December 2, 2019

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Holtby Site Development Plan

#2255-H02 Holtby Site Development Plan_Revision 6_2019.12.02

Contents

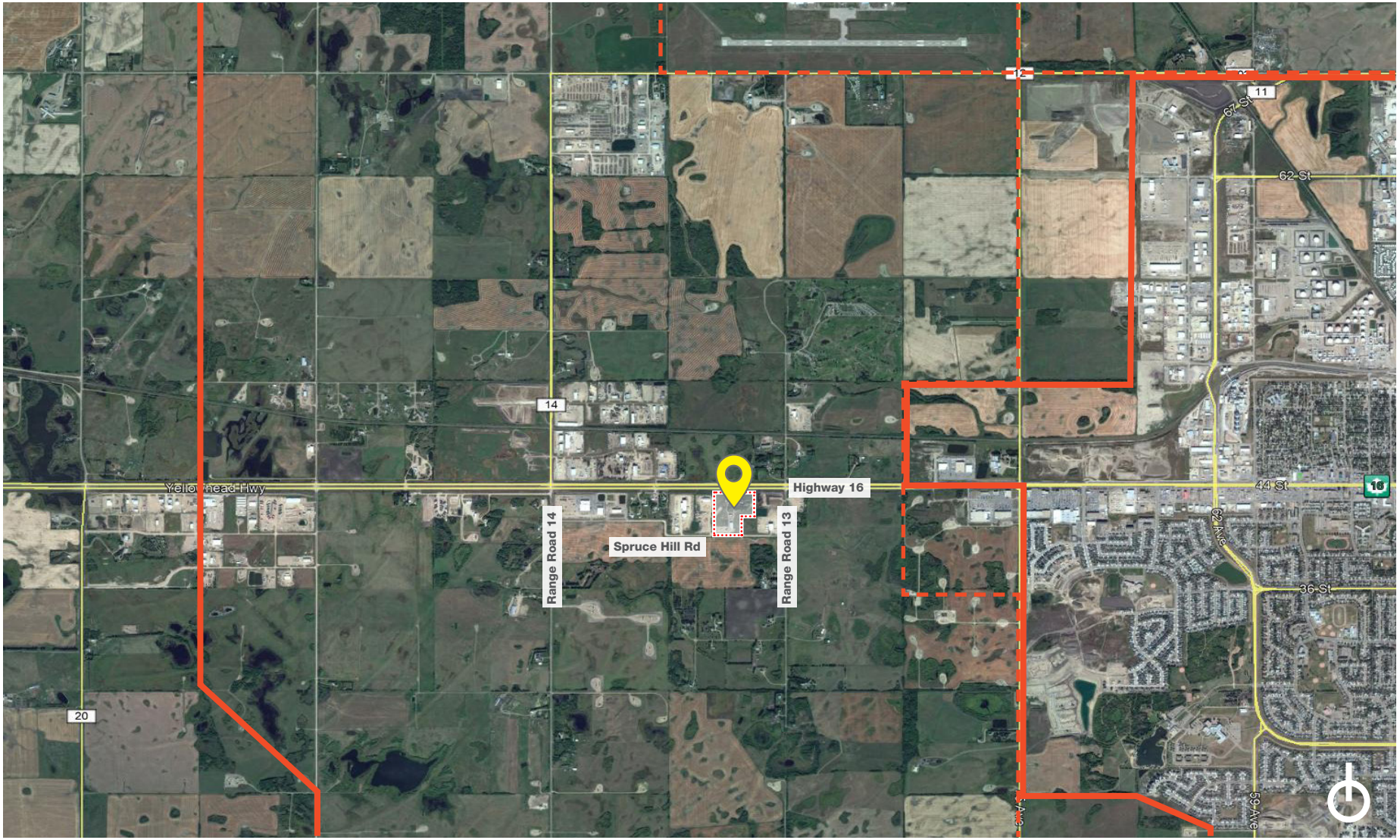


Fig. 01: Site Context

Subject Site — Intermunicipal Development Plan Boundary — City of Lloydminster Boundary

1 Site & Policy Context

1.1 Introduction

The County of Vermilion River Municipal Development Plan requires a Site Development Plan to be prepared by a Registered Professional Planner when a proposed subdivision will create more than four (4) titles out of a quarter section. To fulfill this requirement (MDP 5.2.3), this Site Development Plan is prepared in support of plans to subdivide the property located at Lot 2, Block 2, Plan 032 1016 NE 1/4 Sec 33, Twp 49, Rge 1, W4M.

The subject site is located approximately 5 kilometres from the centre of the City of Lloydminster, within the County of Vermilion River and the City of Lloydminster's Intermunicipal Development Plan (IDP) area (**Figure 1 - Site Context**).

The IDP designates the site Urban Expansion (Central), as per **Figure 2 - Intermunicipal Development Plan**. In addition to the IDP, the subject site is regulated by both the Central Urban Expansion Area Structure Plan and the County of Vermilion River Land Use Bylaw.

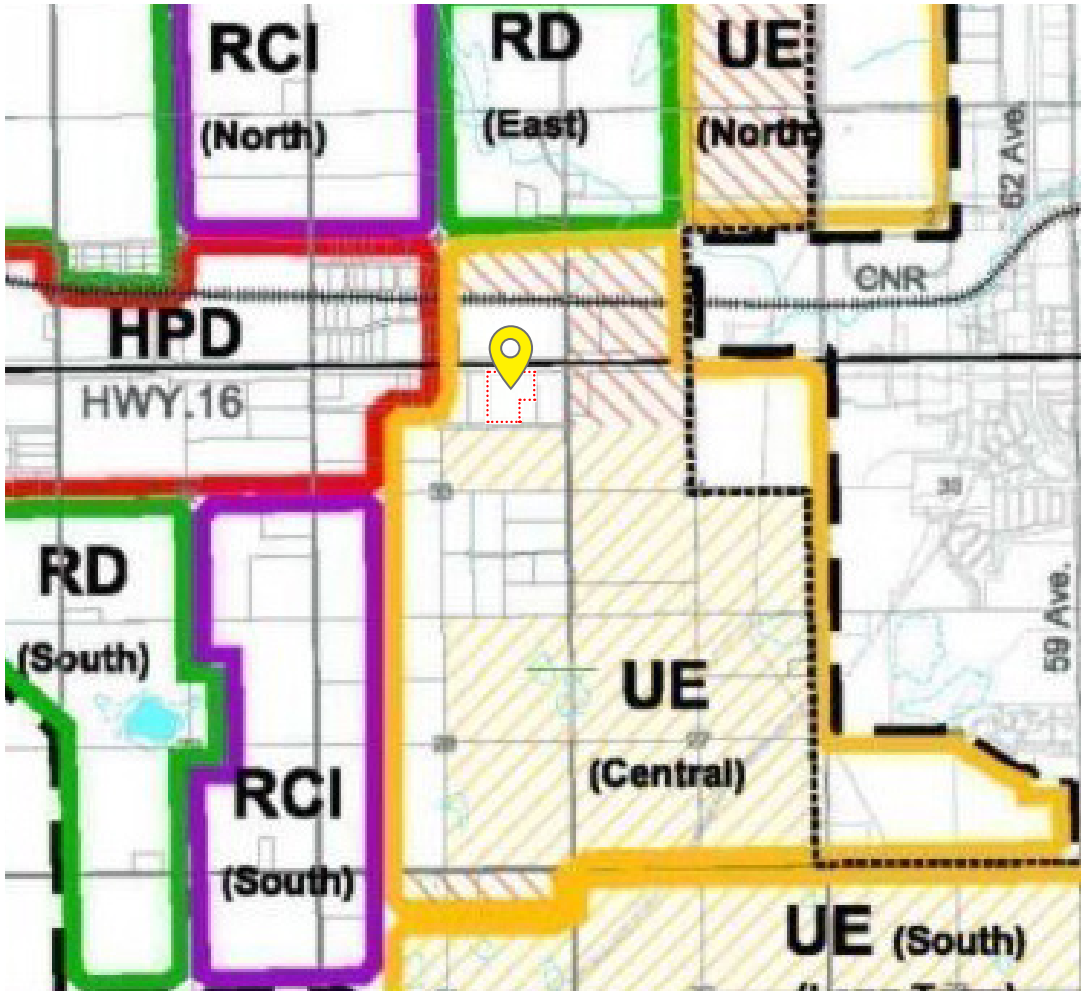


Fig. 02: **Intermunicipal Development Plan**

Subject Site

1.2 County of Vermilion River LUB

The Vermilion River Land Use Bylaw designates the site within the Industrial - Medium (M) District, as per **Figure 3**. The purpose of this district is to allow for the development of medium industrial uses that may require large areas of land and may be considered unsuitable to an urban area. This land use district provides the necessary conditions to achieve the development intent and, as a result, a land use redesignation is not required.

Fig. 03: **Land Use Bylaw**

1.3 Intermunicipal Development Plan

The County of Vermilion River and City of Lloydminster Intermunicipal Development Plan designates the site Urban Expansion (Central). It is anticipated that the Central Urban Expansion Area will see the first stage of residential growth among expansion areas. In addition to residential, this area will include retail commercial, secondary commercial, and a minor potential industrial land component.

1.4 Central Urban Expansion Area Structure Plan

The purpose of the CUEASP is to guide the transition of a rural-urban area to an urban one. It also serves to accommodate a variety of rural commercial/industrial and highway-related development at the Plan's western edge.

The CUEASP is intended to operate in tandem with the IDP. In doing so, the CUEASP identifies policy from the IDP that pertains to the Central Urban Expansion Area. Policy that pertains to the subject site includes:

4.2(c) - *Parcels within the IDP area that are currently zoned for Lloydminster Fringe Business (B2), may continue with those uses identified in the County of Vermilion River Land Use Bylaw. New applications for subdivision and development are subject to any amendments to the land use bylaw as may arise from the implementation of this IDP.*

We understand that the County requires new Area Structure Plan's prior to approval of a subdivision which would create more than four parcels out of a quarter section. In this case, the proponent wishes to subdivide into 5 parcels (see **Figure 5 - Outline Plan**), however it is our understanding that a new/amended ASP is not required as the subject site falls within the existing Central Urban Expansion ASP and the proponent's intention is consistent with all applicable policies.

2 Environment

2.1 Existing Water Bodies

There is a water storage pond on the east boundary of the site with a surface area of approximately 0.62 ha. The pond is contained within utility right-of-way 032 1017. The pond is a shared fire water supply for this development and the adjacent development to the east. Approximately 0.19 ha of this pond is on the subject property, and 0.43 ha on the adjacent property.

2.2 Impervious Surfacing

The proposed development will transform the subject site from a largely undeveloped parcel into 6 individual lots that reflect the intention of the Medium Industrial (M) land use district. **Table 1** highlights the anticipated changes to the subject site's surface area. Surfaced areas and building coverage amount to 86% of the site, which is consistent with the surrounding context.

2.3 Water Well Tests

Water well tests have been obtained for four wells. 2 of the wells (1501401 and 1500048) are on the subject property. The other 2 wells are located within 400 metres of the property. The results of these tests are provided in **Appendix C**.

2.4 Air Quality

No long-term air pollutants generated by this project are anticipated. Some dust may be generated during construction. Dust suppression by watering truck is expected and is a normal practice during construction.

2.5 Reserves

There will not be an environmental reserve allocated as part of this development. Requirements for municipal reserve may be met through cash-in-lieu.

Lot Coverage	Existing	Proposed
Building Coverage	2%	20%
Surfaced Areas	14%	66%
Landscaped Areas	0%	10%
Permanent Open Space & Stormwater Management Areas (excluding required landscaping)	84%	4%
Total	**100%**	**100%**

Table 01: **Lot Coverage**

Fig. 04: **Lot Coverage Context**

3 Utilities & Services

3.1 Utilities

Energy and telecommunications utilities are available to the subject site through main feeds along Spruce Hill Road. Utility easements will be required to service individual lots with power and telephone, via overhead utility lines.

Electrical utility distribution and servicing will be coordinated by ATCO Electric at the request of the developer.

Provision for natural gas distribution and servicing is designed and coordinated by the gas company at the request of the developer. ATCO Gas will provide natural gas distribution to the proposed development.

Telus Communications is the service provider for communication services to the subject site area.

3.2 Solid Waste

Brush and tree clearing will be required to develop the site. It is anticipated that brush and trees will be shredded and disposed of off-site.

3.3 Potable Water

Municipal potable water is not available to the subject site. Each parcel will utilize on-site well water obtained through a provincially approved drilling program or a cistern in which hauled potable water may be stored for on-site distribution.

3.4 Stormwater

Stormwater management is accommodated by way of ditches on either side of the primary access road, a culvert transporting stormwater under the road, and a surface drainage swale travelling east-west through proposed lot 11 from the road to the existing stormwater detention pond.

As illustrated in **Figure 9 – Drainage Plan**, stormwater from all proposed lots is directed first to the central access road before being re-routed through the surface swale to the detention pond. The surface swale is accommodated in a 3.0m drainage easement through lot 11. The intention is not to develop lot 11 at this time, rather, lot 11 is reserved for future expansion of the stormwater detention pond and associated infrastructure, as needed. Additionally, a 6.0m access easement is proposed from the central access road to the detention pond. This access easement will accommodate an all-weather graveled access road.

The intention is for the existing pond to accommodate all stormwater management for the site. As such, no additional facilities (ponds) are proposed. At the detailed design / development permit stage, the project team will conduct stormwater modelling to determine the capacity of the pond. If it is determined that the size of the pond needs to be increased, this will be accommodated for in proposed lot 11.

Of note, pre- and post-development flows will be matched at the design stage.

Overflow from the detention pond is directed to the highway ditch by means of a surface swale in a registered utility right-of-way along the east boundary of proposed lot 10. Discharge to surface waters will be the normal stormwater discharge. There will be no waste water present in the discharge.

In addition to managing peak stormwater flows, the detention pond provides water supply for firefighting purposes. The detention pond is private and will be maintained by the land owner.

At this time, the project team has not calculated anticipated flows in the internal stormwater system. This, along with cross sections illustrating proposed culvert treatments, will be provided at the Development Permit / Detailed Design stage.

3.5 Waste Water

Municipal waste water collection services are not available to the subject site and surrounding area. Future owners of subdivided lots will be responsible for providing these services in a manner that meets municipal and provincial standards. Servicing is to be provided on-site for each lot created to the satisfaction of the County, Alberta Municipal Affairs, Safety Codes Council, and Alberta Environment and Parks.

It is proposed that sanitary sewerage systems will utilize septic tanks for pump and haul. Individual lot owners will be responsible for the collection and disposal of sewage.

4 Transportation & Access

4.1 Site Access

Primary access to the site is by way of an internal cul-de-sac, accessed from Spruce Hill Road. This access road is not a dead end road and will service each individual lot (see **Figure 8 - Outline Plan**). No additional road widening requirements are anticipated.

To accommodate secondary emergency access, an access easement is proposed, beginning at the bulb of the internal cul-de-sac and terminating at the western property line. This is proposed as a 6.0 m (19.7 ft) easement, to be registered on Title, bisecting the southern portion of proposed lot 9. The proposed 6.0 m (19.7 ft) easement reflects the industry standard for emergency access roads. A gate will be installed at the western property line to provide access to the adjacent property in the event of an emergency.

As the roads are public roadways, the County of Vermilion River is responsible for maintenance.

4.2 Transportation Impact Assessment

WATT Consulting Group was retained to conduct a Transportation Impact Assessment (TIA) to inform this Site Development Plan. The findings and recommendations of this assessment are summarized below, with the full report provided as **Appendix A**.

Analysis was completed for the study area assessing the road network based on an existing (2017) scenario, an Opening Day (2021) scenario, and an Opening Day + 20 Years (2041) scenario. In all three cases, AM and PM peak hour traffic volumes are included.

Turning movement data (2017) was obtained from Alberta Transportation for the intersections of Highway 16 / Range Road 14 and Highway 16 / Range Road 13 (**Figure 5- 2017 Traffic Volumes**). Highway 16 traffic volumes were grown at a rate of 2% for 4 years, based on historic growth at these intersections.

Vehicle trips to the site were intially estimated using the ITE Trip Generation Manual (General Light Industrial land use code), however the resulting trip rate (~425 trips per day) is high when considering the anticipated mix of uses and surrounding context. Instead, WATT Consulting Group conducted an 11-hour count at a similar industrial area nearby and then applied the collected trip rate to the subject site. Based on this exercise, the site is estimated to generate approximately 150 trips per day, with fewer than 20 trips during peak hours.

The inbound and outbound volumes were totaled, and percentages were determined for the PM and AM peak hour distribution. Anticipated 2021 and 2041 traffic volumes are shown in **Figure 6** and **Figure 7**, respectively.

The TIA concludes that the transportation network around the site is able to accommodate the existing volumes with no capacity or delay concerns. The increase in traffic volume from this site, and background growth along Highway 16 did not significantly impact the operation of the study intersections. The increase in the

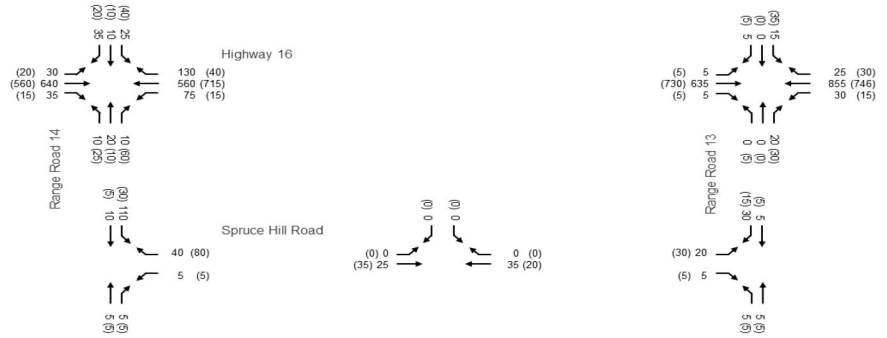


Fig. 05: **2017 Traffic Volumes**

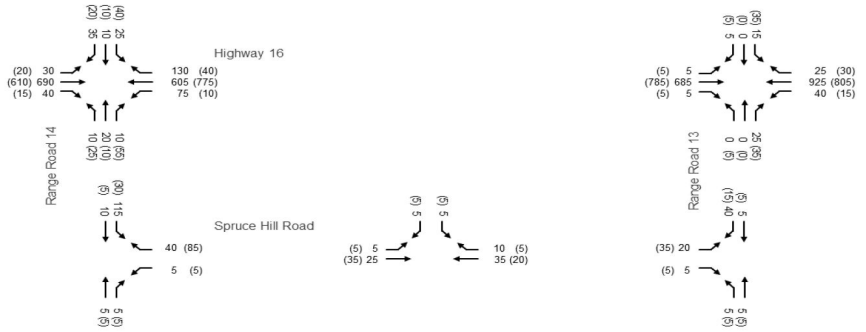


Fig. 06: **Opening Day Volumes**

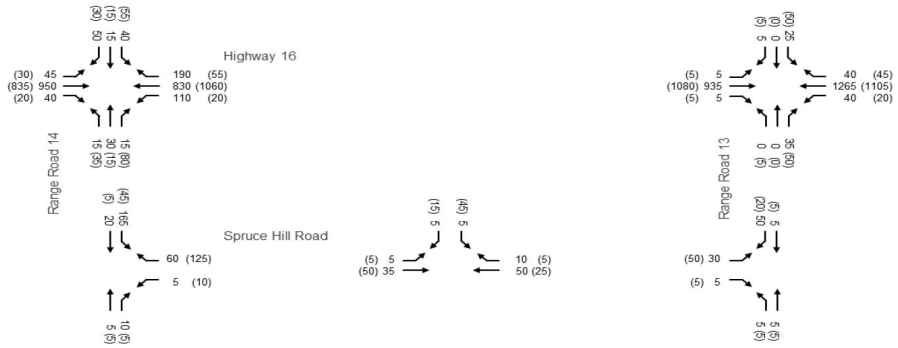


Fig. 07: **Opening Day + 20 Years Volumes**

westbound left turn at the intersection of Highway 16 and Range Road 13 does warrant a left turn lane with a total of 25 metres of storage. Regardless of the development of the site, this improvement would be warranted by the year 2024 or 2025 based on assumed background growth. Nonetheless, the developer will be required to make contributions to intersection improvements, to be established through a Development Agreement.

No other mitigation measures are recommended to accommodate additional traffic generated by the site development.

4.3 Risk Assessment & Emergency Response Plan

WATT Consulting Group was retained to provide a risk assessment and emergency response plan for the proposed development, in accordance with the County's Emergency Response Plan requirements. The County's requirements are outlined in **Appendix B**. The risk assessment indicates that there are no hazardous materials on site. Firefighting capability will be by tank storage on individual lots, in addition to a surface water storage pond of approximately 12,000 m^3.

On-site water wells will provide an additional water source with a capacity of approximately 15 gallons per minute. A dry zz system is not being proposed at this time, however, if the County requires it this can be addressed at the engineering design stage.

The subject site will rely on services available in the County of Vermilion River. Ambulance and police services are available in the County. The County is a member of the East Central Health District. Fire protection will be the responsibility of the County.

Highway 16 will accommodate emergency access to and from the site. The access road located within the subject site is designed to accommodate emergency vehicles, in conformance with the County's General Municipal Servicing Standards. Emergency vehicles will be able to access the site from Spruce Hill Road. In the event of an emergency, private vehicles will also be able to evacuate the area using the internal access road onto Spruce Hill Road. A secondary access is provided by way of a registered easement on Title of proposed lot 3. This is to accommodate emergency vehicles in the event that the primary access road cannot be used.

Appendix B illustrates the emergency response route between the subject site and the Hamlet of Blackfoot Fire Department. This route utilizes Highway 16 and takes approximately 7 minutes.

4.4 Landscape Plan

Landscape Plans will be submitted on a parcel-by-parcel basis at the development permit stage, to the satisfaction of the approving authority. Future development will conform to the requirements of the Land Use Bylaw and other municipal policies with respect to highway frontage.

Future Landscape Plans will address mitigative measures related to stormwater management. As indicated in **Section 3.5**, stormwater is directed to the central access road and then re-routed to a stormwater containment pond located within utility right-of-way Plan 032 1017. The stormwater retention pond directs overflow to the highway ditch by means of a surface swale. This is illustrated in **Figure 9 - Drainage Plan**.

4.5 Aesthetics

Parts of this development will be visible from Highway 16 and from Spruce Hill Road. Additionally, new overhead utility lines will be required to bring power and telephone service to the individual lots. No new exterior lighting is proposed at this time as this will be addressed at the development permit stage.

