TRAFFIC IMPACT ASSESSMENT

FOR

LAST HILL GOLF COURSE RV PARK

Prepared for:

1176598 Alberta Ltd.

Prepared by:

AL-TERRA
ENGINEERING (RED DEER) LTD.
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Red Deer, Alberta T4N 4A1

September 2016

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1. INTRODUCTION

AL-Terra Engineering Ltd. was retained to complete a traffic impact assessment associated with the proposed Last Hill Golf Course & RV Park. The purpose of this assessment is to determine the impact of the traffic generated by this proposed development on the existing road network.

This assessment focuses on existing and proposed level of service (LOS) throughout the evaluated intersections, as well as the existing geometry and sight lines of the intersections.

2. BACKGROUND INFORMATION

2.1 Proposed Development

The Last Hill Golf Course is proposing to resume operation in the spring of 2017, with the addition of a 100 site RV park. The golf course has not operated for the last few seasons, but plans to reopen initially with 9 holes and long term with 12 holes. The RV Park is expected to rent the sites for the entire season.

2.2 Intersections

There are a total of three major intersections that will be evaluated. These intersections are existing and will be evaluated to determine if upgrades are required to accommodate development.

2.2.1 Range Road 34 and Township Road 394

This intersection is currently a 4 leg intersection, with stop control on north/south legs (Range Road 34) and free flow on the east/west legs (Township Road 394). The proposed development would access this intersection from the south. The intersection is currently built to a Type 1B standard with 15.0m radii on the corners.

2.2.2 Range Road 34 and Township Road 393

This intersection currently operates as a 3 way intersection (with an approach to a field on the south) with a stop control on Range Road 34 (from the north), and free flow on Township Road 393 (east/west). The intersection is currently built to a Type 1A standard with 10.0m radii on the corners.

2.2.3 Highway 766 and Township Road 394

This intersection currently operates as a 3 way intersection with stop controls on Township Road 394 (from the west), and free flow on Highway 766 (north/south). The intersection is currently built to a Type 2A standard.

2.3 Roadways

There are three existing roadways that are impacted by this development:

2.3.1 Range Road 34

Range Road 34 is currently an 8.0-8.5m gravel road running North-South between Township Road 393 and Township Road 394. It is currently the only access to the existing Last Hill Golf Course and the Proposed RV Park. This road is currently classified as a Local Road (Lacombe County Road Designations & Standards, See Appendix B).

2.3.2 Township Road 394 (Last Hill Road)

Township Road 394 (known as Last Hill Road) is currently an 8.5m asphalt road with a single lane of traffic in both directions. This road provides access to Range Road 34 from Highway 766. This road is currently classified as a Primary Local Main (Lacombe County Road Designations & Standards, See Appendix B).

2.3.3 Township Road 393(Eckville West Road)

Township Road 393 is currently an 8.5m asphalt road with a single lane of traffic in both directions. The roads provides access to Range Road 34 from the Town of Eckville. This road is currently classified as a Primary Local Main (Lacombe County Road Designations & Standards, See Appendix B).

3. TRAFFIC DATA

3.1 Current Traffic Volumes

Traffic counts were completed by AL-Terra in January 2016 for three intersections that will be affected by the Last Hill Golf Course RV Park development. Data was collected for the following intersections:

- Township Road 394 and Range Road 34
- Township Road 393 and Range Road 34
- Township Road 394 and Highway 766

The 2016 traffic volumes of all counted intersections are illustrated on Exhibit 1, in Appendix A.

Typically traffic volumes on rural roads increases in the summer. Since the counts were performed in January a growth factor was applied to the traffic counts and adjusted accordingly. The adjustment was determined to be 34% based on the Traffic Data from Highway 11 and Highway 20 for 2014 and 2015. Calculation of the adjustment factor has been included in Appendix A.

The 2016 background traffic of all modelled intersections are illustrated on Exhibit 2, in Appendix A.

Through the analysis of the information contained in Appendix E, the level of service (LOS) calculations were completed based on Chapter 17 of the Highway Capacity Manual and the findings are included in Section 4.1 of this report.

3.2 Trip Generation

Trip generation for the proposed site was derived from the Institute of Transportation Engineers (ITE) Trip Generation Handbooks, as well as local knowledge of existing conditions within the Lacombe County, and central Alberta.

The trips generated for the development was based the Land Use Designation for Campground/Recreational Vehicle Park. Additionally traffic volumes generated by the golf course were also added, since the golf course is currently not generating traffic. These adjusted numbers were used for the modeling of the traffic movement for the 2016 Total traffic.

Table 1 – Trip Generation

Land Use	Unit	AM			PM		
		Trip Rate	Split		Trip Rate	Split	
			In	Out		In	Out
Campground/Recreational Vehicle Park (416)	Occupied Camp Sites	0.22	42%	58%	0.41	62%	38%
Golf Course (430)	Holes	4.59	49%	51%	4.59	49%	51%

A.M. and P.M. peak hour of the generator trip generation rates were chosen for the campground to be conservative. The Peak Hour of the Generator for a

Saturday was chosen for the Golf Course, since this was the highest generation rate and provides a conservative estimate.

The trips generated are included in Appendix A, Exhibit 4: Development Trip Generation. Two timelines were chosen for review:

- 2016-Summer Adjusted Background Traffic
- 2016- Summer Adjusted Background Traffic with Full Buildout of RV Park/Operating Golf Course

3.3 Site Traffic Distribution and Assignment

The trip distribution took into account logical trip paths for primary trips, as well as the land use mixes within and around the various developments. The ITE *Trip Generation Handbook, 3rd Edition*, defines primary trips as being those "trips made for the specific purpose of visiting the (site)." It was assumed that all trips generated by the golf course and RV Park are primary trips. It was assumed that the majority of traffic would be generated from Eckville and Highway 766. The assumed trip distribution is shown in Exhibit 3, in Appendix A.

4. INTERSECTION ANALYSIS

As explained in Section 3, intersection analysis were performed for the existing situation and with the development of the RV Park. The intersection analysis performed follows the guidelines in the *Highway Capacity Manual (2010)*, for both unsignalized and signalized intersections. The analysis and resulting Level of Service (LOS) is based on the movements through the intersections. The computer program used to run the analyses, Synchro 8, by Trafficware, provides an overall intersection LOS. The traffic modeling criteria used in the Synchro analysis is summarized in Table 2 and 3 below:

The resulting LOS for each minor movement is defined based on the average delay for that movement, in seconds per vehicle. The LOS Criteria for Two Way Stop Controlled (TWSC) Intersections are as follows:

Table 2- Level of Service Criteria

Level of Service	Average Control Delay (s/veh)
	Unsignalized
A	0 <= 10
B	>10 <= 15
C	>15 <= 25
D	>25 <= 35
E	>25 <= 50
F	> 50

Table 3– Traffic Modeling Criteria

Modeling Criteria	Values
Peak Hour Factor	0.85
Pedestrian Conflicts	none
Ideal Saturation Flow Rate	1900
Percent Heavy Vehicles	5%
Minimum Level of Service	D
V/C Ratio	Max 0.85

4.1 Intersection Analysis Summary

The LOS analysis information is summarized in Tables 4 and 5, included in Appendix E. The Volume to Capacity (v/c) Ratios for each movement were also summarized and are included in brackets.

As illustrated in Tables 4 and 5, the proposed developments have a small effect on the level of service of the existing roadways during the AM and PM Peak hours. Although the additional traffic is adding a significant amount of traffic compared to the background traffic on Range Road 34, the LOS remains an A on all of the intersections.

From the tables it is shown that no improvements are required on the any of the intersections in the model as a result of the development, however left and right turn warrant analysis were still conducted.

5. INTERSECTION CONFIGURATIONS

5.1 Two Way Stop Control (TWSC)

Currently all the intersections discussed in this study are a two way stop control (TWSC). For cases where there is significant difference in volumes on one road vs another, TWSC is the best intersection control type to use. It allows free flow of the major road, and fairly easy access from the minor road.

The intersection of Range Road 34 and Township Road 394 has a LOS of A for all movements in this intersection. Due to the high LOS, this intersection will not require any improvements.

The intersection of Range Road 34 and Township Road 393 has a LOS of A for all movements in this intersection. Due to the high LOS, this intersection will not require any improvements.

The intersection of Highway 766 and Township Road 394 has a LOS of A for all movements in this intersection. Due to the high LOS, this intersection will not require any improvements.

6. INTERSECTION SIGHT LINES

Sight distances were based on the Lacombe County Table C1-1 (included in Appendix B). According to these guidelines the intersections of Range Road 34 & Township Road 394, Range Road 34 & Township Road 393 and the intersection of Township Road 394 and Highway 766 requires a stopping sight distance of 200m. The Last Hill Golf Course access on Range Road 34 require a sight distance of 150m.

The sight triangles are shown in Exhibits 6-9 in Appendix B. There is some tree growth in the sight lines of these existing intersections, but it is not a major concern. Trees within the sight triangle that cause concern should be controlled.

It should be noted that these stopping sight distances are conservative when compared to both the TAC and Alberta Infrastructure Guidelines. The stopping sight distance required by both TAC and Alberta Infrastructure is 75m for a design speed of 90 km/h and 95m for a design speed of 110 km/h on the main road.

7. SIGNAL WARRANT ANALYSIS

Signal Warrant Analysis was performed on the intersection of Highway 766 and Township Road 394. Based on the Manual on Uniform Traffic Control Devices (MUTCD) Warrant 3, Peak Hour Volumes, signalization was not warranted as this intersection for the total traffic volumes in 2016. The signal warrant analysis can be found in Appendix C.

8. LEFT TURN LANE WARRANT ANALYSIS

Left Turn Lane Warrant Analysis was performed on the intersection of Highway 766 and Township Road 394. The intersection did not warrant a left turn lane with the development of the RV Park. Modeling of this intersection also showed a left turn lane was not required for the total traffic in 2016. The left turn warrant analysis can be found in Appendix D.

