residential Subdivision* will be have its own direct access to Sharpe Line. This will provide individual access for each lot for EMS services.

[2] See *Figure 2.3.3.4b,* Geometric Design Guide for Canadian Roads, TAC pub., 2011

5. CONCLUSIONS AND RECOMMENDATIONS

This Section summarizes the salient findings of the analyses and identifies any necessary changes to the transportation infrastructure.

5.1 Conclusions

The following conclusions have been drawn from the traffic impact analyses completed for the proposed *McCamus Residential Subdivision.* They include the following:

- The present study road network operates at a good LoS during weekday peak hour periods with residual capacity for future growth in traffic.
- The auxiliary lane warrant analyses for the CR 10/Sharpe Line has determined that no auxiliary lanes or right turn tapers will be required on CR 10.
- During future Total 2027 peak hour conditions, all traffic movements at the CR 10/Sharpe Line intersection are forecast to operate at Level of Service (LoS) "B" or better. This is considered a good LoS for peak hour traffic conditions. Drivers accessing CR 10 from Sharpe Line will experience acceptable delay.
- Available Intersection Sight Distance (ISD) from the new site entrances along Sharpe Line will meet/exceed TAC requirements for the site entrance based on a 70 kph design speed.

5.2 Recommendations

The following recommendations have been developed from the study analyses and conclusions:

- The residential lot entrances to Sharpe Line should be designed to current Township of Cavan Monaghan standards for such entrances to a local rural Township road.
- To meet Township requirements, the driveway/entrance to Lot 1 the most easterly lot (see *Exhibit 2*), must be located 3 m from the western boundary of the lot. This will maximize driveway spacing from the CR 10/Sharpe Line intersection.
- Township requirements specify that the individual lot driveways for Lots 2 through 7 inclusive must be at least 3 m from the individual lot boundaries.
- As required, all signage and pavement markings should be constructed in accordance with the guidance provided in th*e Ontario Traffic Manual* (OTM) an*d the Manual of Uniform Traffic Control Devices of Canada* (MUTCDC).

Study analyses have shown the existing road network has the capacity to accept future site traffic from the *McCamus Residential Subdivision.* With site entrance driveways constructed to current Township standards, new site traffic will have an acceptable impact on adjacent roads and intersections. No other new road infrastructure will be required to support new traffic from the *McCamus Residential Subdivision.*

