TRANSPORTATION PLANNERS AND ENGINEERS

Ascension

Transportation Impact Assessment Update

Final - Revised

Prepared for

Highfield Land Management

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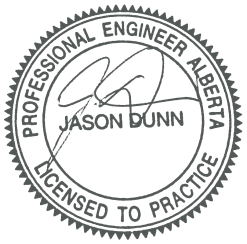

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Engineer's Stamp

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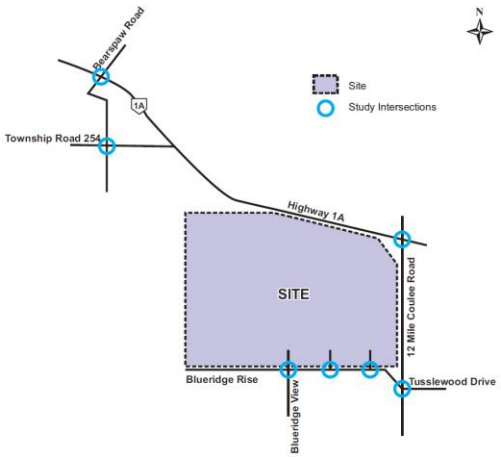
1. EXECUTIVE SUMMARY



This Transportation Impact Assessment (TIA) is an update to the 2017 Ascension TIA[1] completed by Bunt & Associates for Highfield Land Management. The Ascension site is located in the southwest corner of the intersection of Highway 1A & 12 Mile Coulee Road. Following a change in proposed density in from the original TIA, the development will now have single-family and multi-family residential, a seniors' development, retail, and office uses.

The purpose of the TIA Update is to review the transportation impacts of the new proposed development. Findings and recommendations are summarized below.

1.1 Trip Generation

A comparison of the proposed development densities and forecasted trip generation to the 2017 TIA for the 2039 full build out horizon are summarized in **Table 1.1**.

Table 1.1: Full Build Out Trip Generation Comparison

USE	NEW DENSITY (DIFFERENCE)	2020 TIA UPDATE TRIPS		2017 TIA TRIPS	
		AM Peak	PM Peak	AM Peak	PM Peak
Single Family Residential	1026 units (+542 units)	759	1016	363	484
Multi-Family Residential	43 units (-380 units)	20	24	186	220
Seniors' Development	300 units (+300 units)	60	78	-	-
Retail	350,000 ft² (No difference)	329	1334	336	1299
Office	60,000 ft² (No difference)	70	69	94	89
Hotel	0 rooms (-150 rooms)	-	-	80	90
Internal Capture Trips	20% retail rate & 10% office rate	-74	-276	-42	-578
Pass-by Trips	30% retail AM/PM (+30% AM/-4% PM)	-80	-320	0	-349
Diverted Trips	0% AM/PM (0% AM/-5% PM)	-	-	0	-51
NEW EXTERNAL TRIPS		**1084**	**1925**	**1017**	**1204**

1.2 Findings & Recommendations

Study findings and recommendations are described in **Table 1.2**.

[1] *Ascension Transportation Impact Assessment*, Bunt & Associates Engineering Ltd., July 2017.

Table 1.2: Findings & Recommendations

SECTION		FINDINGS
Vehicles	2028 Background	- The intersection of Bearspaw Road & Highway 1A will reach capacity in the AM peak hour with the current intersection configurations. A six-lane Highway 1A and a permitted-protected southbound left turn will allow the intersection to operate within acceptable capacity limits. The same mitigation measures were noted in the Glenbow Reports and 2017 Ascension TIA for the 2025 Background. - A continuous flow intersection (CFI) is proposed for the intersection of 12 Mile Coulee Road & Highway 1A and will allow the intersection to operate within acceptable capacity limits. - While the intersection of 12 Mile Coulee Road & Tusslewood Drive NW warrants signalization at this horizon, the roundabout proposed in the After Development will serve as the mitigation measure. - All other intersections are expected to operate within acceptable capacity limits.
	2039 Background	- The intersection of Bearspaw Road & Highway 1A is expected to approach capacity at this horizon. As noted in the Glenbow Ranch ASP, an interchange should be considered at this intersection. - The intersection of 12 Mile Coulee Road & Highway 1A will require a six-lane Highway 1A at this horizon to mitigate 500-metre queues. - While the intersection of 12 Mile Coulee Road & Tusslewood Drive NW warrants signalization at this horizon, the roundabout proposed in the After Development will serve as the mitigation measure. - All other intersections are expected to operate within acceptable capacity limits.
	2028 After Development	- All intersections are expected to operate within acceptable capacity limits with the improvements warranted in the Background horizon.
	2039 After Development	- All intersections are expected to operate within acceptable capacity limits with the improvements warranted in the Background horizon.
	2039 After Development – Sensitivity	- The two signalized intersections for the interchange of 12 Mile Coulee Road & Highway 1A operate with low delays and queues.
	Signal Warrants	-Signalization is warranted at 12 Mile Coulee Road & Tusslewood Drive NW in the 2028 Background horizon, however as noted above this is not the proposed improvement. -No other unsignalized intersections will warrant signalization.
Active Modes	Sidewalks	-While there is no existing pedestrian infrastructure east of 12 Mile Coulee Road, development off the site will include sidewalks and pathways.
	Crossings	-The intersection of 12 Mile Coulee Road & Tusslewood Drive NW warrants signalization based on TAC guidelines.
	Cycling	-The site is serviced by bikeways on Tuscany Way and a regional pathway along 12 Mile Coulee Road.
	Transit	-The site has poor accessibility to transit.

2. INTRODUCTION

2.1 Scope of Work

Based on discussions with Rocky View County (RVC) and the City of Calgary (**Appendix A**), the scope of work for this study was confirmed to include the following:

Development

- *Trip Generation* – Calculate development trips for vehicles during the weekday AM & PM peak hours based on industry standards and compare to the previous TIA.
- *Trip Assignment* – Assign development trips to the network based on a modified distribution from the 2017 TIA.

Vehicles

- *Intersection Capacity* – Complete weekday peak hour analysis for 2028, and 2039 at:
  - 12 Mile Coulee Road & Highway 1A/Crowchild Trail NW
  - 12 Mile Coulee Road & Blueridge Rise
  - 12 Mile Coulee Road & Tusslewood Drive NW
  - Site Accesses & Blueridge Rise
  - Bearspaw Road & Highway 1A
  - Bearspaw Road & Township Road 254
- *Intersection Recommendations* – Identify mitigation measures for intersections to operate in Background and After Development horizons.

Active Modes

- *Pedestrians* – Review sidewalk connectivity and adequacy of crossing controls near the site.
- *Cyclists* – Review connectivity to cycling facilities.
- *Transit* – Review service levels and connectivity to transit stops.

2.2 Site Context

The site is located northwest of Calgary within RVC and is bounded by Highway 1A to the north, 12 Mile Coulee Road to the east, Blueridge Rise to the south, and Bearspaw Road to the west. The site is currently used as agricultural land, and there is one residential property on the northeast corner of the site. The site context is illustrated in **Figure 2.1**.

Figure 2.1: Site Context

Base Map Source: Google Maps

3. DEVELOPMENT

The site concept plan is illustrated in **Figure 3.1**.

Figure 3.1: Concept Plan

3.1 Densities

The proposed density has changed from that assumed in the original TIA. A comparison of the proposed development uses and densities is summarized in **Table 3.1**.

Table 3.1: Proposed Densities

LAND USE	ORIGINAL DENSITY	NEW DENSITY	NET DIFFERENCE
Single Family Residential	484 units	1026 units	+ 542 units
Multi-Family Residential	423 units	343 units	- 80 units
Retail	350,000 ft^2	350,000 ft^2	0
Office	60,000 ft^2	60,000 ft^2	0
Hotel	150 rooms	0 rooms	- 150 rooms

The multi-family use comprises a 43-unit multi-family development and a 300-unit seniors' development.

3.2 Trip Generation

3.2.1 Trip Generation Rates

The trip generation rates used in this analysis are summarized in **Table 3.2**. The trip generation rates are based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual (10th Edition)*. As a note, the 2017 TIA used trip generation rates from the 9th Edition of the ITE *Trip Generation Manual*.

Table 3.2: Trip Generation Rates

USE	AM PEAK HOUR	PM PEAK HOUR	DATA SOURCE
Single Family Residential	0.74 per unit *(25% In, 75% Out)*	0.99 per unit *(63% In, 37% Out)*	ITE 210
Multi-Family Residential	0.46 per unit *(23% In, 77% Out)*	0.56 per unit *(63% In, 37% Out)*	ITE 220
Seniors' Development	0.20 per unit *(35% In, 65% Out)*	0.26 per unit *(55% In, 45% Out)*	ITE 252
Retail	0.94 per 1,000 ft^2 *(62% In, 38% Out)*	3.81 per 1,000 ft^2 *(48% In, 52% Out)*	ITE 820
Office	1.16 per 1,000 ft^2 *(86% In, 14% Out)*	1.15 per 1,000 ft^2 *(16% In, 84% Out)*	ITE 710

The following internal capture and pass-by rates are used in the analysis:

- Internal Capture – 20% of retail trips
- Internal Capture – 10% of office trips
- Pass-by to Tusslewood Drive – 10% of retail trips
- Pass-by to 12 Mile Coulee Road – 10% of retail trips
- Pass-by into Ascension – 10% of retail trips

To be conservative, no diverted traffic has been assigned to the development.

Pass-by rate for commercial is typically 30%. The 30% was split to the three different residential areas resulting in 10% to each of the three residential areas.

The proposed increase in the amount of residential lots within Ascension indicates that there will be internal capture of the commercial and office trips from those residents. The internal capture rates of 20% of commercial and 10% for office are considered to be conservative based on experience and the NHRCP Internal Capture spreadsheet.

Updated development generated trips are summarized in **Table 3.3** (2028 - Half Build Out) and **Table 3.4** (2039 – Full Build Out).

Table 3.3: Half Build Out Trip Generation (2028)

USE	UPDATED DENSITY	AM PEAK HOUR			PM PEAK HOUR		
		Total	In	Out	Total	In	Out
Single Family	510 units (+268 units)	377 (+195)	94 (+48)	283 (+147)	505 (+263)	318 (+166)	187 (+97)
Multi-Family	43 units (-190 units)	20 (-73)	5 (-11)	15 (-62)	24 (-86)	15 (-61)	9 (-27)
Seniors	150 units (+150 units)	30 (+30)	11 (+11)	19 (+19)	39 (+39)	21 (+21)	18 (+18)
Retail	175,000 ft² (No change)	165 (-3)	102 (-2)	63 (-1)	667 (+18)	320 (+8)	347 (+10)
Office	30,000 ft² (No change)	35 (-12)	30 (-11)	5 (-1)	35 (-10)	6 (-2)	29 (-8)
Hotel	0 rooms (-150 rooms)	- (-80)	- (-47)	- (-33)	- (-90)	- (-46)	- (-44)
Internal Capture Reduction		-38 (-11)	-19 (-6)	-19 (-6)	-138 (+166)	-69 (+83)	-69 (+83)
Retail Pass-by		-40 (-40)	-20 (-20)	-20 (-20)	-160 (+13)	-80 (+6)	-80 (+6)
Retail Diverted		- (-)	- (-)	- (-)	- (+25)	- (+13)	- (+13)
NEW EXTERNAL TRIPS		**549 (+6)**	**203 (-38)**	**346 (+43)**	**972 (+338)**	**531 (+190)**	**441 (+148)**

Table 3.4: Full Build Out Trip Generation (2039)

USE	UPDATED DENSITY	AM PEAK HOUR			PM PEAK HOUR		
		Total	In	Out	Total	In	Out
Single Family	1026 units (+542 units)	759 (+396)	190 (+99)	569 (+297)	1016 (+532)	640 (+335)	376 (+197)
Multi-Family	43 units (-380 units)	20 (-166)	5 (-27)	15 (-139)	24 (-196)	15 (-132)	9 (-64)
Seniors	300 units (+300 units)	60 (+60)	21 (+21)	39 (+39)	78 (+78)	43 (+43)	35 (+35)
Retail	350,000 ft² (No change)	329 (-7)	204 (-4)	125 (-3)	1334 (+35)	640 (+16)	694 (+19)
Office	60,000 ft² (No change)	70 (-24)	60 (-23)	10 (-1)	69 (-20)	11 (-4)	58 (-16)
Hotel	0 rooms (-150 rooms)	- (-80)	- (-47)	- (-33)	- (-90)	- (-46)	- (-44)
Internal Capture Reduction		-74 (-32)	-37 (-16)	-37 (-16)	-276 (+302)	-138 (+151)	-138 (+151)
Retail Pass-by		-80 (-80)	-40 (-40)	-40 (-40)	-320 (+29)	-160 (+14)	-160 (+14)
Retail Diverted		- (-)	- (-)	- (-)	- (+51)	- (+26)	- (+26)
NEW EXTERNAL TRIPS		**1084 (+67)**	**404 (-36)**	**680 (+103)**	**1925 (+721)**	**1051 (+403)**	**872 (+319)**

3.3 Trip Distribution

Vehicle trips are distributed based on a modified distribution from the 2017 TIA. The residential rate on Tusslewood Drive was reduced from 25% to 10%. The residual 15% will be added to Crowchild Trail, increasing the distribution from 55% to 70%.

The reduction in the amount of residential traffic to/from Tusslewood Drive reflects discussions with the City of Calgary which indicated that the park and ride facility at Tuscany station is typically full and as such, residents of Ascension will not be able to use the facility. Also, residents of Ascension will not be attending the schools in Tuscany, further reducing the residential trips.

The trip distribution used in this study is illustrated in **Exhibit 3.1** and summarised in **Table 3.5** and **Table 3.6** below.

Table 3.5: Trip Distribution for Residential

DIRECTION	AM PEAK HOUR		PM PEAK HOUR	
	In	Out	In	Out
To/from the north on 12 Mile Coulee Road	5%	5%	5%	5%
To/from the south on 12 Mile Coulee Road	5%	5%	5%	5%
To/from the west on Highway 1A	10%	10%	10%	10%
To/from the east on Highway 1A	70%	70%	70%	70%
To/from the east on Tusslewood Dr NW	10%	10%	10%	10%
Total	**100%**	**100%**	**100%**	**100%**

Table 3.6: Trip Distribution for Retail

DIRECTION	AM PEAK HOUR		PM PEAK HOUR	
	In	Out	In	Out
To/from the north on 12 Mile Coulee Road	10%	10%	10%	10%
To/from the south on 12 Mile Coulee Road	10%	10%	10%	10%
To/from the west on Highway 1A	5%	5%	5%	5%
To/from the east on Highway 1A	52.5%	52.5%	52.5%	52.5%
To/from the east on Tusslewood Dr NW	10%	10%	10%	10%
To/from the south on Blueridge Rise	2.5%	2.5%	2.5%	2.5%
To/from the west on Bearspaw Village Ln	5%	5%	5%	5%
To/from the south on Bearspaw Village Rd	2.5%	2.5%	2.5%	2.5%
To/from the Bearspaw School Area	2.5%	2.5%	2.5%	2.5%
Total	**100%**	**100%**	**100%**	**100%**

3.4 Access

Vehicle access to the development will be provided from Blueridge Rise, Bearspaw Road, and Bearspaw Village Road. The resulting development generated traffic volumes are illustrated in **Exhibit 3.2** for 2028 and **Exhibit 3.3** for 2039.

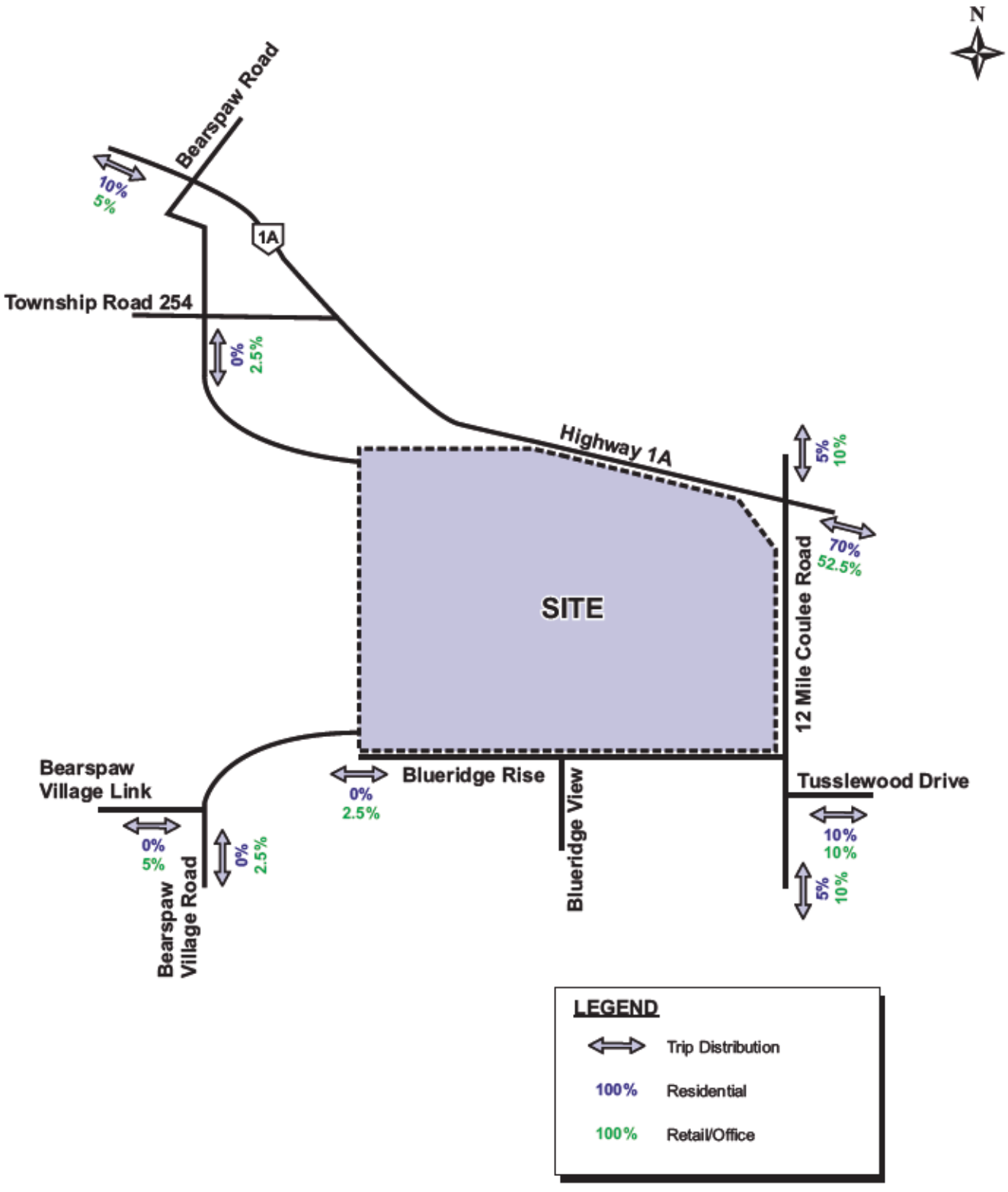


Exhibit 3.1

Site Traffic Distribution

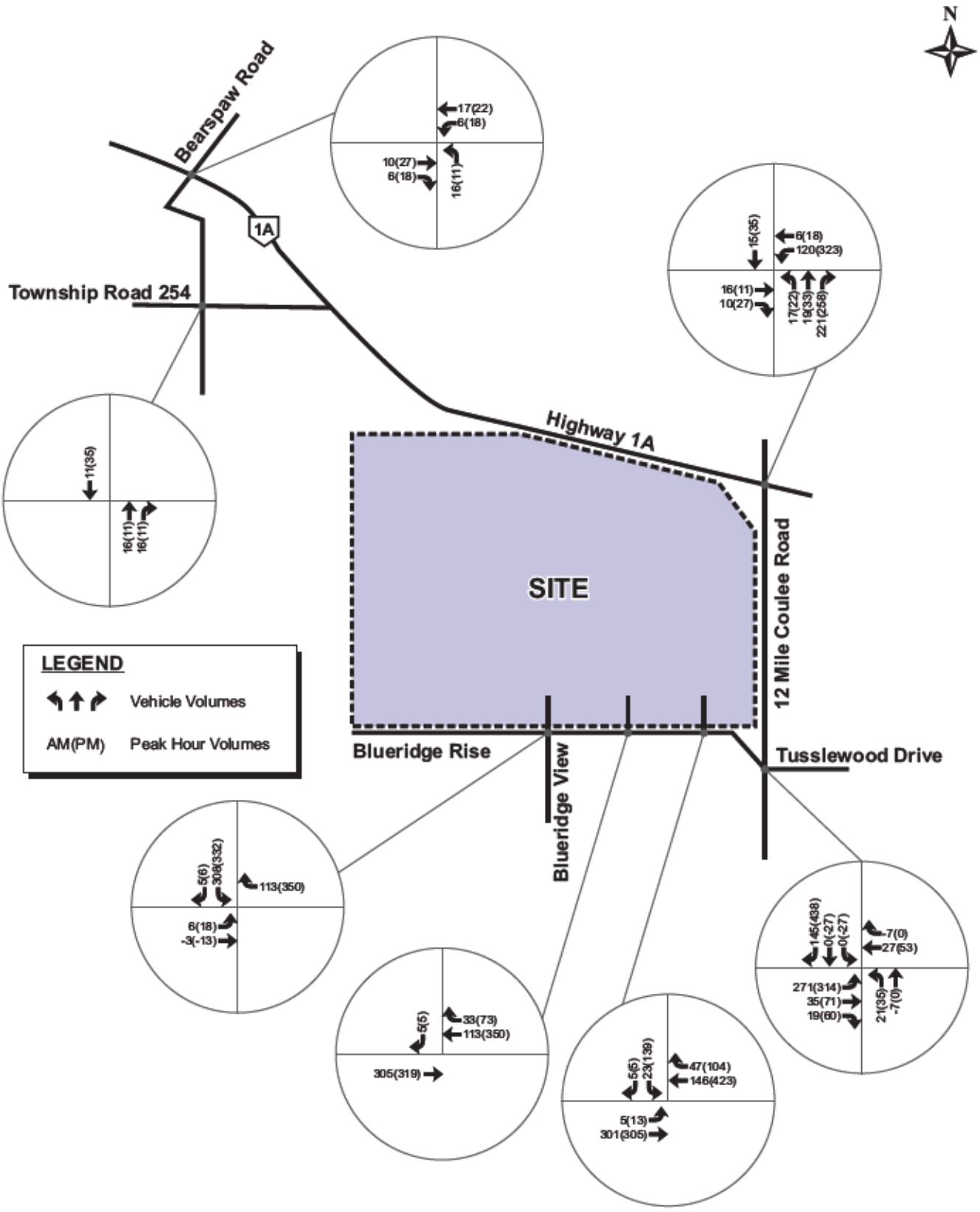


Exhibit 3.2

2028 Site Traffic Volumes

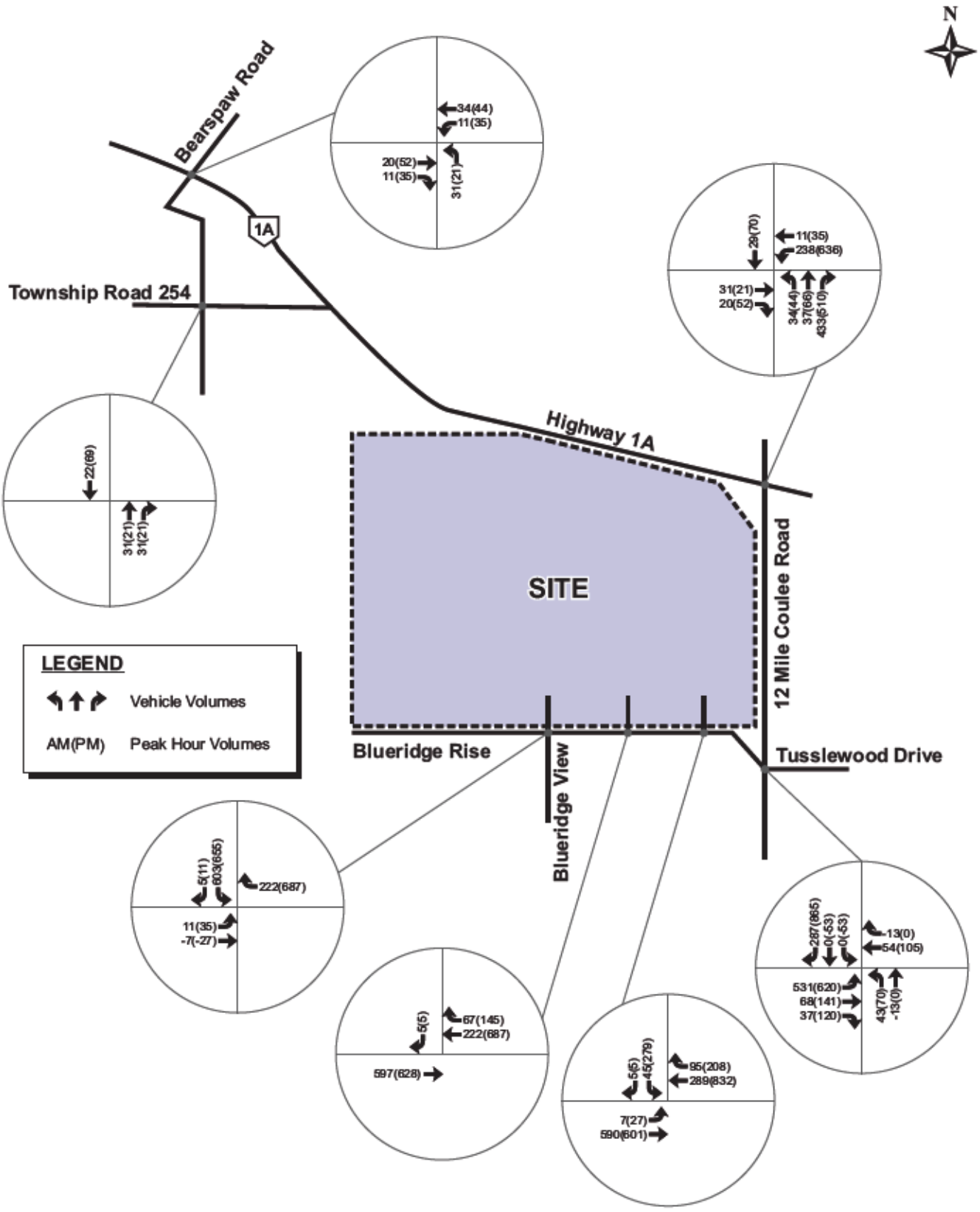


Exhibit 3.3

2039 Site Traffic Volumes

4. VEHICLES

4.1 Road Network

The characteristics of roadways near the site are summarized in **Table 4.1**.

Table 4.1: Existing Roadway Characteristics

ROADWAY	CLASSIFICATION	CROSS-SECTION		POSTED SPEED	FACILITIES		
		# Lanes	Median		Parking	Shoulder	Illumination
Highway 1A (Bow Valley Trail/ Crowchild Trail)	Provincial Highway	4	Yes	90 km/h	No	Yes	West leg
12 Mile Coulee Road	Arterial	4	Yes	60 km/h	No	No	Yes
Blueridge Rise	Undivided County Road	2	No	50 km/h	No	No	No
Tusslewood Drive NW	Collector	2	No	50 km/h	Yes	No	Yes
Bearspaw Road	Undivided County Road	2	No	40 km/h	No	No	No

4.2 Intersections

Existing intersection configurations and controls at study intersections are illustrated in **Exhibit 4.1**.

4.3 Volumes

4.3.1 Background

Background traffic is traffic that would be present on the road network in future years regardless of the development of the site. This traffic is representative of yearly growth on the roadways as well as other residential, commercial, or industrial development that have been approved in the area.

12 Mile Coulee Road

For the intersections of 12 Mile Coulee Road & Highway 1A and 12 Mile Coulee Road & Tusslewood Drive, the background traffic was based on City of Calgary forecast data received in 2020. The forecast data for the 2028 and 2039 horizons is included in **Appendix B**.

The recent City of City forecasts for the same study area predict significantly less traffic in 2039 than shown in the 2016 *Glenbow Ranch ASP Network Study* and consequently, the background traffic volumes used in the original 2017 TIA. A review of the Transportation Zones in the City of Calgary model indicates that TZ 3427 and 3428 cover the Glenbow Ranch ASP area. These two zones have a forecasted population of 917 people in 2028 and 1232 people in 2039. This indicates the City of Calgary's forecast model has accounted for some level of growth in the Glenbow Ranch ASP area.

During the meeting with RVC, the City and AT on June 29, 2020, it was requested that the background volume from the Glenbow Ranch ASP[2,3] to be 1% built out every year following the 2020 horizon. In other words, it is assumed the Glenbow Ranch area is 7% built out by 2028 and 18% built out in 2039. The full build out volumes for the Glenbow Ranch area are shown in **Figure 4.1** below.

Figure 4.1: Excerpt from Glenbow Ranch ASP Network Analysis – Additional Analysis (2017)

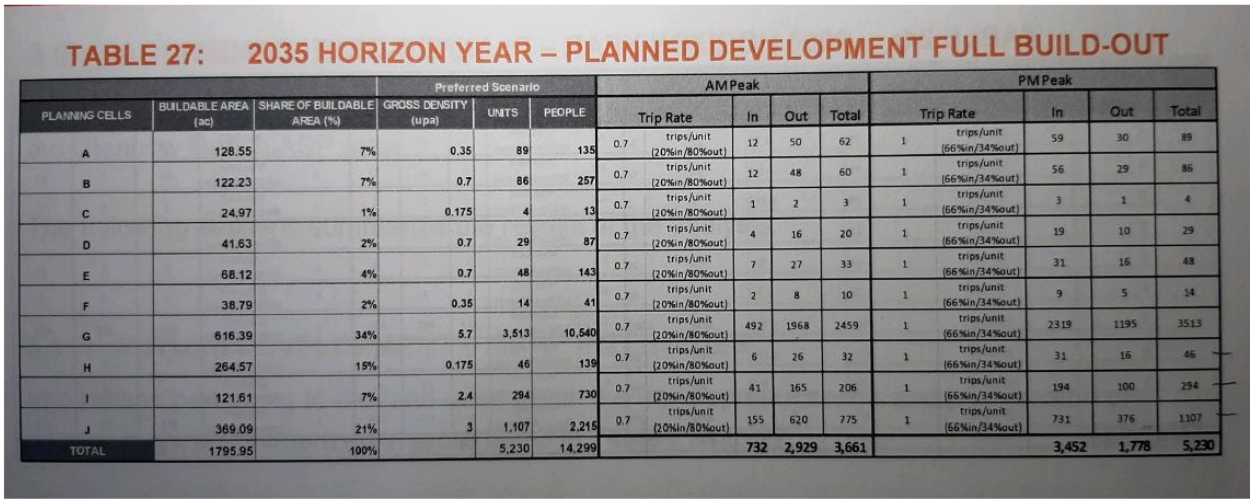


TABLE 27: 2035 HORIZON YEAR – PLANNED DEVELOPMENT FULL BUILD-OUT

			Preferred Scenario			AM Peak				PM Peak			
PLANNING CELLS	BUILDABLE AREA (ac)	SHARE OF BUILDABLE AREA (%)	GROSS DENSITY (upa)	UNITS	PEOPLE	Trip Rate	In	Out	Total	Trip Rate	In	Out	Total
A	128.55	7%	0.35	89	135	0.7 trips/unit (20%in/80%out)	12	50	62	1 trips/unit (66%in/34%out)	59	30	89
B	122.23	7%	0.7	86	257	0.7 trips/unit (20%in/80%out)	12	48	60	1 trips/unit (66%in/34%out)	56	29	86
C	24.97	1%	0.175	4	13	0.7 trips/unit (20%in/80%out)	1	2	3	1 trips/unit (66%in/34%out)	3	1	4
D	41.63	2%	0.7	29	87	0.7 trips/unit (20%in/80%out)	4	16	20	1 trips/unit (66%in/34%out)	19	10	29
E	68.12	4%	0.7	48	143	0.7 trips/unit (20%in/80%out)	7	27	33	1 trips/unit (66%in/34%out)	31	16	48
F	38.79	2%	0.35	14	41	0.7 trips/unit (20%in/80%out)	2	8	10	1 trips/unit (66%in/34%out)	9	5	14
G	616.39	34%	5.7	3,513	10,540	0.7 trips/unit (20%in/80%out)	492	1968	2459	1 trips/unit (66%in/34%out)	2319	1195	3513
H	264.57	15%	0.175	46	139	0.7 trips/unit (20%in/80%out)	6	26	32	1 trips/unit (66%in/34%out)	31	16	46
I	121.61	7%	2.4	294	730	0.7 trips/unit (20%in/80%out)	41	165	206	1 trips/unit (66%in/34%out)	194	100	294
J	369.09	21%	3	1,107	2,215	0.7 trips/unit (20%in/80%out)	155	620	775	1 trips/unit (66%in/34%out)	731	376	1107
TOTAL	1795.95	100%		5,230	14,299		732	2,929	3,661		3,452	1,778	5,230

From the above table, full build out of the Glenbow Ranch area would represent a population of 14,299 people. Therefore, 7% build out of Glenbow Ranch in 2028 would represent 1,001 people and 18% build out of Glenbow Ranch in 2039 would represent 2,574 people. Table 4.2 summarizes the number of single family units in the Glenbow Ranch area that are added to the City Forecasts in the background.

Table 4.2: Additional Glenbow Units to be Added to Background

HORIZON	CITY FORECAST POPULATION	GLENBOW BUILD OUT		DIFFERENCE FROM CITY FORECASTS	ADDITIONAL UNITS TO BE ADDED TO BACKGROUND
		Percentage	Population		
2028	917	7%	1,001	84	31
2039	1232	18%	2,574	1,342	491

The trips generated by the 31 additional units added to the 2028 City Forecasts and the 491 additional units added to the 2039 City Forecasts were calculated using the City of Calgary single family trip rate shown in **Table 4.3**. The trips were added to intersections as through volumes on Highway 1A with inbound trips heading west and outbound trips heading east.

[2] *Glenbow Ranch ASP Network Analysis – Additional Analysis Related to City of Calgary Comments*, Watt Consulting Group, January 2017.

[3] *Glenbow Ranch ASP Network Analysis*, Watt Consulting Group, July 2016.

Table 4.3: Trip Generation Rates

USE	AM PEAK HOUR	PM PEAK HOUR	DATA SOURCE
Single Family Residential	0.7 per unit *(20% In, 80% Out)*	1.00 per unit *(66% In, 34% Out)*	City of Calgary

Bearspaw Road & Township Road 254

The volumes for the intersection were taken from the 2017 TIA. The 2025 counts were used for the 2028 horizon with all volumes grown linearly by 1% per year for 3 years. Additionally, the 2035 counts were used for the 2039 horizon with all volumes grown linearly by 1% per year for 4 years.

Bearspaw Road & Highway 1A

Volumes for the intersection of Bearspaw Road & Highway 1A were taken from the AT 2019 100th Highest Hour counts, included in **Appendix C**. Based on historic AT data, a linear growth rate of 2.5% was applied to the through movements on Highway 1A. All other turning volumes were grown linearly by 1% per year.

As noted in the 2017 TIA, the AT counts did not include Bearspaw school traffic. As such, movements on the south leg of the intersection were balanced up to match the counts at the Bearspaw Road & Township Road 254. School traffic was assigned at the intersection based on the following distribution:

- Outbound: 30% northbound left
- Outbound: 70% northbound through
- Inbound: 25% eastbound right
- Inbound: 50% southbound through
- Inbound: 25% westbound left

Additionally, the additional Glenbow Ranch build out volumes were added as east-west through volumes, similar to the intersection of 12 Mile Coulee Road & Highway 1A.

The Background traffic volumes are illustrated in **Exhibit 4.4** for 2028 and **Exhibit 4.5** for 2039.

4.3.2 After Development

Development generated traffic volumes (**Exhibit 3.2** – 2028 and **Exhibit 3.3** – 2039) were added to Background traffic volumes (**Exhibit 4.4** – 2028 and **Exhibit 4.5** – 2039) to forecast the After Development traffic volumes illustrated in **Exhibit 4.6** for 2028 and **Exhibit 4.7** for 2039.

