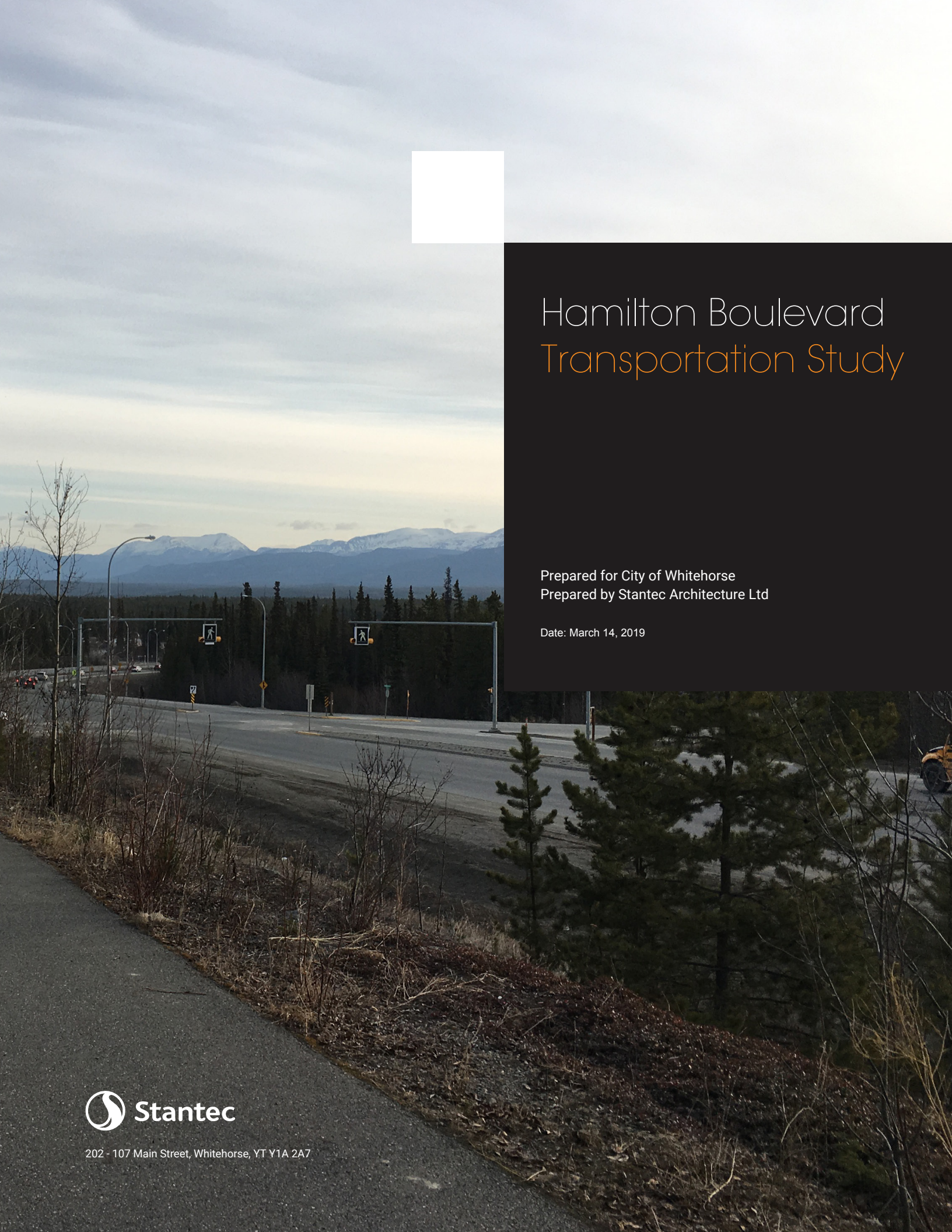

Hamilton Boulevard Transportation Study

Prepared for City of Whitehorse
Prepared by Stantec Architecture Ltd

Date: March 14, 2019

Stantec

202 - 107 Main Street, Whitehorse, YT Y1A 2A7

Sign-off Sheet

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Prepared by L Haskins March 14, 2019

(signature)

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Selby Thannikary, PE, P.Eng.

APEGA Permit to Practice P0258

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LIST OF APPENDICES

1.0 INTRODUCTION

1.1 BACKGROUND

The City of Whitehorse has retained Stantec Consulting Ltd. (Stantec) to complete a Traffic Study for Hamilton Boulevard, which is the main collector for the communities of McIntyre, Granger, Ingram, Arkell, Logan, and Copper Ridge in Whitehorse.

The section of the road under consideration is 1.5 km long and stretches from south of the existing roundabout at McIntyre Drive (north) to Falcon Drive (south).

The study location and existing road network are shown in **Figure 1.1**.

1.2 STUDY SCOPE

Stantec understands the scope of the work to include the following:

- Review the existing traffic data from the City and evaluate the current transportation network to identify safety and operational concerns along the corridor;
- Review historical transportation studies to understand proposed expansion plans for the corridor;
- Collect and review collision data for pedestrian and motor vehicle collisions;
- Identify locations of unacceptable congestion or geometric constraints and determine roadway, intersection, and access requirements in terms of intersection geometry and control to provide acceptable conditions;
- Evaluate improvement options including signalization and roundabouts;
- Suggest upgrades and create an implementation plan and provide cost estimates; and
- Provide conceptual drawings that illustrate existing infrastructure, and proposed improvements for the study area.

Analysis Horizons

Three horizons will be analyzed:

1. Existing Traffic Conditions (2018)
2. 10-Year / Medium Term Horizon (2028)
3. 20-Year / Long Term Horizon (2038)

These horizons were selected based on information provided by the City of Whitehorse. The analysis periods selected for this study are the weekday morning and afternoon peak hours as they are expected to represent the highest traffic volumes.

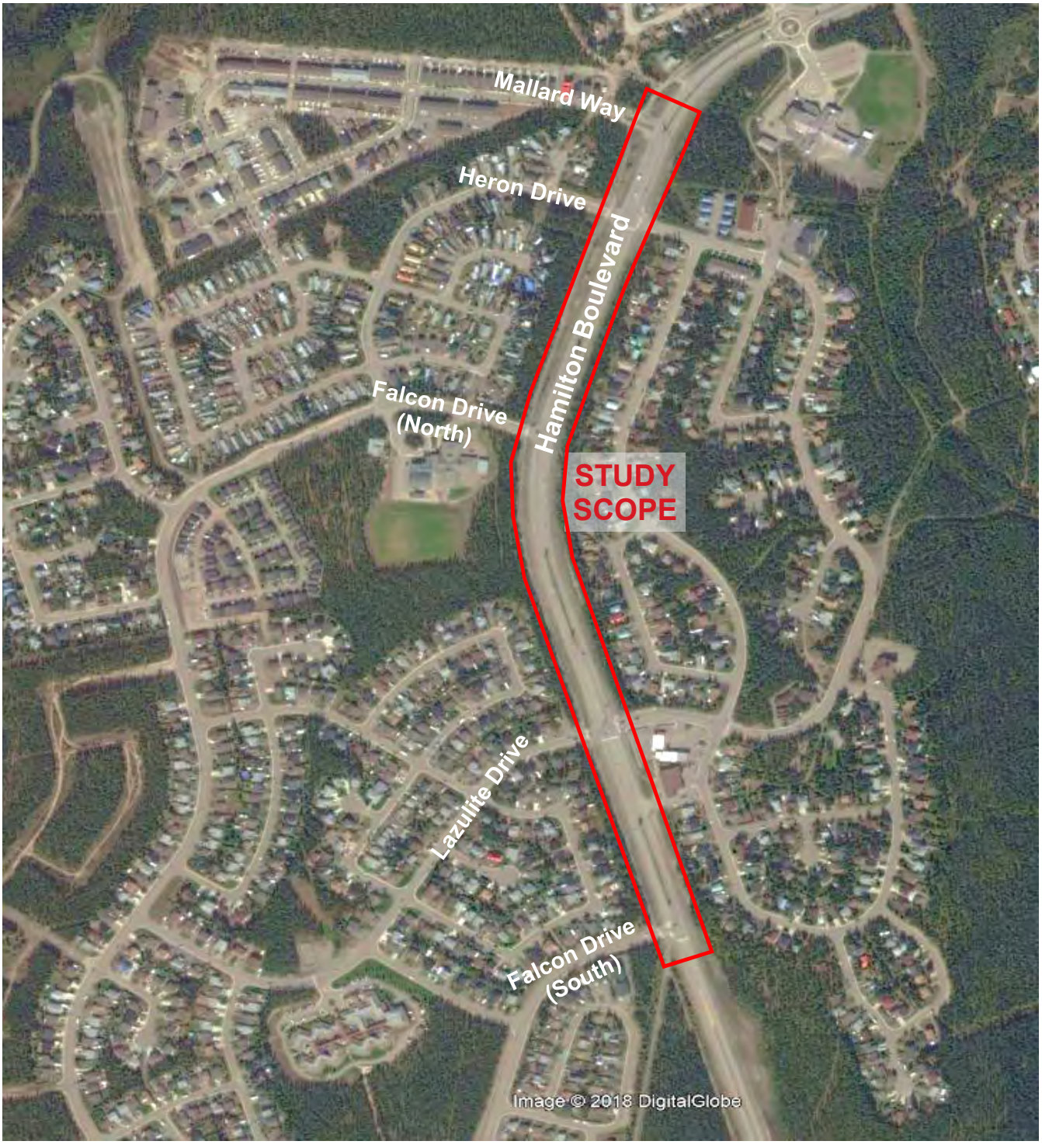

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Figure No.
1.1

Title
Study Area and Road Network

Study Intersections

Five study intersections will be analyzed:

1. Mallard Way & Hamilton Boulevard
2. Heron Drive & Hamilton Boulevard
3. Falcon Drive (North) & Hamilton Boulevard
4. Lazulite Drive & Hamilton Boulevard
5. Falcon Drive (South) & Hamilton Boulevard

This report and appendices represent the deliverables for the scope as described.

2.0 EXISTING CONDITIONS

2.1 ROAD NETWORK

Hamilton Boulevard is a three-lane divided collector road with a posted speed limit of 60 km/h. It serves the neighbourhoods of McIntyre, Granger, Ingram, Arkell, Logan, and Copper Ridge. Safety concerns have been raised by residents in the last few years, especially regarding left turn movements from the neighborhood intersections onto Hamilton Boulevard.

Mallard Way is a two-lane residential street just south of the McIntyre Drive roundabout, with a posted speed limit of 50 km/h. It intersects with Hamilton Boulevard as a right-in/right-out only T-intersection.

Heron Drive is a two-lane residential street with a posted speed limit of 50 km/hr. The intersection of Heron Drive and Hamilton Boulevard is stop controlled in the east-west direction and has a marked crosswalk with pedestrian lights on the south leg of the intersection.

Falcon Drive (north) is a two-lane roadway with a posted speed of 50 km/hr. It intersects with Hamilton Boulevard as a T-intersection with stop-control in the eastbound direction.

Lazulite Drive is a two-lane residential street with a posted speed limit of 50 km/hr. It intersects with Hamilton Boulevard between Falcon Drive (north) and Falcon Drive (south) and has a marked crosswalk with pedestrian lights on the south leg of the intersection.

Falcon Drive (south) is a two-lane roadway with a posted speed limit of 50 km/hr. It intersects with Hamilton Boulevard as a T-intersection south of Lazulite Drive with stop-control in the eastbound direction.

2.2 EXISTING TRAFFIC VOLUMES

Traffic volumes were provided by the City of Whitehorse for the study intersections on Hamilton Boulevard. The peak hour traffic volumes are shown in **Figure 2.1**.

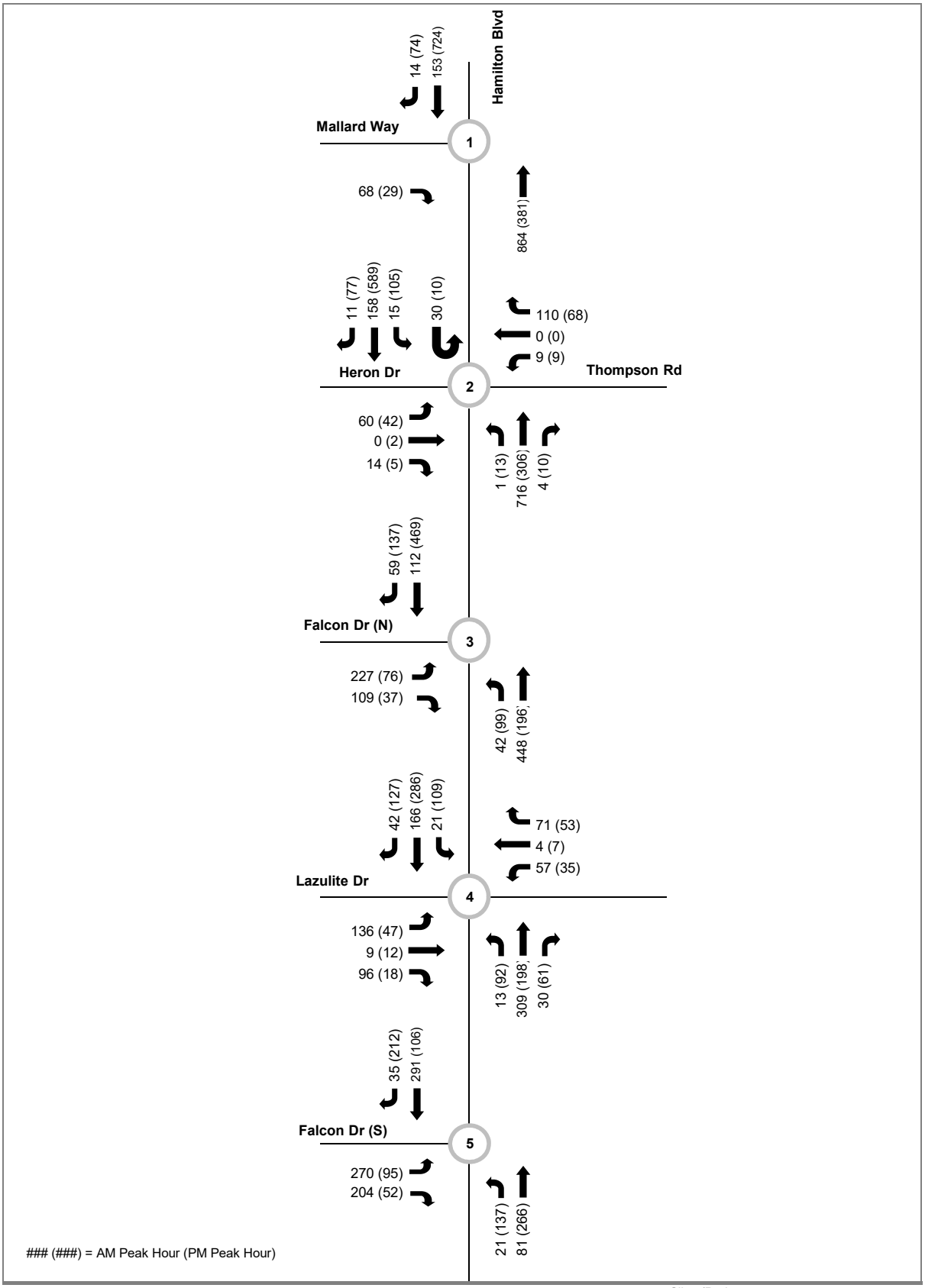

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Figure No.
2.1

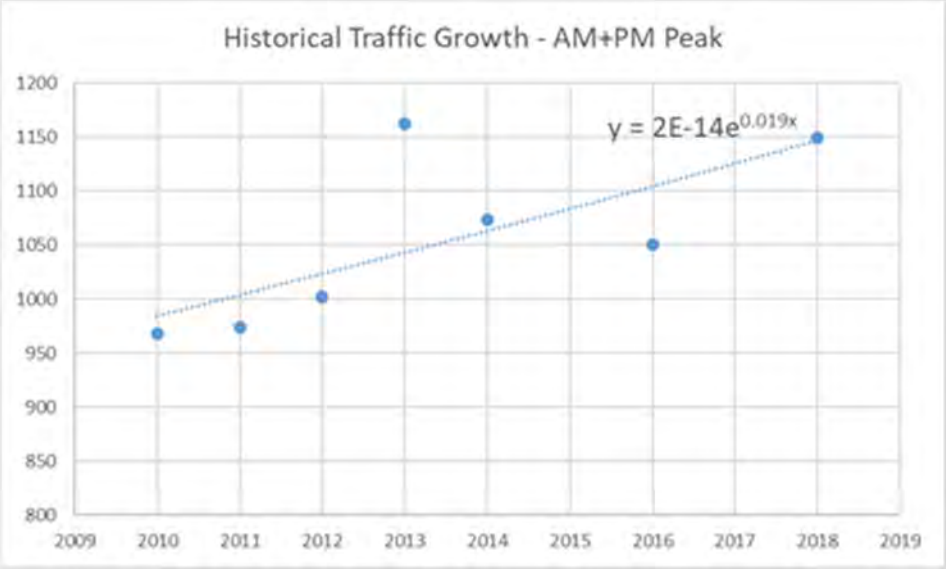
Title
Existing Traffic Volumes 2018

3.0 FUTURE TRAFFIC VOLUMES

3.1 BACKGROUND TRAFFIC GROWTH

Background traffic growth is expected to increase as the population of Whitehorse grows. Historical traffic counts were provided by the City to determine an appropriate rate of growth to represent this. The intersection of Hamilton & Falcon (S) was identified as the location with the most historical data (counts dating back to 2010 with most years available). The combined AM and PM peak hour traffic volumes travelling northbound and southbound at this intersection are shown in **Figure 3.1**.