REPORT EXHIBITS

Exhibit 1
Key Map

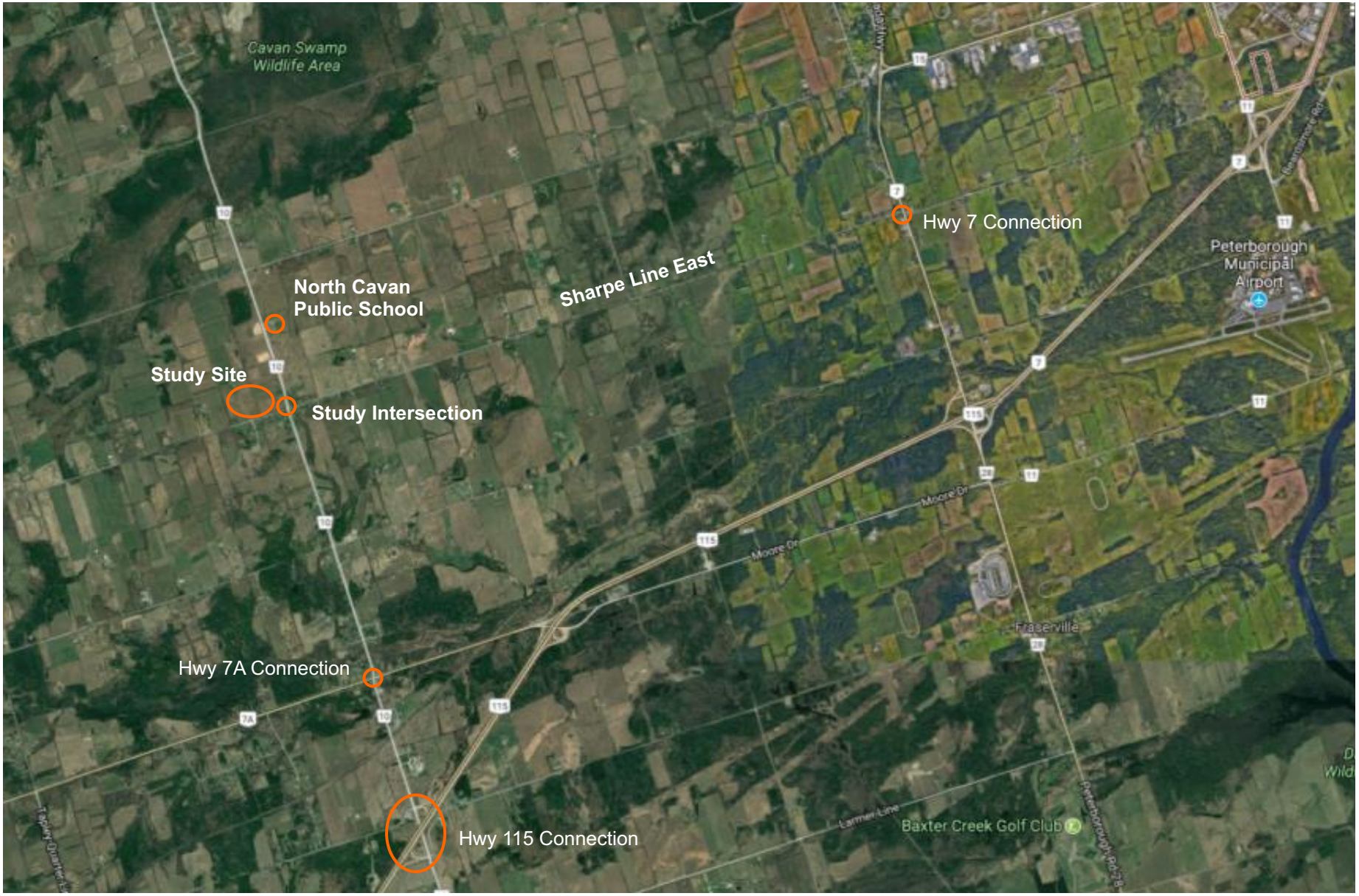


Exhibit 2

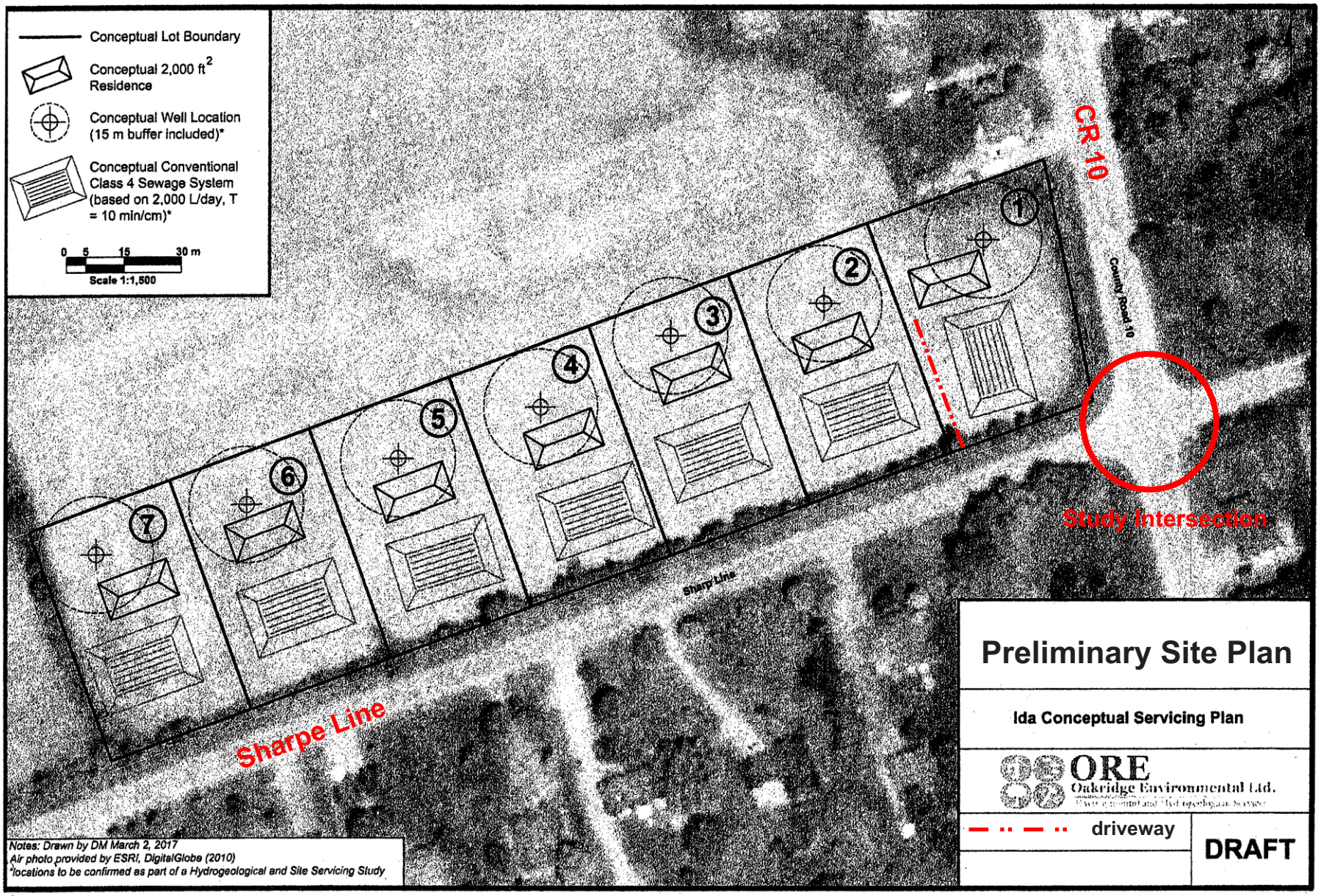
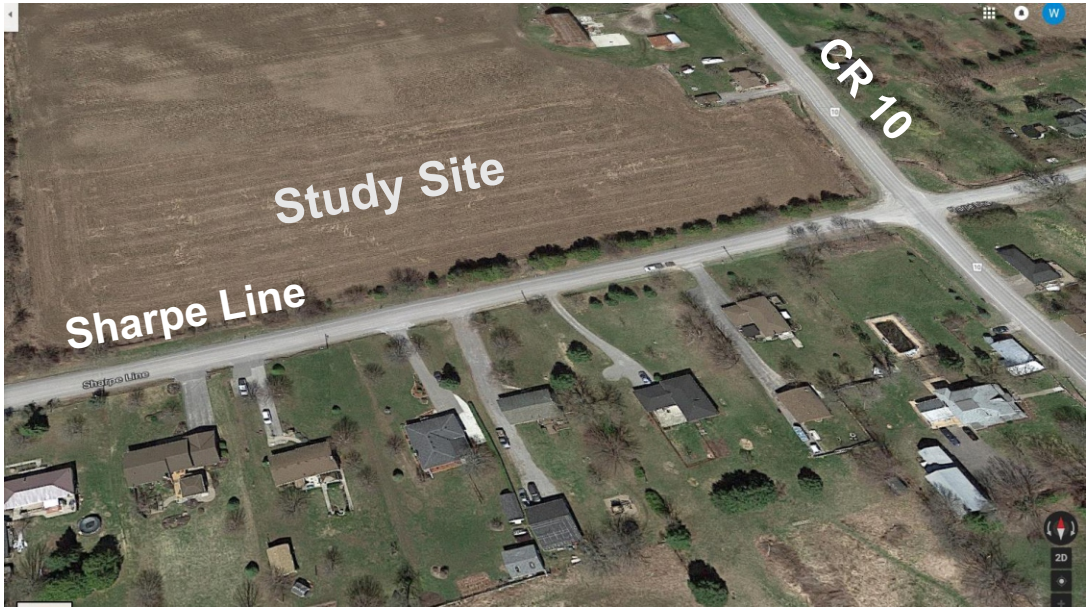

