

Memorandum

Attention:	Merlin Kofoed	File No.:	A22-051
Organization:	Kofoed Contracting Ltd	Project:	7025 Herbert Rd TIA
Phone:		Date:	March 21, 2023
Email:	merlin@kofoedgroup.com	Revision:	2
cc:			

RE: 7025 Herbert Rd Traffic Impact Assessment

1 Introduction

Align Engineering Ltd. (ALIGN) was retained by Kofoed Contracting Ltd to develop a traffic impact assessment (TIA) for the proposed 7025 Herbert Road development Vernon, BC. The following memorandum provides the TIA. The Terms of Reference for the study are provided in **APPENDIX A**.

The proposed development would rezone the property from CR (Country Residential) to the R5 (fourplex residential) zone to provide 57 single-family attached units (13 duplexes, one [1] triplex, and seven [7] fourplexes). The site plan is attached in **APPENDIX B**. Adjacent lots to the south are currently zoned R5.

2 Existing Conditions

The proposed study site location is shown in **FIGURE 1**. The land parcel is located within the City of Vernon and borders the North Okanagan Regional District (NORD) lands. The site is accessed from Bates Road via Silver Star Road. Silver Star Road is classified as an arterial road and is in the jurisdiction of the City of Vernon. Adjacent to the development, Silver Star Road has one southbound (downhill) lane, two northbound (climbing and fast lane), bicycle accessible shoulders, and a multi-use pathway on the west side south of Phoenix Drive. The northbound climbing lane ends prior to the intersection with Bates Road / Phoenix Drive. Silver Star Road has a posted speed of 60 km/h. Bates Road and Herbert Road are local roads within the NORD and are under the jurisdiction of the Ministry of Transportation and Infrastructure. These local roads have posted speeds of 50 km/h.

Winter traffic counts were collected at the intersection of Silver Star Road & Bates Road Phoenix Drive to capture higher volume activities associated with the SilverStar Mountain Resort. These volumes are shown in **FIGURE 2** and were collected on:

- Saturday January 28, 2023, between 9:00 AM to 11:00 AM and 3:00 PM to 5:00 PM.
- Tuesday January 31, 2023, between 7:00 AM to 9:00 AM and 3:30 PM to 5:30 PM.

Traffic volumes collected during the afternoon Saturday peak hour were approximately 60% higher than the other peak hours. Therefore, the analysis will review the peak Saturday PM in the winter when SilverStar Mountain Resort is operating. Collected traffic counts are provided in **APPENDIX C**.