Figure 3.1 – Historical Traffic Growth along Hamilton Boulevard



The recent historical growth rate was found to be approximately 1.9%/year (exponential growth). Based on this data, an average exponential growth rate of 2.0% per year was applied to all movements within the corridor to calculate the future background traffic volumes at the 10-year and 20-year horizons. These resulting background traffic volumes are illustrated in **Figures 3.2 and 3.3**.

3.2 FUTURE DEVELOPMENT AREAS

Future densification in the Copper Ridge/Granger neighbourhoods is expected within the study horizons, both in the form of new developments (e.g. back of CR indigenous area??) and the addition of basement suites etc. to existing homes. This increase in density is reflected in the 2% annual growth rate which has been applied to all traffic movements.

The area south of Copper Ridge area is currently undeveloped but is planned as a future development area. As this area develops, it will add traffic to the Hamilton Boulevard corridor beyond the estimated 2% annual growth. There is some uncertainty as to where the growth areas will be in the City, with the Official Community Plan (OCP) currently

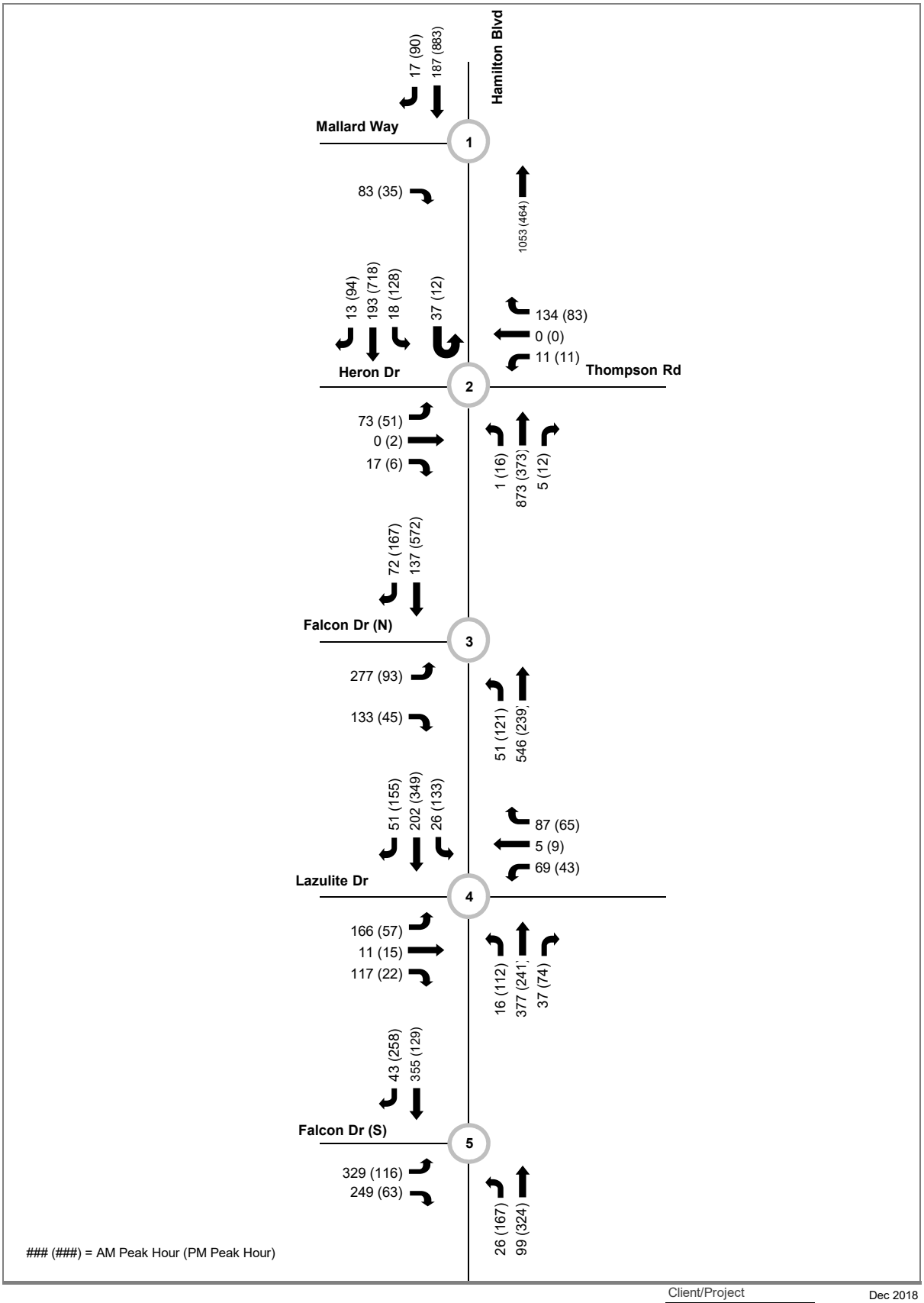


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Figure No.
3.2

Title
Background Traffic Volumes 2028

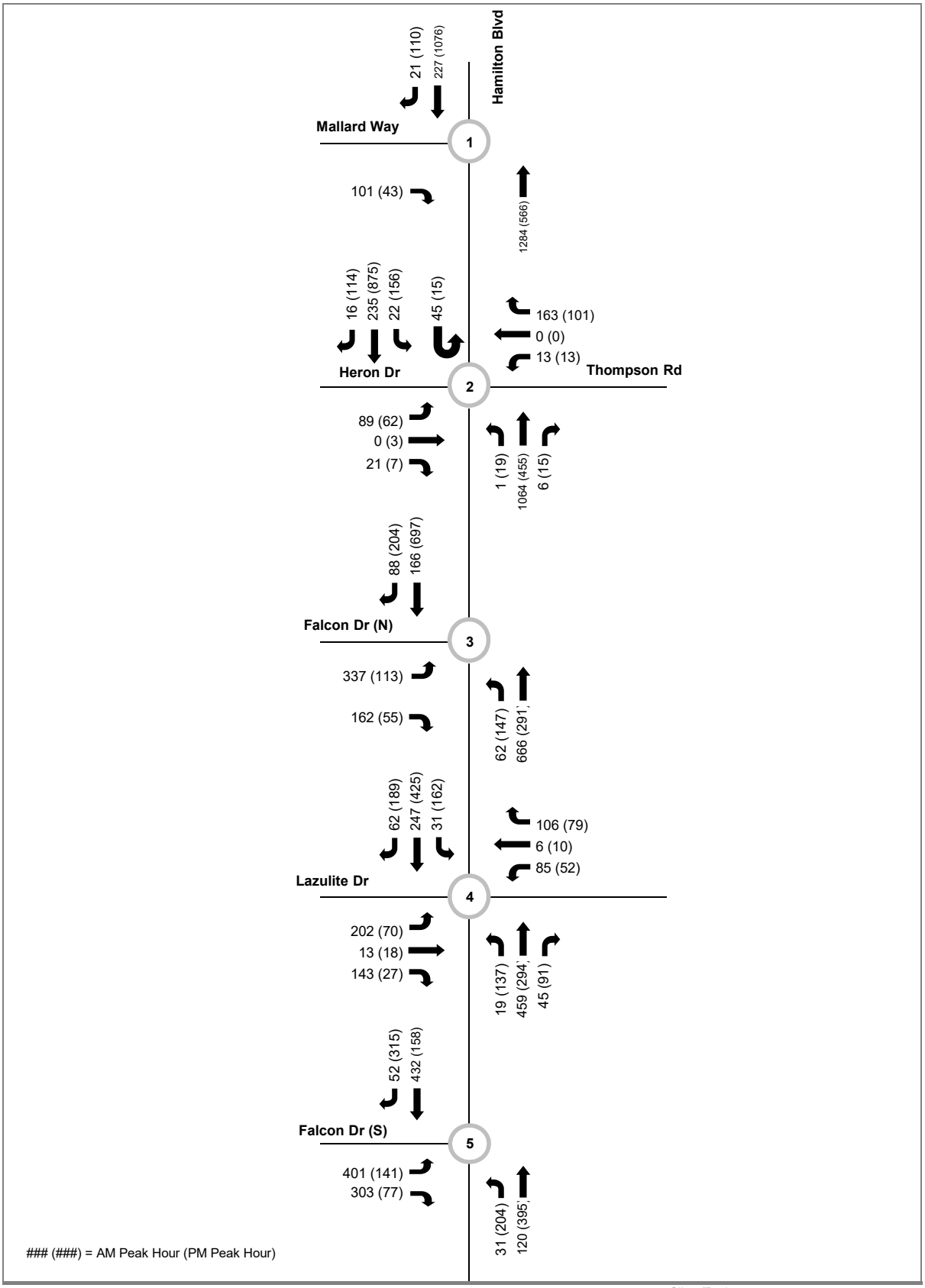

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Figure No.
3.3

Title
Background Traffic Volumes 2038

under review. This review process is intended to determine the next containment boundary for development in the City but will not be finalized until 2019 or 2020.

In the absence of a defined boundary, future development traffic was estimated for the areas identified in the *Hillcrest Development Traffic Impact Study (GY, 1995).* This future development area is illustrated on **Figure 3.4**. Trip generation calculations were completed based on the following assumptions:

- Total buildout of neighbourhood: 1500 homes (from *Hillcrest Development Traffic Impact Study*, GY, 1995)
  - Buildout at 10-year horizon: 20% (300 homes)
  - Buildout at 20-year horizon: 50% (750 homes)
- Trip generation: based on ITE 10th Edition, Land Use 210 (single family housing)
  - 0.74 trips/dwelling unit in the AM and 0.99 trips/dwelling unit in the PM
- Trip distribution: 40% to/from the north on Hamilton Boulevard (i.e. through the study area) and 60% to/from the south on Hamilton Boulevard (based on site context and previous TIS)

The prevalent development area in Whitehorse is currently focused around the north end of the City; however, these assumptions represent a conservative scenario in which development to the south increases.

The assumed Hillcrest traffic volumes at the 10-year and 20-year horizons are illustrated in **Figures 3.5 and 3.6.**

3.2.1 Transportation Demand Management

The City-Wide Transportation Study (2004) identified a vision of sustainable transportation for the City of Whitehorse. In support of this vision, the City completed a Transportation Demand Management (TDM) Plan in 2014 as a guideline to implement sustainable transportation initiatives to increase alternative transportation modes and reduce single occupancy vehicle trips throughout the city, therefore reducing the demand for infrastructure associated with vehicle travel. Some of the initiatives identified in this plan include: improving active transportation options and public transit, supporting and encouraging alternative travel programs, and maximizing existing vehicle infrastructure.

Several of these initiatives are already ongoing, and will continue as Whitehorse grows, such as improved transit and expansion of the active transportation network. It is anticipated that this will result in lower vehicle traffic growth rates than historically observed, as people choose alternative modes of travel. Therefore, it is likely that the 2% annual growth rate applied in this study is a conservative representation of the growth that will be experienced in the region, and in fact lower growth is expected.

3.3 TOTAL FUTURE TRAFFIC VOLUMES

The total estimated future traffic volumes for the Hamilton Boulevard corridor were calculated by adding the projected background traffic volumes and the projected Hillcrest development traffic volumes for each of the study horizons. The resulting design traffic volumes are illustrated in **Figures 3.7 and 3.8**.