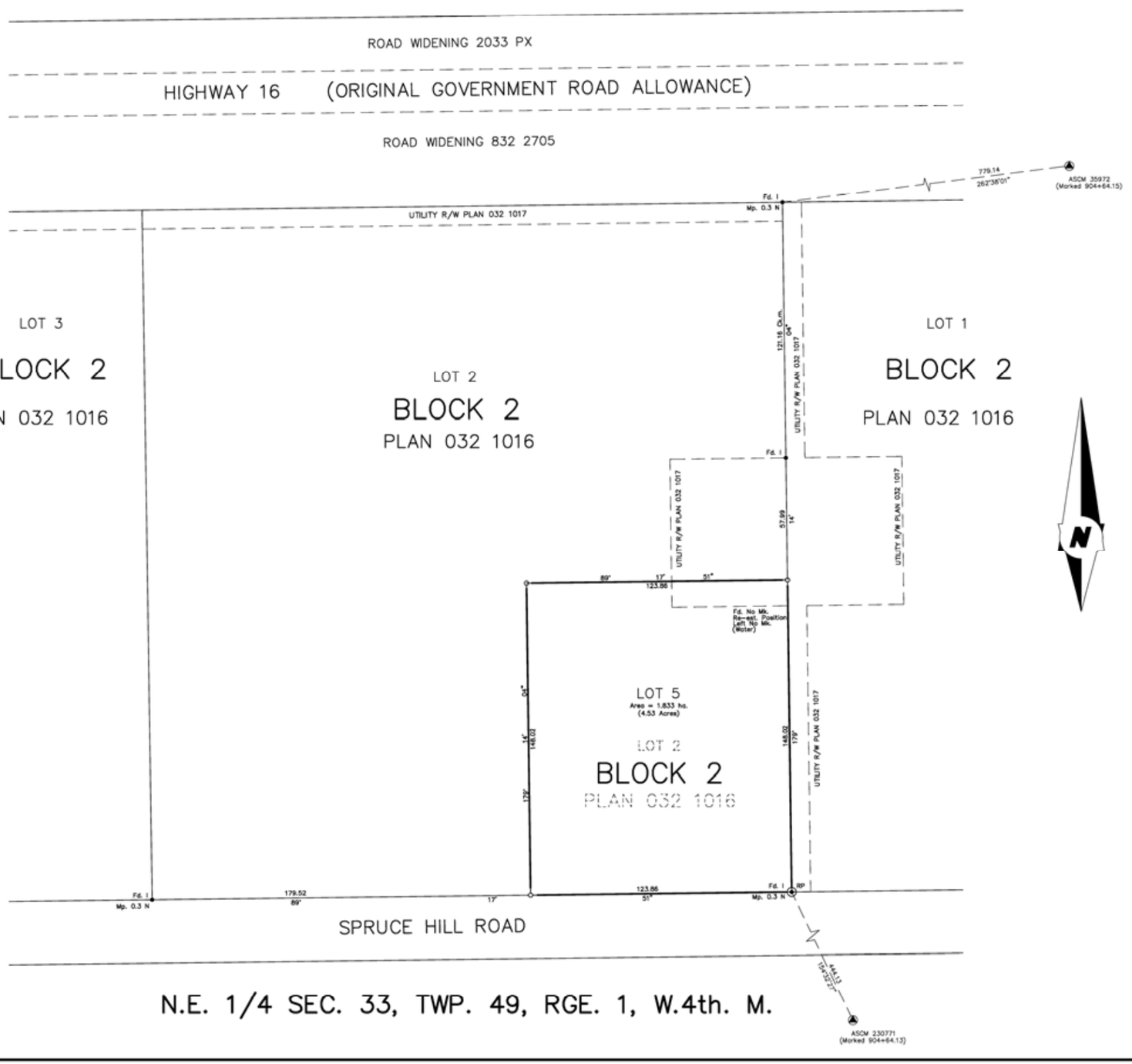
4.6 Signage

Signage will be addressed at the development permit stage and must meet the requirements of the Land Use Bylaw, to the satisfation of the approving authority.

4.7 Phasing

Proposed lot 6, located immediately adjacent to Spruce Hill Road will be the first to develop. The remaining lots will develop as and when an end user purchases the lots.

Fig. 08: Site Plan



LAND TITLES OFFICE
PLAN NO. 182 1996
ENTERED AND REGISTERED
ON July 13 , 2018
INSTRUMENT NO : 182 170 927
A.D. REGISTRAR

THE COUNTY OF VERMILLION RIVER No. 24

PLAN SHOWING SURVEY OF

SUBDIVISION

AFFECTING

LOT 2, BLOCK 2, PLAN 032 1016

WITHIN THE

N.E. 1/4 SEC. 33, TWP. 49, RGE. 1, W.4th. M.

A L B E R T A

2018

BY: JASON DESCHAMPS, A.L.S.

SCALE : 1 : 1000

10 0 10 20 30 40 50 100 Metres

LEGEND:

Area to be Registered is shown thus
Statutory Iron Posts found are shown thus
Statutory Iron Posts planted and marked P085 are shown thus
Geo-Reference point is a found iron post and is shown thus RP
Alberta Survey Control Markers (ASCM) found are shown thus

NOTES:

Distances are shown in metres and decimals thereof
Proposed area to be registered contains 1.83 hectares.
This plan consists of 1 lot.
Bearings are GRID and were derived from GPS Observations to ASCM's as shown.

DATUM: NAD 83 (Original)
PROJECTION : 3° Transverse Mercator
REFERENCE MERIDIAN : 111° WEST
COMBINED SCALE FACTOR: 0.999846
GEO-REFERENCE POINT CO-ORDINATE VALUES ARE; N.:5904983.882 E.:61253.747

ABBREVIATIONS: (where applicable)

Found abbreviated thus	Fd.
Placed abbreviated thus	Pl.
Statutory Iron Post abbreviated thus	I.
Re-established abbreviated thus	Re-est.
Mark abbreviated thus	Mk.
Marks abbreviated thus	Mks.
Hectare abbreviated thus	ha.
Countersunk abbreviated thus	c.s.
Section abbreviated thus	Sec.
Township abbreviated thus	Twp.
Range abbreviated thus	Rge.
Meridian abbreviated thus	M.
North abbreviated thus	N.
East abbreviated thus	E.
South abbreviated thus	S.
West abbreviated thus	W.
Right of Way abbreviated thus	R/W
Marker post abbreviated thus	Mp.
Utility abbreviated thus	U.
Arc Length abbreviated thus	L
Curve Radius abbreviated thus	R
Central Angles of curve are shown thus	Δ
Public Utility Lot abbreviated thus	PUL
Municipal Reserve abbreviated thus	MR
Environmental Reserve abbreviated thus	ER
Radial bearings are shown thus	(R)
Overland Drainage abbreviated thus	O.D.
Boundary abbreviated thus	Bdy.
Intersection abbreviated thus	Int.
Geo-Reference Point abbreviated thus	RP
Check measure abbreviated thus	Ck.m.

SURVEYOR:

NAME:
JASON DESCHAMPS, A.L.S.

SURVEYED BETWEEN THE DATES OF JUNE 21, 2017 AND JUNE 23, 2018. IN ACCORDANCE WITH THE PROVISIONS OF THE SURVEYS ACT

ALBERTA LAND SURVEYORS' ASSOCIATION PERMIT NUMBER P 085 WATT CONSULTING GROUP LTD.

SUBDIVISION AUTHORITY:
MUNICIPAL PLANNING SERVICES (2009) LTD.
FILE NO.: 17-Q-776

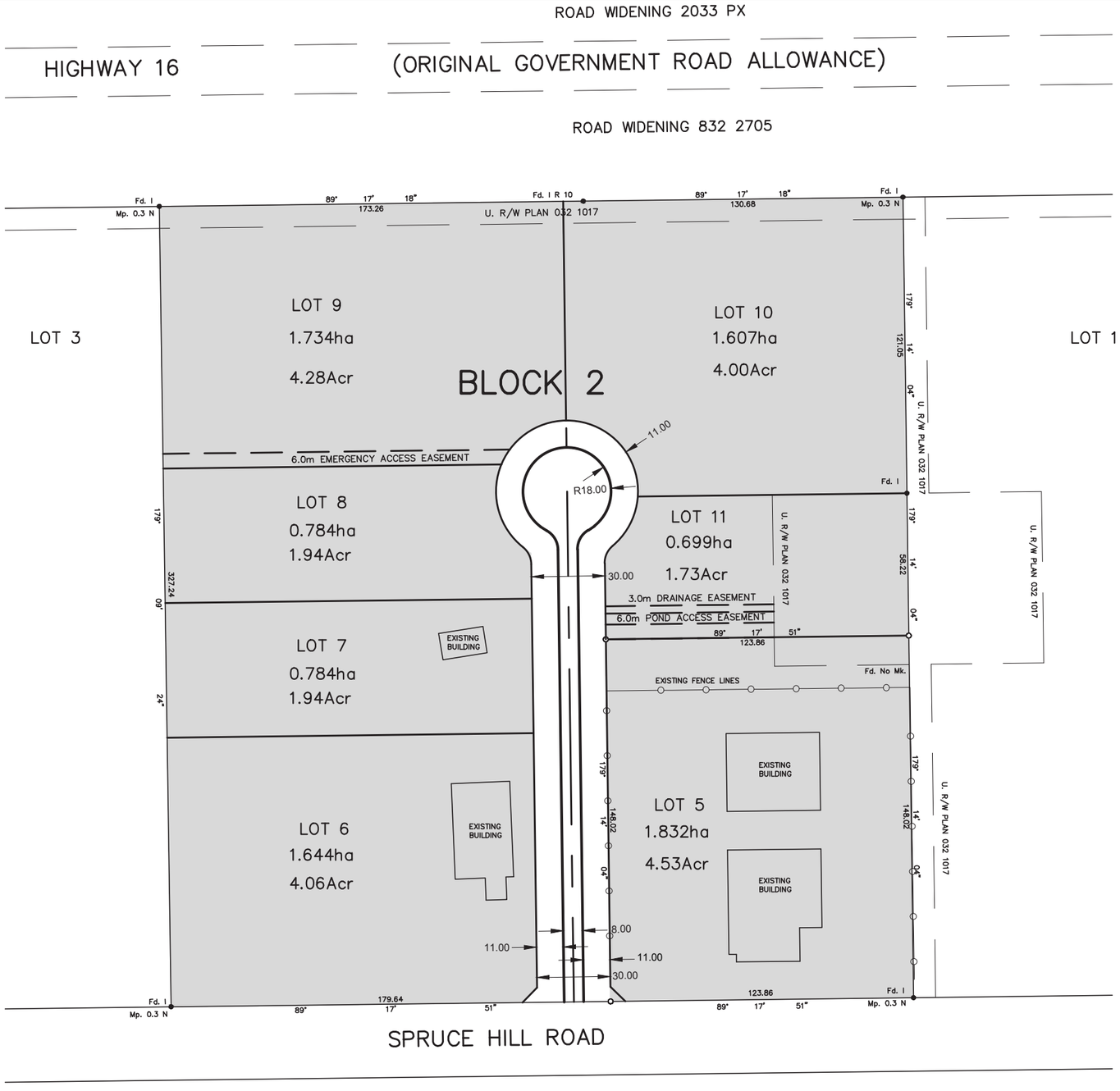
REGISTERED OWNERS:
1662580 ALBERTA LTD.

WATT
Consulting Group
www.wattconsultinggroup.com

Watt Consulting Group Ltd.
2018-5004-18th Street
Lloydminster, Alberta T9V 1V4
T. 780.870.4338

DRAWING FILE NAME: 17K0026 LOT 5 LEGAL.dwg	
DRAWN BY: MJ RICHARDS	CLIENT: 1662580 ALBERTA LTD.
CHECKED BY: K.C.	FILE No: 17K0026.000

Fig. 09: **Outline Plan**



N.E. 1/4 SEC. 33, TWP. 49, RGE. 1, W.5th. M.

WATT Consulting Group

Horiz 1:2000

0 10 20 30 40 50 60 70 80 90 100

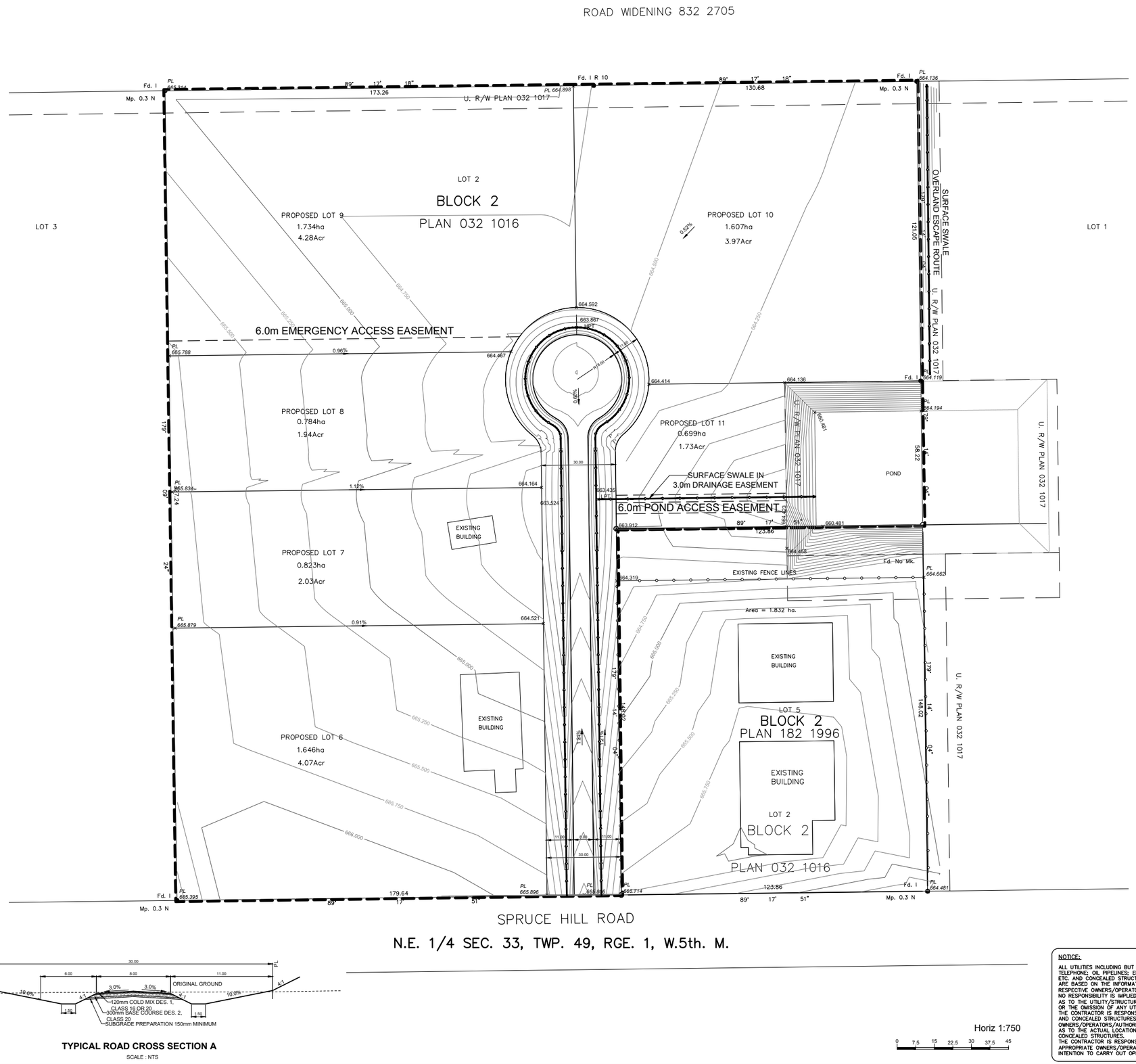
OUTLINE PLAN

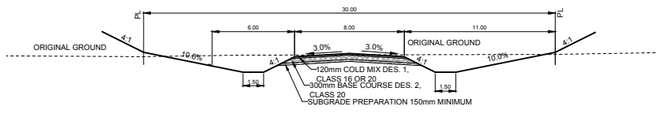
FIGURE - 1

3458.E01

November 27, 2019

Fig. 10: **Grading Plan**





TYPICAL ROAD CROSS SECTION A

SCALE : NTS

Horiz 1:750

0 7.5 15 22.5 30 37.5 45

NOTICE:

ALL UTILITIES INCLUDING BUT NOT LIMITED TO: GAS; TELEPHONE; OIL PIPELINES; ELECTRICAL; CABLE; FIBEROPTICS; ETC. AND CONCEALED STRUCTURES AS SHOWN ON THIS PLAN ARE BASED ON THE INFORMATION RECEIVED FROM THE RESPECTIVE OWNERS/OPERATORS/AUTHORITIES.
NO RESPONSIBILITY IS IMPLIED OR ASSUMED BY THE ENGINEER AS TO THE UTILITY/STRUCTURE LOCATION, SIZE OR ELEVATION OR THE OMISSION OF ANY UTILITY OR STRUCTURE.
THE CONTRACTOR IS RESPONSIBLE TO LOCATE ALL UTILITIES AND CONCEALED STRUCTURES AND TO CONTACT THE VARIOUS OWNERS/OPERATORS/AUTHORITIES FOR ON-SITE INFORMATION AS TO THE ACTUAL LOCATIONS OF ALL EXISTING UTILITIES OR CONCEALED STRUCTURES.
THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE APPROPRIATE OWNERS/OPERATORS/AUTHORITIES OF ITS INTENTION TO CARRY OUT OPERATIONS IN THE AREA.

NOTES

1. ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE LATEST ISSUE OF THE "COUNTY OF VERMILION STANDARD SPECIFICATIONS" UNLESS OTHERWISE SPECIFIED.
2. ALL DIMENSIONS IN METERS UNLESS OTHERWISE SPECIFIED.

LEGEND

PROPOSED	LEGAL AND SURFACE	EXISTING
	LOT/PROPERTY LINES	
	BOUNDARY (CONSTRUCTION)	
	URW/EASEMENTS	
	STORM CHANNEL	
	TOP OF BERM	
90.758 / 3.00%	LOT ELEVATION / GRADE	PL 90.758
	GROUND CONTOURS (MAJOR)	
	GROUND CONTOURS (MINOR)	
201	PROFILE REFERENCE	

PROGRESS PRINT
DATE: 27/11/2019

Engineer's Stamp:

Permit Stamp:

ISSUED

No.	Description	By	Date	Appr
A	PRELIMINARY SUBMISSION	RA	NOV. 27, 2019	DW

REVISIONS

No.	Description	By	Date	Appr

Title:

SITE GRADING PLAN

Job Description:

HOLTBY
NE 33-49-1 W4M
LOT 2, BLK 2, PL 032 1016
COUNTRY OF VERMILION RIVER

Client:

County of VERMILION River

WATT Consulting Group
#310, 3016 - 5 Avenue NE
Calgary, Alberta T2A 6K4
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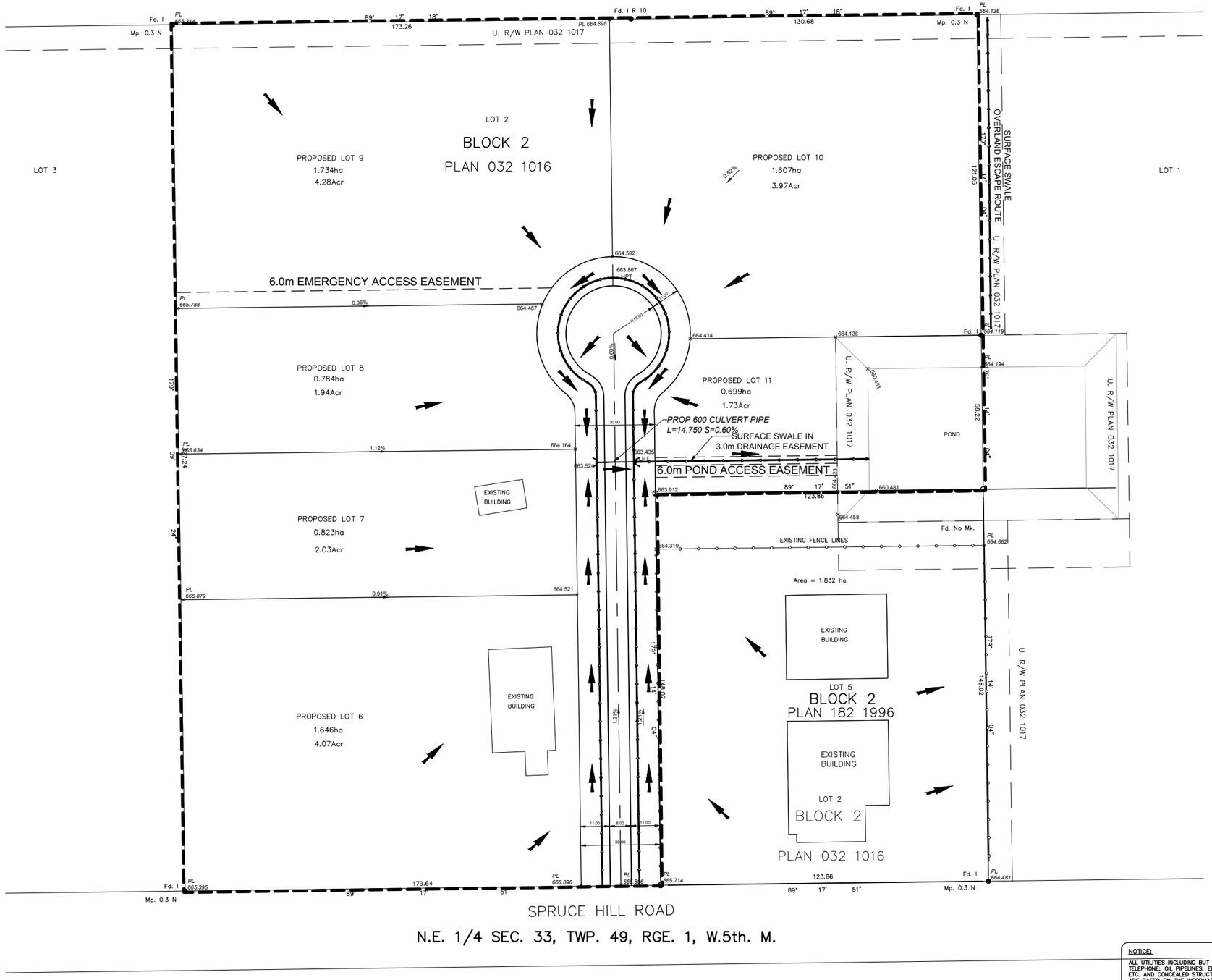
F. 403.273.3440
www.wattconsultinggroup.com

Drawn:	RA	Scale:	AS SHOWN	Drawing Number	Revision / Issued
Designed:	BT	Date:	NOV. 02, 2018	C01	A
Draft Chk:	RA	WATT File #:	3458.E01		
Design Chk:	BT				
Approved:	DW				

Fig. 11: **Drainage Plan**



PROGRESS PRINT
DATE: 27/11/2019

Horiz 1:750
0 7.5 15 22.5 30 37.5 45

NOTES
1. ASSUMED ALLOWABLE RELEASE RATE FROM THE SITE - 0.75 L/S/HA.
2. AS THE DATA FOR VERMILLION RIVER IS NOT READILY AVAILABLE LLOYDMINSTER RAINFALL DATA USED IN SWMHYMO TO MODEL THE 1:100 YEAR STORM.
3. AN OVERALL IMPERVIOUS RATIO IN THE MODEL IS 60% (VERMILLION RIVER GUIDELINES FOR AN INDUSTRIAL USE).

LEGEND

PROPOSED		EXISTING
	LEGAL AND SURFACE	
	LOT/PROPERTY LINES	
	BOUNDARY (CONSTRUCTION)	
	URW/EASEMENTS	
	SWALE	
	TOP OF BERM	
	SYMBOLS	
	CULVERT	
	OVERLAND FLOW DIRECTION	
90.758	LOT ELEVATION	EX 90.758
	GROUND CONTOUR (MAJOR)	660.70
	GROUND CONTOUR (MINOR)	660.70
201	PROFILE REFERENCE	

NOTICE:
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THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE APPROPRIATE OWNERS/OPERATORS/AUTHORITIES OF ITS INTENTION TO CARRY OUT OPERATIONS IN THE AREA.