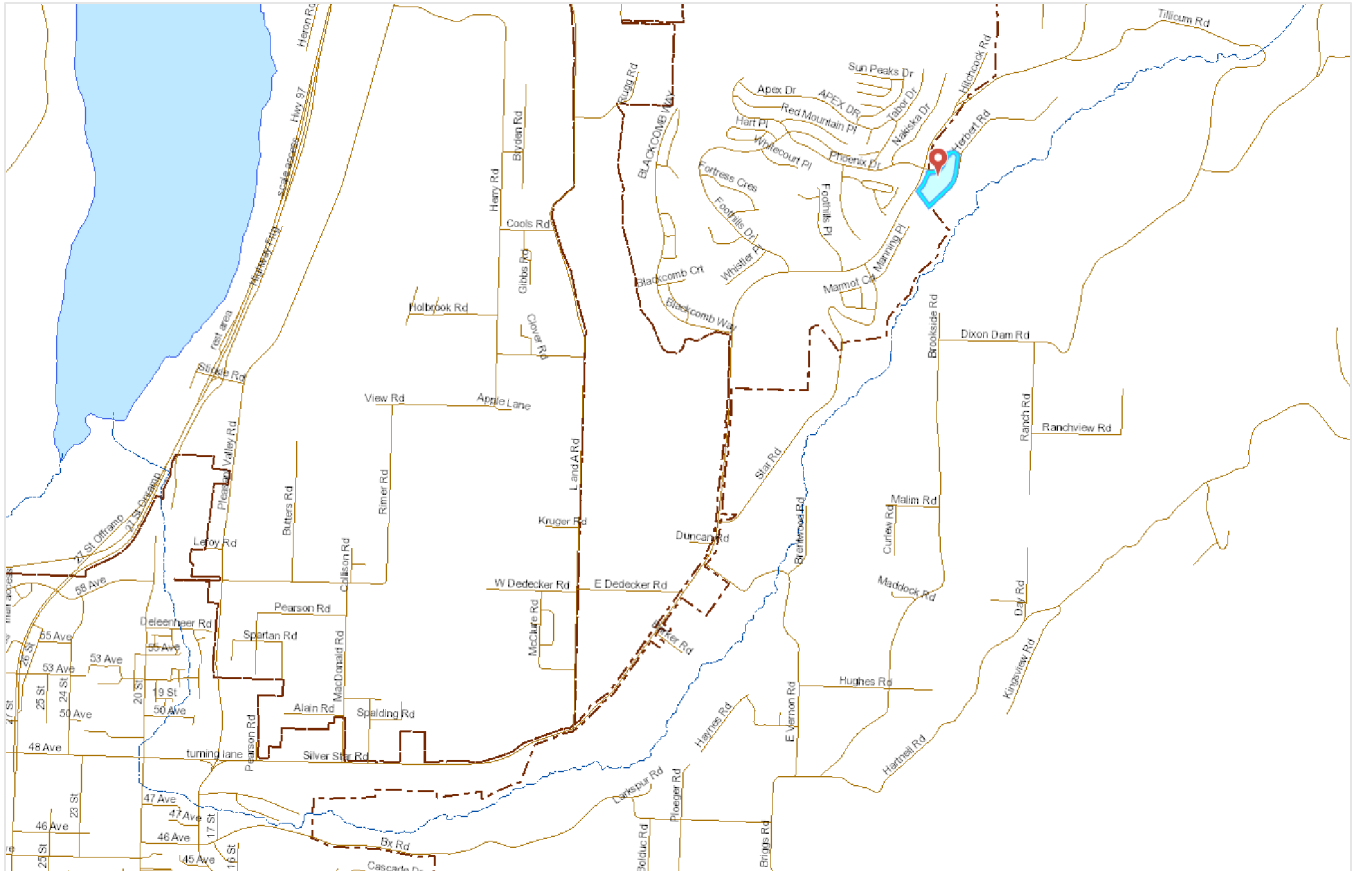


Figure 1: Proposed Development Site Location

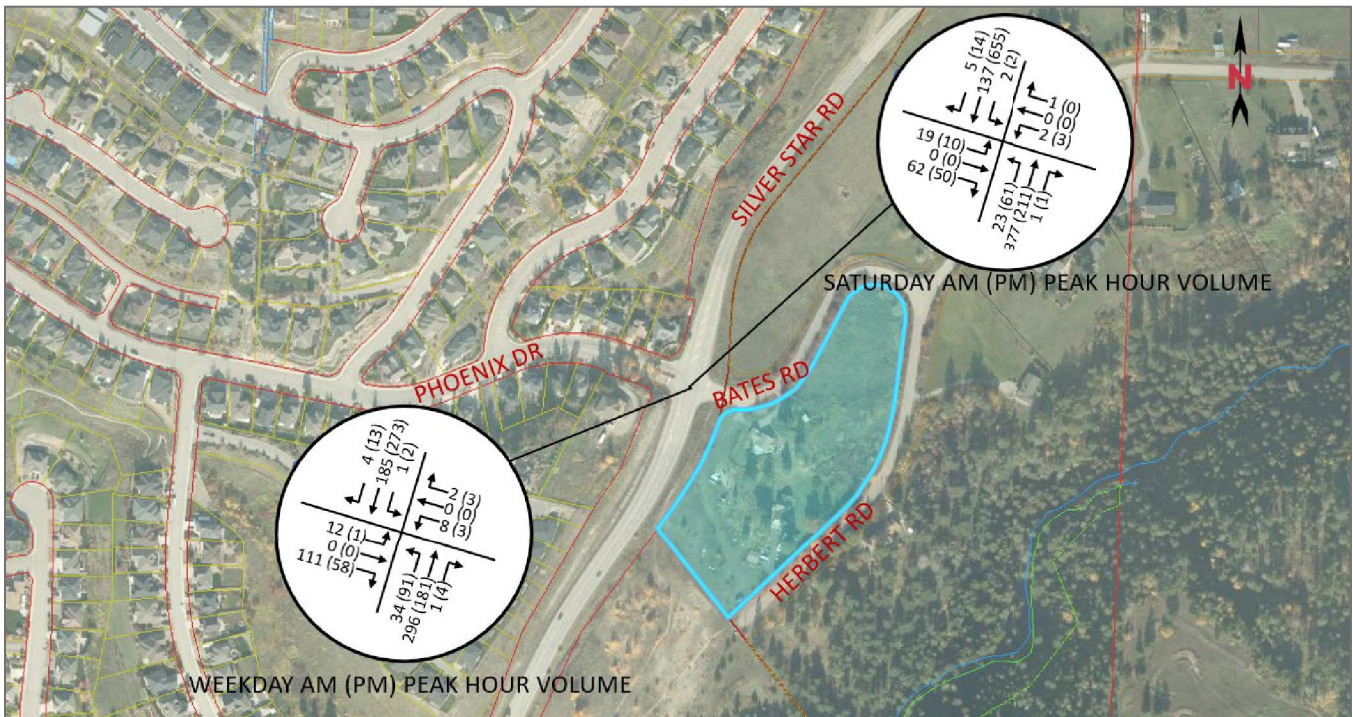


Figure 2: 2023 Existing Winter Weekday & Saturday AM & PM Peak Hour Volumes

2.1 Traffic Analysis

The traffic analysis was conducted with using a network intersection model with Synchro 11 and verified with microsimulation using SimTraffic. These provide with the following measures of effectiveness:

- **Volume-to-Capacity Ratio (v/c):** A measure of the volume of traffic relative to the capacity that can be accommodated.
- **Delay:** A measure of additional time incurred to each vehicle due to traffic control in units of seconds per vehicle
- **95th Percentile Queue (Queue):** Length of vehicles queuing with a five-percent probability of being exceeded during the peak hour of analysis. Units of metres where the average vehicle length is 7.5 m from the front of the vehicle to the front of the next vehicle.
- **Level of Service (LOS):** A qualitative measure of the quality of traffic flow. LOS A refers to free flow (uninterrupted conditions) and breaks down at LOS E or F. The Highway Capacity Manual defines LOS for unsignalized and signalized intersections based on average vehicle delay as per the following:

LOS	Description	Unsignalized Intersection	Signalized Intersection
A	Free Flow	≤ 10 sec	≤ 10 sec
B	Reasonable Flow	10 – 15 sec	10 – 20 sec
C	Stable Flow	15 – 25 sec	20 – 35 sec
D	Approaching Unstable flow	25 – 35 sec	35 – 55 sec
E	Unstable Flow	35 – 50 sec	55 – 80 sec
F	Failing / Breakdown Flow	> 50 sec	> 80 sec

The criteria for analysis include:

- Unsignalized Intersections:
 - Individual movement level of service (LOS) is LOS D;
 - Individual movement v/c 0.90; and
 - 95th percentile vehicle queue lengths do not exceed the available storage length.

Exceeding these criteria would trigger the future planned roundabout at the intersection of Silver Star Rd & Phoenix Drive / Bates Road.

TABLE 1 summarizes existing traffic conditions for the Weekday and Saturday AM and PM peak hours. All peak hours operate at LOS A overall with LOS D on the side streets of Phoenix Drive and Bates Road in the Saturday PM peak hour. Traffic modeling results are provided in **APPENDIX D**.

Table 1: 2023 Existing Winter Traffic Conditions

	Phoenix Dr			Bates Rd			Silver Star Rd						TOTAL	
	Eastbound			Westbound			Northbound			Southbound				
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Weekday AM Peak Hour														
Vol	12	1	111	8	1	2	34	296	1	1	185	4	654	
v/c	0.27			0.12			0.04	0.22			0			-
Delay	12			22			8	0			0			4
LOS	B			C			A	A			A			A
Queue (m)	8			3			1	0			0			-
Weekday PM Peak Hour														
Vol	1	1	58	3	1	3	91	181	4	2	273	13	629	
v/c	0.12			0.06			0.08	0.13			0.01			-
Delay	12			15			8	0			0			3
LOS	B			C			A	A			A			A
Queue (m)	3			2			2	0			0			-
Saturday AM Peak Hour														
Vol	19	1	62	2	1	1	23	377	1	2	137	5	629	
v/c	0.15			0.03			0.02	0.28			0			-
Delay	12			15			8	0			0			2
LOS	B			C			A	A			A			A
Queue (m)	4			1			1	0			0			-
Saturday PM Peak Hour														
Vol	10	1	50	3	1	1	61	211	1	2	655	14	1007	
v/c	0.35			0.10			0.09	0.16			0.00			-
Delay	26			30			10	0			0			3
LOS	D			D			A	A			A			A
Queue (m)	11			3			2	0			0			-

Note: v/c – volume to capacity ration, delay – seconds of delay per vehicle, LOS – Level of Service, Queue – 95th percentile queue in metres.

3 Background Traffic

The Foothills Neighbourhood plan estimates 1,944 residential units in the undeveloped upper section. Since the plan was developed, approximately 143 units were developed (1801 units remaining). Of the remaining development, there is an estimated 177 units of row housing and the remaining as detached single-family. **TABLE 2** provides a summary of estimated trips generated that could be developed by the remaining Foothills neighbourhood. This would include an estimated 1222 vehicle trips in the AM peak hour, 1682 vehicle trips in the PM peak hour, and 1595 vehicle trips in the Saturday peak hour. The Foothills Neighbourhood Plan was adopted by the City of Vernon in October 2013. Since then, 143 units were constructed and occupied averaging nearly 18 units per year. Assuming the Upper Foothills Neighbourhood continues to grow by 25 units per year. This would allocate the following additional units to Phoenix Drive:

- 125 vehicle cumulative units for 2028 five-year build-out and
- 375 vehicle cumulative unit for 2038 fifteen-year build-out.



To be conservative in this analysis, all of these trips were assigned the intersection of Silver Star Road & Phoenix Drive / Bates Road.

Table 2: Estimated Upper Foothills Remaining Development

Land Use		Mode	Units	Peak Period	Trips	Entering	Exiting
210	Single-Family Detached Housing	Vehicle	1624	AM	1137	296	841
				PM	1527	962	565
				Sat	1494	807	687
215	Single-Family Attached Housing	Vehicle	177	AM	85	26	59
				PM	101	58	43
				Sat	101	48	53
Total		Vehicle	1801	AM	1222	322	900
				PM	1628	1020	608
				Sat	1595	855	740
2028 Five-Year Foothills Upper Build-out		Vehicle	125	AM	85	22	62
				PM	113	71	42
				Sat	111	59	51
2038 Fifteen-Year Upper Foothills Build-out		Vehicle	375	AM	254	67	187
				PM	339	212	127
				Sat	332	178	154

Note: Rates for Weekday AM and PM peaks are for Adjacent Peak Hour Traffic Under General Urban / Suburban settings.
 Rates for Saturday are for the Peak Hour Generator Traffic under General Urban / Suburban settings.

Background traffic on Silver Star Road is assumed at a linear growth rate of 1% per year with the Upper Foothills growth and contributing to the Silver Star Road traffic volume.

3.1 Trip Distribution

Trip distributions for analysis were derived from the collected traffic counts. The data indicates the following trip distributions:

- 85% of development traffic travelling to / from the south (Vernon city centre)
- 15% of development traffic travelling to / from the north (SilverStar)

3.2 2028 Background Traffic

TABLE 3 summarizes the background traffic conditions for 2028 show LOS F on Phoenix Drive and Bates Road. The SimTraffic simulation indicates lower delay for these movements, that would equate to LOS C-D.



Table 3: 2028 Background Traffic Conditions

	Phoenix Dr			Bates Rd			Silver Star Rd						TOTAL	
	Eastbound			Westbound			Northbound			Southbound				
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Saturday PM Peak Hour														
Vol	18	1	93	3	1	1	111	222	1	2	688	23	1161	
v/c	0.70			0.17			0.16	0.17			0.00			-
Delay	51			52			10	0			0			7
LOS	F			F			B	A			A			A
Queue (m)	34			5			4	0			0			-
Sim Delay	12	28	10	15	17	2	6	0	1	-	1	0	3	
Sim Queue	22			6			14	0			0			-

Note: v/c – volume to capacity ration, delay – seconds of delay per vehicle, LOS – Level of Service, Queue – 95th percentile queue in metres
 Sim Delay – SimTraffic delay in seconds, Sim Queue – SimTraffic 95th percentile queue in metres

3.3 2038 Background Traffic

TABLE 4 summarizes the 2038 background traffic conditions. The Synchro analysis shows the Phoenix Road and Bates Road approaches with substantially higher delays and queues. SimTraffic indicates more moderate increases to delays and queues with delays in the order of LOS D.