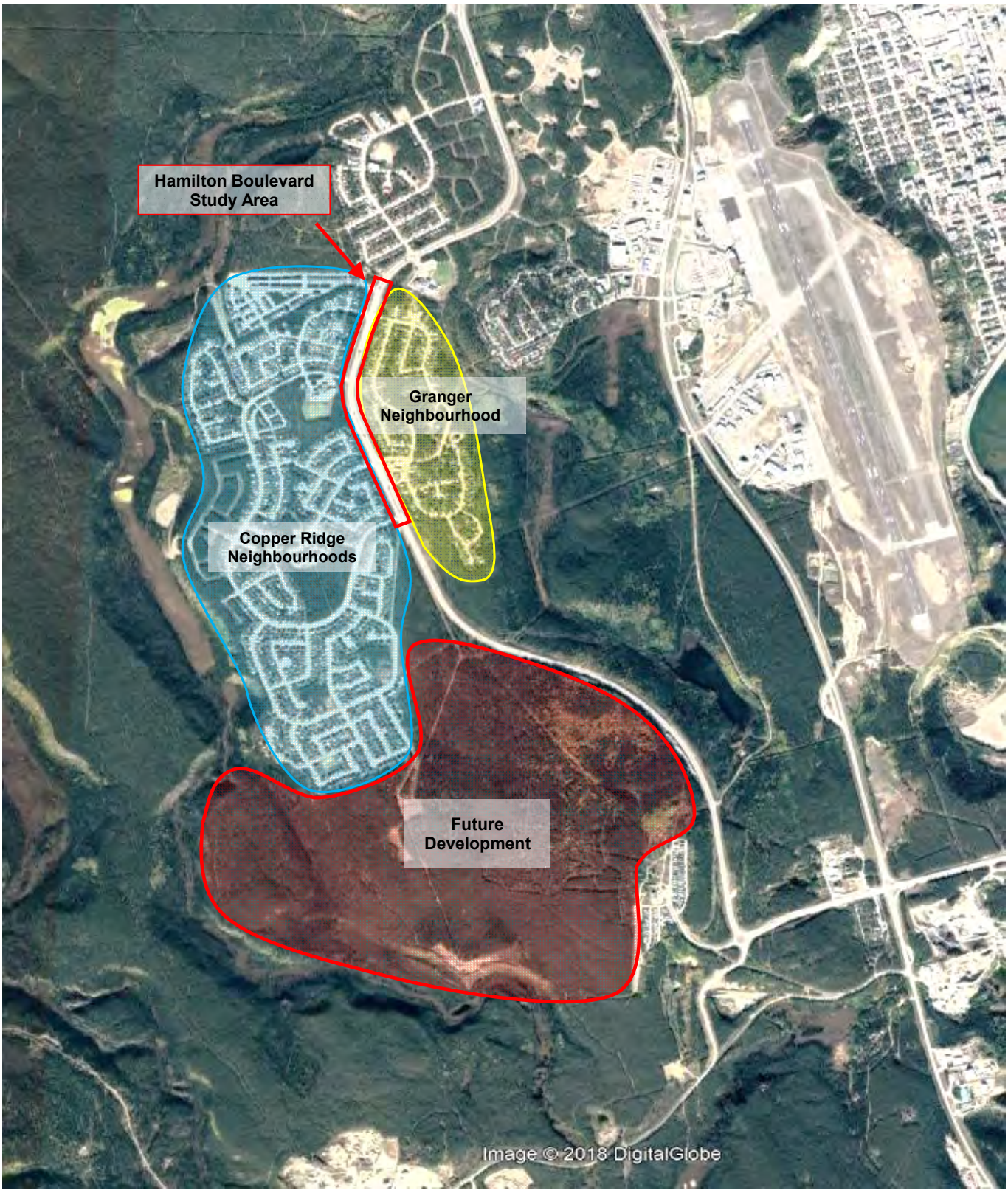

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Figure No.
3.4

Title
Future Development Areas

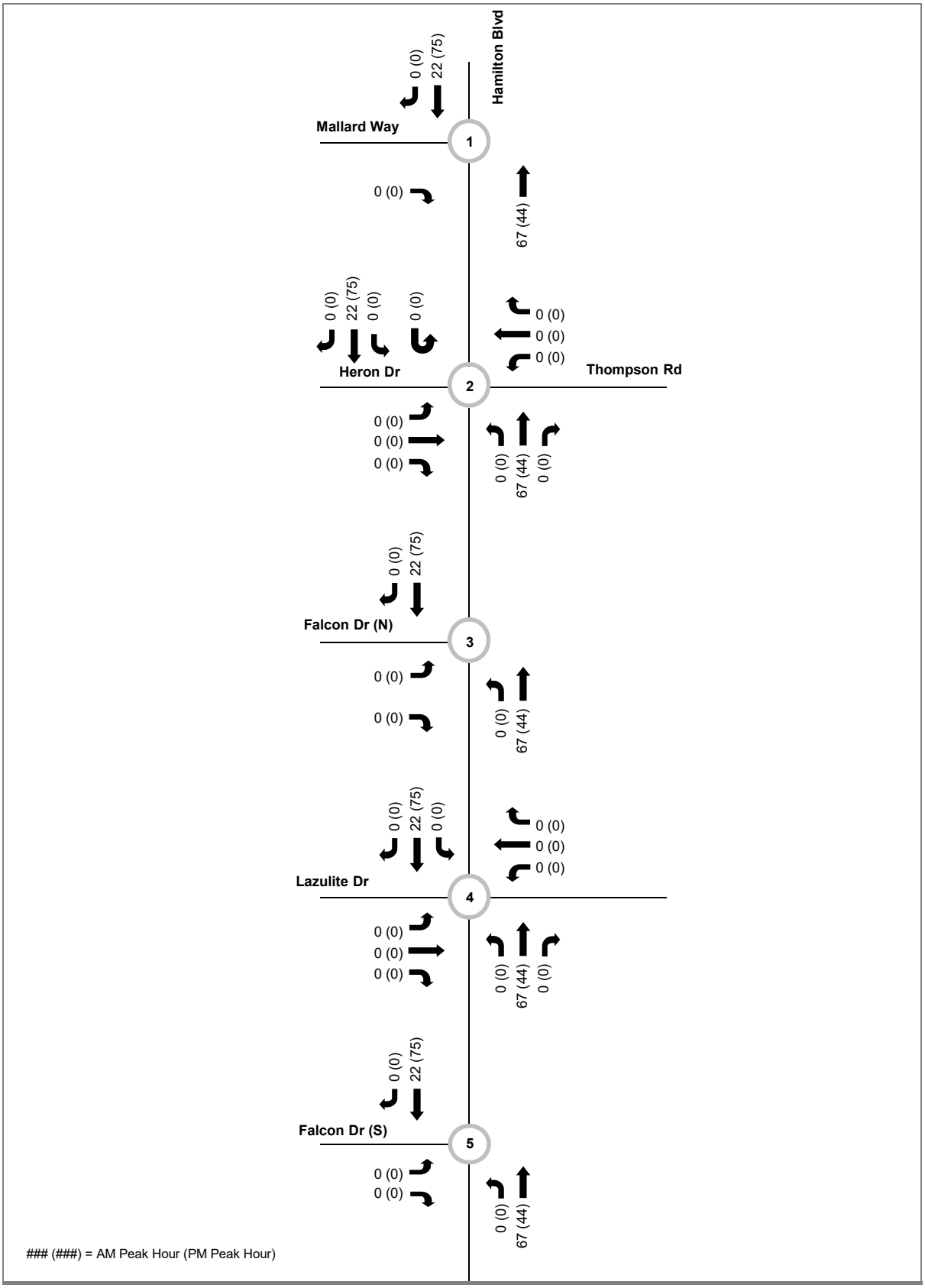

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Figure No.
3.5

Title
Future Development Area Traffic 2028

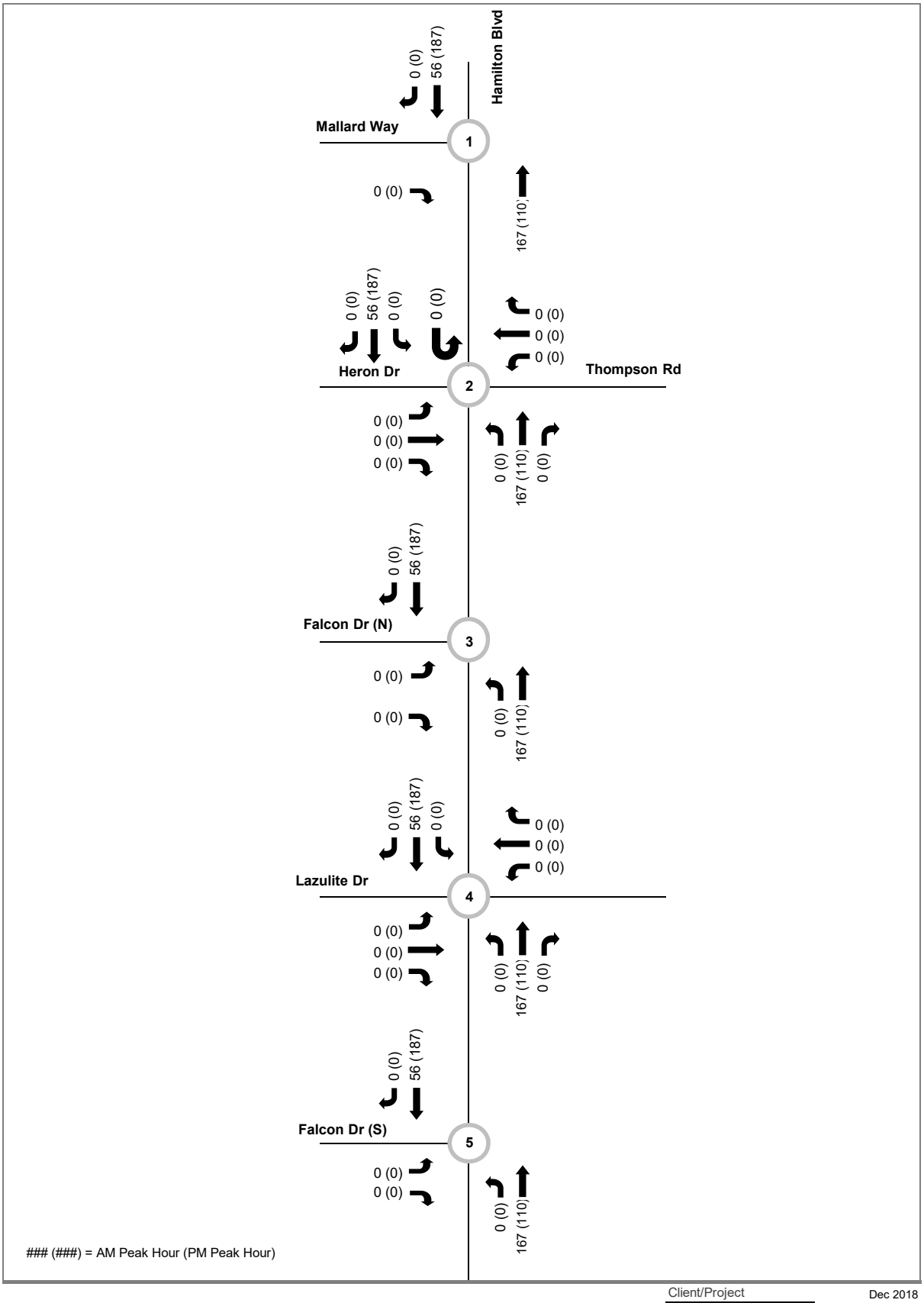

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Figure No.
3.6

Title
Future Development Area Traffic 2038

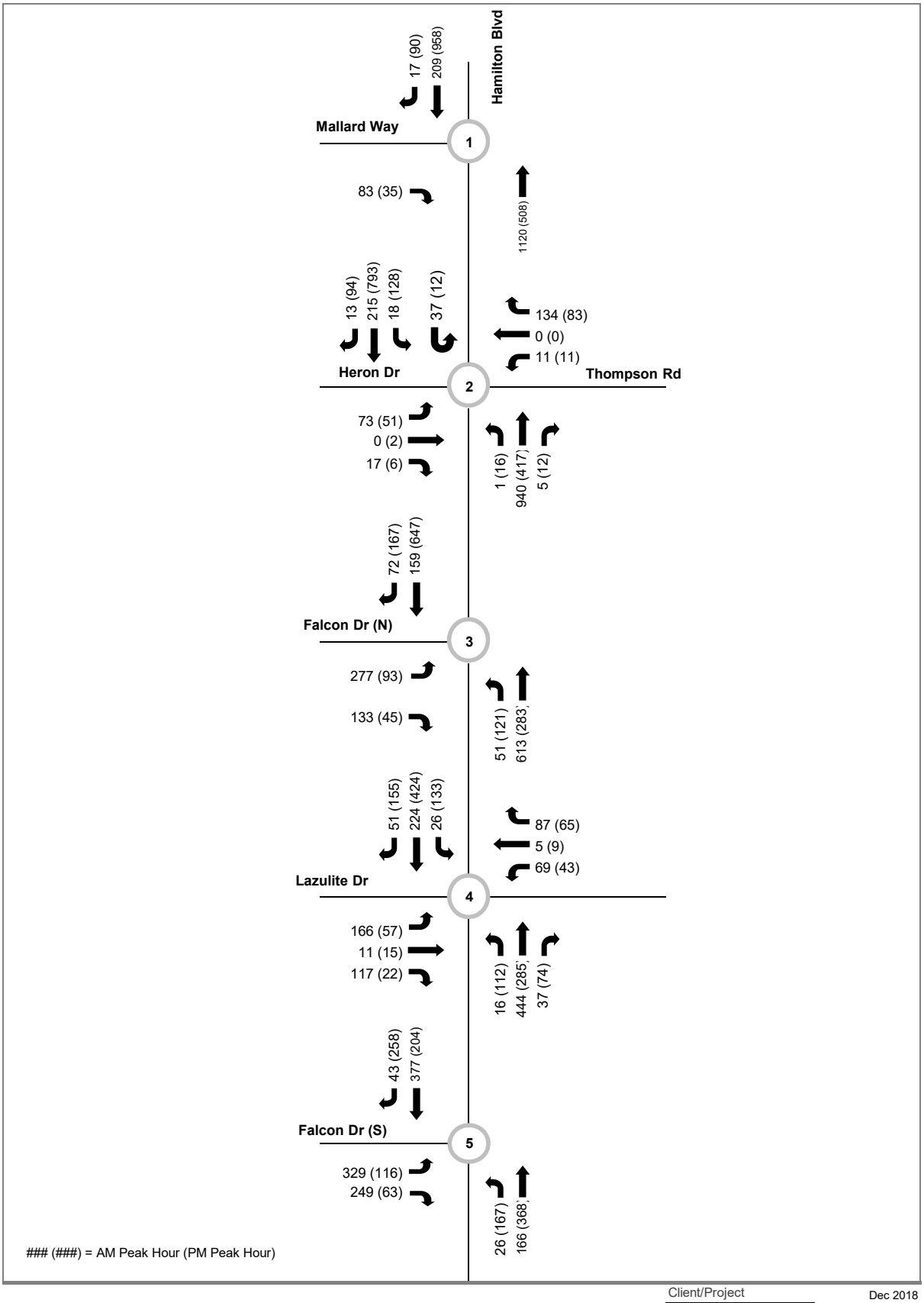

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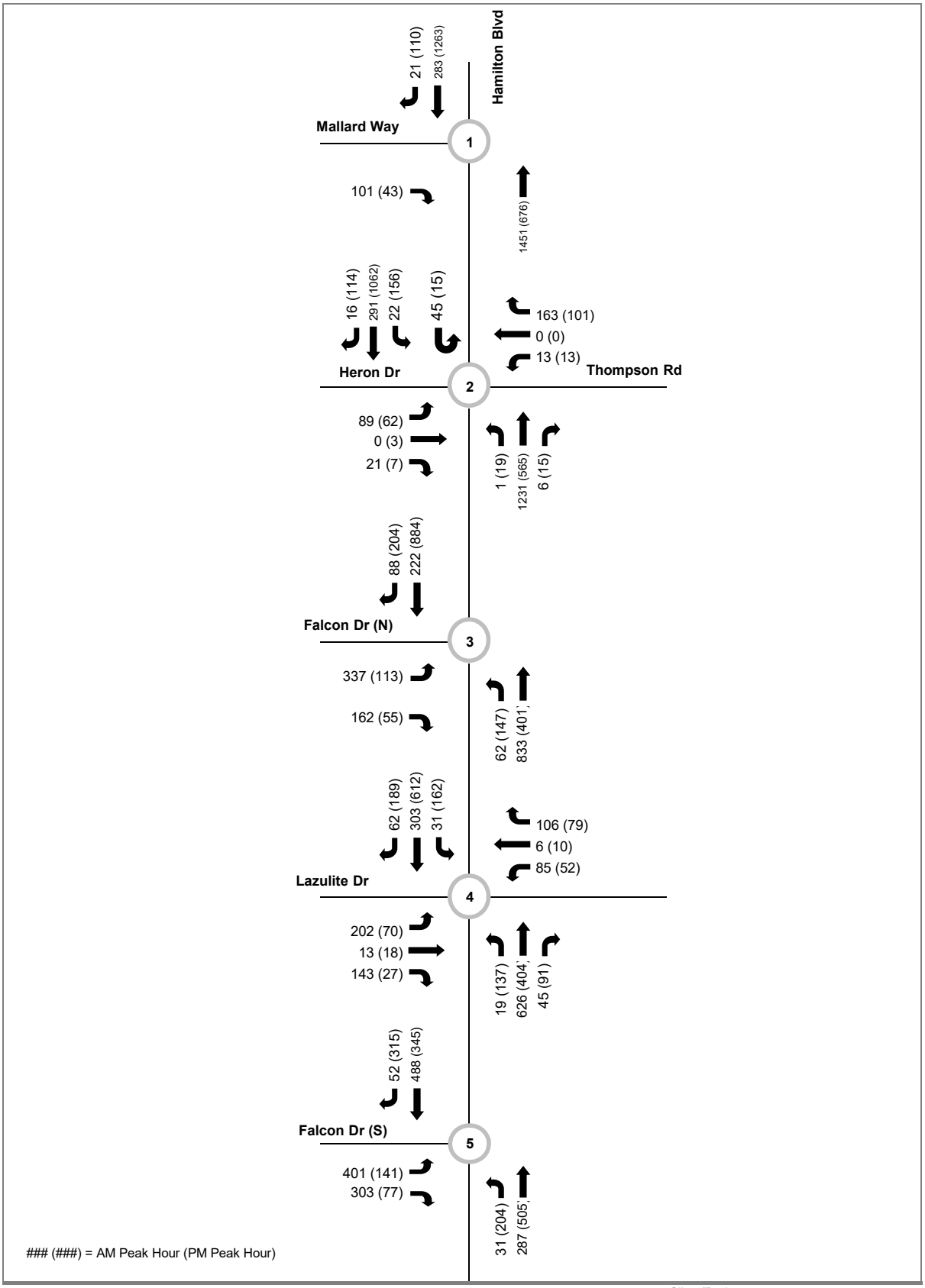
Figure No.
3.7

Title
Total Traffic Volumes
2028



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Hamilton Boulevard Transportation Study
City of Whitehorse

Dec 2018

Figure No.
3.8

Title
Total Traffic Volumes
2038

4.0 INTERSECTION ANALYSIS – EXISTING CONDITIONS

Intersection Capacity Analysis (ICA) was conducted using Synchro software to evaluate the operating conditions of the study intersections under existing and future conditions.

4.1 ANALYSIS CRITERIA

The traffic modeling software Synchro 9 has been used to complete the intersection capacity analysis. The LOS for the intersection is based on the computed delays on each of the critical movements. LOS 'A' represents minimal delays and LOS 'F' represents a scenario with significant vehicular delays. **Table 4.1** shows LOS criteria for both signalized and unsignalized intersections as summarized in the Highway Capacity Manual.

Table 4.1: Level of Service Criteria

Level of Service (LOS)	Delay Per Vehicle (s)	
	Unsignalized	Signalized
A	≤10	≤10
B	>10 and ≤15	>10 and ≤20
C	>15 and ≤25	>20 and ≤35
D	>25 and ≤35	>35 and ≤55
E	>35 and ≤50	>55 and ≤80
F	>50	>80

Most municipalities consider LOS D or LOS E to be the minimum acceptable standard, with LOS E typically more acceptable for urban centres and long-range planning, and LOS D for suburban applications and short term horizons. Given the City's emphasis on TDM strategies and prioritizing alternative travel modes, it is expected that LOS E is acceptable for this corridor. For the purposes of this study, any traffic movement operating at LOS E or worse has been flagged for further discussion.

The volume to capacity (V/C) ratio indicates the level of congestion for a lane. A V/C ratio equal to or greater than 1.00 indicates that the lane is operating at or above capacity. For the purposes of this study, any traffic movement operating with a V/C ratio greater than 0.85 has been flagged for further discussion.

4.2 ANALYSIS RESULTS

The study intersections were analyzed in Synchro using the existing intersection configurations and control.

4.2.1 Existing (2018) Conditions

The 2018 traffic analysis was conducted for all five intersections. The results of this analysis are summarized in **Table 4.2**, with the full Synchro output reports included in **Appendix A**.