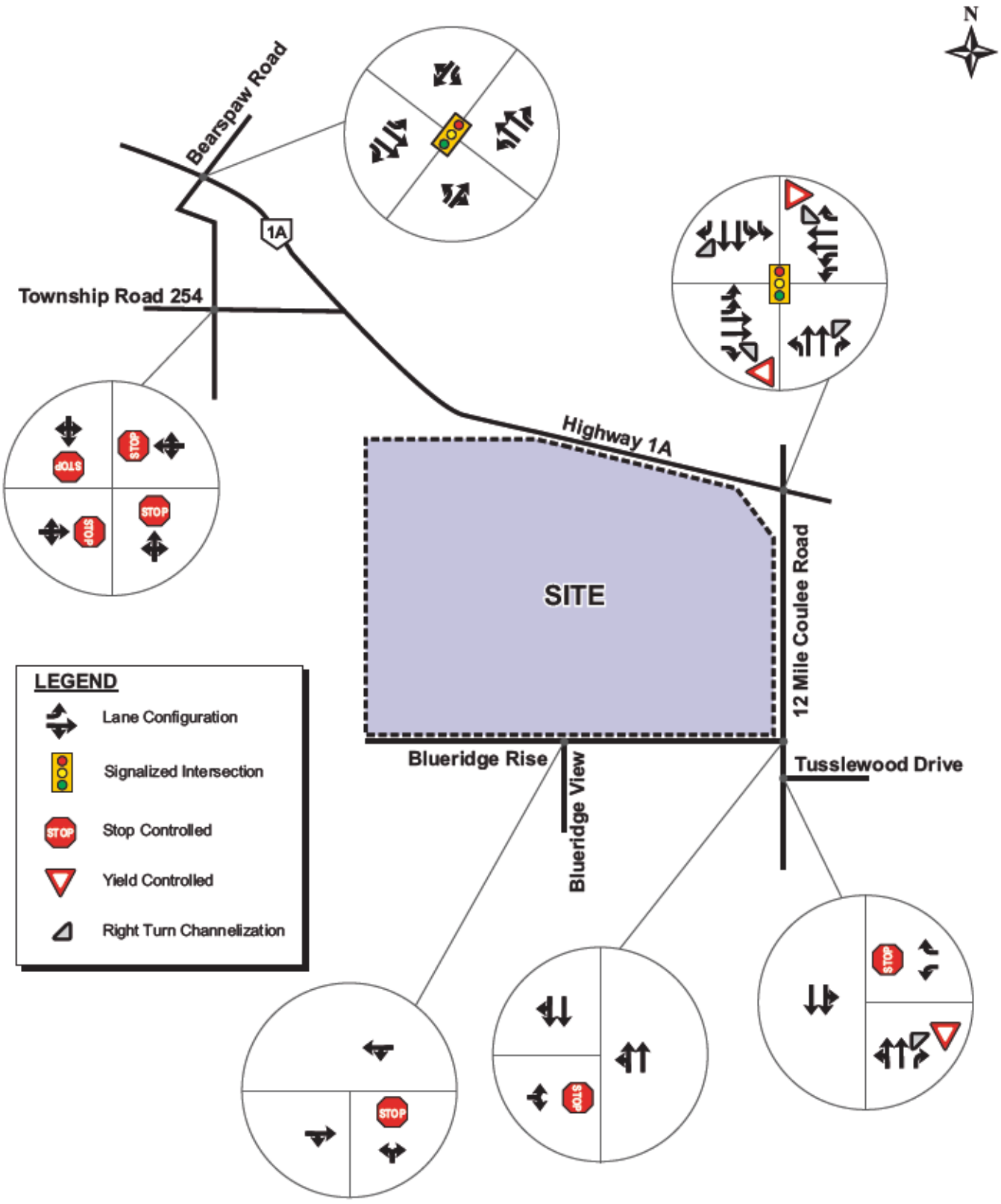


Exhibit 4.1

Existing Intersection Configurations

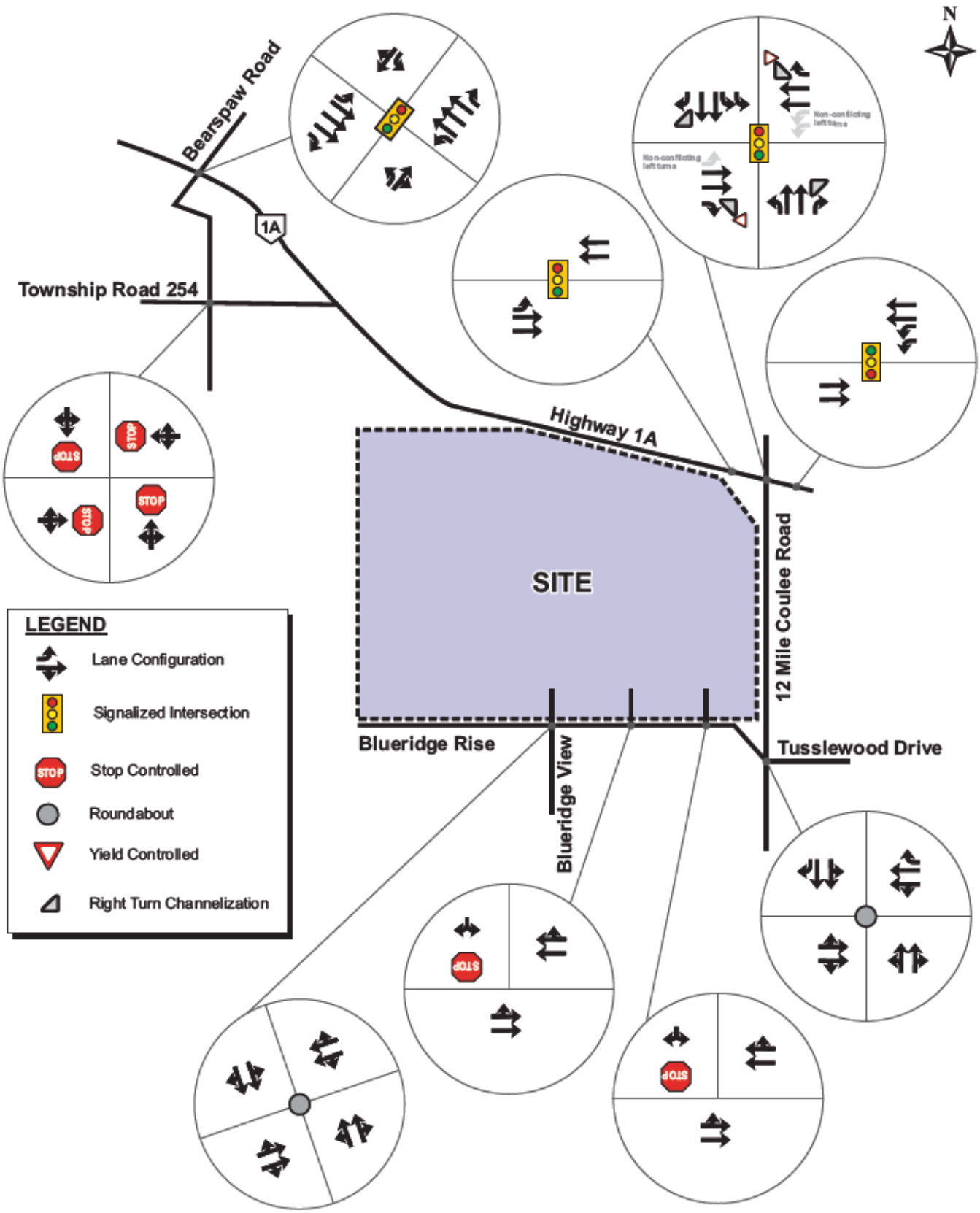


Exhibit 4.2

2028 After Development Intersection Configurations

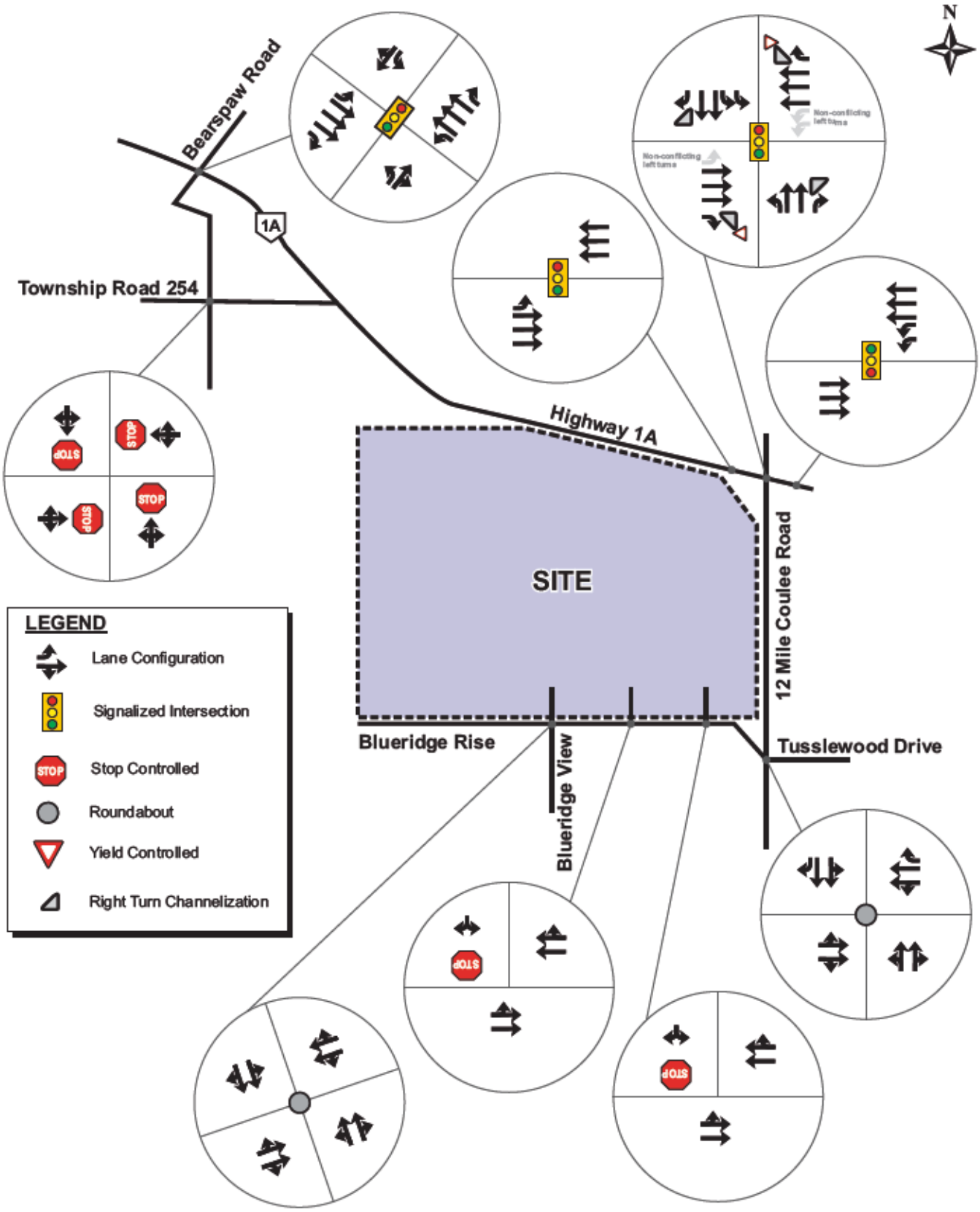


Exhibit 4.3

2039 After Development Intersection Configurations

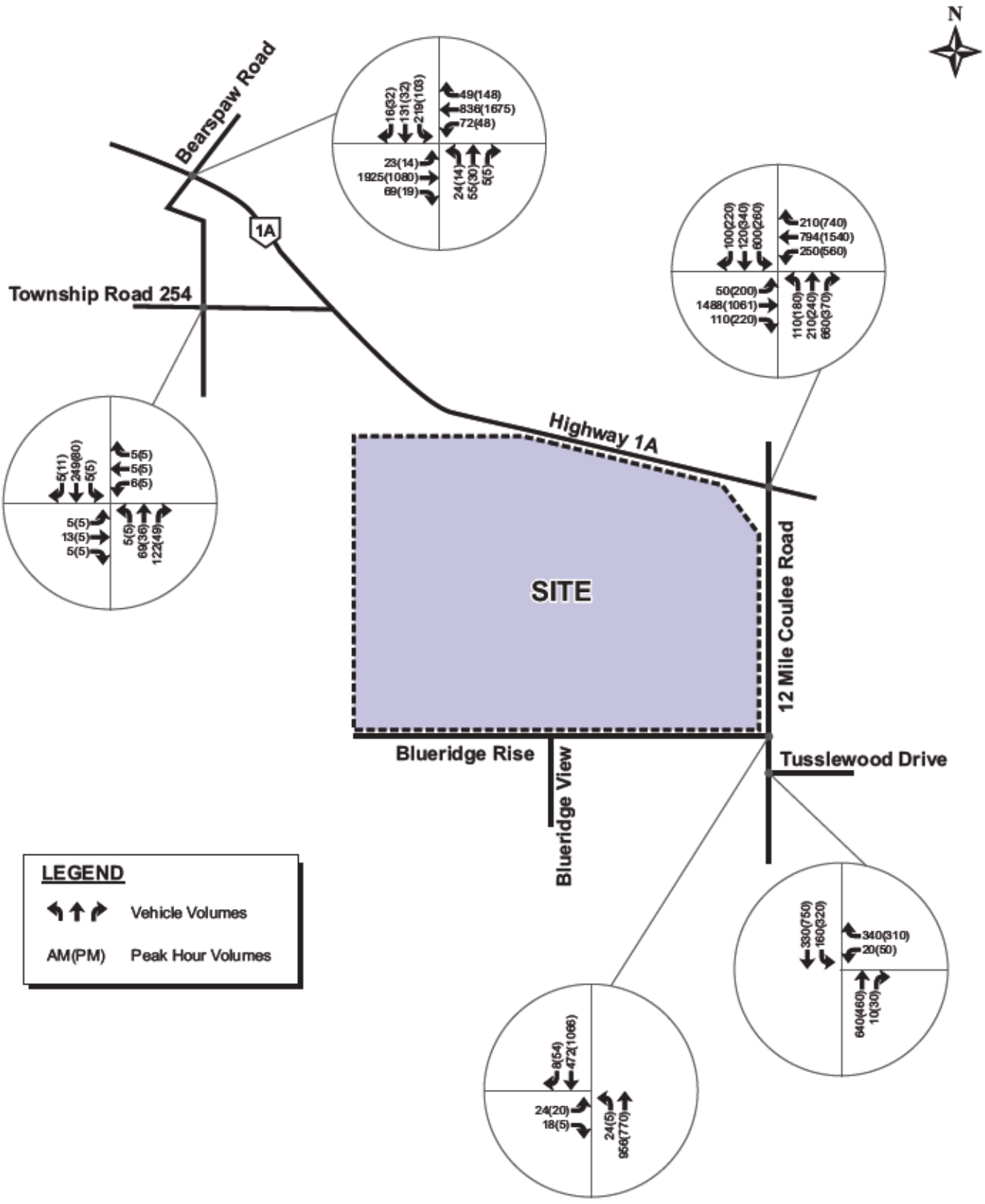


Exhibit 4.4

2028 Background Traffic Volumes

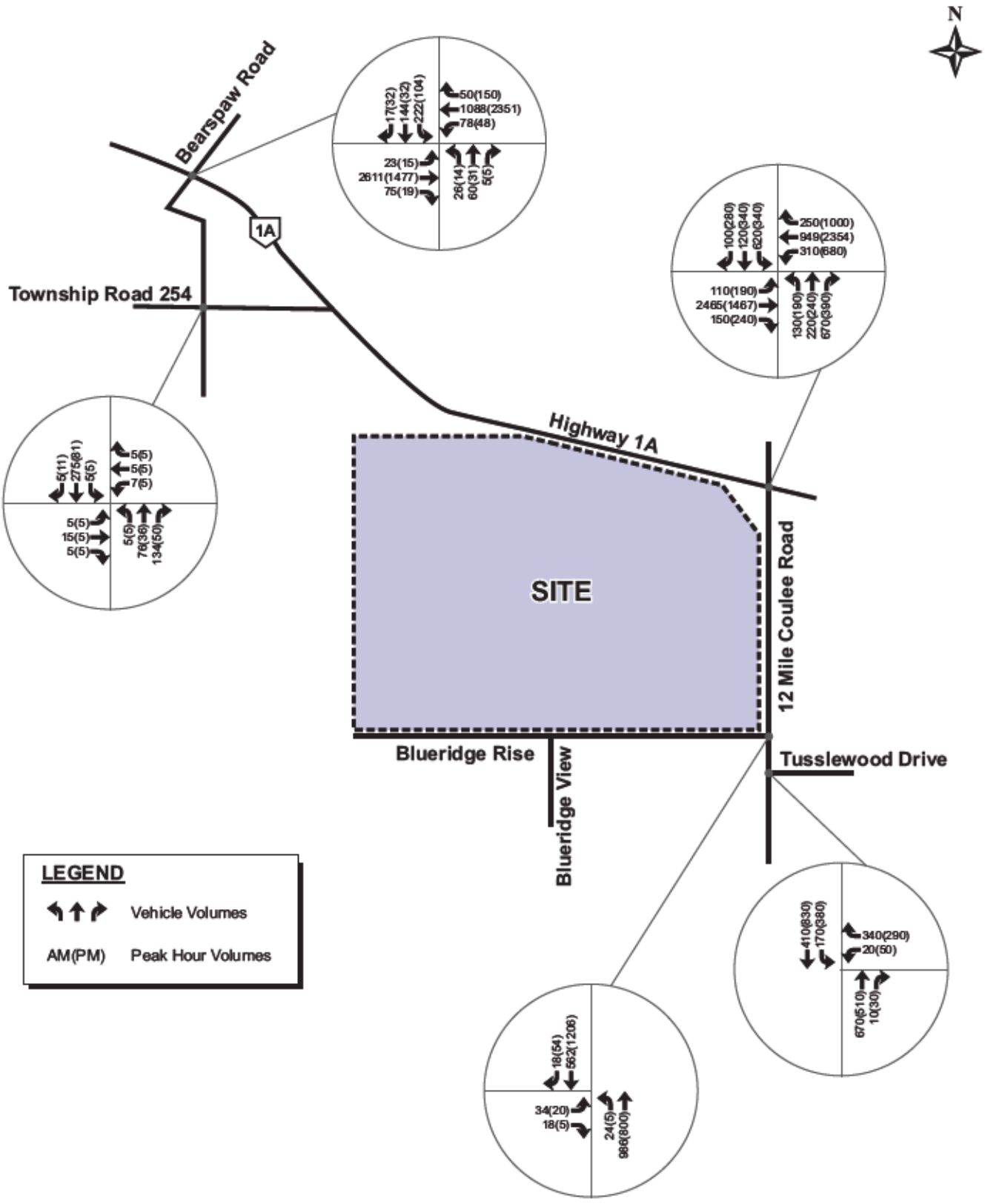


Exhibit 4.5

2039 Background Traffic Volumes

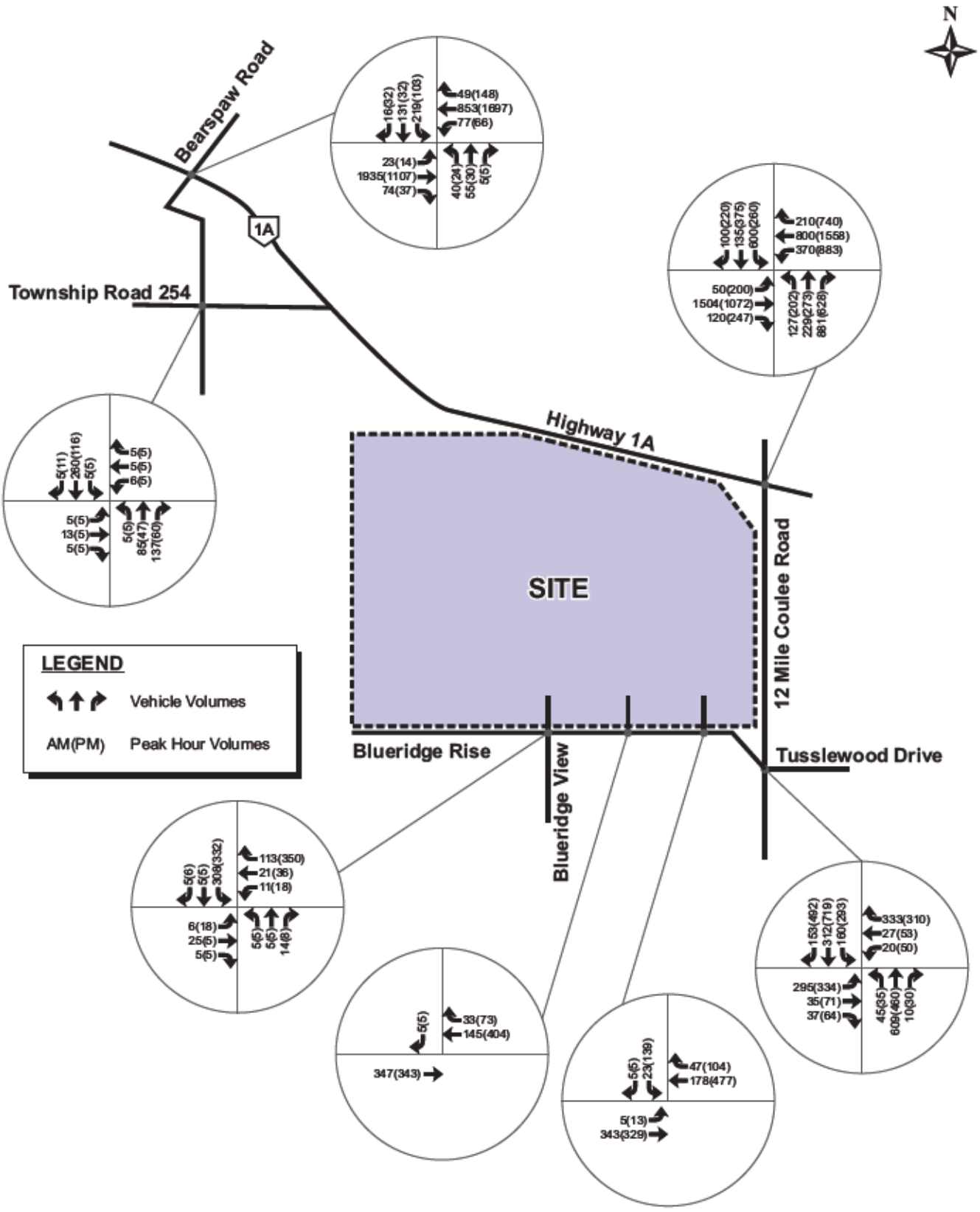


Exhibit 4.6

2028 After Development Traffic Volumes

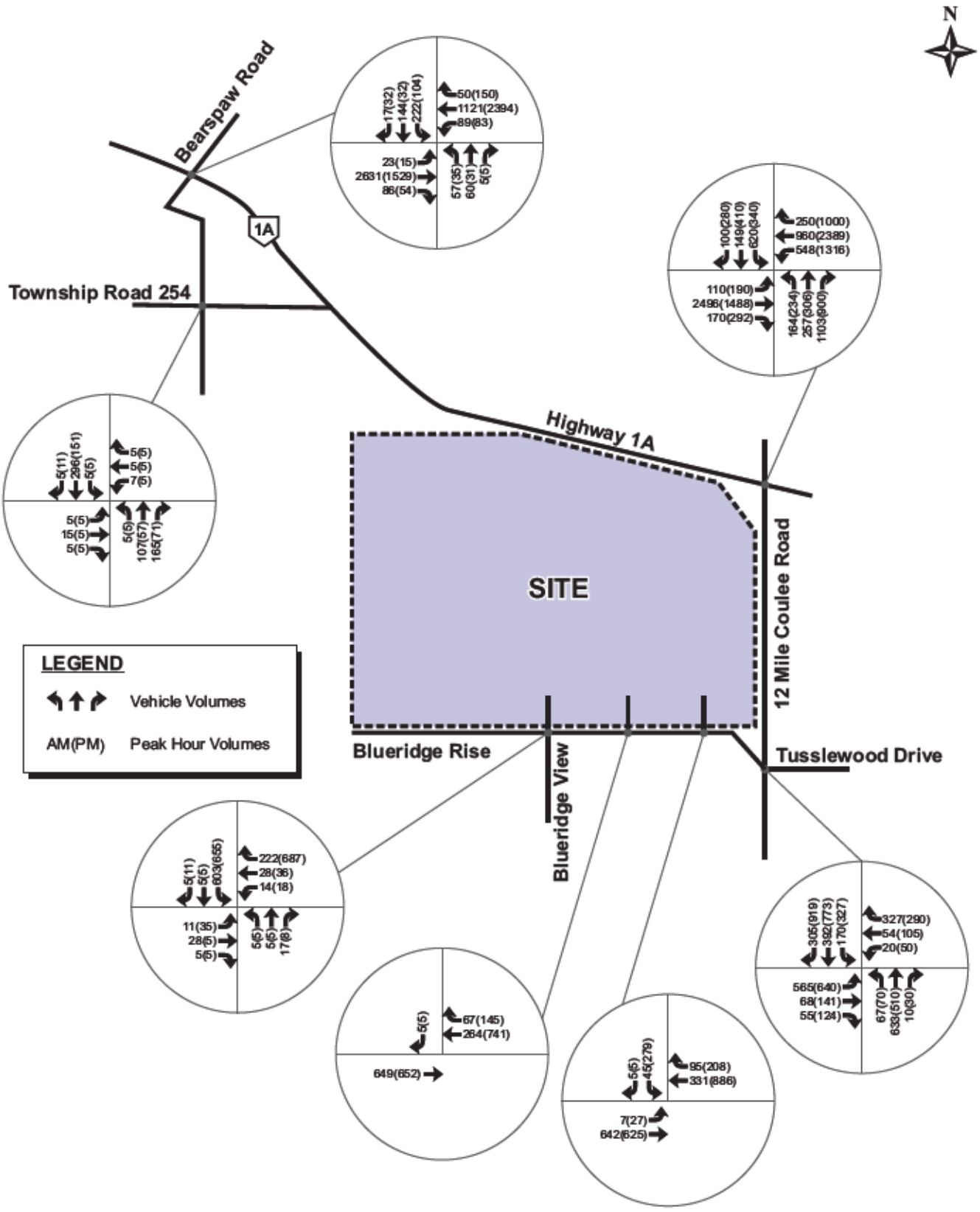


Exhibit 4.7

2039 After Development Traffic Volumes

4.4 Intersection Analysis

Intersection capacity analysis was undertaken for the study area intersections using two different traffic analysis software, Synchro and VISSIM. Both software packages analyze similar measurements of effectiveness (MOEs). The volume-to-capacity (v/c) ratio of an intersection movement represents the ratio between the demand volume and available capacity. A v/c ratio over 1.0 indicates a congested intersection where drivers may have to wait through more than one signal cycle. The Level of Service (LOS) rating is based on average vehicle delays ranging from LOS A (minimal delay) to LOS F (significant delay).

The guidelines for the three different approving authorities are shown and compared in **Table 4.4**.

Table 4.4: Traffic Operation Performance Thresholds

APPROVING AUTHORITY	SATURATION FLOW (VPH/LANE)	PEAK HOUR FACTOR (AM/PM)	PERFORMANCE THRESHOLDS	
			V/C	LOS
Alberta Transportation (AT)	1850	0.92/0.92	0.85	D
City of Calgary	1850	0.94/0.95	0.90	D
Rocky View County	1850	1.00/1.00	1.00	E

Intersections on 12 Mile Coulee Road will be reviewed based on the City's guidelines, AT guidelines will be used for the intersection of Bearspaw Road & Highway 1A, and RVC guidelines will be used for all remaining intersections. The analysis uses a minimum hourly volume of 5 vehicles per movement, 10 pedestrians per crossing, and 5 cyclists per leg.

Synchro 10 was used for the existing intersection configurations and the intersections on Bearspaw Road throughout the analysis. Synchro software is based on the methods outlined in the Highway Capacity Manual. Traffic operations were assessed using the performance measures of v/c, LOS, delay and queue length.

Synchro output reports are provided in **Appendix D**.

The second software used for intersection operation analysis was the VISSIM modelling software from PTV Group/PTV America. VISSIM is based on a "car-following" modelling logic that considers physical and psychological aspects of drivers. It is capable of analyzing multi-modal traffic with a high level of accuracy by incorporating various levels of data such as traffic counts, transit routes and schedules, traffic signal control, yield/stop control, yield/stop operation, and pedestrian movements.

Details such as speed decisions, reduced speed areas, conflict areas, and priority rules were added to the road geometry in VISSIM to produce the physical portion of the network. In addition to the physical elements, the model also includes features that reflect road user behaviour. These consist of car following parameters, lane change model, speed distribution, and acceleration profile. VISSIM uses Wiedemann car following model as default for vehicle movement. Although the parameters within the model can be manually modified to replicate the desired driving behaviour, the default values in Wiedemann 99 model were used to replicate the traffic situation for this exercise.

The intersections were evaluated by using the node evaluation features in VISSIM. The delays and queues for each movement were extracted from five simulation runs and the average between five runs was estimated.

It should be noted that v/c ratios are not available as an output in VISSIM because the volume and capacity vary at any given time in the microsimulation. The simulation produces congestion and queuing throughout the network rather than providing a demand volume. Therefore, average delays and queues are used to report the MOEs in VISSIM.

The average delay corresponds to the LOS for each movement. For signalized intersections, the range of delays for the LOS indicator are as follows:

- LOS A = Control Delay ≤ 10 seconds
- LOS B = Control Delay > 10 seconds and ≤ 20 seconds
- LOS C = Control Delay > 20 seconds and ≤ 35 seconds
- LOS D = Control Delay > 35 seconds and ≤ 55 seconds
- LOS E = Control Delay > 55 seconds and ≤ 80 seconds
- LOS F = Control Delay > 80 seconds

VISSIM was used for the continuous flow intersection and all roundabouts due to the complexity of the intersections. VISSIM output reports are provided in **Appendix E**.

4.4.1 Background Analysis

2028 Background

2028 Background intersection analysis is summarized in **Table 4.5** based on the intersection configurations illustrated in **Exhibit 4.1** and volumes illustrated in **Exhibit 4.4**.

Table 4.5: 2028 Background Intersection Analysis

INTERSECTION	MOVEMENT & LANES		AM PEAK HOUR v/c	AM LOS	AM Delay	AM Queue	PM PEAK HOUR v/c	PM LOS	PM Delay	PM Queue
Bearspaw Road & Highway 1A *(Signalized)* *Synchro*	EBL	1	0.27	E	67	16	0.10	D	37	8
	EBT	2	**1.02**	D	50	339	0.61	B	14	88
	EBR	1	0.08	A	2	<5	0.02	A	<5	0
	WBL	1	0.84	F	117	49	0.34	D	42	20
	WBT	2	0.41	B	12	76	0.84	B	17	210
	WBR	1	0.05	A	1	<5	0.15	A	2	8
	NBL	1	0.15	D	48	14	0.08	C	32	8
	NBTR	1	0.20	D	46	27	0.14	C	29	14
	SBL	1	**1.03**	F	119	117	0.55	D	44	40
	SBTR	1	0.49	D	53	58	0.24	C	21	17
	Overall		-	*D*	*45.1*	-	-	*B*	*17.1*	-
Bearspaw Road & Township Road 254 *(All-way Stop)* *Synchro*	EB	1	0.03	A	8	13	0.02	A	7	11
	WB	1	0.02	A	8	11	0.02	A	7	10
	NB	1	0.21	A	8	21	0.09	A	7	15
	SB	1	0.30	A	9	22	0.11	A	8	15
	Overall		-	*A*	*8.5*	-	-	*A*	*7.3*	-
12 Mile Coulee Road & Highway 1A *(Signalized)* *Synchro*	EBL	1	0.29	E	68	16	**1.21**	F	186	69
	EBT	2	**1.19**	F	128	373	**0.94**	E	58	233
	EBR	1	0.08	A	1	<5	0.15	A	1	<5
	WBL	1	**1.14**	F	153	82	**1.13**	F	131	151
	WBT	2	0.57	C	32	137	**1.02**	E	65	339
	WBR	1	0.15	A	1	<5	0.51	A	1	<5
	NBL	1	0.68	E	78	55	0.76	E	76	80
	NBT	2	0.36	D	46	37	0.33	D	44	42
	NBR	1	0.45	A	1	<5	0.25	A	1	<5
	SBL	2	**1.26**	F	178	173	**1.09**	F	138	81
	SBT	2	0.17	D	39	23	0.72	E	63	68
	SBR	1	0.07	A	1	<5	0.15	A	1	<5
	Overall		-	*F*	*82.6*	-	-	*E*	*59.8*	-
12 Mile Coulee Road & Blueridge Rise *(EB Stop)* *Synchro*	EB	1	0.18	C	22	<5	0.26	F	54	7
	NB	2	0.40	A	1	<5	0.32	A	1	<5
	SB	2	0.20	A	0	0	0.44	A	0	0
	Overall		-	*A*	*0.8*	-	-	*A*	*0.7*	-
12 Mile Coulee Road & Tusslewood Drive NW *(WB Stop)* *Synchro*	WB	1	0.59	E	37	30	0.82	F	168	29
	NB	2	0.20	A	0	0	0.14	A	0	0
	SB	2	0.19	B	10	5	0.33	B	10	11
	Overall		-	*A*	*5.9*	-	-	*A*	*8.4*	-

In the AM peak hour, the intersection of Bearspaw Road & Highway 1A will reach capacity in the background with the current configuration. As a mitigation measure, it is recommended Highway 1A be widened to three through eastbound and westbound lanes. Additionally, a southbound left permitted-protected phase would facilitate southbound traffic. The same recommendations were made for the 2025 horizon in the Glenbow Reports and the 2017 Ascension TIA.

As well, the intersection of 12 Mile Coulee Road & Highway 1A will reach capacity limits for many movements in both peak hours. A Continuous Flow Intersection (CFI) is proposed at this intersection for the 2028 background horizon. Also known as a Crossover Displaced Left-Turn, it is an alternative design to the standard signalized intersection. The basic operation of the intersection is the same as a traditional

at-grade signalized intersection, with the exception of the left turning vehicles on the main road (Highway 1A). Two additional minor signalized intersections are added on either side of the main intersection, where the left turning vehicles cross the opposing through traffic. The left turning vehicles then proceed to the main intersection, where they are now on the leftmost side of the approach. This allows both the through and left turning movements in both major directions (east and westbound in this case) to use the intersection at the same time.

The primary advantage of a CFI intersection is that the capacity of the intersection can be increased at a significantly lower cost compared to a full interchange, while a potential disadvantage of this intersection is that it may be initially confusing for drivers. Another benefit of this configuration is that it would be able to be accommodated within the existing ROW and would not require any additional land.

Meanwhile, the intersection of 12 Mile Coulee Road & Tusslewood Drive NW is approaching capacity in the PM peak hour. Based on the signal warrant results in **Table 4.12**, the intersection warrants signalization at this horizon. However, signalization is not recommended at this horizon as a roundabout is proposed to be built along with the development of the Ascension site.

The results for the analysis of the proposed improvements are summarized in **Table 4.6**. The improvements are carried through the report to future horizons.

Table 4.6: 2028 Background Intersection Analysis - Improved

INTERSECTION	MOVEMENT & LANES		AM PEAK HOUR				PM PEAK HOUR			
			v/c	LOS	Delay	Queue	v/c	LOS	Delay	Queue
Bearspaw Road & Highway 1A *(Signalized)* *Synchro*	EBL	1	0.20	E	57	15	0.08	C	34	8
	EBT	3	0.83	C	26	170	0.47	B	17	67
	EBR	1	0.09	A	1	1	0.02	A	<5	0
	WBL	1	0.57	E	71	41	0.27	D	36	18
	WBT	3	0.34	B	15	54	0.63	B	16	135
	WBR	1	0.06	A	1	<5	0.16	A	2	8
	NBL	1	0.18	D	51	15	0.06	C	29	7
	NBTR	1	0.29	D	51	27	0.11	C	26	12
	SBL	1	0.63	D	43	71	0.29	C	21	24
	SBTR	1	0.37	D	38	50	0.15	B	13	13
	Overall		-	*C*	*25.8*	-	-	*B*	*16.4*	-
12 Mile Coulee Road & Highway 1A *(CFI – Main Intersection)* *VISSIM*	EBL	1	-	A	1	9	-	A	1	<5
	EBT	2	-	B	21	211	-	C	20	130
	EBR	1	-	A	1	<5	-	A	1	10
	WBL	1	-	C	34	69	-	C	33	133
	WBT	2	-	C	20	110	-	C	21	225
	WBR	1	-	A	1	13	-	A	4	14
	NBL	1	-	E	73	100	-	E	68	88
	NBT	2	-	E	59	85	-	E	56	88
	NBR	1	-	A	1	<5	-	A	1	<5
	SBL	2	-	E	59	123	-	E	60	62
	SBT	2	-	D	44	34	-	D	54	79
	SBR	1	-	A	1	<5	-	A	1	<5
	Overall		-	*C*	*25.7*	-	-	*B*	*23.5*	-
12 Mile Coulee Road & Highway 1A *(CFI – East Intersection)* *VISSIM*	EBT	2	-	A	4	133	-	A	7	80
	WBL	2	-	E	67	67	-	E	59	129
	Overall		-	*B*	*10.7*	-	-	C	*22.3*	-
12 Mile Coulee Road & Highway 1A *(CFI – West Intersection)* *VISSIM*	WBT	2	-	A	1	28	-	A	1	29
	EBL	1	-	E	65	40	-	E	73	116
	Overall		-	*A*	*3.7*	-	-	A	*8.6*	-

2039 Background

2039 Background intersection analysis is summarized in **Table 4.7** based on the volumes illustrated in **Exhibit 4.5**.

Table 4.7: 2039 Background Intersection Analysis

INTERSECTION	MOVEMENT & LANES		AM PEAK HOUR v/c	AM LOS	AM Delay	AM Queue	PM PEAK HOUR v/c	PM LOS	PM Delay	PM Queue
Bearspaw Road & Highway 1A *(Signalized)* *Synchro*	EBL	1	0.29	E	78	18	0.11	D	44	10
	EBT	3	**0.95**	C	34	299	0.54	B	15	97
	EBR	1	0.08	A	1	<5	0.02	A	1	0
	WBL	1	0.77	F	107	56	0.37	D	50	22
	WBT	3	0.36	B	12	70	0.81	C	21	228
	WBR	1	0.05	A	1	<5	0.15	A	3	10
	NBL	1	0.28	E	73	19	0.08	D	39	9
	NBTR	1	0.45	E	73	36	0.15	D	36	16
	SBL	1	**0.89**	F	87	118	0.38	C	32	32
	SBTR	1	0.56	E	61	72	0.19	B	19	17
	Overall		-	*C*	*33.6*	-	-	*B*	*18.9*	-
Bearspaw Road & Township Road 254 *(All-way Stop)* *Synchro*	EB	1	0.03	A	8	13	0.02	A	7	11
	WB	1	0.02	A	8	11	0.02	A	7	11
	NB	1	0.24	A	8	23	0.10	A	7	14
	SB	1	0.34	A	9	24	0.11	A	8	15
	Overall		-	*A*	*8.8*	-	-	*A*	*7.3*	-
12 Mile Coulee Road & Highway 1A *(CFI – Main Intersection)* *VISSIM*	EBL	1	-	A	1	9	-	A	1	<5
	EBT	2	-	C	22	**579**	-	C	21	197
	EBR	1	-	A	1	<5	-	A	1	6
	WBL	1	-	D	36	86	-	C	31	151
	WBT	2	-	C	21	120	-	C	21	**514**
	WBR	1	-	A	1	15	-	A	6	**505**
	NBL	1	-	E	69	81	-	E	69	111
	NBT	2	-	E	60	62	-	E	58	68
	NBR	1	-	A	1	<5	-	A	1	<5
	SBL	2	-	E	60	137	-	E	61	80
	SBT	2	-	D	47	36	-	D	56	97
	SBR	1	-	A	1	<5	-	A	1	<5
	Overall		-	C	*25.2*	-	-	*E*	*59.8*	-
12 Mile Coulee Road & Highway 1A *(CFI – East Intersection)* *VISSIM*	EBT	2	-	A	8	246	-	A	8	107
	WBL	2	-	E	64	86	-	E	57	130
	Overall		-	*B*	*13.0*	-	-	*C*	*21.3*	-
12 Mile Coulee Road & Highway 1A *(CFI – West Intersection)* *VISSIM*	WBT	2	-	A	1	28	-	A	1	35
	EBL	1	-	E	72	79	-	E	69	109
	Overall		-	*A*	*7.1*	-	-	*A*	*6.1*	-
12 Mile Coulee Road & Blueridge Rise *(EB Stop)* *Synchro*	EB	1	0.28	D	30	8	0.34	F	74	10
	NB	2	0.41	A	1	<5	0.33	A	1	<5
	SB	2	0.23	A	0	0	0.50	A	0	0
	Overall		-	*A*	*1.1*	-	-	*A*	*0.9*	-
12 Mile Coulee Road & Tusslewood Drive NW *(WB Stop)* *Synchro*	WB	1	0.61	E	44	31	**1.31**	F	401	40
	NB	2	0.21	A	0	0	0.16	A	0	0
	SB	2	0.21	B	10	5	0.41	B	11	15
	Overall		-	*A*	*5.8*	-	-	*B*	*13.7*	-

In the AM peak hour, the intersection of Bearspaw Road & Highway 1A will approach capacity in the 2039 background as a six-lane roadway. A possible mitigation measure for this intersection is an interchange,

which is considered in the Glenbow Ranch ASP[4]. An interchange should be looked at by AT and RVC for this intersection based on background volumes.