9. RIGHT TURN LANE WARRANT ANALYSIS

Right Turn Lane Warrant Analysis was performed on the intersection of Highway 766 and Township Road 394. The intersection did not warrant a right turn lane with the development of the RV Park. Modeling of this intersection also showed a right turn lane was not required for the total traffic in 2016. The right turn warrant analysis can be found in Appendix D.

10. ROADWAY CLASSIFICATION

We have evaluated the required Roadway designation for the Average Annual Daily Traffic (AADT) of the two major roadways used to access the proposed RV Park and

Golf Course. Roadway designation for rural roads has been based on the Lacombe County Road Designations & Standards Policy and has been included in Appendix B.

10.1 Range Road 34

Range Road 34 is currently an 8.0-8.5m gravel road with an AADT of 108. It is currently designated local road as per Lacombe County Policy. With the development of the RV Park and the reopening of the golf course the AADT will increase to 491. With the development of the RV Park and the reopening of the golf course the classification will remain a local road.

10.2 Township Road 394 (Last Hill Road)

Township Road 394 is currently an 8.5m asphalt road built to the Lacombe County Residential Subdivision - Main Asphalt Road standard. Currently the AADT for this road is 582. This road is currently classified as a Primary Local Main, however it does not meet the Primary Local Main standard. With the development of the RV Park the AADT will be 863, which is below 5000 vehicles per day, so Primary Local Main is still an acceptable roadway designation.

10.3 Township Road 393 (Eckville West Road)

Township Road 393 is currently an 8.5m asphalt road built to the Lacombe County Residential Subdivision – Main Asphalt Road standard. Currently the AADT for this road is 763. This road is currently classified as a Primary Local Main, however it does not meet the Primary Local Main standard. With the development of the RV Park the AADT will be 1109, which is below 5000 vehicles per day, so Primary Local Main is still an acceptable roadway designation.

11. RECOMMENDATIONS

From our analysis we have evaluated the required anticipated improvements for each intersection. Below is the summary of the results, the recommended improvements, and where possible, timing of such improvements. In general, timing of improvements to intersections are dictated by a drop in level of service or operational issues with the intersection. It should be noted that the County should monitor these intersections for issues such as long wait times or excessive queue lengths, repeated similar vehicle collisions or a significant rise in traffic volumes.

Our recommendation would be to adopt a standard similar to the City of Red Deer's in this regard. Their guidelines indicate that if the level of service drops to E or if the volume to capacity ratio rises above 0.85, that an intersection should be considered for upgrade.

11.1 Intersections

11.1.1 Range Road 34 and Township Road 394

This intersection is currently a type 1B intersection with a stop control on the south leg. With the development of the RV Park this intersection remains at a LOS of A. No improvements are required for this intersection.

11.1.2 Range Road 34 and Township Road 393

This intersection is currently a type 1A intersection with a stop control on the north leg. With the development of the RV Park this intersection remains at a LOS of A. No improvements are required for this intersection.

11.1.3 Highway 766 and Township Road 394

This intersection is currently a type 2A intersection with a stop control on the west leg. With the development of the RV Park this intersection remains at a LOS of A. No improvements are required for this intersection.

11.2 Roadways

11.2.1 Range Road 34

The roadway is currently a gravel road that varies between 8.0m and 8.5m width. The road currently fits the Lacombe County designation of local road. The increase in daily traffic does not warrant improvements to this road.

11.2.2 Township Road 394 (Last Hill Road)

This is currently an 8.5m asphalt road that does not meet the Primary Local Main standard due to the width. Even with the increase in traffic the AADT remains below acceptable limits for this classification. This road needs to be widened 9.4m to meet the Primary Local Main Road standard from background traffic alone.

11.2.3 Township Road 393 (Eckville West Road)

This is currently an 8.5m asphalt road that does not meet the Primary Local Main standard due to the width. Even with the increase in traffic the

AADT remains below acceptable limits for this classification. This road needs to be widened 9.4m to meet the Primary Local Main Road standard from background traffic alone.

12. CONCLUSIONS

The modeling shows high levels of service within all analyzed intersections when considering the current volumes. Modeling also showed that if the proposed RV Park is developed the level of service remains high.

The proposed developments are anticipated to create an amount of new traffic that can be accommodated by the existing roadway network. The level of service drop is still well within acceptable limits.

Township Road 394 (Last Hill Road) and Township Road 393 (Eckville West Road) are both currently classified by Lacombe County as Primary Local Mains, however they are not built to the Primary Local Main Standard. An upgrade to meet the Primary Local Main standard is warranted by background traffic alone.

Based on the above analysis, we feel that there is no reason to prohibit the proposed development.

CORPORATE AUTHORIZATION

This study entitled "Traffic Impact Assessment for Last Hill Golf Course RV Park" was prepared by AL-Terra Engineering (Red Deer) Ltd., for Lacombe County.

The design and recommendations put forward in this document reflect AL-Terra's best judgment based on the information available at the time of preparation. Any use of this information in a manner not intended, or with the knowledge that situations have changed, shall not be the responsibility of AL-Terra Engineering (Red Deer) Ltd.

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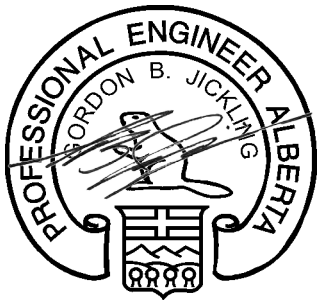
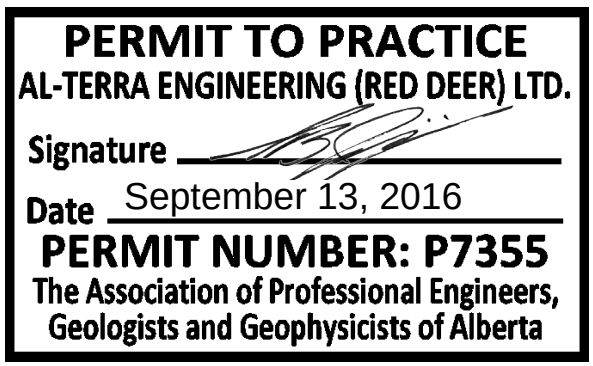


Prepared By: Brandon Wetmore, E.I.T.

Reviewed By: Gordon Jickling, P.Eng.



CORPORATE AUTHORIZATION

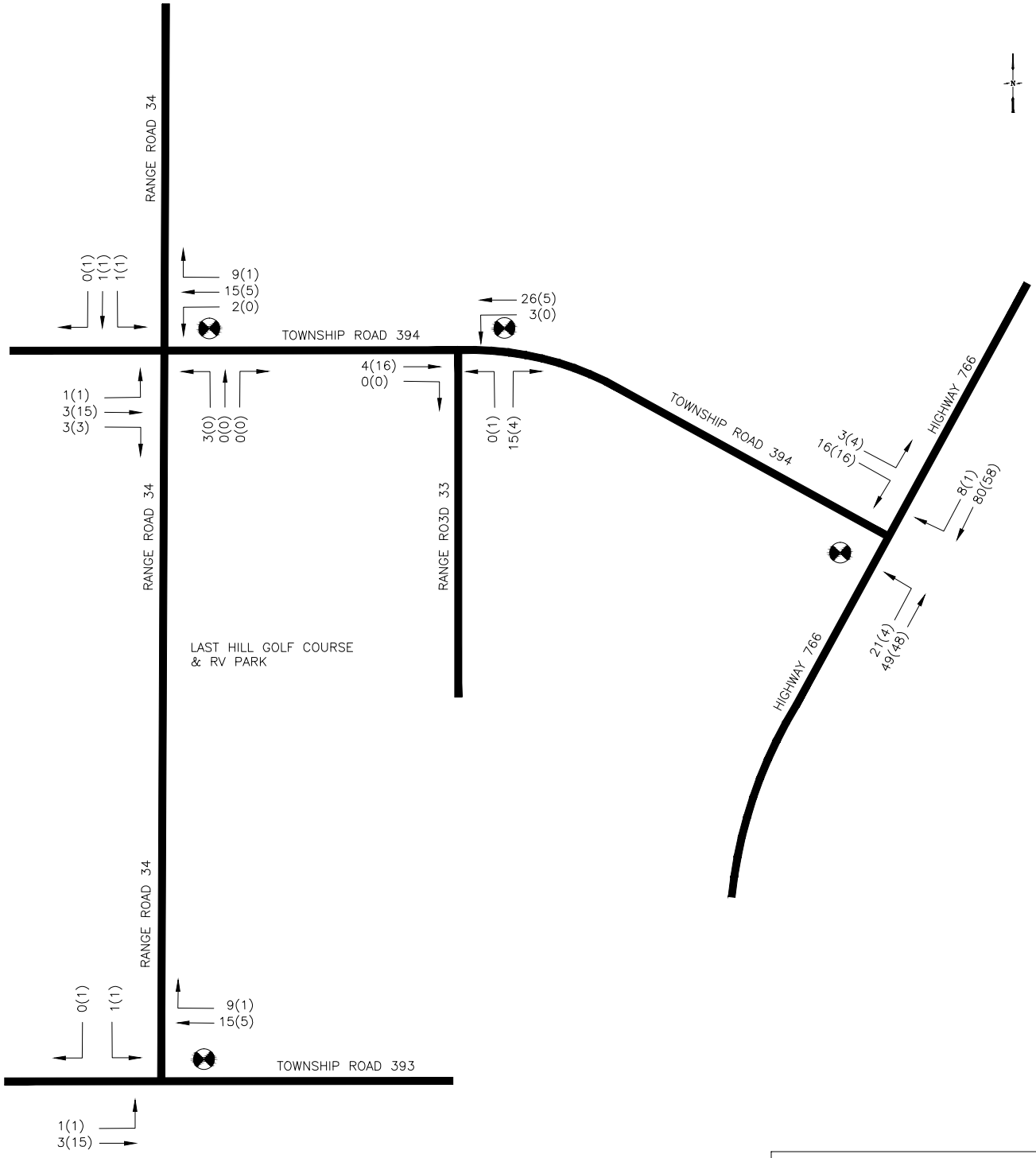
APPENDIX A

Existing and Future Traffic Information

Exhibit 1: January 2016 Traffic Count Volumes
Exhibit 2: Summer 2016 Background Traffic Volumes
Exhibit 3: Proposed Golf Course and RV Park-Trip Distribution
Exhibit 4: Proposed Golf Course and RV Park-Generated Traffic Volumes
Exhibit 5: Summer 2016 Total Traffic Volumes
Calculation Sheet – Summer Adjustment Factor