Table 4.2 – ICA Results: Existing (2018) Conditions

Intersection Location	Intersection Movements												Overall Intersection
	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Mallard Way & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	-	-	1	-	-	-	-	1	-	-	2	SH	
Volumes (veh/h)	-	-	68	-	-	-	-	864	-	-	153	14	Intersection
Volume / Capacity Ratio (v/c)	-	-	0.08	-	-	-	-	0.28	-	-	0.07	0.04	Delay (s)
Total Delay (s)	-	-	9.4	-	-	-	-	0	-	-	0	0	0.6
Level of Service (LOS)	-	-	A	-	-	-	-	A	-	-	A	A	
Queue Length 95th (m)	-	-	2	-	-	-	-	0	-	-	0	0	
PM peak hour													
Intersection / Laning Characteristics	-	-	1	-	-	-	-	1	-	-	2	SH	
Volumes (veh/h)	-	-	29	-	-	-	-	381	-	-	724	74	Intersection
Volume / Capacity Ratio (v/c)	-	-	0.06	-	-	-	-	0.12	-	-	0.31	0.2	Delay (s)
Total Delay (s)	-	-	11.9	-	-	-	-	0	-	-	0	0	0.3
Level of Service (LOS)	-	-	B	-	-	-	-	A	-	-	A	A	
Queue Length 95th (m)	-	-	1.4	-	-	-	-	0	-	-	0	0	
Heron Drive & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	60	0	14	9	0	110	1	716	4	15	158	11	Intersection
Volume / Capacity Ratio (v/c)		0.55			0.41		0	0.46	0	0.02	0.07	0.04	Delay (s)
Total Delay (s)		55.9			23.8		7.6	0	0	9.5	0	0	6.5
Level of Service (LOS)		F			C		A	A	A	A	A	A	
Queue Length 95th (m)		20.7			14.5		0	0	0	0.5	0	0	
PM peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	42	2	5	9	0	68	13	306	10	105	589	77	Intersection
Volume / Capacity Ratio (v/c)		0.47			0.16		0.02	0.2	0.01	0.09	0.25	0.17	Delay (s)
Total Delay (s)		63.4			13.2		9.2	0	0	8.3	0	0	4.2
Level of Service (LOS)		F			B		A	A	A	A	A	A	
Queue Length 95th (m)		16			4.3		0.1	0	0	2.4	0	0	
Falcon Drive (N) & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	2	SH	
Volumes (veh/h)	227	-	109	-	-	-	42	448	-	-	112	59	Intersection
Volume / Capacity Ratio (v/c)		0.86		-	-	-	0.03	0.29	-	-	0.06	0.06	Delay (s)
Total Delay (s)		47.7		-	-	-	7.7	0	-	-	0	0	16.4
Level of Service (LOS)		E		-	-	-	A	A	-	-	A	A	
Queue Length 95th (m)		65.4		-	-	-	0.8	0	-	-	0	0	
PM peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	2	SH	
Volumes (veh/h)	76	-	37	-	-	-	99	196	-	-	469	137	Intersection
Volume / Capacity Ratio (v/c)		0.46		-	-	-	0.12	0.13	-	-	0.2	0.19	Delay (s)
Total Delay (s)		29.4		-	-	-	9.4	0	-	-	0	0	4.2
Level of Service (LOS)		D		-	-	-	A	A	-	-	A	A	
Queue Length 95th (m)		17.3		-	-	-	3	0	-	-	0	0	
Lazulite Dr & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	136	9	96	57	4	71	13	309	30	21	166	42	Intersection
Volume / Capacity Ratio (v/c)		0.6			0.32		0.01	0.2	0.2	0.02	0.07	0.06	Delay (s)
Total Delay (s)		26.1			17.2		7.7	0	0	8.1	0	0	9.2
Level of Service (LOS)		D			C		A	A	A	A	A	A	
Queue Length 95th (m)		30.5			10.7		0.2	0	0	0.5	0	0	
PM peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	47	12	18	35	7	53	92	198	61	109	286	127	Intersection
Volume / Capacity Ratio (v/c)		0.45			0.3		0.09	0.13	0.01	0.09	0.14	0.14	Delay (s)
Total Delay (s)		39.6			19.9		8.6	0	0	8.1	0	0	6.3
Level of Service (LOS)		E			C		A	A	A	A	A	A	
Queue Length 95th (m)		16.2			9.5		2.3	0	0	2.3	0	0	
Falcon Drive (S) & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	1	1	
Volumes (veh/h)	270	-	204	-	-	-	21	81	-	-	291	35	Intersection
Volume / Capacity Ratio (v/c)		0.83		-	-	-	0.02	0.05	-	-	0.19	0.02	Delay (s)
Total Delay (s)		33.2		-	-	-	7.9	0	-	-	0	0	17.6
Level of Service (LOS)		D		-	-	-	A	A	-	-	A	A	
Queue Length 95th (m)		67.4		-	-	-	0.4	0	-	-	0	0	
PM peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	1	1	
Volumes (veh/h)	95	-	52	-	-	-	137	266	-	-	106	212	Intersection
Volume / Capacity Ratio (v/c)		0.34		-	-	-	0.1	0.17	-	-	0.07	0.14	Delay (s)
Total Delay (s)		16.8		-	-	-	7.7	0	-	-	0	0	4.1
Level of Service (LOS)		C		-	-	-	A	A	-	-	A	A	
Queue Length 95th (m)		11.5		-	-	-	2.6	0	-	-	0	0	

As shown in the table, the study intersections along Hamilton Boulevard operate relatively well, with the following movements flagged for further discussion:

- **Heron Drive:** the eastbound movement currently operating at LOS F due to the delay and the difficulty for eastbound vehicles to enter the traffic flows on Hamilton Boulevard.
- **Falcon Drive North:** the eastbound movement is currently operating at LOS E with a v/c ratio of 0.86, indicating that the eastbound vehicles are having difficulty entering the traffic flow on Hamilton Boulevard.
- **Lazulite Drive:** the eastbound movement is currently operating at LOS E, suggesting some delay for eastbound vehicles.

4.2.2 Medium Term (2028) Horizon

The 2028 traffic analysis was conducted for all study intersections assuming no upgrades are carried out. The results of this analysis are summarized in **Table 4.3**, with the full Synchro output reports included in **Appendix B**.

As shown, with the increased traffic volumes expected at the 2028 horizon, the eastbound movements at all study intersections are projected to operate at LOS F, with the exception of Mallard Way. Most of these movements additionally have v/c ratios over one, indicating that they are over capacity. These results indicate that intersection improvements will be required by this horizon.

4.2.3 Long Term (2038) Horizon

The 2038 traffic analysis was conducted for all study intersections assuming no change in the existing geometry. The results of this analysis are summarized in **Table 4.4**, with the full Synchro output reports included in **Appendix C**.

As expected, with the even greater increase in traffic volumes expected at the 2038 horizon, the eastbound movements at all study intersections (except Mallard Way) continue to operate at LOS F with even higher delays and v/c ratios. Synchro returned error messages at Heron Drive and Lazulite Drive, suggesting that these values significantly exceeded the acceptable thresholds. In addition, several of the projected 95th percentile queue lengths are in excess of 200 m, blocking the downstream local intersections on these roadways. At this horizon, several of the westbound movements are expected to fail as well. As with the 2028 horizon, these results suggest that intersection upgrades will be required throughout the corridor.

Table 4.3 – ICA Results: 2028 Horizon

Intersection Location	Intersection Movements												Overall Intersection
	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Mallard Way & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	-	-	1	-	-	-	-	1	-	-	2	SH	
Volumes (veh/h)	-	-	83	-	-	-	-	1120	-	-	207	17	Intersection
Volume / Capacity Ratio (v/c)	-	-	0.1	-	-	-	-	0.36	-	-	0.09	0.06	Delay (s)
Total Delay (s)	-	-	9.4	-	-	-	-	0	-	-	0	0	0.5
Level of Service (LOS)	-	-	A	-	-	-	-	A	-	-	A	A	
Queue Length 95th (m)	-	-	2.5	-	-	-	-	0	-	-	0	0	
PM peak hour													
Intersection / Laning Characteristics	-	-	1	-	-	-	-	1	-	-	2	SH	
Volumes (veh/h)	-	-	35	-	-	-	-	508	-	-	958	90	Intersection
Volume / Capacity Ratio (v/c)	-	-	0.08	-	-	-	-	0.16	-	-	0.41	0.26	Delay (s)
Total Delay (s)	-	-	13.4	-	-	-	-	0	-	-	0	0	0.3
Level of Service (LOS)	-	-	B	-	-	-	-	A	-	-	A	A	
Queue Length 95th (m)	-	-	2	-	-	-	-	0	-	-	0	0	
Heron Drive & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	73	0	17	11	0	134	1	940	5	18	215	13	Intersection
Volume / Capacity Ratio (v/c)		1.85			0.72		0	0.6	0	0.03	0.09	0.05	Delay (s)
Total Delay (s)		573.4			53.9		7.7	0	0	10.5	0	0	41.5
Level of Service (LOS)		F			F		A	A	A	B	A	A	
Queue Length 95th (m)		71.7			35.8		0	0	0	0.7	0	0	
PM peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	51	2	6	11	0	83	16	417	12	12	128	793	Intersection
Volume / Capacity Ratio (v/c)		1.23			0.26		0.02	0.27	0.01	0.13	0.34	0.23	Delay (s)
Total Delay (s)		330.7			17.6		10.2	0	0	8.8	0	0	13.9
Level of Service (LOS)		F			C		B	A	A	B	A	A	
Queue Length 95th (m)		43.5			7.9		0	0	0	5.9	0	0	
Falcon Drive (N) & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	2	SH	
Volumes (veh/h)	277	-	133	-	-	-	51	613	-	-	159	72	Intersection
Volume / Capacity Ratio (v/c)		1.45			-		0.04	0.39	-	-	0.08	0.08	Delay (s)
Total Delay (s)		250.8			-		7.9	0	-	-	0	0	79.2
Level of Service (LOS)		F			-		A	A	-	-	A	A	
Queue Length 95th (m)		183.7			-		1	0	-	-	0	0	
PM peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	2	SH	
Volumes (veh/h)	93	-	45	-	-	-	121	283	-	-	647	167	Intersection
Volume / Capacity Ratio (v/c)		0.97			-		0.17	0.18	-	-	0.28	0.24	Delay (s)
Total Delay (s)		122.8			-		10.7	0	-	-	0	0	13.5
Level of Service (LOS)		F			-		B	A	-	-	A	A	
Queue Length 95th (m)		54.9			-		4.8	0	-	-	0	0	
Lazulite Dr & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	166	11	117	69	5	87	16	444	37	26	224	51	Intersection
Volume / Capacity Ratio (v/c)		1.09			0.55		0.01	0.28	0.02	0.03	0.1	0.08	Delay (s)
Total Delay (s)		117			29.6		7.9	0	0	8.6	0	0	31.5
Level of Service (LOS)		F			D		A	A	A	A	A	A	
Queue Length 95th (m)		96.2			23.9		0.3	0	0	0.6	0	0	
PM peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	57	15	22	43	9	65	112	285	74	133	424	155	Intersection
Volume / Capacity Ratio (v/c)		1.11			0.62		0.13	0.18	0.05	0.12	0.19	0.19	Delay (s)
Total Delay (s)		210.1			47.2		9.4	0	0	8.5	0	0	19.7
Level of Service (LOS)		F			E		A	A	A	A	A	A	
Queue Length 95th (m)		52			27.2		3.3	0	0	3.2	0	0	
Falcon Drive (S) & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	1	1	
Volumes (veh/h)	329	-	249	-	-	-	26	166	-	-	112	59	Intersection
Volume / Capacity Ratio (v/c)		1.26			-		0.02	0.11	-	-	0.06	0.06	Delay (s)
Total Delay (s)		159			-		8.2	0	-	-	0	0	77.5
Level of Service (LOS)		F			-		A	A	-	-	A	A	
Queue Length 95th (m)		194.7			-		0.6	0	-	-	0	0	
PM peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	1	1	
Volumes (veh/h)	116	-	63	-	-	-	167	368	-	-	204	258	Intersection
Volume / Capacity Ratio (v/c)		0.61			-		0.14	0.24	-	-	0.13	0.16	Delay (s)
Total Delay (s)		32.9			-		8.1	0	-	-	0	0	6.1
Level of Service (LOS)		D			-		A	A	-	-	A	A	
Queue Length 95th (m)		29			-		3.6	0	-	-	0	0	

Table 4.4 – ICA Results: 2038 Horizon

Intersection Location	Intersection Movements												Overall Intersection
	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Mallard Way & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	-	-	1	-	-	-	-	1	-	-	2	SH	
Volumes (veh/h)	-	-	101	-	-	-	-	1451	-	-	283	21	Intersection
Volume / Capacity Ratio (v/c)	-	-	0.13	-	-	-	-	0.46	-	-	0.12	0.07	Delay (s)
Total Delay (s)	-	-	9.9	-	-	-	-	0	-	-	0	0	0.5
Level of Service (LOS)	-	-	A	-	-	-	-	A	-	-	A	A	
Queue Length 95th (m)	-	-	3.4	-	-	-	-	0	-	-	0	0	
PM peak hour													
Intersection / Laning Characteristics	-	-	1	-	-	-	-	1	-	-	2	SH	
Volumes (veh/h)	-	-	43	-	-	-	-	676	-	-	1263	110	Intersection
Volume / Capacity Ratio (v/c)	-	-	0.13	-	-	-	-	0.22	-	-	0.54	0.34	Delay (s)
Total Delay (s)	-	-	16.7	-	-	-	-	0	-	-	0	0	0.3
Level of Service (LOS)	-	-	C	-	-	-	-	A	-	-	A	A	
Queue Length 95th (m)	-	-	3.4	-	-	-	-	0	-	-	0	0	
Heron Drive & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	89	0	21	13	0	163	1	1231	6	22	291	16	Intersection
Volume / Capacity Ratio (v/c)	ERROR			1.44			0	0.79	0	0.05	0.12	0.07	Delay (s)
Total Delay (s)	ERROR			296			7.9	0	0	12.4	0	0	ERROR
Level of Service (LOS)	F			F			A	A	A	A	A	A	
Queue Length 95th (m)	ERROR			97.7			0	0	0	1.1	0	0	
PM peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	62	3	7	13	0	101	19	565	15	156	1062	114	Intersection
Volume / Capacity Ratio (v/c)	4.51			0.51			0.04	0.36	0.01	0.18	0.45	0.3	Delay (s)
Total Delay (s)	ERROR			33.8			11.9	0	0	9.6	0	0	341.6
Level of Service (LOS)	F			D			B	A	A	A	A	A	
Queue Length 95th (m)	ERROR			19.9			0.9	0	0	4.9	0	0	
Falcon Drive (N) & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	2	SH	
Volumes (veh/h)	337	-	162	-	-	-	62	833	-	-	222	88	Intersection
Volume / Capacity Ratio (v/c)	2.85			-	-	-	0.05	0.53	-	-	0.1	0.1	Delay (s)
Total Delay (s)	885.4			-	-	-	8.1	0	-	-	0	0	259.6
Level of Service (LOS)	F			-	-	-	A	A	-	-	A	A	
Queue Length 95th (m)	366.4			-	-	-	1.3	0	-	-	0	0	
PM peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	2	SH	
Volumes (veh/h)	113	-	55	-	-	-	147	401	-	-	884	204	Intersection
Volume / Capacity Ratio (v/c)	2.62			-	-	-	0.27	0.26	-	-	0.38	0.32	Delay (s)
Total Delay (s)	860			-	-	-	13.4	0	-	-	0	0	81.3
Level of Service (LOS)	F			-	-	-	B	A	-	-	A	A	
Queue Length 95th (m)	136.5			-	-	-	8.4	0	-	-	0	0	
Lazulite Dr & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	202	13	143	85	6	106	19	626	45	31	303	62	Intersection
Volume / Capacity Ratio (v/c)	2.48			1.11			0.02	0.4	0.03	0.04	0.13	0.1	Delay (s)
Total Delay (s)	730.8			149.3			8.2	0	0	9.3	0	0	177.6
Level of Service (LOS)	F			F			A	A	A	A	A	A	
Queue Length 95th (m)	253.8			79.2			0.4	0	0	0.9	0	0	
PM peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	70	18	27	52	10	79	137	404	91	162	612	189	Intersection
Volume / Capacity Ratio (v/c)	3.84			1.8			0.19	0.26	0.06	0.17	0.26	0.25	Delay (s)
Total Delay (s)	ERROR			486.6			10.8	0	0	9.2	0	0	660.1
Level of Service (LOS)	F			F			B	A	A	A	A	A	
Queue Length 95th (m)	ERROR			98.9			5.4	0	0	4.7	0	0	
Falcon Drive (S) & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	1	1	
Volumes (veh/h)	401	-	303	-	-	-	31	287	-	-	488	52	Intersection
Volume / Capacity Ratio (v/c)	2.08			-	-	-	0.03	0.18	-	-	0.31	0.03	Delay (s)
Total Delay (s)	518			-	-	-	8.6	0	-	-	0	0	233.6
Level of Service (LOS)	F			-	-	-	A	A	-	-	A	A	
Queue Length 95th (m)	416.8			-	-	-	0.8	0	-	-	0	0	
PM peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	1	1	
Volumes (veh/h)	141	-	77	-	-	-	204	505	-	-	345	315	Intersection
Volume / Capacity Ratio (v/c)	1.29			-	-	-	0.19	0.32	-	-	0.22	0.2	Delay (s)
Total Delay (s)	214.5			-	-	-	8.7	0	-	-	0	0	30.6
Level of Service (LOS)	F			-	-	-	A	A	-	-	A	A	
Queue Length 95th (m)	101.2			-	-	-	A	A	-	-	A	A	

5.0 SIGNALIZED INTERSECTION ANALYSIS

5.1 TRAFFIC SIGNAL WARRANT

Based on the results of the existing conditions analysis, it is expected that traffic signals may be warranted at the study intersections currently or at some point in the future. To evaluate this, Signal Warrant Analysis was completed using Transportation Association of Canada's (TAC) Traffic Signal Analysis Spreadsheet (v3H, 2007). When the spreadsheet yields a W-value equal to or greater than 100 points, signalization is required. The analysis was not completed for the intersection of Hamilton Boulevard and Mallard Way as it is projected to operate acceptably as an unsignalized right-in/right-out intersection for the future study horizons.

The warrant yielded the following results summarized in **Table 5.1** below, and the full warrants can be found in **Appendix D**.

Table 5.1: Signal Warrant Analysis Results

Intersection	Existing	2028	2038
2. Heron Drive	47	80	**135**
3. Falcon Drive (N)	56	93	**154**
4. Lazulite Drive	52	90	**153**
5. Falcon Drive (S)	40	71	**124**

According to the results, signals are not currently warranted at any of the study intersections. By the 2028 horizon, the above analysis projects that signals will not be warranted; however, it is expected that they may be required to mitigate the projected eastbound and westbound delays, as described in the operational analysis provided in **Section 4.2.2**. By 2038, it is expected that signals will be required at all four intersections.

5.2 SIGNALIZED INTERSECTION CAPACITY ANALYSIS

Synchro intersection capacity analysis was conducted for the study intersections as signalized intersections, maintaining the existing intersection geometry. The 2038 horizon was selected for this analysis in order to determine the ultimate intersection performance of the corridor.

As noted previously, a significant number of drivers are currently making a southbound to northbound U-turn at the Heron Drive intersection, presumably due to the right-in/right-out at Mallard Way. It is assumed that these movements will be reduced or eliminated with the signalization of this intersection (U-turns are illegal at signalized intersections). Current U-turning trips were therefore reassigned to the southbound right and left turns, assuming that drivers will find alternate ways to turn around and then reenter Hamilton boulevard via an eastbound left or westbound right at the same intersection. Traffic volumes at all other intersections remained the same.