Table 4: 2038 Background Traffic Conditions

	Phoenix Dr			Bates Rd			Silver Star Rd						TOTAL	
	Eastbound			Westbound			Northbound			Southbound				
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Saturday PM Peak Hour														
Vol	33	1	181	3	1	1	212	243	1	2	753	41	1469	
v/c	1.25			0.42			0.28	0.15			0.00			-
Delay	190			158			11	0			0			34
LOS	F			F			B	A			A			A
Queue (m)	102			11			9	0			0			-
Sim Delay	29	-	19	31	20	4	10	0	0	0	2	1	6	
Sim Queue	45			6			29	0			0			-

Note: v/c – volume to capacity ration, delay – seconds of delay per vehicle, LOS – Level of Service, Queue – 95th percentile queue in metres
 Sim Delay – SimTraffic delay in seconds, Sim Queue – SimTraffic 95th percentile queue in metres



4 Post Development

4.1 Trip Generation

TABLE 5 summarizes the ITE Trip Generation 11th Edition weekday trip generation rates for vehicle trips.

Table 5: ITE Trip Generation Weekday Peak Hour Rates

Land Use		Trips	Peak Period	Trip Gen Rate	Entering	Exiting
210	Single-Family Detached Housing	Vehicle	AM	0.70	26%	74%
			PM	0.94	63%	37%
			Sat	0.92	54%	46%
215	Single-Family Attached Housing	Vehicle	AM	0.48	31%	69%
			PM	0.57	57%	43%
			Sat	0.57	48%	52%

Note: Rates for Weekday AM and PM peaks are for Adjacent Peak Hour Traffic Under General Urban / Suburban settings.
Rates for Saturday are for the Peak Hour Generator Traffic under General Urban / Suburban settings.

TABLE 6 shows a breakdown of the estimated vehicle trips for the proposed 7025 Herbert Road development. According to the ITE Trip Generation Manual, the proposed 57-unit single-family attached residential development would generate an estimated 27 vehicles per hour in the weekday AM, 32 vehicles per hour in the weekday PM, and 32 vehicles in the Saturday peak.

Table 6: ITE Trip Generation Weekday Peak Hour Volumes

Land Use		Mode	Units	Peak Period	Trips	Entering	Exiting
215	Single-Family Attached Housing	Vehicle	57	AM	27	8	19
				PM	32	18	14
				Sat	32	15	17

Note: Rates for Weekday AM and PM peaks are for Adjacent Peak Hour Traffic Under General Urban / Suburban settings.
Rates for Saturday are for the Peak Hour Generator Traffic under General Urban / Suburban settings.

4.2 2028 Post Development Traffic

The post development traffic conditions apply the development traffic to the background traffic. In the 2028 post development scenario, conditions worsen from the background traffic due to higher volumes on the Bates Road approach which include a higher portion of left-turn movements. **TABLE 7** shows the Saturday PM peak hour traffic volumes for 2028 with the proposed development. The westbound delay doubles and queue extends to three vehicles. The SimTraffic simulation indicates delays doubling for the westbound and 95th percentile queues equating to 6 vehicles on the eastbound left-turn with LOS F. This indicates that the intersection operations are sensitive to small increases in left-turn movements from Bates Road. Regular daily variation in these traffic volumes or other development in the RDNO accessing Bates Road during peak periods can significantly impact the level of service. This indicates that the Silver Star Road & Phoenix Drive / Bates Road roundabout should be in-service prior to 2028.

Table 7: 2028 Post Development Traffic Conditions

	Phoenix Dr			Bates Rd			Silver Star Rd						TOTAL	
	Eastbound			Westbound			Northbound			Southbound				
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Saturday PM Peak Hour														
Vol	18	1	93	17	1	3	111	222	14	4	688	23	1193	
v/c	0.71			0.63			0.16	0.17			0.01			-
Delay	53			115			10	0			0			10
LOS	F			F			B	A			A			A
Queue (m)	35			21			4	0			0			-
Sim Delay	51	-	25	25	32	13	7	0	0	3	1	1	5	
Sim Queue	44			11			14	0			3			-

Note: v/c – volume to capacity ration, delay – seconds of delay per vehicle, LOS – Level of Service, Queue – 95th percentile queue in metres
 Sim Delay – SimTraffic delay in seconds, Sim Queue – SimTraffic 95th percentile queue in metres

4.3 2038 Post Development Traffic

Traffic conditions for the addition of the 7025 Herbert Road traffic to the Silver Star Road & Phoenix Drive / Bates Road intersection are summarized in **TABLE 8**. Traffic conditions breakdown further with the additional traffic on Bates Road increasing queues on Phoenix Drive due to the sensitivity of the intersection to accommodate more traffic on Bates Road.

Table 8: 2038 Post Development Traffic Conditions

	Phoenix Dr			Bates Rd			Silver Star Rd						TOTAL	
	Eastbound			Westbound			Northbound			Southbound				
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Saturday PM Peak Hour														
Vol	33	1	181	17	1	3	212	243	14	4	753	41	1501	
v/c	1.28			2.27			0.28	0.18			0.01			-
Delay	203			895			11	0			0			64
LOS	F			F			B	A			A			F
Queue (m)	105			55			9	0			0			-
Sim Delay	120	-	93	65	53	-	11	1	0	3	2	1	18	
Sim Queue	134			17			30	0			3			-

Note: v/c – volume to capacity ration, delay – seconds of delay per vehicle, LOS – Level of Service, Queue – 95th percentile queue in metres
 Sim Delay – SimTraffic delay in seconds, Sim Queue – SimTraffic 95th percentile queue in metres

5 Active Modes & Transit

There is an existing asphalt multi-use pathway on the west side of Silver Star Road connecting to the southwest corner of the intersection with Phoenix Drive. The BX Trail runs east of the development connecting to the Grey Canal Trail and parallel to Silver Star Road. The development contemplates a joint connection with the adjacent property to the south (Manning Place) that could support a portion of a future link to the BX Trail. The development should continue this connection to the intersection of Silver Star Road & Bates Road. As the Upper Foothills and 7025 Herbert Road developments build-out, more pedestrian activity can be expected to cross Silver Star Road. While the existing volumes from the winter counts are low, these are anticipated to be higher in the spring, summer, and fall and can easily reach



15 equivalent adult units. Traffic volumes are in the order of 10,000 vehicles per day and the posted speed limit is 60 km/h. According to the TAC Pedestrian Crossing Control Guide, a marked crosswalk with rectangular rapid flashing beacons (RRFBs) should be applied. This crosswalk should be located on the south side of the intersection to tie-in to the Silver Star Road multi-use pathway. Implementation for crosswalk and pathway connections to Silver Star Road should be shared by the 7025 Herbert Road and adjacent Manning Place developments.

Future transit service is anticipated to a neighbourhood centre site south of Bates Road. Connections to 7025 Herbert Road through to Manning Place would provide access for residences on Herbert Road.

6 Access

The site plan in **FIGURE 3** shows the access to Bates Road. This location would be placed adjacent to a 7% road grade, on the inside of a horizontal curve, approximately 60 m from the Bates Road & Herbert Road intersection, and obstructed by adjacent foliage (see **FIGURE 4**). To manage the access, foliage on the inside of the curve should be no higher than 0.3m and no fencing along the property line should obstruct sightlines to the access from Bates Road. Alternatively, the main access could shift to Herbert Road.