At the intersection of 12 Mile Coulee Road & Highway 1A, the background traffic intersection analysis indicates there will be queueing issues with the EBT and WBT movements. To mitigate the long eastbound and westbound through queues on Highway 1A/Crowchild Trail, the intersection was analyzed with 6 through lanes on Crowchild.

Also, the westbound movement at the intersection of 12 Mile Coulee Road & Tusslewood Drive NW is at capacity in the PM peak hour. As noted in the 2028 Background, the intersection warrants signalization. However, signalization is not recommended at this horizon as a roundabout is proposed to be built along with the development of the Ascension site.

The results for the analysis of the proposed improvements are summarized in **Table 4.8**. The improvements are carried through the report to future horizons.

Table 4.8: 2039 Background Intersection Analysis - Improved

INTERSECTION	MOVEMENT & LANES		AM PEAK HOUR				PM PEAK HOUR			
			v/c	LOS	Delay	Queue	v/c	LOS	Delay	Queue
12 Mile Coulee Road & Highway 1A *(CFI – Main Intersection)* *VISSIM*	EBL	1	-	A	1	9	-	A	1	34
	EBT	3	-	B	23	243	-	C	19	115
	EBR	1	-	A	1	<5	-	A	1	9
	WBL	1	-	C	36	87	-	C	31	160
	WBT	3	-	C	19	78	-	C	21	291
	WBR	1	-	A	1	9	-	A	3	184
	NBL	1	-	E	69	81	-	E	69	111
	NBT	2	-	E	60	65	-	E	58	67
	NBR	1	-	A	1	<5	-	A	1	<5
	SBL	2	-	E	60	137	-	E	61	80
	SBT	2	-	D	47	36	-	D	56	98
	SBR	1	-	A	1	<5	-	A	1	<5
	Overall		-	*C*	*25.3*	-	-	*B*	*23.5*	-
12 Mile Coulee Road & Highway 1A *(CFI – East Intersection)* *VISSIM*	EBT	3	-	A	4	112	-	A	8	75
	WBL	2	-	E	64	86	-	E	56	138
	Overall		-	*A*	*9.9*	-	-	C	*20.9*	-
12 Mile Coulee Road & Highway 1A *(CFI – West Intersection)* *VISSIM*	WBT	3	-	A	1	21	-	A	2	28
	EBL	1	-	E	71	81	-	E	70	106
	Overall		-	*A*	*7.1*	-	-	A	*6.4*	-

[4] *Glenbow Ranch Area Structure Plan*, Rocky View County, 2017.

Background Summary

2028 Background

- *Bearspaw Road & Highway 1A* – The intersection will reach capacity in the AM peak hour with the current intersection configurations. A six-lane Highway 1A and a permitted-protected southbound left turn will allow the intersection to operate within acceptable capacity limits. The same mitigation measures were noted in the Glenbow Reports and 2017 Ascension TIA for the 2025 Background.
- *12 Mile Coulee Road & Highway 1A* – The intersection will be operating at capacity with the current intersection configurations. A continuous flow intersection (CFI) is proposed and the intersection will operate within acceptable capacity limits with the CFI configuration.
- *12 Mile Coulee Road & Tusslewood Drive NW* – The westbound movement will approach capacity. While the intersection warrants signalization at this horizon, the roundabout proposed in the After Development will serve as the mitigation measure.
- *All other intersections* – Are expected to operate within acceptable capacity limits.

2039 Background

- *Bearspaw Road & Highway 1A* – The intersection will reach capacity in the AM peak hour with the six-lane Highway 1A. As noted in the Glenbow ASP, an interchange should be considered for the intersection.
- *12 Mile Coulee Road & Highway 1A* – The CFI will experience very large queues (>500 metres) in the eastbound and westbound directions. Widening Highway 1A from four to six lanes through the intersection will improve the intersection.
- *12 Mile Coulee Road & Tusslewood Drive NW* – The westbound movement will operate at capacity. While the intersection warrants signalization at this horizon, the roundabout proposed in the After Development will serve as the mitigation measure.
- *All other intersections* – Are expected to operate within acceptable capacity limits.

4.4.2 After Development Analysis

2028 After Development

- 2028 After Development intersection analysis is summarized in **Table 4.9** based on the volumes illustrated in **Exhibit 4.6** and the intersection configurations illustrated in **Exhibit 4.2**.

Table 4.9: 2028 After Development Intersection Analysis

INTERSECTION	MOVEMENT & LANES		AM PEAK HOUR v/c	AM LOS	AM Delay	AM Queue	PM PEAK HOUR v/c	PM LOS	PM Delay	PM Queue
Bearspaw Road & Highway 1A *(Signalized)* *Synchro*	EBL	1	0.21	E	60	15	0.08	C	34	8
	EBT	3	0.83	C	28	182	0.48	B	17	70
	EBR	1	0.09	A	1	<5	0.04	A	1	0
	WBL	1	0.55	E	69	41	0.36	D	38	23
	WBT	3	0.34	B	15	57	0.64	B	16	138
	WBR	1	0.06	A	1	<5	0.16	A	2	8
	NBL	1	0.30	E	57	22	0.11	C	30	10
	NBTR	1	0.29	D	53	28	0.11	C	27	12
	SBL	1	0.63	D	45	74	0.30	C	21	24
	SBTR	1	0.38	D	40	51	0.15	B	14	13
	Overall		-	*C*	*27.1*	-	-	*B*	*16.7*	-
Bearspaw Road & Township Road 254 *(All-way Stop)* *Synchro*	EB	1	0.03	A	8	13	0.02	A	7	11
	WB	1	0.02	A	8	12	0.02	A	7	11
	NB	1	0.25	A	8	23	0.12	A	7	15
	SB	1	0.32	A	9	23	0.15	A	8	16
	Overall		-	*A*	*8.7*	-	-	*A*	*7.5*	-
12 Mile Coulee Road & Highway 1A *(CFI – Main Intersection)* *VISSIM*	EBL	1	-	A	1	24	-	A	1	9
	EBT	2	-	C	25	184	-	C	22	194
	EBR	1	-	A	1	<5	-	A	1	28
	WBL	1	-	D	40	123	-	C	30	232
	WBT	2	-	C	24	110	-	C	23	245
	WBR	1	-	A	1	<5	-	A	2	76
	NBL	1	-	E	69	92	-	E	66	131
	NBT	2	-	E	57	78	-	E	61	99
	NBR	1	-	A	2	<5	-	A	1	<5
	SBL	2	-	E	59	142	-	E	58	82
	SBT	2	-	D	46	47	-	D	55	90
	SBR	1	-	A	1	<5	-	A	1	41
	Overall		-	C	*27.7*	-	-	*C*	*24.2*	-
12 Mile Coulee Road & Highway 1A *(CFI – East Intersection)* *VISSIM*	EBT	2	-	A	5	124	-	B	10	118
	WBL	2	-	E	64	93	-	D	49	200
	Overall		-	*B*	*13.9*	-	-	*C*	*26.0*	-
12 Mile Coulee Road & Highway 1A *(CFI – West Intersection)* *VISSIM*	WBT	2	-	A	1	15	-	A	2	31
	EBL	1	-	E	75	72	-	E	70	138
	Overall		-	*A*	*4.3*	-	-	*A*	*8.1*	-
12 Mile Coulee Road & Blueridge Rise/ Tusslewood Drive NW *(Roundabout)* *VISSIM*	EB	2	-	A	4	69	-	B	11	122
	WBR	1	-	A	2	37	-	A	2	17
	WB	2	-	A	7	47	-	A	8	85
	NB	2	-	A	3	38	-	A	4	47
	SBR	1	-	A	3	75	-	A	7	159
	SB	2	-	A	3	56	-	A	6	159
	Overall		-	*A*	*3.2*	-	-	*A*	*6.4*	-
Blueridge Rise & Access 1 *(SB Stop)* *VISSIM*	EB	2	-	A	3	5	-	A	9	14
	WB	2	-	A	1	10	-	A	1	24
	SB	1	-	A	8	26	-	B	13	56
	Overall		-	*A*	*0.4*	-	-	*A*	*1.8*	-

Blueridge Rise & Access 2 (Right-in/Right-out) *(SB Stop)* *VISSIM*	EB	2	-	A	1	<5	-	A	1	10
	WB	2	-	A	1	5	-	A	1	14
	SB	1	-	A	1	<5	-	A	1	6
	Overall		-	*A*	*0.1*	-	-	*A*	*0.2*	-
Blueridge Rise & Blueridge View *(Roundabout)* *VISSIM*	EB	2	-	A	4	27	-	A	4	22
	WB	2	-	A	2	30	-	A	5	34
	NB	2	-	A	5	19	-	A	3	21
	SB	2	-	A	2	23	-	A	2	23
	Overall		-	*A*	*1.8*	-	-	*A*	*2.6*	-

2039 After Development

- 2039 After Development intersection analysis is summarized in **Table 4.10** based on the volumes illustrated in **Exhibit 4.7** and the intersection configurations illustrated in **Exhibit 4.3**.

Table 4.10: 2039 After Development Intersection Analysis

INTERSECTION	MOVEMENT & LANES		AM PEAK HOUR				PM PEAK HOUR			
			v/c	LOS	Delay	Queue	v/c	LOS	Delay	Queue
Bearspaw Road & Highway 1A *(Signalized)* *Synchro*	EBL	1	0.30	E	79	18	0.12	D	45	10
	EBT	3	**0.96**	D	36	305	0.62	C	21	112
	EBR	1	0.09	A	2	6	0.06	A	1	0
	WBL	1	**0.92**	F	136	65	0.49	D	51	32
	WBT	3	0.38	B	12	72	0.84	C	22	235
	WBR	1	0.05	A	1	<5	0.15	A	3	10
	NBL	1	0.60	F	89	36	0.22	D	42	17
	NBTR	1	0.43	E	71	36	0.16	D	36	16
	SBL	1	**0.89**	F	87	116	0.38	C	32	32
	SBTR	1	0.53	E	61	72	0.17	B	19	17
	Overall		-	*C*	*35.8*	-	-	*C*	*21.9*	-
Bearspaw Road & Township Road 254 *(All-way Stop)* *Synchro*	EB	1	0.04	A	8	12	0.02	A	8	11
	WB	1	0.02	A	8	11	0.02	A	8	11
	NB	1	0.31	A	9	22	0.14	A	8	16
	SB	1	0.37	A	10	23	0.19	A	8	19
	Overall		-	*A*	*9.2*	-	-	*A*	*7.8*	-
12 Mile Coulee Road & Highway 1A *(CFI – Main Intersection)* *VISSIM*	EBL	1	-	A	1	20	-	A	1	20
	EBT	3	-	C	25	224	-	C	22	162
	EBR	1	-	A	1	<5	-	A	4	83
	WBL	1	-	D	40	149	-	C	23	267
	WBT	3	-	C	22	101	-	C	23	276
	WBR	1	-	A	1	11	-	A	5	218
	NBL	1	-	E	68	103	-	E	62	237
	NBT	2	-	E	59	82	-	E	58	116
	NBR	1	-	A	2	<5	-	A	1	<5
	SBL	2	-	E	59	189	-	E	58	120
	SBT	2	-	D	47	63	-	E	55	130
	SBR	1	-	A	1	<5	-	A	1	<5
	Overall		-	C	*26.6*	-	-	*C*	*22.7*	-
12 Mile Coulee Road & Highway 1A *(CFI – East Intersection)* *VISSIM*	EBT	3	-	A	7	130	-	B	14	92
	WBL	2	-	E	59	127	-	D	38	261
	Overall		-	*B*	*14.8*	-	-	*C*	*23.8*	-

12 Mile Coulee Road & Highway 1A *(CFI – West Intersection)* *VISSIM*	WBT	3	-	A	1	17	-	A	2	25
	EBL	1	-	E	64	92	-	E	70	124
	Overall		-	*A*	*6.7*	-	-	*A*	*6.3*	-
12 Mile Coulee Road & Blueridge Rise/ Tusslewood Drive NW *(Roundabout)* *VISSIM*	EB	2	-	A	8	79	-	D	48	77
	WBR	1	-	A	2	31	-	A	3	35
	WB	2	-	B	16	62	-	C	25	109
	NB	2	-	A	7	56	-	A	9	71
	SBR	1	-	A	5	114	-	B	12	288
	SB	2	-	A	4	94	-	A	6	288
	Overall		-	*A*	*5.5*	-	-	*B*	*17.3*	-
Blueridge Rise & Access 1 *(SB Stop)* *VISSIM*	EB	2	-	A	5	5	-	E	34	18
	WB	2	-	A	1	14	-	A	1	56
	SB	1	-	B	10	31	-	E	40	118
	Overall		-	*A*	*0.6*	-	-	*A*	*6.3*	-
Blueridge Rise & Access 2 (Right-in/Right-out) *(SB Stop)* *VISSIM*	EB	2	-	A	1	<5	-	A	1	10
	WB	2	-	A	1	15	-	A	1	17
	SB	1	-	A	1	7	-	A	2	10
	Overall		-	*A*	*0.1*	-	-	*A*	*0.2*	-
Blueridge Rise & Blueridge View *(Roundabout)* *VISSIM*	EB	2	-	A	6	32	-	B	10	27
	WB	2	-	A	3	27	-	A	6	39
	NB	2	-	A	6	25	-	C	16	29
	SB	2	-	A	2	37	-	A	4	38
	Overall		-	*A*	*2.7*	-	-	*A*	*4.5*	-

2039 After Development - Sensitivity

Sensitivity analysis was performed on the intersection of 12 Mile Coulee Road & Highway 1A if the intersection was constructed as a PARCLO interchange. Results from the 2039 After Development intersection sensitivity analysis are summarized in **Table 4.11** with the volumes based once again on **Exhibit 4.7**.

Table 4.11: 2039 After Development Intersection Analysis - Sensitivity

INTERSECTION	MOVEMENT & LANES		AM PEAK HOUR				PM PEAK HOUR			
			v/c	LOS	Delay	Queue	v/c	LOS	Delay	Queue
12 Mile Coulee Road & Highway 1A *(North - Signalized)* *Synchro*	WBL	2	0.47	B	16	37	0.78	B	15	81
	NBT	2	0.22	A	7	15	0.45	C	21	42
	SBT	2	0.47	B	11	41	0.69	C	21	56
	Overall		-	B	*11.8*	-	-	*B*	*17.9*	-
12 Mile Coulee Road & Highway 1A *(South - Signalized)* *Synchro*	EBL	2	0.12	B	16	10	0.24	C	21	18
	NBT	2	0.23	A	7	18	0.26	A	6	20
	SBT	2	0.38	A	6	24	0.84	B	14	109
	Overall		-	*A*	*7.1*	-	-	*B*	*12.7*	-

After Development Summary

2028 After Development

- *All intersections* – Are expected to operate within acceptable capacity limits with the improvements made in the 2028 Background and the roundabout implemented on 12 Mile Coulee Road.

2039 After Development

- *All intersections* – Are expected to operate within acceptable capacity limits with the improvements made in the 2039 Background.

2039 After Development - Sensitivity

- *12 Mile Coulee Road & Highway 1A* – Both signalized intersections will operate within acceptable capacity limits and much lower queues compared to the CFI design.

4.5 Signal Warrant Analysis

Signal warrant analysis was completed for three study intersections based on the methods outlined in the Transportation Association of Canada (TAC) *Traffic Signal and Pedestrian Signal Head Warrant Handbook* (2014). Under TAC methodology, a score of 100 points or more indicates a traffic signal is warranted. The signal warrant analysis is summarized in **Table 4.12** and included in **Appendix F**.

Table 4.12: Signal Warrant Analysis

INTERSECTION	HORIZON	SIGNAL WARRANT SCORE			COMMENT
		Total	Vehicle	Pedestrian	
12 Mile Coulee Rd & Blueridge Rise	2028 Background	21/100	21	0	Not warranted
	2039 Background	27/100	27	0	Not warranted
12 Mile Coulee Rd & Tusslewood Dr NW	2028 Background	141/100	141	0	Warranted
Access 1 & Blueridge Rise	2028 After Dev.	23/100	23	0	Not warranted
	2039 After Dev.	85/100	85	0	Not warranted

Signal warrant analysis confirms that a traffic signal is warranted at 12 Mile Coulee Road & Tusslewood Drive NW in the 2028 Background horizon. However, a signal is not warranted at the 12 Mile Coulee Road & Blueridge Rise before the implementation of a roundabout. Site Access 1 off Blueridge Rise does not warrant signalization in the After Development horizons.

4.6 Illumination Warrants

The intersections of Highway 1A with Bearspaw Road and 12 Mile Coulee Road are already illuminated, and the addition of the CFI will require revised illumination at the intersection with 12 Mile Coulee Road.

The intersections of 12 Mile Coulee Road with Blueridge Rise and Tusslewood Drive are currently illuminated, and 12 Mile Coulee Road is illuminated through median lighting. Full intersection lighting will be warranted with the addition of the proposed roundabout at this location. In addition, the proposed signalized site access intersections and the site access roundabout on Blueridge Rise will also warrant illumination.

4.7 Road Link Analysis

The volume of daily traffic on a roadway is one of the factors that aids in determining road classifications and appropriate lane requirements. To confirm roadway capacities, background daily traffic volumes were calculated in vehicles per day (vpd) and compared to the environmental guidelines from the *City of Calgary Design Guidelines for Subdivision Servicing*, and *Rocky View County Servicing Standards*. The environmental guidelines represent the limit of comfortable operation of the roadway under most conditions; the actual physical capacity of the roadway can be considerably higher

The daily traffic volumes were determined by applying a factor of 10 to the PM peak hour traffic volumes are per typical industry practice. The results of the daily link analysis are summarized in **Table 4.13**.

Table 4.13: Road Link Analysis

ROADWAY	SECTION	FUTURE CLASS.	GUIDELINE (VPD)	DAILY TRAFFIC VOLUMES (VPD)				
				Existing	Background		After Development	
					2028	2039	2028	2039
Highway 1A	E of 12 Mile Coulee Rd	6/8-Lane Primary Highway	-	41,750	45,300	62,300	51,400	74,300
	Bearspaw Rd to 12 Mile Coulee Rd			24,900	34,200	47,200	35,000	48,700
	W of Bearspaw Rd			22,300	28,350	39,000	29,100	40,600
12 Mile Coulee Road	N of Hwy 1A	4-Lane Arterial	20,000 – 35,000	16,600	20,000	23,900	20,700	25,300
	Hwy 1A to Tusslewood Dr			13,400	19,000	20,500	26,100	34,600
	S of Tusslewood Dr			9,500	12,900	14,200	13,600	15,600
Blueridge Rise	E of 12 Mile Coulee Rd	Grand Blvd	10,000 – 30,000	400	780	780	10,500	20,000

There is no volume guideline for 6/8 lane highways, and instead the capacity of Highway 1A will be based on the capacity of the intersections. For the remaining road links, the daily volume analysis confirms that the future classifications will be sufficient to accommodate the forecasted volumes.

4.8 Internal Road Network Review

Daily traffic volumes were estimated for the future internal road network on the proposed site, based on the number of housing units and an estimated daily rate (10x the PM peak unit trip rate). From this assessment road classifications were assigned to each roadway depending on the anticipated number of daily vehicle trips.

Exhibit 4.8 presents the anticipated daily vehicle volumes along the major roadway links in the study site, and proposed road classifications according to *Rocky View County's Servicing Standards*.

LEGEND

1,000	Daily Traffic Volume
⟷	Existing Country Collector / Future 36m Major (4-Lane Divided)
⟷	27m Urban Primary Collector
⟷	20m Urban Boulevard

Exhibit 4.8

Internal Daily Traffic Volumes & Road Classifications

5. ACTIVE MODES

5.1 Walking

A review of sidewalk facilities near the site is summarized in **Table 5.1**. A review of major roadway crossings near the site is summarized in **Table 5.2** based on Transportation Association of Canada (TAC) *Pedestrian Crossing Control Guide* (2018).

Table 5.1: Sidewalk Review

ROADWAY	TYPE	LOCATION	NOTES
12 Mile Coulee Road NW	Pathway	East Side	Good condition
Tusslewood Drive NW	Monowalk	Both Sides	Good condition

Table 5.2: Crosswalk Review

INTERSECTION		MAJOR ROAD TYPE	LEG	EXISTING CROSSING		TAC GUIDE RECOMMENDED TREATMENT			
Major Road	Minor Road			Control	Curb Cut	# of Lanes	Average Daily Traffic	Speed Limit	Treatment Type
Highway 1A	12 Mile Coulee Road	Highway	North & East	Signal	Yes	4	>15,000	90 km/h	Signal
12 Mile Coulee Road	Blueridge Rise	Arterial	West	Stop-controlled	No	4	12,000 – 15,000	60 km/h	Not enough pedestrians
12 Mile Coulee Road	Tusslewood Drive NW	Arterial	East	Stop-controlled	Yes	4	12,000 – 15,000	60km/h	Signal

The review of pedestrian infrastructure finds:

- **Sidewalks** – There is no existing pedestrian infrastructure on the west side of 12 Mile Coulee Road. Sidewalks and pathways will be included on-site after development.
- **Crosswalks** – The intersection of 12 Mile Coulee Road & Tusslewood Drive NW warrants signalization based on the TAC methodology. The signal warrant performed in Section 4.5 recommends signalization as well.

5.2 Cycling

Cycling facilities near the site are illustrated in **Figure 5.1** and summarized in **Table 5.3**.

Figure 5.1: Existing Cycling Network

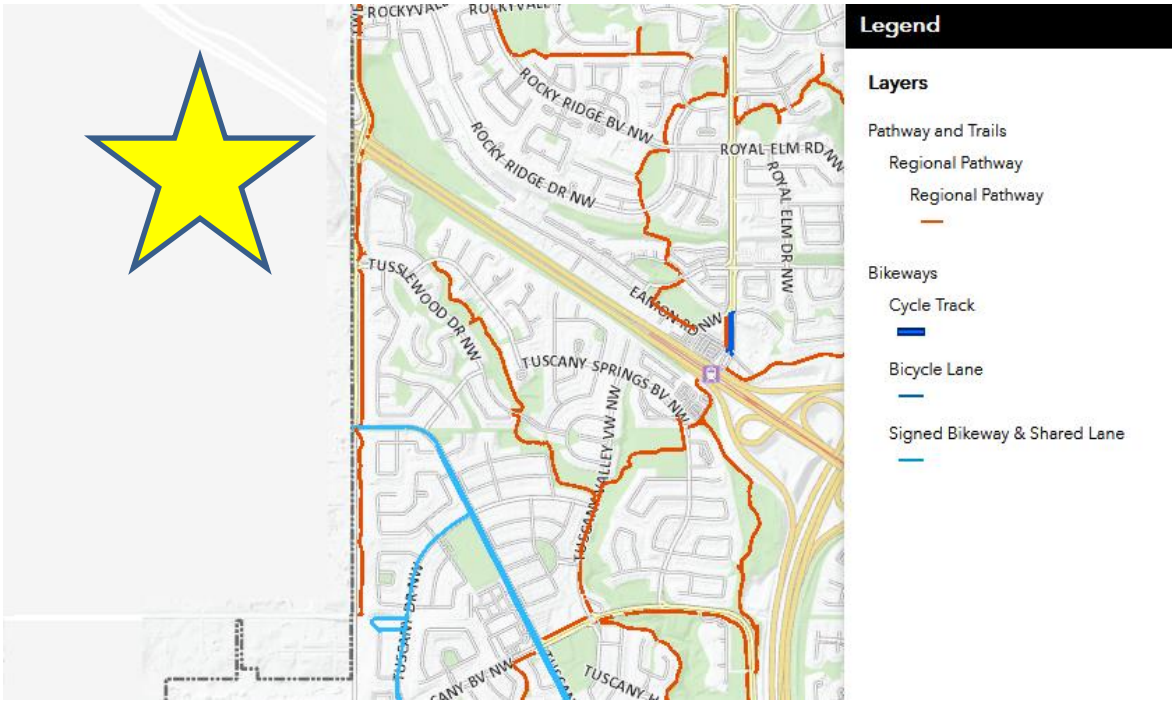


Table 5.3: Existing Cycling network

ROUTE		FACILITY TYPE	EXTENT	ACCESS FROM SITE
Roadway	Classification			
12 Mile Coulee Road	Arterial	Regional Pathway	Lynx Ridge – Country Hills Boulevard NW	Directly
Tuscany Way	Collector	Bikeway	12 Mile Coulee Road – Tuscany Drive NW	Via 12 Mile Coulee Road

Findings

Existing cycling facilities provide adequate connectivity to NW Calgary.

5.3 Transit

Transit services are provided on Tusslewood Drive NW. Stops within 600 metres walking distance are summarized in **Table 5.4**. The existing area transit network is illustrated in **Figure 5.2** and summarized **Table 5.5**.

Table 5.4: Existing Transit Stops

STOP LOCATION			STOP #	ROUTES SERVICED	WALKING DISTANCE
Roadway	Cross-Street	Direction			
Tusslewood Drive	Tuscany Springs Blvd NW	EB	9894	74	350 m

Figure 5.2: Existing Transit Service

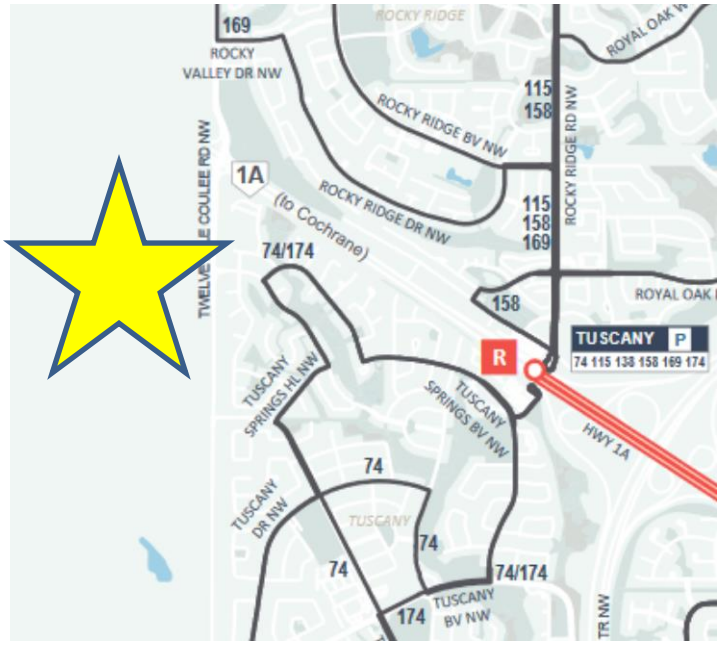


Table 5.5: Existing Transit Frequency

ROUTE		WEEKDAY SERVICE		HEADWAY (MINUTES)				
#	Direction	Start	End	AM	Mid-Day	PM	Even.	Sat.
74	Tuscany	05:10	23:39	30	30	30	30	30

Connectivity to Stops

Pathways and sidewalks provide access to the bus stop and the Tuscany LRT station is 2-kilometre walking distance.

Findings

Existing Calgary Transit service provides poor accessibility to the Ascension site. As the site is in RVC, transit accessibility is very limited.

APPENDIX A

Scope of Work

MEMO

Date: July 14, 2020
Project: **Ascension** **Project #:** 02-18-0114
Subject: **TIA Technical Parameters V2**

To: Milan Patel | RVC
Tom Hopkins | City of Calgary
From: Jason Dunn

The TIA for the Ascension Project is being updated. The proposed density has changed from that assumed in the original TIA. A comparison is contained in the table below.

LAND USE	ORIGINAL DENSITY	NEW DENSITY	NET DIFFERENCE
Single-Family Residential	484 units	1020 units	+ 536 units
Multi-Family Residential	423 units	343 units	- 90 units
Retail	350,000 ft²	350,000 ft²	0
Office	60,000 ft²	60,000 ft²	0
Hotel	150 rooms	0 rooms	- 150 rooms

The multi-family comprises of a 43 unit MF development and a 300 unit seniors development

In order to address some of the concerns raised on the original TIA, the follow technical parameters are proposed for use in the TIA update.

Distribution

The distribution from the original TIA is shown in the extract Exhibit 4.1 below.

It is proposed to change the amount of single family residential and multi-family residential on Tusslewood Drive from 25% to 10%. The residual 15% will be added to Crowchild Trail increasing the distribution from 55% to 70%. All other distributions are proposed to remain the same. It is noted that there is no longer any hotel traffic.

The reduction in the amount of residential traffic to Tusslewood Drive reflects discussions with the City of Calgary which indicated that the park and ride facility at Tuscany station is typically full and as such residents of Ascension won't be able to use it. Also, residents in Ascension won't be using the schools in Tuscany, further reducing the residential trips.

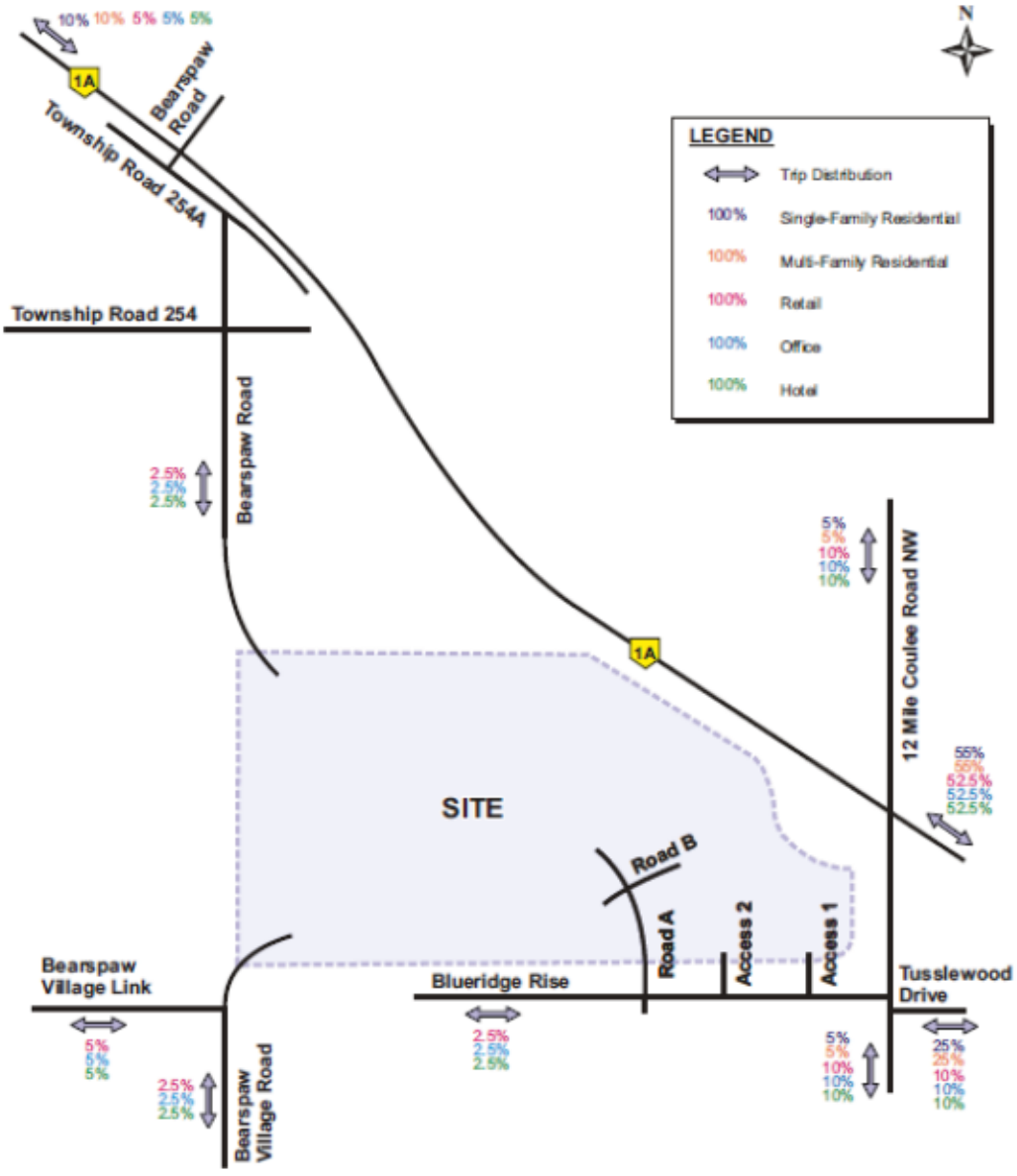


Exhibit 4.1
Site Trip Distribution

Internal Capture / Pass-By Rates

There are 1363 proposed residential units proposed within the Ascension development. With that as a basis, the following rates are proposed.

- Internal Capture – 20% of retail trips
- Internal Capture – 10% of office trips
- Pass-By to Tusslewood Drive – 10% of retail trips
- Pass-By to 12 Mile Coulee Road – 10% of retail trips
- Pass-By into Ascension – 10% of retail trips

To be conservative, no diverted traffic has been assigned to the development.

Pass-by rate for commercial is typically 30%. The 30% was split to the three different residential areas resulting in 10% to each of the three residential areas.

The increase in the amount of residential lots within Ascension indicates that there will be internal capture of the commercial and office trips from those residents. The internal capture rates of 20% of commercial and 10% for office are considered to be conservative based on experience and the NHRCP Internal Capture spreadsheet.

Next Step

Please confirm that these rates and distribution are acceptable. These will be incorporated into the updated TIA.

Subject: RE: Hawkwood - TIA Scope
Date: Thursday, 8 June, 2017 11:20:54 AM Mountain Daylight Time
From: GNijjar@rockyview.ca
To: Jason Dunn
CC: tsholdice@highfieldlm.ca, cboechler@highfieldlm.ca, Lindsay De Leeuw, Lynn Machacek

Sounds good to me Jason.

Thanks.

Cheers,

GURBIR S. NIJJAR, P.ENG.
Municipal Engineer | Engineering Services

ROCKY VIEW COUNTY
911 - 32 Avenue NE | Calgary | AB | T2E 6X6
Phone: 403-520-7293 | Fax: 403-520-7288
gnijjar@rockyview.ca | www.rockyview.ca

From: Jason Dunn [mailto:jdunn@bunteng.com]
Sent: Tuesday, June 6, 2017 11:50 AM
To: Gurbir Nijjar
Cc: tsholdice@highfieldlm.ca; cboechler@highfieldlm.ca; Lindsay De Leeuw; Lynn Machacek
Subject: Re: Hawkwood - TIA Scope

Gurbir,

We will investigate with the City to see what they might have in their model.

As for Cell J, we propose to assume that it will connect to Bearspaw Village Lane, which will then give the opportunity for this traffic to use the collector road and grand boulevard to access 12 Mile Coulee Road. We will develop background volumes for the traffic analysis using the Glenbow Ranch Network Analysis for the numbers.

So just to confirm we are not proposing any connection to Cell J across the western property boundary, but will still allow for Cell J traffic to pass through the property.

Regards

Jason Dunn, P.Eng. | Senior Transportation Engineer
Bunt & Associates Engineering Ltd.
Suite 400 - 11012 Macleod Trail SE, Calgary, AB T2J 6A5
p 587-349-7573 | www.bunteng.com

From: "GNijjar@rockyview.ca" <GNijjar@rockyview.ca>
Date: Tuesday, 6 June, 2017 11:38 AM
To: Jason Dunn <jdunn@bunteng.com>
Cc: "tsholdice@highfieldlm.ca" <tsholdice@highfieldlm.ca>, Charles Boechler <cboechler@highfieldlm.ca>, Lindsay De Leeuw <ldeleeuw@bunteng.com>, Lynn Machacek <LMachacek@bunteng.com>
Subject: RE: Hawkwood - TIA Scope

Hi Jason,

Before excluding the Haskayne ASP area, I would check with the City model if they have trip forecast for the area. As per the attached, they are assuming 12 MC as a key linkage point to the area.

In regards to Cell J in Glenbow, there appears to be a future connection identified from Cell J to 12 MC Road. As per the attached map, this connection could come through the Hawkwood Lands or via Blueridge Rise. As this ASP has received first reading and is expected to go back in front of Council shortly for final readings, this should not be omitted.

The trip directions from Cell J can be discussed as not all trips would go to 12 MC Road. We can explore further the assumptions we had made in the transportation model for Cell J.

Just my thoughts.

Cheers,

GURBIR S. NIJJAR, P.ENG.
Municipal Engineer | Engineering Services

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gnijjar@rockyview.ca | www.rockyview.ca

From: Jason Dunn [mailto:jdunn@bunteng.com]
Sent: Tuesday, June 6, 2017 9:16 AM
To: Gurbir Nijjar
Cc: Trevor Sholdice; Charles Boechler; Lindsay De Leeuw; Lynn Machacek
Subject: Re: Hawkwood - TIA Scope

Gurbir,

It has been identified that the scope as outline below includes a connection to Cell J. As per our discussion yesterday, please note that a connection to Cell J is not included in the scope of works.

Also, as discussed we still don't have any useful information for traffic from Haskayne and so do not plan to include any traffic from Haskayne in the background traffic volumes.

Regards

Jason Dunn, P.Eng. | Senior Transportation Engineer
Bunt & Associates Engineering Ltd.
Suite 400 - 11012 Macleod Trail SE, Calgary, AB T2J 6A5
p 587-349-7573 | www.bunteng.com

From: Jason Dunn <jdunn@bunteng.com>
Date: Monday, 5 June, 2017 3:38 PM
To: "GNijjar@rockyview.ca" <GNijjar@rockyview.ca>
Cc: Trevor Sholdice <tsholdice@highfieldlm.ca>, Charles Boechler <cboechler@highfieldlm.ca>, Lindsay De

Leeuw <ldeleeuw@bunteng.com>, Lynn Machacek <LMachacek@bunteng.com>
Subject: Re: Hawkwood - TIA Scope

Gurbir,

Following from our meeting today, I confirm that the scope has been accepted.