JANUARY 2016 TRAFFIC COUNT VOLUMES

EXHIBIT 1



LEGEND	
	UNSIGNALIZED INTERSECTION
	THROUGH LANE
	TURN LANE
XX(XX)	HOURLY TRAFFIC VOLUMES AM PEAK#(PM PEAK#)

NOTES
TRAFFIC DATA COLLECTED BY AL–TERRA ENGINEERING JANUARY 2016

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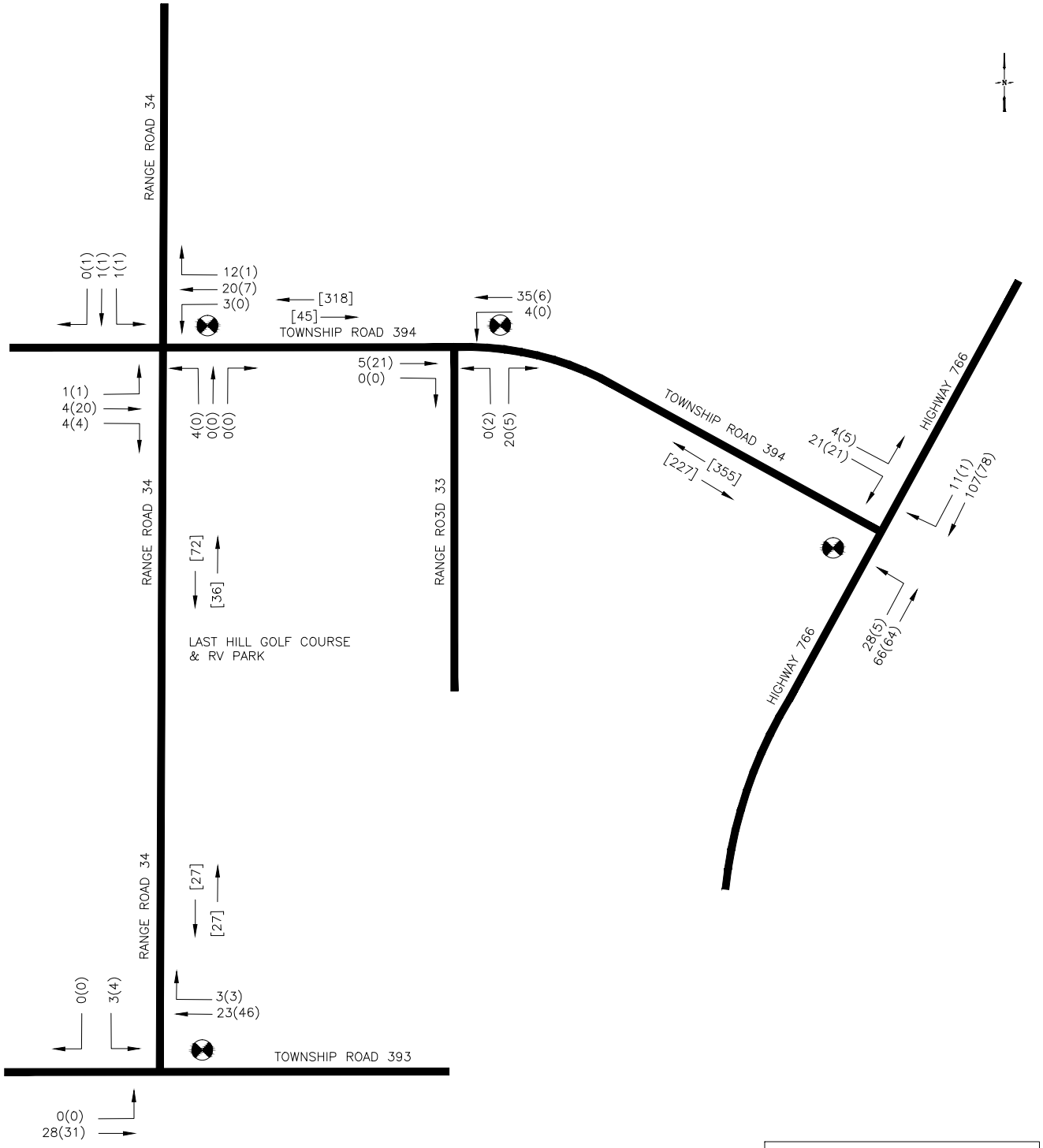
SUMMER 2016 BACKGROUND TRAFFIC VOLUMES

EXHIBIT 2



LEGEND	
	UNSIGNALIZED INTERSECTION
	THROUGH LANE
	TURN LANE
XX(XX)	HOURLY TRAFFIC VOLUMES AM PEAK#(PM PEAK#)
[XXX]	AVERAGE ANNUAL DAILY TRAFFIC (AADT) (k=0.11)

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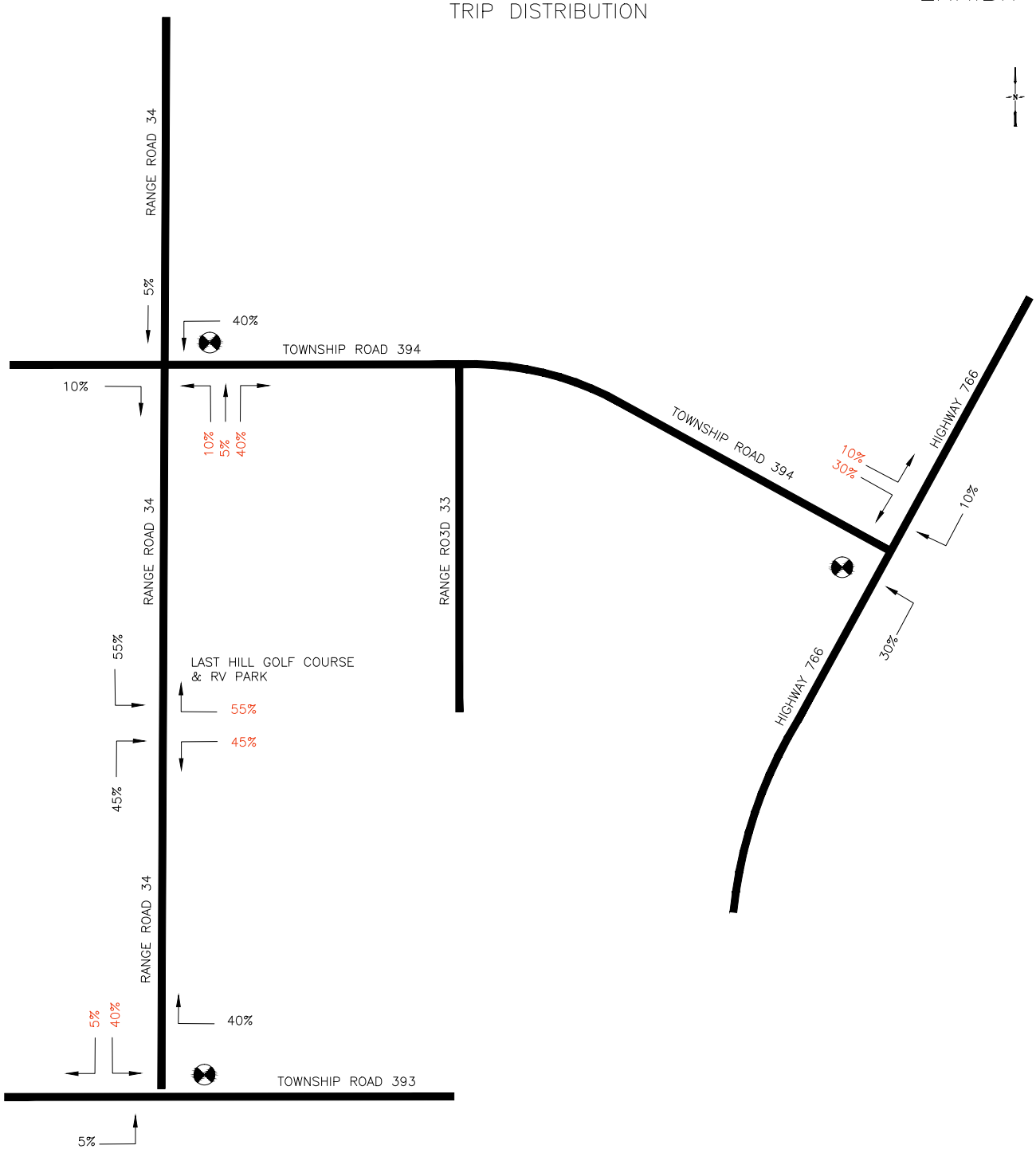
PROPOSED GOLF COURSE AND RV PARK
TRIP DISTRIBUTION

EXHIBIT 3



LEGEND	
	UNSIGNALIZED INTERSECTION
→	THROUGH LANE
↳	TURN LANE
XX%	DISTRIBUTION OF TRAFFIC ENTERING DEVELOPMENT
XX%	DISTRIBUTION OF TRAFFIC EXITING DEVELOPMENT