Engineer's Stamp:

Permit Stamp:

ISSUED

No.	Description	By	Date	Appr
A	PRELIMINARY SUBMISSION	RA	NOV. 27, 2019	DW

REVISIONS

No.	Description	By	Date	Appr

Title:

DRAINAGE PLAN

Job Description:

HOLTBY
NE 33-49-1 W4M
LOT 2, BLK 2, PL 032 1016
COUNTRY OF VERMILION RIVER

Client:

County of VERMILION River

WATT Consulting Group
#310, 3016 - 5 Avenue NE
Calgary, Alberta T2A 6K4
T. 403.273.9001
F. 403.273.3440
www.wattconsultinggroup.com

				Drawing Number	Revision	Issued
Drawn:	RA	Scale: AS SHOWN		C02	-	A
Designed:	BT	Date: NOV. 02, 2018				
Draft Chk:	RA	WATT File #: 3458.E01				
Design Chk:	BT					
Approved:	DW					

Fig. 12: **Watershed Plan**

SCALE
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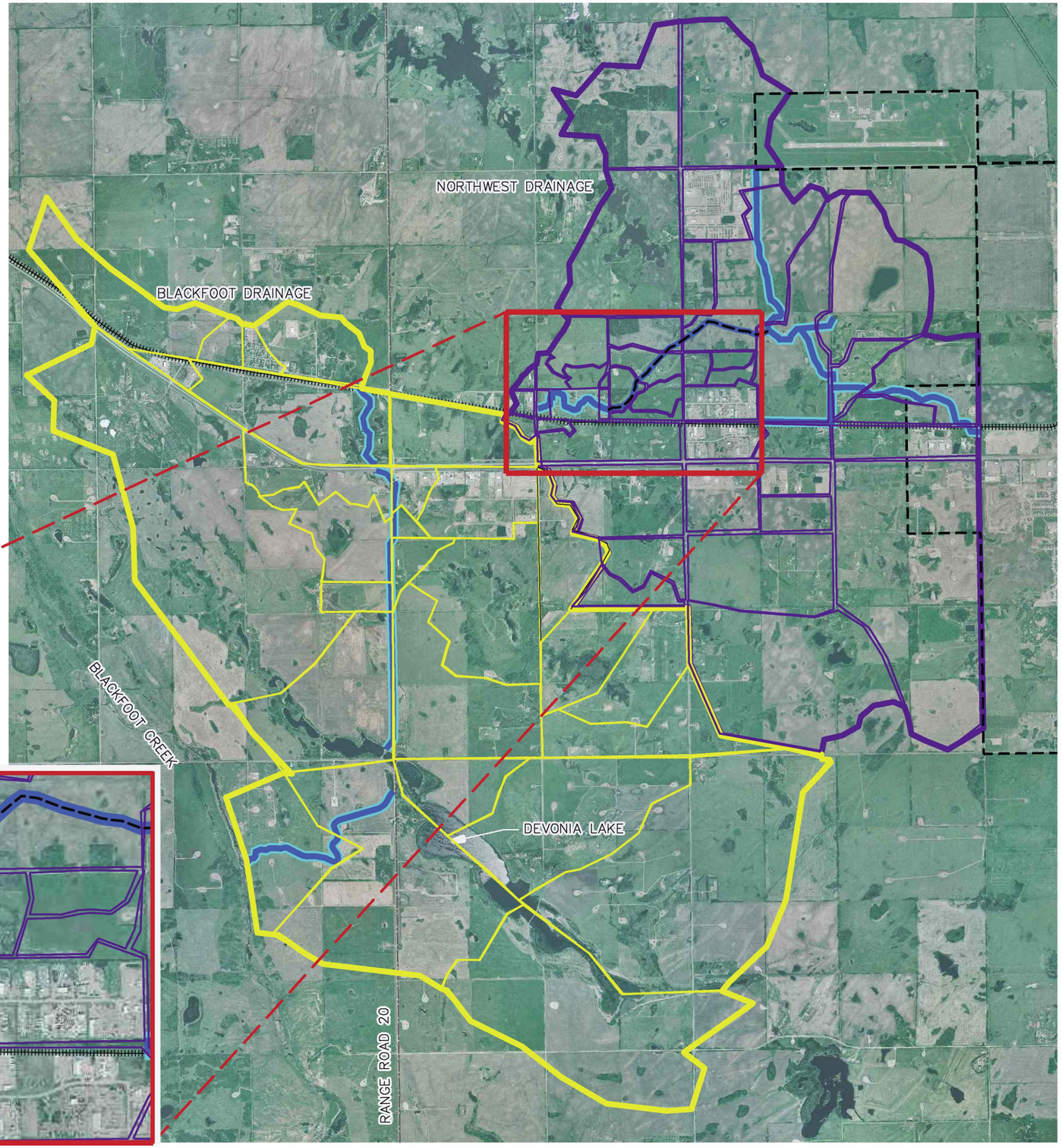

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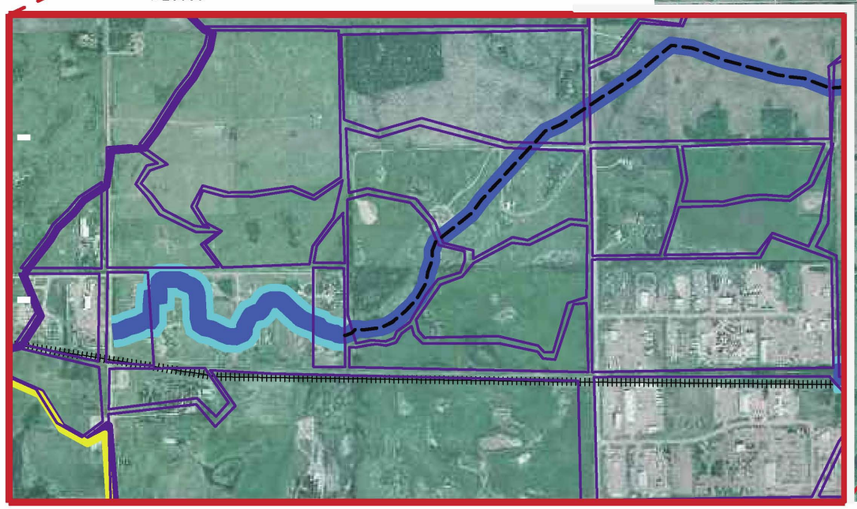

LEGEND:

- NORTHWEST DRAINAGE BOUNDARY
- BLACKFOOT DRAINAGE BOUNDARY
- DRAINAGE DITCH
- NATURAL DRAINAGE
- CITY OF LLOYDMINSTER
- NORTHWEST DRAINAGE SUB–BASINS
- BLACKFOOT DRAINAGE SUB–BASINS
- CN RAIL LINE

NOTES:

1. BASE MAP PROVIDED BY CVR 2003 AERIAL PHOTO.
2. SELECTED ROADS FROM COUNTY.

DRAWING REVISIONS			
6			
5			
4			
3			
2			
1			
NO	DD/MM/YY	DESCRIPTION	BY

Clifton Associates Ltd.
engineering science technology

CLIENT
County of VERMILION River

PROJECT TITLE
MASTER STORMWATER MANAGEMENT PLAN

DRAWING TITLE
DRAINAGE SUB–BASINS

PROJECT NO.		FILE NO.
L77		L77FIG3–2
DATE: 03/11/08	SCALE: AS SHOWN	DWG. NO.
DRAWN: SGE	CHECKED:	FIGURE 2.2–3

Appendices

Appendix A

HOLTBY DEVELOPMENT

Transportation Impact Assessment

November 18, 2019

PERMIT TO PRACTICE
WATT CONSULTING GROUP LTD.
Signature
Date November 18, 2019
PERMIT NUMBER: P 3818
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

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TABLE OF CONTENTS

APPENDICES

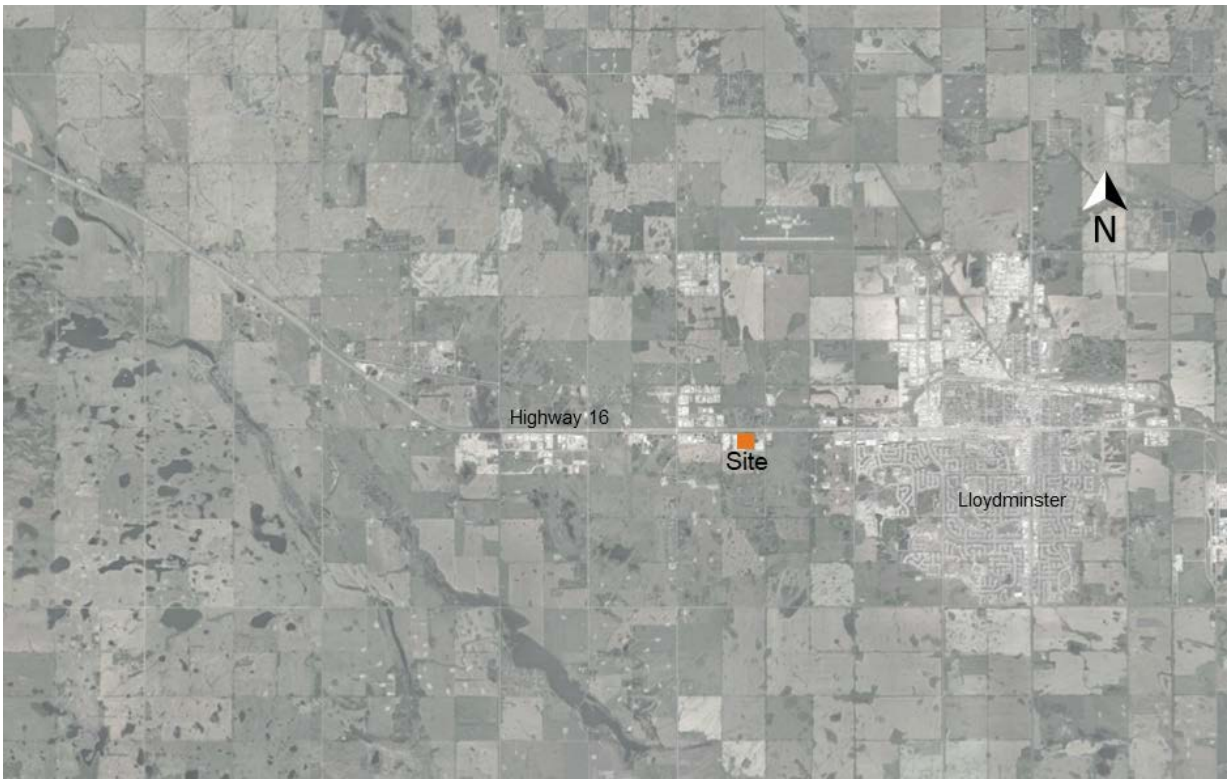
LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

WATT Consulting Group was retained by 1662580 Alberta Ltd. to conduct a Transportation Impact Assessment in conjunction with a site development plan submission. The site is located at Lot 2, Block 2, Plan 032 10165 NE ¼ Sec 33, Twp 49, Rge 1, W4M within the County of Vermillion River. The site location is shown in **Figure 1**.

Figure 1: Site Location



In 2016, WATT completed a regional model for the County of Vermillion River. This model included a PM peak hour 2020 and a 2025 analysis horizon. The information contained in the model was used to support or verify assumptions. Details of the information used and its relevance is outlined in the appropriate sections.

2.0 STUDY AREA

The study area includes four existing intersections plus the proposed site access location. The study intersections are shown on **Figure 2** and listed below:

- Highway 16 / Range Road 14 (NB/SB stop controlled)
- Highway 16 / Range Road 13 (NB/SB stop controlled)
- Spruce Hill Road / Range Road 14 (WB yield controlled)
- Spruce Hill Road / Range Road 13 (EB stop controlled)
- Spruce Hill Road / Site Access (SB stop controlled)

Figure 2: Study Area Intersections

All roadways within the study area are a rural cross section with no designated pedestrian or bicycle facilities. A summary of each roadway is provided below.

Highway 16 (Yellowhead Highway) is a paved, four-lane divided Provincial Highway and is part of the Trans-Canada Highway. The annual average daily traffic for this roadway is approximately 15,000 near the site. The posted speed within the study area is 80 km/hr, increasing to 110 km/hr to the west and reducing to 60 km/hr at the City of Lloydminster to the east.

Range Road 14 is a two-lane A2 class paved roadway. It provides access to businesses adjacent to Highway 16 and continues north and south through most of the County.

Range Road 13 is a two-lane D1 classified road and is paved between Highway 16 and Spruce Hill Road. This roadway continues for approximately a mile north and south of Highway 16.

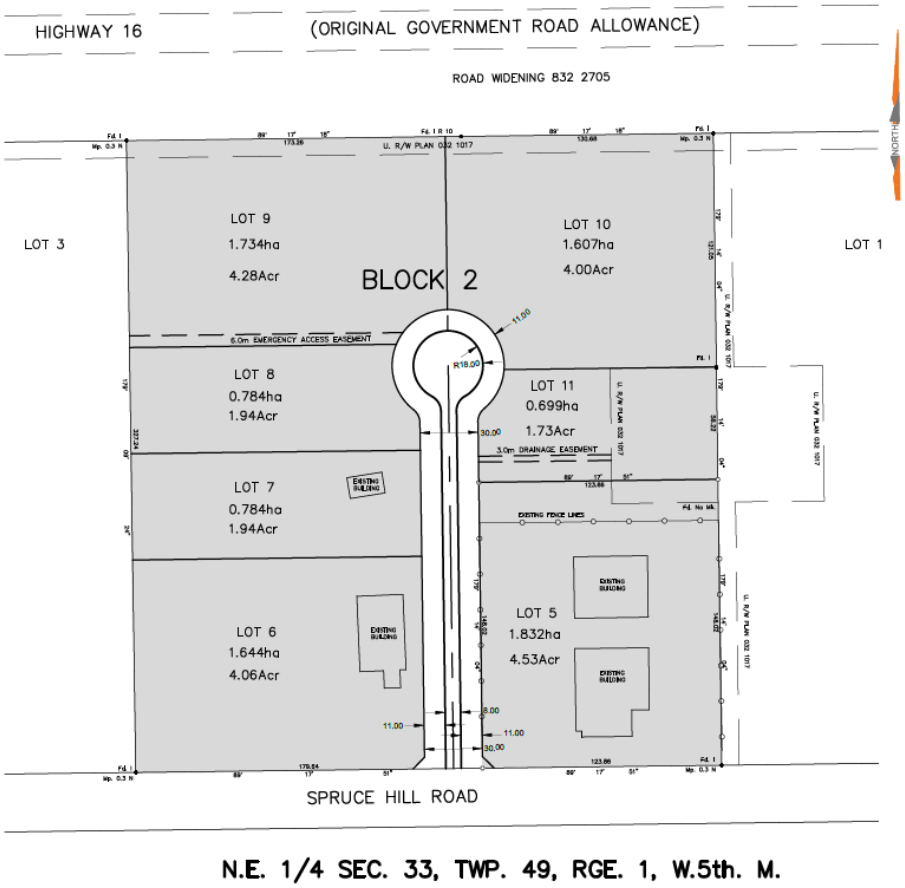
Spruce Hill Road is a two-lane roadway connecting Range Road 14 and Range Road 13, providing access to businesses adjacent to Highway 16. The middle portion, including the roadway adjacent to the site, is gravel with cold mix pavement on both ends.

The intersection with Range Road 14 is based on a typical Major Road intersection[1] with left and right turn lanes on Highway 16 in both directions. The intersection at Range Road 13 has tapers leading into the intersection, but no designated turn lanes on Highway 16, consistent with a Minor Road Intersection[2].

3.0 SITE DETAILS

The site is located at Lot 2, Block 2, Plan 032 10165 NE ¼ Sec 33, Twp 49, Rge 1, W4M within the County of Vermillion River. The location of the site is within the County of Vermillion River and City of Lloydminster's Intermunicipal Development Plan (IDP) Area, designated as "Urban Expansion (Central)". The site is regulated by both the Central Urban Expansion Area Structure Plan and the County of Vermillion River Land Use Bylaw. The site location in relation to these plans is shown in **Appendix A**. The zoning for this site under the County's Land Use Bylaw is Industrial – Medium (M). This district allows development of medium industrial and similar uses. The proposed use of the site is in line with this zoning. The site plan is shown in **Figure 3**, Lot 5 and Lot 6 have existing uses and were not included in the trip generation.

Figure 3: Proposed Site Plan



[1] Figure D-9.1a in Alberta Infrastructure's Highway Geometric Design Guide
[2] Figure D-9.1b in Alberta Infrastructure's Highway Geometric Design Guide

4.0 TRAFFIC ANALYSIS

Analysis was completed for the study area assessing the road network with and without the proposed development. This section outlines the steps that were taken to develop the background and site vehicle trips and the assumptions, results, and implications of the capacity analysis.

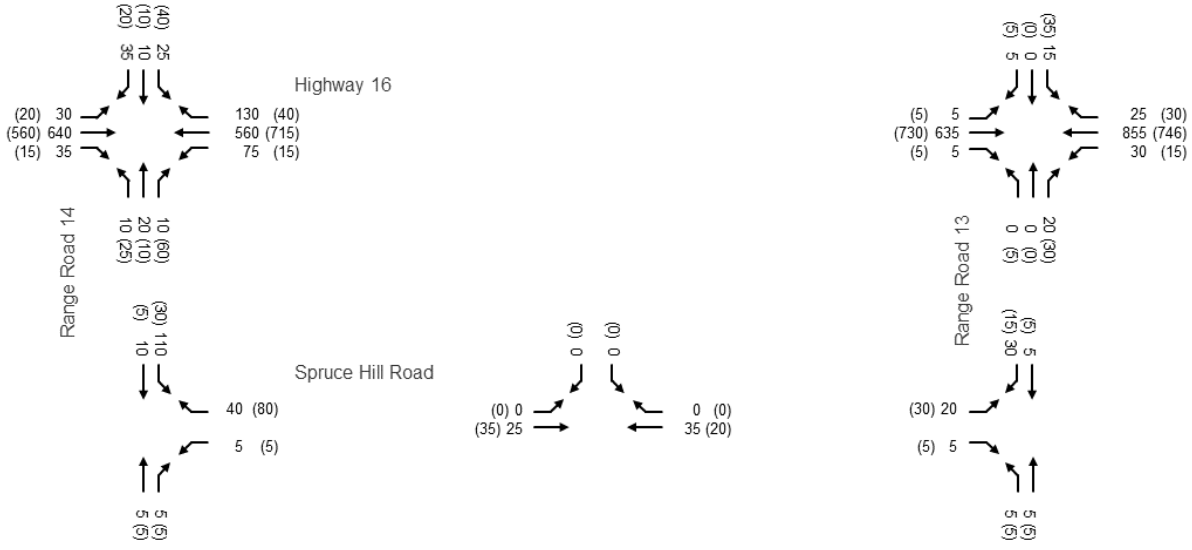
4.1 ANALYSIS ASSUMPTIONS

Three analysis scenarios were developed, an existing (2017) scenario, an Opening Day (2021) scenario and an Opening Day + 20 Years (2041) scenario. All scenarios included the AM and PM peak hour. Analysis was conducted using the Synchro 9[3] software. Synchro / SimTraffic is a two-part traffic modelling software that provides analysis of traffic conditions. The Highway Capacity Manual (2010) methodology built into Synchro was used to analyze the study intersections. The westbound yield control on Spruce Hill Road at Range Road 14 was modelled as a stop control due to limitations with the HCM 2010 methodology.

4.2 EXISTING TRAFFIC

Turning movement data was obtained from the Alberta Transportation website for the intersections of Highway 16 / Range Road 14 and Highway 16 / Range Road 13. The latest data available was for 2017 and was based on a turning movement count from the same year. The turning movements at the intersections of Spruce Hill Road with Range Road 14 and Range Road 13 were developed using the volume information from the Highway 16 intersections combined with turning movements within the model. The assumed 2017 volumes are shown in **Figure 4.**

Figure 4: Existing (2017) Volumes



[3] Version 9.2.915.6

4.3 BACKGROUND TRAFFIC GROWTH

The Highway 16 through volumes were grown at a rate of 2%[4] for 4 years. This percentage is based on the historic growth at these intersections. The 2% growth rate was compared to the volumes shown in the 2020 and 2025 models and deemed to be appropriate. Growth on Range Road 14 and Range Road 13 is assumed to be primarily driven by new developments, and therefore was not adjusted by the 2% for the Opening Day scenario. For the Opening Day + 20 years scenario, growth was applied to all intersection movements.

4.4 TRIP GENERATION

The vehicles trips to the site were estimated using the ITE Trip Generation Manual (10th Edition). The site has a number of acceptable land uses, all with unique trip generation rates. The best estimate within the manual is the General Light Industrial. From the description in the ITE Trip Generation Manual, General Light Industrial has an emphasis on activities other than manufacturing and typically has minimal office space and typically activities include printing, material testing, and assembly of data processing equipment. The average rate for the 'Peak Hour of Adjacent Street Traffic' was used for both the AM and PM peak hour. To convert from the site area to GFA, it was assumed that the building GFA would be 15% of the site area. A brief survey of nearby sites using aerial imagery was conducted and a GFA of 15% of the site area was considered appropriate for this area. The parcel sizes and corresponding assumed GFA is shown in **Table 1** with trip Generation numbers (AM peak hour, PM peak hour, and daily) shown in **Table 2**.

TABLE 1: PARCEL SIZE AND ASSUMED GFA

Parcel Number	Land Area (acre)	Land Area (1,000 sq ft)	Assumed GFA (1,000 sq ft)
6*	4.06	176.9	26.5
7	1.94	84.5	12.7
8	1.94	84.5	12.7
9	4.28	186.4	28.0
10	4.00	174.2	26.1
11	1.73	75.4	11.3
Total	**17.95**	**781.9**	**117.3**
Total for new trips	13.89	605.0	90.8

**- Parcel has an existing use and was not included in the trip generation.*

[4] Linear growth

TABLE 2: TRIP GENERATION FOR PROPOSED DEVELOPMENT (ITE)

Peak Hour	ITE Code	Land Use	GFA (1,000 ft²)	Trip Rate (per 1,000 ft²)	Total Trips	Trips In	Trips Out
AM	110	General Light Industrial	90.8	0.70	63.5	56	8
PM	110	General Light Industrial	90.8	0.63	57.2	7	50
Daily	110	General Light Industrial	90.8	4.69	425.7	213	213

Based on the surrounding land use and existing volumes within the area, it was determined that the ITE trip rate may be too high for the local context. A 11-hour count was conducted on Production Avenue to measure the trip rate for a similar industrial use nearby. **Figure 5** shows the count location and included area and **Table 3** provides the calculated trip rates.

Figure 5: Data Collection Location and Captured Land Area

TABLE 3: COLLECTED TRIP GENERATION RATE

Peak Hour	Land Use	Gross Area (acres)	Total Trips	Trips In	Trips Out	Trip Rate (per acre)
AM	Production Ave Cul-de-sac	67.7	73	57	16	1.08
PM	Production Ave Cul-de-sac	67.7	65	14	51	0.96
7am – 6pm	Production Ave Cul-de-sac	67.7	581	292	289	8.58

The collected trip rate was applied to the proposed development with the resulting volumes shown in **Table 4**.