The results of this analysis are summarized in **Table 5.2**, with the full Synchro output reports included in **Appendix E.**

Table 5.2 – ICA Results: 2038 Horizon, with Signalization

Intersection Location	Intersection Movements												Overall Intersection
	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Heron Drive & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	112	0	21	13	0	185	1	1231	6	44	291	39	Intersection
Volume / Capacity Ratio (v/c)		0.96			0.56		0	0.98	0.01	0.71	0.14	0.14	Delay (s)
Total Delay (s)		104.8			28.3		4	35.3	1	65.4	4.3	4.3	34.7
Level of Service (LOS)		F			C		A	D	A	E	A	A	
Queue Length 95th (m)		#67.9			47.1		0.5	#371.7	0.7	#15.6	#15.6	13.7	
PM peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	70	3	7	13	0	109	19	565	15	164	1062	122	Intersection
Volume / Capacity Ratio (v/c)		0.22			0.23		0.15	0.59	0.02	0.56	0.66	0.66	Delay (s)
Total Delay (s)		16.4			5.8		9.7	12	2.1	17.2	11.3	11.3	11.7
Level of Service (LOS)		B			A		A	B	A	B	B	B	
Queue Length 95th (m)		15.6			10.9		4.4	66.9	1.5	30.2	64.3	64.3	
Falcon Drive (N) & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	2	SH	
Volumes (veh/h)	337	-	162	-	-	-	62	833	-	-	222	88	Intersection
Volume / Capacity Ratio (v/c)		0.89		-	-	-	0.12	0.86	-	-	0.17	0.17	Delay (s)
Total Delay (s)		45.7		-	-	-	10	26.9	-	-	7	7	28.2
Level of Service (LOS)		D		-	-	-	A	C	-	-	A	A	
Queue Length 95th (m)		#143.0		-	-	-	11.2	#206.3	-	-	15.8	15.8	
PM peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	2	SH	
Volumes (veh/h)	113	-	55	-	-	-	147	401	-	-	884	204	Intersection
Volume / Capacity Ratio (v/c)		0.44		-	-	-	0.66	0.35	-	-	0.51	0.51	Delay (s)
Total Delay (s)		26.4		-	-	-	24.7	6.9	-	-	7.3	7.3	10.4
Level of Service (LOS)		C		-	-	-	C	A	-	-	A	A	
Queue Length 95th (m)		38.3		-	-	-	#47.7	39	-	-	51.4	51.4	
Lazulite Dr & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	202	13	143	85	6	106	19	626	45	31	303	62	Intersection
Volume / Capacity Ratio (v/c)		0.74			0.39		0.05	0.79	0.06	0.2	0.24	0.24	Delay (s)
Total Delay (s)		22.7			8.3		7.9	20.6	3.2	11.9	7.3	7.3	15.8
Level of Service (LOS)		C			A		A	C	A	B	A	A	
Queue Length 95th (m)		#61.0			17.9		3.7	#98.9	3.9	6.5	15.1	15.1	
PM peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	1	1	1	2	SH	
Volumes (veh/h)	70	18	27	52	10	79	137	404	91	162	612	189	Intersection
Volume / Capacity Ratio (v/c)		0.32			0.34		0.45	0.38	0.1	0.34	0.41	0.41	Delay (s)
Total Delay (s)		19.8			12.5		8.2	5.6	0.9	9	6.9	6.9	7.8
Level of Service (LOS)		B			B		A	A	A	A	A	A	
Queue Length 95th (m)		23.7			20.3		m10.0	m27.3	m0.3	20.9	33.7	33.7	
Falcon Drive (S) & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	1	1	
Volumes (veh/h)	401	-	303	-	-	-	31	287	-	-	488	52	Intersection
Volume / Capacity Ratio (v/c)		0.85		-	-	-	0.21	0.44	-	-	0.74	0.09	Delay (s)
Total Delay (s)		26.3		-	-	-	20	19.7	-	-	27.8	5	24.7
Level of Service (LOS)		C		-	-	-	C	B	-	-	C	A	
Queue Length 95th (m)		#151.8		-	-	-	9.8	52.4	-	-	98.2	6.4	
PM peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	1	-	-	1	1	
Volumes (veh/h)	141	-	77	-	-	-	204	505	-	-	345	315	Intersection
Volume / Capacity Ratio (v/c)		0.43		-	-	-	0.41	0.5	-	-	0.34	0.32	Delay (s)
Total Delay (s)		20.5		-	-	-	11.6	11.4	-	-	9.4	1.8	10.3
Level of Service (LOS)		C		-	-	-	B	B	-	-	A	A	
Queue Length 95th (m)		40.9		-	-	-	30.7	64.9	-	-	40.4	9.3	

Footnotes: #: indicates that the 95th percentile volume exceeds capacity; still considered a valid method for storage bay design
m: indicates that traffic is metered by an upstream traffic signal

Heron Drive

As a signalized intersection with the existing geometry, the eastbound movement is projected to operate at LOS F and with a v/c ratio of 0.96 during the AM peak hour for the 2038 horizon. In addition, the northbound movement is projected to operate with a v/c ratio of 0.98 and long queues (372 m), and the southbound left turn movement is projected to operate at LOS E. These results suggest the need for additional improvements at this location.

Falcon Drive (North)

With traffic signals, this intersection is projected to operate with v/c ratios greater than 0.85 in the eastbound and northbound directions, with moderate queuing for these movements as well. This suggests that this intersection is approaching capacity and further improvements may be required.

Lazulite Drive

Lazulite Drive is projected to operate satisfactorily when upgraded to a signalized intersection at the 2038 horizon with no movements flagged for discussion.

Falcon Drive (South)

With traffic signals, the intersection operates with all movements at LOS C or better; however, the eastbound movement is projected to operate with a v/c ratio of 0.85 and a 95th percentile queue over 150 m, suggesting that it is approaching capacity and further improvements may be required.

5.3 INTERSECTION GEOMETRY IMPROVEMENTS

As shown in the previous section, several of the study intersections have movements approaching or over capacity at the 2038 horizon, even with the addition of traffic signals. The following section explores additional potential intersection improvements. Synchro output reports are included in **Appendix F.**

Heron Drive

Based on the previous analysis, it appears that the intersection in its current configuration may be over capacity at the 2038 horizon, predominantly due to the heavy northbound movement. An additional northbound through lane was analyzed to determine the impact it would have on the intersection. In this scenario the existing northbound right turn lane would be converted to a shared through/right turn lane. The results of this analysis are shown below.

Table 5.3 – ICA Results: 2038 Horizon, with Improvements – Heron Drive

Intersection Location	Intersection Movements												Overall Intersection
	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Heron Drive & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	**2**	**SH**	1	2	SH	
Volumes (veh/h)	112	0	21	13	0	185	1	1231	6	44	291	39	Intersection
Volume / Capacity Ratio (v/c)		0.41			0.42		0	0.68		0.38	0.18		Delay (s)
Total Delay (s)		17.8			16.5		6	12		18.4	6.3		12
Level of Service (LOS)		B			B		A	B		B	A		
Queue Length 95th (m)		23.7			30.8		0.6	70		11.5	13.6		
PM peak hour													
Intersection / Laning Characteristics	SH	1	SH	SH	1	SH	1	**2**	**SH**	1	2	SH	
Volumes (veh/h)	70	3	7	13	0	109	19	565	15	164	1062	122	Intersection
Volume / Capacity Ratio (v/c)		0.22			0.23		0.15	0.32		0.44	0.66		Delay (s)
Total Delay (s)		16.4			5.8		9.7	7.8		12.3	11.3		10.3
Level of Service (LOS)		B			A		A	A		B	B		
Queue Length 95th (m)		15.6			10.9		4.4	25.9		24.1	64.3		

As shown, with this improvement, all movements are projected to operate at acceptable levels of service.

Falcon Drive (North)

Similarly to Heron Drive, a second northbound lane was analyzed at this intersection for the 2038 horizon. This additional lane would be developed south of the intersection and be continued north to tie into the current right turn lane at the Heron Drive intersection. The results of this analysis are shown below.

Table 5.4 – ICA Results: 2038 Horizon, with Improvements – Falcon Drive North

Intersection Location	Intersection Movements												Overall Intersection
	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Falcon Drive (N) & Hamilton Boulevard													
AM Peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	**2**	-	-	2	SH	
Volumes (veh/h)	337	-	162	-	-	-	62	833	-	-	222	88	Intersection
Volume / Capacity Ratio (v/c)		0.74		-	-	-	0.16	0.63	-	-	0.24		Delay (s)
Total Delay (s)		18.4		-	-	-	10	13.3	-	-	6.8		13.5
Level of Service (LOS)		B		-	-	-	A	B	-	-	A		
Queue Length 95th (m)		#71.3		-	-	-	8.9	42.9	-	-	12.1		
PM peak hour													
Intersection / Laning Characteristics	1	-	SH	-	-	-	1	**2**	-	-	2	SH	
Volumes (veh/h)	113	-	55	-	-	-	147	401	-	-	884	204	Intersection
Volume / Capacity Ratio (v/c)		0.44		-	-	-	0.66	0.18	-	-	0.51		Delay (s)
Total Delay (s)		26.4		-	-	-	24.7	5.4	-	-	7.3		10.1
Level of Service (LOS)		C		-	-	-	C	A	-	-	A		
Queue Length 95th (m)		38.3		-	-	-	#47.7	16.7	-	-	51.4		

As shown, with this improvement, all movements are projected to operate at acceptable levels of service.

Falcon Drive (South)

To improve the eastbound conditions at this intersection, a second eastbound lane was analyzed (i.e. separate left and right turn lanes for the eastbound movement). The results of this analysis are shown below.

Table 5.4 – ICA Results: 2038 Horizon, with Improvements – Falcon Drive South

Intersection Location	Intersection Movements												Overall Intersection
	EB			WB			NB			SB			
	L	T	R	L	T	R	L	T	R	L	T	R	
Falcon Drive (S) & Hamilton Boulevard													
AM Peak Hour													
Intersection / Laning Characteristics	1	-	**1**	-	-	-	1	1	-	-	1	1	
Volumes (veh/h)	401	-	303	-	-	-	31	287	-	-	488	52	Intersection
Volume / Capacity Ratio (v/c)	0.63	-	0.43	-	-	-	0.14	0.39	-	-	0.66	0.08	Delay (s)
Total Delay (s)	17.2	-	6.2	-	-	-	10.5	11.5	-	-	16.7	3.6	13.3
Level of Service (LOS)	B	-	A	-	-	-	B	B	-	-	B	A	
Queue Length 95th (m)	53.4	-	19.6	-	-	-	6	32.7	-	-	m60.6	m2.7	
PM Peak Hour													
Intersection / Laning Characteristics	1	-	**1**	-	-	-	1	1	-	-	1	1	
Volumes (veh/h)	141	-	77	-	-	-	204	505	-	-	345	315	Intersection
Volume / Capacity Ratio (v/c)	0.24	-	0.13	-	-	-	0.54	0.63	-	-	0.43	0.37	Delay (s)
Total Delay (s)	12.5	-	3.9	-	-	-	15.7	14.4	-	-	11.1	2.5	10.8
Level of Service (LOS)	B	-	A	-	-	-	B	B	-	-	B	A	
Queue Length 95th (m)	19.3	-	6.3	-	-	-	30.2	60.3	-	-	37.4	10	

As shown, with this improvement, all movements are projected to operate at acceptable levels of service.

6.0 ROUNDABOUT ANALYSIS

The Hamilton Boulevard intersections at Heron Drive, Lazulite Drive, and Falcon Drive South were identified as potential roundabout locations based on their traffic volumes and operations. Therefore, these three locations were analyzed as roundabouts at the 2028 and 2038 horizons using VISSIM software.

6.1 ROUNDABOUT GEOMETRY

The Hamilton Boulevard corridor through these intersections generally consists of a 3-lane cross-section (two lanes southbound and one lane northbound). However, it is expected that a single lane roundabout will be sufficient to accommodate the expected traffic volumes. Narrowing down to a single lane is consistent with other roundabout locations on Hamilton Boulevard so this would maintain consistent driver expectations. Single lane roundabouts also provide greater driver and pedestrian safety than multi-lane roundabouts.

6.2 ANALYSIS RESULTS

The results of the analysis are shown in **Tables 6.1 to 6.3** below.

Table 6.1 – Roundabout Analysis Results: Heron Drive (2038 Horizon)

		Volume (veh/hr)	Ave Delay (sec.)	Unsignalized LOS	Signalized LOS	Avg. Queue (m)	95th %ile Queue (m)
AM Peak 2038	SB	283	0.6	A	A	0.0	0.0
	EB	90	1.2	A	A	0.1	0.0
	NB	946	4.2	A	A	1.3	5.1
	WB	145	28.6	D	C	8.0	37.1
	All	1464	6.0	A	A	-	-
PM Peak 2038	SB	1027	3.0	A	A	0.1	0.0
	EB	59	14.6	B	B	1.1	5.8
	NB	445	2.4	A	A	0.4	3.0
	WB	94	2.5	A	A	0.2	0.0
	All	1625	3.2	A	A	-	-

Analysis results are provided for both a signalized and unsignalized roundabout type at this location. Given the context of the site and the style of other roundabouts in Whitehorse, the unsignalized style is preferred. As a single-lane, four-leg unsignalized roundabout, the Heron Drive intersection is projected to operate at LOS A at the 2038 horizon. The westbound movement is projected to operate at LOS D in the AM peak hour with a 95th percentile queue of 37 m. All other movements are projected to operate at LOS B or better. Based on these results, a single-lane roundabout would operate acceptably at this location at the 2038 horizon.

Table 6.2 – Roundabout Analysis Results: Lazulite Drive (2038 Horizon)

		Volume (veh/hr)	Ave Delay (sec.)	Unsignalized LOS	Signalized LOS	Avg. Queue (m)	95th %ile Queue (m)
AM Peak 2038	SB	396	1.7	A	A	0.2	0.0
	EB	358	5.1	A	A	1.9	10.4
	NB	690	4.5	A	A	1.5	8.6
	WB	197	14.8	B	B	5.0	26.2
	All	1641	5.3	A	A	-	-
PM Peak 2038	SB	963	8.6	A	A	4.5	25.9
	EB	115	8.6	A	A	1.2	7.2
	NB	632	5.6	A	A	2.7	13.8
	WB	141	4.1	A	A	0.6	5.3
	WB	1851	7.2	A	A	-	-

Analysis results are provided for both a signalized and unsignalized roundabout type at this location. Given the context of the site and the style of other roundabouts in Whitehorse, the unsignalized style is preferred. As a single-lane, four-leg unsignalized roundabout, the Heron Drive intersection is projected to operate at LOS A at the 2038 horizon. The westbound movement is projected to operate at LOS B in the AM peak hour with a 95th percentile queue of 26 m. All other movements are projected to operate at LOS A. Based on these results, a single-lane roundabout would operate acceptably at this location at the 2038 horizon.

Table 6.3 – Roundabout Analysis Results: Falcon Drive South (2038 Horizon)

		Volume (veh/hr)	Ave Delay (sec.)	Unsignalized LOS	Signalized LOS	Avg. Queue (m)	95th %ile Queue (m)
AM Peak 2038	SB	580	2.1	A	A	0.1	0.0
	EB	690	16.6	C	B	9.3	59.5
	NB	323	3.9	A	A	1.1	5.6
	All	1593	8.7	A	A	-	-
PM Peak 2038	SB	630	5.2	A	A	2.0	9.3
	EB	207	1.5	A	A	0.2	0.0
	NB	695	4.2	A	A	0.9	4.7
	All	1532	4.3	A	A	-	-

Analysis results are provided for both a signalized and unsignalized roundabout type at this location. Given the context of the site and the style of other roundabouts in Whitehorse, the unsignalized style is preferred. As a single-lane, three-leg unsignalized roundabout, the Falcon Drive South intersection is projected to operate at LOS A at the 2038 horizon. The eastbound movement is projected to operate at LOS C in the AM peak hour with a 95th percentile queue of 60 m. All other movements are projected to operate at LOS B or better. Based on these results, a single-lane roundabout would operate acceptably at this location at the 2038 horizon

7.0 SAFETY ASSESSMENT

In order to evaluate historic traffic concerns along Hamilton Boulevard, collision data was provided by the City of Whitehorse and Yukon Provincial Government spanning the most recent 10-year period (2007 – 2017). It should be noted that the collision data is limited to *reported* incidents – that is, incidents where an official police report was filed. Collisions that were unreported during this time period are not included. In addition, near misses, or narrowly avoided incidents, are typically also unreported in official collision statistics.