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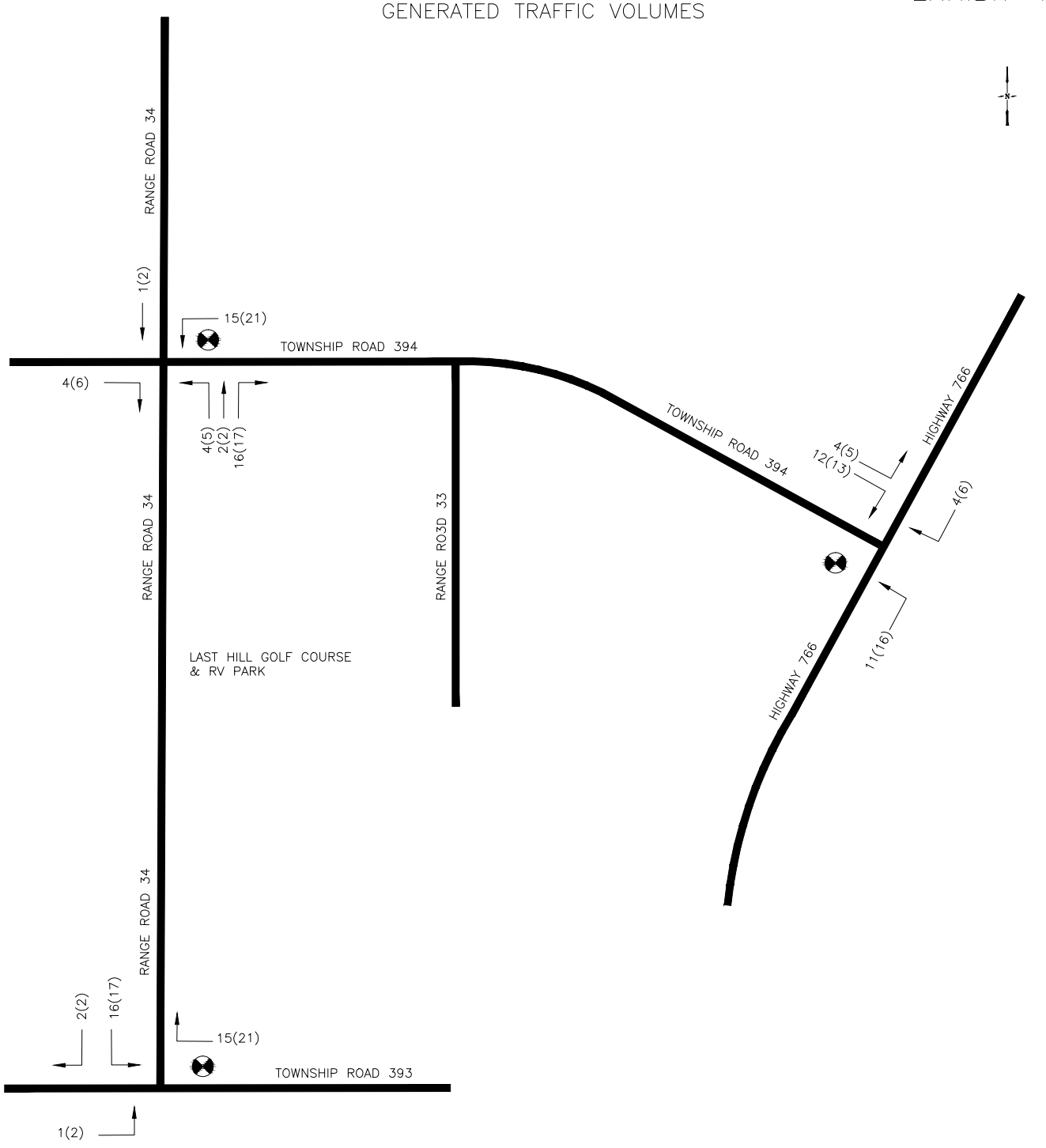
PROPOSED GOLF COURSE AND RV PARK
GENERATED TRAFFIC VOLUMES

EXHIBIT 4



LEGEND	
	UNSIGNALIZED INTERSECTION
→	THROUGH LANE
↳	TURN LANE
XX(XX)	HOURLY TRAFFIC VOLUMES AM PEAK#(PM PEAK#)

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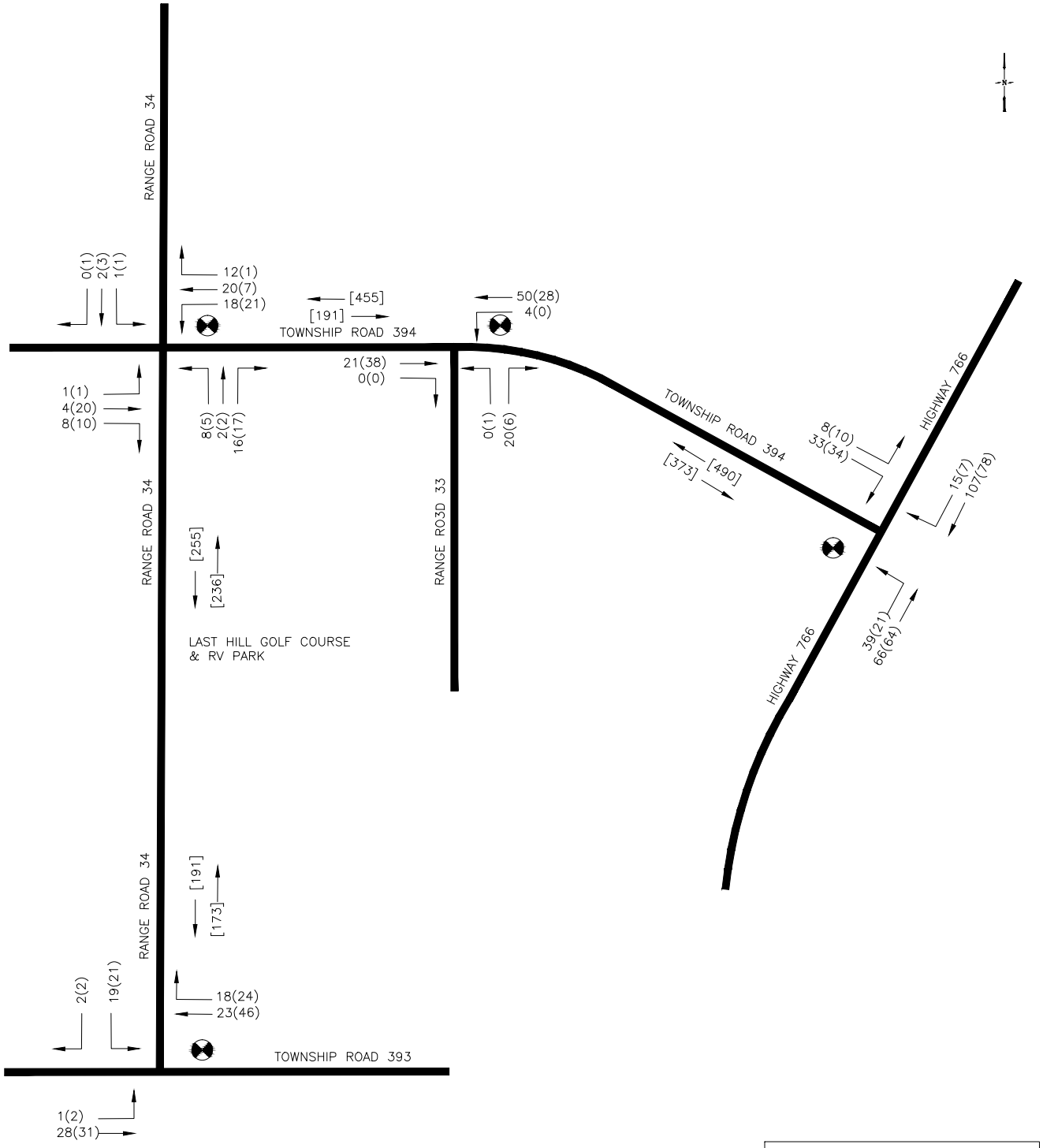
SUMMER 2016 TOTAL TRAFFIC VOLUMES

EXHIBIT 5



LEGEND	
	UNSIGNALIZED INTERSECTION
	THROUGH LANE
	TURN LANE
XX(XX)	HOURLY TRAFFIC VOLUMES AM PEAK#(PM PEAK#)
[XXX]	AVERAGE ANNUAL DAILY TRAFFIC (AADT) (k=0.11)

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Calculation Sheet

Project:	**5054**	**Prepared by:**	Brandon Wetmore	**Date:**	**16/02/2016**

Summer Adjustment Factor

Highway: 20
Control Section: 04
ATR Number: 60200450
Location Description: 1.1 KM N OF 12 & 20 BENTLEY

Year: 2014

January Monthly Average Daily Traffic Two Way: 4122 Growth: 36%
July Monthly Average Daily Traffic Two Way: 5604

Year: 2015

January Monthly Average Daily Traffic Two Way: 3938 Growth: 42%
July Monthly Average Daily Traffic Two Way: 5573

Highway: 11
Control Section: 10
ATR Number: 50111010
Location Description: 1.2 KM W OF 11 & 766 HESPERO WJ

Year: 2014

January Monthly Average Daily Traffic Two Way: 4702 Growth: 37%
July Monthly Average Daily Traffic Two Way: 6440

Year: 2015

January Monthly Average Daily Traffic Two Way: 4714 Growth: 20%
July Monthly Average Daily Traffic Two Way: 5673

Average Growth: 34%

APPENDIX B

Existing Intersection Layouts

Exhibit 6: Township Road 394 and Range Road 34
Exhibit 7: Township Road 393 and Range Road 34
Exhibit 8: Township Road 394 and Highway 766
Exhibit 9: Proposed Golf Course and RV Park and Range Road 34
Lacombe County Table C1-1
Lacombe County Road Designations and Standards