Regards

Jason Dunn, P.Eng. | Senior Transportation Engineer
Bunt & Associates Engineering Ltd.
Suite 400 - 11012 Macleod Trail SE, Calgary, AB T2J 6A5
p 587-349-7573 | www.bunteng.com

From: Jason Dunn <jdunn@bunteng.com>
Date: Wednesday, 15 February, 2017 2:44 PM
To: "GNijjar@rockyview.ca" <GNijjar@rockyview.ca>
Cc: Trevor Sholdice <tsholdice@highfieldlm.ca>, Charles Boechler <cboechler@highfieldlm.ca>
Subject: Re: Hawkwood - TIA Scope

Gurbir,

Following on from yesterday's meeting, below is the proposed scope for the Hawkwood Project.

It is proposed that the community will connect north to Bearspaw Road, south to Bearspaw Village Road, east onto 12 Mile Coulee Road and a future west connect to Cell J of the proposed Glenbow ASP. The development will be a mix of residential and commercial uses, although the exact amount of each is not yet known. It is proposed that the entrance into the site on 12 Mile Coulee Road will align with Blueridge Rise. Currently we are looking at combining this intersection and the intersection with Tusslewood Dr with a "peanut" roundabout. It is proposed to upgrade the intersection of Crowchild TR / 12 Mile Coulee Road with a Continuous Flow Intersection (CFI).

The background counts along Highway 1A will be based on the information in in the Glenbow ASP Network Analysis. The background counts on 12 Mile Coulee Road will be based on counts recently undertaken, with additional traffic from Watermark added and a base growth factor of 1%. As the Glenbow Ranch Network Analysis report only goes to the 2035 horizon, we will review the 2025 and 2035 horizons in the AM and PM peak periods. We will attempt to include traffic from the Haskayne area with the best information available at the time.

Traffic generation will be based on ITE trip generation rates for the various proposed uses.

The following intersections will be analysed, with any necessary mitigation measures being recommended. The analysis will be undertaken using, VISIM, Synchro and SIDRA softwares.

- 12 Mile Coulee Rd / Crowchild Tr (Hwy 1A)
- Bow Valley Trail (Hwy 1A) and Bearspaw Road
- 12 Mile Coulee Rd / Tusslewood Dr / Blueridge Rise
- Blueridge Rise / first internal road
- TWP 254 / Bearspaw Road

We will review the link capacity of the internal and immediately adjacent road network and provide appropriate road classifications.

We will review active mode and transit opportunities.

Please let me know if this scope is acceptable.

Regards

Jason Dunn, P.Eng. | Senior Transportation Engineer
Bunt & Associates Engineering (Alberta) Ltd.
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From: "GNijjar@rockyview.ca" <GNijjar@rockyview.ca>
Date: Tuesday, 14 February, 2017 9:43 AM
To: Jason Dunn <jdunn@bunteng.com>
Subject: RE: Hawkwood - TIA Scope

It is proposed that the community will connect north to Bearspaw Road, south to Bearspaw Village Road, east onto 12 Mile Coulee Road and a future west connect to Cell J of the proposed Glenbow ASP. The development will be a mix of residential and commercial uses, although the exact amount of each is not yet known. It is proposed that the entrance into the site on 12 Mile Coulee Road will align with Tusslewood Dr NW. Blueridge Rise will be realigned and connected to the proposed road network within the development.

The background counts along Highway 1A will be based on the information in in the Glenbow ASP Network Analysis. The background counts on 12 Mile Coulee Road will be based on counts recently undertaken, with additional traffic from Watermark added and a base growth factor of 1%. We will look at the 2025 and 2035 horizons in the AM and PM peak periods.

Traffic generation will be based on ITE trip generation rates for the various proposed uses.

The following intersections will be analysed, with any necessary mitigation measures being recommended.

- 12 Mile Coulee Rd / Crowchild Tr (Hwy 1A)
- Bow Valley Trail (Hwy 1A) and Bearspaw Road
- 12 Mile Coulee Rd / Tusslewood Dr

We will review the link capacity of the internal and immediately adjacent road network and provide appropriate road classifications.

We will review active mode and transit opportunities.

APPENDIX B

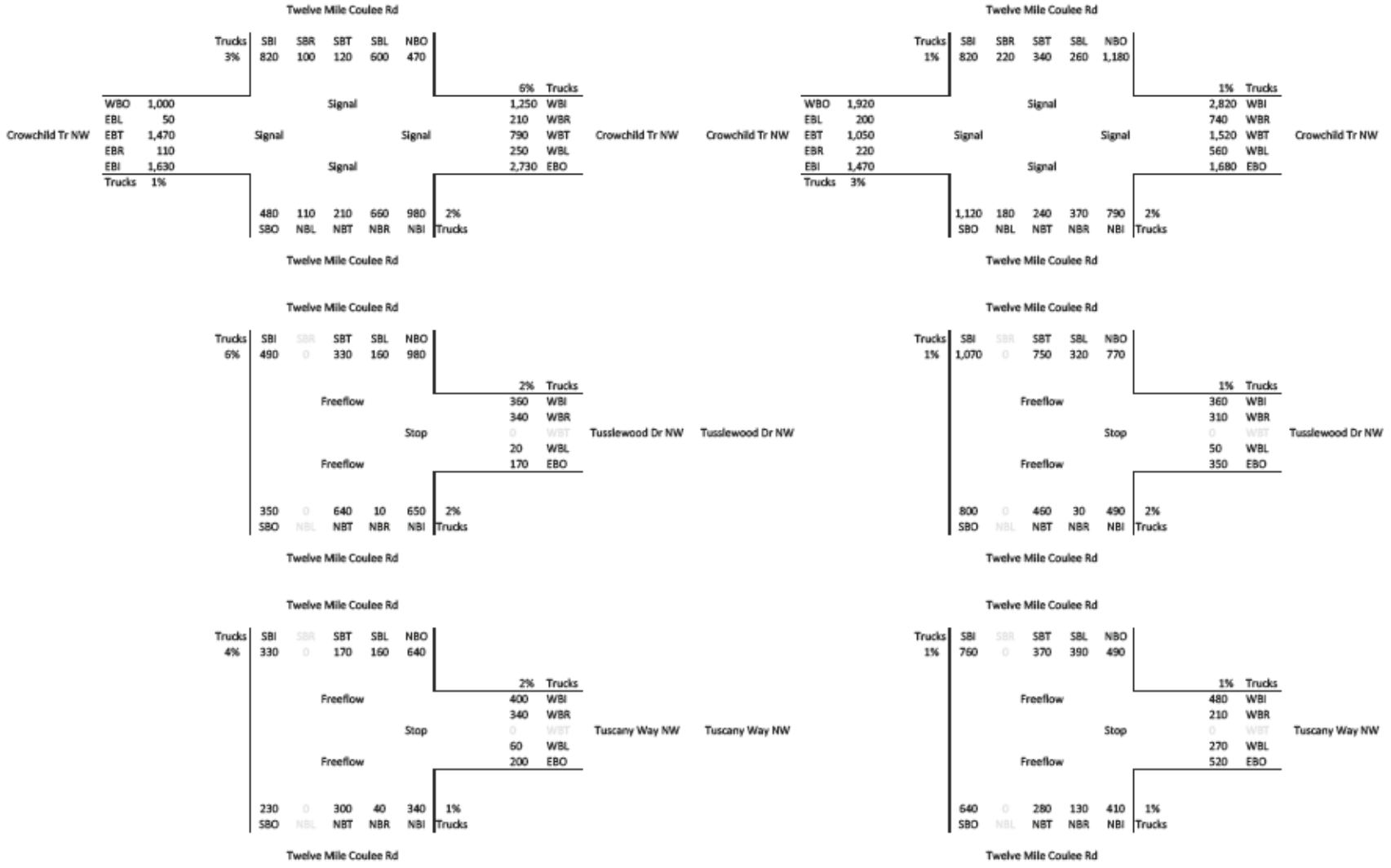
Forecast Data

Damkar Seniors 2020 - R2356
Transportation Forecast
ISC: Unrestricted
02-Mar-20
Databanks:
2028 LUN 092618 CTP MDP Scenario Series
2039 LUN 101118 CTP MDP Scenario Series

Understanding turning movement diagrams:

NB	Northbound	I	In (entering intersection)
SB	Southbound	O	Out (leaving intersection)
EB	Eastbound	R	Right turn
WB	Westbound	T	Through
Trucks	Inbound Truck %	L	Left Turn

2028 LUN AM Peak Hour Forecast



2028 LUN PM Peak Hour Forecast

Damkar Seniors 2020 - R2356
Transportation Forecast
ISC: Unrestricted
02-Mar-20
Databanks:
2028 LUN 092618 CTP MDP Scenario Series
2039 LUN 101118 CTP MDP Scenario Series

Understanding turning movement diagrams:

NB	Northbound	I	In (entering intersection)
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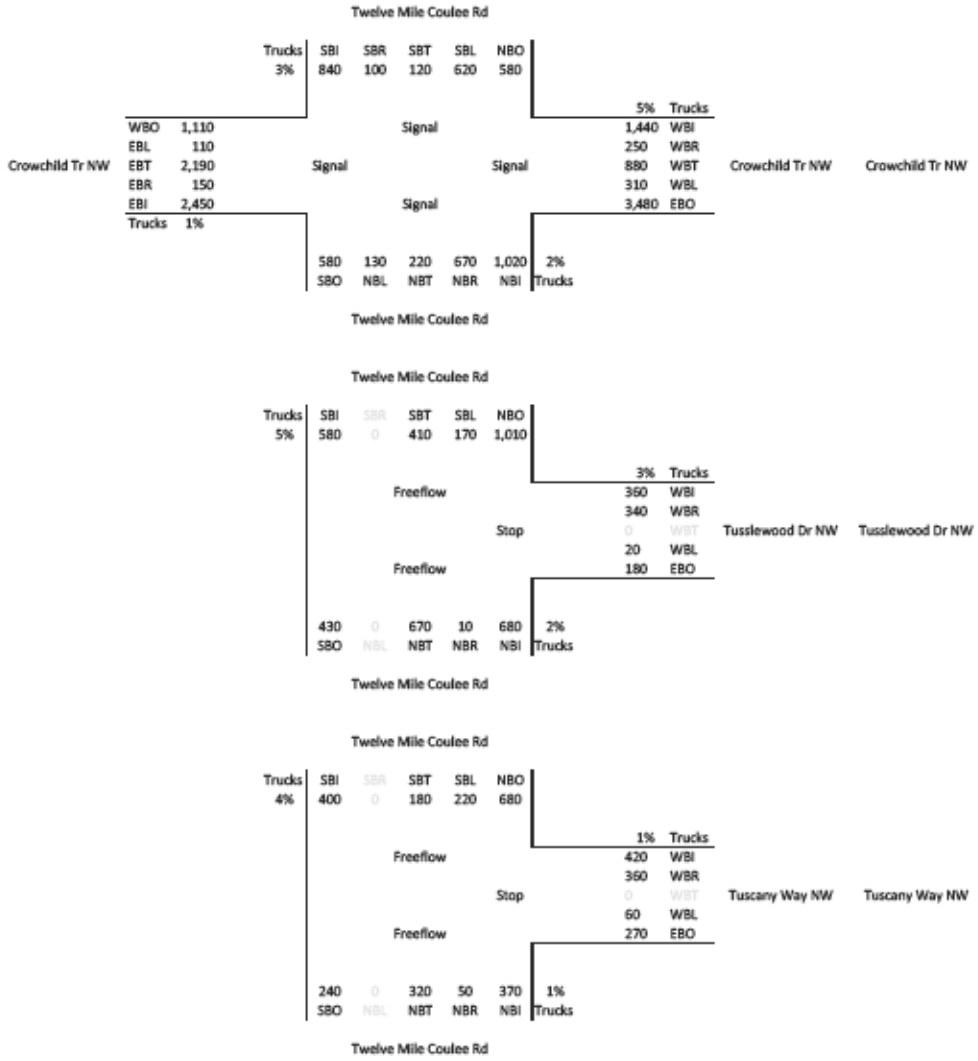
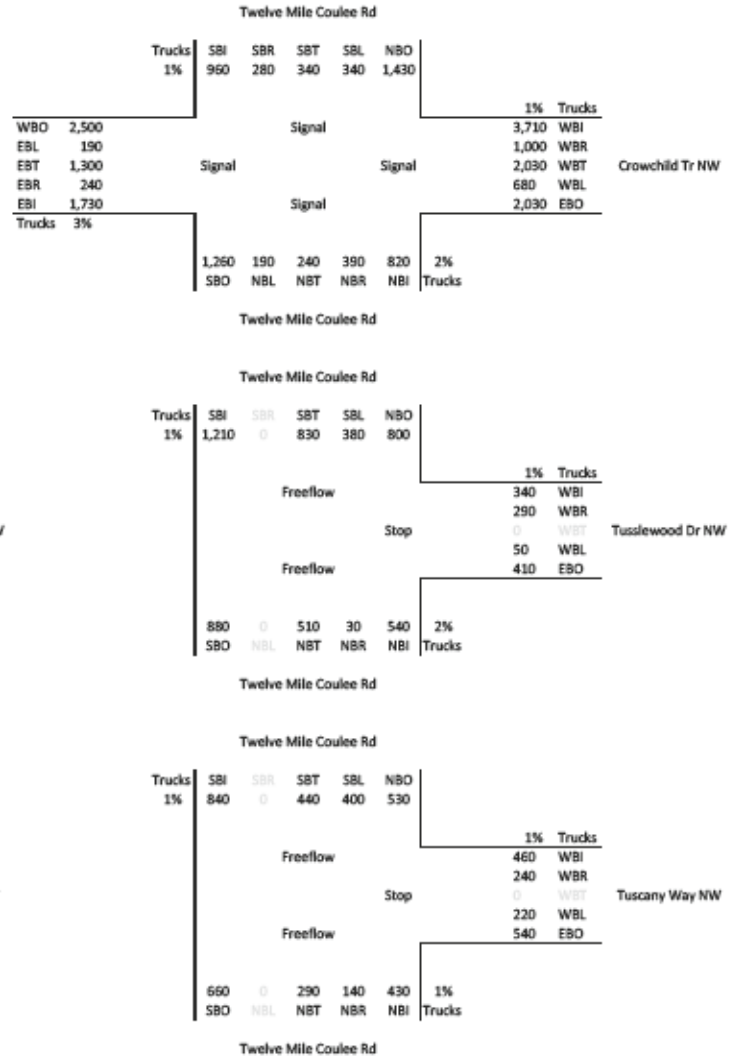
WB	Westbound	T	Through
Trucks	Inbound Truck %	L	Left Turn

2039 LUN AM Peak Hour Forecast



2039 LUN PM Peak Hour Forecast

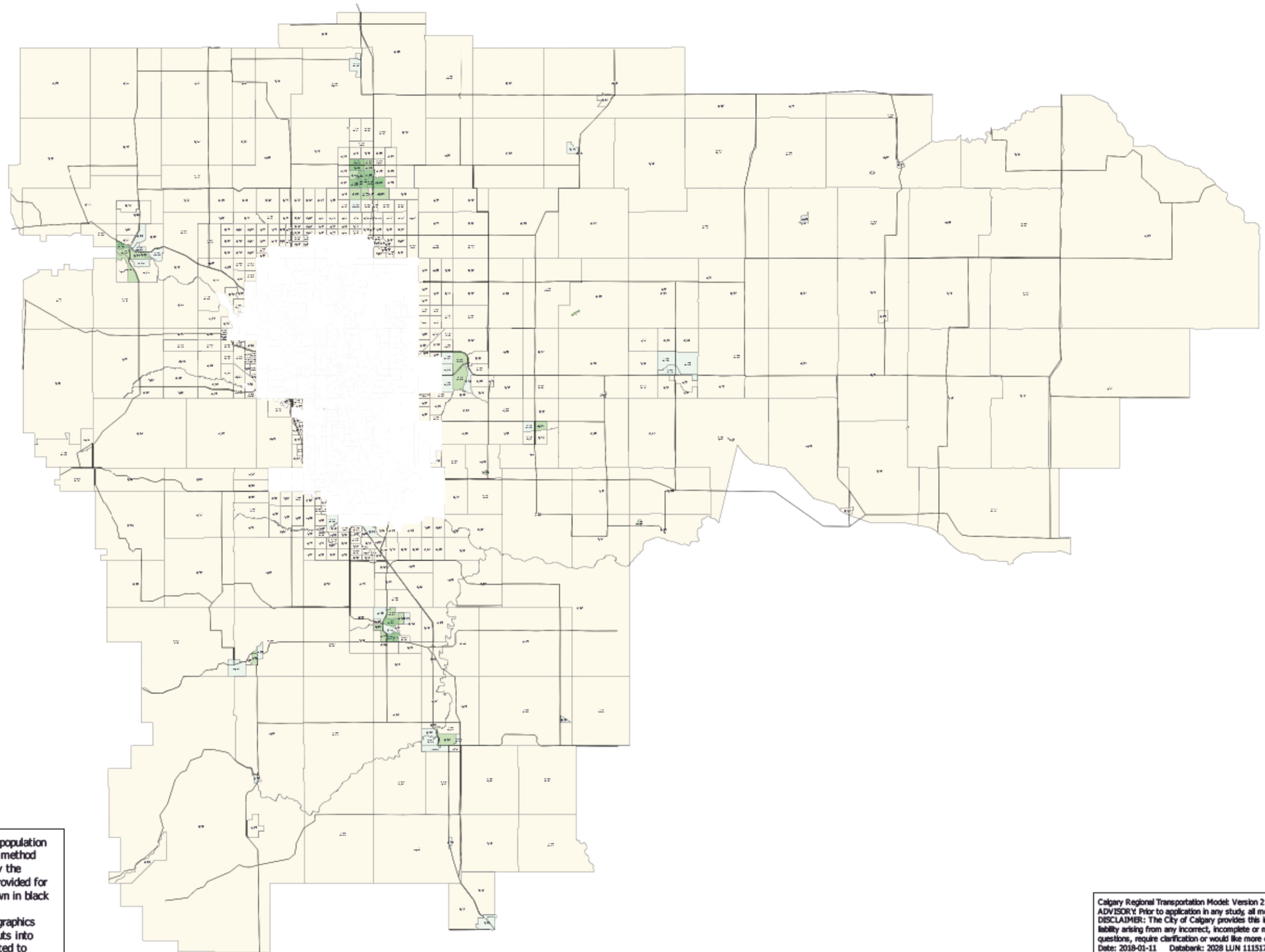


THE CITY OF CALGARY
TRANSPORTATION PLANNING

Scenario Assumptions: Total Population by Transportation Zone (Region)
2028 LUN
Calgary Regional Transportation Model (RTMv2)
www.calgary.ca/forecasting

Standard Scenario: 2015 CTP MDP Scenario Series (Run ID: 111517)

N



LEGEND

- Density (ppl/sq km) <500
- 500 <= Density <1,500
- 1,500<= Density <3,000
- 3,000<= Density <4,500
- 4,500<= Density <6,000
- 6,000<= Density <7,500
- Density > 7,500

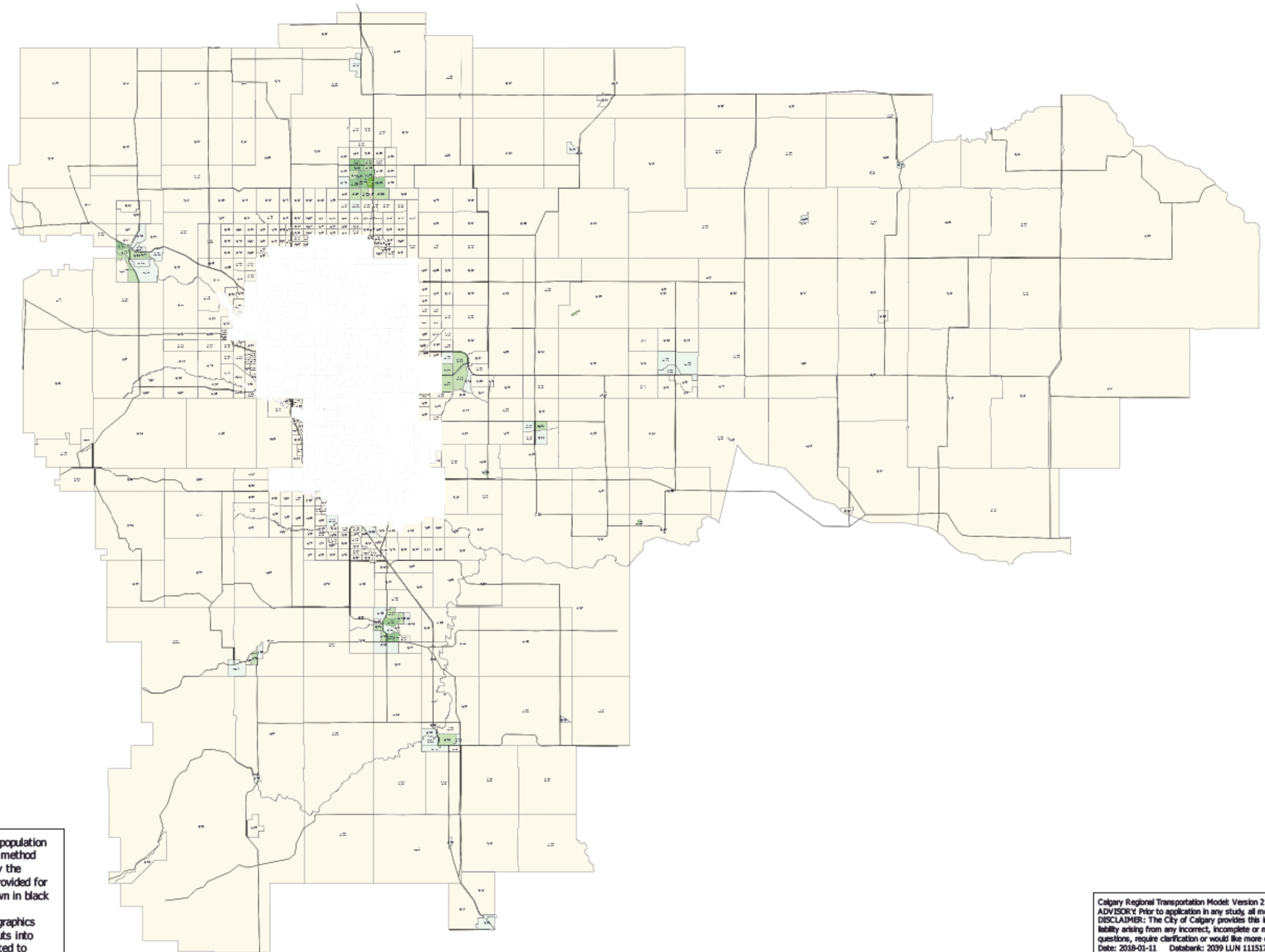
Density Color Scheme calculated using Assumed population divided by area of the Transportation Zone. This method varies from job density calculations performed by the Planning Department. Underlying road network provided for reference. Primary and secondary highways shown in black for clarity.
Land use assumptions are produced by Geodemographics in Land Use Planning and Policy, then used as inputs into the RTM. For questions or additional details related to these assumptions, please contact Geodemographics directly.

Calgary Regional Transportation Model: Version 2
ADVISORY: Prior to application in any study, all model inputs and outputs require interpretation and adjustment.
DISCLAIMER: The City of Calgary provides this information in good faith but provides no warranty, nor accepts any liability arising from any incorrect, incomplete or misleading information or its improper use. If you have any questions, require clarification or would like more details on this data please contact TranPlanForecast@calgary.ca.
Date: 2018-01-11 Databank: 2028 LUN 111517-CTP MDP Scenario Series
Sc: 1: AM Crown (AMCR) Scenario

Scenario Assumptions: Total Population by Transportation Zone (Region)
2039 LUN
Calgary Regional Transportation Model (RTMv2)
www.calgary.ca/forecasting

Standard Scenario: 2015 CTP MDP Scenario Series (Run ID: 111517)

N



LEGEND

- Density (ppl/sq km) <500
- 500 <= Density <1,500
- 1,500<= Density <3,000
- 3,000<= Density <4,500
- 4,500<= Density <6,000
- 6,000<= Density <7,500
- Density > 7,500

Density Color Scheme calculated using Assumed population divided by area of the Transportation Zone. This method varies from job density calculations performed by the Planning Department. Underlying road network provided for reference. Primary and secondary highways shown in black for clarity.
Land use assumptions are produced by Geodemographics in Land Use Planning and Policy, then used as inputs into the RTM. For questions or additional details related to these assumptions, please contact Geodemographics directly.

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Date: 2018-01-11 Databank: 2039 LUN 111517-CTP MDP Scenario Series
Sc: 1: AM Crown (AMCR) Scenario

APPENDIX C

Traffic Counts

Turning Movement Summary Diagram

Reference No.: 67210

Intersection of:
1A & BEARSPAW RD 25-25-3-500001200

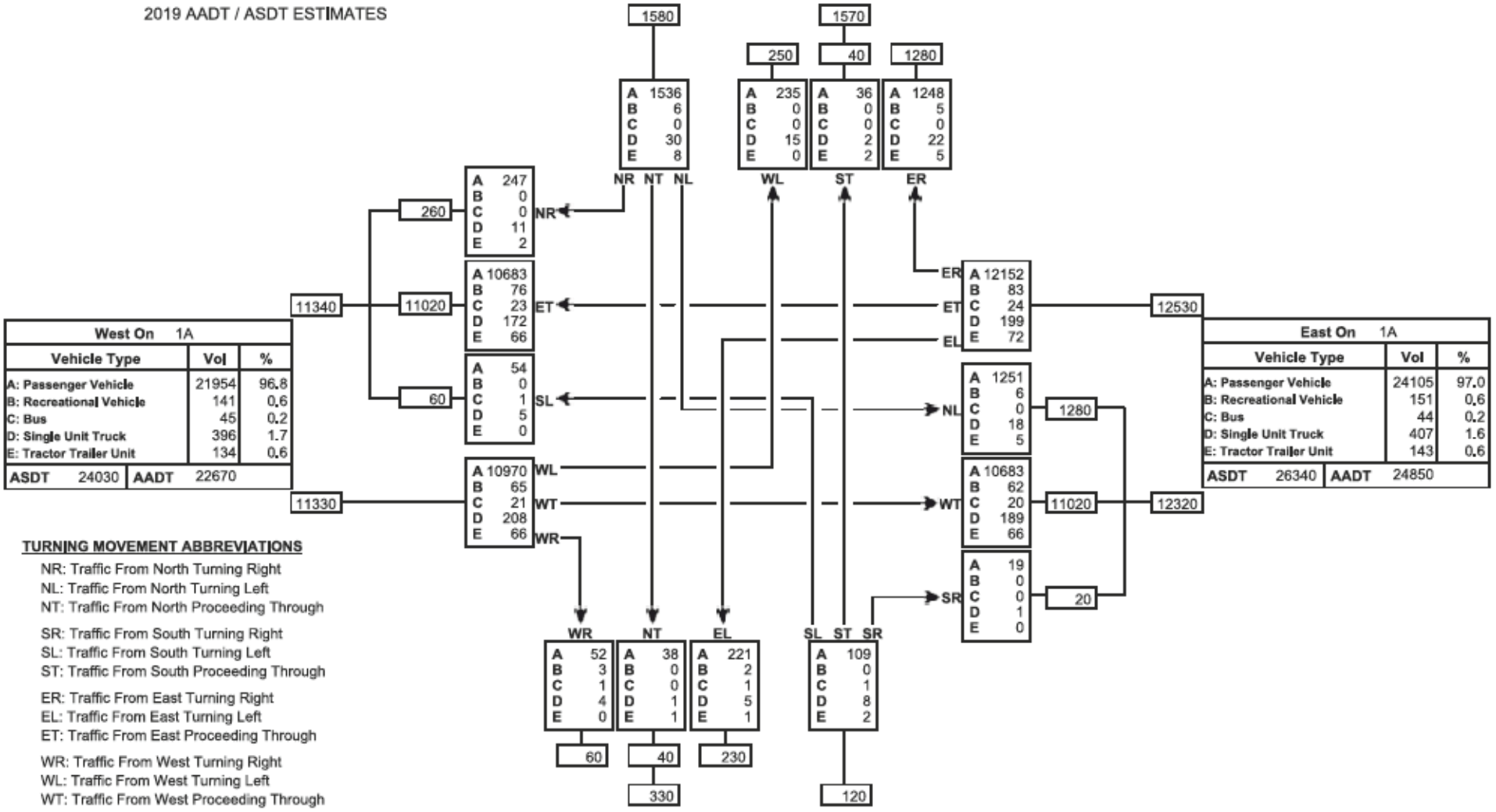
2019 AADT / ASDT ESTIMATES

North On Rge Rd 30		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	3055	97.0
B: Recreational Vehicle	11	0.3
C: Bus	0	0.0
D: Single Unit Truck	69	2.2
E: Tractor Trailer Unit	15	0.5
ASDT 3340	**AADT** 3150	

West On 1A		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	21954	96.8
B: Recreational Vehicle	141	0.6
C: Bus	45	0.2
D: Single Unit Truck	396	1.7
E: Tractor Trailer Unit	134	0.6
ASDT 24030	**AADT** 22670	

East On 1A		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	24105	97.0
B: Recreational Vehicle	151	0.6
C: Bus	44	0.2
D: Single Unit Truck	407	1.6
E: Tractor Trailer Unit	143	0.6
ASDT 26340	**AADT** 24850	

South On Rge Rd 30		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	420	93.3
B: Recreational Vehicle	5	1.1
C: Bus	3	0.7
D: Single Unit Truck	18	4.0
E: Tractor Trailer Unit	4	0.9
ASDT 480	**AADT** 450	



TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Annual Average Daily Traffic
Average daily traffic expressed as vehicles per day fo
period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehicles per day fo
period of May 1 to September 30 (153 days)

Turning Movement Summary Diagram

Reference No.: 67210

Intersection of:
1A & BEARSPAW RD 25-25-3-500001200

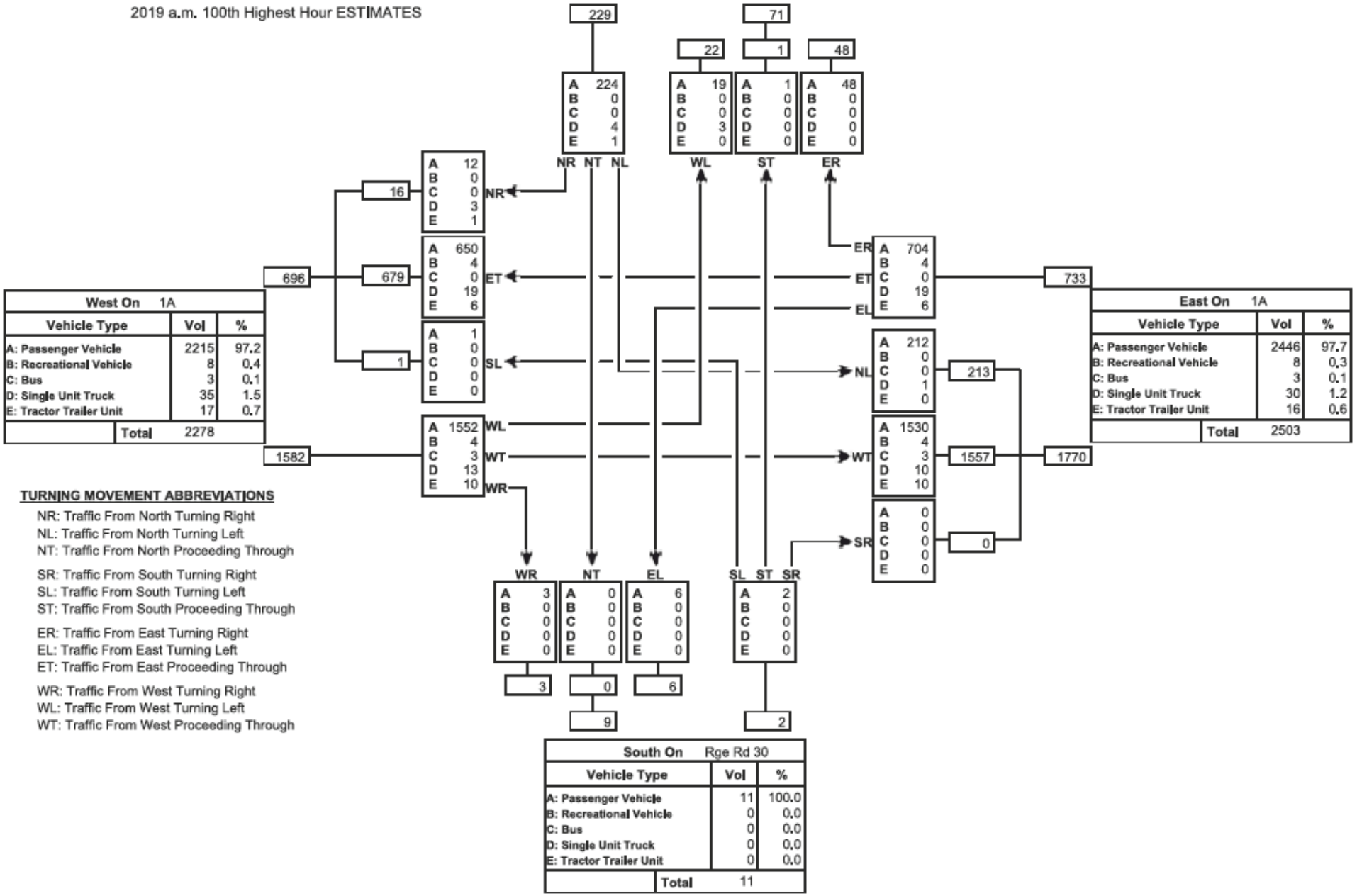
2019 a.m. 100th Highest Hour ESTIMATES

North On Rge Rd 30		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	292	97.3
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	7	2.3
E: Tractor Trailer Unit	1	0.3
Total	300	

West On 1A		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	2215	97.2
B: Recreational Vehicle	8	0.4
C: Bus	3	0.1
D: Single Unit Truck	35	1.5
E: Tractor Trailer Unit	17	0.7
Total	2278	

East On 1A		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	2446	97.7
B: Recreational Vehicle	8	0.3
C: Bus	3	0.1
D: Single Unit Truck	30	1.2
E: Tractor Trailer Unit	16	0.6
Total	2503	

South On Rge Rd 30		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	11	100.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	11	



TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
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ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

Turning Movement Summary Diagram

Reference No.: 67210

Intersection of:
1A & BEARSPAW RD 25-25-3-500001200

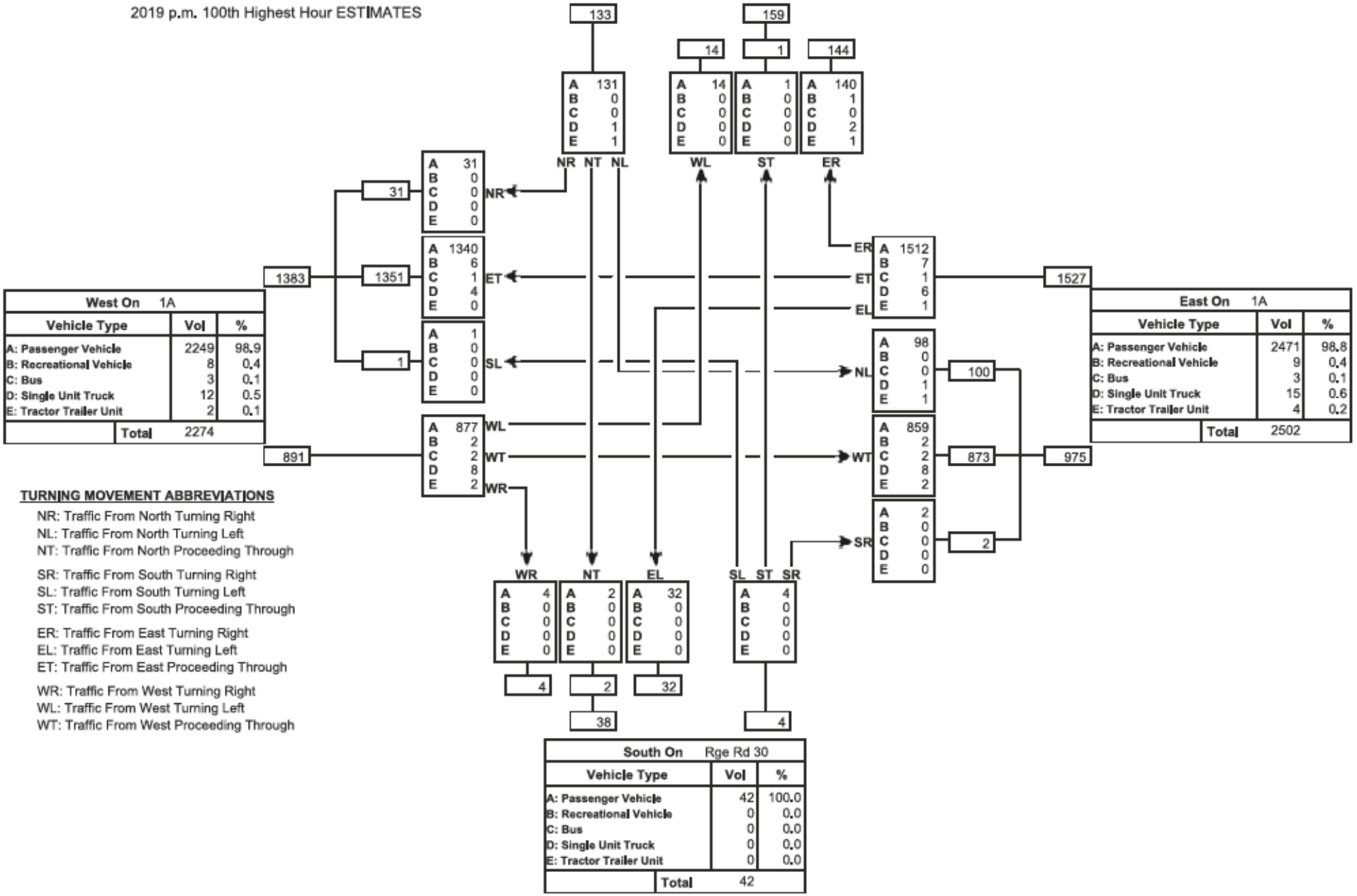
2019 p.m. 100th Highest Hour ESTIMATES

North On Rge Rd 30		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	286	97.9
B: Recreational Vehicle	1	0.3
C: Bus	0	0.0
D: Single Unit Truck	3	1.0
E: Tractor Trailer Unit	2	0.7
Total	292	