TABLE 4: TRIP GENERATION FOR PROPOSED DEVELOPMENT (LOCAL RATE)

Peak Hour	ITE Code	Land Use	GFA (1,000 ft²)	Trip Rate (per 1,000 ft²)	Total Trips	Trips In	Trips Out
AM	110	General Light Industrial	15.21	1.08	16.4	13	4
PM	110	General Light Industrial	112.6	0.96	14.6	3	11
Daily	110	General Light Industrial	112.6	8.58	130.5	65	65

The proposed volumes on Spruce Hill Road just east of the site along with the county's model scenarios are provided in **Table 5**.

TABLE 5: SPRUCE HILL ROAD VOLUMES

PM Peak Hour	Existing Volumes	New Site Trips	Opening Day Volumes	2020 Model Volumes	2025 Model Volumes
Westbound	13	3	16	60	59
Eastbound	29	11	40	96	113

4.5 TRIP DISTRIBUTION

An analysis of the model volumes was conducted to determine trip distribution for the zone containing the site. The inbound and outbound volumes from the study site's zone were totaled and percentages were determined for the PM peak hour distribution. The inbound and outbound distribution was swapped to generate the AM peak hour distribution. The assumed trip distribution is shown in **Table 6**.

TABLE 6: TRIP DISTRIBUTION.

Roadway link	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Highway 16 west	75%	80%	75%	65%
Highway 16 east	15%	20%	25%	20%
RR 14 north	8%	0%	0%	8%
RR 14 south	7%	0%	0%	7%
RR 13 north	0%	0%	0%	0%
RR 13 south	0%	0%	0%	0%

Based on the assumptions provided above, the Opening Day (2021) and Opening Day + 20 Years (2041) volumes are shown in **Figure 6** and **Figure 7**.

Figure 6: Opening Day Volumes

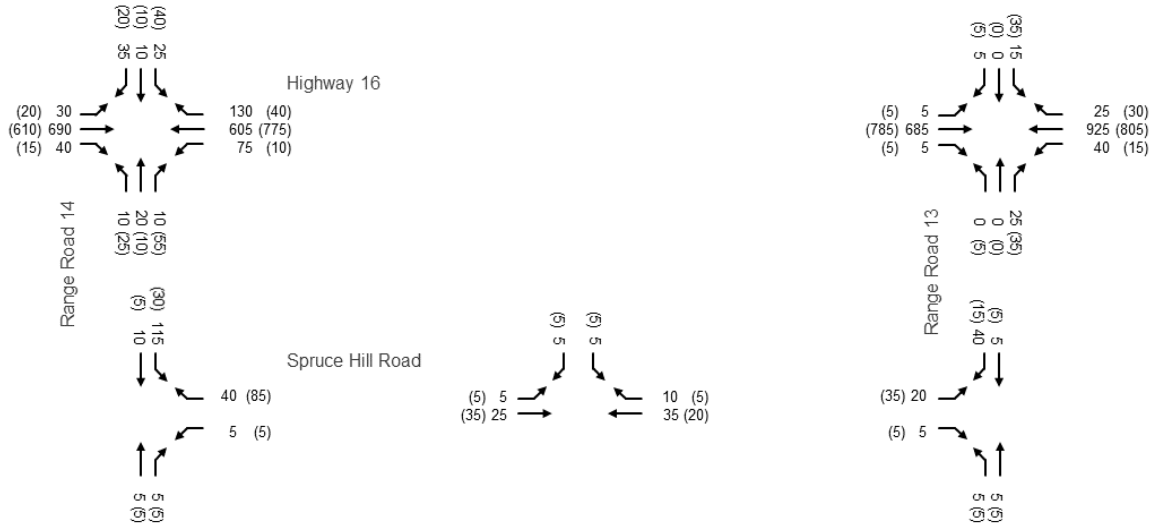
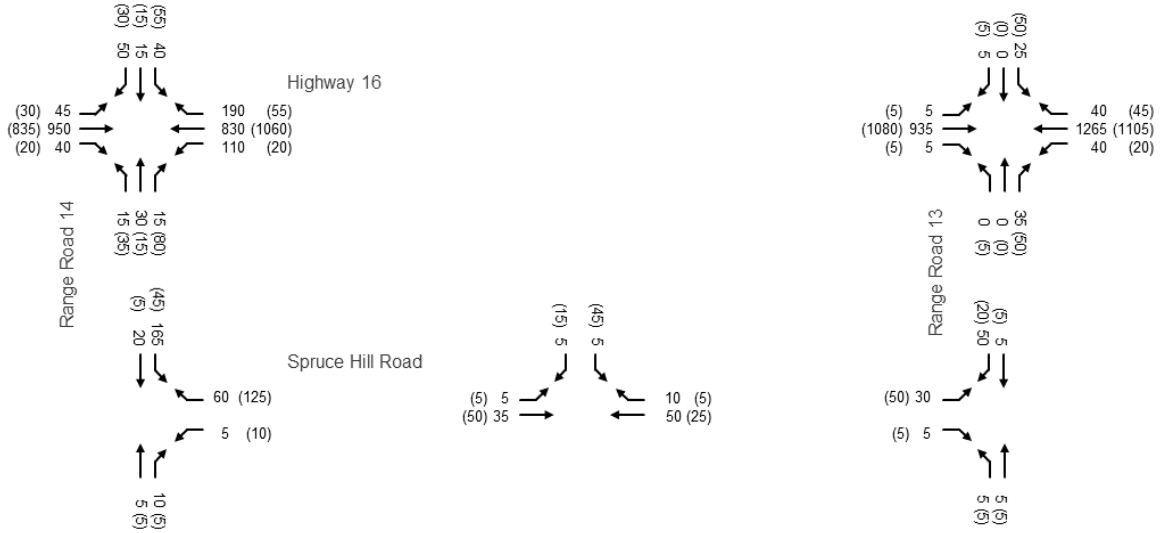


Figure 7: Opening Day + 20 Years Volumes



4.6 TRAFFIC ANALYSIS

4.6.1 OPENING DAY

Analysis for the AM and PM peak hours was conducted and all movements were shown to operate with acceptable delay and capacity. The results show no capacity concerns with all movements below a 0.30 volume to capacity ratio and LOS C or better. The Opening Day scenario shows only minor delay increases in the order of 1 to 2 seconds or less over the Existing scenario. A summary of the analysis findings is provided in **Appendix B** with detailed Synchro outputs provided in **Appendix C**. Based on the analysis findings, the existing road network is able to accommodate the additional trips from the proposed site.

4.6.2 OPENING DAY + 20 YEARS

For the Opening Day + 20 Years scenario, the intersection along Spruce Hill Drive continue to operate with acceptable levels of service. The left turns from Range Road 13 and 14 onto Highway 16 show higher delay and LOS. Analysis was completed using 2041 Background volumes, and all southbound left turns are LOS E along with the northbound left turn on Range Road 14 during the PM Peak Hour. For the Opening Day + 20 scenario (with site trips), delay increases in the order of 1-2 seconds were reported on the left turns. There are no capacity or queuing concerns with this movement.

4.7 WARRANT CALCULATIONS

Warrant calculations were conducted for both intersection with Highway 16 including the Alberta Transportation Canadian Matrix Signal Warrant Analysis and the Alberta Transportation left and right turn lane warrants. Both intersections are already illuminated and an illumination warrant was not required.

For the signal warrants, the raw count data from 2017 was used to obtain the six peak hours. These numbers were manually increased to better reflect the published 100th Highest Hour estimates. The site trips were then added to the volumes with four of the six peak hours estimated based on the AM and PM peak hour volumes. The results of the warrants are shown in **Table 7** with the warrant results in **Appendix D**.

TABLE 7: SIGNAL WARRANT

Intersection	Scenario	Warrant Score*	Result
Highway 16 / RR 14	Opening Day	68	Not Warranted
Highway 16 / RR 13	Opening Day	31	Not Warranted
Highway 16 / RR 14	OD + 20 year BG	147	Warranted
Highway 16 / RR 13	OD + 20 year BG	57	Not Warranted
Highway 16 / RR 14	OD + 20 year	149	Warranted
Highway 16 / RR 13	OD + 20 year	64	Not Warranted

In the Opening Day + 20 Year Background scenario, a signal is warranted at the intersection of Highway 16 / Range Road 14. The site trips added to this slightly increase the warrant score, but the warrant is triggered by the background growth.

Left and right turn lane warrants were completed using Sections D.8.6 and D.8.7, respectively, in the Alberta Transportation Highway Geometric Design Guide. The intersection of Highway 16 / Range Road 14 already contains left and right turn lanes and therefore warrant calculations were not completed for the intersection. The right turn volumes at the intersection of Highway 16 / Range Road 13 do not exceed 360 daily movements and therefore a right turn is not warranted. The results of the left turn warrant are provided in **Table 8** with the results on Figure D-8.6c are provided in **Appendix D**.

TABLE 8: LEFT TURN WARRANT

Intersection	Scenario	Time Period	Direction	Warrant
Highway 16 / RR 13	Opening Day BG	AM Peak	Eastbound	No Left Turn
Highway 16 / RR 13	Opening Day BG	PM Peak	Eastbound	No Left Turn
Highway 16 / RR 13	Opening Day	AM Peak	Eastbound	No Left Turn
Highway 16 / RR 13	Opening Day	PM Peak	Eastbound	No Left Turn
Highway 16 / RR 13	Opening Day BG	AM Peak	Westbound	No Left Turn
Highway 16 / RR 13	Opening Day BG	PM Peak	Westbound	No Left Turn
Highway 16 / RR 13	Opening Day	AM Peak	Westbound	Left Turn S=15m
Highway 16 / RR 13	Opening Day	PM Peak	Westbound	No Left Turn
Highway 16 / RR 13	OD + 20 year BG	AM Peak	Eastbound	No Left Turn
Highway 16 / RR 13	OD + 20 year BG	PM Peak	Eastbound	No Left Turn
Highway 16 / RR 13	OD + 20 year	AM Peak	Eastbound	No Left Turn
Highway 16 / RR 13	OD + 20 year	PM Peak	Eastbound	No Left Turn
Highway 16 / RR 13	OD + 20 year BG	AM Peak	Westbound	Left Turn S=15m
Highway 16 / RR 13	OD + 20 year BG	PM Peak	Westbound	No Left Turn
Highway 16 / RR 13	OD + 20 year	AM Peak	Westbound	Left Turn S=15m
Highway 16 / RR 13	OD + 20 year	PM Peak	Westbound	No Left Turn

For the Opening Day horizon, a left turn lane in the westbound direction at Range Road 13 is warranted with a base length of 15m. The increase of 8 site trips is enough result in a warranted left turn lane. Looking at the Opening Day plus 20 Background, a 15m left turn bay is also warranted with the AM peak hour volume. Based on background growth alone, the left turn lane would be warranted around 2024 or 2025. The addition of the site trips accelerates the warranting of a left turn lane, but is not the primary driver of the improvement. The 10% truck volume on Highway 16 increases the storage requirement by 10m based on Table D.7.6a in the Manual. This results in a left turn lane with 25m of storage.

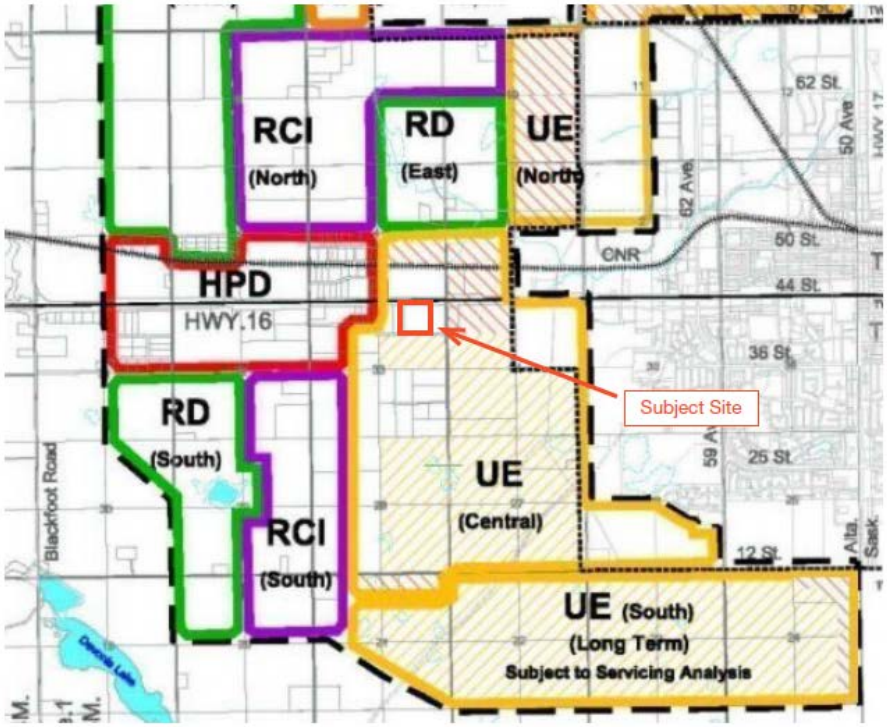
5.0 RECOMMENDATIONS AND CONCLUSIONS

The proposed use of the site is in line with the land use bylaw and the adjacent developments. The transportation network around the site is able to accommodate the existing volumes with no capacity or delay concerns.

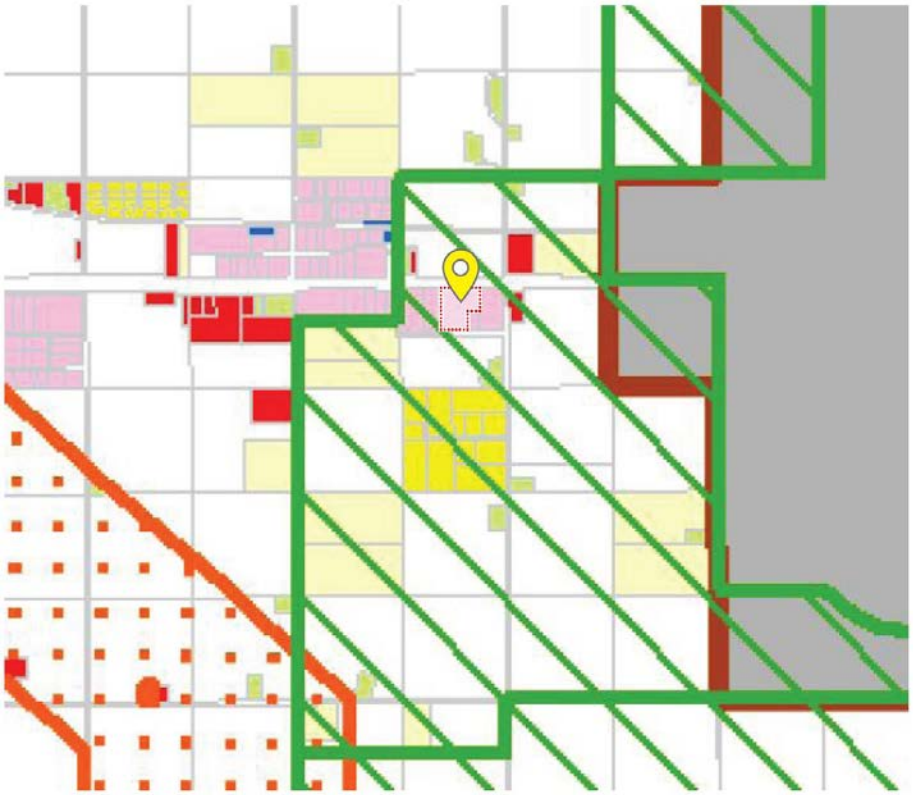
The site is estimated to generate roughly 150 trips per day with less than 20 trips in the peak hours. The increase in volume from this site and background growth along Highway 16 did not significantly impact the operation of the study intersections in the short term. The addition of the site trips to the westbound left turn at the intersection of Highway 16 / Range Road 13 does warrant a left turn lane with a total of 25m of storage. Regardless of the development of the site, this improvement would be warranted in approximately 2024 or 2025 based on assumed background growth. Background growth over the next 2 years may warrant signalization or additional improvements to the Highway 16 intersections, but these are not the direct result of the site. No other mitigation measures are recommended to accommodate the additional traffic generated by the site development.

APPENDIX A: REGULATORY PLAN MAPS

Intermunicipal Development Plan



Vermilion River Land Use Bylaw



APPENDIX B: TRAFFIC ANLAYSIS RESULTS SUMMARY

AM Peak Hour (Long Term)

Intersection (EW Street / NS Street)	Movement	Opening Day + 20 BG			Opening Day + 20		
		v/c	LOS	Delay (s)	v/c	LOS	Delay (s)
Highway 16 / RR 13	NBLTR	0.06	B	12.6	0.07	B	12.6
	EBL	0.00	B	12.6	0.00	B	12.6
	EBT	-	A	0.0	-	A	0.0
	WBL	0.07	B	10.7	0.08	B	10.8
	WBT	-	A	1.7	-	A	2
	SBLTR	0.23	**E**	43.6	0.23	**E**	44.8
Highway 16 / RR 14	NBLTR	0.44	**E**	46.7	0.45	**E**	47.2
	EBL	0.08	B	11.2	0.08	B	11.2
	WBL	0.19	B	11.8	0.19	B	11.9
	SBLTR	0.53	**E**	40.2	0.54	**E**	41.2
Spruce Hill Rd / RR 13	NBL	0.00	A	7.3	0.00	A	7.3
	NBT	-	A	0	-	A	0
	EBLR	0.03	A	8.7	0.04	A	8.9
Spruce Hill Rd / RR 14	WBLR	0.05	A	8.7	0.07	A	9.0
	SBL	0.07	A	7.4	0.12	A	7.5
	SBT	-	A	0	-	A	0
Spruce Hill Rd / Site Access	EBL	-	A	0	0.00	A	0
	EBT	-	A	0	-	A	0
	SBL	-	A	0	0.01	A	0

PM Peak Hour (Short Term)

Intersection (EW Street / NS Street)	Movement	Existing			Opening Day		
		v/c	LOS	Delay (s)	v/c	LOS	Delay (s)
Highway 16 / RR 13	NBLTR	0.06	B	11.6	0.07	B	12.0
	EBL	0.00	A	9.6	0.00	A	9.8
	EBT	-	A	0	-	A	0.0
	WBL	0.02	A	9.5	0.02	A	9.7
	WBT	-	A	0.1	-	A	0.2
	SBLTR	0.14	C	19.8	0.15	C	21.6
Highway 16 / RR 14	NBLTR	0.20	B	14.4	0.22	C	15.5
	EBL	0.03	A	9.6	0.03	A	9.9
	WBL	0.01	A	8.8	0.01	A	9.0
	SBLTR	0.22	C	18.4	0.23	C	19.8
Spruce Hill Rd / RR 13	NBL	0.00	A	7.3	0.00	A	7.3
	NBT	-	A	0	-	A	0.0
	EBLR	0.04	A	8.7	0.05	A	8.8
Spruce Hill Rd / RR 14	WBLR	0.09	A	8.7	0.09	A	8.7
	SBL	0.02	A	7.3	0.02	A	7.3
	SBT	-	A	0	-	A	0.0
Spruce Hill Rd / Site Access	EBL	-	A	0	0.00	A	7.3
	EBT	-	-	-	-	A	0.0
	SBL	-	A	0	0.01	A	8.7

PM Peak Hour (Long Term)

Intersection (EW Street / NS Street)	Movement	Opening Day + 20 BG			Opening Day + 20		
		v/c	LOS	Delay (s)	v/c	LOS	Delay (s)
Highway 16 / RR 13	NBLTR	0.11	B	14.3	0.13	B	14.4
	EBL	0.01	B	11.5	0.01	B	11.5
	EBT	-	A	0.1	-	A	0.1
	WBL	0.04	B	11.3	0.04	B	11.3
	WBT	-	A	0.6	-	A	0.7
	SBLTR	0.36	E	40.6	0.36	**E**	41.0
Highway 16 / RR 14	NBLTR	0.44	D	25.1	0.46	D	26.0
	EBL	0.06	B	11.7	0.06	B	11.7
	WBL	0.03	B	10	0.03	B	10.0
	SBLTR	0.54	E	41.9	0.54	**E**	41.9
Spruce Hill Rd / RR 13	NBL	0.00	A	7.3	0.01	A	7.3
	NBT	-	A	0	-	A	0.0
	EBLR	0.04	A	8.7	0.06	A	8.9
Spruce Hill Rd / RR 14	WBLR	0.09	A	8.7	0.14	A	9.0
	SBL	0.02	A	7.3	0.03	A	7.3
	SBT	-	A	0	-	A	0.0
Spruce Hill Rd / Site Access	EBL	-	A	0	0.00	A	7.3
	EBT	-	-	-	-	A	0.0
	SBL	-	A	0	0.01	A	8.8

APPENDIX C: TRAFFIC ANALYSIS SYNCHRO OUTPUTS

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	633	3	30	856	26	0	0	20	16	0	1
Future Vol, veh/h	1	633	3	30	856	26	0	0	20	16	0	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	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	688	3	33	930	28	0	0	22	17	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	958	0	0	691	0	0	1223	1716	346	1356	1703	479
Stage 1	-	-	-	-	-	-	692	692	-	1010	1010	-
Stage 2	-	-	-	-	-	-	531	1024	-	346	693	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	714	-	-	900	-	-	135	89	650	108	91	533
Stage 1	-	-	-	-	-	-	400	443	-	257	316	-
Stage 2	-	-	-	-	-	-	500	311	-	643	443	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	714	-	-	900	-	-	126	82	650	98	84	533
Mov Cap-2 Maneuver	-	-	-	-	-	-	309	238	-	232	237	-
Stage 1	-	-	-	-	-	-	399	442	-	256	291	-
Stage 2	-	-	-	-	-	-	460	286	-	620	442	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.6	10.7	21.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	650	714	-	-	900	-	-	240
HCM Lane V/C Ratio	0.033	0.002	-	-	0.036	-	-	0.077
HCM Control Delay (s)	10.7	10.1	0	-	9.2	0.3	-	21.2
HCM Lane LOS	B	B	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	641	37	75	560	128	11	19	11	26	9	34
Future Vol, veh/h	31	641	37	75	560	128	11	19	11	26	9	34
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	300	-	400	300	-	300	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	697	40	82	609	139	12	21	12	28	10	37

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	748	0	0	737	0	0	1239	1677	349	1200	1578	305
Stage 1	-	-	-	-	-	-	765	765	-	773	773	-
Stage 2	-	-	-	-	-	-	474	912	-	427	805	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	856	-	-	865	-	-	132	94	647	141	108	691
Stage 1	-	-	-	-	-	-	362	410	-	358	407	-
Stage 2	-	-	-	-	-	-	540	351	-	576	393	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	856	-	-	865	-	-	109	82	647	116	94	691
Mov Cap-2 Maneuver	-	-	-	-	-	-	273	231	-	276	235	-
Stage 1	-	-	-	-	-	-	348	394	-	344	368	-
Stage 2	-	-	-	-	-	-	450	318	-	514	377	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.9	19.4	16.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	294	856	-	-	865	-	-	380
HCM Lane V/C Ratio	0.152	0.039	-	-	0.094	-	-	0.197
HCM Control Delay (s)	19.4	9.4	-	-	9.6	-	-	16.8
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0.3	-	-	0.7

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	19	5	5	1	3	30
Future Vol, veh/h	19	5	5	1	3	30
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	5	5	1	3	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	31	20	36	0	-	0
Stage 1	20	-	-	-	-	-
Stage 2	11	-	-	-	-	-
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	983	1058	1575	-	-	-
Stage 1	1003	-	-	-	-	-
Stage 2	1012	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	980	1058	1575	-	-	-
Mov Cap-2 Maneuver	980	-	-	-	-	-
Stage 1	1000	-	-	-	-	-
Stage 2	1012	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.7	6.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1575	-	995	-	-
HCM Lane V/C Ratio	0.003	-	0.026	-	-
HCM Control Delay (s)	7.3	0	8.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	6.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	39	2	5	109	12
Future Vol, veh/h	5	39	2	5	109	12
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	42	2	5	118	13