EXISTING INTERSECTION LAYOUT
TOWNSHIP ROAD 394 AND RANGE ROAD 34

AL-TERRA ENGINEERING (RED DEER) LTD. QUALITY • COMMITMENT • INTEGRITY ••• SUCCESS		LAST HILL GOLF COURSE RV PARK			
		LOCATION: Z:\projects\5054\14		EXHIBIT 6	
DRAWN: BJW	CHECKED: GBJ	SCALE: N.T.S	DATE: FEB 2016	JOB NO: 5054	DRAWING NO: E-6

EXISTING INTERSECTION LAYOUT
TOWNSHIP ROAD 393 AND RANGE ROAD 34

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LAST HILL GOLF COURSE RV PARK

LOCATION: Z:\projects\5054\14

EXHIBIT 7

DRAWN: BJW	CHECKED: GBJ	SCALE: N.T.S	DATE: FEB 2016	JOB NO: 5054	DRAWING NO: E-7

EXISTING INTERSECTION LAYOUT
TOWNSHIP ROAD 394 AND HIGHWAY 766

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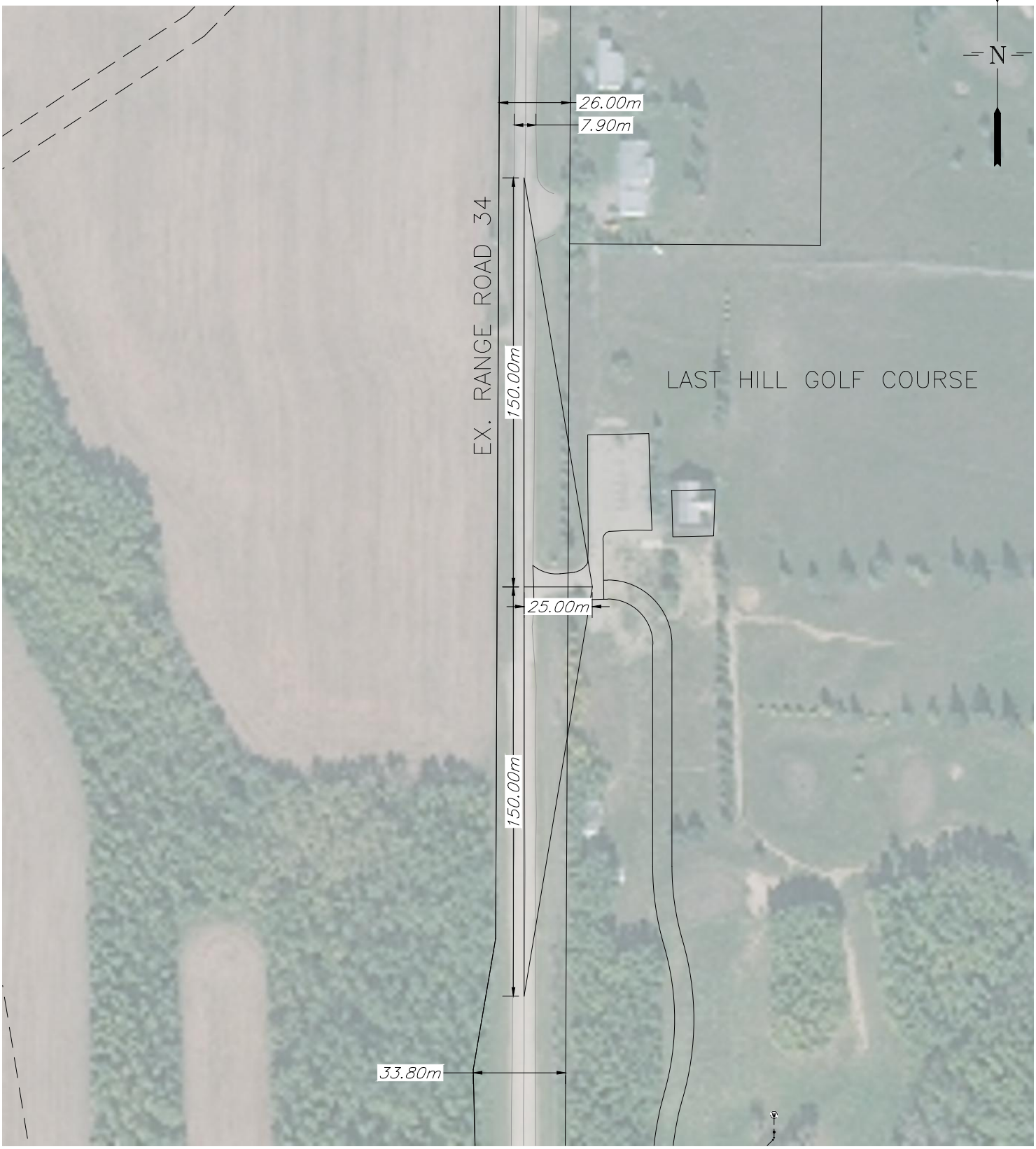
LAST HILL GOLF COURSE RV PARK

LOCATION: Z:\projects\5054\14

EXHIBIT 8

DRAWN: BJW	CHECKED: GBJ	SCALE: N.T.S	DATE: FEB 2016	JOB NO: 5054	DRAWING NO: E-8

EXISTING INTERSECTION LAYOUT
LAST HILL GOLF COURSE AND RV PARK ACCESS – RANGE ROAD 34



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LAST HILL GOLF COURSE RV PARK

LOCATION: Z:\projects\5054\14

EXHIBIT 9

DRAWN: BJW	CHECKED: GBJ	SCALE: N.T.S	DATE: FEB 2016	JOB NO: 5054	DRAWING NO: E–9

ROAD CLASSIFICATION	MINIMUM DEEP STRENGTH PAVEMENT EQUIVALENT (mm)	MAXIMUM SIDESLOPE RATIO	GRADE SLOPE	MINIMUM BACKSLOPE RATIO	MINIMUM RIGHT-OF WAY WIDTH (meters)	PAVED SURFACE (meters)	SIGHT DISTANCE (meters)
Main Roads Asphalt	500	4:1	4:1	6:1	40	9.4	200 meters
Local Roads	N/A	4:1	4:1	4:1	20	8	150 meters
Access Roads	N/A	3:1	3:1	3:1	20	6.1	150 meters
Farm Machinery Roads	N/A	3:1	3:1	3:1 Preferred	20	6.1	150 meters
Industrial Subdivision Road	500	4:1	4:1	6:1	30	8.5	150 meters
County Residential Subdivision Road	375	4:1	4:1	6:1	20	8.0	150 meters
Country Residential Subdivision Main Access Road	500	4:1	4:1	6:1	30	8.5	150 meters

Department **Operations**	Policy No. **OP(1)**	**Page 1 of 4**
Policy Title **ROAD DESIGNATIONS & STANDARDS**	Date: **June 23, 2016**	Resolution No. **C/357/16**

Policy Statement

To facilitate the orderly and effective management of roads under the jurisdiction of Lacombe County the following classification system and standards have been adopted. The classifications and standards may be varied to address specific need or unusual conditions.

Regulation

1. Primary Local Main

   Roads designated as Primary Local Main will normally be designed and constructed to a paved standard that will not require weight restrictions and/or bans. Specifications for the design and construction of a Primary Local Main are identified in the Lacombe County Standards Manual. The purpose of Primary Local Main roads is to:

   - facilitate the flow of commodities during all four seasons
   - accommodate large volumes of traffic (more than 500 vehicles/day)
   - provide connector route to trading centers within Lacombe County
   - allow for year round movement of legal loads

   Primary Local Main Roads are to be designated by resolution of Council and will be reviewed by Council at least every three years.

   The following roads are designated as Primary Local Main:

Aspelund	Lacombe Lakeshore Drive	Prentiss
Clive North Access	Lakeside/Sargent	Rainy Creek Road
D & M Road	Lasthill	Rock Pine Road
Eckville North	Milton/Gadsby Lake Road	Spruceville
Eckville West	Milton West Branch Road	Woody Nook
Freedom Road	Nova North Access	

2. Secondary Local Main

   Roads designated as Secondary Local Main will normally be designed and constructed to a paved standard that may require weight restrictions and/or bans to be placed on the road during certain seasons. Specifications for the design and construction of a Secondary Local Main are identified in the Lacombe County Standards Manual. The purpose of Secondary Local Main roads is to:

   - facilitate the flow of light vehicle traffic
   - provide connector routes to urban areas and other paved roads
   - provide for the limited flow of commodities on a seasonal basis
   - minimize maintenance procedures (grading, graveling, dust control)

   Secondary Local Main Roads are to be designated by resolution of Council and will be reviewed by Council at least every three years.

The following roads are designated as Secondary Local Main:

Alix North	Centreview	Lockhart Road
Barnett Road	Duckett Road	Otto Road
C&E Trail	Haynes Road	

TWP RD 41-2 south of SW 15-41-26 W4 (Old Milton Road)
RGE RD 25-3 west of SW 21-38-25 W4 (Old 815 south of Hwy 11)
RGE RD 24-4 North of City of Lacombe Limits to Hwy 2A

3. Local Roads

Roads designated as Local Roads will normally be designed and constructed to an all season gravel standard that may require weight restrictions and/or bans to be placed on the road during certain seasons. Specifications for design and construction of a Local Road are as identified in the Lacombe County Standards Manual. The purpose of Local Roads is to:

- facilitate the flow of all types of traffic
- provide connector routes between paved roads
- facilitate the flow of commodities during all four seasons
- accommodate moderate to low volumes of traffic (less than 500 vehicles/day)
- provide connector route to trading centers within Lacombe County
- allow for year round movement of legal loads

Local Roads are to be designated by Council at the time the road is constructed or reconstructed.