West On 1A		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	2249	98.9
B: Recreational Vehicle	8	0.4
C: Bus	3	0.1
D: Single Unit Truck	12	0.5
E: Tractor Trailer Unit	2	0.1
Total	2274	

East On 1A		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	2471	98.8
B: Recreational Vehicle	9	0.4
C: Bus	3	0.1
D: Single Unit Truck	15	0.6
E: Tractor Trailer Unit	4	0.2
Total	2502	

South On Rge Rd 30		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	42	100.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	42	



TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

APPENDIX D

Synchro Reports

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1925	69	72	836	49	24	55	5	219	131	16
Future Volume (vph)	23	1925	69	72	836	49	24	55	5	219	131	16
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.988			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1742	3385	1559	1742	3385	1559	1742	1812	0	1742	1805	0
Flt Permitted	0.950			0.950			0.552			0.715		
Satd. Flow (perm)	1742	3385	1559	1742	3385	1559	1012	1812	0	1311	1805	0
Satd. Flow (RTOR)			92			92		3			4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	25	2092	75	78	909	53	26	60	5	238	142	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	2092	75	78	909	53	26	65	0	238	159	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	12.0	12.0		12.0	12.0	
Minimum Split (s)	14.0	27.0	27.0	14.0	27.0	27.0	19.0	19.0		19.0	19.0	
Total Split (s)	14.0	86.0	86.0	14.0	86.0	86.0	30.0	30.0		30.0	30.0	
Total Split (%)	10.8%	66.2%	66.2%	10.8%	66.2%	66.2%	23.1%	23.1%		23.1%	23.1%	
Maximum Green (s)	7.0	79.0	79.0	7.0	79.0	79.0	23.0	23.0		23.0	23.0	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	4.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0		4.0	4.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	7.0	79.0	79.0	7.0	84.6	84.6	23.0	23.0		23.0	23.0	
Actuated g/C Ratio	0.05	0.61	0.61	0.05	0.65	0.65	0.18	0.18		0.18	0.18	
v/c Ratio	0.27	1.02	0.08	0.84	0.41	0.05	0.15	0.20		1.03	0.49	
Control Delay	66.6	50.0	1.5	117.4	12.3	0.5	47.7	45.5		119.3	53.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	66.6	50.0	1.5	117.4	12.3	0.5	47.7	45.5		119.3	53.0	
LOS	E	D	A	F	B	A	D	D		F	D	
Approach Delay		48.5			19.6			46.1			92.7	
Approach LOS		D			B			D			F	
Queue Length 50th (m)	6.3	~297.8	0.0	20.2	62.1	0.0	5.7	13.7		~65.0	36.2	
Queue Length 95th (m)	15.6	#339.0	4.2	#49.0	76.4	1.2	14.3	27.2		#116.6	58.3	
Internal Link Dist (m)		216.0			442.3			82.3			107.7	
Turn Bay Length (m)	170.0		170.0	150.0		150.0						
Base Capacity (vph)	93	2057	983	93	2203	1046	179	323		231	322	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	

1: Bearspaw Rd & Highway 1A
08-11-2020
AM Peak Hour
2028 Background

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.27	1.02	0.08	0.84	0.41	0.05	0.15	0.20		1.03	0.49	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Natural Cycle: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 45.1 — Intersection LOS: D
Intersection Capacity Utilization 93.6% — ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Bearspaw Rd & Highway 1A

Z:\Project Files\2018\0114 Ascension Comments\AI\Synchro\TIA Synchro July 2020\Background\Background 2028 AM.syn
Synchro 10
DB

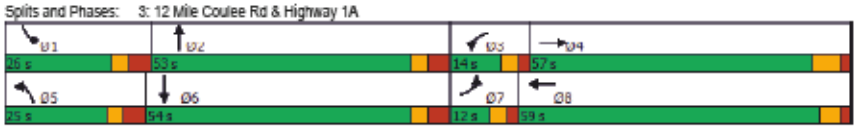
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1488	110	250	794	210	110	210	660	600	120	100
Future Volume (vph)	50	1488	110	250	794	210	110	210	660	600	120	100
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor										0.98		
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3347	3385	1529	3315	3385	1514	1742	3417	1559	3380	3231	1529
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3347	3385	1529	3315	3385	1514	1742	3417	1559	3299	3231	1529
Satd. Flow (RTOR)			167			167			479			167
Conf. Peds. (#/hr)										20		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	3%	5%	4%	4%	5%	5%	2%	4%	2%	2%	10%	4%
Adj. Flow (vph)	53	1583	117	266	845	223	117	223	702	638	128	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	1583	117	266	845	223	117	223	702	638	128	106
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0		7.0	20.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	12.0	27.0		12.0	25.5		14.0	53.0		14.0	17.0	
Total Split (s)	12.0	57.0		14.0	59.0		25.0	53.0		26.0	54.0	
Total Split (%)	8.0%	38.0%		9.3%	39.3%		16.7%	35.3%		17.3%	36.0%	
Maximum Green (s)	7.0	50.0		9.0	53.5		18.0	46.0		19.0	47.0	
Yellow Time (s)	3.0	5.0		3.0	3.5		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		4.0	4.0		4.0	4.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	7.0		5.0	5.5		7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)								8.0				
Flash Dont Walk (s)								38.0				
Pedestrian Calls (#/hr)								10				
Act Effct Green (s)	7.1	50.8	129.2	9.1	57.1	129.2	12.9	23.5	129.2	19.3	29.9	129.2
Actuated g/C Ratio	0.05	0.39	1.00	0.07	0.44	1.00	0.10	0.18	1.00	0.15	0.23	1.00
v/c Ratio	0.29	1.19	0.08	1.14	0.57	0.15	0.68	0.36	0.45	1.26	0.17	0.07
Control Delay	67.9	126.3	0.1	153.1	32.3	0.2	78.0	45.7	0.9	177.7	39.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.9	126.3	0.1	153.1	32.3	0.2	78.0	45.7	0.9	177.7	39.1	0.1
LOS	E	F	A	F	C	A	E	D	A	F	D	A
Approach Delay		117.9			51.0			19.2			135.8	
Approach LOS		F			D			B			F	
Queue Length 50th (m)	6.0	~215.2	0.0	~33.9	71.6	0.0	25.9	25.0	0.0	~89.1	13.6	0.0
Queue Length 95th (m)	15.5	#373.2	0.0	#81.8	136.9	0.0	54.7	37.0	0.0	#172.8	22.5	0.0

3: 12 Mile Coulee Rd & Highway 1A
08-11-2020
AM Peak Hour
2028 Background

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		425.3			429.6			236.6			405.0	
Turn Bay Length (m)	135.0		150.0	90.0		25.0	50.0		25.0	75.0		25.0
Base Capacity (vph)	184	1331	1529	234	1495	1514	246	1236	1559	505	1208	1529
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	1.19	0.08	1.14	0.57	0.15	0.48	0.18	0.45	1.25	0.11	0.07

Intersection Summary	
Cycle Length: 150	
Actuated Cycle Length: 129.2	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.26	
Intersection Signal Delay: 82.6	Intersection LOS: F
Intersection Capacity Utilization 97.1%	ICU Level of Service F
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 3: 12 Mile Coulee Rd & Highway 1A



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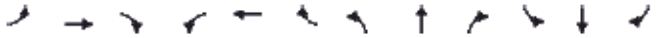
Synchro 10
DB



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	13	5	6	5	5	5	69	122	5	249	5
Future Volume (vph)	5	13	5	6	5	5	5	69	122	5	249	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	13	5	6	5	5	5	69	122	5	249	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	23	16	196	259
Volume Left (vph)	5	6	5	5
Volume Right (vph)	5	5	122	5
Hadj (s)	-0.05	-0.06	-0.33	0.03
Departure Headway (s)	4.8	4.6	3.9	4.2
Degree Utilization, x	0.03	0.02	0.21	0.30
Capacity (veh/h)	672	671	893	832
Control Delay (s)	8.0	7.9	8.0	9.0
Approach Delay (s)	8.0	7.9	8.0	9.0
Approach LOS	A	A	A	A

Intersection Summary				
Delay		8.5		
Level of Service		A		
Intersection Capacity Utilization	29.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	24	18	24	956	472	8
Future Volume (Veh/h)	24	18	24	956	472	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	26	19	26	1017	502	9
Pedestrians	30				50	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	3				4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1147	286	541			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1147	286	541			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	85	97	97			
cM capacity (veh/h)	175	693	997			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	45	365	678	335	176
Volume Left	26	25	0	0	0
Volume Right	19	0	0	0	9
cSH	255	997	1700	1700	1700
Volume to Capacity	0.18	0.03	0.40	0.20	0.10
Queue Length 95th (m)	4.8	0.6	0.0	0.0	0.0
Control Delay (s)	22.1	0.9	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	22.1	0.3		0.0	
Approach LOS	C				

Intersection Summary				
Average Delay		0.8		
Intersection Capacity Utilization		54.8%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	20	340	640	10	160	330
Future Volume (Veh/h)	20	340	640	10	160	330
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	21	362	681	11	170	351
Pedestrians	15		15			15
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1226	370			707	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1226	370			707	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	41			81	
cM capacity (veh/h)	134	611			876	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	21	362	340	340	11	170	176	176
Volume Left	21	0	0	0	0	170	0	0
Volume Right	0	362	0	0	11	0	0	0
cSH	134	611	1700	1700	1700	876	1700	1700
Volume to Capacity	0.16	0.59	0.20	0.20	0.01	0.19	0.10	0.10
Queue Length 95th (m)	4.1	29.5	0.0	0.0	0.0	5.4	0.0	0.0
Control Delay (s)	36.8	19.1	0.0	0.0	0.0	10.1	0.0	0.0
Lane LOS	E	C				B		
Approach Delay (s)	20.1		0.0			3.3		
Approach LOS	C							

Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	48.0%	ICU Level of Service		A
Analysis Period (min)	15			

Intersection: 2: Bearspaw Rd & Twp Rd 254

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	11.8	9.3	26.0	24.5
Average Queue (m)	5.1	3.6	12.4	14.2
95th Queue (m)	12.8	10.8	20.2	21.6
Link Distance (m)	149.7	115.5	187.5	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

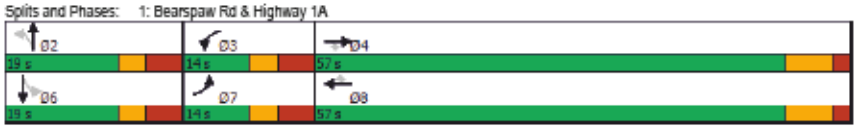
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	1060	19	48	1675	148	14	30	5	103	32	32
Future Volume (vph)	14	1060	19	48	1675	148	14	30	5	103	32	32
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.980			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1742	3385	1559	1742	3385	1559	1742	1797	0	1742	1696	0
Flt Permitted	0.950			0.950			0.711			0.732		
Satd. Flow (perm)	1742	3385	1559	1742	3385	1559	1304	1797	0	1342	1696	0
Satd. Flow (RTOR)			133			161		5			35	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	15	1174	21	52	1821	161	15	33	5	112	35	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	1174	21	52	1821	161	15	38	0	112	70	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	12.0	12.0		12.0	12.0	
Minimum Split (s)	14.0	27.0	27.0	14.0	27.0	27.0	19.0	19.0		19.0	19.0	
Total Split (s)	14.0	57.0	57.0	14.0	57.0	57.0	19.0	19.0		19.0	19.0	
Total Split (%)	15.6%	63.3%	63.3%	15.6%	63.3%	63.3%	21.1%	21.1%		21.1%	21.1%	
Maximum Green (s)	7.0	50.0	50.0	7.0	50.0	50.0	12.0	12.0		12.0	12.0	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	4.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0		4.0	4.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	7.0	44.7	44.7	7.0	50.5	50.5	12.1	12.1		12.1	12.1	
Actuated g/C Ratio	0.09	0.57	0.57	0.09	0.64	0.64	0.15	0.15		0.15	0.15	
v/c Ratio	0.10	0.61	0.02	0.34	0.84	0.15	0.06	0.14		0.55	0.24	
Control Delay	36.8	14.4	0.1	41.6	17.3	1.8	32.0	29.1		43.8	21.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	36.8	14.4	0.1	41.6	17.3	1.8	32.0	29.1		43.8	21.0	
LOS	D	B	A	D	B	A	C	C		D	C	
Approach Delay		14.4			16.7			29.9			35.0	
Approach LOS		B			B			C			D	
Queue Length 50th (m)	2.0	68.0	0.0	7.2	87.7	0.0	1.9	4.1		15.0	4.4	
Queue Length 95th (m)	8.4	87.7	0.0	19.9	#210.1	7.9	7.9	13.9		#40.2	17.2	
Internal Link Dist (m)		216.0			442.3			82.3			107.7	
Turn Bay Length (m)	170.0		170.0	150.0		150.0						
Base Capacity (vph)	154	2182	1052	154	2182	1062	196	277		204	288	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.10	0.54	0.02	0.34	0.83	0.15	0.06	0.14		0.55	0.24	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 79.1
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 17.1 — Intersection LOS: B
Intersection Capacity Utilization 71.7% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Bearspaw Rd & Highway 1A



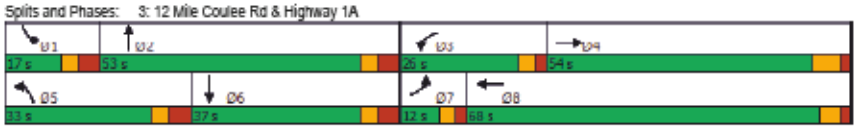
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	1061	220	560	1540	740	180	240	370	260	340	220
Future Volume (vph)	200	1061	220	560	1540	740	180	240	370	260	340	220
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor										0.98		
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3347	3385	1529	3315	3385	1514	1742	3417	1559	3380	3231	1529
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3347	3385	1529	3315	3385	1514	1742	3417	1559	3302	3231	1529
Satd. Flow (RTOR)			255			255			301			255
Confl. Peds. (#/hr)										20		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	5%	4%	4%	5%	5%	2%	4%	2%	2%	10%	4%
Adj. Flow (vph)	211	1117	232	589	1621	779	189	253	389	274	358	232
Shared Lane Traffic (%)												
Lane Group Flow (vph)	211	1117	232	589	1621	779	189	253	389	274	358	232
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0		7.0	20.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	12.0	27.0		12.0	25.5		14.0	53.0		14.0	23.0	
Total Split (s)	12.0	54.0		26.0	68.0		33.0	53.0		17.0	37.0	
Total Split (%)	8.0%	36.0%		17.3%	45.3%		22.0%	35.3%		11.3%	24.7%	
Maximum Green (s)	7.0	47.0		21.0	62.5		26.0	46.0		10.0	30.0	
Yellow Time (s)	3.0	5.0		3.0	3.5		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		4.0	4.0		4.0	4.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	7.0		5.0	5.5		7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)								8.0				
Flash Dont Walk (s)								38.0				
Pedestrian Calls (#/hr)								10				
Act Effct Green (s)	7.0	47.2	134.3	21.1	62.8	134.3	19.2	29.7	134.3	10.1	20.6	134.3
Actuated g/C Ratio	0.05	0.35	1.00	0.16	0.47	1.00	0.14	0.22	1.00	0.08	0.15	1.00
v/c Ratio	1.21	0.94	0.15	1.13	1.02	0.51	0.76	0.33	0.25	1.09	0.72	0.15
Control Delay	186.3	57.9	0.2	130.9	64.7	1.3	75.5	44.2	0.4	138.2	63.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	186.3	57.9	0.2	130.9	64.7	1.3	75.5	44.2	0.4	138.2	63.4	0.2
LOS	F	E	A	F	E	A	E	D	A	F	E	A
Approach Delay		66.7			61.2			30.8			70.2	
Approach LOS		E			E			C			E	
Queue Length 50th (m)	~34.7	149.3	0.0	~92.6	~238.8	0.0	48.4	29.7	0.0	~41.6	48.1	0.0
Queue Length 95th (m)	#68.9	#232.6	0.0	#150.9	#339.4	0.0	79.6	41.5	0.0	#80.5	67.7	0.0

3: 12 Mile Coulee Rd & Highway 1A
08-11-2020
PM Peak Hour
2028 Background

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		425.3			429.6			236.6			405.0	
Turn Bay Length (m)	135.0		150.0	90.0		25.0	50.0		25.0	75.0		25.0
Base Capacity (vph)	175	1190	1529	521	1583	1514	339	1176	1559	252	725	1529
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.21	0.94	0.15	1.13	1.02	0.51	0.56	0.22	0.25	1.09	0.49	0.15

Intersection Summary	
Cycle Length: 150	
Actuated Cycle Length: 134.3	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.21	
Intersection Signal Delay: 59.8	Intersection LOS: E
Intersection Capacity Utilization 89.9%	ICU Level of Service E
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 3: 12 Mile Coulee Rd & Highway 1A



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Synchro 10
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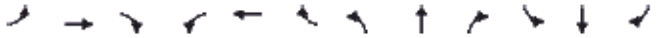


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	5	5	5	5	5	5	36	49	5	80	11
Future Volume (vph)	5	5	5	5	5	5	5	36	49	5	80	11
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	5	5	5	5	5	5	36	49	5	80	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	15	15	90	96
Volume Left (vph)	5	5	5	5
Volume Right (vph)	5	5	49	11
Hadj (s)	-0.10	-0.10	-0.28	-0.02
Departure Headway (s)	4.2	4.2	3.8	4.0
Degree Utilization, x	0.02	0.02	0.09	0.11
Capacity (veh/h)	816	816	930	881
Control Delay (s)	7.3	7.3	7.2	7.5
Approach Delay (s)	7.3	7.3	7.2	7.5
Approach LOS	A	A	A	A

Intersection Summary				
Delay			7.3	
Level of Service			A	
Intersection Capacity Utilization			21.9%	ICU Level of Service
Analysis Period (min)			15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	5	5	770	1066	54
Future Volume (Veh/h)	20	5	5	770	1066	54
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	21	5	5	811	1122	57
Pedestrians	30				50	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	3				4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1646	620	1209			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1646	620	1209			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	75	99	99			
cM capacity (veh/h)	83	420	558			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	26	275	541	748	431
Volume Left	21	5	0	0	0
Volume Right	5	0	0	0	57
cSH	99	558	1700	1700	1700
Volume to Capacity	0.26	0.01	0.32	0.44	0.25
Queue Length 95th (m)	7.4	0.2	0.0	0.0	0.0
Control Delay (s)	54.1	0.3	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	54.1	0.1		0.0	
Approach LOS	F				

Intersection Summary				
Average Delay		0.7		
Intersection Capacity Utilization		42.2%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	50	310	460	30	320	750
Future Volume (Veh/h)	50	310	460	30	320	750
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	53	326	484	32	337	789
Pedestrians	15		15			15
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1582	272			531	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1582	272			531	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	18	54			67	
cM capacity (veh/h)	65	707			1019	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	53	326	242	242	32	337	394	394
Volume Left	53	0	0	0	0	337	0	0
Volume Right	0	326	0	0	32	0	0	0
cSH	65	707	1700	1700	1700	1019	1700	1700
Volume to Capacity	0.82	0.46	0.14	0.14	0.02	0.33	0.23	0.23
Queue Length 95th (m)	28.7	18.5	0.0	0.0	0.0	11.1	0.0	0.0
Control Delay (s)	168.1	14.4	0.0	0.0	0.0	10.3	0.0	0.0
Lane LOS	F	B				B		
Approach Delay (s)	35.9		0.0			3.1		
Approach LOS	E							

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 2: Bearspaw Rd & Twp Rd 254

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.2	9.3	19.2	18.2
Average Queue (m)	3.8	3.3	9.4	9.4
95th Queue (m)	10.9	10.4	14.9	14.6
Link Distance (m)	149.7	115.5	187.5	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

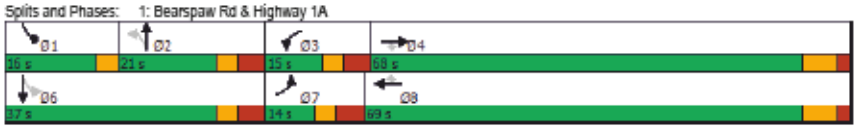
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1925	69	72	836	49	24	55	5	219	131	16
Future Volume (vph)	23	1925	69	72	836	49	24	55	5	219	131	16
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.988			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1742	4863	1559	1742	4863	1559	1742	1812	0	1742	1805	0
Flt Permitted	0.950			0.950			0.656			0.534		
Satd. Flow (perm)	1742	4863	1559	1742	4863	1559	1203	1812	0	979	1805	0
Satd. Flow (RTOR)			127			127		3			5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	25	2092	75	78	909	53	26	60	5	238	142	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	2092	75	78	909	53	26	65	0	238	159	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	12.0	12.0		7.0	12.0	
Minimum Split (s)	14.0	27.0	27.0	14.0	27.0	27.0	19.0	19.0		10.0	19.0	
Total Split (s)	14.0	68.0	68.0	15.0	69.0	69.0	21.0	21.0		16.0	37.0	
Total Split (%)	11.7%	56.7%	56.7%	12.5%	57.5%	57.5%	17.5%	17.5%		13.3%	30.8%	
Maximum Green (s)	7.0	61.0	61.0	8.0	62.0	62.0	14.0	14.0		13.0	30.0	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	4.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0		0.0	4.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	7.5	54.6	54.6	8.2	58.0	58.0	13.0	13.0		28.9	24.6	
Actuated g/C Ratio	0.07	0.52	0.52	0.08	0.55	0.55	0.12	0.12		0.28	0.23	
v/c Ratio	0.20	0.83	0.09	0.57	0.34	0.06	0.18	0.29		0.63	0.37	
Control Delay	57.0	26.3	0.6	70.5	14.6	0.1	51.3	50.5		43.2	37.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	57.0	26.3	0.6	70.5	14.6	0.1	51.3	50.5		43.2	37.9	
LOS	E	C	A	E	B	A	D	D		D	D	
Approach Delay		25.7			18.0			50.7			41.1	
Approach LOS		C			B			D			D	
Queue Length 50th (m)	5.5	144.8	0.0	17.7	43.1	0.0	5.5	13.3		45.6	29.3	
Queue Length 95th (m)	14.7	169.5	1.2	#40.6	53.8	0.0	14.5	27.4		71.4	49.5	
Internal Link Dist (m)		216.0			442.3			82.3			107.7	
Turn Bay Length (m)	170.0		170.0	150.0		150.0						
Base Capacity (vph)	123	3011	1014	141	3108	1042	170	260		377	553	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.20	0.69	0.07	0.55	0.29	0.05	0.15	0.25		0.63	0.29	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 105
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 25.8 — Intersection LOS: C
Intersection Capacity Utilization 82.0% — ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Bearspaw Rd & Highway 1A



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	1060	19	48	1675	148	14	30	5	103	32	32
Future Volume (vph)	14	1060	19	48	1675	148	14	30	5	103	32	32
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.980			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1742	4863	1559	1742	4863	1559	1742	1797	0	1742	1696	0
Flt Permitted	0.950			0.950			0.711			0.494		
Satd. Flow (perm)	1742	4863	1559	1742	4863	1559	1304	1797	0	906	1696	0
Satd. Flow (RTOR)			191			191		5			35	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	15	1174	21	52	1821	161	15	33	5	112	35	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	1174	21	52	1821	161	15	38	0	112	70	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	12.0	12.0		7.0	12.0	
Minimum Split (s)	14.0	27.0	27.0	14.0	27.0	27.0	19.0	19.0		10.0	19.0	
Total Split (s)	14.0	37.0	37.0	14.0	37.0	37.0	19.0	19.0		10.0	29.0	
Total Split (%)	17.5%	46.3%	46.3%	17.5%	46.3%	46.3%	23.8%	23.8%		12.5%	36.3%	
Maximum Green (s)	7.0	30.0	30.0	7.0	30.0	30.0	12.0	12.0		7.0	22.0	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	4.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0		0.0	4.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	7.4	34.4	34.4	7.4	39.3	39.3	12.6	12.6		19.3	17.8	
Actuated g/C Ratio	0.11	0.52	0.52	0.11	0.59	0.59	0.19	0.19		0.29	0.27	
v/c Ratio	0.08	0.47	0.02	0.27	0.63	0.16	0.06	0.11		0.29	0.15	
Control Delay	33.9	17.2	0.1	36.4	16.2	2.2	29.3	25.4		20.5	13.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	33.9	17.2	0.1	36.4	16.2	2.2	29.3	25.4		20.5	13.3	
LOS	C	B	A	D	B	A	C	C		C	B	
Approach Delay		17.1			15.6			27.2			17.7	
Approach LOS		B			B			C			B	
Queue Length 50th (m)	2.0	52.7	0.0	6.9	67.6	0.0	1.8	4.0		10.7	3.5	
Queue Length 95th (m)	7.6	66.7	0.0	18.1	#135.4	7.9	7.1	12.4		23.7	13.1	
Internal Link Dist (m)		216.0			442.3			82.3			107.7	
Turn Bay Length (m)	170.0		170.0	150.0		150.0						
Base Capacity (vph)	193	2628	930	193	2880	1001	247	345		383	614	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	

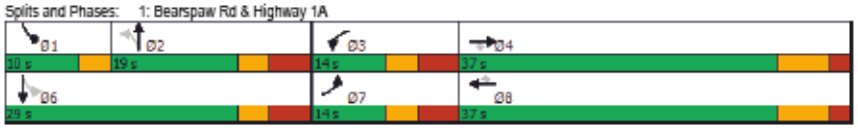
1: Bearspaw Rd & Highway 1A
08-11-2020
PM Peak Hour
2028 Background - Improved

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.08	0.45	0.02	0.27	0.63	0.16	0.06	0.11		0.29	0.11	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 66.4
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 16.4 — Intersection LOS: B
Intersection Capacity Utilization 65.2% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Bearspaw Rd & Highway 1A



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Synchro 10
DB

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	2611	75	78	1088	50	26	60	5	222	144	17
Future Volume (vph)	23	2611	75	78	1088	50	26	60	5	222	144	17
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.989			0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1742	4863	1559	1742	4863	1559	1742	1814	0	1742	1806	0
Flt Permitted	0.950			0.950			0.647			0.535		
Satd. Flow (perm)	1742	4863	1559	1742	4863	1559	1187	1814	0	981	1806	0
Satd. Flow (RTOR)			102			102		2			3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	25	2838	82	85	1183	54	28	65	5	241	157	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	2838	82	85	1183	54	28	70	0	241	175	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	12.0	12.0		7.0	12.0	
Minimum Split (s)	14.0	27.0	27.0	14.0	27.0	27.0	19.0	19.0		10.0	19.0	
Total Split (s)	14.0	99.0	99.0	16.0	101.0	101.0	19.0	19.0		16.0	35.0	
Total Split (%)	9.3%	66.0%	66.0%	10.7%	67.3%	67.3%	12.7%	12.7%		10.7%	23.3%	
Maximum Green (s)	7.0	92.0	92.0	9.0	94.0	94.0	12.0	12.0		13.0	28.0	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	4.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0		0.0	4.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	7.1	87.5	87.5	9.1	95.7	95.7	12.2	12.2		28.4	24.3	
Actuated g/C Ratio	0.05	0.62	0.62	0.06	0.67	0.67	0.09	0.09		0.20	0.17	
v/c Ratio	0.29	0.95	0.08	0.77	0.36	0.05	0.28	0.45		0.89	0.56	
Control Delay	78.0	34.1	1.3	107.4	11.6	0.1	72.7	73.4		87.4	61.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	78.0	34.1	1.3	107.4	11.6	0.1	72.7	73.4		87.4	61.3	
LOS	E	C	A	F	B	A	E	E		F	E	
Approach Delay		33.6			17.3			73.2			76.4	
Approach LOS		C			B			E			E	
Queue Length 50th (m)	7.3	274.2	0.0	25.5	60.5	0.0	8.0	19.7		66.2	46.6	
Queue Length 95th (m)	17.7	299.3	4.3	#56.0	69.6	0.0	18.9	35.1		#118.0	71.5	
Internal Link Dist (m)		216.0			442.3			82.3			107.7	
Turn Bay Length (m)	170.0		170.0	150.0		150.0						
Base Capacity (vph)	87	3190	1057	111	3350	1106	101	156		270	362	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	

1: Bearspaw Rd & Highway 1A
08-11-2020
AM Peak Hour
2039 Background

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.29	0.89	0.08	0.77	0.35	0.05	0.28	0.45		0.89	0.48	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 142.2
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 33.6 — Intersection LOS: C
Intersection Capacity Utilization 97.3% — ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Bearspaw Rd & Highway 1A

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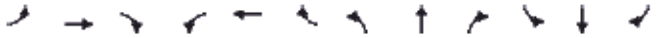
Synchro 10
DB



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	15	5	7	5	5	5	76	134	5	275	5
Future Volume (vph)	5	15	5	7	5	5	5	76	134	5	275	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	15	5	7	5	5	5	76	134	5	275	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	25	17	215	285
Volume Left (vph)	5	7	5	5
Volume Right (vph)	5	5	134	5
Hadj (s)	-0.05	-0.06	-0.34	0.03
Departure Headway (s)	4.9	4.9	4.0	4.2
Degree Utilization, x	0.03	0.02	0.24	0.34
Capacity (veh/h)	653	651	884	826
Control Delay (s)	8.1	8.0	8.2	9.4
Approach Delay (s)	8.1	8.0	8.2	9.4
Approach LOS	A	A	A	A

Intersection Summary				
Delay		8.8		
Level of Service		A		
Intersection Capacity Utilization	30.5%	ICU Level of Service	A	
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	34	18	24	986	562	18
Future Volume (Veh/h)	34	18	24	986	562	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	36	19	26	1049	598	19
Pedestrians	30				50	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	3				4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1264	338	647			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1264	338	647			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	75	97	97			
cM capacity (veh/h)	146	640	910			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	55	376	699	399	218
Volume Left	36	25	0	0	0
Volume Right	19	0	0	0	19
cSH	199	910	1700	1700	1700
Volume to Capacity	0.28	0.03	0.41	0.23	0.13
Queue Length 95th (m)	8.2	0.7	0.0	0.0	0.0
Control Delay (s)	29.8	0.9	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	29.8	0.3		0.0	
Approach LOS	D				

Intersection Summary				
Average Delay		1.1		
Intersection Capacity Utilization		55.7%	ICU Level of Service	B
Analysis Period (min)		15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	20	340	670	10	170	410
Future Volume (Veh/h)	20	340	670	10	170	410
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	21	362	713	11	181	436
Pedestrians	15		15			15
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1323	386			739	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1323	386			739	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	81	39			79	
cM capacity (veh/h)	113	596			852	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	21	362	356	356	11	181	218	218
Volume Left	21	0	0	0	0	181	0	0
Volume Right	0	362	0	0	11	0	0	0
cSH	113	596	1700	1700	1700	852	1700	1700
Volume to Capacity	0.19	0.61	0.21	0.21	0.01	0.21	0.13	0.13
Queue Length 95th (m)	4.9	30.9	0.0	0.0	0.0	6.1	0.0	0.0
Control Delay (s)	43.9	19.9	0.0	0.0	0.0	10.4	0.0	0.0
Lane LOS	E	C				B		
Approach Delay (s)	21.2		0.0			3.0		
Approach LOS	C							

Intersection Summary				
Average Delay		5.8		
Intersection Capacity Utilization		48.8%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 2: Bearspaw Rd & Twp Rd 254

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	11.8	13.5	27.8	28.8
Average Queue (m)	5.0	4.5	13.7	15.6
95th Queue (m)	12.5	12.5	22.6	24.4
Link Distance (m)	149.7	115.5	187.5	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

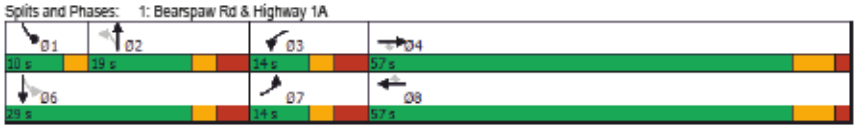
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1477	19	48	2351	150	14	31	5	104	32	32
Future Volume (vph)	15	1477	19	48	2351	150	14	31	5	104	32	32
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.981			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1742	4863	1559	1742	4863	1559	1742	1799	0	1742	1696	0
Flt Permitted	0.950			0.950			0.711			0.503		
Satd. Flow (perm)	1742	4863	1559	1742	4863	1559	1304	1799	0	922	1696	0
Satd. Flow (RTOR)			153			163		5			35	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	16	1605	21	52	2555	163	15	34	5	113	35	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	1605	21	52	2555	163	15	39	0	113	70	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	12.0	12.0		7.0	12.0	
Minimum Split (s)	14.0	27.0	27.0	14.0	27.0	27.0	19.0	19.0		10.0	19.0	
Total Split (s)	14.0	57.0	57.0	14.0	57.0	57.0	19.0	19.0		10.0	29.0	
Total Split (%)	14.0%	57.0%	57.0%	14.0%	57.0%	57.0%	19.0%	19.0%		10.0%	29.0%	
Maximum Green (s)	7.0	50.0	50.0	7.0	50.0	50.0	12.0	12.0		7.0	22.0	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	4.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0		0.0	4.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	7.1	53.5	53.5	7.1	56.3	56.3	12.2	12.2		19.6	17.7	
Actuated g/C Ratio	0.08	0.62	0.62	0.08	0.65	0.65	0.14	0.14		0.23	0.20	
v/c Ratio	0.11	0.54	0.02	0.37	0.81	0.15	0.08	0.15		0.38	0.19	
Control Delay	44.3	15.4	0.1	49.8	20.5	2.6	39.3	35.5		31.8	19.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	44.3	15.4	0.1	49.8	20.5	2.6	39.3	35.5		31.8	19.1	
LOS	D	B	A	D	C	A	D	D		C	B	
Approach Delay		15.5			20.0			36.6			26.9	
Approach LOS		B			C			D			C	
Queue Length 50th (m)	2.5	81.6	0.0	8.3	124.9	0.0	2.2	5.0		13.9	4.4	
Queue Length 95th (m)	9.5	97.2	0.0	21.8	#227.7	9.6	8.6	15.7		31.7	16.7	
Internal Link Dist (m)		216.0			442.3			82.3			107.7	
Turn Bay Length (m)	170.0		170.0	150.0		150.0						
Base Capacity (vph)	142	3148	1063	142	3152	1068	183	257		295	463	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	

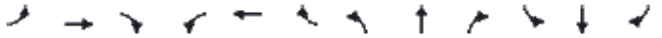
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.11	0.51	0.02	0.37	0.81	0.15	0.08	0.15		0.38	0.15	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 86.9
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 18.9 — Intersection LOS: B
Intersection Capacity Utilization 70.9% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Bearspaw Rd & Highway 1A





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	5	5	5	5	5	5	36	50	5	81	11
Future Volume (vph)	5	5	5	5	5	5	5	36	50	5	81	11
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	5	5	5	5	5	5	36	50	5	81	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	15	15	91	97
Volume Left (vph)	5	5	5	5
Volume Right (vph)	5	5	50	11
Hadj (s)	-0.10	-0.10	-0.28	-0.02
Departure Headway (s)	4.2	4.2	3.8	4.0
Degree Utilization, x	0.02	0.02	0.10	0.11
Capacity (veh/h)	815	805	931	881
Control Delay (s)	7.3	7.3	7.2	7.5
Approach Delay (s)	7.3	7.3	7.2	7.5
Approach LOS	A	A	A	A

Intersection Summary				
Delay			7.3	
Level of Service			A	
Intersection Capacity Utilization			22.0%	ICU Level of Service
Analysis Period (min)			15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	5	5	800	1205	54
Future Volume (Veh/h)	20	5	5	800	1205	54
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	21	5	5	842	1269	57
Pedestrians	30				50	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.2				1.2	
Percent Blockage	3				4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1808	693	1356			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1808	693	1356			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	68	99	99			
cM capacity (veh/h)	65	376	490			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	26	286	561	846	480
Volume Left	21	5	0	0	0
Volume Right	5	0	0	0	57
cSH	77	490	1700	1700	1700
Volume to Capacity	0.34	0.01	0.33	0.50	0.28
Queue Length 95th (m)	9.7	0.2	0.0	0.0	0.0
Control Delay (s)	73.9	0.4	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	73.9	0.1		0.0	
Approach LOS	F				

Intersection Summary				
Average Delay		0.9		
Intersection Capacity Utilization		46.1%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	50	290	510	30	380	830
Future Volume (Veh/h)	50	290	510	30	380	830
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	53	305	537	32	400	874
Pedestrians	15		15			15
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1804	298			584	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1804	298			584	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	55			59	
cM capacity (veh/h)	41	680			974	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	53	305	268	268	32	400	437	437
Volume Left	53	0	0	0	0	400	0	0
Volume Right	0	305	0	0	32	0	0	0
cSH	41	680	1700	1700	1700	974	1700	1700
Volume to Capacity	1.31	0.45	0.16	0.16	0.02	0.41	0.26	0.26
Queue Length 95th (m)	40.3	17.7	0.0	0.0	0.0	15.5	0.0	0.0
Control Delay (s)	401.0	14.5	0.0	0.0	0.0	11.2	0.0	0.0
Lane LOS	F	B				B		
Approach Delay (s)	71.7		0.0			3.5		
Approach LOS	F							

Intersection Summary				
Average Delay	13.7			
Intersection Capacity Utilization	53.4%	ICU Level of Service		A
Analysis Period (min)	15			