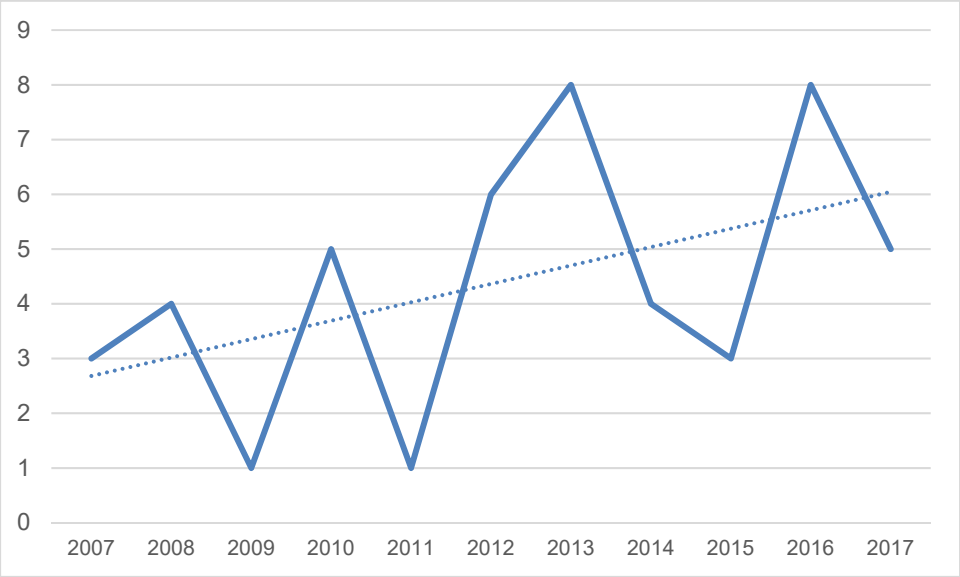
It should also be noted that due to the format of the data, the Hamilton Boulevard corridor was assessed as a whole rather than individual intersections or locations. This is due to the fact that some locations provided in the collision data could not be specifically identified. For example, some collisions were reported at the intersection of Hamilton Boulevard & Thompson Road. However, Thompson Road operates as a loop road that intersects Hamilton Boulevard in two locations. Therefore, the reported incident could have occurred at either location.

A review of the collision data indicated a number of duplicate records. In total, 85 reported incidents were provided between 2007 and 2017. After removing duplicates, approximately 48 reported incidents remained. **Table 7.1** summarizes the total number of incidents for each year. **Figure 7.1** provides a graphical presentation of the annual number of reported incidents. The results indicate a general rising trend in the number of reported incidents. A further breakdown of this data is therefore warranted.

Table 7.1 – Total Number of Incidents

	Number of Reported Incidents
2007	3
2008	4
2009	1
2010	5
2011	1
2012	6
2013	8
2014	4
2015	3
2016	8
2017	5
TOTAL	**48**

Figure 7.1 – Number of Reported Incidents



7.1 COLLISION TYPES

Collisions were cataloged into two general categories – Property Damage over $1000 and Personal Injury. Incidents involving Personal Injury may also include Property Damage over $1000, however Property Damage over $1000 did not involve Personal Injury. In other words, if an incident involved Personal Injury, it became the overruling classification.

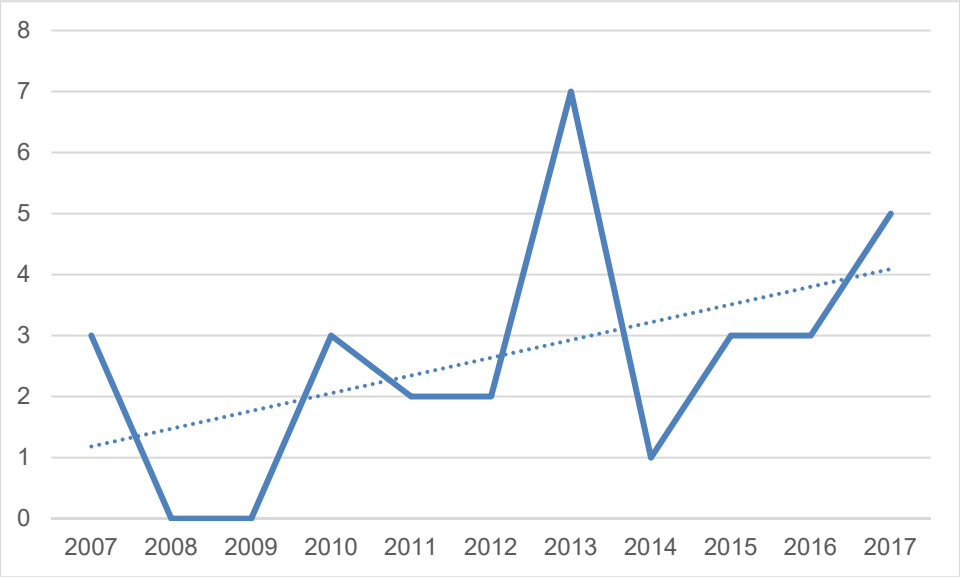
In addition, collisions were categorized as follows, based on the manner in which the collision occurred:

- Fixed Object
- Intersection
- Left Turn
- Off Road Left
- Off Road Right
- Rear End
- Side Swipe
- Other
- Unknown

Data was also provided to indicate the road surface conditions when the incident occurred, weather conditions, and general lighting conditions.

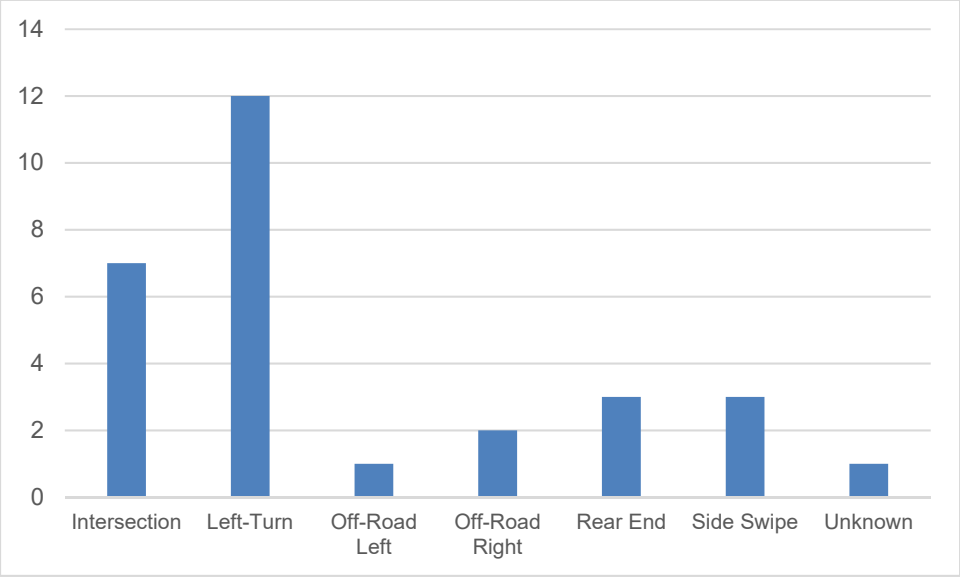
Figure 7.2 illustrates the number of personal injuries that have occurred over the 10-year time period.

Figure 7.2 – Number of Injuries



In total, 29 injuries have occurred over the 10-year time period. With the exception of incidents in 2013 and 2017 where multiple injuries occurred, the total number of injuries have remained relatively flat at 3 injuries per year or less. A further breakdown of injuries based on collision type is provided in **Figure 7.3**.

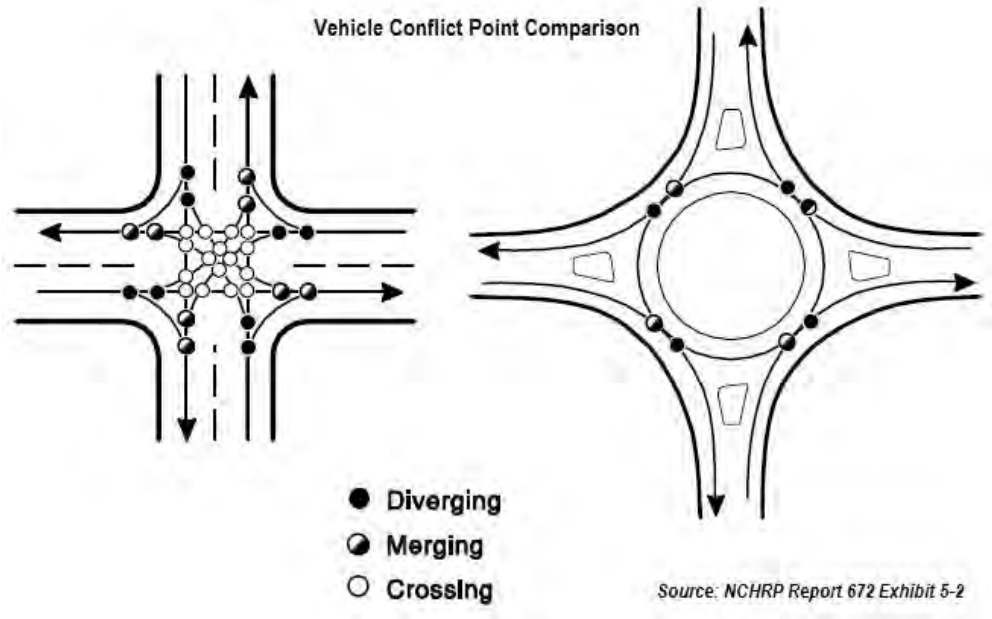
Figure 7.3 – Injury-Involving Collision Types



A traditional 4-legged intersection consists of 32 conflict points, or locations where vehicle paths may potentially cross. Of the 32 conflict points, 8 are categorized diverging (typically involving rear end collisions and low risk of injury), 8 are categorized as merging (typically involving side-swipe collisions and low risk of injury), and 16 are

categorized as crossing (typically involving broadside collisions, with a higher risk of injury). By comparison, a roundabout consists of 8 conflict points, of which 4 are categorized as diverging and 4 are categorized as diverging.

Figure 7.4 – Intersection Conflict Points (image source: FHWA)



As noted in Figure 7.3, the majority of injuries have occurred either at intersections or when making a left-turn. While details for the circumstances around these incidents is not provided, collisions involving left-turns and at intersections generally occur due to miscommunication between drivers regarding priority, misjudgment in opposing vehicle travel speeds and misjudgment in the available gap in traffic in complete a turn. Therefore, improvements to the operations of intersections and for left-turns along the corridor may potentially reduce the number of injuries that occur. In addition, roundabouts at intersections may also reduce both of these types of incidents involving injuries.

7.2 ROAD SEGMENT CRASH RATE CALCULATION

To calculate the crash rate for Hamilton Boulevard the following formula is applied:

$$R = [100{,}000{,}000 \times C] / [365 \times N \times V \times L]$$

Where: R = Crash rate for the road segment expressed as crashes per 100 million vehicle kilometers of travel

C = Total number of crashes in the study period (48 reported incidents)

N = Number of years of data (10 years)

V = Number of vehicles per day, both directions

L = Length of the roadway segment (approximately 1.5km)

To estimate the number of vehicles per day, standard engineering practice was followed by multiplying the PM peak hour volumes by a factor of 10. Average two-way PM peak hour volumes along the Hamilton Boulevard corridor calculated as 925 vehicles. Therefore, average daily two-way traffic volumes are calculated as 9,250 vehicles per day.

Therefore, applying the formula:

R = [100,000,000 x C] / [365 x N x V x L]

R = [100,000,000 x 48] / [365 x 10 x 9,250 x 1.5]

R = 94.8 crashes per 100 million vehicle kilometers of travel on Hamilton Boulevard

In order to assess the severity of this crash rate, further comparisons should be made by the City to other roadway segments.

8.0 CONCEPTUAL DESIGN

Conceptual design drawings were prepared for the 2038 horizon recommendations including both traditional intersection and roundabout options for the Heron Drive, Lazulite Drive, and Falcon Drive South locations. These concepts are illustrated on **Figures 8.1 to 8.9** and the details of the designs are included below:

Hamilton Boulevard & Mallard Way

No improvements are recommended at this intersection.

Hamilton Boulevard & Heron Drive – Signalized Intersection

Improvements to convert this intersection include the following:

- Road widening on south leg of intersection extends halfway (175m) to Hamilton Boulevard and Falcon Drive (North) intersection.
- Sidewalk Upgrades
- Traffic Signal Upgrades
- Street Lighting Upgrades
- Pavement Marking Upgrades

Hamilton Boulevard & Heron Drive – Roundabout

Significant improvements would be required to convert this intersection to a roundabout. Hamilton Boulevard currently runs at a 6% grade roughly from Mallard Way to Falcon Drive North, including through this intersection. The TAC guidelines recommend a maximum grade of 3% through roundabouts. In order to meet this standard, Hamilton Boulevard would need to be lowered from about 85m north of the intersection to about 350m south (to Falcon Dr N). The proposed profile change is illustrated in **Figure 8.4**. This work would include the following:

- Intersection to be completely overhauled
- Roadway work extends 80m on the east and west leg of the intersection

The roundabout design includes crosswalks as well as new multi-use trails on the east and west sides of Hamilton Boulevard which will allow cyclists to exit the existing bike lane and bypass the roundabout.

Hamilton Boulevard & Falcon Drive North

Improvements to convert this to a signalized intersection include the following:

- Road widening on north leg of intersection extends halfway (175m) to Hamilton Boulevard and Heron/Thompson Dr N intersection
- Sidewalk Upgrades
- Traffic Signal Upgrades
- Pavement Marking Upgrades

Hamilton Boulevard & Lazulite Drive – Signalized Intersection

Improvements to convert this to a signalized intersection include the following:

- Sidewalk Upgrades
- Traffic Signal Upgrades
- Pavement Marking Upgrades

Hamilton Boulevard & Lazulite Drive – Roundabout

Improvements to convert this intersection to a roundabout include the following:

- Roadway work extends 80m on the east and west leg (both lanes) of the intersection, 140m on north leg (west leg), and 200m on the south leg (east lane).
- Assumed new asphalt trail required to by-pass asphalt trail (bike path)
- Assume all existing asphalt removed, reshape granular base under existing asphalt and new road structure outside of existing limit (as required). Pave all new asphalt in project area.

The roundabout design includes crosswalks as well as new multi-use trails on the east and west sides of Hamilton Boulevard which will allow cyclists to exit the existing bike lane and bypass the roundabout.

Hamilton Boulevard & Falcon Drive South

Improvements to convert this to a signalized intersection include the following:

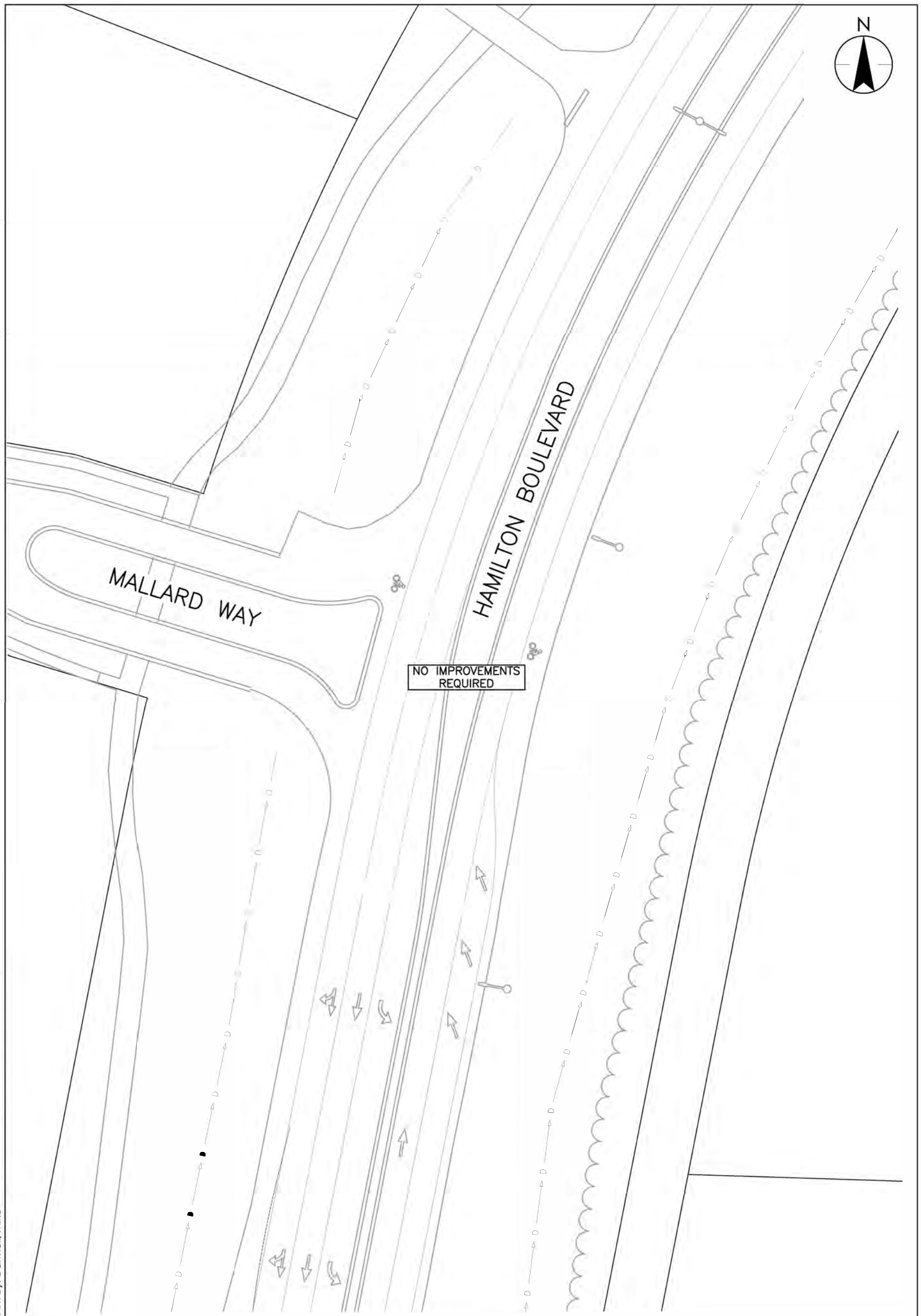
- Assume 60m of road widening on west leg of intersection for right turn lane.
- Sidewalk Upgrades
- Traffic Signal Upgrades
- Pavement Marking Upgrades

Hamilton Boulevard & Falcon Drive South – Roundabout

Improvements to convert this intersection to a roundabout include the following:

- Roadway work extends 80m on the west leg (both lanes) of the intersection, 130m on north leg (west lane), and 200m on the south leg (east lane).
- Assumed new asphalt trail required to by-pass asphalt trail (bike path)
- Assume all existing asphalt removed, reshape granular base under existing asphalt and new road structure outside of existing limit (as required). Pave all new asphalt in project area.