Conceptual Lot Boundary
Conceptual 2,000 ft2 Residence
Conceptual Well Location (15 m buffer included)*
Conceptual Conventional Class 4 Sewage System (based on 2,000 L/day, T = 10 min/cm)*
0 5 15 30 m
Scale 1:1,500
CR 10
County Road 10
Study Intersection
Sharpe Line
Sharp Line
1
2
3
4
5
6
7
Preliminary Site Plan
Ida Conceptual Servicing Plan
ORE
Oakridge Environmental Ltd.
driveway
DRAFT
Notes: Drawn by DM March 2, 2017
Air photo provided by ESRI, DigitalGlobe (2010)
*locations to be confirmed as part of a Hydrogeological and Site Servicing Study

Exhibit 3
Site Access Context



Study Site Looking North

Sharpe Line Looking East Along Study Site Frontage

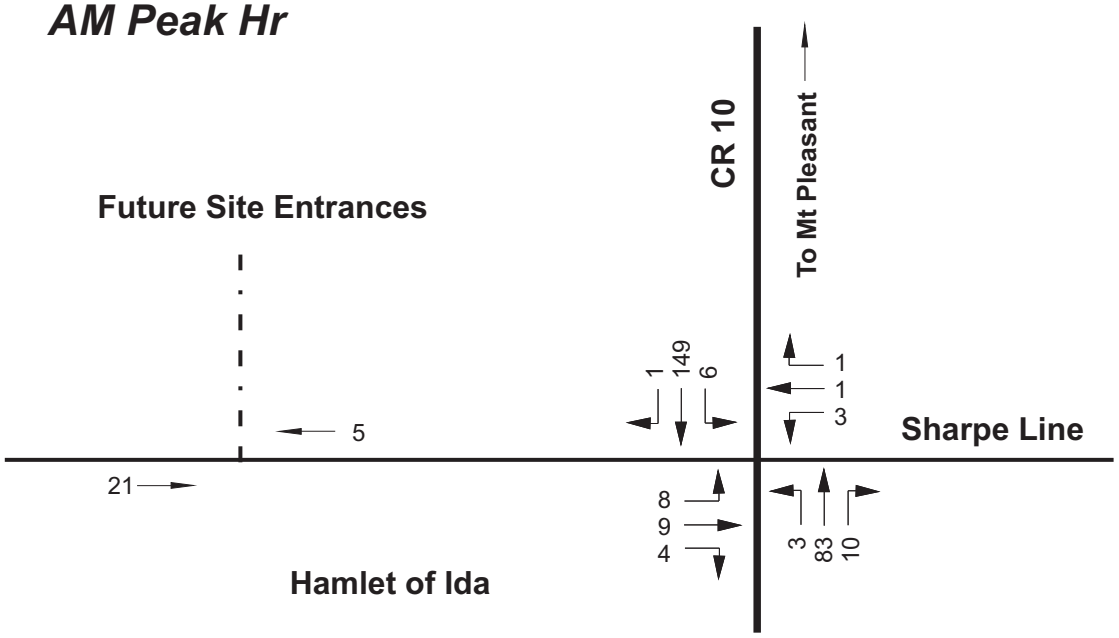
Exhibit 4
CR 10/Sharpe Line Intersection