Intersection: 2: Bearspaw Rd & Twp Rd 254

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	10.6	9.3	14.9	18.7
Average Queue (m)	3.6	3.5	9.1	10.0
95th Queue (m)	10.9	10.7	14.0	15.3
Link Distance (m)	149.7	115.5	187.5	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1935	74	77	853	49	40	55	5	219	131	16
Future Volume (vph)	23	1935	74	77	853	49	40	55	5	219	131	16
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.988			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1742	4863	1559	1742	4863	1559	1742	1812	0	1742	1805	0
Flt Permitted	0.950			0.950			0.656			0.536		
Satd. Flow (perm)	1742	4863	1559	1742	4863	1559	1203	1812	0	983	1805	0
Satd. Flow (RTOR)			122			122		3			5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	25	2103	80	84	927	53	43	60	5	238	142	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	2103	80	84	927	53	43	65	0	238	159	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	12.0	12.0		7.0	12.0	
Minimum Split (s)	14.0	27.0	27.0	14.0	27.0	27.0	19.0	19.0		10.0	19.0	
Total Split (s)	14.0	70.0	70.0	17.0	73.0	73.0	21.0	21.0		17.0	38.0	
Total Split (%)	11.2%	56.0%	56.0%	13.6%	58.4%	58.4%	16.8%	16.8%		13.6%	30.4%	
Maximum Green (s)	7.0	63.0	63.0	10.0	66.0	66.0	14.0	14.0		14.0	31.0	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	4.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0		0.0	4.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	7.5	56.7	56.7	9.6	61.5	61.5	13.3	13.3		29.8	25.5	
Actuated g/C Ratio	0.07	0.52	0.52	0.09	0.56	0.56	0.12	0.12		0.27	0.23	
v/c Ratio	0.21	0.83	0.09	0.55	0.34	0.06	0.30	0.29		0.63	0.38	
Control Delay	60.1	27.8	1.0	68.9	14.6	0.1	57.2	53.0		44.9	39.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	60.1	27.8	1.0	68.9	14.6	0.1	57.2	53.0		44.9	39.6	
LOS	E	C	A	E	B	A	E	D		D	D	
Approach Delay		27.2			18.2			54.7			42.8	
Approach LOS		C			B			D			D	
Queue Length 50th (m)	5.8	154.9	0.0	19.8	45.2	0.0	9.8	14.1		48.4	31.0	
Queue Length 95th (m)	15.2	182.4	2.5	#40.6	56.6	0.0	21.8	28.3		74.1	51.1	
Internal Link Dist (m)		216.0			442.3			82.3			107.7	
Turn Bay Length (m)	170.0		170.0	150.0		150.0						
Base Capacity (vph)	119	2994	1007	171	3143	1051	165	251		377	552	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	

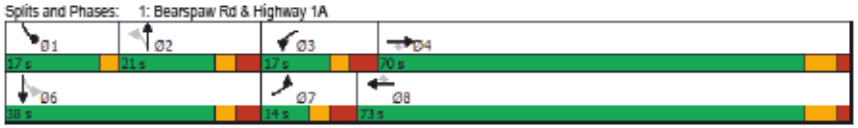
1: Bearspaw Rd & Highway 1A
08-11-2020
AM Peak Hour
2028 After Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.21	0.70	0.08	0.49	0.29	0.05	0.26	0.26		0.63	0.29	

Intersection Summary

Cycle Length: 125
Actuated Cycle Length: 109.5
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 27.1 — Intersection LOS: C
Intersection Capacity Utilization 87.6% — ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Bearspaw Rd & Highway 1A



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Synchro 10
DB

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	13	5	6	5	5	5	85	137	5	260	5
Future Volume (vph)	5	13	5	6	5	5	5	85	137	5	260	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	13	5	6	5	5	5	85	137	5	260	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	23	16	227	270
Volume Left (vph)	5	6	5	5
Volume Right (vph)	5	5	137	5
Hadj (s)	-0.05	-0.06	-0.32	0.03
Departure Headway (s)	4.9	4.9	3.9	4.2
Degree Utilization, x	0.03	0.02	0.25	0.32
Capacity (veh/h)	656	655	888	826
Control Delay (s)	8.1	8.0	8.2	9.2
Approach Delay (s)	8.1	8.0	8.2	9.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay		8.7		
Level of Service		A		
Intersection Capacity Utilization		29.7%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 2: Bearspaw Rd & Twp Rd 254

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	11.8	9.3	31.4	27.6
Average Queue (m)	5.1	4.3	13.8	14.4
95th Queue (m)	12.5	11.7	23.3	22.7
Link Distance (m)	149.7	115.5	187.5	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

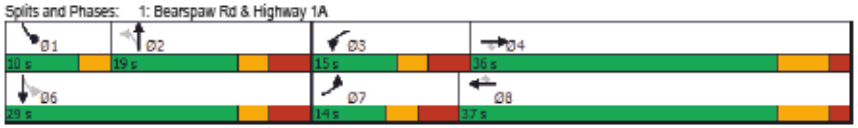
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	1107	37	66	1697	148	24	30	5	103	32	32
Future Volume (vph)	14	1107	37	66	1697	148	24	30	5	103	32	32
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.980			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1742	4863	1559	1742	4863	1559	1742	1797	0	1742	1696	0
Flt Permitted	0.950			0.950			0.711			0.494		
Satd. Flow (perm)	1742	4863	1559	1742	4863	1559	1304	1797	0	906	1696	0
Satd. Flow (RTOR)			191			191		5			35	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	15	1203	40	72	1845	161	26	33	5	112	35	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	1203	40	72	1845	161	26	38	0	112	70	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	12.0	12.0		7.0	12.0	
Minimum Split (s)	14.0	27.0	27.0	14.0	27.0	27.0	19.0	19.0		10.0	19.0	
Total Split (s)	14.0	36.0	36.0	15.0	37.0	37.0	19.0	19.0		10.0	29.0	
Total Split (%)	17.5%	45.0%	45.0%	18.8%	46.3%	46.3%	23.8%	23.8%		12.5%	36.3%	
Maximum Green (s)	7.0	29.0	29.0	8.0	30.0	30.0	12.0	12.0		7.0	22.0	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	4.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0		0.0	4.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	7.3	35.0	35.0	7.9	40.4	40.4	12.6	12.6		19.4	17.8	
Actuated g/C Ratio	0.11	0.52	0.52	0.12	0.60	0.60	0.19	0.19		0.29	0.26	
v/c Ratio	0.08	0.48	0.04	0.36	0.64	0.16	0.11	0.11		0.30	0.15	
Control Delay	34.4	17.7	0.1	37.8	16.2	2.2	30.2	25.9		21.0	13.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	34.4	17.7	0.1	37.8	16.2	2.2	30.2	25.9		21.0	13.6	
LOS	C	B	A	D	B	A	C	C		C	B	
Approach Delay		17.3			15.8			28.2			18.2	
Approach LOS		B			B			C			B	
Queue Length 50th (m)	2.0	55.6	0.0	9.8	68.9	0.0	3.3	4.1		11.1	3.6	
Queue Length 95th (m)	7.6	70.2	0.0	22.7	#138.2	7.9	10.3	12.4		23.7	13.1	
Internal Link Dist (m)		216.0			442.3			82.3			107.7	
Turn Bay Length (m)	170.0		170.0	150.0		150.0						
Base Capacity (vph)	188	2572	914	215	2902	1007	242	338		376	600	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.08	0.47	0.04	0.33	0.64	0.16	0.11	0.11		0.30	0.12	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 67.7
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 16.7 — Intersection LOS: B
Intersection Capacity Utilization 69.5% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Bearspaw Rd & Highway 1A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	5	5	5	5	5	5	47	60	5	116	11
Future Volume (vph)	5	5	5	5	5	5	5	47	60	5	116	11
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	5	5	5	5	5	5	47	60	5	116	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	15	15	112	132
Volume Left (vph)	5	5	5	5
Volume Right (vph)	5	5	60	11
Hadj (s)	-0.10	-0.10	-0.28	-0.01
Departure Headway (s)	4.3	4.3	3.8	4.1
Degree Utilization, x	0.02	0.02	0.12	0.15
Capacity (veh/h)	783	774	920	873
Control Delay (s)	7.4	7.4	7.3	7.8
Approach Delay (s)	7.4	7.4	7.3	7.8
Approach LOS	A	A	A	A

Intersection Summary				
Delay		7.5		
Level of Service		A		
Intersection Capacity Utilization		23.1%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 2: Bearspaw Rd & Twp Rd 254

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.1	9.3	16.7	18.1
Average Queue (m)	3.4	3.7	10.0	10.0
95th Queue (m)	10.5	11.0	14.6	15.7
Link Distance (m)	149.7	115.5	187.5	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	2631	86	89	1121	50	57	60	5	222	144	17
Future Volume (vph)	23	2631	86	89	1121	50	57	60	5	222	144	17
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.989			0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1742	4863	1559	1742	4863	1559	1742	1814	0	1742	1806	0
Flt Permitted	0.950			0.950			0.647			0.578		
Satd. Flow (perm)	1742	4863	1559	1742	4863	1559	1187	1814	0	1060	1806	0
Satd. Flow (RTOR)			102			102		2			3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	25	2860	93	97	1218	54	62	65	5	241	157	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	2860	93	97	1218	54	62	70	0	241	175	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	12.0	12.0		7.0	12.0	
Minimum Split (s)	14.0	27.0	27.0	14.0	27.0	27.0	19.0	19.0		10.0	19.0	
Total Split (s)	14.0	99.0	99.0	16.0	101.0	101.0	21.0	21.0		14.0	35.0	
Total Split (%)	9.3%	66.0%	66.0%	10.7%	67.3%	67.3%	14.0%	14.0%		9.3%	23.3%	
Maximum Green (s)	7.0	92.0	92.0	9.0	94.0	94.0	14.0	14.0		11.0	28.0	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	4.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0		0.0	4.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	7.0	91.1	91.1	9.0	98.8	98.8	13.0	13.0		31.0	27.0	
Actuated g/C Ratio	0.05	0.62	0.62	0.06	0.67	0.67	0.09	0.09		0.21	0.18	
v/c Ratio	0.30	0.96	0.09	0.92	0.38	0.05	0.60	0.43		0.89	0.53	
Control Delay	79.0	36.0	1.9	136.0	12.1	0.1	89.1	71.4		87.0	60.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	79.0	36.0	1.9	136.0	12.1	0.1	89.1	71.4		87.0	60.5	
LOS	E	D	A	F	B	A	F	E		F	E	
Approach Delay		35.3			20.4			79.7			75.8	
Approach LOS		D			C			E			E	
Queue Length 50th (m)	7.3	274.5	0.0	29.1	61.7	0.0	18.0	19.4		66.2	46.6	
Queue Length 95th (m)	17.7	304.7	5.9	#65.2	72.1	0.0	#35.5	35.6		#115.6	71.5	
Internal Link Dist (m)		216.0			442.3			82.3			107.7	
Turn Bay Length (m)	170.0		170.0	150.0		150.0						
Base Capacity (vph)	82	3021	1007	105	3243	1073	112	173		272	343	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	

1: Bearspaw Rd & Highway 1A
08-11-2020

AM Peak Hour
2039 After Development

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.30	0.95	0.09	0.92	0.38	0.05	0.55	0.40		0.89	0.51	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 148.1
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 35.8 Intersection LOS: D
Intersection Capacity Utilization 101.5% ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Bearspaw Rd & Highway 1A

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Synchro 10 DB

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	15	5	7	5	5	5	107	165	5	296	5
Future Volume (vph)	5	15	5	7	5	5	5	107	165	5	296	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	15	5	7	5	5	5	107	165	5	296	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	25	17	277	306
Volume Left (vph)	5	7	5	5
Volume Right (vph)	5	5	165	5
Hadj (s)	-0.05	-0.06	-0.32	0.03
Departure Headway (s)	5.1	5.1	4.0	4.3
Degree Utilization, x	0.04	0.02	0.31	0.37
Capacity (veh/h)	624	621	876	814
Control Delay (s)	8.3	8.2	8.8	9.8
Approach Delay (s)	8.3	8.2	8.8	9.8
Approach LOS	A	A	A	A

Intersection Summary				
Delay		9.2		
Level of Service		A		
Intersection Capacity Utilization		32.6%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 2: Bearspaw Rd & Twp Rd 254

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.2	9.3	27.6	27.8
Average Queue (m)	5.0	4.0	14.6	15.5
95th Queue (m)	12.3	11.4	22.2	23.4
Link Distance (m)	149.7	115.5	187.5	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

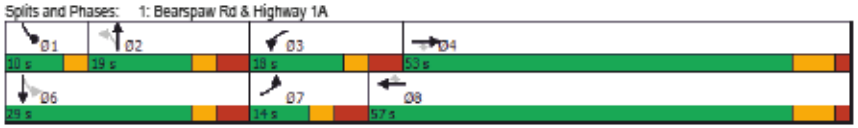
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1529	54	83	2394	150	35	31	5	104	32	32
Future Volume (vph)	15	1529	54	83	2394	150	35	31	5	104	32	32
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.981			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1742	4863	1559	1742	4863	1559	1742	1799	0	1742	1696	0
Flt Permitted	0.950			0.950			0.711			0.552		
Satd. Flow (perm)	1742	4863	1559	1742	4863	1559	1304	1799	0	1012	1696	0
Satd. Flow (RTOR)			153			163		5			35	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	16	1662	59	90	2602	163	38	34	5	113	35	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	1662	59	90	2602	163	38	39	0	113	70	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	12.0	12.0		7.0	12.0	
Minimum Split (s)	14.0	27.0	27.0	14.0	27.0	27.0	19.0	19.0		10.0	19.0	
Total Split (s)	14.0	53.0	53.0	18.0	57.0	57.0	19.0	19.0		10.0	29.0	
Total Split (%)	14.0%	53.0%	53.0%	18.0%	57.0%	57.0%	19.0%	19.0%		10.0%	29.0%	
Maximum Green (s)	7.0	46.0	46.0	11.0	50.0	50.0	12.0	12.0		7.0	22.0	
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	4.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0		0.0	4.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	
Act Effct Green (s)	7.1	49.6	49.6	9.4	57.5	57.5	12.2	12.2		21.6	19.8	
Actuated g/C Ratio	0.08	0.55	0.55	0.10	0.64	0.64	0.14	0.14		0.24	0.22	
v/c Ratio	0.12	0.62	0.06	0.49	0.84	0.15	0.22	0.16		0.38	0.17	
Control Delay	45.1	20.8	0.1	50.5	22.3	2.6	42.1	36.4		31.8	19.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	45.1	20.8	0.1	50.5	22.3	2.6	42.1	36.4		31.8	19.2	
LOS	D	C	A	D	C	A	D	D		C	B	
Approach Delay		20.3			22.1			39.2			27.0	
Approach LOS		C			C			D			C	
Queue Length 50th (m)	2.7	91.9	0.0	15.3	130.0	0.0	6.2	5.5		15.5	4.9	
Queue Length 95th (m)	9.5	111.5	0.0	32.2	#234.6	9.6	16.6	15.7		31.7	16.7	
Internal Link Dist (m)		216.0			442.3			82.3			107.7	
Turn Bay Length (m)	170.0		170.0	150.0		150.0						
Base Capacity (vph)	137	2870	983	215	3105	1054	176	247		300	446	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.12	0.58	0.06	0.42	0.84	0.15	0.22	0.16		0.38	0.16	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 90.1
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 21.9 — Intersection LOS: C
Intersection Capacity Utilization 83.4% — ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Bearspaw Rd & Highway 1A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	5	5	5	5	5	5	57	71	5	151	11
Future Volume (vph)	5	5	5	5	5	5	5	57	71	5	151	11
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	5	5	5	5	5	5	57	71	5	151	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	15	15	133	167
Volume Left (vph)	5	5	5	5
Volume Right (vph)	5	5	71	11
Hadj (s)	-0.10	-0.10	-0.28	0.00
Departure Headway (s)	4.4	4.4	3.9	4.1
Degree Utilization, x	0.02	0.02	0.14	0.19
Capacity (veh/h)	746	746	911	866
Control Delay (s)	7.5	7.5	7.5	8.0
Approach Delay (s)	7.5	7.5	7.5	8.0
Approach LOS	A	A	A	A

Intersection Summary				
Delay		7.8		
Level of Service		A		
Intersection Capacity Utilization	24.4%	ICU Level of Service		A
Analysis Period (min)		15		

Intersection: 2: Bearspaw Rd & Twp Rd 254

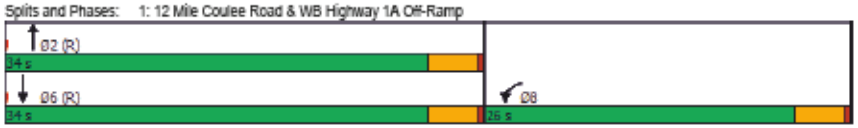
Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	10.6	9.3	18.0	21.4
Average Queue (m)	3.5	3.5	10.4	11.6
95th Queue (m)	10.7	10.7	15.7	18.6
Link Distance (m)	149.7	115.5	187.5	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	548	0	357	0	0	769
Future Volume (vph)	548	0	357	0	0	769
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	3380	0	3484	0	0	3484
Flt Permitted	0.950					
Satd. Flow (perm)	3380	0	3484	0	0	3484
Satd. Flow (RTOR)						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	583	0	390	0	0	818
Shared Lane Traffic (%)						
Lane Group Flow (vph)	583	0	390	0	0	818
Turn Type	Prot		NA			NA
Protected Phases	8		2			6
Permitted Phases						
Minimum Split (s)	20.0		24.0			24.0
Total Split (s)	26.0		34.0			34.0
Total Split (%)	43.3%		56.7%			56.7%
Maximum Green (s)	22.0		30.0			30.0
Yellow Time (s)	3.5		3.5			3.5
All-Red Time (s)	0.5		0.5			0.5
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	4.0		4.0			4.0
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0		5.0			5.0
Flash Dont Walk (s)	11.0		11.0			11.0
Pedestrian Calls (#/hr)	0		0			0
Act Effct Green (s)	22.0		30.0			30.0
Actuated g/C Ratio	0.37		0.50			0.50
v/c Ratio	0.47		0.22			0.47
Control Delay	16.1		7.1			10.9
Queue Delay	0.0		0.0			0.0
Total Delay	16.1		7.1			10.9
LOS	B		A			B
Approach Delay	16.1		7.1			10.9
Approach LOS	B		A			B
Queue Length 50th (m)	24.5		7.7			28.5
Queue Length 95th (m)	36.7		15.2			40.8
Internal Link Dist (m)	226.0		276.0			122.0
Turn Bay Length (m)						
Base Capacity (vph)	1239		1742			1742
Starvation Cap Reductn	0		0			0
Spillback Cap Reductn	0		0			0
Storage Cap Reductn	0		0			0
Reduced v/c Ratio	0.47		0.22			0.47

Intersection Summary

Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 45	
Control Type: Pretimed	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 44.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: 12 Mile Coulee Road & WB Highway 1A Off-Ramp

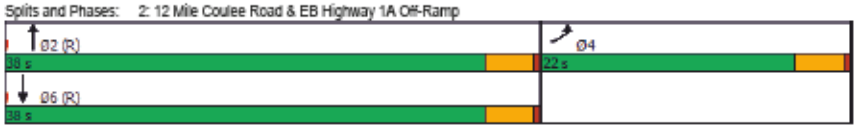


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	110	0	0	421	697	0
Future Volume (vph)	110	0	0	421	697	0
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	3380	0	0	3484	3484	0
Flt Permitted	0.950					
Satd. Flow (perm)	3380	0	0	3484	3484	0
Satd. Flow (RTOR)						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	117	0	0	448	741	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	117	0	0	448	741	0
Turn Type	Prot			NA	NA	
Protected Phases	4			2	6	
Permitted Phases						
Minimum Split (s)	20.0			24.0	24.0	
Total Split (s)	22.0			38.0	38.0	
Total Split (%)	36.7%			63.3%	63.3%	
Maximum Green (s)	18.0			34.0	34.0	
Yellow Time (s)	3.5			3.5	3.5	
All-Red Time (s)	0.5			0.5	0.5	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.0			4.0	4.0	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0			5.0	5.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	18.0			34.0	34.0	
Actuated g/C Ratio	0.30			0.57	0.57	
v/c Ratio	0.12			0.23	0.38	
Control Delay	15.7			6.8	5.8	
Queue Delay	0.0			0.0	0.0	
Total Delay	15.7			6.8	5.8	
LOS	B			A	A	
Approach Delay	15.7			6.8	5.8	
Approach LOS	B			A	A	
Queue Length 50th (m)	4.7			11.4	21.9	
Queue Length 95th (m)	9.6			17.6	24.4	
Internal Link Dist (m)	176.0			140.0	276.0	
Turn Bay Length (m)						
Base Capacity (vph)	1014			1974	1974	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.12			0.23	0.38	

Intersection Summary

Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 45	
Control Type: Pretimed	
Maximum v/c Ratio: 0.38	
Intersection Signal Delay: 7.1	Intersection LOS: A
Intersection Capacity Utilization 44.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: 12 Mile Coulee Road & EB Highway 1A Off-Ramp

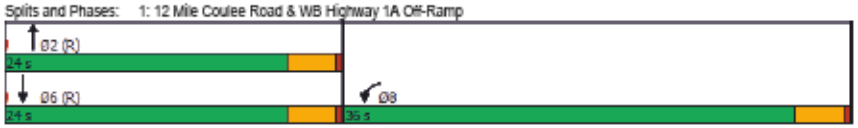


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1316	0	495	0	0	750
Future Volume (vph)	1316	0	495	0	0	750
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	3380	0	3484	0	0	3484
Flt Permitted	0.950					
Satd. Flow (perm)	3380	0	3484	0	0	3484
Satd. Flow (RTOR)						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1400	0	528	0	0	798
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1400	0	528	0	0	798
Turn Type	Prot		NA			NA
Protected Phases	8		2			6
Permitted Phases						
Minimum Split (s)	20.0		24.0			24.0
Total Split (s)	36.0		24.0			24.0
Total Split (%)	60.0%		40.0%			40.0%
Maximum Green (s)	32.0		20.0			20.0
Yellow Time (s)	3.5		3.5			3.5
All-Red Time (s)	0.5		0.5			0.5
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	4.0		4.0			4.0
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0		5.0			5.0
Flash Dont Walk (s)	11.0		11.0			11.0
Pedestrian Calls (#/hr)	0		0			0
Act Effct Green (s)	32.0		20.0			20.0
Actuated g/C Ratio	0.53		0.33			0.33
v/c Ratio	0.78		0.45			0.69
Control Delay	15.0		17.3			21.0
Queue Delay	0.0		0.0			0.0
Total Delay	15.0		17.3			21.0
LOS	B		B			C
Approach Delay	15.0		17.3			21.0
Approach LOS	B		B			C
Queue Length 50th (m)	57.2		23.4			39.0
Queue Length 95th (m)	80.9		35.4			56.2
Internal Link Dist (m)	226.0		276.0			122.0
Turn Bay Length (m)						
Base Capacity (vph)	1802		1161			1161
Starvation Cap Reductn	0		0			0
Spillback Cap Reductn	0		0			0
Storage Cap Reductn	0		0			0
Reduced v/c Ratio	0.78		0.45			0.69

Intersection Summary

Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 60	
Control Type: Pretimed	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 17.2	Intersection LOS: B
Intersection Capacity Utilization 66.5%	ICU Level of Service C
Analysis Period (min) 15	

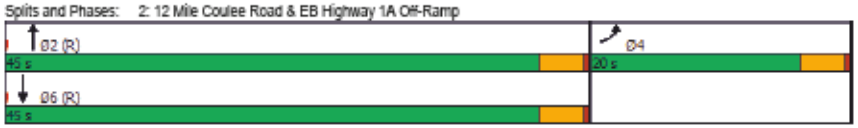
Splits and Phases: 1: 12 Mile Coulee Road & WB Highway 1A Off-Ramp



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	190	0	0	540	1726	0
Future Volume (vph)	190	0	0	540	1726	0
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	3380	0	0	3484	3484	0
Flt Permitted	0.950					
Satd. Flow (perm)	3380	0	0	3484	3484	0
Satd. Flow (RTOR)						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	202	0	0	574	1836	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	202	0	0	574	1836	0
Turn Type	Prot			NA	NA	
Protected Phases	4			2	6	
Permitted Phases						
Minimum Split (s)	20.0			24.0	24.0	
Total Split (s)	20.0			45.0	45.0	
Total Split (%)	30.8%			69.2%	69.2%	
Maximum Green (s)	16.0			41.0	41.0	
Yellow Time (s)	3.5			3.5	3.5	
All-Red Time (s)	0.5			0.5	0.5	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.0			4.0	4.0	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0			5.0	5.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	16.0			41.0	41.0	
Actuated g/C Ratio	0.25			0.63	0.63	
v/c Ratio	0.24			0.26	0.84	
Control Delay	20.6			5.7	14.0	
Queue Delay	0.0			0.0	0.0	
Total Delay	20.6			5.7	14.0	
LOS	C			A	B	
Approach Delay	20.6			5.7	14.0	
Approach LOS	C			A	B	
Queue Length 50th (m)	10.0			13.7	77.6	
Queue Length 95th (m)	17.5			20.1	109.4	
Internal Link Dist (m)	176.0			140.0	276.0	
Turn Bay Length (m)						
Base Capacity (vph)	832			2197	2197	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.24			0.26	0.84	

Intersection Summary	
Cycle Length: 65	
Actuated Cycle Length: 65	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 60	
Control Type: Pretimed	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 12.7	Intersection LOS: B
Intersection Capacity Utilization 66.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: 12 Mile Coulee Road & EB Highway 1A Off-Ramp



APPENDIX E

VISSIM Reports

2028 Background AM - Improved

Intersection	Movement	Assigned Vol.	Vehicles / hr	GEH	Movement	Average Delay	95% Queue
Blueridge Rise & Access 1	WB Peds	10	8	0.7	1-41@47.6-41@77.8	0.0	34
	SBL	0	0	#DIV/0!	1-46@105.1-32@6.0	0.0	0
	SBR	0	0	#DIV/0!	1-46@105.1-56@2.0	0.0	0
	EBT	42	36	1.0	1-57@151.9-32@6.0	0.0	0
	EBL	0	0	#DIV/0!	1-57@151.9-44@0.9	0.0	0
	EB Peds	10	11	0.3	1-65@264.6-65@297.9	0.0	25
	WBR	0	0	#DIV/0!	1-84@103.9-44@0.9	0.0	0
	WBT	32	32	0.0	1-84@103.9-56@2.0	0.0	0
	Intersection Avg	94	87	0.7	1	0.0	25
Blueridge Rise & Access 2	WB Peds	10	8	0.7	2-41@229.8-41@262.1	0.0	34
	EBT	42	36	1.0	2-48@116.8-57@0.2	0.1	0
	WBT	32	32	0.0	2-56@153.9-47@1.9	0.0	0
	WBR	0	0	#DIV/0!	2-56@153.9-59@4.1	0.0	0
	SBR	0	0	#DIV/0!	2-58@100.5-47@1.9	0.0	0
	EB Peds	10	11	0.3	2-65@80.3-65@112.6	0.0	27
	Intersection Avg	94	87	0.7	2	0.0	27
Blueridge Rise & Blueridge View	NB U Turn	0	0	#DIV/0!	3-54@100.1-55@1.4	0.0	19
	NBT	0	0	#DIV/0!	3-54@100.1-10047@10.	0.0	19
	NBR	14	11	0.8	3-54@100.1-10049@10.	1.0	19
	NBL	0	0	#DIV/0!	3-54@100.1-10051@8.7	0.0	19
	SBT	0	0	#DIV/0!	3-10046@0.6-55@1.4	0.0	0
	SB U Turn	0	0	#DIV/0!	3-10046@0.6-10047@1(	0.0	0
	SBL	0	0	#DIV/0!	3-10046@0.6-10049@1(	0.0	0
	SBR	0	0	#DIV/0!	3-10046@0.6-10051@8.	0.0	0
	WBL	11	11	0.0	3-10048@0.5-55@1.4	1.1	22
	WBR	0	0	#DIV/0!	3-10048@0.5-10047@1(	0.0	22
	WB U Turn	0	0	#DIV/0!	3-10048@0.5-10049@1(	0.0	22
	WBT	21	20	0.2	3-10048@0.5-10051@8.	0.9	22
	EBR	0	0	#DIV/0!	3-10050@1.1-55@1.4	0.0	23
	EBL	0	0	#DIV/0!	3-10050@1.1-10047@1(	0.0	23
	EBT	28	25	0.6	3-10050@1.1-10049@1(	1.0	23
	EB U Turn	0	0	#DIV/0!	3-10050@1.1-10051@8.	0.0	23
	Intersection Avg	74	67	0.8	3	1.0	21
12 Mile Coulee Road & Tusslewood Drive NW	NB Peds	10	8	0.7	4-9@114.7-9@140.9	0.0	20
	SBL	160	154	0.5	4-21@513.3-35@2.7	3.3	75
	SBT	330	341	0.6	4-21@513.3-38@10.2	0.7	55
	WBL	20	22	0.4	4-34@42.2-38@10.2	8.4	94
	WBR	340	339	0.1	4-34@42.2-10118@12.1	12.6	93
	NBT	640	635	0.2	4-37@375.1-10115@23.	0.1	0
	SB Peds	10	8	0.7	4-75@15.6-75@45.0	0.0	34
	NBR	10	13	0.9	4-89@15.2-89@19.3	0.4	0
	Intersection Avg	1520	1521	0.0	4	3.5	99
12 Mile Coulee Road & Highway 1A/Crowchild Trail (CFI)	SB Peds	10	8	0.7	5-1@423.0-1@475.8	83.6	27
	EBT	1488	1466	0.6	5-11@947.3-12@2.3	22.4	195
	WBT	794	808	0.5	5-14@1687.9-13@1.3	21.1	108
	EBL	50	47	0.4	5-18@357.8-25@14.4	0.7	11
	EBR	110	114	0.4	5-19@221.9-19@230.1	0.2	0
	WBR	210	208	0.1	5-20@127.4-20@133.4	0.3	28
	NBT	210	203	0.5	5-22@486.9-25@14.4	56.2	60
	SBL	600	607	0.3	5-23@145.4-12@2.3	58.9	123
	SBT	120	124	0.4	5-24@389.3-21@21.0	43.8	34
	SBR	100	101	0.1	5-27@38.6-27@44.9	0.3	0
	WBL	250	249	0.1	5-29@335.5-21@21.0	35.9	69
	NBR	660	660	0.0	5-30@29.0-30@32.3	0.7	60
	NB Peds	20	17	0.7	5-43@475.0-43@531.2	160.5	32
	NBL	110	111	0.1	5-10091@0.5-10091@5	73.7	118
	Intersection Avg	4732	4720	0.2	5	26.2	195
CFI East Intersection	EBT	2088	2081	0.2	6-12@340.8-10025@45.	3.9	131
	WBL	250	256	0.4	6-26@243.9-10024@52.	67.1	67
	Intersection Avg	2338	2337	0.0	6	10.8	131
CFI West Intersection	WBT	904	924	0.7	7-13@358.1-17@1.2	0.6	38
	EBL	50	48	0.3	7-16@146.1-18@6.7	64.6	40
	Intersection Avg	954	972	0.6	7	3.8	40
12 Mile Coulee Road & Blueridge Rise	SB Peds	10	10	0.0	8-3@162.9-3@184.0	0.0	20
	SBT	472	483	0.5	8-21@424.3-21@455.3	0.3	0
	SBR	8	8	0.0	8-21@424.3-31@1.4	1.8	14
	NBT	956	949	0.2	8-22@55.1-22@87.7	0.1	0
	NBL	24	24	0.0	8-22@55.1-31@1.4	2.2	14
	NB Peds	10	9	0.3	8-72@108.0-72@132.5	0.0	37
	EBR	18	14	1.0	8-85@130.4-21@455.3	5.9	19
	EBL	24	22	0.4	8-85@130.4-22@87.7	10.7	19
	Intersection Avg	1522	1519	0.1	8	0.4	37

2028 Background PM - Improved

Intersection	Movement	Assigned Vol.	Vehicles / hr	GEH	Movement	Average Delay	95% Queue
Blueridge Rise & Access 1	WB Peds	10	8	0.7	1-41@47.6-41@77.8	0.0	34
	SBL	0	0	#DIV/0!	1-46@105.1-32@6.0	0.0	0
	SBR	0	0	#DIV/0!	1-46@105.1-56@2.0	0.0	0
	EBT	24	20	0.9	1-57@151.9-32@6.0	0.0	0
	EBL	0	0	#DIV/0!	1-57@151.9-44@0.9	0.0	0
	EB Peds	10	11	0.3	1-65@264.6-65@297.9	0.0	25
	WBR	0	0	#DIV/0!	1-84@103.9-44@0.9	0.0	0
	WBT	54	56	0.3	1-84@103.9-56@2.0	0.0	0
	Intersection Avg	98	94	0.4	1	0.0	25
Blueridge Rise & Access 2	WB Peds	10	8	0.7	2-41@229.8-41@262.1	0.0	34
	EBT	24	20	0.9	2-48@116.8-57@0.2	0.0	0
	WBT	54	56	0.3	2-56@153.9-47@1.9	0.0	0
	WBR	0	0	#DIV/0!	2-56@153.9-59@4.1	0.0	0
	SBR	0	0	#DIV/0!	2-58@100.5-47@1.9	0.0	0
	EB Peds	10	11	0.3	2-65@80.3-65@112.6	0.0	27
	Intersection Avg	98	95	0.3	2	0.0	27
Blueridge Rise & Blueridge View	NB U Turn	0	0	#DIV/0!	3-54@100.1-55@1.4	0.0	0
	NBT	0	0	#DIV/0!	3-54@100.1-10047@10.	0.0	0
	NBR	8	6	0.8	3-54@100.1-10049@10.	0.5	0
	NBL	0	0	#DIV/0!	3-54@100.1-10051@8.7	0.0	0
	SBT	0	0	#DIV/0!	3-10046@0.6-55@1.4	0.0	0
	SB U Turn	0	0	#DIV/0!	3-10046@0.6-10047@1(	0.0	0
	SBL	0	0	#DIV/0!	3-10046@0.6-10049@1(	0.0	0
	SBR	0	0	#DIV/0!	3-10046@0.6-10051@8.	0.0	0
	WBL	18	20	0.5	3-10048@0.5-55@1.4	1.1	22
	WBR	0	0	#DIV/0!	3-10048@0.5-10047@1(	0.0	22
	WB U Turn	0	0	#DIV/0!	3-10048@0.5-10049@1(	0.0	22
	WBT	36	37	0.2	3-10048@0.5-10051@8.	0.9	22
	EBR	0	0	#DIV/0!	3-10050@1.1-55@1.4	0.0	14
	EBL	0	0	#DIV/0!	3-10050@1.1-10047@1(	0.0	14
	EBT	16	13	0.8	3-10050@1.1-10049@1(	1.2	14
	EB U Turn	0	0	#DIV/0!	3-10050@1.1-10051@8.	0.0	14
	Intersection Avg	78	76	0.2	3	1.0	18
12 Mile Coulee Road & Tusslewood Drive NW	NB Peds	10	8	0.7	4-9@114.7-9@140.9	0.0	20
	SBL	320	320	0.0	4-21@513.3-35@2.7	4.5	124
	SBT	750	761	0.4	4-21@513.3-38@10.2	1.7	112
	WBL	50	54	0.6	4-34@42.2-38@10.2	12.6	85
	WBR	310	308	0.1	4-34@42.2-10118@12.1	10.1	85
	NBT	460	461	0.0	4-37@375.1-10115@23.	0.1	0
	SB Peds	10	8	0.7	4-75@15.6-75@45.0	0.0	23
	NBR	30	31	0.2	4-89@15.4-89@19.2	0.4	0
	Intersection Avg	1940	1951	0.2	4	3.4	125
12 Mile Coulee Road & Highway 1A/Crowchild Trail (CFI)	SB Peds	10	8	0.7	5-1@423.0-1@475.8	79.8	27
	EBT	1061	1042	0.6	5-11@947.3-12@2.3	19.5	130
	WBT	1540	1532	0.2	5-14@1687.9-13@1.3	20.2	191
	EBL	200	194	0.4	5-18@357.8-25@14.4	0.9	0
	EBR	220	223	0.2	5-19@221.9-19@230.1	0.4	10
	WBR	740	744	0.1	5-20@127.4-20@133.4	3.1	113
	NBT	240	233	0.5	5-22@486.9-25@14.4	57.7	65
	SBL	260	257	0.2	5-23@145.4-12@2.3	60.7	68
	SBT	340	350	0.5	5-24@389.3-21@21.0	55.2	88
	SBR	220	224	0.3	5-27@38.6-27@44.9	0.4	0
	WBL	560	550	0.4	5-29@335.5-21@21.0	31.6	133
	NBR	370	366	0.2	5-30@29.0-30@32.3	0.5	44
	NB Peds	20	17	0.7	5-43@475.0-43@531.2	165.1	32
	NBL	180	178	0.1	5-10091@0.5-10091@5	68.5	88
	Intersection Avg	5961	5916	0.6	5	22.9	191
CFI East Intersection	EBT	1321	1302	0.5	6-12@340.8-10025@45.	6.8	80
	WBL	560	554	0.3	6-26@243.9-10024@52.	58.8	129
	Intersection Avg	1881	1857	0.6	6	22.3	129
CFI West Intersection	WBT	1720	1717	0.1	7-13@358.1-17@1.2	1.4	29
	EBL	200	194	0.4	7-16@146.1-18@6.7	72.7	116
	Intersection Avg	1920	1911	0.2	7	8.6	116
12 Mile Coulee Road & Blueridge Rise	SB Peds	10	10	0.0	8-3@162.9-3@184.0	0.0	20
	SBT	1066	1080	0.4	8-21@424.3-21@455.3	1.0	60
	SBR	54	51	0.4	8-21@424.3-31@1.4	2.1	78
	NBT	770	763	0.3	8-22@55.1-22@87.7	0.1	0
	NBL	5	5	0.0	8-22@55.1-31@1.4	3.6	10
	NB Peds	10	9	0.3	8-72@108.0-72@132.5	0.0	37
	EBR	5	3	1.0	8-85@130.4-21@455.3	7.0	17
	EBL	20	16	0.9	8-85@130.4-22@87.7	14.7	17
	Intersection Avg	1940	1937	0.1	8	0.8	75