4. Residential Subdivision – Main Access Road

Roads designated as a Residential Subdivision – Main Access Road will normally be designed and constructed to an all season paved standard that may require weight restrictions and/or bans to be placed on the road during certain seasons. Specifications for design and construction of a Residential Subdivision – Main Access Road are as identified in the Lacombe County Standards Manual.

The purpose of a Residential Subdivision – Main Access Road is to:

- provide access to a Country and/or Lakeshore residential development
- provide access from the residential area to a Primary Highway or Local Main road

Residential Subdivision – Main Access Roads may be designated by Council at any time but normally at the time the road is constructed or reconstructed.

The following roads are designated as Main Access Roads:

Birch Bay Drive	Shores of Sylvan
Burbank Road	Sunbreaker Cove Road
Jarvis Bay Access	Westend Landing Road
McLaurin Lane	Westside Country Estates
Meridian Road	Wilson Beach Road
RGE RD 1-4 (The Slopes)	Sandy Point Road

5. Residential Subdivision Road

Roads designated as a Residential Subdivision Road will normally be designed and constructed to an all season paved standard that may require weight restrictions and/or bans to be placed on the road during certain seasons. Specifications for design and construction of a Residential Subdivision Road are identified in the Lacombe County Standards Manual.

The purpose of a Residential Subdivision or Internal Road is to:

- provide access to residential lots from the main access road
- accommodate low traffic volumes and low speed traffic within residential area

Residential Subdivision Roads are to be designated by Council at the time the road is constructed or reconstructed.

6. Industrial Subdivision Internal Road

Roads designated as an Industrial Subdivision Internal Road will normally be designed and constructed to an all season paved standard that may require weight restrictions and/or bans to be placed on the road during certain seasons. Specifications for design and construction of an Industrial Subdivision Road are identified in the Lacombe County Standards Manual.

The purpose of an Industrial Subdivision Internal Road is to:

- provide access to industrial lots within the subdivision

Industrial Subdivision Roads are to be designated by Council at the time the road is constructed or reconstructed.

The following roads are designated as Industrial Subdivision Internal Roads:

Roads within the Aspelund Industrial Park
Roads within the Burbank Industrial Park
Roads within the Iron Rail Industrial Park
Roads within the Aspelund South Industrial Park
Roads within the Wildrose Business Park

7. RV Campground Internal Road

Roads designated as an RV Campground Internal Road will normally be designed and constructed to an all season paved standard that may require weight restrictions and/or bans to be placed on the road during certain seasons. Specifications for design and construction of RV Campground Roads are identified in the Lacombe County Standards Manual.

The purpose of an Industrial Subdivision Internal Road is to:

- provide access to campground lots within the subdivision

RV Campground Internal Roads are to be designated by Council at the time the road is constructed or reconstructed.

8. Access Road

Roads designated as an Access Road will normally be designed and constructed to an all season gravel standard that may require weight restrictions and/or bans to be placed on the road during certain seasons. Specifications for design and construction of Access Roads are as identified in the Lacombe County Standards Manual.

The purpose of an Access Road is to:

- accommodate low volumes of traffic from a single source or destination
- facilitate the flow of commodities from an agricultural operation, industrial facility or residence to a Local or Local Main road
- provide limited access to residential, agricultural, industrial or commercial operations
- provide limited access to a recreational area

Access Roads are to be designated by Council at the time a road is constructed or reconstructed.

9. Farm Machinery Road

Improvements to roads designated as a Farm Machinery Road will normally be limited to brushing of trees and minor excavation that will allow for the limited movement of machinery in dry conditions. Specifications for design and construction of a Farm Machinery Road are as identified in the Lacombe County Standards Manual.

The purpose of a Farm Machinery Road is to:

- facilitate the limited movement of farm machinery to fields where no other access is available
- facilitate the limited movement of farm produce during harvest time
- facilitate the limited movement of livestock to pastures

Farm Machinery Roads are to be designated by resolution of Council and are to be signed to advise travelers that use is at your own risk.

10. Unopened Road Allowance

Road allowances that are unnecessary or impractical to open for general public travel shall be designated as an Unopened Road Allowance. There will normally be no improvements made to an unopened road allowance and access is limited to walking, horseback or ATV. There is no planned use for an unopened road allowance.

Approved:	C/151/81		
Revised:	April 23, 2015	June 27, 2013	October 13, 2011
	July 14, 2007	February 12, 2004	July 18, 2000
	October 9, 1997	C/414/88	C/50/86
	C/223/83	C/352/83	

APPENDIX C

Highway 766-Township Road 394 Signal Warrant Analysis

Lacombe County Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Highway 766	Direction (EW or NS)	NS	Road Authority:	Lacombe County
Side Street (name)	Township Road 394	Direction (EW or NS)	EW	City:	Lacombe County
Quadrant / Int #	3	Comments	2016 Total Traffic	Analysis Date:	2016 Feb 02, Tue
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	2016 Jan 26, Tue
				Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Highway 766	NB	0	1	0	0	0	0	5,000	1
Highway 766	SB	0	0	0	0	1	0	5,000	1
Township Road 394	WB	0	0	0	0	0	0		
Township Road 394	EB	1	0	0	0	0	1		
							y		
							y		

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	
Central Business District	(y/n)	n

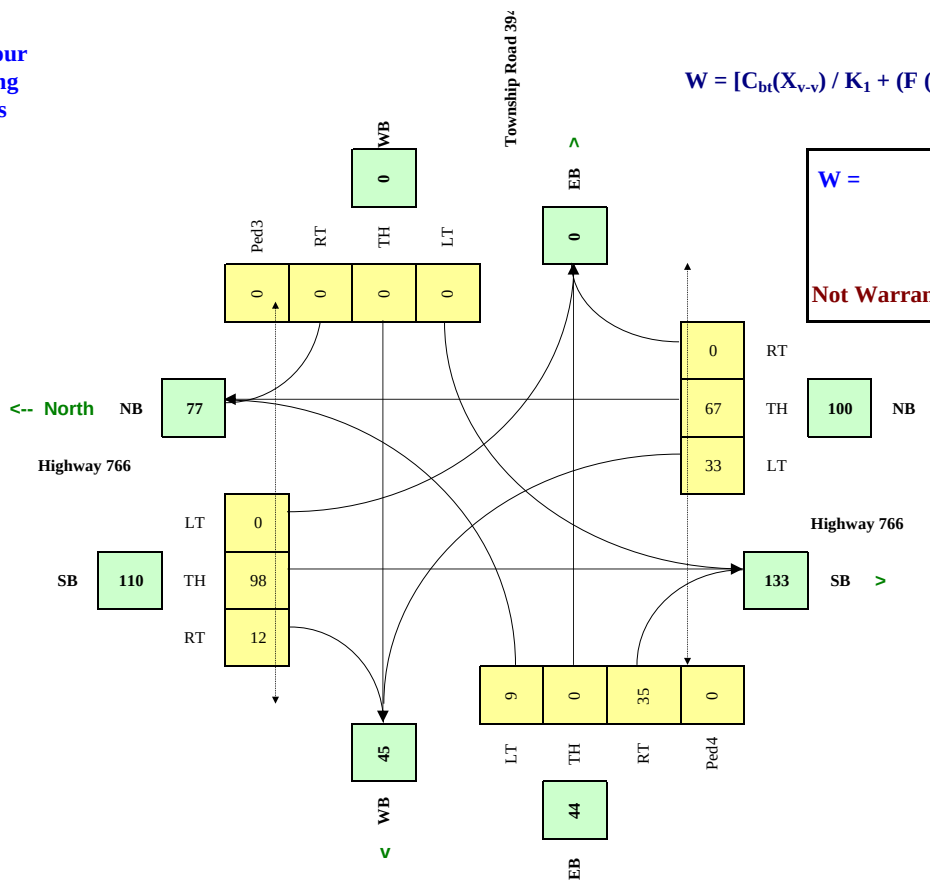
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Highway 766	NS	80	5.0%	n	0.0
Township Road 394	EW	60	5.0%	n	0.0

t Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1	Ped2	Ped3	Ped4
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	NS	NS	EW	EW
													W Side	E Side	N Side	S Side
	39	66	0	0	107	15	0	0	0	8	0	33	0	0	0	0
	52	88	0	0	143	20	0	0	0	11	0	44	0	0	0	0
	52	88	0	0	143	20	0	0	0	11	0	44	0	0	0	0
	16	49	0	0	59	5	0	0	0	8	0	26	0	0	0	0
	16	49	0	0	59	5	0	0	0	8	0	26	0	0	0	0
	21	64	0	0	78	7		0	0	10	0	34	0	0	0	0
Total (6-hour peak)	**196**	**404**	**0**	**0**	**589**	**72**	**0**	**0**	**0**	**56**	**0**	**207**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**33**	**67**	**0**	**0**	**98**	**12**	**0**	**0**	**0**	**9**	**0**	**35**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W =	7	7	0
		Veh	*Ped*

Not Warranted - Vs<75

RESET SHEET

APPENDIX D

Highway 766-Township Road 394 Turn Lane Warrant Analysis

Left Turn Lane Warrant Analysis
Right Turn Lane Warrant Analysis

AL-TERRA Engineering (Red Deer) Ltd.
QUALITY·COMMITMENT·INTEGRITY···SUCCESS

LEFT TURN LANE WARRANT ANALYSIS

Project Number: 5054

2016 Total Traffic

	EB/WB	NB/SB	Peak Hour
Intersection:	Township Road 394	Highway 766	AM

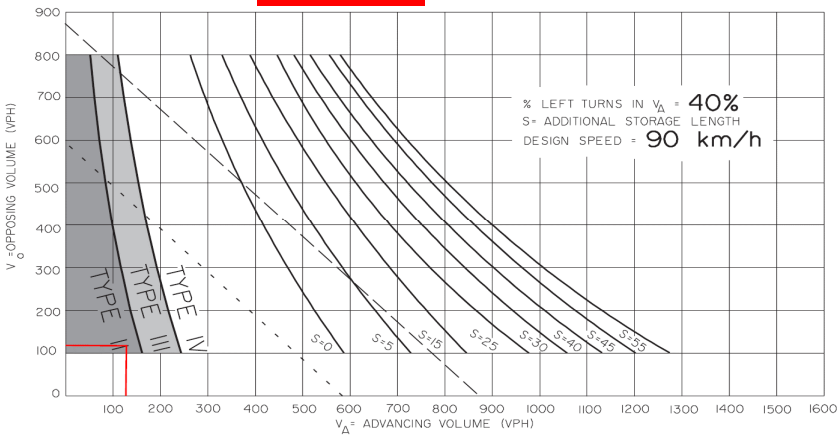
Stop Control On: Township Road 394
Date Created: February 2, 2016
Date Revised: March 1, 2016