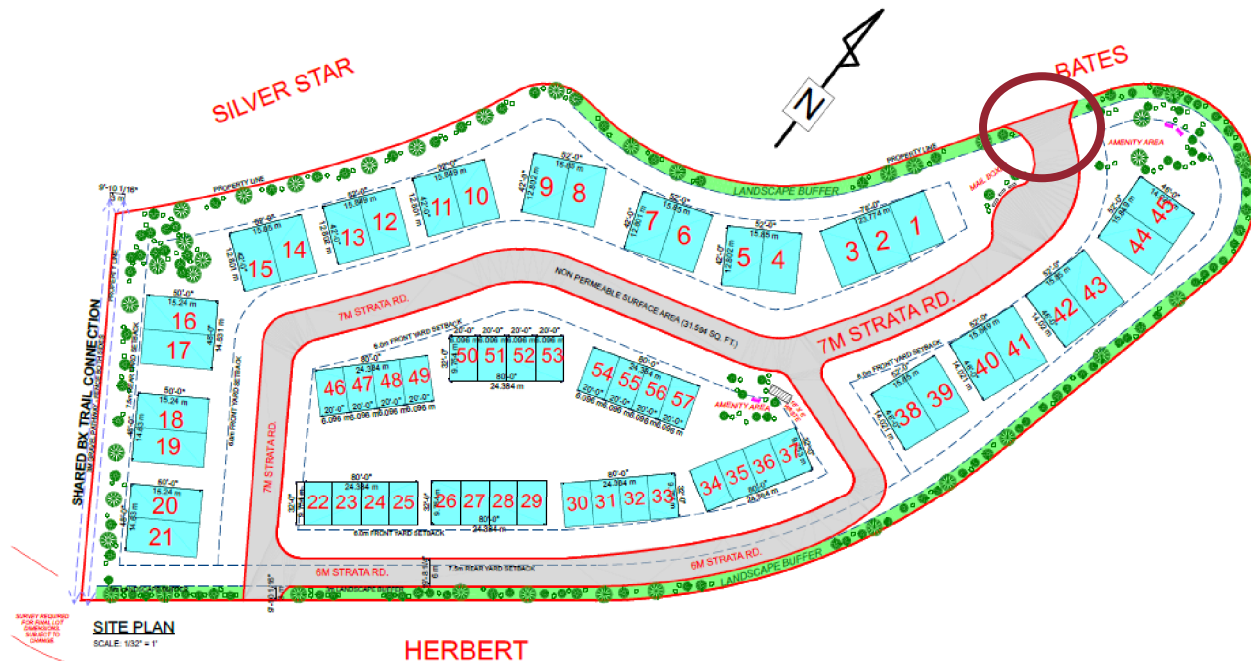


Figure 3: 7025 Herbert Rd Site Plan & Access to Bates Rd



Figure 4: Proposed Access Location

7 Road Safety

According to ICBC collision data, there were three (3) collisions at Silver Star Road & Phoenix Drive / Bates Road between 2017 and 2021. Two of these occurred in 2017 and one in 2020. Two of the collisions were casualty collisions and one was a property-damage-only collision. None of the collisions involved vulnerable road users. The addition of a roundabout at the intersection is expected to reduce risk of injury collisions, but may experience more property damage only collisions in the form of rear-end collisions. This is considered a safer treatment to the existing condition as it would lower speeds entering and exiting the intersection, lower severity collisions, and improve visibility to existing and future vulnerable road users.

8 Summary & Recommendations

The proposed 7025 Herbert Road development would rezone the property from CR (Country Residential) to the R5 (four-plex residential) zone to provide 57 single-family attached units (13 duplexes, one [1] triplex, and seven [7] fourplexes). The development proposes a shared pathway connection between the Manning Place property to the south and along the east side of Silver Star Road to Bates Road. In addition, an RRFB crosswalk should be implemented with the development that would work with the future roundabout.

It is recommended that the City:

- Construct the roundabout at Silver Star Road & Phoenix Drive / Bates Road prior to 2028 to safely accommodate future Upper Foothills and 7025 Herbert Road traffic.
- Coordinate shared implementation with the neighbouring Manning Place property for the pedestrian pathway right-of-way, and intersection crosswalk improvements.

Please contact me at 250-870-3865 if there are any questions or comments. Thank you.

Sincerely,

Align Engineering Ltd

Authored by:



Tom Baumgartner, MSc, P.Eng., RSP₁
Senior Transportation Engineer | Principal
Permit to Practice Number: 1000340

Reviewed by:

A handwritten signature in blue ink that reads "Elisabeth Hofbauer-Spitzer".

Elisabeth Hofbauer-Spitzer, MSc, P.Eng.
Senior Transportation Engineer



Appendix A: Terms of Reference

Memorandum

Attention:	Merlin Kofoed	File No.:	A22-051
Organization:	Kofoed Contracting Ltd	Project:	7025 Herbert Rd TIA
Phone:		Date:	February 14, 2023
Email:	merlin@kofoedgroup.com	Revision:	2
cc:			

RE: 7025 Herbert Rd Terms of Reference

1 Introduction

Align Engineering Ltd. (ALIGN) was retained by Kofoed Contracting Ltd to develop a traffic impact assessment (TIA) for the proposed 7025 Herbert Road TIA in Vernon, BC. The following memorandum provides the terms of reference (ToR) for the TIA.

The proposed development would rezone the property from CR (Country Residential) to the R5 (four-plex residential) zone to provide 57 single-family attached units (13 duplexes, one [1] triplex, and seven [7] fourplexes). A site plan is attached in **APPENDIX A**. Adjacent lots to the south are currently zoned R5.

2 Study Scope

The proposed study site location is shown in **FIGURE 1**. The land parcel is located within the City of Vernon and borders the North Okanagan Regional District (NORD) lands. The site is accessed from Bates Road via Silver Star Road. Silver Star Road is classified as an arterial road and is in the jurisdiction of the City of Vernon. Adjacent to the development, Silver Star Road has one southbound (downhill) lane, two northbound (climbing and fast lane), and bicycle accessible shoulders. The northbound climbing lane ends prior to the intersection with Bates Road / Phoenix Drive. Silver Star Road has a posted speed of 60 km/h. Bates Road and Herbert Road are local roads within the NORD and are under the jurisdiction of the Ministry of Transportation and Infrastructure. These local roads have posted speeds of 50 km/h.

Traffic counts were collected at the intersection of Silver Star Road & Bates Road Phoenix Drive on:

- Saturday January 28, 2023:
 - 9:00 AM to 11:00 AM and
 - 3:00 PM to 5:00 PM.
- Tuesday January 31, 2023:
 - 7:00 AM to 9:00 AM and
 - 3:30 PM to 5:30 PM.

Traffic volumes collected during the afternoon Saturday peak hour were approximately 60% higher than the other peak hour. Therefore, the analysis will review the peak Saturday PM in the winter when SilverStar Mountain Resort is operating.

Table 2: ITE Trip Generation Weekday Peak Hour Volumes

Land Use	Mode	Units	Peak Period	Trips	Entering	Exiting	
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Note: Rates for Weekday AM and PM peaks are for Adjacent Peak Hour Traffic Under General Urban / Suburban settings.
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2.1.1 Background Traffic

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2.2 Trip Distribution

Trip distributions for analysis were derived from the collected traffic counts. The data indicates the following during the Saturday peak analysis period:

- 85% of development traffic travelling to / from the south (Vernon city centre)
- 15% of development traffic travelling to / from the north (SilverStar)

2.3 Active Modes & Transit

The study will assess active transportation. This will include warrants for a safe pedestrian crossing of Silver Star Road to connect to the multi-use pathway on the west side of Silver Star Road and the BX Trail on the east. There is no current transit service to the area but is noted as part of the future transit network in the Master Transportation Plan.



2.4 Access

The study will assess safe access to the adjacent road network from an assessment of sightlines and traffic operations at the access points and the Silver Star Road & Bates Road / Phoenix Drive intersection. Site observations and ICBC collision maps will be reviewed to assess safety performance.

2.5 2.6 Reporting

The study will provide recommendations on required engineering measures to mitigate impacts and integrate into the transportation network. The findings of the study will be summarized in a technical memorandum.

Please contact me at 250-870-3865 if there are any questions or comments. Thank you.