CR 10 Looking South Through the Intersection

Sharpe LIne Looking West Through the Intersection

Exhibit 5
2017 Design Hour Volumes

AM Peak Hr



PM Peak Hr

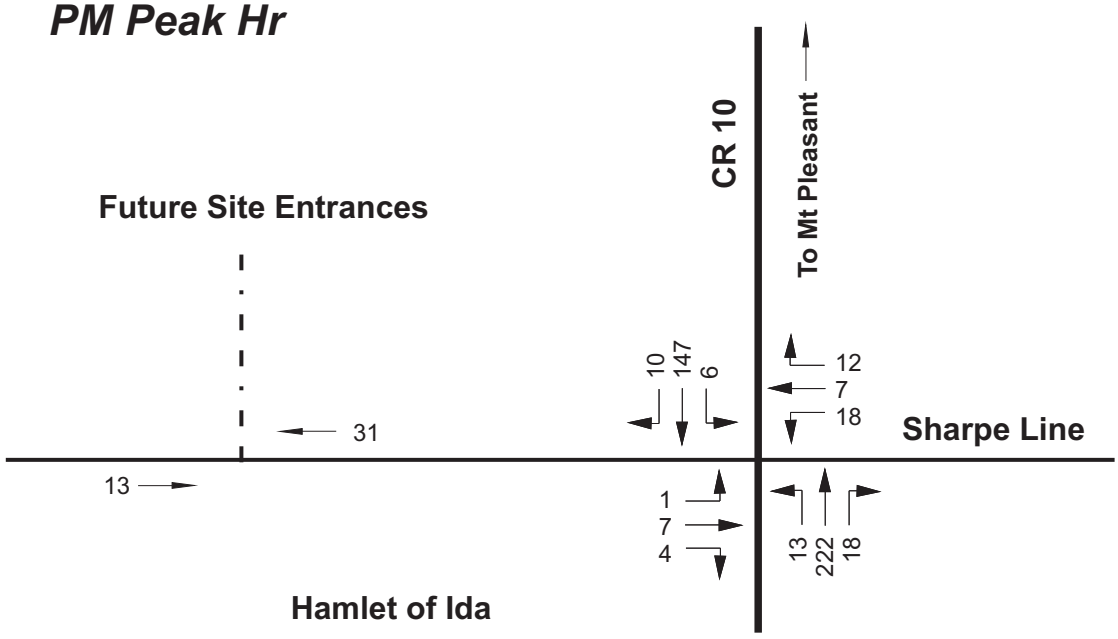
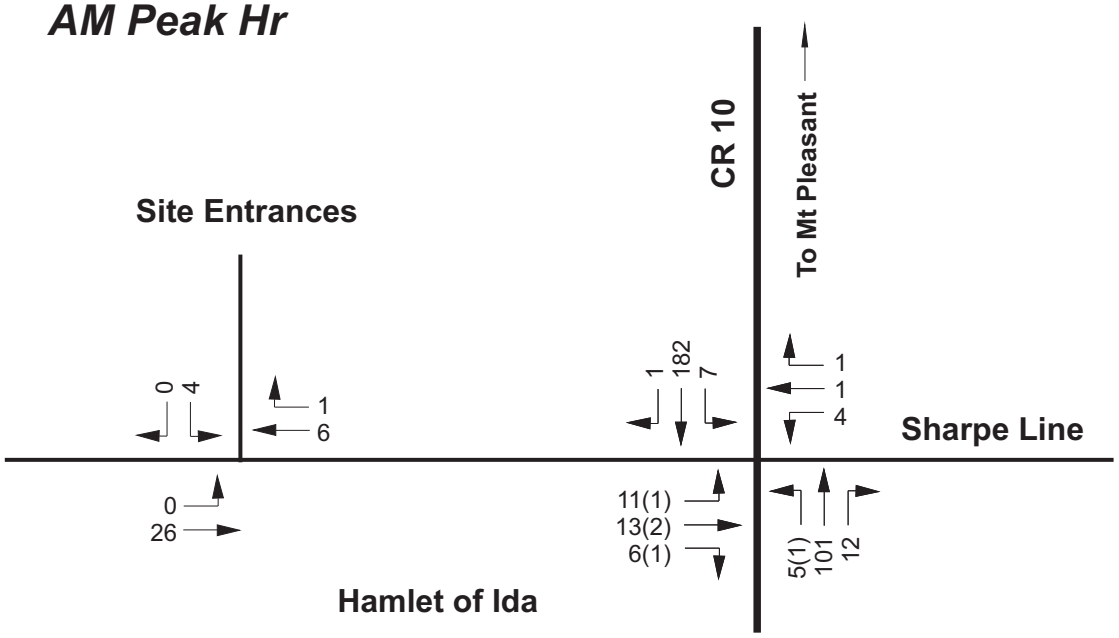
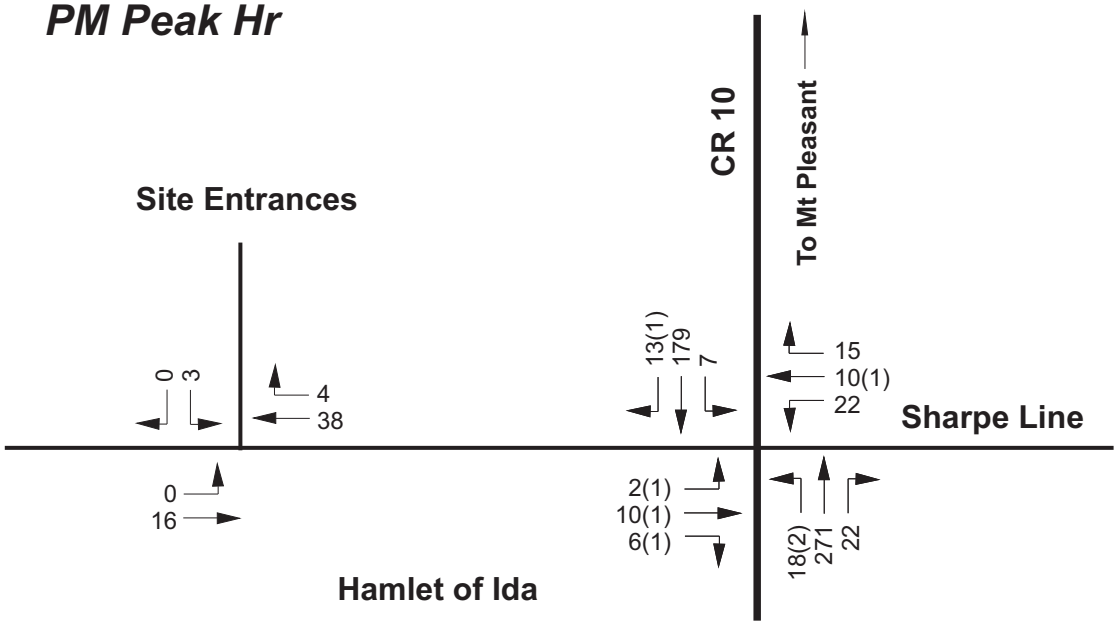


Exhibit 6
2027 Total Peak Hour Volumes

AM Peak Hr



PM Peak Hr



xx - Total Peak Hour
(xx) - Site Traffic

TECHNICAL APPENDIX

Intersection Capacity Analyses

DEFINITION OF LEVELS OF SERVICE
Automobile Mode

UNSIGNALIZED INTERSECTIONS

Analysis of the Level of Service for unsignalized intersections is based on the ***Highway Capacity Manual*** *(HCM 2010)* procedures using current software for unsignalized intersections. The Level of Service for intersections is based on *Control Delay*. At two way stop controlled intersections (TWSC), *Control Delay* is the total elapsed time from a vehicle joining the queue until its departure from the stopped position at the head of the queue. The *Control Delay* also includes the time required to decelerate from a stop and to accelerate to the free-flow speed.