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	254	5	0	0	7	0
Stage 1	5	-	-	-	-	-
Stage 2	249	-	-	-	-	-
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	735	1078	-	-	1614	-
Stage 1	1018	-	-	-	-	-
Stage 2	792	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	681	1078	-	-	1614	-
Mov Cap-2 Maneuver	681	-	-	-	-	-
Stage 1	1018	-	-	-	-	-
Stage 2	733	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	6.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1011	1614	-
HCM Lane V/C Ratio	-	-	0.047	0.073	-
HCM Control Delay (s)	-	-	8.7	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	24	35	0	0	0
Future Vol, veh/h	0	24	35	0	0	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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	26	38	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	38	0	-	0	64	38
Stage 1	-	-	-	-	38	-
Stage 2	-	-	-	-	26	-
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	1572	-	-	-	942	1034
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	997	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1572	-	-	-	942	1034
Mov Cap-2 Maneuver	-	-	-	-	942	-
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	997	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1572	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	729	2	13	746	29	1	0	30	34	0	1
Future Vol, veh/h	2	729	2	13	746	29	1	0	30	34	0	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	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	792	2	14	811	32	1	0	33	37	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	843	0	0	794	0	0	1231	1668	397	1255	1653	422
Stage 1	-	-	-	-	-	-	797	797	-	855	855	-
Stage 2	-	-	-	-	-	-	434	871	-	400	798	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	789	-	-	823	-	-	134	95	602	128	97	580
Stage 1	-	-	-	-	-	-	346	397	-	319	373	-
Stage 2	-	-	-	-	-	-	570	367	-	597	396	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	789	-	-	823	-	-	130	91	602	118	93	580
Mov Cap-2 Maneuver	-	-	-	-	-	-	297	264	-	277	264	-
Stage 1	-	-	-	-	-	-	344	395	-	317	361	-
Stage 2	-	-	-	-	-	-	551	355	-	562	394	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	11.6	19.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	583	789	-	-	823	-	-	281
HCM Lane V/C Ratio	0.058	0.003	-	-	0.017	-	-	0.135
HCM Control Delay (s)	11.6	9.6	0	-	9.5	0.1	-	19.8
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.5

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	563	13	12	716	38	23	10	53	38	10	20
Future Vol, veh/h	20	563	13	12	716	38	23	10	53	38	10	20
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	300	-	400	300	-	300	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	612	14	13	778	41	25	11	58	41	11	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	819	0	0	626	0	0	1077	1501	306	1160	1474	389
Stage 1	-	-	-	-	-	-	656	656	-	804	804	-
Stage 2	-	-	-	-	-	-	421	845	-	356	670	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	805	-	-	952	-	-	173	121	690	151	125	610
Stage 1	-	-	-	-	-	-	421	460	-	343	394	-
Stage 2	-	-	-	-	-	-	581	377	-	634	454	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	805	-	-	952	-	-	157	116	690	130	120	610
Mov Cap-2 Maneuver	-	-	-	-	-	-	335	282	-	289	295	-
Stage 1	-	-	-	-	-	-	410	448	-	334	388	-
Stage 2	-	-	-	-	-	-	537	372	-	551	442	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	14.4	18.4
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	475	805	-	-	952	-	-	343
HCM Lane V/C Ratio	0.197	0.027	-	-	0.014	-	-	0.215
HCM Control Delay (s)	14.4	9.6	-	-	8.8	-	-	18.4
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	29	5	5	2	2	13
Future Vol, veh/h	29	5	5	2	2	13
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	5	5	2	2	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	21	9	16	0	-	0
Stage 1	9	-	-	-	-	-
Stage 2	12	-	-	-	-	-
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	996	1073	1602	-	-	-
Stage 1	1014	-	-	-	-	-
Stage 2	1011	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	993	1073	1602	-	-	-
Mov Cap-2 Maneuver	993	-	-	-	-	-
Stage 1	1011	-	-	-	-	-
Stage 2	1011	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.7	5.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1602	-	1004	-	-
HCM Lane V/C Ratio	0.003	-	0.037	-	-
HCM Control Delay (s)	7.3	0	8.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	7.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	82	4	5	31	4
Future Vol, veh/h	5	82	4	5	31	4
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	89	4	5	34	4

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	79	7	0	0	9	0
Stage 1	7	-	-	-	-	-
Stage 2	72	-	-	-	-	-
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	924	1075	-	-	1611	-
Stage 1	1016	-	-	-	-	-
Stage 2	951	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	905	1075	-	-	1611	-
Mov Cap-2 Maneuver	905	-	-	-	-	-
Stage 1	1016	-	-	-	-	-
Stage 2	931	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	6.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1064	1611	-
HCM Lane V/C Ratio	-	-	0.089	0.021	-
HCM Control Delay (s)	-	-	8.7	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	34	18	0	0	0
Future Vol, veh/h	0	34	18	0	0	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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	37	20	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	20	0	-	0	57	20
Stage 1	-	-	-	-	20	-
Stage 2	-	-	-	-	37	-
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	1596	-	-	-	950	1058
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	985	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1596	-	-	-	950	1058
Mov Cap-2 Maneuver	-	-	-	-	950	-
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	985	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1596	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	684	3	38	924	26	0	0	23	16	0	1
Future Vol, veh/h	1	684	3	38	924	26	0	0	23	16	0	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	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	743	3	41	1004	28	0	0	25	17	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1032	0	0	746	0	0	1331	1861	373	1474	1848	516
Stage 1	-	-	-	-	-	-	747	747	-	1100	1100	-
Stage 2	-	-	-	-	-	-	584	1114	-	374	748	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	669	-	-	858	-	-	113	72	624	88	74	504
Stage 1	-	-	-	-	-	-	371	418	-	226	286	-
Stage 2	-	-	-	-	-	-	465	282	-	619	418	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	669	-	-	858	-	-	103	64	624	77	65	504
Mov Cap-2 Maneuver	-	-	-	-	-	-	278	210	-	204	208	-
Stage 1	-	-	-	-	-	-	370	417	-	225	254	-
Stage 2	-	-	-	-	-	-	412	250	-	592	417	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.8	11	23.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	624	669	-	-	858	-	-	211
HCM Lane V/C Ratio	0.04	0.002	-	-	0.048	-	-	0.088
HCM Control Delay (s)	11	10.4	0	-	9.4	0.5	-	23.7
HCM Lane LOS	B	B	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0.2	-	-	0.3

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	692	40	75	605	128	12	19	11	26	10	34
Future Vol, veh/h	31	692	40	75	605	128	12	19	11	26	10	34
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	300	-	400	300	-	300	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	752	43	82	658	139	13	21	12	28	11	37

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	797	0	0	795	0	0	1319	1781	376	1277	1685	329
Stage 1	-	-	-	-	-	-	820	820	-	822	822	-
Stage 2	-	-	-	-	-	-	499	961	-	455	863	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	821	-	-	822	-	-	115	81	622	123	93	667
Stage 1	-	-	-	-	-	-	335	387	-	334	386	-
Stage 2	-	-	-	-	-	-	522	333	-	554	370	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	821	-	-	822	-	-	94	70	622	100	80	667
Mov Cap-2 Maneuver	-	-	-	-	-	-	252	214	-	256	216	-
Stage 1	-	-	-	-	-	-	321	371	-	320	347	-
Stage 2	-	-	-	-	-	-	430	300	-	492	355	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.9	20.8	18
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	273	821	-	-	822	-	-	352
HCM Lane V/C Ratio	0.167	0.041	-	-	0.099	-	-	0.216
HCM Control Delay (s)	20.8	9.6	-	-	9.9	-	-	18
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0.3	-	-	0.8

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	5	5	1	3	38
Future Vol, veh/h	22	5	5	1	3	38
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	5	5	1	3	41

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	35	24	44	0	-	0
Stage 1	24	-	-	-	-	-
Stage 2	11	-	-	-	-	-
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	978	1052	1564	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	1012	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	975	1052	1564	-	-	-
Mov Cap-2 Maneuver	975	-	-	-	-	-
Stage 1	996	-	-	-	-	-
Stage 2	1012	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.8	6.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1564	-	988	-	-
HCM Lane V/C Ratio	0.003	-	0.03	-	-
HCM Control Delay (s)	7.3	0	8.8	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	6.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	40	2	6	113	12
Future Vol, veh/h	5	40	2	6	113	12
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	43	2	7	123	13

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	265	6	0	0	9	0
Stage 1	6	-	-	-	-	-
Stage 2	259	-	-	-	-	-
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	724	1077	-	-	1611	-
Stage 1	1017	-	-	-	-	-
Stage 2	784	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	668	1077	-	-	1611	-
Mov Cap-2 Maneuver	668	-	-	-	-	-
Stage 1	1017	-	-	-	-	-
Stage 2	724	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	6.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1008	1611	-
HCM Lane V/C Ratio	-	-	0.049	0.076	-
HCM Control Delay (s)	-	-	8.8	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.2	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	24	35	8	3	1
Future Vol, veh/h	5	24	35	8	3	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	26	38	9	3	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	47	0	-	0	79	43
Stage 1	-	-	-	-	43	-
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	1560	-	-	-	924	1027
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	986	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1560	-	-	-	921	1027
Mov Cap-2 Maneuver	-	-	-	-	921	-
Stage 1	-	-	-	-	976	-
Stage 2	-	-	-	-	986	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1560	-	-	-	945
HCM Lane V/C Ratio	0.003	-	-	-	0.005
HCM Control Delay (s)	7.3	0	-	-	8.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	787	2	15	806	29	1	0	37	34	0	1
Future Vol, veh/h	2	787	2	15	806	29	1	0	37	34	0	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	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	855	2	16	876	32	1	0	40	37	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	908	0	0	857	0	0	1330	1800	429	1356	1785	454
Stage 1	-	-	-	-	-	-	860	860	-	924	924	-
Stage 2	-	-	-	-	-	-	470	940	-	432	861	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	745	-	-	779	-	-	113	79	574	108	81	553
Stage 1	-	-	-	-	-	-	317	371	-	290	346	-
Stage 2	-	-	-	-	-	-	543	340	-	572	371	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	745	-	-	779	-	-	109	75	574	97	77	553
Mov Cap-2 Maneuver	-	-	-	-	-	-	271	241	-	251	240	-
Stage 1	-	-	-	-	-	-	315	369	-	289	331	-
Stage 2	-	-	-	-	-	-	519	326	-	529	369	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.4	12	21.6
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	558	745	-	-	779	-	-	255
HCM Lane V/C Ratio	0.074	0.003	-	-	0.021	-	-	0.149
HCM Control Delay (s)	12	9.8	0	-	9.7	0.2	-	21.6
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.5

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	608	14	12	773	38	25	11	53	38	10	20
Future Vol, veh/h	20	608	14	12	773	38	25	11	53	38	10	20
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	300	-	400	300	-	300	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	661	15	13	840	41	27	12	58	41	11	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	881	0	0	676	0	0	1157	1612	331	1247	1586	420
Stage 1	-	-	-	-	-	-	705	705	-	866	866	-
Stage 2	-	-	-	-	-	-	452	907	-	381	720	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	763	-	-	911	-	-	151	103	665	130	107	582
Stage 1	-	-	-	-	-	-	393	437	-	314	369	-
Stage 2	-	-	-	-	-	-	557	353	-	613	430	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	763	-	-	911	-	-	136	99	665	111	102	582
Mov Cap-2 Maneuver	-	-	-	-	-	-	311	261	-	265	274	-
Stage 1	-	-	-	-	-	-	382	424	-	305	364	-
Stage 2	-	-	-	-	-	-	513	348	-	528	418	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	15.5	19.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	440	763	-	-	911	-	-	317
HCM Lane V/C Ratio	0.22	0.028	-	-	0.014	-	-	0.233
HCM Control Delay (s)	15.5	9.9	-	-	9	-	-	19.8
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.8	0.1	-	-	0	-	-	0.9

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	36	5	5	2	2	15
Future Vol, veh/h	36	5	5	2	2	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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	5	5	2	2	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	22	10	18	0	-	0
Stage 1	10	-	-	-	-	-
Stage 2	12	-	-	-	-	-
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	995	1071	1599	-	-	-
Stage 1	1013	-	-	-	-	-
Stage 2	1011	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	992	1071	1599	-	-	-
Mov Cap-2 Maneuver	992	-	-	-	-	-
Stage 1	1010	-	-	-	-	-
Stage 2	1011	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.8	5.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1599	-	1001	-	-
HCM Lane V/C Ratio	0.003	-	0.045	-	-
HCM Control Delay (s)	7.3	0	8.8	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	7.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	6	85	4	5	32	4
Future Vol, veh/h	6	85	4	5	32	4
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	92	4	5	35	4

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	81	7	0	0	9	0
Stage 1	7	-	-	-	-	-
Stage 2	74	-	-	-	-	-
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	921	1075	-	-	1611	-
Stage 1	1016	-	-	-	-	-
Stage 2	949	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	901	1075	-	-	1611	-
Mov Cap-2 Maneuver	901	-	-	-	-	-
Stage 1	1016	-	-	-	-	-
Stage 2	928	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	6.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1061	1611	-
HCM Lane V/C Ratio	-	-	0.093	0.022	-
HCM Control Delay (s)	-	-	8.7	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	34	18	2	7	4
Future Vol, veh/h	1	34	18	2	7	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	37	20	2	8	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	22	0	-	0	60	21
Stage 1	-	-	-	-	21	-
Stage 2	-	-	-	-	39	-
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	1593	-	-	-	947	1056
Stage 1	-	-	-	-	1002	-
Stage 2	-	-	-	-	983	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1593	-	-	-	946	1056
Mov Cap-2 Maneuver	-	-	-	-	946	-
Stage 1	-	-	-	-	1001	-
Stage 2	-	-	-	-	983	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1593	-	-	-	983
HCM Lane V/C Ratio	0.001	-	-	-	0.012
HCM Control Delay (s)	7.3	0	-	-	8.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	937	4	44	1267	38	0	0	30	24	0	1
Future Vol, veh/h	1	937	4	44	1267	38	0	0	30	24	0	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	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1018	4	48	1377	41	0	0	33	26	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1418	0	0	1022	0	0	1807	2536	511	2005	2518	709
Stage 1	-	-	-	-	-	-	1022	1022	-	1494	1494	-
Stage 2	-	-	-	-	-	-	785	1514	-	511	1024	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	476	-	-	675	-	-	50	27	508	35	28	377
Stage 1	-	-	-	-	-	-	253	312	-	129	185	-
Stage 2	-	-	-	-	-	-	352	181	-	514	311	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	476	-	-	675	-	-	36	18	508	~ 24	18	377
Mov Cap-2 Maneuver	-	-	-	-	-	-	163	104	-	117	105	-
Stage 1	-	-	-	-	-	-	252	310	-	128	122	-
Stage 2	-	-	-	-	-	-	231	119	-	479	309	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1.9	12.6	43.6
HCM LOS			B	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	508	476	-	-	675	-	-	120
HCM Lane V/C Ratio	0.064	0.002	-	-	0.071	-	-	0.226
HCM Control Delay (s)	12.6	12.6	0	-	10.7	1.7	-	43.6
HCM Lane LOS	B	B	A	-	B	A	-	E
HCM 95th %tile Q(veh)	0.2	0	-	-	0.2	-	-	0.8

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	949	37	111	829	189	16	28	16	38	13	50
Future Vol, veh/h	46	949	37	111	829	189	16	28	16	38	13	50
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	300	-	400	300	-	300	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	1032	40	121	901	205	17	30	17	41	14	54

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1106	0	0	1072	0	0	1832	2480	516	1774	2315	451
Stage 1	-	-	-	-	-	-	1132	1132	-	1143	1143	-
Stage 2	-	-	-	-	-	-	700	1348	-	631	1172	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	627	-	-	646	-	-	47	~ 29	504	52	37	556
Stage 1	-	-	-	-	-	-	216	276	-	213	273	-
Stage 2	-	-	-	-	-	-	396	218	-	436	264	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	627	-	-	646	-	-	31	~ 22	504	~ 32	28	556
Mov Cap-2 Maneuver	-	-	-	-	-	-	142	108	-	141	104	-
Stage 1	-	-	-	-	-	-	199	254	-	196	222	-
Stage 2	-	-	-	-	-	-	272	177	-	341	243	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	1.2	46.7	40.2
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	149	627	-	-	646	-	-	208
HCM Lane V/C Ratio	0.438	0.08	-	-	0.187	-	-	0.528
HCM Control Delay (s)	46.7	11.2	-	-	11.8	-	-	40.2
HCM Lane LOS	E	B	-	-	B	-	-	E
HCM 95th %tile Q(veh)	2	0.3	-	-	0.7	-	-	2.7

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	19	5	5	1	3	30
Future Vol, veh/h	19	5	5	1	3	30
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	5	5	1	3	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	31	20	36	0	-	0
Stage 1	20	-	-	-	-	-
Stage 2	11	-	-	-	-	-
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	983	1058	1575	-	-	-
Stage 1	1003	-	-	-	-	-
Stage 2	1012	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	980	1058	1575	-	-	-
Mov Cap-2 Maneuver	980	-	-	-	-	-
Stage 1	1000	-	-	-	-	-
Stage 2	1012	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.7	6.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1575	-	995	-	-
HCM Lane V/C Ratio	0.003	-	0.026	-	-
HCM Control Delay (s)	7.3	0	8.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	6.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	39	2	5	109	12
Future Vol, veh/h	5	39	2	5	109	12
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	42	2	5	118	13

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	254	5	0	0	7	0
Stage 1	5	-	-	-	-	-
Stage 2	249	-	-	-	-	-
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	735	1078	-	-	1614	-
Stage 1	1018	-	-	-	-	-
Stage 2	792	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	681	1078	-	-	1614	-
Mov Cap-2 Maneuver	681	-	-	-	-	-
Stage 1	1018	-	-	-	-	-
Stage 2	733	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	6.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1011	1614	-
HCM Lane V/C Ratio	-	-	0.047	0.073	-
HCM Control Delay (s)	-	-	8.7	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	24	35	0	0	0
Future Vol, veh/h	0	24	35	0	0	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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	26	38	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	38	0	-	0	64	38
Stage 1	-	-	-	-	38	-
Stage 2	-	-	-	-	26	-
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	1572	-	-	-	942	1034
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	997	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1572	-	-	-	942	1034
Mov Cap-2 Maneuver	-	-	-	-	942	-
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	997	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1572	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	1079	3	19	1104	43	1	0	44	50	0	1
Future Vol, veh/h	3	1079	3	19	1104	43	1	0	44	50	0	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	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	1173	3	21	1200	47	1	0	48	54	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1247	0	0	1176	0	0	1823	2470	588	1859	2448	624
Stage 1	-	-	-	-	-	-	1181	1181	-	1266	1266	-
Stage 2	-	-	-	-	-	-	642	1289	-	593	1182	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	554	-	-	590	-	-	48	30	452	~ 45	31	428
Stage 1	-	-	-	-	-	-	202	262	-	179	238	-
Stage 2	-	-	-	-	-	-	429	232	-	459	262	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	554	-	-	590	-	-	43	26	452	~ 36	27	428
Mov Cap-2 Maneuver	-	-	-	-	-	-	169	151	-	153	149	-
Stage 1	-	-	-	-	-	-	199	258	-	176	210	-
Stage 2	-	-	-	-	-	-	377	205	-	404	258	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.8	14.3	40.6
HCM LOS			B	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	436	554	-	-	590	-	-	155
HCM Lane V/C Ratio	0.112	0.006	-	-	0.035	-	-	0.358
HCM Control Delay (s)	14.3	11.5	0.1	-	11.3	0.6	-	40.6
HCM Lane LOS	B	B	A	-	B	A	-	E
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	1.5

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	833	19	18	1060	56	34	15	78	56	15	30
Future Vol, veh/h	30	833	19	18	1060	56	34	15	78	56	15	30
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	300	-	400	300	-	300	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	905	21	20	1152	61	37	16	85	61	16	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1213	0	0	926	0	0	1595	2224	453	1719	2184	576
Stage 1	-	-	-	-	-	-	971	971	-	1192	1192	-
Stage 2	-	-	-	-	-	-	624	1253	-	527	992	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	571	-	-	734	-	-	72	43	554	~ 58	45	460
Stage 1	-	-	-	-	-	-	271	329	-	199	259	-
Stage 2	-	-	-	-	-	-	440	242	-	502	322	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	571	-	-	734	-	-	58	39	554	~ 43	41	460
Mov Cap-2 Maneuver	-	-	-	-	-	-	200	163	-	160	181	-
Stage 1	-	-	-	-	-	-	255	310	-	187	252	-
Stage 2	-	-	-	-	-	-	372	235	-	380	303	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.2	25.1	41.9
HCM LOS			D	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	315	571	-	-	734	-	-	203
HCM Lane V/C Ratio	0.438	0.057	-	-	0.027	-	-	0.541
HCM Control Delay (s)	25.1	11.7	-	-	10	-	-	41.9
HCM Lane LOS	D	B	-	-	B	-	-	E
HCM 95th %tile Q(veh)	2.1	0.2	-	-	0.1	-	-	2.8

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	29	5	5	2	2	13
Future Vol, veh/h	29	5	5	2	2	13
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	5	5	2	2	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	21	9	16	0	-	0
Stage 1	9	-	-	-	-	-
Stage 2	12	-	-	-	-	-
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	996	1073	1602	-	-	-
Stage 1	1014	-	-	-	-	-
Stage 2	1011	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	993	1073	1602	-	-	-
Mov Cap-2 Maneuver	993	-	-	-	-	-
Stage 1	1011	-	-	-	-	-
Stage 2	1011	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.7	5.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1602	-	1004	-	-
HCM Lane V/C Ratio	0.003	-	0.037	-	-
HCM Control Delay (s)	7.3	0	8.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	7.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	82	4	5	31	4
Future Vol, veh/h	5	82	4	5	31	4
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	89	4	5	34	4

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	79	7	0	0	9	0
Stage 1	7	-	-	-	-	-
Stage 2	72	-	-	-	-	-
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	924	1075	-	-	1611	-
Stage 1	1016	-	-	-	-	-
Stage 2	951	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	905	1075	-	-	1611	-
Mov Cap-2 Maneuver	905	-	-	-	-	-
Stage 1	1016	-	-	-	-	-
Stage 2	931	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	6.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1064	1611	-
HCM Lane V/C Ratio	-	-	0.089	0.021	-
HCM Control Delay (s)	-	-	8.7	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	34	18	0	0	0
Future Vol, veh/h	0	34	18	0	0	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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	37	20	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	20	0	-	0	57	20
Stage 1	-	-	-	-	20	-
Stage 2	-	-	-	-	37	-
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	1596	-	-	-	950	1058
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	985	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1596	-	-	-	950	1058
Mov Cap-2 Maneuver	-	-	-	-	950	-
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	985	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1596	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	937	4	52	1267	38	0	0	33	24	0	1
Future Vol, veh/h	1	937	4	52	1267	38	0	0	33	24	0	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	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1018	4	57	1377	41	0	0	36	26	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1418	0	0	1022	0	0	1825	2554	511	2023	2536	709
Stage 1	-	-	-	-	-	-	1022	1022	-	1512	1512	-
Stage 2	-	-	-	-	-	-	803	1532	-	511	1024	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	476	-	-	675	-	-	48	26	508	34	27	377
Stage 1	-	-	-	-	-	-	253	312	-	126	181	-
Stage 2	-	-	-	-	-	-	343	177	-	514	311	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	476	-	-	675	-	-	33	15	508	~ 21	16	377
Mov Cap-2 Maneuver	-	-	-	-	-	-	151	93	-	114	93	-
Stage 1	-	-	-	-	-	-	252	310	-	125	107	-
Stage 2	-	-	-	-	-	-	203	105	-	475	309	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.3	12.6	44.8
HCM LOS			B	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	508	476	-	-	675	-	-	117
HCM Lane V/C Ratio	0.071	0.002	-	-	0.084	-	-	0.232
HCM Control Delay (s)	12.6	12.6	0	-	10.8	2	-	44.8
HCM Lane LOS	B	B	A	-	B	A	-	E
HCM 95th %tile Q(veh)	0.2	0	-	-	0.3	-	-	0.8