Sincerely,

Align Engineering Ltd



Tom Baumgartner, MSc, P.Eng., RSP,
Senior Transportation Engineer | Principal



Appendix B: Conceptual Site Plan

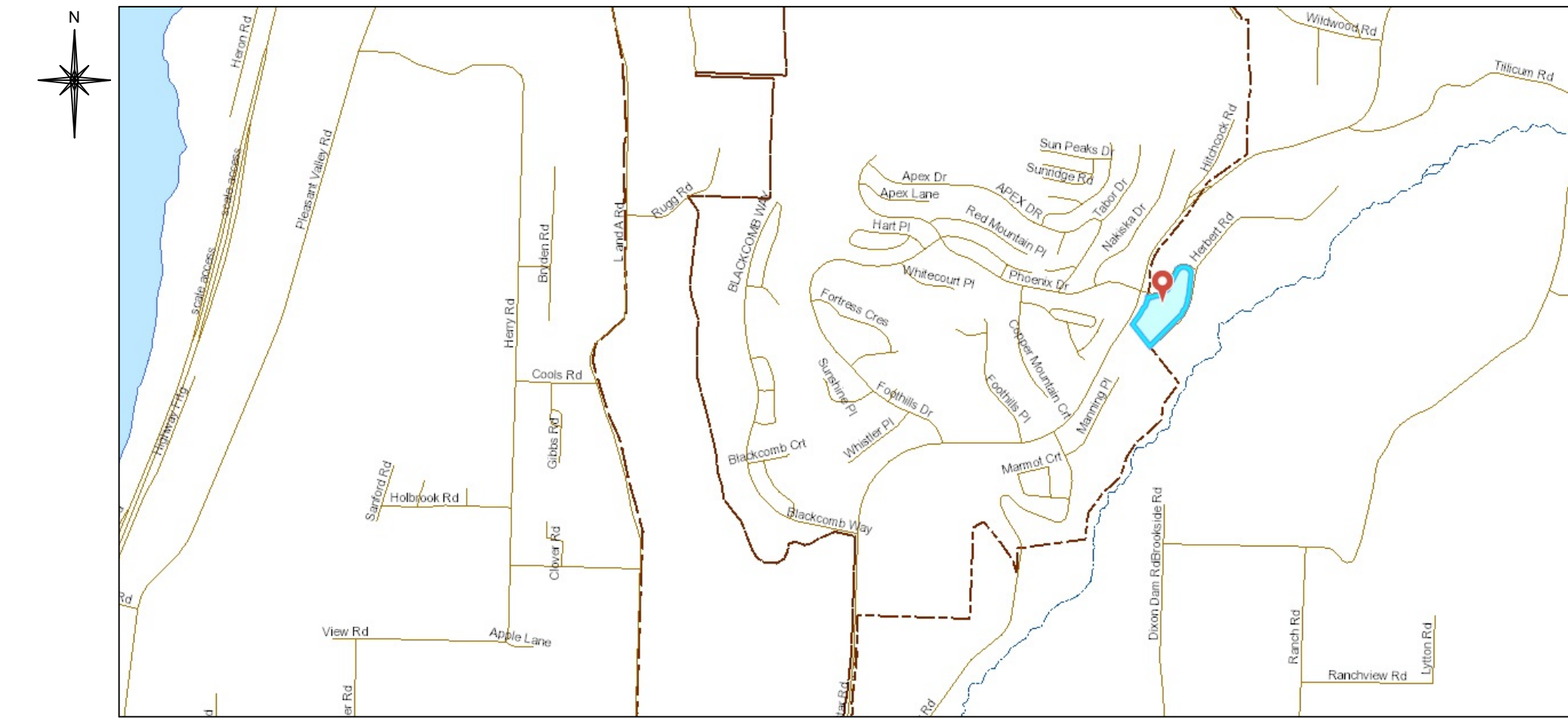
KOFOED GROUP

PROJECT INFO:

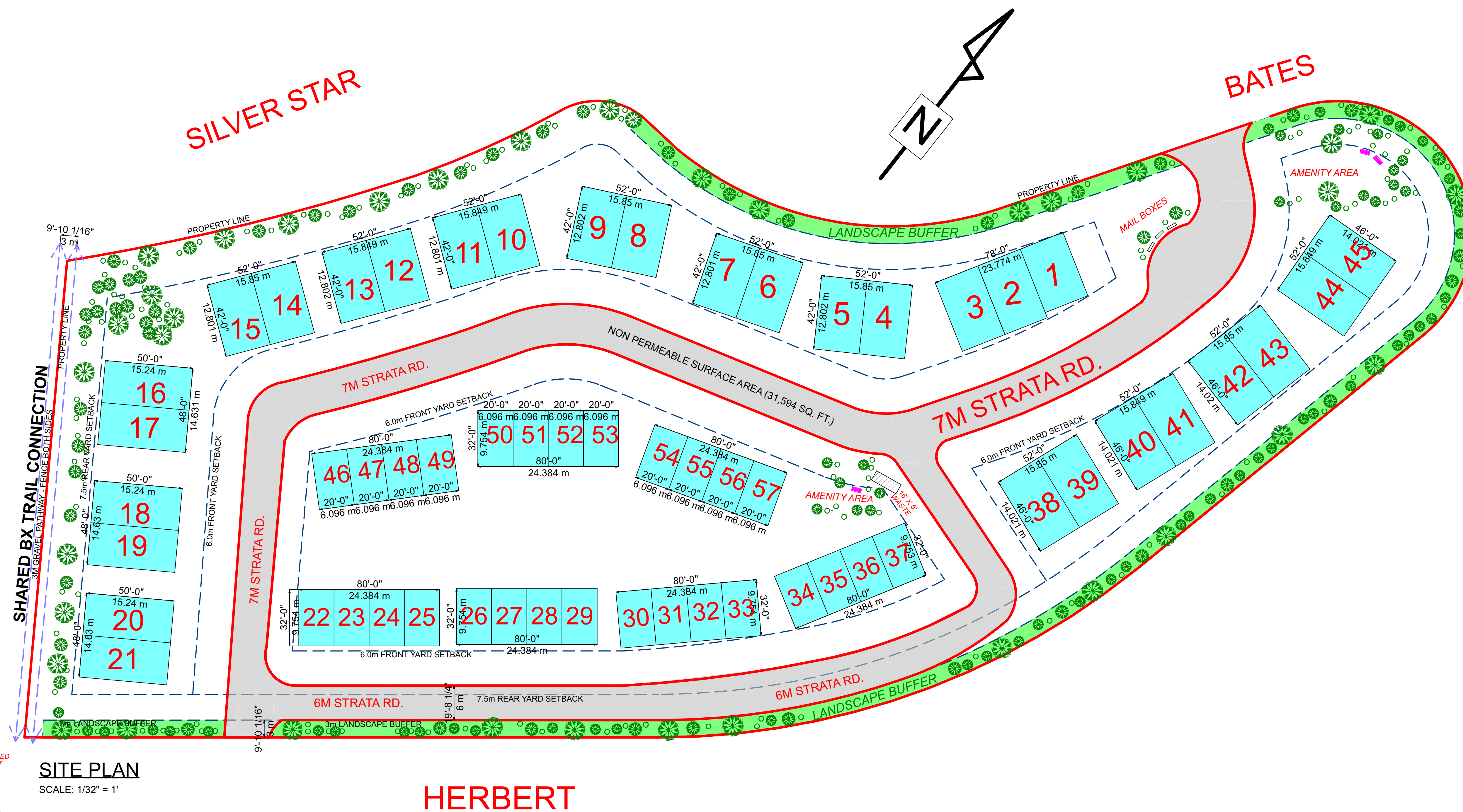
CIVIC ADDRESS:
7025 HERBERT RD.

Legal Description:
PID: 004-119-665
Plan: 29910
Lot: 3

TOTAL PROPERTY AREA	20,139.97	SQ. M.	(216,781.6 SQ. FT.)
SITE COVERAGE			
BUILDING FOOTPRINTS	23.5%		(51,068 SQ. FT.)
STRATA ROAD	14.5%		(31,594 SQ. FT.)
TOTAL SITE COVERAGE INCLUDING NON-PERMEABLE SURFACES	38.1%		(82,662 SQ. FT.)



SOURCE: NORTH OKANAGAN MAP(GIS)



SURVEY REQUIRED FOR FINAL LOT DIMENSIONS. SUBJECT TO CHANGE.