The analysis of individual movements at TWSC intersections can also include the estimate of the ratio of volume or demand to available capacity for the movements. This is commonly know as the (v/c) ratio. The v/c ratio provides some indication of how well these individual intersection movements will function during peak hour periods.

Level of Service definitions for unsignalized intersections as defined by the ***Highway Capacity Manual*** are summarized in the table below.

Definition of Level of Service for Unsignalized Intersections
(see Exhibit 19-1, Highway Capacity Manual 2010)

Level of Service	Average Delay (seconds)
A	0 - 10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	More than 50s and/or v/c > 1

Level of Service (LoS) for a TWSC intersection is determined by the computed or measured *Control Delay* and is defined for each minor movement at the intersection. LoS is not defined for the major street approaches or the intersection as a whole. LoS “F” is considered to be undesirable for design or planning purposes. However, many individual turning movements at TWSC intersections and commercial entrances along urban arterial corridors operate at LoS “F” during peak hour periods.

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	8	9	4	3	1	1	3	83	10	6	149	1
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	9	10	4	3	1	1	3	89	11	6	160	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	286	290	171	292	285	105	166	0	0	105	0	0
Stage 1	179	179	-	106	106	-	-	-	-	-	-	-
Stage 2	107	111	-	186	179	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	651	607	852	645	611	928	1365	-	-	1438	-	-
Stage 1	804	736	-	880	792	-	-	-	-	-	-	-
Stage 2	879	788	-	798	736	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	641	599	845	626	602	921	1359	-	-	1432	-	-
Mov Cap-2 Maneuver	641	599	-	626	602	-	-	-	-	-	-	-
Stage 1	800	730	-	875	788	-	-	-	-	-	-	-
Stage 2	871	784	-	776	730	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	10.5	0.2	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1359	-	-	651	663	1432	-	-
HCM Lane V/C Ratio	0.002	-	-	0.035	0.008	0.005	-	-
HCM Control Delay (s)	7.7	0	-	10.7	10.5	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	7	4	18	7	12	13	222	18	6	147	10
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	1	8	4	19	8	13	14	239	19	6	158	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	473	472	173	468	468	258	174	0	0	263	0	0
Stage 1	181	181	-	281	281	-	-	-	-	-	-	-
Stage 2	292	291	-	187	187	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	488	479	850	492	481	762	1356	-	-	1256	-	-
Stage 1	802	735	-	709	664	-	-	-	-	-	-	-
Stage 2	699	657	-	797	730	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	464	468	843	474	470	756	1350	-	-	1251	-	-
Mov Cap-2 Maneuver	464	468	-	474	470	-	-	-	-	-	-	-
Stage 1	790	729	-	698	654	-	-	-	-	-	-	-
Stage 2	668	647	-	778	724	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.7	12.2	0.4	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1350	-	-	549	538	1251	-	-
HCM Lane V/C Ratio	0.01	-	-	0.024	0.074	0.005	-	-
HCM Control Delay (s)	7.7	0	-	11.7	12.2	7.9	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	0	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	10	6	22	10	15	18	271	22	7	179	13
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	2	11	6	24	11	16	19	291	24	8	192	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	580	579	209	575	574	313	211	0	0	320	0	0
Stage 1	220	220	-	347	347	-	-	-	-	-	-	-
Stage 2	360	359	-	228	227	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	414	416	812	417	418	709	1313	-	-	1196	-	-
Stage 1	765	706	-	653	621	-	-	-	-	-	-	-
Stage 2	642	613	-	757	701	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	386	402	806	394	404	704	1307	-	-	1191	-	-
Mov Cap-2 Maneuver	386	402	-	394	404	-	-	-	-	-	-	-
Stage 1	749	698	-	639	608	-	-	-	-	-	-	-
Stage 2	603	600	-	730	693	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.8	13.8	0.5	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1307	-	-	480	461	1191	-	-
HCM Lane V/C Ratio	0.015	-	-	0.04	0.11	0.006	-	-
HCM Control Delay (s)	7.8	0	-	12.8	13.8	8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.4	0	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	11	13	6	4	1	1	5	101	12	7	182	1
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	12	14	6	4	1	1	5	109	13	8	196	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	348	353	206	358	348	125	202	0	0	127	0	0
Stage 1	216	216	-	131	131	-	-	-	-	-	-	-
Stage 2	132	137	-	227	217	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	592	559	815	583	563	905	1323	-	-	1411	-	-
Stage 1	768	709	-	854	773	-	-	-	-	-	-	-
Stage 2	853	768	-	758	709	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	581	550	809	558	553	898	1317	-	-	1405	-	-
Mov Cap-2 Maneuver	581	550	-	558	553	-	-	-	-	-	-	-
Stage 1	762	702	-	848	767	-	-	-	-	-	-	-
Stage 2	844	762	-	729	702	-	-	-	-	-	-	-