2039 Background AM

Intersection	Movement	Assigned Vol.	Vehicles / hr	GEH	Movement	Average Delay	95% Queue
Blueridge Rise & Access 1	WB Peds	10	8	0.7	1-41@47.6-41@77.8	0.0	34
	SBL	0	0	#DIV/0!	1-46@105.1-32@6.0	0.0	0
	SBR	0	0	#DIV/0!	1-46@105.1-56@2.0	0.0	0
	EBT	52	47	0.7	1-57@151.9-32@6.0	0.0	0
	EBL	0	0	#DIV/0!	1-57@151.9-44@0.9	0.0	0
	EB Peds	10	11	0.3	1-65@264.6-65@297.9	0.0	25
	WBR	0	0	#DIV/0!	1-84@103.9-44@0.9	0.0	0
	WBT	42	43	0.2	1-84@103.9-56@2.0	0.0	0
	Intersection Avg	114	109	0.5	1	0.0	25
Blueridge Rise & Access 2	WB Peds	10	8	0.7	2-41@229.8-41@262.1	0.0	34
	EBT	52	47	0.7	2-48@116.8-57@0.2	0.0	0
	WBT	42	43	0.2	2-56@153.9-47@1.9	0.0	0
	WBR	0	0	#DIV/0!	2-56@153.9-59@4.1	0.0	0
	SBR	0	0	#DIV/0!	2-58@100.5-47@1.9	0.0	0
	EB Peds	10	11	0.3	2-65@80.3-65@112.6	0.0	27
	Intersection Avg	114	108	0.6	2	0.0	27
Blueridge Rise & Blueridge View	NB U Turn	0	0	#DIV/0!	3-54@100.1-55@1.4	0.0	12
	NBT	0	0	#DIV/0!	3-54@100.1-10047@10.	0.0	12
	NBR	17	12	1.3	3-54@100.1-10049@10.	0.6	12
	NBL	0	0	#DIV/0!	3-54@100.1-10051@8.7	0.0	12
	SBT	0	0	#DIV/0!	3-10046@0.6-55@1.4	0.0	0
	SB U Turn	0	0	#DIV/0!	3-10046@0.6-10047@1(	0.0	0
	SBL	0	0	#DIV/0!	3-10046@0.6-10049@1(	0.0	0
	SBR	0	0	#DIV/0!	3-10046@0.6-10051@8.	0.0	0
	WBL	14	15	0.3	3-10048@0.5-55@1.4	1.0	22
	WBR	0	0	#DIV/0!	3-10048@0.5-10047@1(	0.0	22
	WB U Turn	0	0	#DIV/0!	3-10048@0.5-10049@1(	0.0	22
	WBT	28	27	0.2	3-10048@0.5-10051@8.	1.0	22
	EBR	0	0	#DIV/0!	3-10050@1.1-55@1.4	0.0	17
	EBL	0	0	#DIV/0!	3-10050@1.1-10047@1(	0.0	17
	EBT	35	34	0.2	3-10050@1.1-10049@1(	1.0	17
	EB U Turn	0	0	#DIV/0!	3-10050@1.1-10051@8.	0.0	17
	Intersection Avg	94	89	0.5	3	1.0	22
12 Mile Coulee Road & Tusslewood Drive NW	NB Peds	10	8	0.7	4-9@114.7-9@140.9	0.0	20
	SBL	170	162	0.6	4-21@513.3-35@2.7	3.6	55
	SBT	410	422	0.6	4-21@513.3-38@10.2	0.5	41
	WBL	20	22	0.4	4-34@42.2-38@10.2	9.4	111
	WBR	340	339	0.1	4-34@42.2-10118@12.1	12.9	111
	NBT	670	666	0.2	4-37@375.1-10115@23.	0.1	0
	SB Peds	10	8	0.7	4-75@15.6-75@45.0	0.0	29
	NBR	10	13	0.9	4-89@15.2-89@19.3	0.4	0
	Intersection Avg	1640	1640	0.0	4	3.4	111
12 Mile Coulee Road & Highway 1A/Crowchild Trail (CFI)	SB Peds	10	8	0.7	5-1@423.0-1@475.8	84.8	27
	EBT	2465	2456	0.2	5-11@947.3-12@2.3	22.1	579
	WBT	949	968	0.6	5-14@1687.9-13@1.3	20.5	120
	EBL	110	105	0.5	5-18@357.8-25@14.4	0.8	9
	EBR	150	153	0.2	5-19@221.9-19@230.1	0.2	0
	WBR	250	245	0.3	5-20@127.4-20@133.4	0.3	15
	NBT	220	209	0.8	5-22@486.9-25@14.4	59.7	62
	SBL	620	631	0.4	5-23@145.4-12@2.3	60.3	137
	SBT	120	121	0.1	5-24@389.3-21@21.0	47.4	36
	SBR	100	101	0.1	5-27@38.6-27@44.9	0.3	0
	WBL	310	311	0.1	5-29@335.5-21@21.0	35.8	86
	NBR	670	677	0.3	5-30@29.0-30@32.3	0.8	63
	NB Peds	20	17	0.7	5-43@475.0-43@531.2	160.5	32
	NBL	130	129	0.1	5-10091@0.5-10091@5	68.6	81
	Intersection Avg	6124	6131	0.1	5	25.2	579
CFI East Intersection	EBT	3085	3100	0.3	6-12@340.8-10025@45.	7.9	246
	WBL	310	319	0.5	6-26@243.9-10024@52.	63.7	86
	Intersection Avg	3395	3419	0.4	6	13.0	246
CFI West Intersection	WBT	1079	1105	0.8	7-13@358.1-17@1.2	0.7	28
	EBL	110	108	0.2	7-16@146.1-18@6.7	71.9	79
	Intersection Avg	1189	1213	0.7	7	7.1	79
12 Mile Coulee Road & Blueridge Rise	SB Peds	10	10	0.0	8-3@162.9-3@184.0	0.0	20
	SBT	562	571	0.4	8-21@424.3-21@455.3	0.4	19
	SBR	18	20	0.5	8-21@424.3-31@1.4	1.7	36
	NBT	986	981	0.2	8-22@55.1-22@87.7	0.1	9
	NBL	24	23	0.2	8-22@55.1-31@1.4	2.8	26
	NB Peds	10	9	0.3	8-72@108.0-72@132.5	0.0	37
	EBR	18	14	1.0	8-85@130.4-21@455.3	6.5	23
	EBL	34	32	0.3	8-85@130.4-22@87.7	13.0	23
	Intersection Avg	1662	1660	0.0	8	0.6	41

2039 Background PM

Intersection	Movement	Assigned Vol.	Vehicles / hr	GEH	Movement	Average Delay	95% Queue
Blueridge Rise & Access 1	WB Peds	10	8	0.7	1-41@47.6-41@77.8	0.0	34
	SBL	0	0	#DIV/0!	1-46@105.1-32@6.0	0.0	0
	SBR	0	0	#DIV/0!	1-46@105.1-56@2.0	0.0	0
	EBT	24	20	0.9	1-57@151.9-32@6.0	0.0	0
	EBL	0	0	#DIV/0!	1-57@151.9-44@0.9	0.0	0
	EB Peds	10	11	0.3	1-65@264.6-65@297.9	0.0	25
	WBR	0	0	#DIV/0!	1-84@103.9-44@0.9	0.0	0
	WBT	54	58	0.5	1-84@103.9-56@2.0	0.0	0
	Intersection Avg	98	96	0.2	1	0.0	25
Blueridge Rise & Access 2	WB Peds	10	8	0.7	2-41@229.8-41@262.1	0.0	34
	EBT	24	20	0.9	2-48@116.8-57@0.2	0.0	0
	WBT	54	58	0.5	2-56@153.9-47@1.9	0.0	0
	WBR	0	0	#DIV/0!	2-56@153.9-59@4.1	0.0	0
	SBR	0	0	#DIV/0!	2-58@100.5-47@1.9	0.0	0
	EB Peds	10	11	0.3	2-65@80.3-65@112.6	0.0	27
	Intersection Avg	98	96	0.2	2	0.0	27
Blueridge Rise & Blueridge View	NB U Turn	0	0	#DIV/0!	3-54@100.1-55@1.4	0.0	0
	NBT	0	0	#DIV/0!	3-54@100.1-10047@10.	0.0	0
	NBR	8	6	0.8	3-54@100.1-10049@10.	0.5	0
	NBL	0	0	#DIV/0!	3-54@100.1-10051@8.7	0.0	0
	SBT	0	0	#DIV/0!	3-10046@0.6-55@1.4	0.0	0
	SB U Turn	0	0	#DIV/0!	3-10046@0.6-10047@1(	0.0	0
	SBL	0	0	#DIV/0!	3-10046@0.6-10049@1(	0.0	0
	SBR	0	0	#DIV/0!	3-10046@0.6-10051@8.	0.0	0
	WBL	18	19	0.2	3-10048@0.5-55@1.4	1.1	20
	WBR	0	0	#DIV/0!	3-10048@0.5-10047@1(	0.0	20
	WB U Turn	0	0	#DIV/0!	3-10048@0.5-10049@1(	0.0	20
	WBT	36	39	0.5	3-10048@0.5-10051@8.	0.9	20
	EBR	0	0	#DIV/0!	3-10050@1.1-55@1.4	0.0	16
	EBL	0	0	#DIV/0!	3-10050@1.1-10047@1(	0.0	16
	EBT	16	13	0.8	3-10050@1.1-10049@1(	0.9	16
	EB U Turn	0	0	#DIV/0!	3-10050@1.1-10051@8.	0.0	16
	Intersection Avg	78	78	0.0	3	0.9	22
12 Mile Coulee Road & Tusslewood Drive NW	NB Peds	10	8	0.7	4-9@114.7-9@140.9	0.0	20
	SBL	380	374	0.3	4-21@513.3-35@2.7	5.9	143
	SBT	830	826	0.1	4-21@513.3-38@10.2	2.5	98
	WBL	50	52	0.3	4-34@42.2-38@10.2	13.8	80
	WBR	290	288	0.1	4-34@42.2-10118@12.1	9.4	80
	NBT	510	512	0.1	4-37@375.1-10115@23.	0.1	0
	SB Peds	10	8	0.7	4-75@15.6-75@45.0	0.0	23
	NBR	30	32	0.4	4-89@15.4-89@19.2	0.4	0
	Intersection Avg	2110	2101	0.2	4	3.7	128
12 Mile Coulee Road & Highway 1A/Crowchild Trail (CFI)	SB Peds	10	8	0.7	5-1@423.0-1@475.8	80.1	27
	EBT	1467	1460	0.2	5-11@947.3-12@2.3	21.3	197
	WBT	2354	2222	2.8	5-14@1687.9-13@1.3	20.6	514
	EBL	190	189	0.1	5-18@357.8-25@14.4	0.9	0
	EBR	240	241	0.1	5-19@221.9-19@230.1	0.4	6
	WBR	1000	961	1.2	5-20@127.4-20@133.4	5.8	505
	NBT	240	231	0.6	5-22@486.9-25@14.4	57.5	68
	SBL	340	339	0.1	5-23@145.4-12@2.3	60.5	80
	SBT	340	351	0.6	5-24@389.3-21@21.0	55.7	97
	SBR	280	281	0.1	5-27@38.6-27@44.9	0.5	0
	WBL	680	650	1.2	5-29@335.5-21@21.0	31.1	151
	NBR	390	388	0.1	5-30@29.0-30@32.3	0.7	60
	NB Peds	20	17	0.7	5-43@475.0-43@531.2	163.3	32
	NBL	190	189	0.1	5-10091@0.5-10091@5	68.5	111
	Intersection Avg	7741	7528	2.4	5	23.0	514
CFI East Intersection	EBT	1807	1807	0.0	6-12@340.8-10025@45.	8.2	107
	WBL	680	657	0.9	6-26@243.9-10024@52.	57.4	130
	Intersection Avg	2487	2464	0.5	6	21.3	130
CFI West Intersection	WBT	2544	2419	2.5	7-13@358.1-17@1.2	1.1	35
	EBL	190	188	0.1	7-16@146.1-18@6.7	69.1	109
	Intersection Avg	2734	2608	2.4	7	6.1	109
12 Mile Coulee Road & Blueridge Rise	SB Peds	10	10	0.0	8-3@162.9-3@184.0	0.0	20
	SBT	1206	1198	0.2	8-21@424.3-21@455.3	1.5	98
	SBR	54	52	0.3	8-21@424.3-31@1.4	2.4	113
	NBT	800	794	0.2	8-22@55.1-22@87.7	0.1	0
	NBL	5	6	0.4	8-22@55.1-31@1.4	6.8	10
	NB Peds	10	9	0.3	8-72@108.0-72@132.5	0.0	37
	EBR	5	3	1.0	8-85@130.4-21@455.3	7.8	17
	EBL	20	17	0.7	8-85@130.4-22@87.7	18.0	17
	Intersection Avg	2110	2088	0.5	8	1.1	113

2039 Background AM - Improved

Intersection	Movement	Assigned Vol.	Vehicles / hr	GEH	Movement	Average Delay	95% Queue
Blueridge Rise & Access 1	WB Peds	10	8	0.7	1-41@47.6-41@77.8	0.0	34
	SBL	0	0	#DIV/0!	1-46@105.1-32@6.0	0.0	0
	SBR	0	0	#DIV/0!	1-46@105.1-56@2.0	0.0	0
	EBT	52	47	0.7	1-57@151.9-32@6.0	0.0	0
	EBL	0	0	#DIV/0!	1-57@151.9-44@0.9	0.0	0
	EB Peds	10	11	0.3	1-65@264.6-65@297.9	0.0	25
	WBR	0	0	#DIV/0!	1-84@103.9-44@0.9	0.0	0
	WBT	42	43	0.2	1-84@103.9-56@2.0	0.0	0
	Intersection Avg	114	109	0.5	1	0.0	25
Blueridge Rise & Access 2	WB Peds	10	8	0.7	2-41@229.8-41@262.1	0.0	34
	EBT	52	47	0.7	2-48@116.8-57@0.2	0.0	0
	WBT	42	43	0.2	2-56@153.9-47@1.9	0.0	0
	WBR	0	0	#DIV/0!	2-56@153.9-59@4.1	0.0	0
	SBR	0	0	#DIV/0!	2-58@100.5-47@1.9	0.0	0
	EB Peds	10	11	0.3	2-65@80.3-65@112.6	0.0	27
	Intersection Avg	114	109	0.5	2	0.0	27
Blueridge Rise & Blueridge View	NB U Turn	0	0	#DIV/0!	3-54@100.1-55@1.4	0.0	12
	NBT	0	0	#DIV/0!	3-54@100.1-10047@10.	0.0	12
	NBR	17	12	1.3	3-54@100.1-10049@10.	0.7	12
	NBL	0	0	#DIV/0!	3-54@100.1-10051@8.7	0.0	12
	SBT	0	0	#DIV/0!	3-10046@0.6-55@1.4	0.0	0
	SB U Turn	0	0	#DIV/0!	3-10046@0.6-10047@1(	0.0	0
	SBL	0	0	#DIV/0!	3-10046@0.6-10049@1(	0.0	0
	SBR	0	0	#DIV/0!	3-10046@0.6-10051@8.	0.0	0
	WBL	14	16	0.5	3-10048@0.5-55@1.4	1.0	19
	WBR	0	0	#DIV/0!	3-10048@0.5-10047@1(	0.0	19
	WB U Turn	0	0	#DIV/0!	3-10048@0.5-10049@1(	0.0	19
	WBT	28	27	0.2	3-10048@0.5-10051@8.	0.9	19
	EBR	0	0	#DIV/0!	3-10050@1.1-55@1.4	0.0	15
	EBL	0	0	#DIV/0!	3-10050@1.1-10047@1(	0.0	15
	EBT	35	34	0.2	3-10050@1.1-10049@1(	1.0	15
	EB U Turn	0	0	#DIV/0!	3-10050@1.1-10051@8.	0.0	15
	Intersection Avg	94	90	0.4	3	0.9	18
12 Mile Coulee Road & Tusslewood Drive NW	NB Peds	10	8	0.7	4-9@114.7-9@140.9	0.1	20
	SBL	170	161	0.7	4-21@513.3-35@2.7	3.8	53
	SBT	410	422	0.6	4-21@513.3-38@10.2	0.6	33
	WBL	20	22	0.4	4-34@42.2-38@10.2	9.5	111
	WBR	340	339	0.1	4-34@42.2-10118@12.1	12.9	111
	NBT	670	666	0.2	4-37@375.1-10115@23.	0.1	0
	SB Peds	10	8	0.7	4-75@15.6-75@45.0	0.0	29
	NBR	10	13	0.9	4-89@15.2-89@19.3	0.4	0
	Intersection Avg	1640	1639	0.0	4	3.4	111
12 Mile Coulee Road & Highway 1A/Crowchild Trail (CFI)	SB Peds	10	8	0.7	5-1@422.0-1@473.5	84.8	40
	EBT	2465	2455	0.2	5-11@947.2-12@2.6	23.0	243
	WBT	949	967	0.6	5-14@1686.8-13@2.8	19.3	78
	EBL	110	105	0.5	5-18@357.3-25@16.6	0.8	9
	EBR	150	153	0.2	5-19@226.1-19@234.0	0.1	0
	WBR	250	244	0.4	5-20@127.8-20@133.9	0.4	9
	NBT	220	209	0.8	5-22@486.9-25@16.6	59.6	65
	SBL	620	631	0.4	5-23@144.2-12@2.6	59.7	137
	SBT	120	121	0.1	5-24@388.7-21@21.0	47.4	36
	SBR	100	101	0.1	5-27@34.6-27@39.9	0.3	0
	WBL	310	311	0.1	5-29@335.4-21@21.0	35.9	87
	NBR	670	677	0.3	5-30@28.2-30@30.8	0.8	57
	NB Peds	20	17	0.7	5-43@480.9-43@531.9	160.4	43
	NBL	130	129	0.1	5-10091@0.5-13@2.8	68.6	81
	Intersection Avg	6124	6127	0.0	5	25.3	243
CFI East Intersection	EBT	3085	3105	0.4	6-12@342.5-10025@47.	4.4	116
	WBL	310	319	0.5	6-26@243.9-10024@52.	63.9	86
	Intersection Avg	3395	3423	0.5	6	9.9	116
CFI West Intersection	WBT	1079	1107	0.8	7-13@358.4-17@1.3	0.8	21
	EBL	110	108	0.2	7-16@146.1-18@6.7	71.4	81
	Intersection Avg	1189	1215	0.7	7	7.1	81
12 Mile Coulee Road & Blueridge Rise	SB Peds	10	10	0.0	8-3@162.9-3@184.0	0.0	20
	SBT	562	570	0.3	8-21@424.3-21@455.3	0.4	0
	SBR	18	20	0.5	8-21@424.3-31@1.4	1.5	14
	NBT	986	981	0.2	8-22@55.1-22@87.7	0.1	9
	NBL	24	23	0.2	8-22@55.1-31@1.4	3.2	26
	NB Peds	10	9	0.3	8-72@108.0-72@132.5	0.0	37
	EBR	18	14	1.0	8-85@130.4-21@455.3	6.3	23
	EBL	34	32	0.3	8-85@130.4-22@87.7	13.3	23
	Intersection Avg	1662	1659	0.1	8	0.6	37

2039 Background PM - Improved

Intersection	Movement	Assigned Vol.	Vehicles / hr	GEH	Movement	Average Delay	95% Queue
Blueridge Rise & Access 1	WB Peds	10	8	0.7	1-41@47.6-41@77.8	0.0	34
	SBL	0	0	#DIV/0!	1-46@105.1-32@6.0	0.0	0
	SBR	0	0	#DIV/0!	1-46@105.1-56@2.0	0.0	0
	EBT	24	20	0.9	1-57@151.9-32@6.0	0.0	0
	EBL	0	0	#DIV/0!	1-57@151.9-44@0.9	0.0	0
	EB Peds	10	11	0.3	1-65@264.6-65@297.9	0.0	25
	WBR	0	0	#DIV/0!	1-84@103.9-44@0.9	0.0	0
	WBT	54	59	0.7	1-84@103.9-56@2.0	0.0	0
	Intersection Avg	98	98	0.0	1	0.0	25
Blueridge Rise & Access 2	WB Peds	10	8	0.7	2-41@229.8-41@262.1	0.0	34
	EBT	24	20	0.9	2-48@116.8-57@0.2	0.0	0
	WBT	54	59	0.7	2-56@153.9-47@1.9	0.0	0
	WBR	0	0	#DIV/0!	2-56@153.9-59@4.1	0.0	0
	SBR	0	0	#DIV/0!	2-58@100.5-47@1.9	0.0	0
	EB Peds	10	11	0.3	2-65@80.3-65@112.6	0.0	27
	Intersection Avg	98	98	0.0	2	0.0	27
Blueridge Rise & Blueridge View	NB U Turn	0	0	#DIV/0!	3-54@100.1-55@1.4	0.0	13
	NBT	0	0	#DIV/0!	3-54@100.1-10047@10.	0.0	13
	NBR	8	6	0.8	3-54@100.1-10049@10.	0.6	13
	NBL	0	0	#DIV/0!	3-54@100.1-10051@8.7	0.0	13
	SBT	0	0	#DIV/0!	3-10046@0.6-55@1.4	0.0	0
	SB U Turn	0	0	#DIV/0!	3-10046@0.6-10047@1(	0.0	0
	SBL	0	0	#DIV/0!	3-10046@0.6-10049@1(	0.0	0
	SBR	0	0	#DIV/0!	3-10046@0.6-10051@8.	0.0	0
	WBL	18	20	0.5	3-10048@0.5-55@1.4	1.1	20
	WBR	0	0	#DIV/0!	3-10048@0.5-10047@1(	0.0	20
	WB U Turn	0	0	#DIV/0!	3-10048@0.5-10049@1(	0.0	20
	WBT	36	39	0.5	3-10048@0.5-10051@8.	0.9	20
	EBR	0	0	#DIV/0!	3-10050@1.1-55@1.4	0.0	15
	EBL	0	0	#DIV/0!	3-10050@1.1-10047@1(	0.0	15
	EBT	16	13	0.8	3-10050@1.1-10049@1(	0.8	15
	EB U Turn	0	0	#DIV/0!	3-10050@1.1-10051@8.	0.0	15
	Intersection Avg	78	79	0.1	3	0.9	20
12 Mile Coulee Road & Tusslewood Drive NW	NB Peds	10	8	0.7	4-9@114.7-9@140.9	0.1	20
	SBL	380	381	0.1	4-21@513.3-35@2.7	5.7	130
	SBT	830	844	0.5	4-21@513.3-38@10.2	2.5	96
	WBL	50	52	0.3	4-34@42.2-38@10.2	14.0	74
	WBR	290	288	0.1	4-34@42.2-10118@12.1	9.4	74
	NBT	510	512	0.1	4-37@375.1-10115@23.	0.1	0
	SB Peds	10	8	0.7	4-75@15.6-75@45.0	0.2	23
	NBR	30	32	0.4	4-89@15.4-89@19.2	0.4	0
	Intersection Avg	2110	2126	0.3	4	3.7	123
12 Mile Coulee Road & Highway 1A/Crowchild Trail (CFI)	SB Peds	10	8	0.7	5-1@422.0-1@473.5	80.1	40
	EBT	1467	1457	0.3	5-11@947.2-12@2.6	19.3	115
	WBT	2354	2301	1.1	5-14@1686.8-13@2.8	20.9	249
	EBL	190	189	0.1	5-18@357.3-25@16.6	1.1	0
	EBR	240	242	0.1	5-19@226.1-19@234.0	0.4	9
	WBR	1000	1002	0.1	5-20@127.8-20@133.9	3.5	180
	NBT	240	231	0.6	5-22@486.9-25@16.6	57.7	68
	SBL	340	339	0.1	5-23@144.2-12@2.6	60.5	80
	SBT	340	351	0.6	5-24@388.7-21@21.0	55.9	98
	SBR	280	281	0.1	5-27@34.6-27@39.9	0.5	0
	WBL	680	675	0.2	5-29@335.4-21@21.0	30.9	160
	NBR	390	388	0.1	5-30@28.2-30@30.8	0.6	60
	NB Peds	20	17	0.7	5-43@480.9-43@531.9	163.3	45
	NBL	190	189	0.1	5-10091@0.5-13@2.8	68.8	111
	Intersection Avg	7741	7669	0.8	5	22.3	249
CFI East Intersection	EBT	1807	1805	0.0	6-12@342.5-10025@47.	7.6	76
	WBL	680	678	0.1	6-26@243.9-10024@52.	56.3	138
	Intersection Avg	2487	2483	0.1	6	20.9	138
CFI West Intersection	WBT	2544	2503	0.8	7-13@358.4-17@1.3	1.6	28
	EBL	190	188	0.1	7-16@146.1-18@6.7	69.5	106
	Intersection Avg	2734	2691	0.8	7	6.4	106
12 Mile Coulee Road & Blueridge Rise	SB Peds	10	10	0.0	8-3@162.9-3@184.0	0.0	20
	SBT	1206	1221	0.4	8-21@424.3-21@455.3	1.6	135
	SBR	54	53	0.1	8-21@424.3-31@1.4	2.4	152
	NBT	800	794	0.2	8-22@55.1-22@87.7	0.1	0
	NBL	5	6	0.4	8-22@55.1-31@1.4	7.2	10
	NB Peds	10	9	0.3	8-72@108.0-72@132.5	0.0	37
	EBR	5	3	1.0	8-85@130.4-21@455.3	11.1	21
	EBL	20	16	0.9	8-85@130.4-22@87.7	18.7	21
	Intersection Avg	2110	2112	0.0	8	1.2	152

2028 After Development AM

Intersection	Movement	Assigned Vol.	Vehicles / hr	GEH	Movement	Average Delay	95% Queue
Blueridge Rise & Access 1	WBR	47	45	0.3	1-31@214.0-44@0.9	0.7	10
	WBT	178	181	0.2	1-31@214.0-56@2.0	0.0	0
	WB Peds	20	17	0.7	1-41@47.6-41@77.8	0.0	21
	SBL	23	22	0.2	1-46@105.1-32@6.0	8.4	26
	SBR	5	7	0.8	1-46@105.1-56@2.0	6.1	26
	EBT	343	336	0.4	1-57@151.9-32@6.0	0.0	0
	EBL	5	6	0.4	1-57@151.9-44@0.9	3.1	5
	EB Peds	20	22	0.4	1-65@264.6-65@297.9	0.0	24
	Intersection Avg	641	636	0.2	1	0.4	29
Blueridge Rise & Access 2	WB Peds	20	17	0.7	2-41@229.8-41@262.1	0.0	26
	EBT	347	342	0.3	2-48@116.8-57@0.2	0.1	0
	WBT	145	150	0.4	2-56@153.9-47@1.9	0.0	0
	WBR	33	37	0.7	2-56@153.9-59@4.1	0.8	5
	SBR	5	5	0.0	2-58@100.5-47@1.9	0.7	3
	EB Peds	20	23	0.6	2-65@80.3-65@112.6	0.0	21
	Intersection Avg	570	575	0.2	2	0.1	21
Blueridge Rise & Blueridge View	NB U Turn	0	0	#DIV/0!	3-54@100.1-55@1.4	0.0	19
	NBT	5	4	0.5	3-54@100.1-10047@10.	2.4	19
	NBR	14	13	0.3	3-54@100.1-10049@10.	2.1	19
	NBL	5	3	1.0	3-54@100.1-10051@8.7	4.5	19
	SBT	5	6	0.4	3-10046@0.6-55@1.4	1.9	23
	SB U Turn	0	0	#DIV/0!	3-10046@0.6-10047@1(	0.0	23
	SBL	308	303	0.3	3-10046@0.6-10049@1(	1.7	23
	SBR	5	4	0.5	3-10046@0.6-10051@8.	1.1	23
	WBL	11	11	0.0	3-10048@0.5-55@1.4	2.4	30
	WBR	113	120	0.6	3-10048@0.5-10047@1(	1.6	30
	WB U Turn	0	0	#DIV/0!	3-10048@0.5-10049@1(	0.0	30
	WBT	21	24	0.6	3-10048@0.5-10051@8.	2.0	30
	EBR	5	5	0.0	3-10050@1.1-55@1.4	2.3	13
	EBL	6	4	0.9	3-10050@1.1-10047@1(	3.7	27
	EBT	25	25	0.0	3-10050@1.1-10049@1(	2.3	12
	EB U Turn	0	0	#DIV/0!	3-10050@1.1-10051@8.	0.0	40
	Intersection Avg	523	523	0.0	3	1.8	34
12 Mile Coulee Road & Tusslewood Drive NW	W SB Peds	20	22	0.4	4-3@201.3-3@206.6	0.0	26
	E NB Peds	20	16	0.9	4-9@115.8-9@119.9	0.0	30
	SBR	153	155	0.2	4-36@21.1-36@26.3	3.3	75
	W NB Peds	40	39	0.2	4-72@148.5-72@153.9	0.1	44
	E SB Peds	0	0	#DIV/0!	4-75@6.5-75@10.4	0.0	39
	WBR	333	332	0.1	4-81@19.9-81@24.5	1.9	37
	NB U Turn	0	0	#DIV/0!	4-10094@5.8-38@0.0	0.0	38
	NBL	45	41	0.6	4-10094@5.8-10097@7.	3.0	38
	NBT	609	608	0.0	4-10094@5.8-10099@1(	3.2	38
	NBR	10	13	0.9	4-10094@5.8-10102@7.	3.0	38
	EBR	37	37	0.0	4-10096@6.8-38@0.0	3.8	69
	EB U Turn	0	0	#DIV/0!	4-10096@6.8-10097@7.	0.0	66
	EBL	295	288	0.4	4-10096@6.8-10099@1(	4.1	66
	EBT	35	31	0.7	4-10096@6.8-10102@7.	3.1	66
	SBT	312	324	0.7	4-10098@8.1-38@0.0	3.2	56
	SBR 0 assigned	0	0	#DIV/0!	4-10098@8.1-10097@7.	0.0	56
	SB U Turn	0	0	#DIV/0!	4-10098@8.1-10099@1(	0.0	56
	SBL	160	155	0.4	4-10098@8.1-10102@7.	4.0	56
	WBL	20	21	0.2	4-10100@0.6-38@0.0	6.6	47
	WBT	27	29	0.4	4-10100@0.6-10097@7.	6.4	27
	WBR 0 assigned	0	0	#DIV/0!	4-10100@0.6-10099@1(	0.0	49
	WB U Turn	0	0	#DIV/0!	4-10100@0.6-10102@7.	0.0	50
	Intersection Avg	2116	2110	0.1	4	3.2	70
12 Mile Coulee Road & Highway 1A/Crowchild Trail (CFI)	SB Peds	20	18	0.5	5-1@423.0-1@475.8	86.0	25
	EBT	1504	1490	0.4	5-11@947.3-12@2.3	25.0	184
	WBT	800	818	0.6	5-14@1687.9-13@1.3	23.9	110
	EBL	50	47	0.4	5-18@357.8-25@14.4	0.7	24
	EBR	120	123	0.3	5-19@221.9-19@230.1	0.2	10
	WBR	210	210	0.0	5-20@127.4-20@133.4	0.3	3
	NBT	229	219	0.7	5-22@453.6-25@14.4	57.4	78
	SBL	600	608	0.3	5-23@145.4-12@2.3	59.1	142
	SBT	135	137	0.2	5-24@389.3-21@21.0	45.8	47
	SBR	100	101	0.1	5-27@38.6-27@44.9	0.3	19
	WBL	370	373	0.2	5-29@335.5-21@21.0	39.7	123
	NBR	881	880	0.0	5-30@29.0-30@32.3	1.5	91
	NB Peds	40	34	1.0	5-43@466.9-43@523.1	155.5	54
	NBL	127	127	0.0	5-10091@0.5-10091@5	68.9	92
	Intersection Avg	5186	5184	0.0	5	27.7	182
CFI East Intersection	EBT	2104	2098	0.1	6-12@340.8-10025@45.	5.0	124
	WBL	370	375	0.3	6-26@243.9-10024@52.	63.7	93
	Intersection Avg	2474	2473	0.0	6	13.9	112
CFI West Intersection	WBT	927	946	0.6	7-13@358.1-17@1.2	0.6	15
	EBL	50	48	0.3	7-16@146.1-18@6.7	74.6	72
	Intersection Avg	977	995	0.6	7	4.3	52

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Intersection	Movement	Assigned Vol.	Vehicles / hr	GEH	Movement	Average Delay	95% Queue
Blueridge Rise & Access 1	WBR	104	104	0.0	1-31@214.0-44@0.9	0.8	24
	WBT	477	489	0.5	1-31@214.0-56@2.0	0.1	0
	WB Peds	20	18	0.5	1-41@47.6-41@77.8	0.0	30
	SBL	139	139	0.0	1-46@105.1-32@6.0	12.5	56
	SBR	5	3	1.0	1-46@105.1-56@2.0	6.5	49
	EBT	329	332	0.2	1-57@151.9-32@6.0	0.0	14
	EBL	13	14	0.3	1-57@151.9-44@0.9	8.6	8
	EB Peds	20	18	0.5	1-65@264.6-65@297.9	0.0	28
	Intersection Avg	1107	1116	0.3	1	1.8	45
Blueridge Rise & Access 2	WB Peds	20	18	0.5	2-41@229.8-41@262.1	0.0	29
	EBT	343	345	0.1	2-48@116.8-57@0.2	0.1	10
	WBT	404	416	0.6	2-56@153.9-47@1.9	0.1	14
	WBR	73	76	0.3	2-56@153.9-59@4.1	0.9	13
	SBR	5	4	0.5	2-58@100.5-47@1.9	0.9	6
	EB Peds	20	18	0.5	2-65@80.3-65@112.6	0.0	29
	Intersection Avg	865	878	0.4	2	0.2	32
Blueridge Rise & Blueridge View	NB U Turn	0	0	#DIV/0!	3-54@100.1-55@1.4	0.0	21
	NBT	5	5	0.0	3-54@100.1-10047@10.	3.3	21
	NBR	8	6	0.8	3-54@100.1-10049@10.	2.2	21
	NBL	5	6	0.4	3-54@100.1-10051@8.7	3.8	21
	SBT	5	5	0.0	3-10046@0.6-55@1.4	1.8	23
	SB U Turn	0	0	#DIV/0!	3-10046@0.6-10047@1(	0.0	23
	SBL	332	333	0.1	3-10046@0.6-10049@1(	2.1	23
	SBR	6	5	0.4	3-10046@0.6-10051@8.	2.2	23
	WBL	18	21	0.7	3-10048@0.5-55@1.4	4.8	34
	WBR	350	360	0.5	3-10048@0.5-10047@1(	2.6	34
	WB U Turn	0	0	#DIV/0!	3-10048@0.5-10049@1(	0.0	34
	WBT	36	39	0.5	3-10048@0.5-10051@8.	4.4	34
	EBR	5	3	1.0	3-10050@1.1-55@1.4	2.4	15
	EBL	18	17	0.2	3-10050@1.1-10047@1(	3.6	22
	EBT	5	6	0.4	3-10050@1.1-10049@1(	2.0	11
	EB U Turn	0	0	#DIV/0!	3-10050@1.1-10051@8.	0.0	78
	Intersection Avg	793	807	0.5	3	2.6	37
12 Mile Coulee Road & Tusslewood Drive NW	W SB Peds	20	17	0.7	4-3@201.3-3@206.6	0.1	38
	E NB Peds	20	18	0.5	4-9@115.8-9@119.9	0.0	35
	SBR	492	500	0.4	4-36@21.1-36@26.3	7.4	159
	W NB Peds	40	41	0.2	4-72@148.5-72@153.9	0.7	33
	E SB Peds	0	0	#DIV/0!	4-75@6.5-75@10.4	0.0	33
	WBR	310	298	0.7	4-81@19.9-81@24.5	1.8	17
	NB U Turn	0	0	#DIV/0!	4-10094@5.8-38@0.0	0.0	47
	NBL	35	38	0.5	4-10094@5.8-10097@7.	3.6	47
	NBT	460	460	0.0	4-10094@5.8-10099@1(	4.0	47
	NBR	30	33	0.5	4-10094@5.8-10102@7.	3.4	47
	EBR	64	55	1.2	4-10096@6.8-38@0.0	11.3	122
	EB U Turn	0	0	#DIV/0!	4-10096@6.8-10097@7.	0.0	119
	EBL	334	342	0.4	4-10096@6.8-10099@1(	12.4	119
	EBT	71	73	0.2	4-10096@6.8-10102@7.	11.3	119
	SBT	719	730	0.4	4-10098@8.1-38@0.0	6.1	155
	SBR 0 assigned	0	0	#DIV/0!	4-10098@8.1-10097@7.	0.0	155
	SB U Turn	0	0	#DIV/0!	4-10098@8.1-10099@1(	0.0	155
	SBL	293	279	0.8	4-10098@8.1-10102@7.	6.8	155
	WBL	50	52	0.3	4-10100@0.6-38@0.0	7.9	85
	WBT	53	53	0.0	4-10100@0.6-10097@7.	7.2	44
	WBR 0 assigned	0	0	#DIV/0!	4-10100@0.6-10099@1(	0.0	49
	WB U Turn	0	0	#DIV/0!	4-10100@0.6-10102@7.	0.0	93
	Intersection Avg	2991	2987	0.1	4	6.4	155
12 Mile Coulee Road & Highway 1A/Crowchild Trail (CFI)	SB Peds	20	20	0.0	5-1@423.0-1@475.8	87.0	47
	EBT	1072	1049	0.7	5-11@947.3-12@2.3	21.7	194
	WBT	1558	1569	0.3	5-14@1687.9-13@1.3	23.0	245
	EBL	200	191	0.6	5-18@357.8-25@14.4	1.1	9
	EBR	247	243	0.3	5-19@221.9-19@230.1	0.7	28
	WBR	740	736	0.1	5-20@127.4-20@133.4	2.2	76
	NBT	273	266	0.4	5-22@453.6-25@14.4	60.8	99
	SBL	260	261	0.1	5-23@145.4-12@2.3	57.9	82
	SBT	375	371	0.2	5-24@389.3-21@21.0	54.6	90
	SBR	220	221	0.1	5-27@38.6-27@44.9	0.5	41
	WBL	883	894	0.4	5-29@335.5-21@21.0	30.3	232
	NBR	628	624	0.2	5-30@29.0-30@32.3	1.4	71
	NB Peds	40	38	0.3	5-43@466.9-43@523.1	165.8	56
	NBL	202	208	0.4	5-10091@0.5-10091@5	66.4	131
	Intersection Avg	6718	6692	0.3	5	24.2	225
CFI East Intersection	EBT	1332	1320	0.3	6-12@340.8-10025@45.	10.3	118
	WBL	883	890	0.2	6-26@243.9-10024@52.	49.2	200
	Intersection Avg	2215	2210	0.1	6	26.0	167
CFI West Intersection	WBT	1760	1781	0.5	7-13@358.1-17@1.2	1.5	31
	EBL	200	190	0.7	7-16@146.1-18@6.7	69.6	138
	Intersection Avg	1960	1972	0.3	7	8.1	153