The roundabout design includes crosswalks as well as a new multi-use trail on the west side of Hamilton Boulevard which will allow cyclists to exit the existing bike lane and bypass the roundabout.



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ORIGINAL SHEET - ANSI B

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144902685

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TRANSPORTATION STUDY

Figure No.
8.1

Title
HAMILTON BOULEVARD &
MALLARD WAY INTERSECTION
IMPROVEMENTS

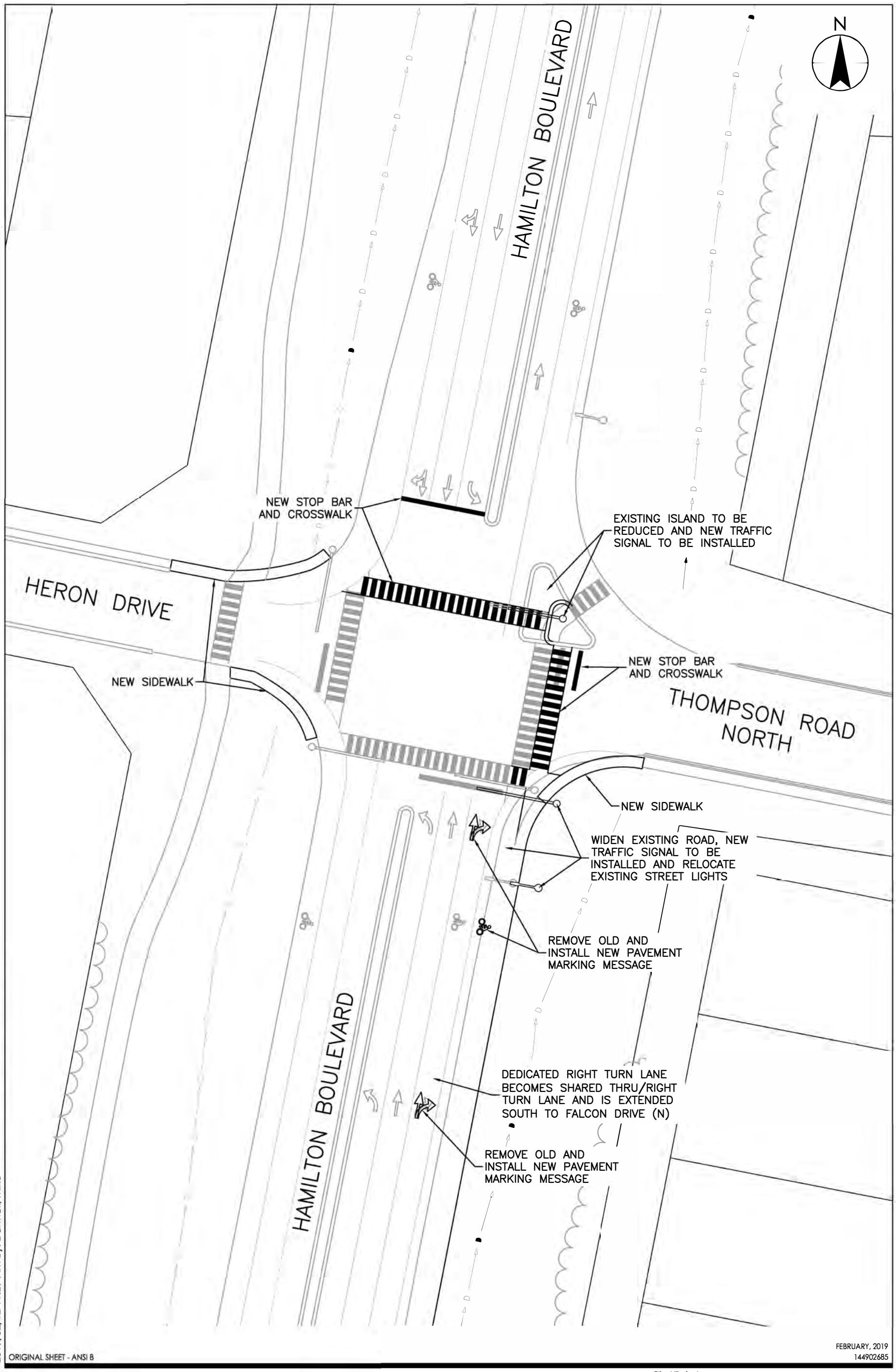

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Figure No.
8.2

Title
HAMILTON BOULEVARD &
HERON DRIVE INTERSECTION
IMPROVEMENTS

N

HAMILTON BOULEVARD

NEW MULTI–USE TRAIL

NEW CURB & GUTTER AND SHOULDER LINE

REMOVE OLD AND INSTALL NEW PAVEMENT MARKING MESSAGE

NEW CURB AND SHOULDER LINE

NEW MULTI–USE TRAIL

REMOVE EXISTING TRAFFIC SIGNALS

NEW CURB & GUTTER AND SHOULDER LINE

NEW MULTI–USE TRAIL

REMOVE EXISTING TRAFFIC SIGNALS

HERON DRIVE

NEW CURBS AND CONCRETE APRON

NEW CURB AND SHOULDER LINE

THOMPSON ROAD NORTH

NEW CURB AND SHOULDER LINE

REMOVE EXISTING TRAFFIC SIGNALS

NEW MULTI–USE TRAIL

REMOVE EXISTING TRAFFIC SIGNALS

NEW CURB & GUTTER AND SHOULDER LINE

NEW MULTI–USE TRAIL

NEW CURB AND SHOULDER LINE

REMOVE OLD AND INSTALL NEW PAVEMENT MARKING MESSAGE

NEW CURB & GUTTER AND SHOULDER LINE

HAMILTON BOULEVARD

NEW MULTI–USE TRAIL

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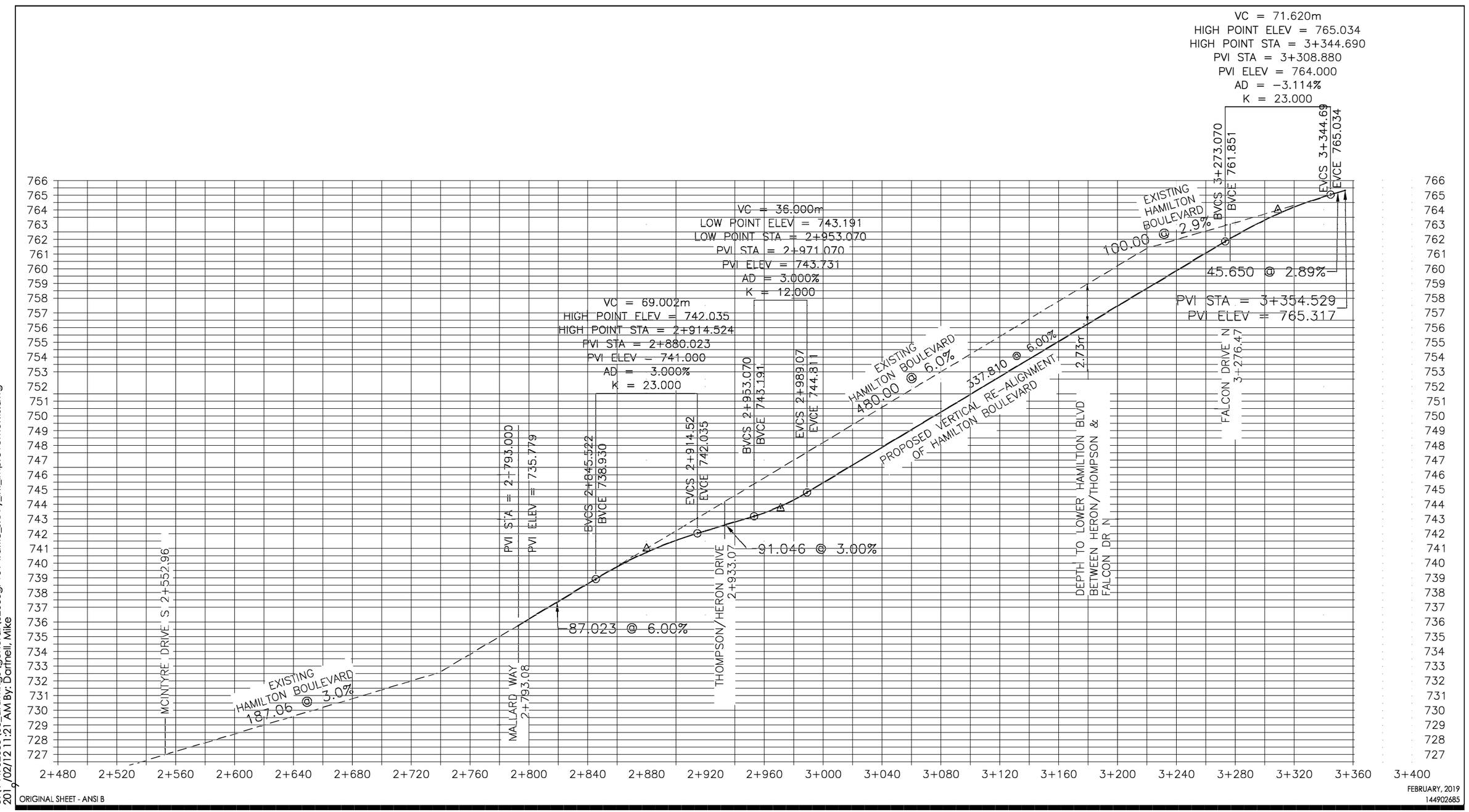
Figure No.
8.3

Title
HAMILTON BOULEVARD &
HERON DRIVE INTERSECTION
IMPROVEMENTS



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Legend

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Figure No.
8.4

Title
HAMILTON BOULEVARD
FALCON DR N TO MALLARD
WAY IMPROVEMENTS

N

HAMILTON BOULEVARD

DEDICATED RIGHT TURN LANE BECOMES SHARED THRU/RIGHT TURN LANE AND IS EXTENDED NORTH TO HERON DRIVE

WIDEN EXISTING ROAD AND RELOCATE EXISTING STREET LIGHTS

NEW STOP BAR AND CROSSWALK

INSTALL NEW TRAFFIC SIGNAL

NEW SIDEWALK

REMOVE OLD AND INSTALL NEW PAVEMENT MARKING MESSAGE

INSTALL NEW TRAFFIC SIGNAL

FALCON DRIVE NORTH

NEW SIDEWALK

INSTALL NEW TRAFFIC SIGNAL

NEW STOP BAR AND CROSSWALK

INSTALL NEW TRAFFIC SIGNAL

RELOCATE EXISTING STREET LIGHTS

REMOVE OLD AND INSTALL NEW PAVEMENT MARKING MESSAGE

HAMILTON BOULEVARD

REMOVE OLD AND INSTALL NEW PAVEMENT MARKING MESSAGE

RELOCATE EXISTING STREET LIGHTS

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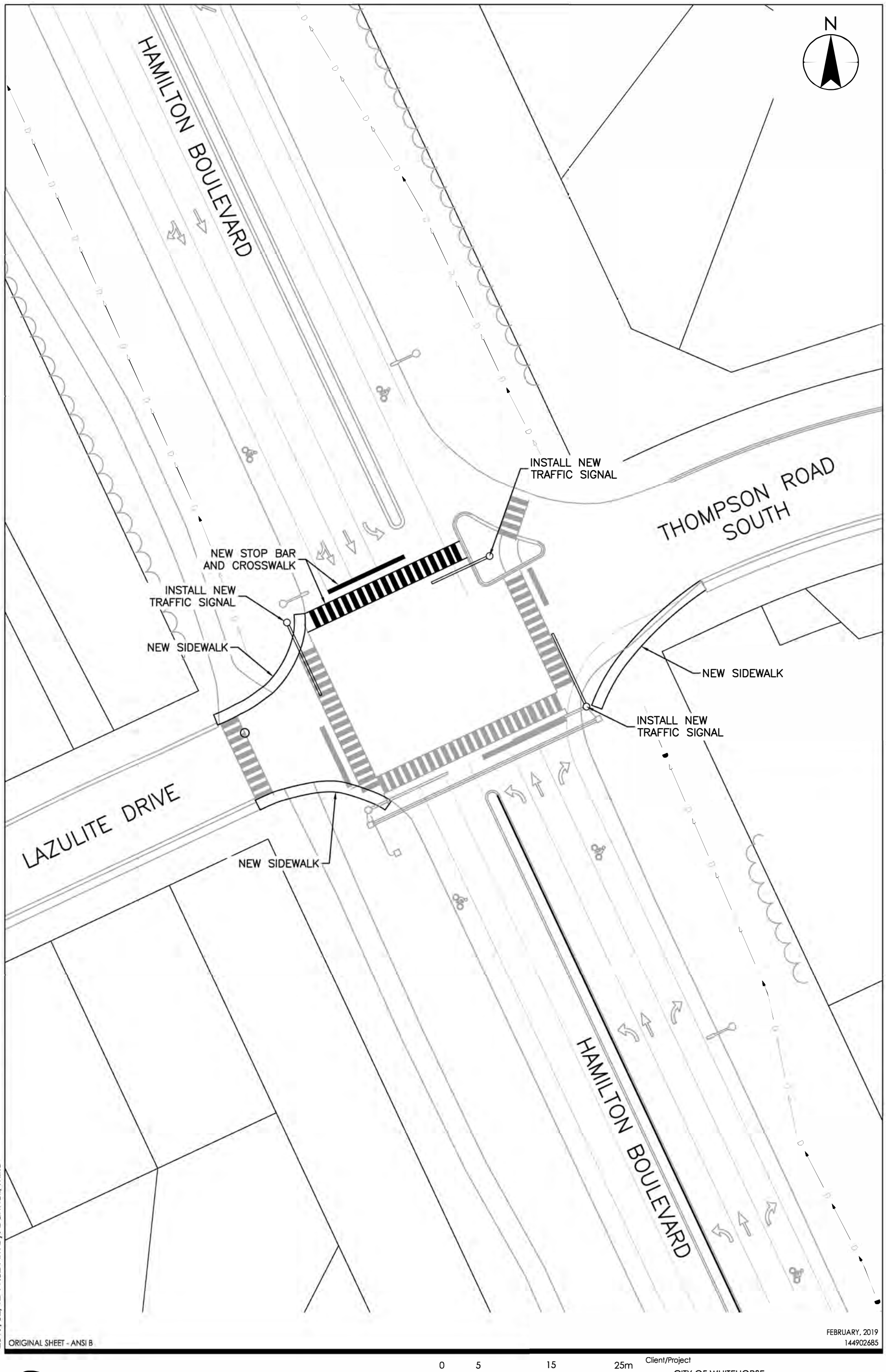
Figure No.
8.5