SITE PLAN
SCALE: 1/32" = 1'

**HERBERT ROAD
VERNON BC**

PROJECT TITLE

TITLE

SCALE

DATE
JUL-21-2022

PROJECT NUMBER	DRAWING NUMBER
Z-138-02	1.9

SHEET

1 of 1

Appendix C: Traffic Counts



Intersection Turning Movement Count Report

N/S Street Silver Star Rd
 E/W Street Bates Rd / Phoenix Dr
 Location Vernon, BC

Counter Evan Geck
 Peak Hr 9:00 AM to 10:00 AM

Date Saturday January 28, 2023
 Weather Sunny
 Job# A22-051

All Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound			Total Volume	Hourly Volume	Pedestrian Crossings			
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			N	S	W	E
9:00 AM	9:15 AM	5	0	14	1	0	0	6	88	0	0	41	0	155		0	0	0	0
9:15 AM	9:30 AM	5	0	16	0	0	1	5	117	1	1	35	1	182		0	0	0	0
9:30 AM	9:45 AM	5	0	14	0	0	0	8	85	0	0	31	0	143		0	0	0	0
9:45 AM	10:00 AM	4	0	18	1	0	0	4	87	0	1	30	4	149	629	0	0	0	0
10:00 AM	10:15 AM	4	0	13	0	0	1	3	76	2	1	50	1	151	625	0	0	0	0
10:15 AM	10:30 AM	5	1	12	4	0	0	12	63	1	0	31	4	133	576	0	2	3	0
10:30 AM	10:45 AM	5	0	14	0	0	0	12	78	0	0	46	3	158	591	0	0	1	0
10:45 AM	11:00 AM	2	0	15	0	0	1	8	70	0	0	72	4	172	614	0	0	0	0
TOTAL		35	1	116	6	0	3	58	664	4	3	336	17			0	2	4	0
Peak Hr Vol		19	0	62	2	0	1	23	377	1	2	137	5			0	0	0	0
Peak Hr Factor		0.95		0.86	0.50		0.25	0.72	0.81	0.25	0.50	0.84	0.31						

Passenger Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
9:00 AM	9:15 AM	5	0	14	1	0	0	6	87	0	0	39	0
9:15 AM	9:30 AM	5	0	16	0	0	1	5	117	1	1	35	1
9:30 AM	9:45 AM	5	0	14	0	0	0	8	85	0	0	31	0
9:45 AM	10:00 AM	4	0	18	1	0	0	4	87	0	1	30	4
10:00 AM	10:15 AM	4	0	13	0	0	1	3	76	2	1	48	1
10:15 AM	10:30 AM	5	1	12	4	0	0	12	62	1	0	31	4
10:30 AM	10:45 AM	5	0	14	0	0	0	12	78	0	0	45	3
10:45 AM	11:00 AM	2	0	15	0	0	1	8	70	0	0	71	4
TOTAL		35	1	116	6	0	3	58	662	4	3	330	17
Peak Hr Vol		19	0	62	2	0	1	23	376	1	2	135	5

Heavy Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
9:00 AM	9:15 AM	0	0	0	0	0	0	0	1	0	0	2	0
9:15 AM	9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
9:30 AM	9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	10:15 AM	0	0	0	0	0	0	0	0	0	0	2	0
10:15 AM	10:30 AM	0	0	0	0	0	0	0	1	0	0	0	0
10:30 AM	10:45 AM	0	0	0	0	0	0	0	0	0	0	1	0
10:45 AM	11:00 AM	0	0	0	0	0	0	0	0	0	0	1	0
TOTAL		0	0	0	0	0	0	0	2	0	0	6	0
Peak Hr Vol		0	0	0	0	0	0	0	1	0	0	2	0
% Heavy Vehicle		0%		0%	0%		0%	0%	0%	0%	0%	1%	0%

Bicycles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
9:00 AM	9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
9:15 AM	9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
9:30 AM	9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	0	0	0	0
Peak Hr Vol		0	0	0	0	0	0	0	0	0	0	0	0



Intersection Turning Movement Count Report

N/S Street Silver Star Rd
 E/W Street Bates Rd / Phoenix Dr
 Location Vernon, BC

Counter Evan Geck
 Peak Hr 3:15 PM to 4:15 PM

Date Saturday January 28, 2023
 Weather Sunny
 Job# A22-051

All Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound			Total Volume	Hourly Volume	Pedestrian Crossings			
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			N	S	W	E
3:00 PM	3:15 PM	2	0	11	0	1	0	14	73	0	0	95	1	197		0	0	2	0
3:15 PM	3:30 PM	4	0	11	2	0	0	9	66	0	1	133	7	233		0	0	0	0
3:30 PM	3:45 PM	6	0	16	1	0	0	18	56	0	1	191	1	290		0	0	0	0
3:45 PM	4:00 PM	0	0	13	0	0	0	16	47	1	0	188	6	271	991	0	0	0	0
4:00 PM	4:15 PM	0	0	10	0	0	0	18	42	0	0	143	0	213	1007	0	0	0	0
4:15 PM	4:30 PM	1	1	11	1	0	0	19	46	1	2	116	3	201	975	0	0	0	0
4:30 PM	4:45 PM	0	1	10	1	0	0	15	40	0	0	82	6	155	840	0	0	0	0
4:45 PM	5:00 PM	0	0	11	1	0	0	18	39	0	2	57	4	132	701	0	0	0	0
TOTAL		13	2	93	6	1	0	127	409	2	6	1005	28			0	0	2	0
Peak Hr Vol		10	0	50	3	0	0	61	211	1	2	655	14			0	0	0	0
Peak Hr Factor		0.42		0.78	0.38			0.85	0.80	0.25	0.50	0.86	0.50						

Passenger Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
3:00 PM	3:15 PM	2	0	11	0	1	0	14	73	0	0	95	1
3:15 PM	3:30 PM	4	0	11	2	0	0	9	64	0	1	132	7
3:30 PM	3:45 PM	6	0	16	1	0	0	18	56	0	1	191	1
3:45 PM	4:00 PM	0	0	13	0	0	0	16	46	1	0	188	6
4:00 PM	4:15 PM	0	0	10	0	0	0	18	42	0	0	143	0
4:15 PM	4:30 PM	0	1	11	1	0	0	19	45	1	2	111	3
4:30 PM	4:45 PM	0	1	10	1	0	0	15	40	0	0	82	6
4:45 PM	5:00 PM	0	0	11	1	0	0	18	38	0	1	55	4
TOTAL		12	2	93	6	1	0	127	404	2	5	997	28
Peak Hr Vol		10	0	50	3	0	0	61	208	1	2	654	14

Heavy Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
3:00 PM	3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	3:30 PM	0	0	0	0	0	0	0	2	0	0	1	0
3:30 PM	3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	4:00 PM	0	0	0	0	0	0	0	1	0	0	0	0
4:00 PM	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	4:30 PM	1	0	0	0	0	0	0	1	0	0	5	0
4:30 PM	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	5:00 PM	0	0	0	0	0	0	0	1	0	1	2	0
TOTAL		1	0	0	0	0	0	0	5	0	1	8	0
Peak Hr Vol		0	0	0	0	0	0	0	3	0	0	1	0
% Heavy Vehicle		0%		0%	0%			0%	1%	0%	0%	0%	0%

Bicycles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
3:00 PM	3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	0	0	0	0
Peak Hr Vol		0	0	0	0	0	0	0	0	0	0	0	0



Intersection Turning Movement Count Report

N/S Street Silver Star Rd
 E/W Street Bates Rd / Phoenix Dr
 Location Vernon, BC

Counter Evan Geck
 Peak Hr 7:45 AM to 8:45 AM

Date Tuesday January 31, 2023
 Weather Cloudy, Light Snow
 Job# A22-051

All Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound			Total Volume	Hourly Volume	Pedestrian Crossings			
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			N	S	W	E
7:00 AM	7:15 AM	1	0	12	0	0	0	5	27	0	0	17	0	62		0	0	0	0
7:15 AM	7:30 AM	1	0	21	2	0	0	5	34	0	0	20	0	83		0	0	0	0
7:30 AM	7:45 AM	1	0	27	1	0	0	6	56	0	1	51	2	145		0	0	0	0
7:45 AM	8:00 AM	3	0	35	1	0	1	3	58	0	0	45	0	146	436	0	0	0	0
8:00 AM	8:15 AM	5	0	40	5	0	0	9	61	0	1	58	1	180	554	0	0	0	0
8:15 AM	8:30 AM	1	0	21	0	0	1	9	83	1	0	45	2	163	634	0	0	0	0
8:30 AM	8:45 AM	3	0	15	2	0	0	13	94	0	0	37	1	165	654	0	0	0	0
8:45 AM	9:00 AM	1	0	22	0	0	2	14	69	1	0	32	1	142	650	0	0	0	0
TOTAL		16	0	193	11	0	4	64	482	2	2	305	7			0	0	0	0
Peak Hr Vol		12	0	111	8	0	2	34	296	1	1	185	4			0	0	0	0
Peak Hr Factor		0.60		0.69	0.40		0.50	0.65	0.79	0.25	0.25	0.80	0.50						

Passenger Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
7:00 AM	7:15 AM	1	0	12	0	0	0	5	25	0	0	17	0
7:15 AM	7:30 AM	1	0	21	2	0	0	5	32	0	0	19	0
7:30 AM	7:45 AM	1	0	27	1	0	0	5	54	0	0	50	2
7:45 AM	8:00 AM	3	0	35	1	0	0	2	58	0	0	45	0
8:00 AM	8:15 AM	4	0	40	5	0	0	8	61	0	0	56	1
8:15 AM	8:30 AM	1	0	21	0	0	1	9	83	1	0	45	2
8:30 AM	8:45 AM	3	0	15	2	0	0	13	91	0	0	36	1
8:45 AM	9:00 AM	1	0	21	0	0	2	14	69	1	0	31	1
TOTAL		15	0	192	11	0	3	61	473	2	0	299	7
Peak Hr Vol		11	0	111	8	0	1	32	293	1	0	182	4