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	949	40	111	829	189	17	28	16	38	14	50
Future Vol, veh/h	46	949	40	111	829	189	17	28	16	38	14	50
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	300	-	400	300	-	300	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	1032	43	121	901	205	18	30	17	41	15	54

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1106	0	0	1075	0	0	1832	2480	516	1774	2318	451
Stage 1	-	-	-	-	-	-	1132	1132	-	1143	1143	-
Stage 2	-	-	-	-	-	-	700	1348	-	631	1175	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	627	-	-	644	-	-	47	~ 29	504	52	37	556
Stage 1	-	-	-	-	-	-	216	276	-	213	273	-
Stage 2	-	-	-	-	-	-	396	218	-	436	264	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	627	-	-	644	-	-	30	~ 22	504	~ 32	28	556
Mov Cap-2 Maneuver	-	-	-	-	-	-	142	108	-	141	104	-
Stage 1	-	-	-	-	-	-	199	254	-	196	222	-
Stage 2	-	-	-	-	-	-	270	177	-	341	243	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	1.2	47.2	41.2
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	149	627	-	-	644	-	-	206
HCM Lane V/C Ratio	0.445	0.08	-	-	0.187	-	-	0.538
HCM Control Delay (s)	47.2	11.2	-	-	11.9	-	-	41.2
HCM Lane LOS	E	B	-	-	B	-	-	E
HCM 95th %tile Q(veh)	2	0.3	-	-	0.7	-	-	2.8

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	31	7	7	1	4	52
Future Vol, veh/h	31	7	7	1	4	52
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	8	8	1	4	57

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	50	33	61	0	-	0
Stage 1	33	-	-	-	-	-
Stage 2	17	-	-	-	-	-
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	959	1041	1542	-	-	-
Stage 1	989	-	-	-	-	-
Stage 2	1006	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	954	1041	1542	-	-	-
Mov Cap-2 Maneuver	954	-	-	-	-	-
Stage 1	984	-	-	-	-	-
Stage 2	1006	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	6.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1542	-	969	-	-
HCM Lane V/C Ratio	0.005	-	0.043	-	-
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	7.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	59	3	8	165	18
Future Vol, veh/h	7	59	3	8	165	18
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	64	3	9	179	20

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	386	8	0	0	12	0
Stage 1	8	-	-	-	-	-
Stage 2	378	-	-	-	-	-
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	617	1074	-	-	1607	-
Stage 1	1015	-	-	-	-	-
Stage 2	693	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	547	1074	-	-	1607	-
Mov Cap-2 Maneuver	547	-	-	-	-	-
Stage 1	1015	-	-	-	-	-
Stage 2	615	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	6.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	974	1607	-
HCM Lane V/C Ratio	-	-	0.074	0.112	-
HCM Control Delay (s)	-	-	9	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.4	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	36	52	8	3	1
Future Vol, veh/h	5	36	52	8	3	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	39	57	9	3	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	66	0	-	0	111	62
Stage 1	-	-	-	-	62	-
Stage 2	-	-	-	-	49	-
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	1536	-	-	-	886	1003
Stage 1	-	-	-	-	961	-
Stage 2	-	-	-	-	973	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1536	-	-	-	883	1003
Mov Cap-2 Maneuver	-	-	-	-	883	-
Stage 1	-	-	-	-	958	-
Stage 2	-	-	-	-	973	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1536	-	-	-	910
HCM Lane V/C Ratio	0.004	-	-	-	0.005
HCM Control Delay (s)	7.4	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱			↑↑↱			↱			↱	
Traffic Vol, veh/h	3	1079	3	21	1104	43	1	0	51	50	0	1
Future Vol, veh/h	3	1079	3	21	1104	43	1	0	51	50	0	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	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	1173	3	23	1200	47	1	0	55	54	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1247	0	0	1176	0	0	1827	2474	588	1863	2452	624
Stage 1	-	-	-	-	-	-	1181	1181	-	1270	1270	-
Stage 2	-	-	-	-	-	-	646	1293	-	593	1182	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	554	-	-	590	-	-	48	29	452	~ 45	30	428
Stage 1	-	-	-	-	-	-	202	262	-	178	237	-
Stage 2	-	-	-	-	-	-	427	231	-	459	262	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	554	-	-	590	-	-	43	25	452	~ 35	26	428
Mov Cap-2 Maneuver	-	-	-	-	-	-	169	148	-	152	147	-
Stage 1	-	-	-	-	-	-	199	258	-	175	206	-
Stage 2	-	-	-	-	-	-	371	201	-	396	258	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.9	14.4	41
HCM LOS			B	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	438	554	-	-	590	-	-	154
HCM Lane V/C Ratio	0.129	0.006	-	-	0.039	-	-	0.36
HCM Control Delay (s)	14.4	11.5	0.1	-	11.3	0.7	-	41
HCM Lane LOS	B	B	A	-	B	A	-	E
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	1.5

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	833	20	18	1060	56	36	16	78	56	15	30
Future Vol, veh/h	30	833	20	18	1060	56	36	16	78	56	15	30
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	300	-	400	300	-	300	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	2	-	-	2	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	905	22	20	1152	61	39	17	85	61	16	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1213	0	0	927	0	0	1595	2224	453	1719	2185	576
Stage 1	-	-	-	-	-	-	971	971	-	1192	1192	-
Stage 2	-	-	-	-	-	-	624	1253	-	527	993	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	571	-	-	733	-	-	72	43	554	~ 58	45	460
Stage 1	-	-	-	-	-	-	271	329	-	199	259	-
Stage 2	-	-	-	-	-	-	440	242	-	502	322	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	571	-	-	733	-	-	58	39	554	~ 42	41	460
Mov Cap-2 Maneuver	-	-	-	-	-	-	200	163	-	160	181	-
Stage 1	-	-	-	-	-	-	255	310	-	187	252	-
Stage 2	-	-	-	-	-	-	372	235	-	378	303	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.2	26	41.9
HCM LOS			D	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	310	571	-	-	733	-	-	203
HCM Lane V/C Ratio	0.456	0.057	-	-	0.027	-	-	0.541
HCM Control Delay (s)	26	11.7	-	-	10	-	-	41.9
HCM Lane LOS	D	B	-	-	B	-	-	E
HCM 95th %tile Q(veh)	2.3	0.2	-	-	0.1	-	-	2.8

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	50	7	7	3	3	21
Future Vol, veh/h	50	7	7	3	3	21
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	8	8	3	3	23

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	34	15	26	0	-	0
Stage 1	15	-	-	-	-	-
Stage 2	19	-	-	-	-	-
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	979	1065	1588	-	-	-
Stage 1	1008	-	-	-	-	-
Stage 2	1004	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	974	1065	1588	-	-	-
Mov Cap-2 Maneuver	974	-	-	-	-	-
Stage 1	1003	-	-	-	-	-
Stage 2	1004	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	5.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1588	-	984	-	-
HCM Lane V/C Ratio	0.005	-	0.063	-	-
HCM Control Delay (s)	7.3	0	8.9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	7.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	124	6	7	47	6
Future Vol, veh/h	8	124	6	7	47	6
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	135	7	8	51	7

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	120	11	0	0	15	0
Stage 1	11	-	-	-	-	-
Stage 2	109	-	-	-	-	-
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	876	1070	-	-	1603	-
Stage 1	1012	-	-	-	-	-
Stage 2	916	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	848	1070	-	-	1603	-
Mov Cap-2 Maneuver	848	-	-	-	-	-
Stage 1	1012	-	-	-	-	-
Stage 2	887	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	6.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1053	1603	-
HCM Lane V/C Ratio	-	-	0.136	0.032	-
HCM Control Delay (s)	-	-	9	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	50	27	2	7	4
Future Vol, veh/h	1	50	27	2	7	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	54	29	2	8	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	31	0	-	0	86	30
Stage 1	-	-	-	-	30	-
Stage 2	-	-	-	-	56	-
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	-	-	-	915	1044
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	967	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1582	-	-	-	914	1044
Mov Cap-2 Maneuver	-	-	-	-	914	-
Stage 1	-	-	-	-	992	-
Stage 2	-	-	-	-	967	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1582	-	-	-	957
HCM Lane V/C Ratio	0.001	-	-	-	0.012
HCM Control Delay (s)	7.3	0	-	-	8.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

APPENDIX D: WARRANT CALCULATIONS

Alberta Transportation Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Highway 16	Direction (EW or NS)	EW
Side Street (name)	Range Road 14	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Enter Comments about the analysis here.

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Road Authority:	Alberta Transportation
City:	Lloydminster
Analysis Date:	2019 May 30, Thu
Count Date:	2017 Jun 20, 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 16	WB	1		2			1	1 000	2
Highway 16	EB	1		2			1	1 000	2
Range Road 14	NB				1				
Range Road 14	SB				1				
Are the Range Road 14 NB right turns significantly impeded by through movements? (y/n)							y		
Are the Range Road 14 SB right turns significantly impeded by through movements? (y/n)							y		

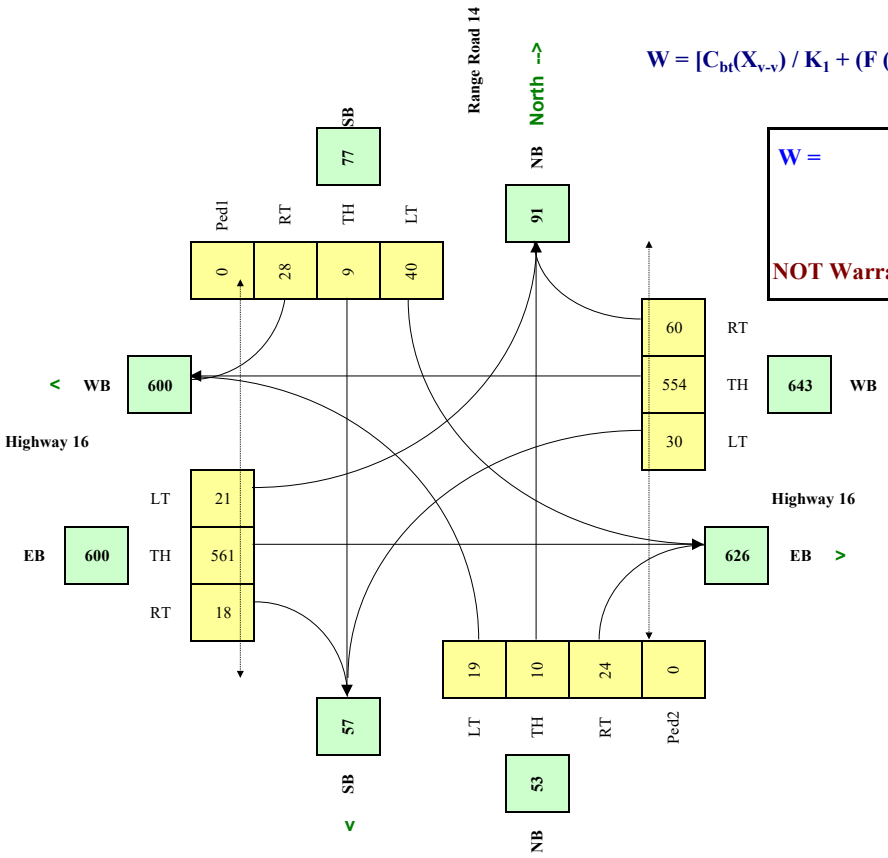
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	31 000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Highway 16	EW	80	10.0%	n	15.0
Range Road 14	NS		10.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods	13	14	11	20	6	30	52	545	109	23	649	31				
	17	13	13	29	13	29	20	441	50	21	574	11				
	21	1	55	40	3	14	36	502	65	20	548	19				
	18	5	5	30	2	16	33	507	51	16	503	16				
	21	15	48	55	13	31	24	617	40	27	544	19				
	22	12	11	68	18	46	13	710	43	18	550	12				
Total (6-hour peak)	112	60	143	242	55	166	178	3 322	358	125	3 368	108	0	0	0	0
Average (6-hour peak)	19	10	24	40	9	28	30	554	60	21	561	18	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 =	68	68	0
		Veh	*Ped*

NOT Warranted

RESET SHEET

Alberta Transportation Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Highway 16	Direction (EW or NS)	EW
Side Street (name)	Range Road 13	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Enter Comments about the analysis here.

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Road Authority:	Alberta Transportation
City:	Lloydminster
Analysis Date:	2019 May 30, Thu
Count Date:	2017 Jun 20, 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 16	WB		1			1		1 000	2
Highway 16	EB		1			1		1 000	2
Range Road 13	NB				1				
Range Road 13	SB				1				

Are the Range Road 13 NB right turns significantly impeded by through movements? (y/n) y

Are the Range Road 13 SB right turns significantly impeded by through movements? (y/n) y

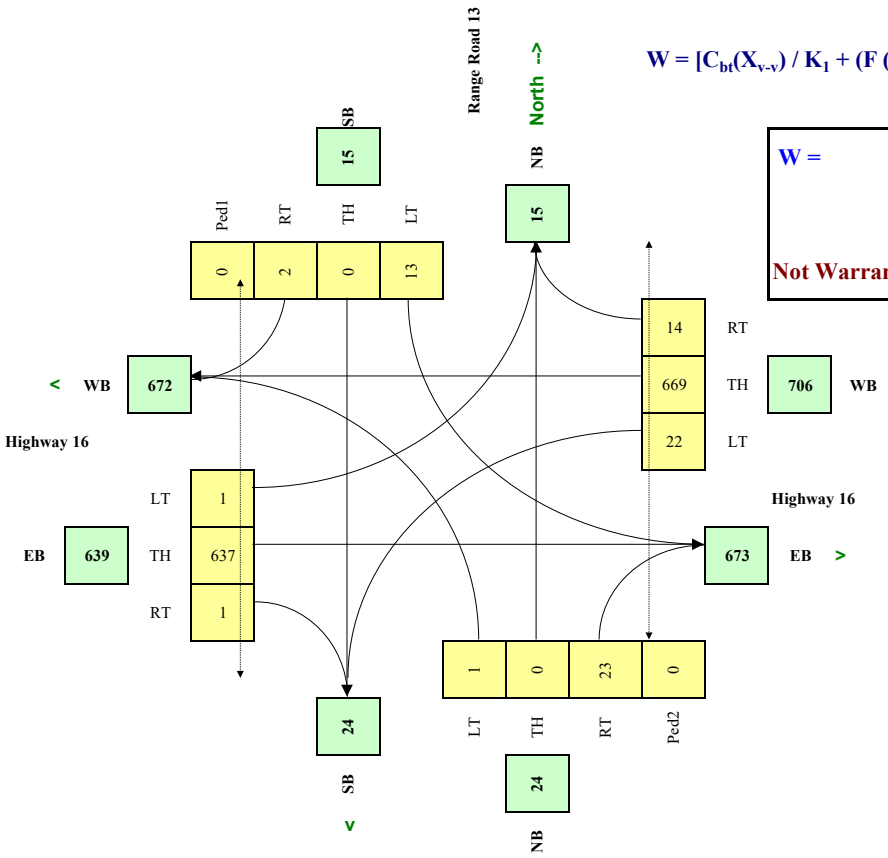
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	31 000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Highway 16	EW	80	10.0%	n	15.0
Range Road 13	NS		10.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods	0	0	18	9	0	1	27	845	16	1	636	2				
	0	0	19	8	0	3	28	610	12	0	554	1				
	2	0	21	4	1	1	21	566	6	0	670	2				
	2	0	21	12	0	1	23	570	10	0	564	0				
	2	1	31	23	1	4	21	699	21	2	712	1				
	0	0	26	23	0	0	13	725	21	2	687	2				
Total (6-hour peak)	6	1	136	79	2	10	133	4 015	86	5	3 823	8	0	0	0	0
Average (6-hour peak)	1	0	23	13	0	2	22	669	14	1	637	1	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 =	31	31	0
		Veh	*Ped*

Not Warranted - Vs<75

RESET SHEET

Alberta Transportation Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Highway 16	Direction (EW or NS)	EW	Road Authority:	Alberta Transportation
Side Street (name)	Range Road 14	Direction (EW or NS)	NS	City:	Lloydminster
Quadrant / Int #		Comments	2041 Background	Analysis Date:	2019 May 30, Thu
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	2017 Jun 20, 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 16	WB	1		2			1	1 000	2
Highway 16	EB	1		2			1	1 000	2
Range Road 14	NB				1				
Range Road 14	SB				1				
Are the Range Road 14 NB right turns significantly impeded by through movements? (y/n)							y		
Are the Range Road 14 SB right turns significantly impeded by through movements? (y/n)							y		

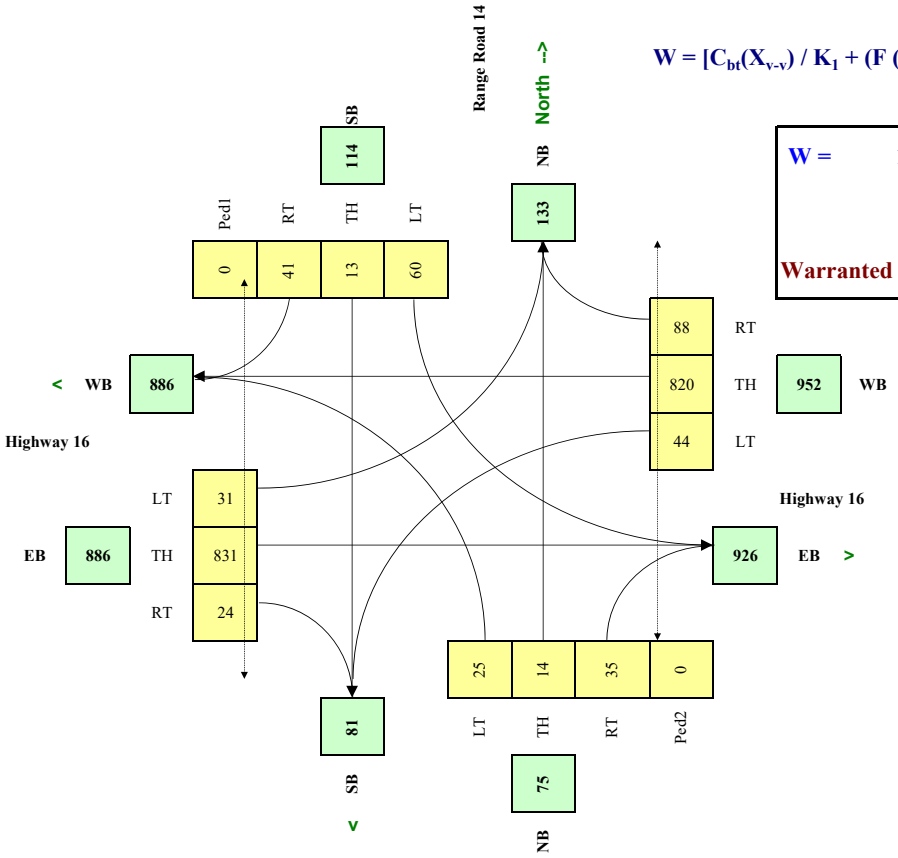
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	31 000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Highway 16	EW	80	10.0%	n	15.0
Range Road 14	NS		10.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods	18	21	16	30	7	44	77	807	161	34	961	41				
	24	19	19	43	18	43	30	653	74	31	850	13				
	28	1	81	59	4	21	53	743	96	30	811	25				
	24	7	7	44	3	24	49	750	75	24	744	21				
	28	21	71	81	19	46	36	913	59	40	805	27				
	30	16	16	101	27	68	19	1051	64	27	814	16				
Total (6-hour peak)	152	85	210	358	78	246	264	4 917	529	186	4 985	143	0	0	0	0
Average (6-hour peak)	25	14	35	60	13	41	44	820	88	31	831	24	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 =	147	147	0
		Veh	*Ped*

Warranted

RESET SHEET

Alberta Transportation Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Highway 16	Direction (EW or NS)	EW	Road Authority:	Alberta Transportation
Side Street (name)	Range Road 13	Direction (EW or NS)	NS	City:	Lloydminster
Quadrant / Int #		Comments	2041 Background	Analysis Date:	2019 May 30, Thu
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	2017 Jun 20, 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 16	WB		1			1		1 000	2
Highway 16	EB		1			1		1 000	2
Range Road 13	NB				1				
Range Road 13	SB				1				
Are the Range Road 13 NB right turns significantly impeded by through movements? (y/n)							y		
Are the Range Road 13 SB right turns significantly impeded by through movements? (y/n)							y		

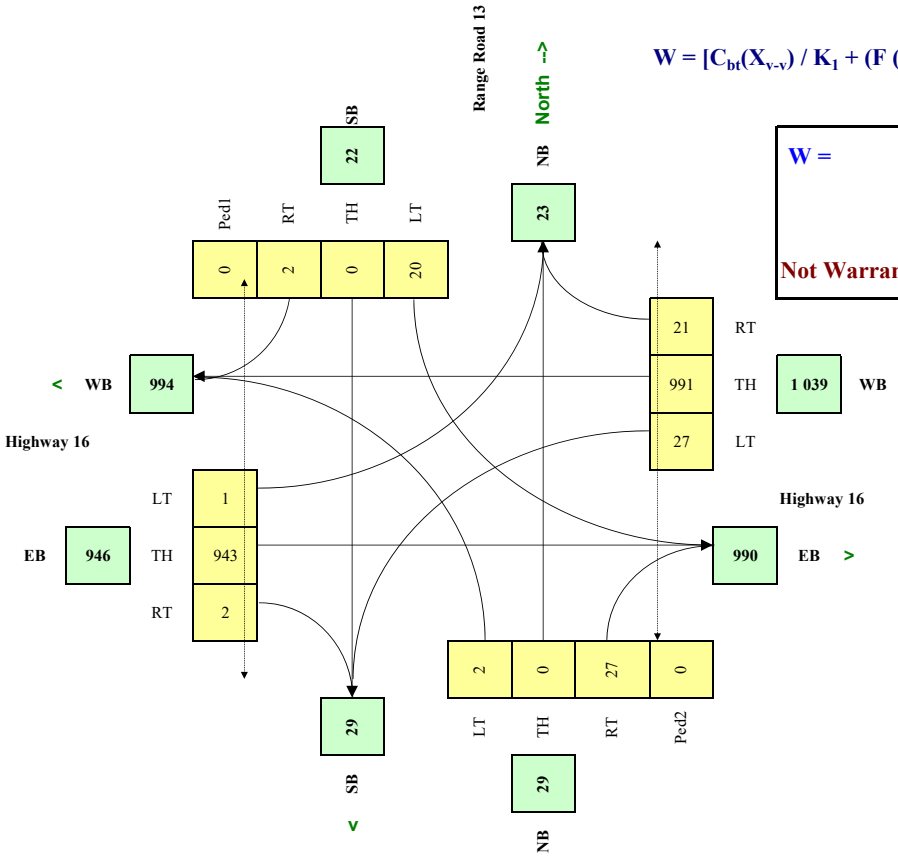
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	31 000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Highway 16	EW	80	10.0%	n	15.0
Range Road 13	NS		10.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods	0	0	22	13	0	1	28	1251	24	1	941	3				
	0	0	25	12	0	4	33	903	18	0	820	1				
	3	0	24	6	1	1	24	838	9	0	992	3				
	3	0	25	18	0	1	28	844	15	0	835	0				
	3	1	36	34	1	6	28	1035	31	3	1054	1				
	0	0	31	34	0	0	18	1073	31	3	1017	3				
Total (6-hour peak)	9	1	163	117	2	13	159	5 944	128	7	5 659	11	0	0	0	0
Average (6-hour peak)	2	0	27	20	0	2	27	991	21	1	943	2	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 =	57	57	0
		Veh	*Ped*