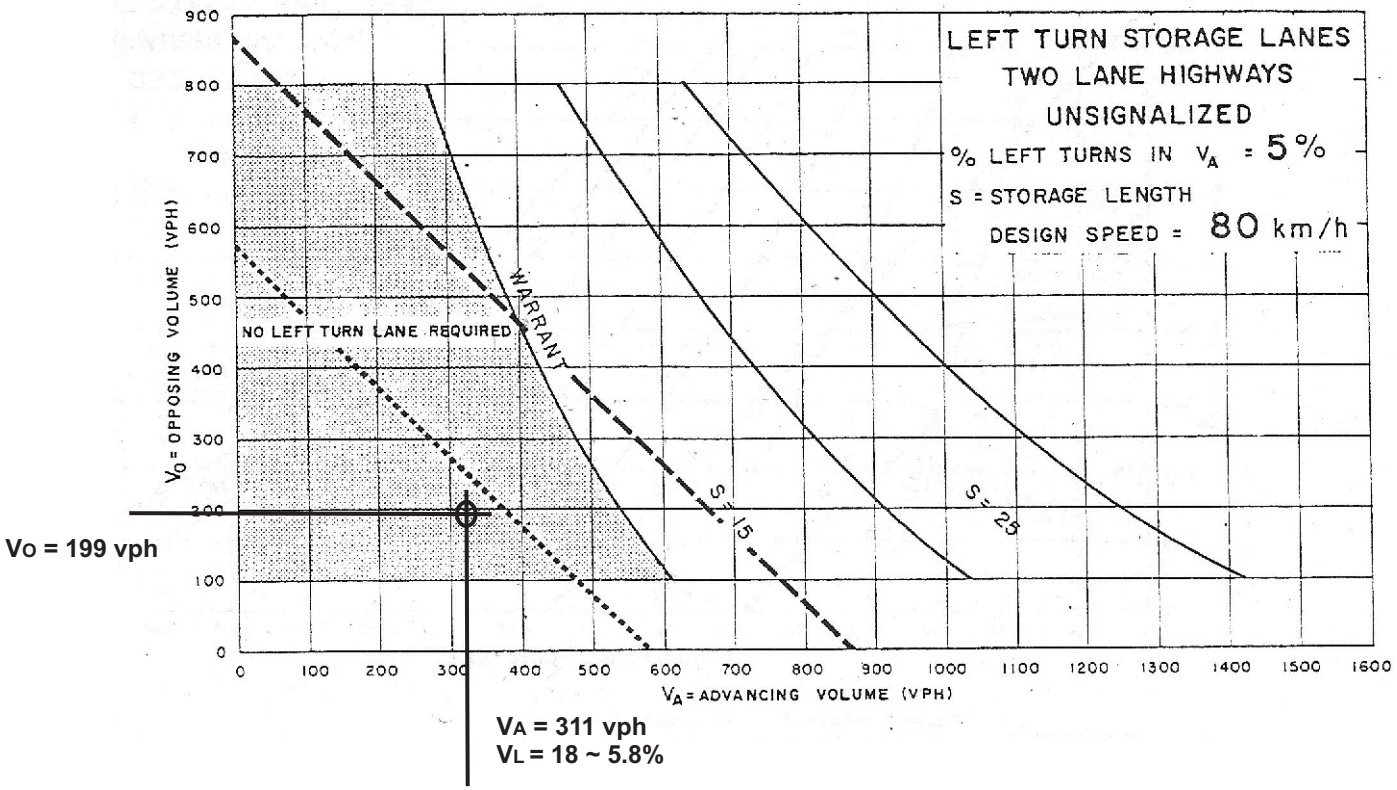
Approach	EB	WB	NB	SB
HCM Control Delay, s	11.3	11.1	0.3	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1317	-	-	600	595	1405	-	-
HCM Lane V/C Ratio	0.004	-	-	0.054	0.011	0.005	-	-
HCM Control Delay (s)	7.7	0	-	11.3	11.1	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0	0	-	-

Auxiliary Lane Warrant Analysis

Left Turn Lane Warrant Analysis
Intersection of CR 10 & Sharpe Line
2027 PM Peak Hour