Heavy Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
7:00 AM	7:15 AM	0	0	0	0	0	0	0	2	0	0	0	0
7:15 AM	7:30 AM	0	0	0	0	0	0	0	2	0	0	1	0
7:30 AM	7:45 AM	0	0	0	0	0	0	1	2	0	1	1	0
7:45 AM	8:00 AM	0	0	0	0	0	1	1	0	0	0	0	0
8:00 AM	8:15 AM	1	0	0	0	0	0	1	0	0	1	2	0
8:15 AM	8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	8:45 AM	0	0	0	0	0	0	0	3	0	0	1	0
8:45 AM	9:00 AM	0	0	1	0	0	0	0	0	0	0	1	0
TOTAL		1	0	1	0	0	1	3	9	0	2	6	0
Peak Hr Vol		1	0	0	0	0	1	2	3	0	1	3	0
% Heavy Vehicle		9%		0%	0%		100%	6%	1%	0%		2%	0%

Bicycles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
7:00 AM	7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	0	0	0	0
Peak Hr Vol		0	0	0	0	0	0	0	0	0	0	0	0



Intersection Turning Movement Count Report

N/S Street Silver Star Rd
 E/W Street Bates Rd / Phoenix Dr
 Location Vernon, BC

Counter Evan Geck
 Peak Hr 3:30 PM to 4:30 PM

Date Tuesday January 31, 2023
 Weather Cloudy, Light Snow
 Job# A22-051

All Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound			Total Volume	Hourly Volume	Pedestrian Crossings			
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			N	S	W	E
3:30 PM	3:45 PM	0	0	15	2	0	3	22	52	2	2	76	1	175		0	0	0	0
3:45 PM	4:00 PM	0	0	17	0	0	0	21	45	1	0	68	5	157		1	0	1	0
4:00 PM	4:15 PM	0	0	13	0	0	0	26	34	1	0	69	2	145		0	0	0	0
4:15 PM	4:30 PM	1	0	13	1	0	0	22	50	0	0	60	5	152	629	0	0	0	0
4:30 PM	4:45 PM	1	0	13	0	0	0	19	41	1	0	42	2	119	573	0	0	0	0
4:45 PM	5:00 PM	1	0	10	0	0	0	18	48	2	0	30	1	110	526	0	0	0	0
5:00 PM	5:15 PM	0	0	10	0	0	0	27	57	3	0	27	2	126	507	0	0	0	0
5:15 PM	5:30 PM	2	0	13	0	0	0	23	49	1	0	35	3	126	481	0	0	0	0
TOTAL		5	0	104	3	0	3	178	376	11	2	407	21			1	0	1	0
Peak Hr Vol		1	0	58	3	0	3	91	181	4	2	273	13			1	0	1	0
Peak Hr Factor		0.25		0.85	0.38		0.25	0.88	0.87	0.50	0.25	0.90	0.65						

Passenger Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
3:30 PM	3:45 PM	0	0	15	2	0	1	20	50	2	1	74	1
3:45 PM	4:00 PM	0	0	17	0	0	0	20	43	1	0	68	5
4:00 PM	4:15 PM	0	0	13	0	0	0	25	34	1	0	68	2
4:15 PM	4:30 PM	1	0	13	1	0	0	22	50	0	0	58	5
4:30 PM	4:45 PM	1	0	13	0	0	0	19	41	1	0	42	2
4:45 PM	5:00 PM	1	0	10	0	0	0	17	48	2	0	28	1
5:00 PM	5:15 PM	0	0	10	0	0	0	26	57	3	0	27	2
5:15 PM	5:30 PM	2	0	13	0	0	0	23	48	1	0	35	3
TOTAL		5	0	104	3	0	1	172	371	11	1	400	21
Peak Hr Vol		1	0	58	3	0	1	87	177	4	1	268	13

Heavy Vehicles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
3:30 PM	3:45 PM	0	0	0	0	0	2	2	2	0	1	2	0
3:45 PM	4:00 PM	0	0	0	0	0	0	1	2	0	0	0	0
4:00 PM	4:15 PM	0	0	0	0	0	0	1	0	0	0	1	0
4:15 PM	4:30 PM	0	0	0	0	0	0	0	0	0	0	2	0
4:30 PM	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	5:00 PM	0	0	0	0	0	0	1	0	0	0	2	0
5:00 PM	5:15 PM	0	0	0	0	0	0	1	0	0	0	0	0
5:15 PM	5:30 PM	0	0	0	0	0	0	0	1	0	0	0	0
TOTAL		0	0	0	0	0	2	6	5	0	1	7	0
Peak Hr Vol		0	0	0	0	0	2	4	4	0	1	5	0
% Heavy Vehicle		0%		0%	0%		200%	5%	2%	0%	100%	2%	0%

Bicycles

Interval		Eastbound			Westbound			Northbound			Southbound		
Start	End	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
3:30 PM	3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	0	0	0	0
Peak Hr Vol		0	0	0	0	0	0	0	0	0	0	0	0



Appendix D: Synchro & SimTraffic Reports

HCM Unsignalized Intersection Capacity Analysis

2: Silver Star Rd & Phoenix Dr/Bates Rd

03-09-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↘			↕	
Traffic Volume (veh/h)	10	1	50	3	1	1	61	211	1	2	655	14
Future Volume (Veh/h)	10	1	50	3	1	1	61	211	1	2	655	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.42	0.25	0.78	0.38	0.25	0.25	0.85	0.80	0.25	0.50	0.86	0.50
Hourly flow rate (vph)	24	4	64	8	4	4	72	264	4	4	762	28
Pedestrians		2										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.0										
Percent Blockage		0										
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1200	1198	778	1260	1210	266	792			268		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1200	1198	778	1260	1210	266	792			268		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	84	98	84	93	98	99	91			100		
cM capacity (veh/h)	147	169	396	113	166	773	827			1296		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total	92	16	72	268	794							
Volume Left	24	8	72	0	4							
Volume Right	64	4	0	4	28							
cSH	264	160	827	1700	1296							
Volume to Capacity	0.35	0.10	0.09	0.16	0.00							
Queue Length 95th (m)	11.3	2.5	2.1	0.0	0.1							
Control Delay (s)	25.8	30.1	9.8	0.0	0.1							
Lane LOS	D	D	A		A							
Approach Delay (s)	25.8	30.1	2.1		0.1							
Approach LOS	D	D										
Intersection Summary												
Average Delay			2.9									
Intersection Capacity Utilization			58.9%		ICU Level of Service					B		
Analysis Period (min)			15									

2: Silver Star Rd & Phoenix Dr/Bates Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.1	0.1	0.1	0.1	3.9	0.2	0.1	0.5	0.1	0.6
Total Del/Veh (s)	6.7	6.3	8.3	11.7	7.4	1.7	4.5	0.2	1.1	0.6	0.0	1.3

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	1.9

Intersection: 2: Silver Star Rd & Phoenix Dr/Bates Rd

Movement	EB	WB	NB
Directions Served	LTR	LTR	L
Maximum Queue (m)	28.5	8.2	8.2
Average Queue (m)	9.3	1.4	4.9
95th Queue (m)	18.3	6.4	11.3
Link Distance (m)	132.6	106.4	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			30.0
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

HCM Unsignalized Intersection Capacity Analysis

2: Silver Star Rd & Phoenix Dr/Bates Rd

03-09-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Volume (veh/h)	18	1	93	3	1	1	111	222	1	2	688	23
Future Volume (Veh/h)	18	1	93	3	1	1	111	222	1	2	688	23
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.25	0.78	0.38	0.25	0.25	0.85	0.80	0.25	0.50	0.86	0.65
Hourly flow rate (vph)	36	4	119	8	4	4	131	278	4	4	800	35
Pedestrians		2										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.0										
Percent Blockage		0										
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1374	1372	820	1488	1387	280	837			282		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1374	1372	820	1488	1387	280	837			282		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	65	97	68	86	97	99	84			100		
cM capacity (veh/h)	104	121	374	59	119	759	795			1280		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total	159	16	131	282	839							
Volume Left	36	8	131	0	4							
Volume Right	119	4	0	4	35							
cSH	228	92	795	1700	1280							
Volume to Capacity	0.70	0.17	0.16	0.17	0.00							
Queue Length 95th (m)	34.1	4.5	4.4	0.0	0.1							
Control Delay (s)	50.8	52.2	10.4	0.0	0.1							
Lane LOS	F	F	B		A							
Approach Delay (s)	50.8	52.2	3.3		0.1							
Approach LOS	F	F										
Intersection Summary												
Average Delay			7.3									
Intersection Capacity Utilization			66.2%		ICU Level of Service					C		
Analysis Period (min)			15									