Not Warranted - Vs<75

RESET SHEET

Alberta Transportation Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Highway 16	Direction (EW or NS)	EW
Side Street (name)	Range Road 14	Direction (EW or NS)	NS
Quadrant / Int #		Comments	2041 Volmes

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Road Authority:	Alberta Transportation
City:	Lloydminster
Analysis Date:	2019 May 30, Thu
Count Date:	2017 Jun 20, 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 16	WB	1		2			1	1 000	2
Highway 16	EB	1		2			1	1 000	2
Range Road 14	NB				1				
Range Road 14	SB				1				

Are the Range Road 14 NB right turns significantly impeded by through movements? (y/n) y

Are the Range Road 14 SB right turns significantly impeded by through movements? (y/n) y

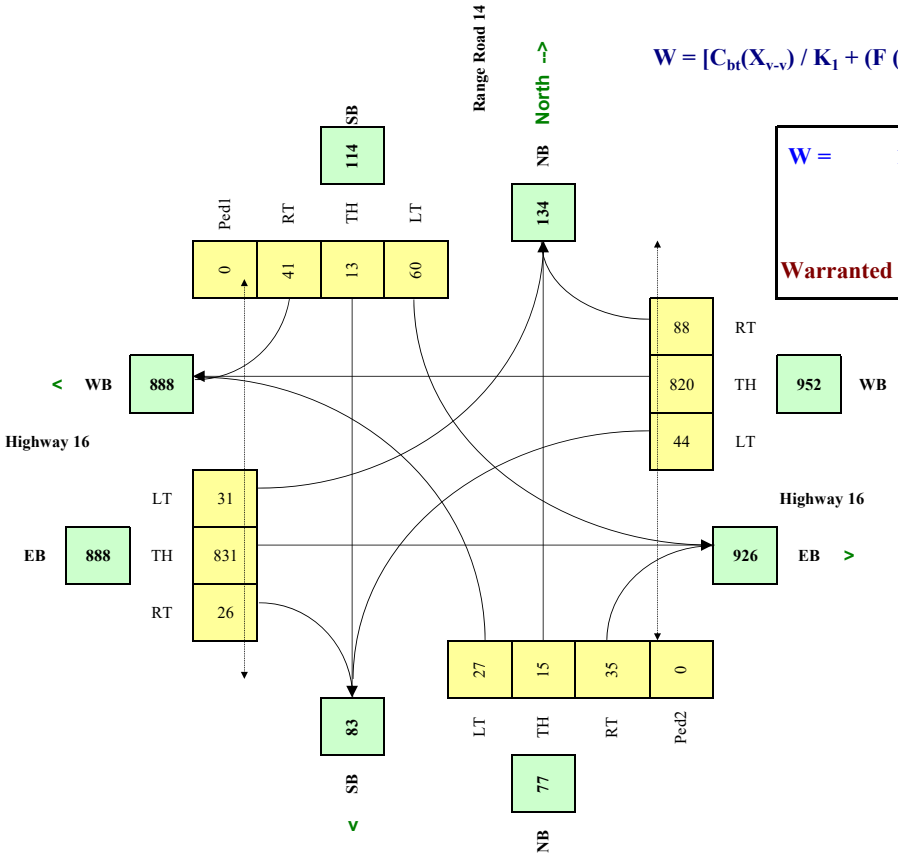
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	31 000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Highway 16	EW	80	10.0%	n	15.0
Range Road 14	NS		10.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods	19	21	16	30	8	44	77	807	161	34	961	44				
	25	19	19	43	19	43	30	653	74	31	850	15				
	30	1	81	59	4	21	53	743	96	30	811	27				
	26	7	7	44	3	24	49	750	75	24	744	23				
	30	22	71	81	19	46	36	913	59	40	805	28				
	32	17	16	101	27	68	19	1051	64	27	814	17				
Total (6-hour peak)	162	87	210	358	80	246	264	4 917	529	186	4 985	154	0	0	0	0
Average (6-hour peak)	27	15	35	60	13	41	44	820	88	31	831	26	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 =	149	149	0
		Veh	*Ped*

Warranted

RESET SHEET

Alberta Transportation Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Highway 16	Direction (EW or NS)	EW
Side Street (name)	Range Road 13	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Enter Comments about the analysis here.

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Road Authority:	Alberta Transportation
City:	Lloydminster
Analysis Date:	2019 May 30, Thu
Count Date:	2017 Jun 20, 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 16	WB		1			1		1 000	2
Highway 16	EB		1			1		1 000	2
Range Road 13	NB				1				
Range Road 13	SB				1				

Are the Range Road 13 NB right turns significantly impeded by through movements? (y/n) y

Are the Range Road 13 SB right turns significantly impeded by through movements? (y/n) y

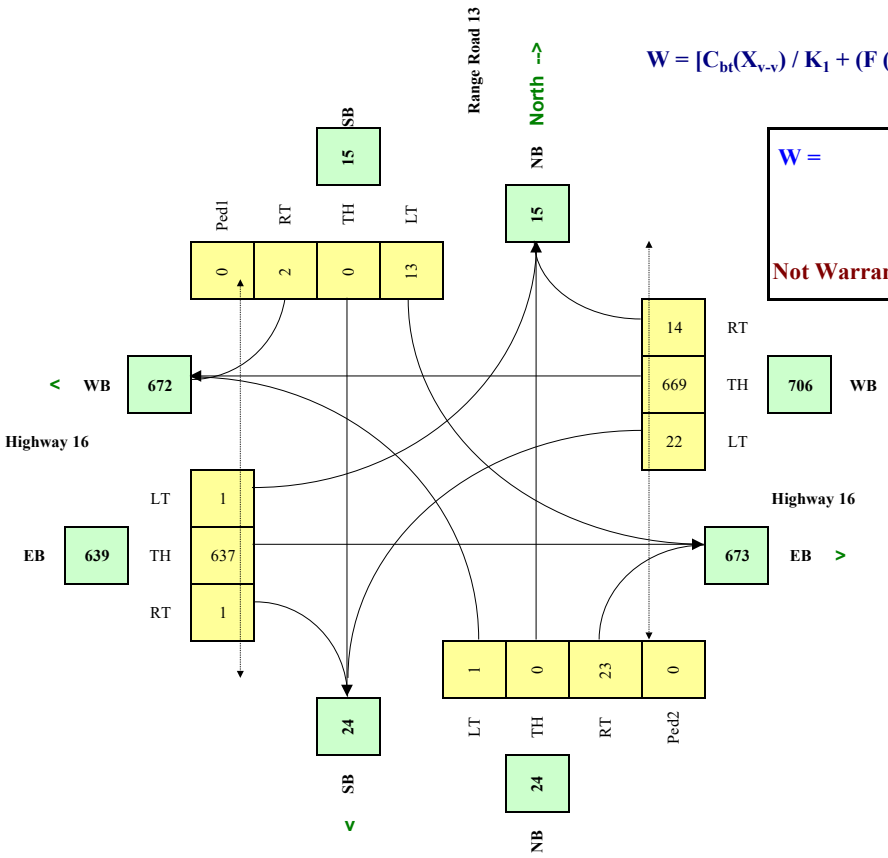
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	31 000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Highway 16	EW	80	10.0%	n	15.0
Range Road 13	NS		10.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods	0	0	18	9	0	1	27	845	16	1	636	2				
	0	0	19	8	0	3	28	610	12	0	554	1				
	2	0	21	4	1	1	21	566	6	0	670	2				
	2	0	21	12	0	1	23	570	10	0	564	0				
	2	1	31	23	1	4	21	699	21	2	712	1				
	0	0	26	23	0	0	13	725	21	2	687	2				
Total (6-hour peak)	6	1	136	79	2	10	133	4 015	86	5	3 823	8	0	0	0	0
Average (6-hour peak)	1	0	23	13	0	2	22	669	14	1	637	1	0	0	0	0

Average 6-hour Peak Turning Movements



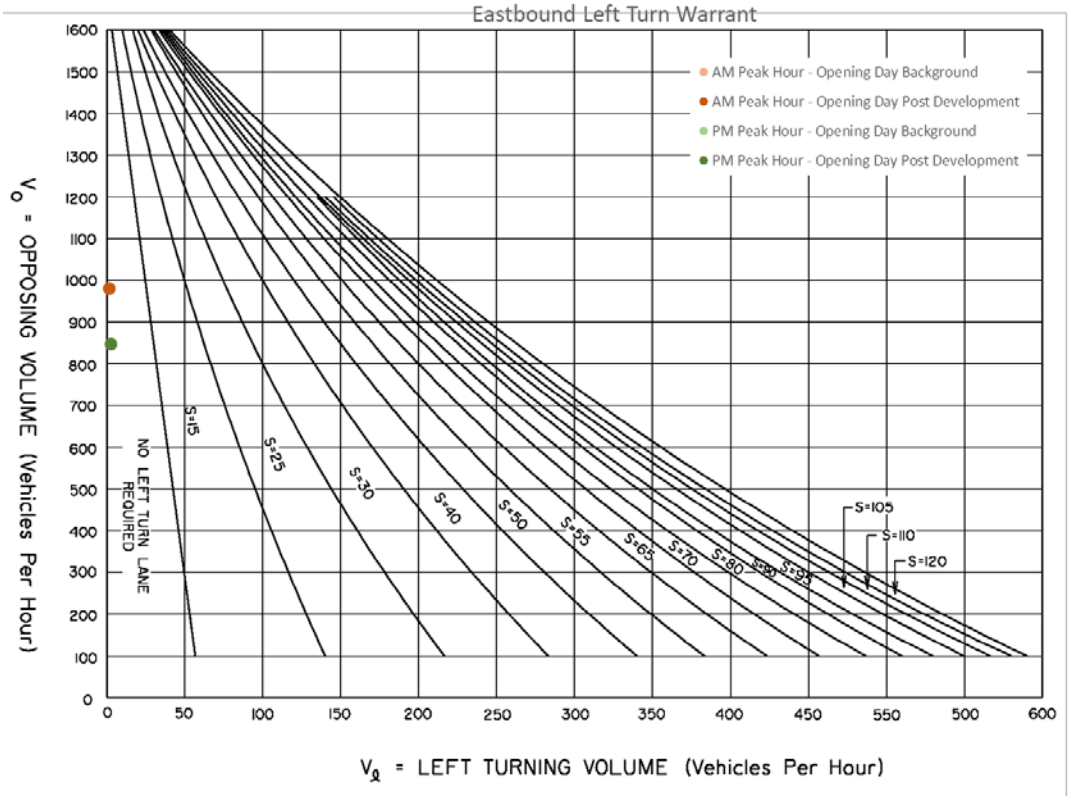
$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$

W =	31	31	0
		Veh	*Ped*

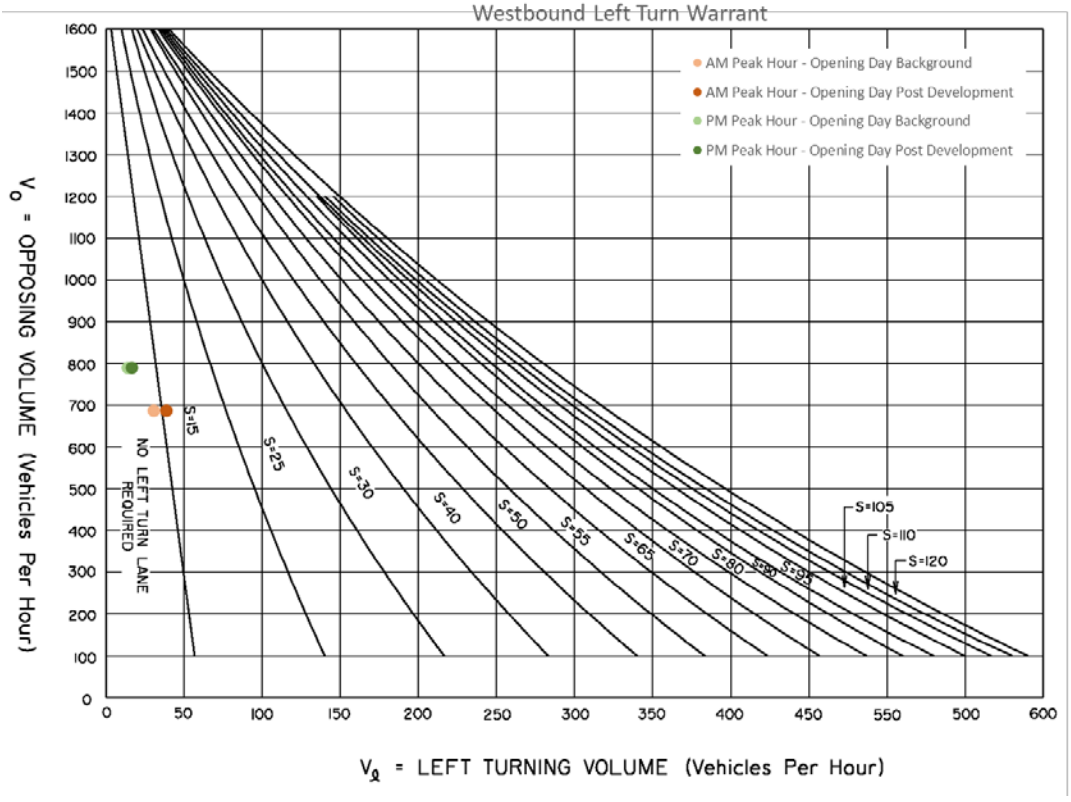
Not Warranted - Vs<75

RESET SHEET

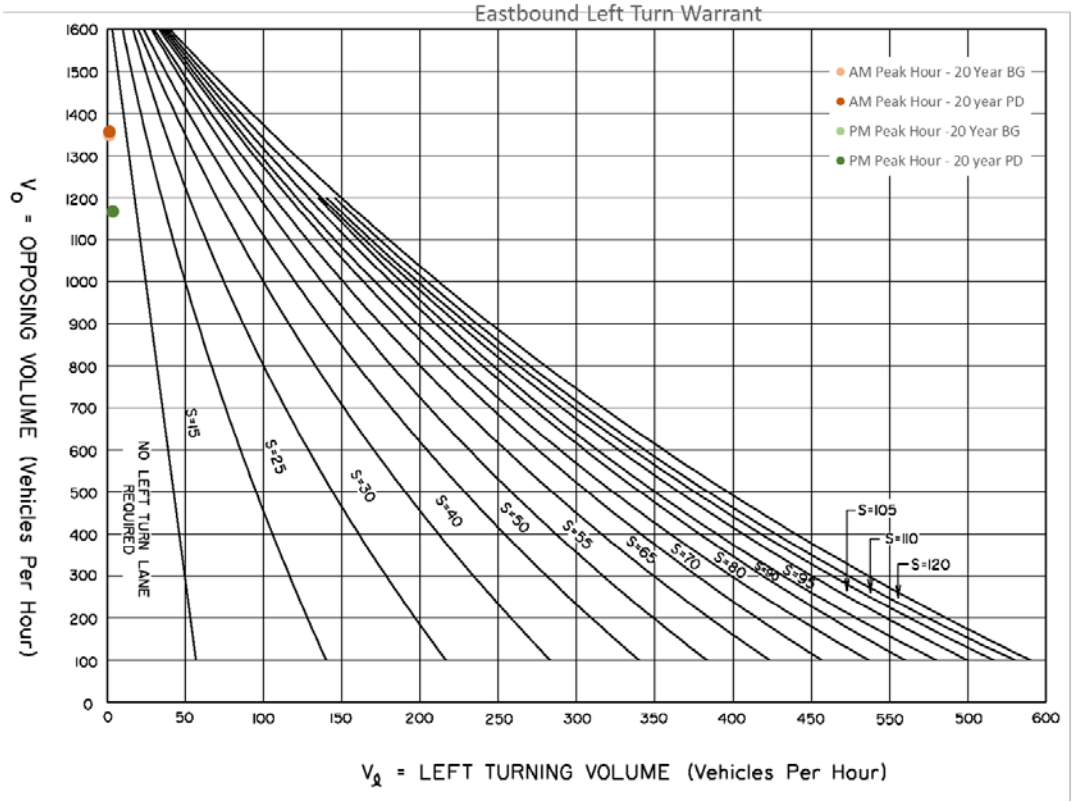
Highway 16 / Range Road 13
Eastbound Left Turn Warrant



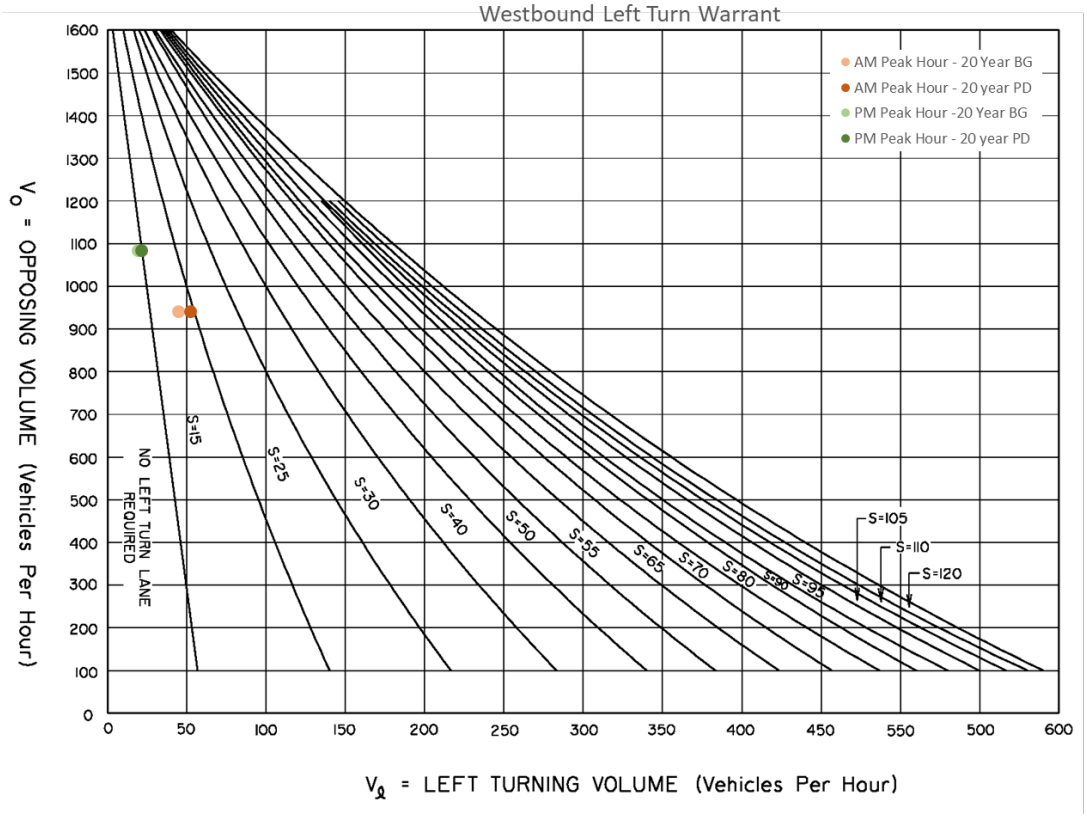
Highway 16 / Range Road 13
Westbound Left Turn Warrant



Highway 16 / Range Road 13
Eastbound Left Turn Warrant



Highway 16 / Range Road 13
Westbound Left Turn Warrant



Appendix B

Risk Assessment / Emergency Response Plan

IMPORTANT NOTICE:

In order for the application to be considered complete, it must include the required items indicated below AND any applicable additional supportive information requested as indicated below or during the process of reviewing your application. All required information must be attached to the application.

INCOMPLETE APPLICATIONS MAY BE RETURNED OR EXPERIENCE DELAYS

Water Supplies for Firefighting (Fire Pumps)

For full list of tasks and inspection form sample refer to NFPA 25

General	Responsibility
Ensure quality of fuel through replacement and/or testing	____n/a_____
Daily	
The temperature of pump rooms shall be checked daily during freezing weather.	____n/a_____

Private Fire Hydrants

For full list of tasks and inspection form sample refer to NFPA 25

General	Responsibility
Hydrants shall be readily available and unobstructed for use at all times. Private hydrants shall be painted yellow.	_____n/a_____

Water Volumes & Sources

Source of Water	Volume (m^3) _____
__on-site water wells_____	approx. 15 gal/min
___on-site shared storage pond_____	approx.12,000m3_____ ____

Water Supplies for Firefighting (Water Tanks)

For full list of tasks and inspection form sample refer to NFPA 25

Daily	Responsibility
Unobstructed access to building and fire tank as per *Alberta Building Code 3.2.5.6 (1)*	___n/a_____
Weekly	
Ensure water levels are adequate for firefighting as per *Alberta Building Code 3.2.5.7 (1)*	_____n/a_____

Water Supplies for Firefighting (Ponds)

For full list of tasks and inspection form sample refer to NFPA 25

General

Daily — Responsibility _____

Unobstructed access to building and fire pond as per *Alberta Building Code 3.2.5.6 (1)* — n/a_____

Monthly

Ensure water levels are adequate for firefighting as per *Alberta Building Code 3.2.5.7 (1)(2)* (ice depth and drought conditions need to be reported to the County if volumes do not meet code) — _____n/a_____

Yearly

Annual inspection of hydrants and roadways (repairs as needed) — _____n/a_____

Emergency Lighting

□ No
□ Yes Location(s): _____n/a_____

Emergency Power

□ No
□ Yes □ Battery □ Generator

Generator
□ Diesel □ Natural Gas

Fuel supply location: _____n/a_____
Transfer switch location: _____
Equipment powered by generator:
_____
_____

Proper Signage

□ No
□ Yes Location(s): _____n/a_____

Hazardous Area(s)

Are there hazardous material on site?