	EB	WB	NB	SB
Posted Speed:	60	60	80	80
Design Speed:	70	70	90	90
Percent of Trucks:	5%	5%	5%	5%

Traffic Volumes

			North (122)						
			Right	Through	Left				
			15	107					
West (41)	Left	8	AM				Left	East (0)	
	Through						Through		
	Right	33					Right		
			39	66					
			Left	Through	Right				
			(105) South						

	EB	NB
V_l	8	39
V_a	41	105
L	20%	37%
V_o	0	122



S = Additional storage length required, that is, in addition to what is shown on the appropriate Type IV standard drawing. Designers should check additional storage requirements for trucks, also see Table D.7.6a.
- - - - Traffic signals may be warranted in rural areas, or urban areas, with restricted flow.
—— —— —— Traffic signals may be warranted in "free flow" urban areas.

Notes:
1. The traffic signal warrant lines are provided for reference only. For detailed analysis of the requirements for signals, contact Roadway Engineering Branch.
2. Warrant for Type I treatment is shown in Figure D-7.4.

AL-TERRA Engineering (Red Deer) Ltd.
QUALITY·COMMITMENT·INTEGRITY···SUCCESS

LEFT TURN LANE WARRANT ANALYSIS

Project Number: 5054

2016 Total Traffic

	EB/WB	NB/SB	Peak Hour
Intersection:	Township Road 394	Highway 766	PM

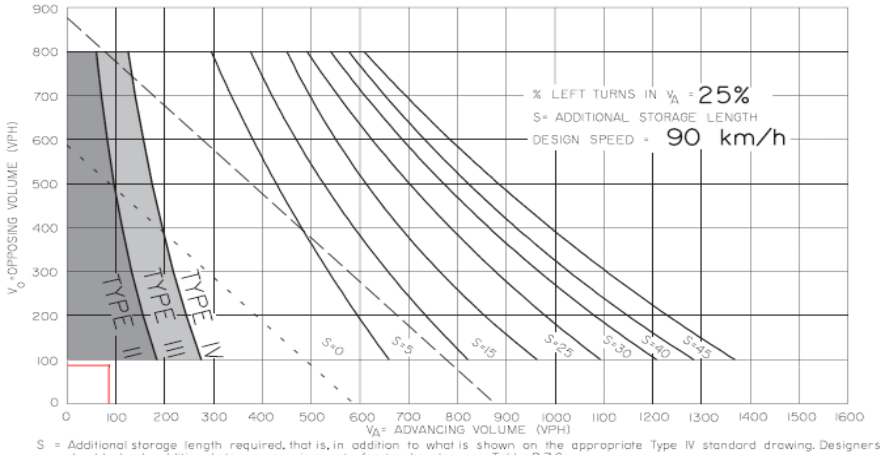
Stop Control On: Township Road 394
Date Created: February 2, 2016
Date Revised: March 1, 2016

	EB	WB	NB	SB
Posted Speed:	60	60	80	80
Design Speed:	70	70	90	90
Percent of Trucks:	5%	5%	5%	5%

Traffic Volumes

			North (85)					
			Right	Through	Left			
			7	78				
West (44)	Left	10	PM				Left	East (0)
	Through						Through	
	Right	34					Right	
			21	64				
			Left	Through	Right			
			(85) South					

	EB	NB
V_l	10	21
V_a	44	85
L	23%	25%
V_o	0	85



S = Additional storage length required, that is, in addition to what is shown on the appropriate Type IV standard drawing. Designers should check additional storage requirements for trucks, also see Table D.7.6a.
- - - - Traffic signals may be warranted in rural areas, or urban areas, with restricted flow.
—— —— Traffic signals may be warranted in "free flow" urban areas.

Notes:
1. The traffic signal warrant lines are provided for reference only. For detailed analysis of the requirements for signals, contact Roadway Engineering Branch.
2. Warrant for Type I treatment is shown in Figure D-7.4.

APPENDIX E

Synchro & SimTraffic Modeling Reports

Table 4: 2016 Background Summer Traffic LOS(v/c ratio) Summary
Table 5: 2016 Total Summer Traffic LOS(v/c ratio) Summary
2016 Background Summer Traffic AM Synchro 8 & SimTraffic Analysis
2016 Background Summer Traffic PM Synchro 8 & SimTraffic Analysis
2016 Total Summer Traffic AM Synchro 8 & SimTraffic Analysis
2016 Total Summer Traffic PM Synchro 8 & SimTraffic Analysis

Project: Last Hill Golf Course RV Park Table No.: 4
Job No.: 5054
Date: Feb 1 2016

Level of Service (v/c Ratio)
2016 Background Summer Traffic

AM

Intersection	EB			WB			NB			SB			Overall
	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	
1. Range Road 34/Township Road 394	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A
2. Range Road 34/Township Road 393	A (0.00)	A (0.00)	-	-	A (0.02)	A (0.02)	-	-	-	A (0.00)	-	A (0.00)	A
3. Highway 766/Township Road 394	A (0.03)	-	A (0.03)	-	-	-	A (0.02)	A (0.02)	-	-	A (0.08)	A (0.08)	A

PM

Intersection	EB			WB			NB			SB			Overall
	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	
1. Range Road 34/Township Road 394	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A (0.00)	A
2.Range Road 34/Township Road 393	A (0.00)	A (0.00)	-	-	A (0.03)	A (0.03)	-	-	-	A (0.01)	-	A (0.01)	A
3. Highway 766/Township Road 394	A (0.03)	-	A (0.03)	-	-	-	A (0.00)	A (0.00)	-	-	A (0.05)	A (0.05)	A

202 – 4708 50th AVENUE, RED DEER, ALBERTA, T4N 4A1
PHONE: (403) 340-3022 FAX: (403) 340-3038
Email: INFO@AL-TERRA-RD.COM
Website: www.al-terra-rd.com

Level of Service (v/c Ratio)
2016 Total Traffic

AM

Intersection	EB			WB			NB			SB			Overall
	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	
1. Range Road 34/Township Road 394	A (0.00)	A (0.00)	A (0.00)	A (0.01)	A (0.01)	A (0.01)	A (0.03)	A (0.03)	A (0.03)	A (0.00)	A (0.00)	A (0.00)	A
2. Range Road 34/Township Road 393	A (0.00)	A (0.00)	-	-	A (0.03)	A (0.03)	-	-	-	A (0.03)	-	A (0.03)	A
3. Highway 766/Township Road 394	A (0.06)	-	A (0.06)	-	-	-	A (0.03)	A (0.03)	-	-	A (0.08)	A (0.08)	A

PM

Intersection	EB			WB			NB			SB			Overall
	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	
1. Range Road 34/Township Road 394	A (0.00)	A (0.00)	A (0.00)	A (0.02)	A (0.02)	A (0.02)	A (0.03)	A (0.03)	A (0.03)	A (0.01)	A (0.01)	A (0.01)	A
2.Range Road 34/Township Road 393	A (0.00)	A (0.00)	-	-	A (0.05)	A (0.05)	-	-	-	A (0.03)	-	A (0.03)	A
3. Highway 766/Township Road 394	A (0.06)	-	A (0.06)	-	-	-	A (0.02)	A (0.02)	-	-	A (0.06)	A (0.06)	A

202 – 4708 50th AVENUE, RED DEER, ALBERTA, T4N 4A1
PHONE: (403) 340-3022 FAX: (403) 340-3038
Email: INFO@AL-TERRA-RD.COM
Website: www.al-terra-rd.com

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	4	4	3	20	12	4	0	0	1	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	5	5	4	24	14	5	0	0	1	1	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	38	0	0	9	0	0	47	54	7	47	50	31
Stage 1	-	-	-	-	-	-	9	9	-	38	38	-
Stage 2	-	-	-	-	-	-	38	45	-	9	12	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1572	-	-	1611	-	-	954	837	1075	954	841	1043
Stage 1	-	-	-	-	-	-	1012	888	-	977	863	-
Stage 2	-	-	-	-	-	-	977	857	-	1012	886	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1572	-	-	1611	-	-	950	834	1075	951	838	1043
Mov Cap-2 Maneuver	-	-	-	-	-	-	950	834	-	951	838	-
Stage 1	-	-	-	-	-	-	1011	887	-	976	860	-
Stage 2	-	-	-	-	-	-	973	854	-	1011	885	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.6	8.8	9.1
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	950	1572	-	-	1611	-	-	891
HCM Lane V/C Ratio	0.005	0.001	-	-	0.002	-	-	0.003
HCM Control Delay (s)	8.8	7.3	0	-	7.2	0	-	9.1
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	28	23	3	3	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	33	27	4	4	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	31	0	-	0	62	29
Stage 1	-	-	-	-	29	-
Stage 2	-	-	-	-	33	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1582	-	-	-	944	1046
Stage 1	-	-	-	-	994	-
Stage 2	-	-	-	-	989	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1582	-	-	-	944	1046
Mov Cap-2 Maneuver	-	-	-	-	944	-
Stage 1	-	-	-	-	994	-
Stage 2	-	-	-	-	989	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1582	-	-	-	944
HCM Lane V/C Ratio	-	-	-	-	0.004
HCM Control Delay (s)	0	-	-	-	8.8
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	4	21	28	66	107	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	25	33	78	126	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	276	132	139	0	-	0
Stage 1	132	-	-	-	-	-
Stage 2	144	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	714	917	1445	-	-	-
Stage 1	894	-	-	-	-	-
Stage 2	883	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	697	917	1445	-	-	-
Mov Cap-2 Maneuver	697	-	-	-	-	-
Stage 1	894	-	-	-	-	-
Stage 2	862	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	2.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1445	-	873	-	-
HCM Lane V/C Ratio	0.023	-	0.034	-	-
HCM Control Delay (s)	7.5	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection: 1: Range Road 34 & Township Road 394