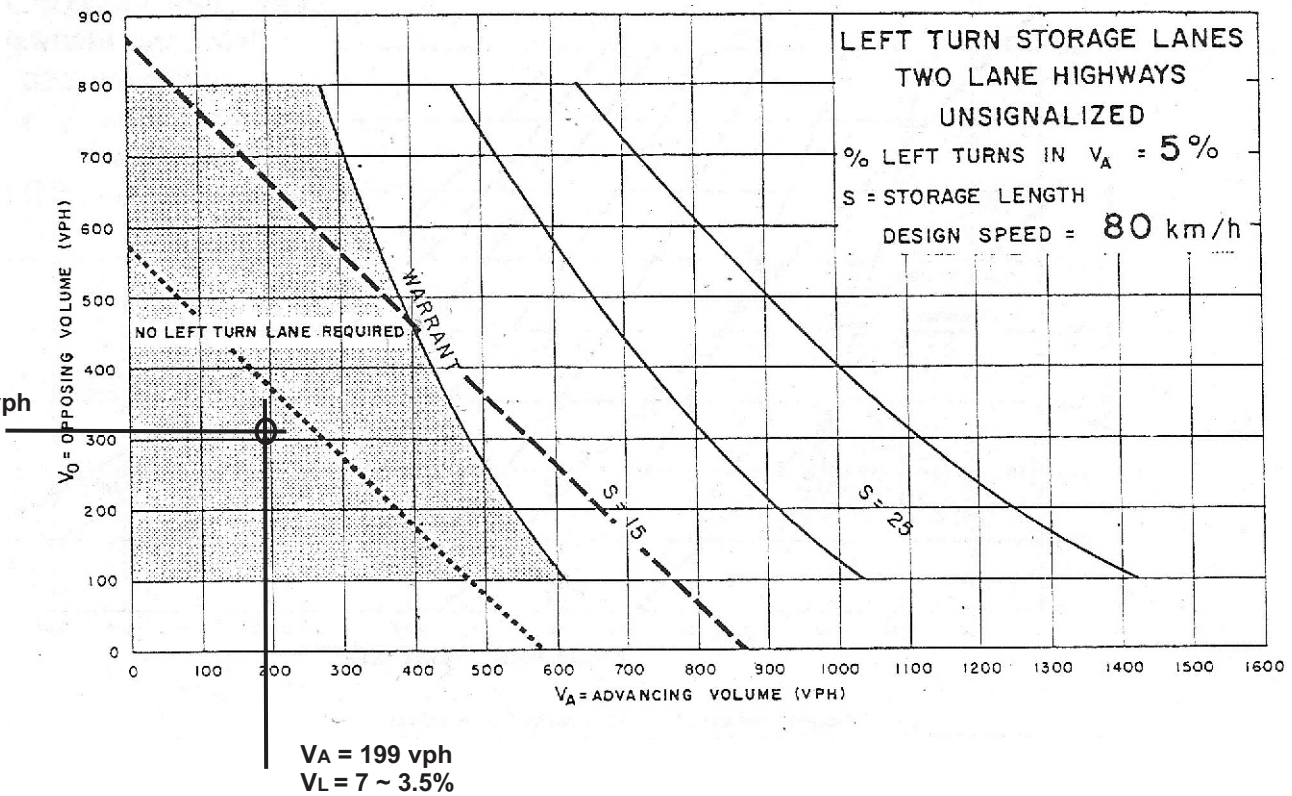
CR 10 South Approach



Vo = 199 vph

VA = 311 vph
VL = 18 ~ 5.8%

CR 10 North Approach

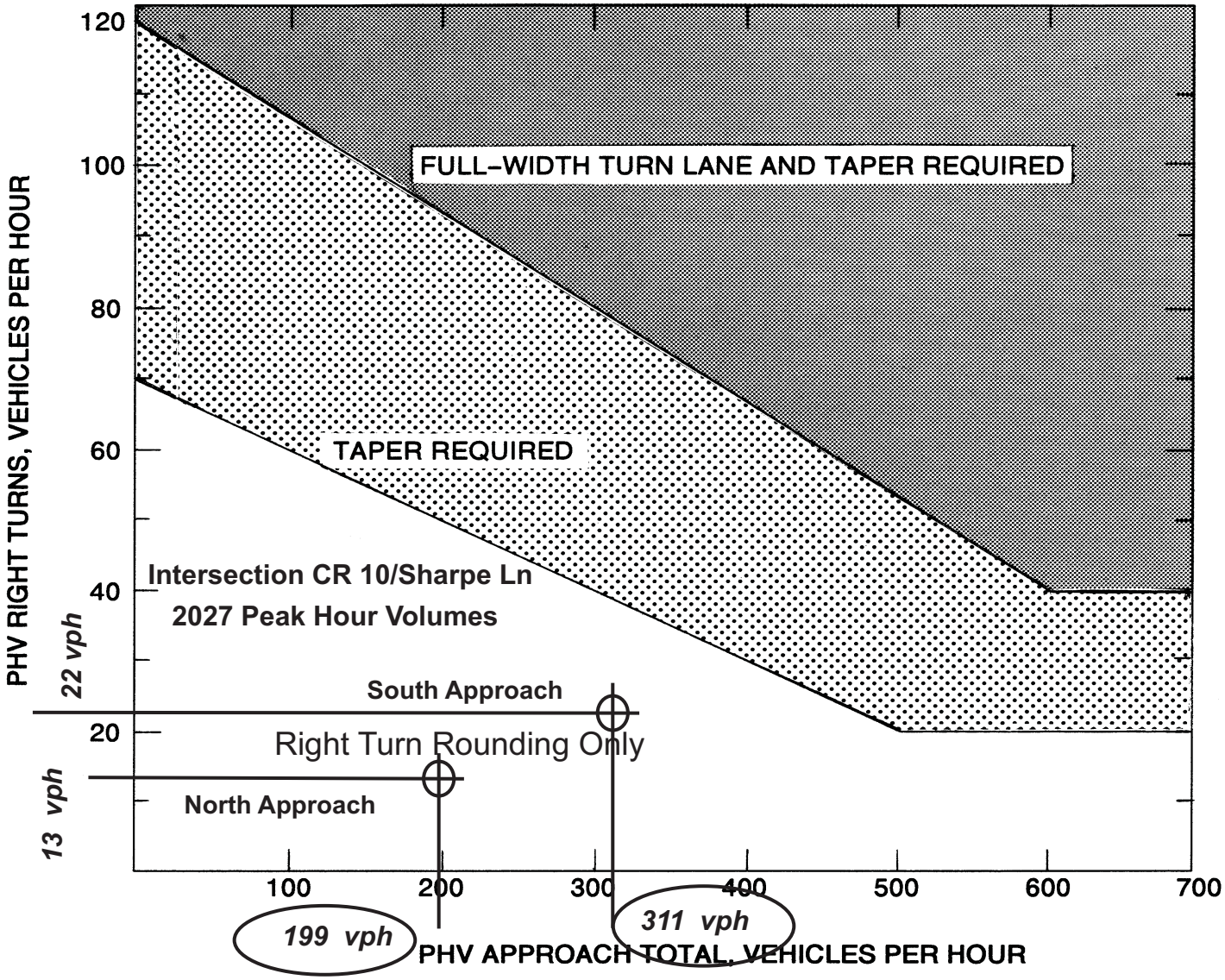


Vo = 311 vph

VA = 199 vph
VL = 7 ~ 3.5%

No Warrant for County Road 30 Left Turn Lanes

VDOT Guidelines for Right Turn Treatment
Two Lane Highway



Appropriate Radius required at all Intersections and Entrances (Commercial or Private).

LEGEND

PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

For posted speeds at or under 70 kph, PHV right turns > 40, and PHV total < 300.
Adjusted right turns = PHV Right Turns - 20
If PHV is not known use formula: PHV = ADT x K x D

K = the percent of AADT occurring in the peak hour
D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

APPENDIX B: July 2024 Traffic Count

15 MINUTE REPORT

North-South Road: CR 10 **Municipality:** Ida **Day:** Monday
East-West Road: Sharpe Line **Weather:** AM: Mainly Clear **Survey Date:** July 22, 2024