2: Silver Star Rd & Phoenix Dr/Bates Rd Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.4	0.2	0.1	0.1	0.1	3.7	0.5	0.3	0.6	0.9	0.8
Total Del/Veh (s)	11.5	27.7	10.1	15.4	16.9	1.7	6.3	0.3	0.5	1.0	0.4	2.3

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	3.2

Intersection: 2: Silver Star Rd & Phoenix Dr/Bates Rd

Movement	EB	WB	NB
Directions Served	LTR	LTR	L
Maximum Queue (m)	28.5	8.2	14.6
Average Queue (m)	13.2	1.5	7.3
95th Queue (m)	22.4	6.3	13.8
Link Distance (m)	132.6	106.4	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			30.0
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

HCM Unsignalized Intersection Capacity Analysis

2: Silver Star Rd & Phoenix Dr/Bates Rd

03-09-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Volume (veh/h)	33	1	181	3	1	1	212	243	1	2	753	41
Future Volume (Veh/h)	33	1	181	3	1	1	212	243	1	2	753	41
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.25	0.85	0.38	0.25	0.25	0.95	0.95	0.25	0.50	0.95	0.75
Hourly flow rate (vph)	44	4	213	8	4	4	223	256	4	4	793	55
Pedestrians		2										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.0										
Percent Blockage		0										
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1538	1536	822	1748	1562	258	850			260		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1538	1536	822	1748	1562	258	850			260		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	37	95	43	63	95	99	72			100		
cM capacity (veh/h)	70	83	373	22	80	781	787			1304		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total	261	16	223	260	852							
Volume Left	44	8	223	0	4							
Volume Right	213	4	0	4	55							
cSH	209	38	787	1700	1304							
Volume to Capacity	1.25	0.42	0.28	0.15	0.00							
Queue Length 95th (m)	102.2	10.8	8.8	0.0	0.1							
Control Delay (s)	190.2	158.0	11.4	0.0	0.1							
Lane LOS	F	F	B		A							
Approach Delay (s)	190.2	158.0	5.3		0.1							
Approach LOS	F	F										
Intersection Summary												
Average Delay			34.0									
Intersection Capacity Utilization			78.1%		ICU Level of Service					D		
Analysis Period (min)			15									

2: Silver Star Rd & Phoenix Dr/Bates Rd Performance by movement

Movement	EBL	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.3	0.1	0.1	0.1	3.6	0.6	0.1	0.7	0.9	1.0
Total Del/Veh (s)	28.8	18.5	30.8	19.8	4.3	9.8	0.4	0.0	1.7	0.8	5.2

Total Network Performance

Denied Del/Veh (s)	1.0
Total Del/Veh (s)	6.1

Intersection: 2: Silver Star Rd & Phoenix Dr/Bates Rd

Movement	EB	WB	NB
Directions Served	LTR	LTR	L
Maximum Queue (m)	53.5	8.2	51.0
Average Queue (m)	24.7	1.5	15.1
95th Queue (m)	45.3	6.3	29.3
Link Distance (m)	132.6	106.4	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			30.0
Storage Blk Time (%)			1
Queuing Penalty (veh)			2

Network Summary

Network wide Queuing Penalty: 2

HCM Unsignalized Intersection Capacity Analysis

2: Silver Star Rd & Phoenix Dr/Bates Rd

03-09-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↘			↔	
Traffic Volume (veh/h)	18	1	93	17	1	3	111	222	14	4	688	23
Future Volume (Veh/h)	18	1	93	17	1	3	111	222	14	4	688	23
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.25	0.78	0.50	0.25	0.35	0.85	0.80	1.00	0.50	0.86	0.65
Hourly flow rate (vph)	36	4	119	34	4	9	131	278	14	8	800	35
Pedestrians		2										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.0										
Percent Blockage		0										
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1386	1390	820	1502	1400	285	837			292		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1386	1390	820	1502	1400	285	837			292		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	64	97	68	41	97	99	84			99		
cM capacity (veh/h)	100	118	374	58	116	754	795			1270		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total	159	47	131	292	843							
Volume Left	36	34	131	0	8							
Volume Right	119	9	0	14	35							
cSH	224	74	795	1700	1270							
Volume to Capacity	0.71	0.63	0.16	0.17	0.01							
Queue Length 95th (m)	35.0	21.3	4.4	0.0	0.1							
Control Delay (s)	52.8	115.0	10.4	0.0	0.2							
Lane LOS	F	F	B		A							
Approach Delay (s)	52.8	115.0	3.2		0.2							
Approach LOS	F	F										
Intersection Summary												
Average Delay			10.4									
Intersection Capacity Utilization			66.9%		ICU Level of Service					C		
Analysis Period (min)			15									

2: Silver Star Rd & Phoenix Dr/Bates Rd Performance by movement

Movement	EBL	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.2	0.2	0.1	0.1	3.6	0.5	0.4	2.9	0.6	0.9	0.8
Total Del/Veh (s)	51.1	25.0	24.6	32.2	13.0	7.1	0.4	0.2	3.1	1.2	0.8	4.4

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	5.2

Intersection: 2: Silver Star Rd & Phoenix Dr/Bates Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	LTR
Maximum Queue (m)	72.3	20.5	14.6	8.4
Average Queue (m)	17.8	3.0	8.3	0.3
95th Queue (m)	44.2	11.0	14.4	2.9
Link Distance (m)	132.6	106.4		141.7
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)			30.0	
Storage Blk Time (%)				
Queuing Penalty (veh)				


















Network Summary

Network wide Queuing Penalty: 0

HCM Unsignalized Intersection Capacity Analysis

2: Silver Star Rd & Phoenix Dr/Bates Rd

03-09-2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	1	181	17	1	3	212	243	14	4	753	41
Future Volume (Veh/h)	33	1	181	17	1	3	212	243	14	4	753	41
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.25	0.85	0.38	0.25	0.25	0.95	0.95	0.25	0.50	0.95	0.75
Hourly flow rate (vph)	44	4	213	45	4	12	223	256	56	8	793	55
Pedestrians		2										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.0										
Percent Blockage		0										
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1554	1596	822	1782	1596	284	850			312		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1554	1596	822	1782	1596	284	850			312		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	35	95	43	0	95	98	72			99		
cM capacity (veh/h)	67	76	373	20	76	755	787			1248		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total	261	61	223	312	856							
Volume Left	44	45	223	0	8							
Volume Right	213	12	0	56	55							
cSH	204	27	787	1700	1248							
Volume to Capacity	1.28	2.27	0.28	0.18	0.01							
Queue Length 95th (m)	105.3	55.3	8.8	0.0	0.1							
Control Delay (s)	203.1	894.7	11.4	0.0	0.2							
Lane LOS	F	F	B		A							
Approach Delay (s)	203.1	894.7	4.7		0.2							
Approach LOS	F	F										
Intersection Summary												
Average Delay			64.4									
Intersection Capacity Utilization			78.5%		ICU Level of Service					D		
Analysis Period (min)			15									

2: Silver Star Rd & Phoenix Dr/Bates Rd Performance by movement

Movement	EBL	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	3.1	2.4	0.2	0.1	3.5	0.6	0.6	0.8	0.8	0.8	1.4
Total Del/Veh (s)	119.6	93.4	65.2	52.7	11.0	0.5	0.4	3.4	1.9	1.0	17.0

Total Network Performance

Denied Del/Veh (s)	1.4
Total Del/Veh (s)	17.9

Intersection: 2: Silver Star Rd & Phoenix Dr/Bates Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	LTR
Maximum Queue (m)	137.2	27.5	50.9	6.4
Average Queue (m)	56.6	5.0	16.7	0.4
95th Queue (m)	133.9	16.5	30.3	3.1
Link Distance (m)	132.6	106.4		141.7
Upstream Blk Time (%)	12			
Queuing Penalty (veh)	0			
Storage Bay Dist (m)			30.0	
Storage Blk Time (%)			1	
Queuing Penalty (veh)			2	

Network Summary

Network wide Queuing Penalty: 2