X No
□ Yes Material & quantity:
_____
_____
_____

Additional Supportive Information

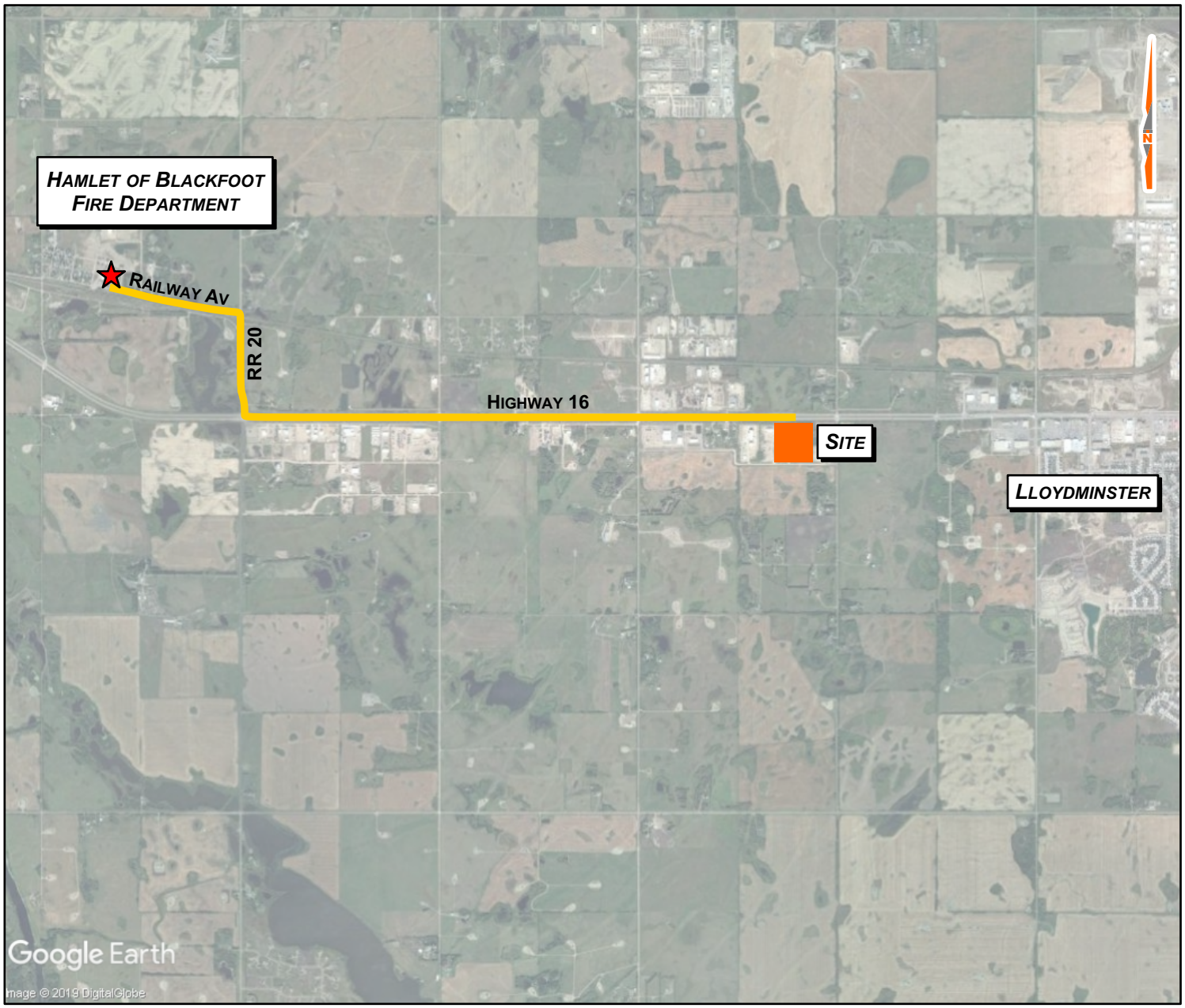
Please list any additional supportive information that you may have to append to this form (will become part of the application:

This is a subdivision application only.
Emergency access will be provided by public roadways (see attached emergency routes).
Fire fighting capability will be by tank storage on individual lot developments supported by a shared surface water storage pond of approximately 12,000m3.

I / We, the Applicant and/or registered owner/s understand that failure to provide complete and accurate information to satisfy all the required items for my application may deem my application incomplete and may result in project processing delays.

Applicant Signature	Registered Owner Signature	Registered Owner Signature
Cyril Tomlinson	Jason Holtby	
Print Name	Print Name	Print Name

The personal information requested on this form is being collected by the County of Vermilion River for purposes provided under Section 33(c) of the Freedom of Information and Protection of Privacy (FOIP) Act and is protected by the FOIP Act. If you have any questions about this collection, contact the County Administrator at (780)846-2244 or (780)853-5492



EMERGENCY RESPONSE ROUTES

Appendix C

Water Well Tests

Water Well Drilling Report

View in Metric | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID 1500048
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

GOWN ID

Well Identification and Location

Measurement in Imperial

Owner Name	Address	Town	Province	Country	Postal Code
DARVISH HOLDINGS LTD	P.O. BOX 1046	LLOYDMINSTER	AB	CA	T9V 3A6

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	33	49	1	4				

Measured from Boundary of
ft from
ft from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.274300 Longitude -110.085000
How Location Obtained: Not Verified

Elevation ft
How Elevation Obtained: Not Obtained

Drilling Information

Method of Drilling
Rotary

Proposed Well Use
Domestic

Type of Work
New Well

Formation Log

Measurement in Imperial

Depth from ground level (ft)	Water Bearing	Lithology Description
12.00		Brown Till
108.00		Gray Till
133.00		Gray Shale
145.00		Gray Sandy Shale
148.00		Siltstone
224.00		Gray Sandstone
226.00		Siltstone
238.00		Gray Sandstone
240.00		Siltstone
254.00		Gray Sandstone
257.00		Gray Shale

Yield Test Summary

Measurement in Imperial

Recommended Pump Rate 11.00 igpm

Test Date	Water Removal Rate (igpm)	Static Water Level (ft)
2002/08/30	6.00	125.26

Well Completion

Measurement in Imperial

Total Depth Drilled	Finished Well Depth	Start Date	End Date
257.00 ft		2002/08/30	2002/08/30

Borehole

Diameter (in)	From (ft)	To (ft)
6.25	0.00	257.00

Surface Casing (if applicable)
Plastic
Size OD : 5.00 in
Wall Thickness : 0.258 in
Bottom at : 240.00 ft

Well Casing/Liner
Unknown
Size OD : in
Wall Thickness : in
Top at : ft
Bottom at : ft

Perforations

From (ft)	To (ft)	Diameter or Slot Width(in)	Slot Length (in)	Hole or Slot Interval(in)

Perforated by Unknown

Annular Seal Bentonite Chips/Tablets
Placed from 0.00 ft to 200.00 ft
Amount

Other Seals

Type	At (ft)

Screen Type Stainless Steel
Size OD : 4.00 in

From (ft)	To (ft)	Slot Size (in)
240.00	250.00	0.012

Attachment Attached To Casing
Top Fittings Unknown Bottom Fittings Plug

Pack
Type Artificial Grain Size 13 60
Amount 750.00 Pounds

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
BRAD RIELAND

Certification No
315770

Company Name
MCALLISTER DRILLING INC.

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

View in Metric | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID 1500048
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

GOWN ID

Well Identification and Location

Measurement in Imperial

Owner Name	Address	Town	Province	Country	Postal Code
DARVISH HOLDINGS LTD	P.O. BOX 1046	LLOYDMINSTER	AB	CA	T9V 3A6

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	33	49	1	4				

Measured from Boundary of
ft from
ft from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.274300 Longitude -110.085000
How Location Obtained: Not Verified

Elevation ft
How Elevation Obtained: Not Obtained

Additional Information

Measurement in Imperial

Distance From Top of Casing to Ground Level: 24.00 in
Is Artesian Flow
Rate igpm
Is Flow Control Installed
Describe

Recommended Pump Rate: 11.00 igpm
Recommended Pump Intake Depth (From TOC): 218.01 ft
Pump Installed
Depth ft
Type
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth ft
Gas
Depth ft
Well Disinfected Upon Completion
Geophysical Log Taken: Electric
Submitted to ESRD: Electric

Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well

Yield Test

Taken From Ground Level
Measurement in Imperial

Test Date	Start Time	Static Water Level
2002/08/30	12:00 AM	125.26 ft

Method of Water Removal

Type: Air
Removal Rate: 6.00 igpm
Depth Withdrawn From: 229.99 ft

If water removal period was < 2 hours, explain why

Depth to water level

Pumping (ft)	Elapsed Time Minutes:Sec	Recovery (ft)
	0:00	218.27
	1:00	202.10
	2:00	188.75
	3:00	176.25
	4:00	169.13
	5:00	162.14
	6:00	155.94
	7:00	150.66
	8:00	146.59
	9:00	143.05
	10:00	140.32
	12:00	135.76
	14:00	132.68
	16:00	130.58
	20:00	128.12
	25:00	126.67
	50:00	125.53
	60:00	125.49

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	ig	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well: BRAD RIELAND
Certification No: 315770
Company Name: MCALLISTER DRILLING INC.
Copy of Well report provided to owner
Date approval holder signed

Water Well Drilling Report

View in Metric | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 1501401
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2008/12/15

Well Identification and Location

Measurement in Imperial

Owner Name	Address	Town	Province	Country	Postal Code
ELITE MECHANICAL / BEXON CONST	3705 - 51 AVE	LLOYDMINSTER	ALBERTA	CA	T9V 2C3

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	15	33	49	1	4	4	2	0321016	

Measured from Boundary of
ft from
ft from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.276138 Longitude -110.087972
How Location Obtained
Lat/Long calculated to centre of lot

Elevation ft
How Elevation Obtained
Not Obtained

Drilling Information

Method of Drilling
Rotary

Proposed Well Use
Other

Type of Work
New Well

Formation Log

Measurement in Imperial

Depth from ground level (ft)	Water Bearing	Lithology Description
10.00		Brown Till
70.00		Gray Till
90.00		Soft Clay
148.00		Gray Till
154.00		Siltstone
158.00		Sandstone
161.00		Siltstone
236.00		Sandstone
237.00		Siltstone
241.00		Sandy Shale

Yield Test Summary

Measurement in Imperial

Recommended Pump Rate 12.00 igpm

Test Date	Water Removal Rate (igpm)	Static Water Level (ft)
2007/10/17	10.00	122.05

Well Completion

Measurement in Imperial

Total Depth Drilled	Finished Well Depth	Start Date	End Date
241.00 ft	220.00 ft	2007/10/16	2007/10/17

Borehole

Diameter (in)	From (ft)	To (ft)
6.25	0.00	241.00

Surface Casing (if applicable)
Plastic
Size OD : 5.00 in
Wall Thickness : 0.258 in
Bottom at : 210.00 ft

Well Casing/Liner
Unknown
Size OD : in
Wall Thickness : in
Top at : ft
Bottom at : ft

Perforations

From (ft)	To (ft)	Diameter or Slot Width(in)	Slot Length (in)	Hole or Slot Interval(in)

Perforated by

Annular Seal Bentonite Chips/Tablets
Placed from 0.00 ft to 190.00 ft
Amount

Other Seals

Type	At (ft)

Screen Type Stainless Steel
Size OD : 4.00 in

From (ft)	To (ft)	Slot Size (in)
210.00	220.00	0.015

Attachment Attached To Casing
Top Fittings Coupler Bottom Fittings Plug

Pack
Type Artificial Grain Size 16/40
Amount 20.00 Bags

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
KENT MCALLISTER

Certification No
35/313409

Company Name
MCALLISTER DRILLING INC.

Copy of Well report provided to owner
Yes

Date approval holder signed
2007/10/17

Water Well Drilling Report

View in Metric | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 1501401
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2008/12/15

Well Identification and Location

Measurement in Imperial

Owner Name	Address	Town	Province	Country	Postal Code
ELITE MECHANICAL / BEXON CONST	3705 - 51 AVE	LLOYDMINSTER	ALBERTA	CA	T9V 2C3

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	15	33	49	1	4	4	2	0321016	

Measured from Boundary of
ft from
ft from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.276138 Longitude -110.087972
How Location Obtained
Lat/Long calculated to centre of lot

Elevation ft
How Elevation Obtained
Not Obtained

Additional Information

Measurement in Imperial

Distance From Top of Casing to Ground Level 23.62 in
Is Artesian Flow
Rate igpm
Is Flow Control Installed
Describe

Recommended Pump Rate 12.00 igpm
Recommended Pump Intake Depth (From TOC) 180.00 ft
Pump Installed
Type
Depth ft
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth ft
Gas
Depth ft
Well Disinfected Upon Completion
Geophysical Log Taken Electric
Submitted to ESRD

Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well
PROPOSED WELL USE - SHOP,

Yield Test

Taken From Ground Level
Measurement in Imperial

Test Date	Start Time	Static Water Level
2007/10/17	12:00 AM	122.05 ft

Method of Water Removal
Type Air
Removal Rate 10.00 igpm
Depth Withdrawn From 200.13 ft

If water removal period was < 2 hours, explain why
MEASUREMENTS FROM GROUND LEVEL, 90% RECOVERY @ 25 MIN, TESTED @ 10+ GPM

Depth to water level

Pumping (ft)	Elapsed Time Minutes:Sec	Recovery (ft)
122.05	0:00	175.85
	1:00	152.72
	2:00	138.98
	3:00	133.43
	4:00	129.20
	5:00	126.71
	6:00	125.33
	7:00	124.18
	8:00	123.69
	9:00	123.29
	10:00	123.10
	12:00	122.80
	14:00	122.67
	16:00	122.57
	20:00	122.47
	25:00	122.44

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	ig	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
KENT MCALLISTER

Certification No
35/313409

Company Name
MCALLISTER DRILLING INC.

Copy of Well report provided to owner
Yes

Date approval holder signed
2007/10/17

Water Well Drilling Report

View in Metric | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 1502092
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2012/11/08

Well Identification and Location

Measurement in Imperial

Owner Name	Address	Town	Province	Country	Postal Code
1662580 ALTA. LTD.	243 ASPEN RIDGE PLACE SW	CALGARY	ALBERTA	CANADA	T3H 0J7

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	16	33	49	1	4				

Measured from Boundary of Lot
150.00 ft from South
80.00 ft from West

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.274900 Longitude -110.084000
How Location Obtained
Hand held autonomous GPS 20-30m

Elevation 2209.00 ft
How Elevation Obtained
Hand held autonomous GPS 20-30m

Drilling Information

Method of Drilling
Rotary - Mud

Type of Work
New Well

Proposed Well Use
Domestic

Formation Log

Measurement in Imperial

Depth from ground level (ft)	Water Bearing	Lithology Description
2.00		Black Topsoil
24.00		Brown Till
120.00		Gray Till
146.00		Gray Shale
150.00		Gray Sandy Shale
228.00		Gray Sandstone
229.00		Siltstone
233.00		Gray Sandy Shale
240.00		Gray Shale

Yield Test Summary

Measurement in Imperial

Recommended Pump Rate 12.00 igpm

Test Date	Water Removal Rate (igpm)	Static Water Level (ft)
2012/08/27	8.00	117.68

Well Completion

Measurement in Imperial

Total Depth Drilled	Finished Well Depth	Start Date	End Date
240.00 ft	220.00 ft	2012/08/26	2012/08/27

Borehole

Diameter (in)	From (ft)	To (ft)
6.25	0.00	240.00

Surface Casing (if applicable)
Size OD : in
Wall Thickness : in
Bottom at : ft

Well Casing/Liner
Plastic
Size OD : 5.00 in
Wall Thickness : 0.258 in
Top at : -2.00 ft
Bottom at : 210.00 ft

Perforations

From (ft)	To (ft)	Diameter or Slot Width(in)	Slot Length (in)	Hole or Slot Interval(in)

Perforated by

Annular Seal Bentonite Slurry
Placed from 0.00 ft to 190.00 ft
Amount 190.00 Gallons

Other Seals

Type	At (ft)

Screen Type Stainless Steel
Size OD : 3.00 in

From (ft)	To (ft)	Slot Size (in)
210.00	220.00	0.015

Attachment Attached To Casing
Top Fittings
Bottom Fittings Plug

Pack
Type Artificial
Grain Size 16-30
Amount 850.00 Pounds

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
GEORGE MCALLISTER

Certification No
VA7828

Company Name
MCALLISTER DRILLING INC.

Copy of Well report provided to owner

Date approval holder signed
2012/08/28

Water Well Drilling Report

View in Metric | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID 1502092
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2012/11/08

GOWN ID

Well Identification and Location

Measurement in Imperial

Owner Name	Address	Town	Province	Country	Postal Code
1662580 ALTA. LTD.	243 ASPEN RIDGE PLACE SW	CALGARY	ALBERTA	CANADA	T3H 0J7

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	16	33	49	1	4				

Measured from Boundary of Lot
150.00 ft from South
80.00 ft from West

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.274900 Longitude -110.084000
How Location Obtained
Hand held autonomous GPS 20-30m

Elevation 2209.00 ft
How Elevation Obtained
Hand held autonomous GPS 20-30m

Additional Information

Measurement in Imperial

Distance From Top of Casing to Ground Level 24.00 in
Is Artesian Flow
Rate igpm
Is Flow Control Installed
Describe

Recommended Pump Rate 12.00 igpm
Recommended Pump Intake Depth (From TOC) 200.00 ft
Pump Installed
Depth ft
Type
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth ft
Gas
Depth ft
Well Disinfected Upon Completion
Geophysical Log Taken
Submitted to ESRD

Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well

Yield Test

Taken From Ground Level
Measurement in Imperial

Test Date 2012/08/27
Start Time 4:00 PM
Static Water Level 117.68 ft

Method of Water Removal
Type Air
Removal Rate 8.00 igpm
Depth Withdrawn From 190.00 ft

If water removal period was < 2 hours, explain why

Depth to water level

Pumping (ft)	Elapsed Time Minutes:Sec	Recovery (ft)
117.68	0:00	175.20
	1:00	158.23
	2:00	147.24
	3:00	139.76
	4:00	134.02
	5:00	130.22
	6:00	127.43
	7:00	125.26
	8:00	123.62
	9:00	122.44
	10:00	121.65
	12:00	120.41
	14:00	119.85
	16:00	119.36
	20:00	118.96
	25:00	118.83
	30:00	118.70

Water Diverted for Drilling

Water Source	Amount Taken		Diversion Date & Time
DUGOUT	3520.00	ig	2012/08/26 7:00 AM

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
GEORGE MCALLISTER

Certification No
VA7828

Company Name
MCALLISTER DRILLING INC.

Copy of Well report provided to owner

Date approval holder signed
2012/08/28

Water Well Drilling Report

View in Metric | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 1502177
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2013/08/23

Well Identification and Location

Measurement in Imperial

Owner Name	Address	Town	Province	Country	Postal Code
HURICANE IND/CITADEL MECH	P.O. BOX 10368	LLOYDMINSTER	ALBERTA	CANADA	T9V 3A5

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	16	33	49	1	4				HURICANE IND./ C/O CITADEL MECHANICAL

Measured from Boundary of
ft from
ft from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.274708 Longitude -110.082231
How Location Obtained
Hand held autonomous GPS 20-30m

Elevation 2175.20 ft
How Elevation Obtained
Hand held autonomous GPS 20-30m

Drilling Information

Method of Drilling
Rotary - Mud

Proposed Well Use
Other

Type of Work
New Well

Formation Log

Measurement in Imperial

Depth from ground level (ft)	Water Bearing	Lithology Description
14.00		Brown Till
46.00		Gray Till
58.00		Gray Rocky Till
61.00		Coarse Grained Sand
85.00		Gray Till
86.00		Rocks
91.00		Gray Till
118.00		Gray Tight Clay
140.00		Gray Till
144.00		Sandstone
154.00		Sandy Shale
158.00		Hard Siltstone
166.00		Dirty Sandstone
185.00		Coarse Grained Sandstone
209.00		Dirty Sandstone
210.00		Siltstone
222.00		Clean Sandstone
231.00		Sandy Shale
239.00		Shale & Sandstone Ledges

Yield Test Summary

Measurement in Imperial

Recommended Pump Rate 15.00 igpm

Test Date	Water Removal Rate (igpm)	Static Water Level (ft)
2013/08/09	15.00	118.17

Well Completion

Measurement in Imperial

Total Depth Drilled	Finished Well Depth	Start Date	End Date
239.00 ft	222.00 ft	2013/08/09	2013/08/09

Borehole

Diameter (in)	From (ft)	To (ft)
6.25	0.00	239.00

Surface Casing (if applicable)
Size OD : in
Wall Thickness : in
Bottom at : ft

Well Casing/Liner
Plastic
Size OD : 5.00 in
Wall Thickness : 0.258 in
Top at : -2.00 ft
Bottom at : 212.00 ft

Perforations

From (ft)	To (ft)	Diameter or Slot Width(in)	Slot Length (in)	Hole or Slot Interval(in)

Perforated by

Annular Seal Bentonite Chips/Tablets
Placed from 0.00 ft to 195.00 ft
Amount 10.00 Bags

Other Seals

Type	At (ft)

Screen Type Stainless Steel
Size OD : 4.00 in

From (ft)	To (ft)	Slot Size (in)
212.00	222.00	0.015

Attachment Attached To Casing
Top Fittings Coupler Bottom Fittings Plug

Pack
Type Grain Size
Amount

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
SHAWN ERB

Certification No
78082A

Company Name
MCALLISTER DRILLING INC.

Copy of Well report provided to owner
Yes

Date approval holder signed
2013/08/09

Water Well Drilling Report

View in Metric | Export to Excel

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GIC Well ID 1502177
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2013/08/23

GOWN ID

Well Identification and Location

Measurement in Imperial

Owner Name	Address	Town	Province	Country	Postal Code
HURICANE IND/CITADEL MECH	P.O. BOX 10368	LLOYDMINSTER	ALBERTA	CANADA	T9V 3A5

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
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ft from

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Latitude 53.274708 Longitude -110.082231
How Location Obtained
Hand held autonomous GPS 20-30m

Elevation 2175.20 ft
How Elevation Obtained
Hand held autonomous GPS 20-30m

Additional Information

Measurement in Imperial

Distance From Top of Casing to Ground Level 24.00 in
Is Artesian Flow
Rate igpm
Is Flow Control Installed
Describe

Recommended Pump Rate 15.00 igpm
Recommended Pump Intake Depth (From TOC) 170.00 ft
Pump Installed Yes
Type Submersible
Depth 200.00 ft
Make GRUNDFOS
H.P. 1.5
Model (Output Rating) 15 SQE-15-290

Did you Encounter Saline Water (>4000 ppm TDS)
Depth ft
Gas
Depth ft
Well Disinfected Upon Completion Yes
Geophysical Log Taken Electric
Submitted to ESRD

Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well

PROPOSED WELL USE: SHOP WELL, LITH: 166' - 185' ALSO CLEAN, 185' - 209' DIRTY LAYERS,

Yield Test

Taken From Ground Level
Measurement in Imperial

Test Date 2013/08/09
Start Time 3:00 PM
Static Water Level 118.17 ft

Method of Water Removal

Type Air
Removal Rate 15.00 igpm
Depth Withdrawn From 206.69 ft

If water removal period was < 2 hours, explain why

AIR COMPRESSOR USED, 90% RECOVERY @ 12 MINUTES

Depth to water level

Pumping (ft)	Elapsed Time Minutes:Sec	Recovery (ft)
118.18	0:00	174.51
	1:00	144.65
	2:00	131.53
	3:00	125.43
	4:00	122.11
	5:00	120.37
	6:00	119.23
	7:00	118.86
	8:00	118.57
	9:00	118.41
	10:00	118.27

Water Diverted for Drilling

Water Source	Amount Taken		Diversion Date & Time
MCALLISTER YARD	3000.00	ig	2013/08/09 7:30 AM

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
SHAWN ERB

Certification No
78082A

Company Name
MCALLISTER DRILLING INC.

Copy of Well report provided to owner
Yes

Date approval holder signed
2013/08/09