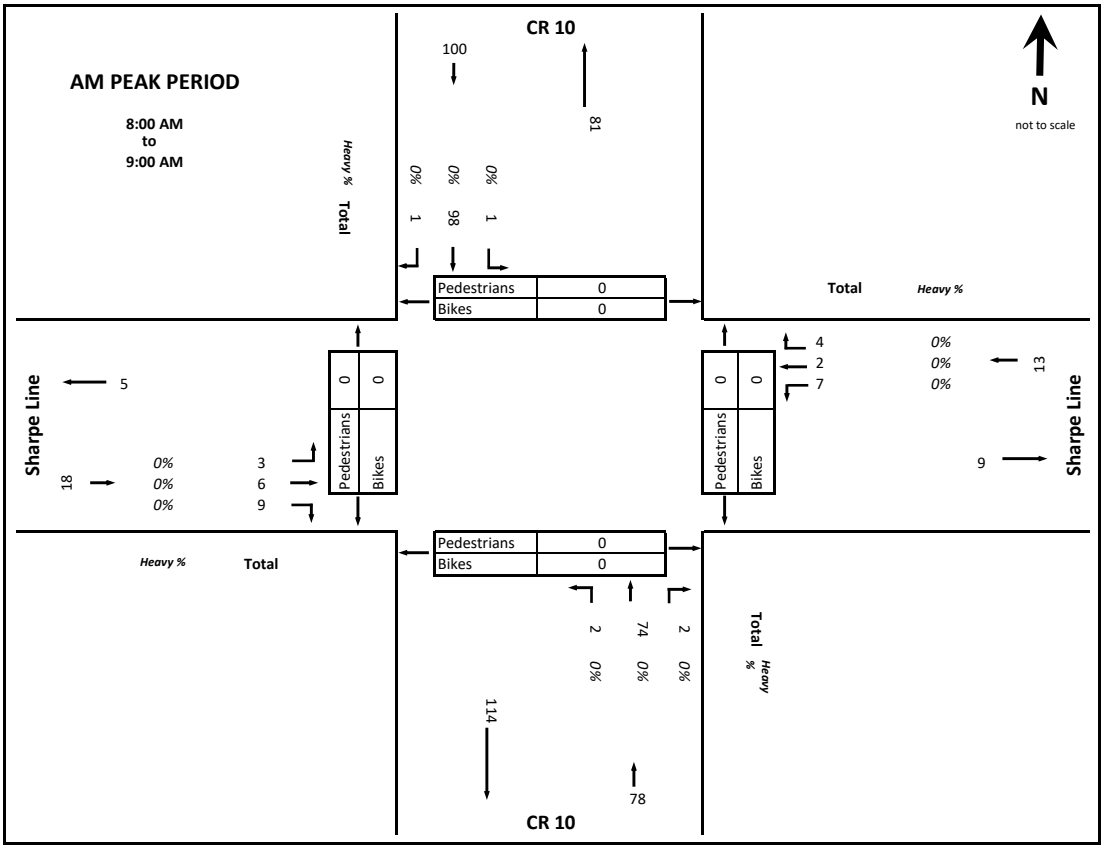
TIME BEGINNING	NORTH APPROACH								EAST APPROACH								SOUTH APPROACH								WEST APPROACH								Total Vehicular Traffic	Total PED/BIKE Traffic
	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike		
	Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right				
7:00	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	1	0	0	0	0	0	32	0
7:15	0	22	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	16	0	0	0	0	0	0	1	0	0	0	0	0	0	0	40	0
7:30	0	25	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	2	0	0	0	0	0	44	0
7:45	0	29	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	1	0	0	0	0	0	45	0
8:00	0	24	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	11	1	0	0	0	0	0	0	2	0	0	0	0	0	0	42	0
8:15	0	23	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	21	1	0	0	0	0	0	2	0	3	0	0	0	0	0	54	0
8:30	1	29	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	3	2	0	0	0	0	0	59	0
8:45	0	22	1	0	0	0	0	0	2	0	2	0	0	0	0	0	2	19	0	0	0	0	0	0	1	1	4	0	0	0	0	0	54	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

North-South Road: CR 10 **Municipality:** Ida **Day:** Monday
East-West Road: Sharpe Line **Weather:** PM: Mainly Clear **Survey Date:** July 22, 2024

TIME BEGINNING	NORTH APPROACH								EAST APPROACH								SOUTH APPROACH								WEST APPROACH								Total Vehicular Traffic	Total PED/BIKE Traffic
	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike		
	Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right				
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	1	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	1	0	0	0	0	0	0	0	1	0	0	0	0	0	59	0
16:15	0	21	1	0	0	0	0	0	2	1	1	0	0	0	0	0	1	41	2	0	0	0	0	0	1	1	0	0	0	0	0	0	72	0
16:30	1	16	0	0	0	0	0	0	3	2	1	0	0	0	0	0	2	46	1	0	0	0	0	0	0	0	1	0	0	0	0	0	73	0
16:45	1	22	1	0	0	0	0	0	3	1	2	0	0	0	0	0	2	42	3	0	0	0	0	0	1	0	2	0	0	0	0	0	80	0
17:00	0	26	2	0	0	0	0	0	2	2	3	0	0	0	0	0	2	41	1	0	0	0	0	0	1	1	1	0	0	0	0	0	82	0
17:15	1	29	1	0	0	0	0	0	2	2	2	0	0	0	0	0	1	49	2	0	0	0	0	0	0	0	2	0	0	0	0	0	91	0
17:30	2	22	1	0	0	0	0	0	0	1	2	0	0	0	0	0	3	50	2	0	0	0	0	0	0	1	1	0	0	0	0	0	85	0
17:45	1	28	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2	42	1	0	0	0	0	0	1	0	0	0	0	0	0	0	77	0

TURNING MOVEMENT DIAGRAMS

North-South Road: CR 10 **Municipality:** Ida **Day:** Monday
East-West Road: Sharpe Line **Weather:** AM: Mainly Clear **Survey Date:** July 22, 2024



South Road: CR 10 **Municipality:** Ida **Day:** Monday
East-West Road: Sharpe Line **Weather:** PM: Mainly Clear **Survey Date:** July 22, 2024