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	8.0	8.9
Average Queue (m)	1.0	0.6
95th Queue (m)	5.1	4.0
Link Distance (m)	322.8	303.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Township Road 393 & Range Road 34

Movement	SB
Directions Served	LR
Maximum Queue (m)	7.9
Average Queue (m)	0.6
95th Queue (m)	3.9
Link Distance (m)	414.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Highway 766 & Township Road 394

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	10.1	8.6
Average Queue (m)	4.0	0.8
95th Queue (m)	10.5	4.7
Link Distance (m)	291.4	120.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	20	4	0	7	1	0	0	0	1	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	24	5	0	8	1	0	0	0	1	1	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	9	0	0	28	0	0	38	37	26	37	40	9
Stage 1	-	-	-	-	-	-	28	28	-	9	9	-
Stage 2	-	-	-	-	-	-	10	9	-	28	31	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1611	-	-	1585	-	-	967	855	1050	968	852	1073
Stage 1	-	-	-	-	-	-	989	872	-	1012	888	-
Stage 2	-	-	-	-	-	-	1011	888	-	989	869	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1611	-	-	1585	-	-	964	854	1050	967	851	1073
Mov Cap-2 Maneuver	-	-	-	-	-	-	964	854	-	967	851	-
Stage 1	-	-	-	-	-	-	988	871	-	1011	888	-
Stage 2	-	-	-	-	-	-	1009	888	-	988	868	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	0	8.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1611	-	-	1585	-	-	955
HCM Lane V/C Ratio	-	0.001	-	-	-	-	-	0.004
HCM Control Delay (s)	0	7.2	0	-	0	-	-	8.8
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	31	46	3	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	36	54	4	5	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	58	0	-	0	92	56
Stage 1	-	-	-	-	56	-
Stage 2	-	-	-	-	36	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1546	-	-	-	908	1011
Stage 1	-	-	-	-	967	-
Stage 2	-	-	-	-	986	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1546	-	-	-	908	1011
Mov Cap-2 Maneuver	-	-	-	-	908	-
Stage 1	-	-	-	-	967	-
Stage 2	-	-	-	-	986	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1546	-	-	-	908
HCM Lane V/C Ratio	-	-	-	-	0.005
HCM Control Delay (s)	0	-	-	-	9
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	5	21	5	64	78	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	25	6	75	92	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	179	92	93	0	-	0
Stage 1	92	-	-	-	-	-
Stage 2	87	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	811	965	1501	-	-	-
Stage 1	932	-	-	-	-	-
Stage 2	936	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	808	965	1501	-	-	-
Mov Cap-2 Maneuver	808	-	-	-	-	-
Stage 1	932	-	-	-	-	-
Stage 2	932	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	0.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1501	-	930	-	-
HCM Lane V/C Ratio	0.004	-	0.033	-	-
HCM Control Delay (s)	7.4	0	9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection: 1: Range Road 34 & Township Road 394

Movement	SB
Directions Served	LTR
Maximum Queue (m)	8.5
Average Queue (m)	0.6
95th Queue (m)	4.0
Link Distance (m)	303.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Township Road 393 & Range Road 34

Movement	SB
Directions Served	LR
Maximum Queue (m)	7.9
Average Queue (m)	0.9
95th Queue (m)	4.8
Link Distance (m)	414.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Highway 766 & Township Road 394

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	10.2	3.2
Average Queue (m)	5.0	0.1
95th Queue (m)	11.3	1.4
Link Distance (m)	291.4	120.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	4	8	18	20	12	8	2	16	1	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	5	9	21	24	14	9	2	19	1	2	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	38	0	0	14	0	0	86	92	9	95	89	31
Stage 1	-	-	-	-	-	-	12	12	-	73	73	-
Stage 2	-	-	-	-	-	-	74	80	-	22	16	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1572	-	-	1604	-	-	900	798	1073	888	801	1043
Stage 1	-	-	-	-	-	-	1009	886	-	937	834	-
Stage 2	-	-	-	-	-	-	935	828	-	996	882	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1572	-	-	1604	-	-	888	787	1073	861	790	1043
Mov Cap-2 Maneuver	-	-	-	-	-	-	888	787	-	861	790	-
Stage 1	-	-	-	-	-	-	1008	885	-	936	823	-
Stage 2	-	-	-	-	-	-	920	817	-	975	881	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	2.6	8.8	9.5
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	983	1572	-	-	1604	-	-	812
HCM Lane V/C Ratio	0.031	0.001	-	-	0.013	-	-	0.004
HCM Control Delay (s)	8.8	7.3	0	-	7.3	0	-	9.5
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	28	23	18	19	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	33	27	21	22	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	48	0	-	0	73	38
Stage 1	-	-	-	-	38	-
Stage 2	-	-	-	-	35	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1559	-	-	-	931	1034
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	987	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1559	-	-	-	930	1034
Mov Cap-2 Maneuver	-	-	-	-	930	-
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	986	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1559	-	-	-	939
HCM Lane V/C Ratio	0.001	-	-	-	0.026
HCM Control Delay (s)	7.3	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	8	33	39	66	107	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	39	46	78	126	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	304	135	144	0	-	0
Stage 1	135	-	-	-	-	-
Stage 2	169	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	688	914	1438	-	-	-
Stage 1	891	-	-	-	-	-
Stage 2	861	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	665	914	1438	-	-	-
Mov Cap-2 Maneuver	665	-	-	-	-	-
Stage 1	891	-	-	-	-	-
Stage 2	833	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	2.8	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1438	-	852	-	-
HCM Lane V/C Ratio	0.032	-	0.057	-	-
HCM Control Delay (s)	7.6	0	9.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection: 1: Range Road 34 & Township Road 394

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	9.2	8.4
Average Queue (m)	4.3	0.5
95th Queue (m)	10.5	3.7
Link Distance (m)	322.8	303.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Township Road 393 & Range Road 34

Movement	SB
Directions Served	LR
Maximum Queue (m)	9.1
Average Queue (m)	3.9
95th Queue (m)	10.1
Link Distance (m)	414.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Highway 766 & Township Road 394

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	16.7	10.4
Average Queue (m)	6.2	1.1
95th Queue (m)	12.7	5.9
Link Distance (m)	291.4	120.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	20	10	21	7	1	5	2	17	1	3	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	24	12	25	8	1	6	2	20	1	4	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	9	0	0	35	0	0	93	91	29	101	96	9
Stage 1	-	-	-	-	-	-	32	32	-	58	58	-
Stage 2	-	-	-	-	-	-	61	59	-	43	38	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1611	-	-	1576	-	-	891	799	1046	880	794	1073
Stage 1	-	-	-	-	-	-	984	868	-	954	847	-
Stage 2	-	-	-	-	-	-	950	846	-	971	863	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1611	-	-	1576	-	-	875	785	1046	850	781	1073
Mov Cap-2 Maneuver	-	-	-	-	-	-	875	785	-	850	781	-
Stage 1	-	-	-	-	-	-	983	867	-	953	833	-
Stage 2	-	-	-	-	-	-	930	832	-	949	862	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	5.3	8.8	9.3
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	979	1611	-	-	1576	-	-	840
HCM Lane V/C Ratio	0.029	0.001	-	-	0.016	-	-	0.007
HCM Control Delay (s)	8.8	7.2	0	-	7.3	0	-	9.3
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	2	31	46	24	21	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	36	54	28	25	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	82	0	-	0	109	68
Stage 1	-	-	-	-	68	-
Stage 2	-	-	-	-	41	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1515	-	-	-	888	995
Stage 1	-	-	-	-	955	-
Stage 2	-	-	-	-	981	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1515	-	-	-	887	995
Mov Cap-2 Maneuver	-	-	-	-	887	-
Stage 1	-	-	-	-	955	-
Stage 2	-	-	-	-	980	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1515	-	-	-	895
HCM Lane V/C Ratio	0.002	-	-	-	0.03
HCM Control Delay (s)	7.4	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	10	34	21	64	78	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	40	25	75	92	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	221	96	100	0	-	0
Stage 1	96	-	-	-	-	-
Stage 2	125	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	767	960	1493	-	-	-
Stage 1	928	-	-	-	-	-
Stage 2	901	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	754	960	1493	-	-	-
Mov Cap-2 Maneuver	754	-	-	-	-	-
Stage 1	928	-	-	-	-	-
Stage 2	886	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	1.8	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1493	-	904	-	-
HCM Lane V/C Ratio	0.017	-	0.057	-	-
HCM Control Delay (s)	7.5	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection: 1: Range Road 34 & Township Road 394

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	5.1	9.2	9.2
Average Queue (m)	0.3	4.4	1.3
95th Queue (m)	2.7	10.6	6.1
Link Distance (m)	389.8	322.8	303.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Township Road 393 & Range Road 34

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	3.0	9.1
Average Queue (m)	0.0	3.7
95th Queue (m)	1.1	9.9
Link Distance (m)	365.1	414.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Highway 766 & Township Road 394

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	16.4	7.9
Average Queue (m)	6.7	0.4
95th Queue (m)	13.0	3.1
Link Distance (m)	291.4	120.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0