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Intersection	Movement	Assigned Vol.	Vehicles / hr	GEH	Movement	Average Delay	95% Queue
Blueridge Rise & Access 1	WBR	95	94	0.1	1-31@214.0-44@0.9	0.9	14
	WBT	331	326	0.3	1-31@214.0-56@2.0	0.1	2
	WB Peds	20	17	0.7	1-41@47.6-41@77.8	0.0	21
	SBL	45	50	0.7	1-46@105.1-32@6.0	10.1	31
	SBR	5	6	0.4	1-46@105.1-56@2.0	6.5	31
	EBT	642	639	0.1	1-57@151.9-32@6.0	0.0	0
	EBL	7	7	0.0	1-57@151.9-44@0.9	5.0	5
	EB Peds	20	22	0.4	1-65@264.6-65@297.9	0.0	24
	Intersection Avg	1165	1161	0.1	1	0.6	30
Blueridge Rise & Access 2	WB Peds	20	17	0.7	2-41@229.8-41@262.1	0.0	20
	EBT	649	646	0.1	2-48@116.8-57@0.2	0.1	0
	WBT	264	264	0.0	2-56@153.9-47@1.9	0.1	0
	WBR	67	67	0.0	2-56@153.9-59@4.1	1.0	15
	SBR	5	5	0.0	2-58@100.5-47@1.9	0.6	7
	EB Peds	20	23	0.6	2-65@80.3-65@112.6	0.0	27
	Intersection Avg	1025	1023	0.1	2	0.1	27
Blueridge Rise & Blueridge View	NB U Turn	0	0	#DIV/0!	3-54@100.1-55@1.4	0.0	25
	NBT	5	5	0.0	3-54@100.1-10047@10.	6.2	25
	NBR	17	16	0.2	3-54@100.1-10049@10.	3.9	25
	NBL	5	3	1.0	3-54@100.1-10051@8.7	4.5	25
	SBT	5	5	0.0	3-10046@0.6-55@1.4	1.7	27
	SB U Turn	0	0	#DIV/0!	3-10046@0.6-10047@1(	0.0	27
	SBL	603	599	0.2	3-10046@0.6-10049@1(	2.7	27
	SBR	5	4	0.5	3-10046@0.6-10051@8.	2.5	27
	WBL	14	13	0.3	3-10048@0.5-55@1.4	3.2	26
	WBR	222	227	0.3	3-10048@0.5-10047@1(	2.5	26
	WB U Turn	0	0	#DIV/0!	3-10048@0.5-10049@1(	0.0	26
	WBT	28	29	0.2	3-10048@0.5-10051@8.	2.4	26
	EBR	5	5	0.0	3-10050@1.1-55@1.4	2.8	26
	EBL	11	9	0.6	3-10050@1.1-10047@1(	5.6	32
	EBT	28	30	0.4	3-10050@1.1-10049@1(	3.1	17
	EB U Turn	0	0	#DIV/0!	3-10050@1.1-10051@8.	0.0	48
	Intersection Avg	948	946	0.1	3	2.7	38
12 Mile Coulee Road & Tusslewood Drive NW	W SB Peds	20	22	0.4	4-3@201.3-3@206.6	0.0	26
	E NB Peds	20	16	0.9	4-9@115.8-9@119.9	0.0	40
	SBR	305	303	0.1	4-36@21.1-36@26.3	4.9	114
	W NB Peds	40	39	0.2	4-72@148.5-72@153.9	0.3	40
	E SB Peds	0	0	#DIV/0!	4-75@6.5-75@10.4	0.0	35
	WBR	327	325	0.1	4-81@19.9-81@24.5	1.9	31
	NB U Turn	0	0	#DIV/0!	4-10094@5.8-38@0.0	0.0	56
	NBL	67	60	0.9	4-10094@5.8-10097@7.	6.5	56
	NBT	633	632	0.0	4-10094@5.8-10099@1(	6.3	56
	NBR	10	12	0.6	4-10094@5.8-10102@7.	5.6	56
	EBR	55	57	0.3	4-10096@6.8-38@0.0	5.5	82
	EB U Turn	0	0	#DIV/0!	4-10096@6.8-10097@7.	0.0	79
	EBL	565	565	0.0	4-10096@6.8-10099@1(	7.8	79
	EBT	68	65	0.4	4-10096@6.8-10102@7.	5.4	79
	SBT	392	407	0.8	4-10098@8.1-38@0.0	3.9	94
	SBR 0 assigned	0	0	#DIV/0!	4-10098@8.1-10097@7.	0.0	94
	SB U Turn	0	0	#DIV/0!	4-10098@8.1-10099@1(	0.0	94
	SBL	170	166	0.3	4-10098@8.1-10102@7.	5.0	94
	WBL	20	21	0.2	4-10100@0.6-38@0.0	12.2	62
	WBT	54	56	0.3	4-10100@0.6-10097@7.	15.7	51
	WBR 0 assigned	0	0	#DIV/0!	4-10100@0.6-10099@1(	0.0	61
	WB U Turn	0	0	#DIV/0!	4-10100@0.6-10102@7.	0.0	44
	Intersection Avg	2746	2747	0.0	4	5.5	106
12 Mile Coulee Road & Highway 1A/Crowchild Trail (CFI)	SB Peds	20	18	0.5	5-1@422.0-1@473.5	86.6	30
	EBT	2496	2501	0.1	5-11@947.2-12@2.6	25.2	224
	WBT	960	989	0.9	5-14@1686.8-13@2.8	21.9	101
	EBL	110	108	0.2	5-18@357.3-25@16.6	0.9	20
	EBR	170	173	0.2	5-19@226.1-19@234.0	0.2	5
	WBR	250	244	0.4	5-20@127.8-20@133.9	0.6	11
	NBT	257	248	0.6	5-22@453.6-25@16.6	58.7	82
	SBL	620	627	0.3	5-23@144.2-12@2.6	59.2	189
	SBT	149	150	0.1	5-24@388.7-21@21.0	47.3	63
	SBR	100	102	0.2	5-27@34.6-27@39.9	0.3	17
	WBL	548	553	0.2	5-29@335.4-21@21.0	40.2	149
	NBR	1103	1108	0.2	5-30@28.2-30@30.8	2.3	148
	NB Peds	40	34	1.0	5-43@472.7-43@523.8	156.2	57
	NBL	164	163	0.1	5-10091@0.5-13@2.8	67.6	103
	Intersection Avg	6987	7018	0.4	5	26.6	215
CFI East Intersection	EBT	3116	3128	0.2	6-12@342.5-10025@47.	7.0	130
	WBL	548	554	0.3	6-26@243.9-10024@52.	58.9	130
	Intersection Avg	3664	3682	0.3	6	14.8	127
CFI West Intersection	WBT	1124	1155	0.9	7-13@358.4-17@1.3	1.2	17
	EBL	110	109	0.1	7-16@146.1-18@6.7	64.3	92
	Intersection Avg	1234	1264	0.8	7	6.7	84

2039 After Development PM

Intersection	Movement	Assigned Vol.	Vehicles / hr	GEH	Movement	Average Delay	95% Queue
Blueridge Rise & Access 1	WBR	208	207	0.1	1-31@214.0-44@0.9	1.1	56
	WBT	886	890	0.1	1-31@214.0-56@2.0	0.9	12
	WB Peds	20	18	0.5	1-41@47.6-41@77.8	0.0	28
	SBL	279	273	0.4	1-46@105.1-32@6.0	40.2	99
	SBR	5	2	1.6	1-46@105.1-56@2.0	11.3	118
	EBT	625	638	0.5	1-57@151.9-32@6.0	0.3	22
	EBL	27	30	0.6	1-57@151.9-44@0.9	33.9	18
	EB Peds	20	18	0.5	1-65@264.6-65@297.9	0.0	38
	Intersection Avg	2070	2077	0.2	1	6.3	84
Blueridge Rise & Access 2	WB Peds	20	18	0.5	2-41@229.8-41@262.1	0.0	30
	EBT	652	668	0.6	2-48@116.8-57@0.2	0.1	10
	WBT	741	745	0.1	2-56@153.9-47@1.9	0.2	17
	WBR	145	149	0.3	2-56@153.9-59@4.1	1.2	22
	SBR	5	4	0.5	2-58@100.5-47@1.9	2.1	10
	EB Peds	20	18	0.5	2-65@80.3-65@112.6	0.0	30
	Intersection Avg	1583	1603	0.5	2	0.2	34
Blueridge Rise & Blueridge View	NB U Turn	0	0	#DIV/0!	3-54@100.1-55@1.4	0.0	29
	NBT	5	5	0.0	3-54@100.1-10047@10.	14.5	29
	NBR	8	6	0.8	3-54@100.1-10049@10.	5.8	29
	NBL	5	6	0.4	3-54@100.1-10051@8.7	15.8	29
	SBT	5	6	0.4	3-10046@0.6-55@1.4	3.7	38
	SB U Turn	0	0	#DIV/0!	3-10046@0.6-10047@1(	0.0	38
	SBL	655	658	0.1	3-10046@0.6-10049@1(	4.0	38
	SBR	11	9	0.6	3-10046@0.6-10051@8.	3.5	38
	WBL	18	17	0.2	3-10048@0.5-55@1.4	6.3	39
	WBR	687	689	0.1	3-10048@0.5-10047@1(	4.3	39
	WB U Turn	0	0	#DIV/0!	3-10048@0.5-10049@1(	0.0	39
	WBT	36	42	1.0	3-10048@0.5-10051@8.	6.2	39
	EBR	5	3	1.0	3-10050@1.1-55@1.4	8.1	26
	EBL	35	37	0.3	3-10050@1.1-10047@1(	10.2	27
	EBT	5	4	0.5	3-10050@1.1-10049@1(	3.8	23
	EB U Turn	0	0	#DIV/0!	3-10050@1.1-10051@8.	0.0	279
	Intersection Avg	1475	1483	0.2	3	4.5	47
12 Mile Coulee Road & Tusslewood Drive NW	W SB Peds	20	17	0.7	4-3@201.3-3@206.6	0.2	38
	E NB Peds	20	18	0.5	4-9@115.8-9@119.9	0.2	52
	SBR	919	927	0.3	4-36@21.1-36@26.3	12.3	288
	W NB Peds	40	41	0.2	4-72@148.5-72@153.9	1.3	49
	E SB Peds	0	0	#DIV/0!	4-75@6.5-75@10.4	0.0	43
	WBR	290	284	0.4	4-81@19.9-81@24.5	3.4	35
	NB U Turn	0	0	#DIV/0!	4-10094@5.8-38@0.0	0.0	71
	NBL	70	70	0.0	4-10094@5.8-10097@7.	8.9	71
	NBT	510	506	0.2	4-10094@5.8-10099@1(	8.2	71
	NBR	30	32	0.4	4-10094@5.8-10102@7.	7.4	71
	EBR	124	118	0.5	4-10096@6.8-38@0.0	47.0	77
	EB U Turn	0	0	#DIV/0!	4-10096@6.8-10097@7.	0.0	75
	EBL	640	661	0.8	4-10096@6.8-10099@1(	48.0	75
	EBT	141	137	0.3	4-10096@6.8-10102@7.	42.4	75
	SBT	773	771	0.1	4-10098@8.1-38@0.0	5.2	259
	SBR 0 assigned	0	0	#DIV/0!	4-10098@8.1-10097@7.	0.0	259
	SB U Turn	0	0	#DIV/0!	4-10098@8.1-10099@1(	0.0	259
	SBL	327	316	0.6	4-10098@8.1-10102@7.	5.9	259
	WBL	50	52	0.3	4-10100@0.6-38@0.0	22.2	361
	WBT	105	101	0.4	4-10100@0.6-10097@7.	24.5	107
	WBR 0 assigned	0	0	#DIV/0!	4-10100@0.6-10099@1(	0.0	109
	WB U Turn	0	0	#DIV/0!	4-10100@0.6-10102@7.	0.0	184
	Intersection Avg	4059	4051	0.1	4	17.3	274
12 Mile Coulee Road & Highway 1A/Crowchild Trail (CFI)	SB Peds	20	20	0.0	5-1@422.0-1@473.5	87.6	40
	EBT	1488	1488	0.0	5-11@947.2-12@2.6	21.9	162
	WBT	2389	2419	0.6	5-14@1686.8-13@2.8	23.1	276
	EBL	190	181	0.7	5-18@357.3-25@16.6	1.0	20
	EBR	292	285	0.4	5-19@226.1-19@234.0	4.2	69
	WBR	1000	993	0.2	5-20@127.8-20@133.9	5.0	218
	NBT	306	309	0.2	5-22@453.6-25@16.6	57.6	116
	SBL	340	333	0.4	5-23@144.2-12@2.6	57.6	120
	SBT	410	423	0.6	5-24@388.7-21@21.0	55.3	130
	SBR	280	283	0.2	5-27@34.6-27@39.9	0.8	30
	WBL	1316	1310	0.2	5-29@335.4-21@21.0	22.7	267
	NBR	900	909	0.3	5-30@28.2-30@30.8	2.0	126
	NB Peds	40	38	0.3	5-43@472.7-43@523.8	162.4	172
	NBL	234	232	0.1	5-10091@0.5-13@2.8	61.8	237
	Intersection Avg	9205	9222	0.2	5	22.7	263
CFI East Intersection	EBT	1828	1839	0.3	6-12@342.5-10025@47.	14.0	92
	WBL	1316	1314	0.1	6-26@243.9-10024@52.	37.5	261
	Intersection Avg	3144	3153	0.2	6	23.8	256
CFI West Intersection	WBT	2623	2662	0.8	7-13@358.4-17@1.3	1.9	25
	EBL	190	183	0.5	7-16@146.1-18@6.7	69.5	124
	Intersection Avg	2813	2846	0.6	7	6.3	208

APPENDIX F

Signal Warrants

City of Calgary - Traffic Signal Warrant Analysis

Main Street (name)	12 Mile Coulee Road
Side Street (name)	Blueridge Rise
Quadrant / Int #	

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Direction (EW or NS)	NS
Direction (EW or NS)	EW
Comments	2028 Background

Road Authority:	City of Calgary
City:	Calgary
Analysis Date:	2020 Jul 23, Thu
Count Date:	N/A
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
12 Mile Coulee Road	NB		1	1					2
12 Mile Coulee Road	SB			1		1			2
Blueridge Rise	WB								
Blueridge Rise	EB				1				

Are the Blueridge Rise WB right turns significantly impeded by through movements? (y/n)	n
Are the Blueridge Rise EB right turns significantly impeded by through movements? (y/n)	n

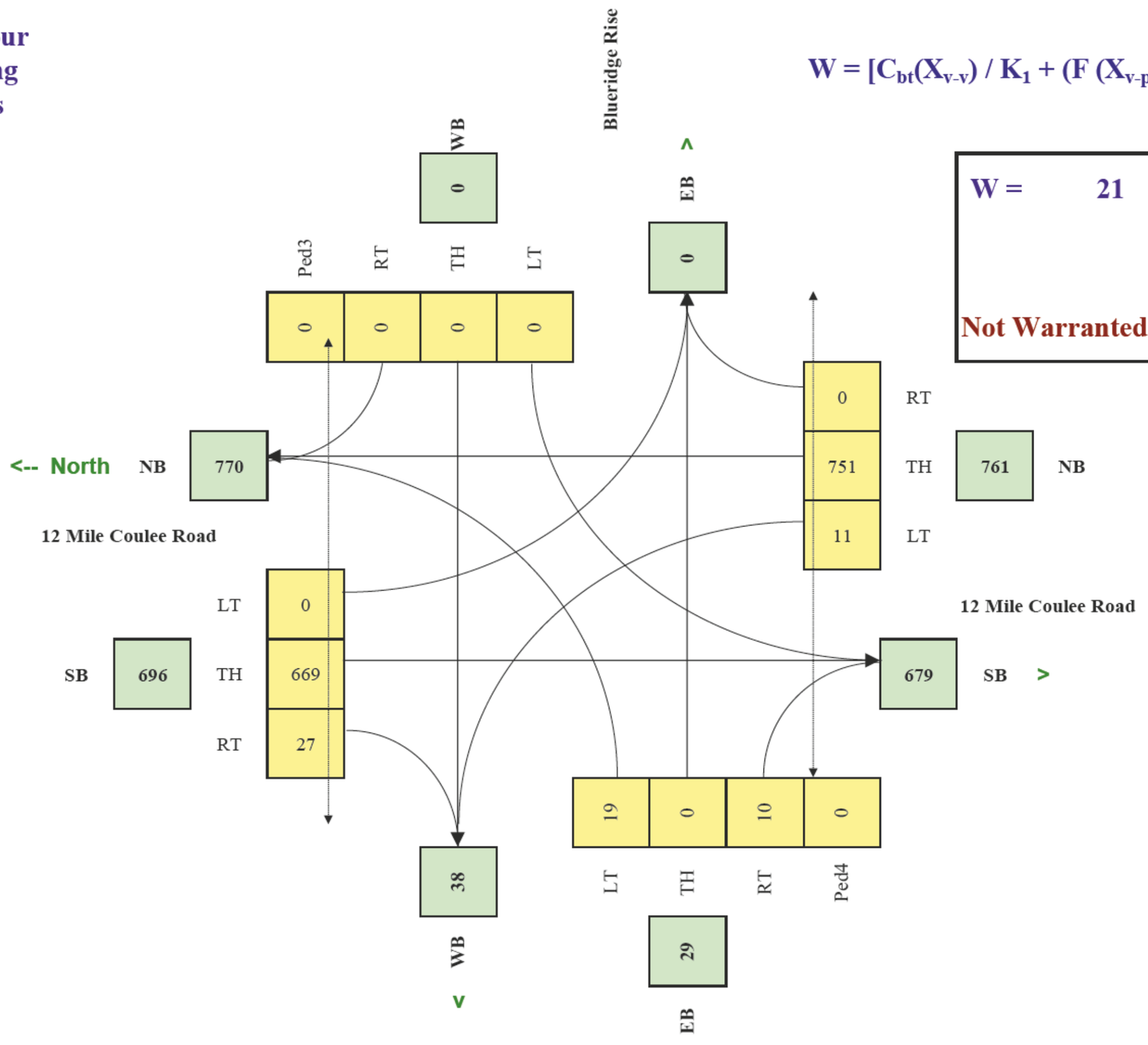
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	1,200,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
12 Mile Coulee Road	NS	60	2.0%	n	5.0
Blueridge Rise	EW		2.0%	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
2028 Background	63	4505	0	0	4014	162	0	0	0	115	0	57	52	0	0	0
Total (6-hour peak)	63	4,505	0	0	4,014	162	0	0	0	115	0	57	52	0	0	0
Average (6-hour peak)	11	751	0	0	669	27	0	0	0	19	0	10	9	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 =	21	21	0
		Veh	*Ped*

Not Warranted - Vs<75

RESET SHEET

Traffic Signal Warrant Spreadsheet - v3H © 2007 Transportation Association of Canada

City of Calgary - Traffic Signal Warrant Analysis

Main Street (name)	12 Mile Coulee Road
Side Street (name)	Blueridge Rise
Quadrant / Int #	

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Direction (EW or NS)	NS
Direction (EW or NS)	EW
Comments	2039 Background

Road Authority:	City of Calgary
City:	Calgary
Analysis Date:	2020 Jul 23, Thu
Count Date:	N/A
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
12 Mile Coulee Road	NB		1	1					2
12 Mile Coulee Road	SB			1		1			2
Blueridge Rise	WB								
Blueridge Rise	EB				1				

Are the Blueridge Rise WB right turns significantly impeded by through movements? (y/n) n

Are the Blueridge Rise EB right turns significantly impeded by through movements? (y/n) n

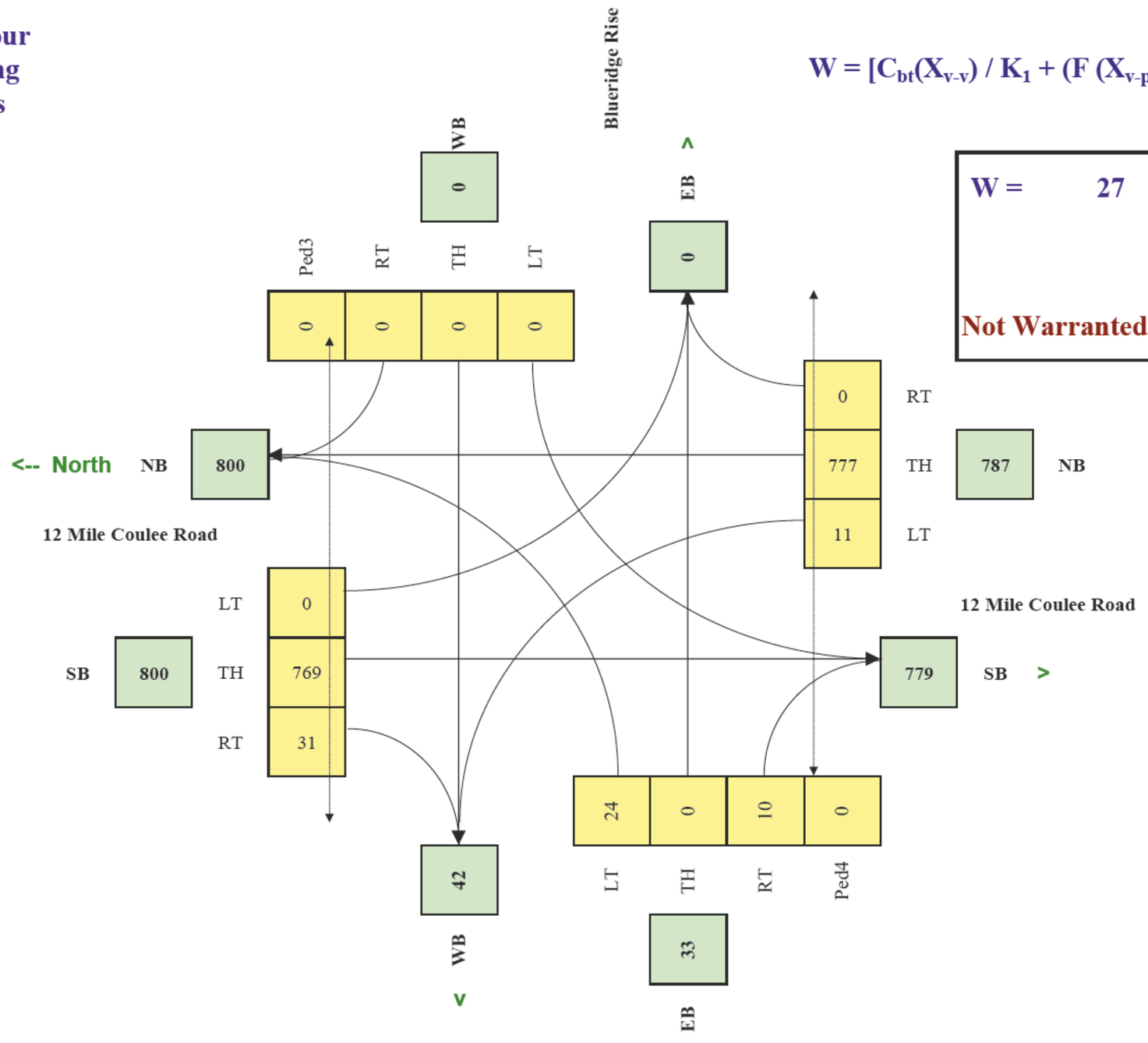
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	1,200,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
12 Mile Coulee Road	NS	60	2.0%	n	5.0
Blueridge Rise	EW		2.0%	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
2028 Background	63	4661	0	0	4614	188	0	0	0	141	0	57	52	0	0	0
Total (6-hour peak)	63	4,661	0	0	4,614	188	0	0	0	141	0	57	52	0	0	0
Average (6-hour peak)	11	777	0	0	769	31	0	0	0	24	0	10	9	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 =	27	27	0
		Veh	*Ped*

Not Warranted - Vs<75

RESET SHEET

Traffic Signal Warrant Spreadsheet - v3H © 2007 Transportation Association of Canada

City of Calgary - Traffic Signal Warrant Analysis

Main Street (name)	12 Mile Coulee Road
Side Street (name)	Tusslewood Drive
Quadrant / Int #	

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Direction (EW or NS)	NS
Direction (EW or NS)	EW
Comments	2028 Background

Road Authority:	City of Calgary
City:	Calgary
Analysis Date:	2020 Jul 23, Thu
Count Date:	N/A
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
12 Mile Coulee Road	NB			1		1			2
12 Mile Coulee Road	SB		1	1					2
Tusslewood Drive	WB				1				
Tusslewood Drive	EB								

Are the Tusslewood Drive WB right turns significantly impeded by through movements? (y/n) n

Are the Tusslewood Drive EB right turns significantly impeded by through movements? (y/n) n

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	1,200,000
Central Business District	(y/n)	n

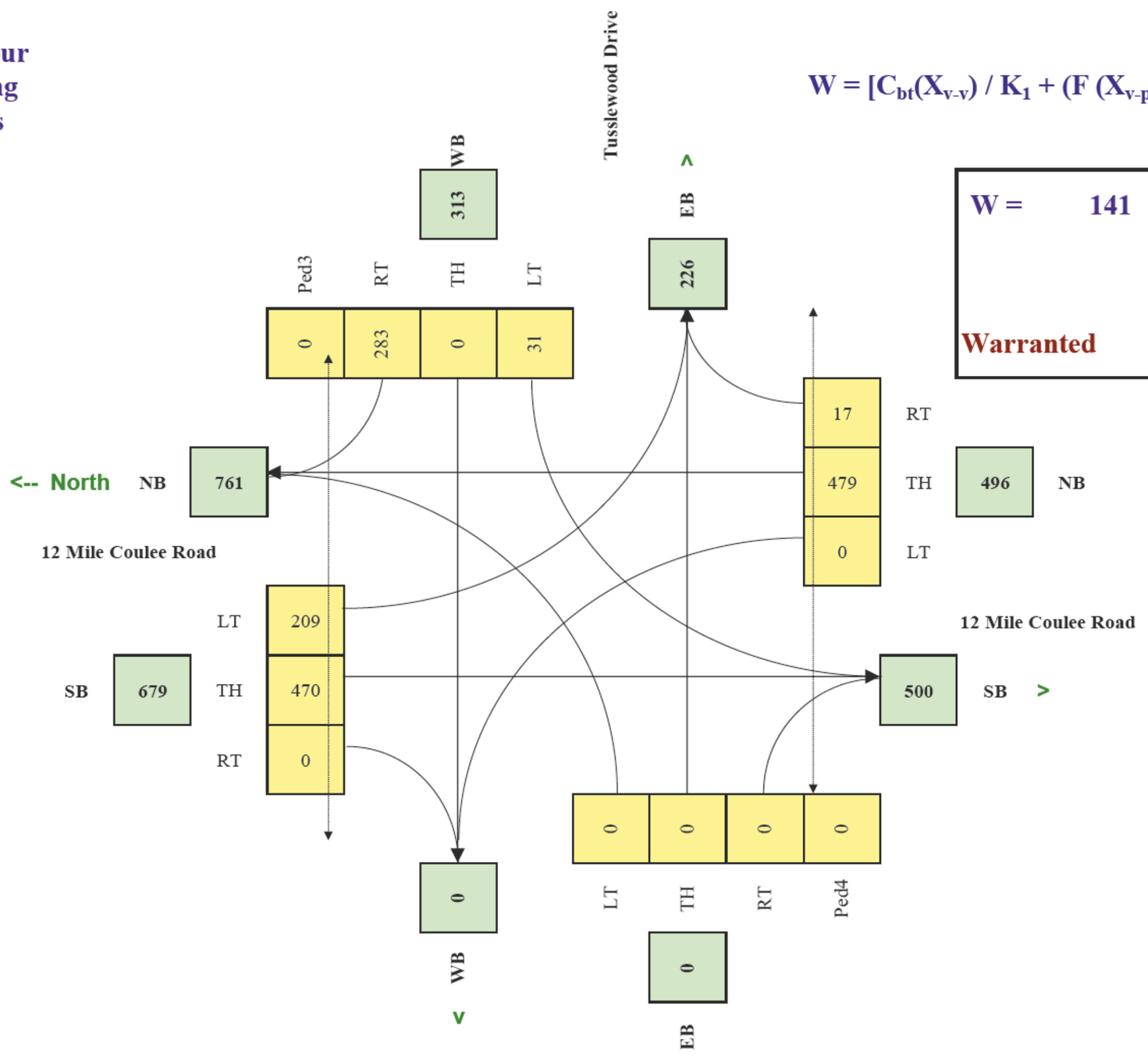
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
12 Mile Coulee Road	NS	60	2.0%	n	5.0
Tusslewood Drive	EW		2.0%	n	

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
2028 Background	0	2871	104	1253	2819	0	183	0	1697	0	0	0	0	52	0	0
Total (6-hour peak)	0	2,871	104	1,253	2,819	0	183	0	1,697	0	0	0	0	52	0	0
Average (6-hour peak)	0	479	17	209	470	0	31	0	283	0	0	0	0	9	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 =	141	141	0
		Veh	*Ped*

Warranted

RESET SHEET

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Rocky View County - Traffic Signal Warrant Analysis

Main Street (name)	Blueridge Rise
Side Street (name)	Site Access 1
Quadrant / Int #	

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Direction (EW or NS)	EW
Direction (EW or NS)	NS
Comments	2028 After Development

Road Authority:	Rocky View County
City:	West of Calgary
Analysis Date:	2020 Jul 23, Thu
Count Date:	N/A
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
Blueridge Rise	WB			1		1			2
Blueridge Rise	EB		1	1					2
Site Access 1	NB								
Site Access 1	SB	1					1		
Are the Site Access 1 NB right turns significantly impeded by through movements? (y/n)							n		
Are the Site Access 1 SB right turns significantly impeded by through movements? (y/n)							n		

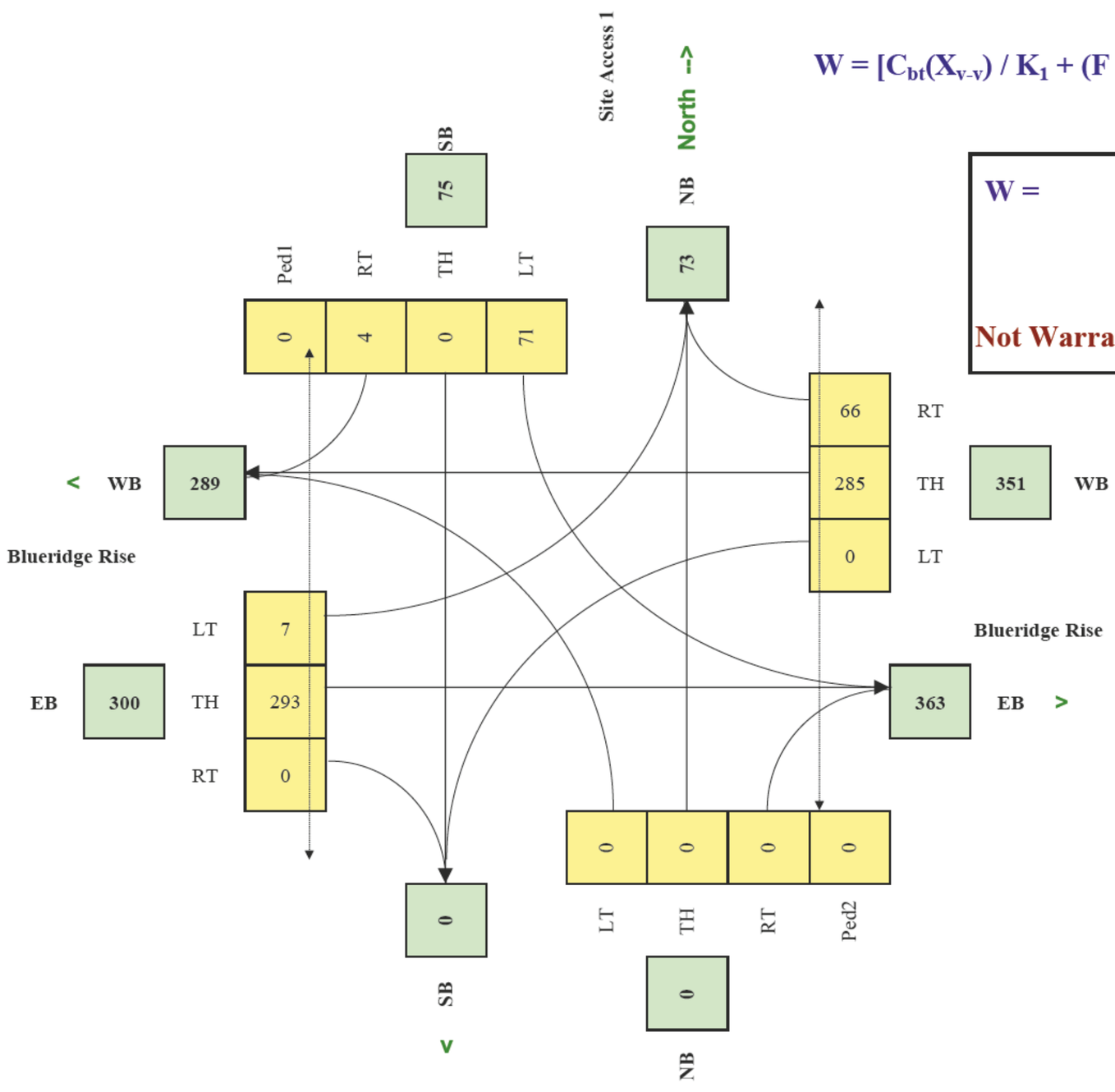
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	1,200,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Blueridge Rise	EW	50	2.0%	n	3.5
Site Access 1	NS		2.0%	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
2028 After Development	0	0	0	423	0	26	0	1710	395	44	1755	0	0	0	52	0
Total (6-hour peak)	0	0	0	423	0	26	0	1,710	395	44	1,755	0	0	0	52	0
Average (6-hour peak)	0	0	0	71	0	4	0	285	66	7	293	0	0	0	9	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 =	23	23	0
		Veh	*Ped*

Not Warranted - Vs<75

RESET SHEET

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Rocky View County - Traffic Signal Warrant Analysis

Main Street (name)	Blueridge Rise
Side Street (name)	Site Access 1
Quadrant / Int #	

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Direction (EW or NS)	EW
Direction (EW or NS)	NS
Comments	2039 After Development

Road Authority:	Rocky View County
City:	West of Calgary
Analysis Date:	2020 Jul 23, Thu
Count Date:	N/A
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
Blueridge Rise	WB			1		1			2
Blueridge Rise	EB		1	1					2
Site Access 1	NB								
Site Access 1	SB	1					1		
Are the Site Access 1 NB right turns significantly impeded by through movements? (y/n)							n		
Are the Site Access 1 SB right turns significantly impeded by through movements? (y/n)							n		

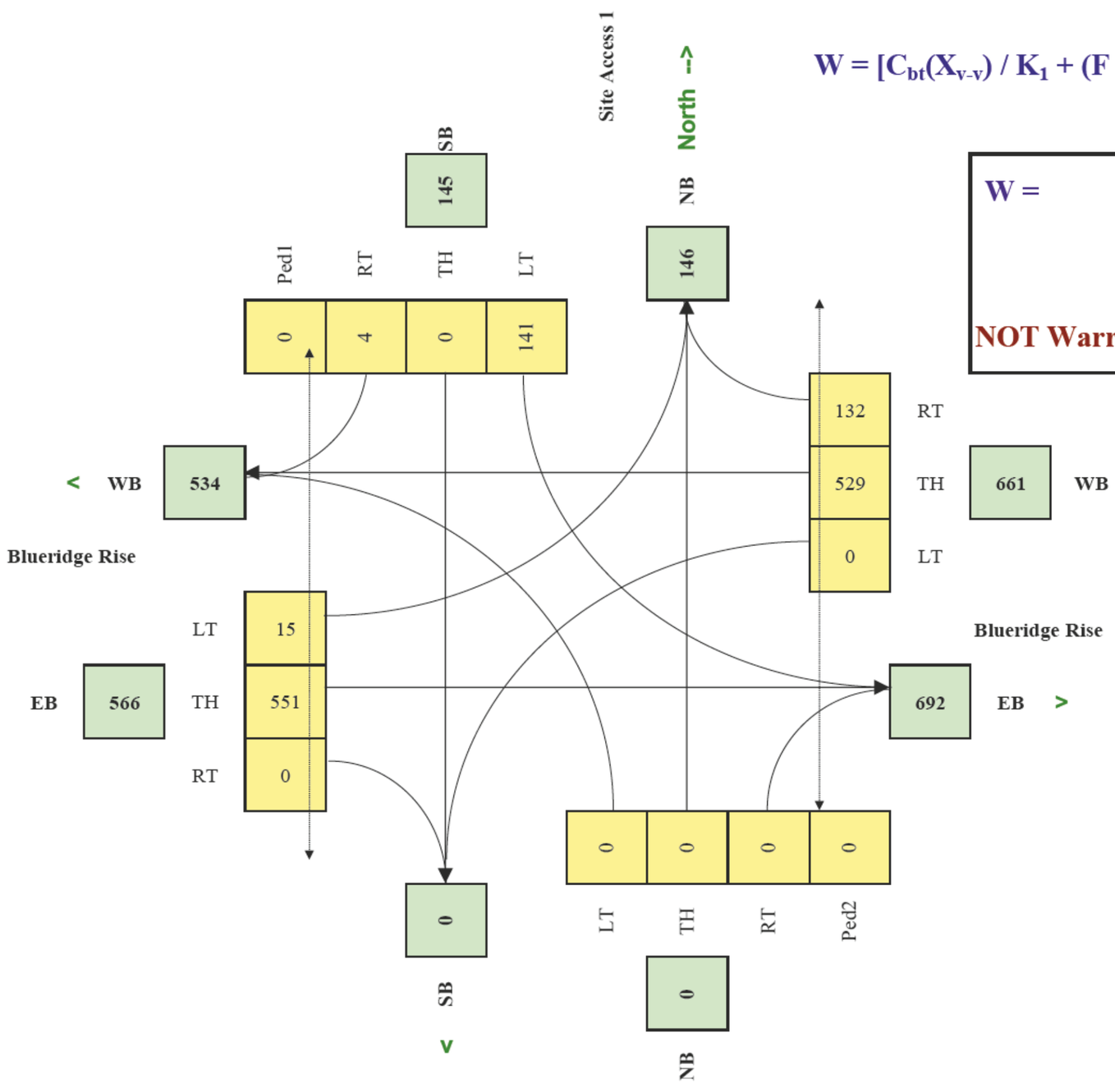
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	1,200,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Blueridge Rise	EW	50	2.0%	n	3.5
Site Access 1	NS		2.0%	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
2028 After Development	0	0	0	846	0	26	0	3176	791	87	3308	0	0	0	52	0
Total (6-hour peak)	0	0	0	846	0	26	0	3,176	791	87	3,308	0	0	0	52	0
Average (6-hour peak)	0	0	0	141	0	4	0	529	132	15	551	0	0	0	9	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 =	85	85	0
		Veh	*Ped*

NOT Warranted

RESET SHEET

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