Title
HAMILTON BOULEVARD AND
FALCON DRIVE NORTH
INTERSECTION IMPROVEMENTS



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0 5 15 25m

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Figure No.
8.6

Title
HAMILTON BOULEVARD &
LAZULITE DRIVE INTERSECTION
IMPROVEMENTS

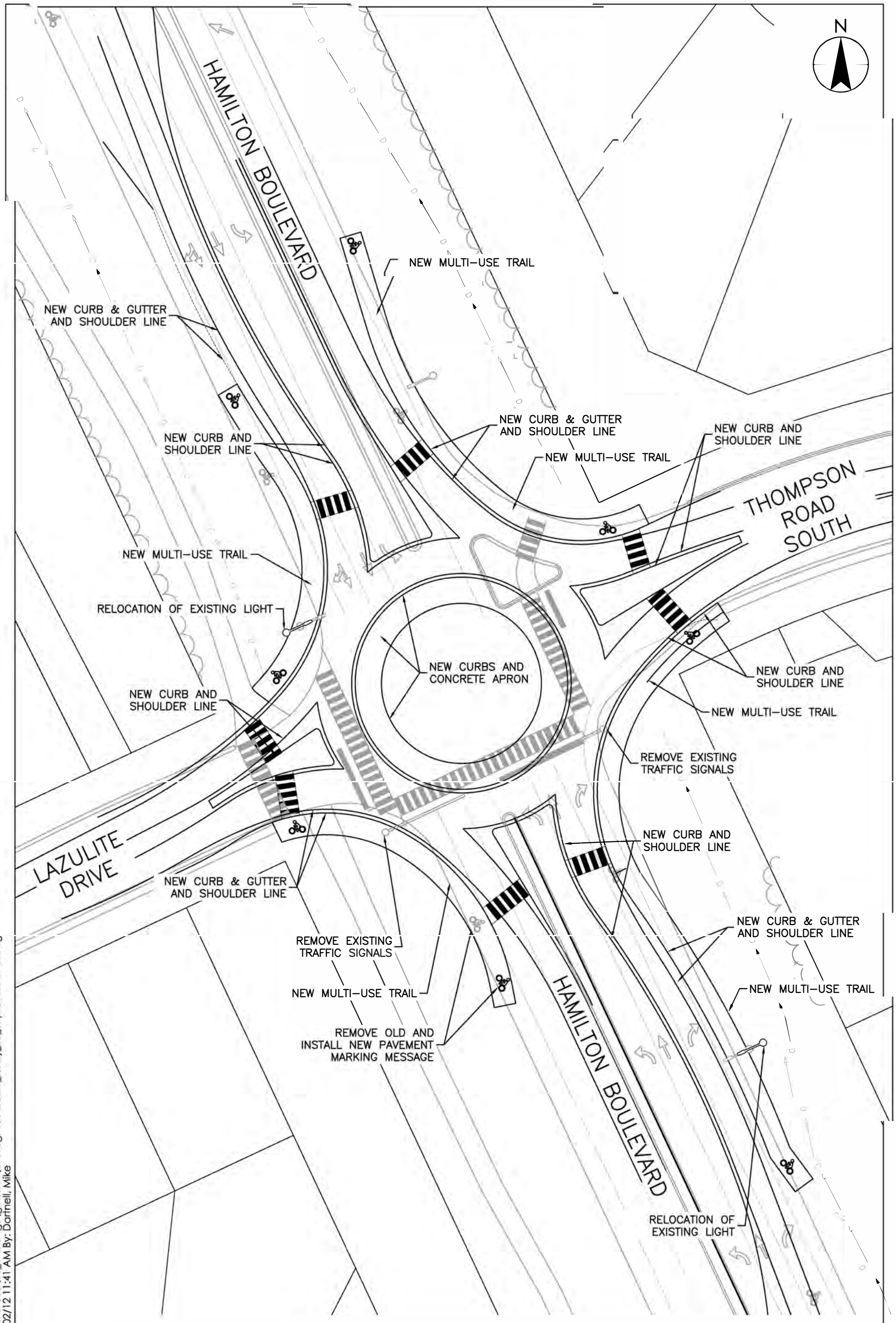

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Figure No.
8.7

Title
HAMILTON BOULEVARD & LAZULITE DRIVE INTERSECTION IMPROVEMENTS

N

HAMILTON BOULEVARD

INSTALL NEW
TRAFFIC SIGNAL

NEW STOP BAR
AND CROSSWALK

NEW SIDEWALK

INSTALL NEW
TRAFFIC SIGNAL

NEW STOP BAR
AND CROSSWALK

NEW CROSSWALK

FALCON DRIVE
SOUTH

INSTALL NEW
TRAFFIC SIGNAL

NEW SIDEWALK

NEW PAVEMENT
MARKING MESSAGE

ADD ADDITIONAL EASTBOUND
LANE FOR EXCLUSIVE LEFT
AND RIGHT TURN LANES

HAMILTON BOULEVARD

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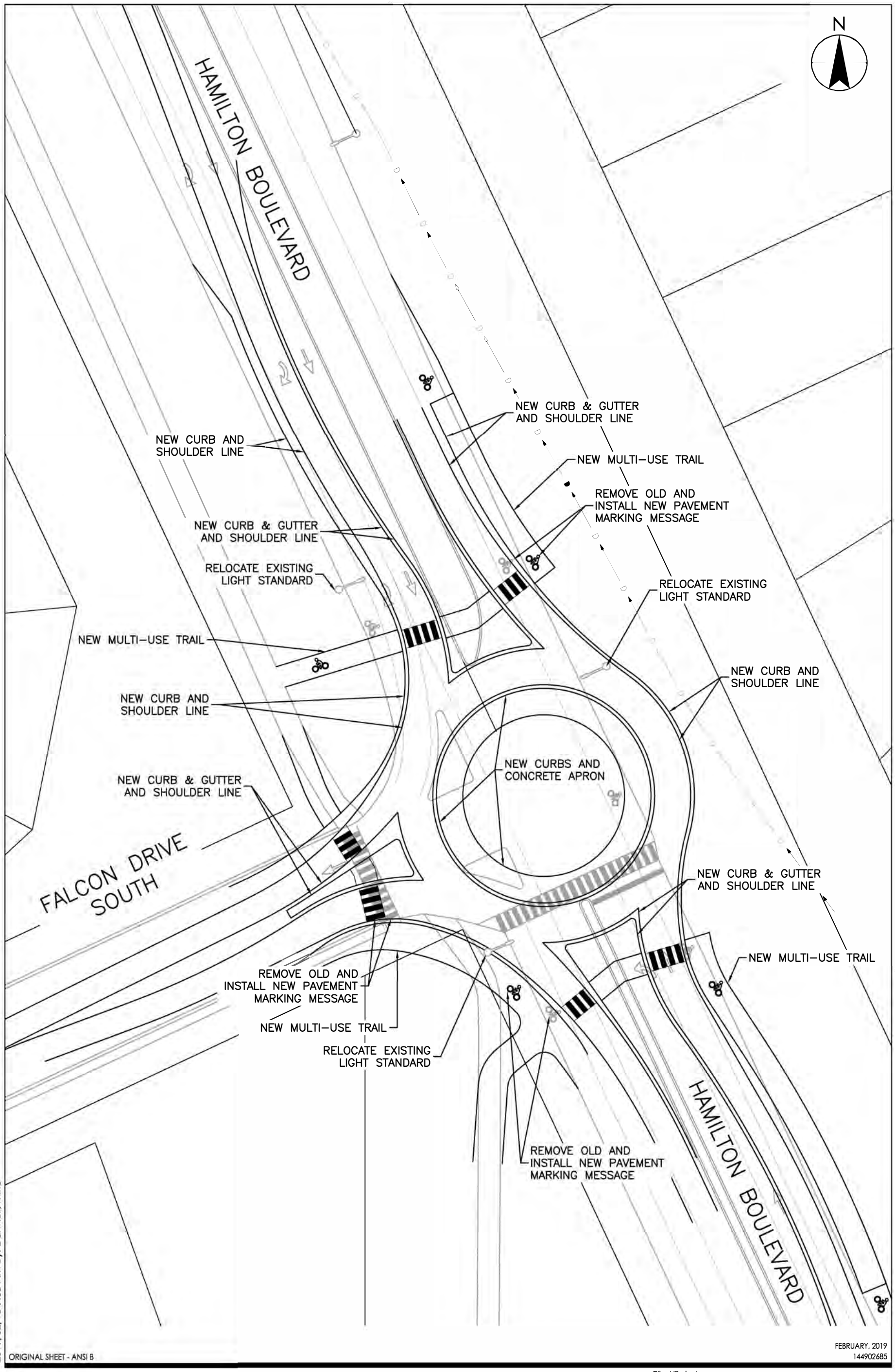
TRANSPORTATION STUDY

Figure No.
8.8

Title
HAMILTON BOULEVARD &
FALCON DRIVE SOUTH
INTERSECTION IMPROVEMENTS



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2019/02/13 9:03 AM By: Darnell, Mike

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Figure No.
8.9

Title
HAMILTON BOULEVARD &
FALCON DRIVE SOUTH
INTERSECTION IMPROVEMENTS

8.1 COST ESTIMATE

An order-of-magnitude opinion of probable cost was developed for the high-level scope of upgrades based on estimated detail design and project management costs; estimated area and quantity measurements using unit rate estimates from recent City of Whitehorse projects, including a 30% contingency. Any deep utility relocation costs have not been included. The resulting costs estimated for each of the recommended intersection upgrades are summarized below:

- Hamilton Boulevard & Heron Drive:
    - Traditional intersection: $1.1 M
    - Roundabout: $4.7 M
- Hamilton Boulevard & Falcon Drive North: $1.0 M
- Hamilton Boulevard & Lazulite Drive:
    - Traditional intersection: $0.9 M
    - Roundabout: $1.7 M
- Hamilton Boulevard & Falcon Drive South: $0.8 M
    - Traditional intersection: $0.8 M
    - Roundabout: $1.1 M

Any opinion of cost cannot consist of all contractor mobilization and front-end costs, overhead and profit, as well as detailed schedule of values, which would require the review of drawings, specifications, and material schedules. Stantec does not guarantee the accuracy of these costs and shall incur no liability where actual construction costs are exceeded.

In preparation of the costing we have assumed:

- all work is done under a single contract;
- summer construction;
- public competitive tender with minimum of three bidders;
- completed in 2019; and
- no allowance for escalation;

The opinions in the document are based on conditions and information existing at the time the document was published, and do not consider any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party because of decisions made or actions taken based on this document.

Some of the findings herein are based on spot review and others are based on a visual review of the surface conditions. Deficiencies that may exist but were not recorded in this report were not apparent, given the level of study undertaken. The material in this report reflects the best judgement of Stantec considering the information available at the time of preparation.

9.0 EVALUATION

The previous analysis has shown that the intersections of Hamilton Boulevard & Heron Drive and Hamilton Boulevard & Lazulite Drive are expected to operate acceptably as either roundabouts or traditional signalized intersections through the 2038 horizon. These options were evaluated to identify their comparable benefits.

9.1 EVALUATION CRITERIA

Through discussion with the project team and the City, the following criteria were identified to evaluate the options:

- **Traffic Operations** – evaluated in terms of vehicle delay (LOS) and queue length
- **Pedestrian/Cyclist Accommodation** – evaluated based on industry knowledge and experience of the relative benefits of each intersection type in accommodating these active transportation modes
- **Cost** – evaluated based on high-level assessment of the options relative to each other
- **Maintenance** – evaluated based on the high-level cost and complexity of maintaining the infrastructure
- **Safety** – evaluated based on industry knowledge and experience of the relative safety impacts of each intersection type

9.2 EVALUATION OF OPTIONS

The two intersection options were evaluated against the above criteria. **Table 8.1** provides a high-level rank of the options for each criterion, with further information below.

Table 8.1 – Evaluation of Traditional Intersection Treatment vs. Roundabout

Criteria	Traditional (Signalized) Intersection	Roundabout
Traffic Operations	✓	✓✓
Pedestrian/Cyclist Accommodation	✓✓	✓
Cost	✓✓	✓
Maintenance	✓	✓
Safety	✓	✓✓
OVERALL	✓✓✓✓✓✓✓	✓✓✓✓✓✓✓

Traffic Operations

For all three locations evaluated, the traffic analyses showed better results (lower delays and shorter queues) for the roundabout options. While some movements were found to be slightly better with a signalized intersection (e.g. westbound movement at Heron Drive), the majority of the movements and the overall intersection performance showed better results under the roundabout scenario.

There have been limited studies on the impacts of roundabouts on public transit. Generally, it is expected that bus service may be improved by the reduced travel time experienced by all vehicles through a roundabout vs. a traditional signalized intersection.

Pedestrian/Cyclist Accommodation

There does not appear to be industry consensus on the relative benefits of roundabout vs. intersections in accommodating pedestrians and cyclists. The benefits and limitations of both depend on a strong design. However, there is some belief that roundabout may be slightly more challenging for pedestrians, particularly those with vision limitations. Based on the high traffic volumes expected along Hamilton Boulevard, in this case it expected that traditional signalized intersections would better accommodate pedestrians and cyclists, however, they could be safely accommodated in either alternative.

Cost

The costs associated with building a roundabout are higher than converting to a signalized intersection due to the extent of rebuilding required. At Heron Drive this difference is even greater due to the required profile change through the corridor. Signalized intersections would require only minor upgrades plus the cost to install traffic signals.

Maintenance

Maintenance costs for roundabouts may be lower due to the elimination of electrical and hardware costs associated with traffic signals; however, the additional splitter islands present more of a maintenance challenge in winter conditions. At this high level, the cost differentials between the two options are assumed to be negligible.

Safety

Roundabouts are generally considered to be the safer intersection configuration, particularly for single-lane roundabouts as proposed in this study. While the total number of collisions is typically higher at a roundabout, the severity of these collisions is greatly reduced, resulting in fewer injuries and deaths.

9.2.1 Summary

The results of the evaluation show that overall, both options are equally feasible and provide different but comparable benefits to the Hamilton Boulevard corridor at the two study intersections. It is expected that the decision to move forward with one of the options will take into account City policy and direction as well as potentially public input and available funding.

Looking at the corridor as a whole and considering the City's TDM policies, it may not be ideal to have traffic signals at every intersection along the corridor and may be beneficial to include a roundabout to increase overall travel times through the corridor.

10.0 CONCLUSION

The traffic analysis conducted for the study corridor of Hamilton Boulevard from Mallard Way to Falcon Drive South identified several existing and future traffic concerns. The intersections as built today will not adequately support the projected traffic volumes and are expected to require improvements by the 10-year (2028) horizon.

The following recommendations were identified based on the preceding analysis:

Hamilton Boulevard & Mallard Way

This intersection is projected to continue operating acceptably into the 20-year horizon. No improvements are recommended.

Hamilton Boulevard & Heron Drive

Two options were identified to improve this intersection:

- Install traffic signals and construct an additional northbound lane, or
- Construct a single lane roundabout

The evaluation found that both options are equally feasible and provide different but comparable benefits to the Hamilton Boulevard corridor; however, it found that the roundabout has a significantly higher cost than the signalized intersection.

Hamilton Boulevard & Falcon Drive North

In order to accommodate the future traffic volumes at this intersection, it is recommended to install traffic signals. In addition, it may be required to construct an additional northbound lane if and when the traffic volumes exceed the existing capacity of the intersection. This is projected to occur around the 2038 horizon, but conditions should be monitored in the future.

Hamilton Boulevard & Lazulite Drive

Two options were identified to improve this intersection:

- Install traffic signals, or
- Construct a single lane roundabout

The evaluation found that both options are equally feasible and provide different but comparable benefits to the Hamilton Boulevard corridor.

Hamilton Boulevard & Falcon Drive South

Two options were identified to improve this intersection:

- Install traffic signals and construct an eastbound right lane, or
- Construct a single lane roundabout

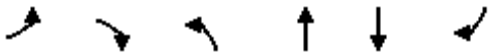
The evaluation found that both options are equally feasible and provide different but comparable benefits to the Hamilton Boulevard corridor. These improvements will be required when the traffic volumes exceed the existing

capacity of the intersection. This is projected to occur around the 2038 horizon, but conditions should be monitored in the future.

Overall Corridor Recommendations

Overall, the results suggest that improvements will be required at four of the five study intersections in the future. Traffic signals are recommended at Falcon Drive North; while either traffic signals or conversion to a roundabout is recommended at Heron Drive, Lazulite Drive, and Falcon Drive South. Both options are equally feasible and provide different but comparable benefits to the Hamilton Boulevard corridor. The roundabouts are likely to improve traffic operating conditions and safety but come at a much higher cost to construct. Depending on available funding, it may be beneficial to construct a roundabout at at least one of these locations to improve the overall corridor travel times.

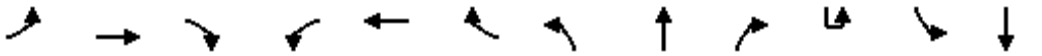
Appendix A SYNCHRO REPORTS: 2018 CONDITIONS



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	68	0	864	153	14
Future Volume (Veh/h)	0	68	0	864	153	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	74	0	939	166	15
Pedestrians	11			11		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			1		
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	654	112	177			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	654	112	177			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	92	100			
cM capacity (veh/h)	395	899	1381			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	74	470	470	111	70
Volume Left	0	0	0	0	0
Volume Right	74	0	0	0	15
cSH	899	1700	1700	1700	1700
Volume to Capacity	0.08	0.28	0.28	0.07	0.04
Queue Length 95th (m)	2.0	0.0	0.0	0.0	0.0
Control Delay (s)	9.4	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.4	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

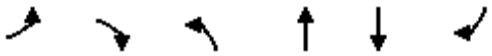


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	60	0	14	9	0	110	1	716	4	30	15	158
Future Volume (Veh/h)	60	0	14	9	0	110	1	716	4	30	15	158
Sign Control		Stop			Stop			Free				Free
Grade		0%			0%			0%				0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	0	15	10	0	120	1	778	4	0	16	172
Pedestrians		6			6			2				2
Lane Width (m)		3.7			3.7			3.7				3.7
Walking Speed (m/s)		1.1			1.1			1.1				1.1
Percent Blockage		1			1			0				0
Right turn flare (veh)												
Median type								None				None
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked										0.00		
vC, conflicting volume	998	1006	100	921	1008	786	190			0	788	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	998	1006	100	921	1008	786	190			0	788	
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			0.0	4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			0.0	2.2	
p0 queue free %	47	100	98	95	100	64	100			0	98	
cM capacity (veh/h)	123	232	929	215	232	332	1373			0	822	

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	80	130	1	778	4	16	115	69
Volume Left	65	10	1	0	0	16	0	0
Volume Right	15	120	0	0	4	0	0	12
cSH	146	319	1373	1700	1700	822	1700	1700
Volume to Capacity	0.55	0.41	0.00	0.46	0.00	0.02	0.07	0.04
Queue Length 95th (m)	20.7	14.5	0.0	0.0	0.0	0.5	0.0	0.0
Control Delay (s)	55.9	23.8	7.6	0.0	0.0	9.5	0.0	0.0
Lane LOS	F	C	A			A		
Approach Delay (s)	55.9	23.8	0.0			0.8		
Approach LOS	F	C						

Intersection Summary				
Average Delay	6.5			
Intersection Capacity Utilization	55.4%	ICU Level of Service		B
Analysis Period (min)	15			

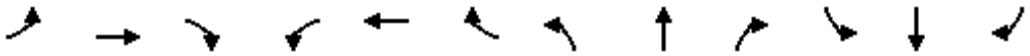
Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	11
Future Volume (Veh/h)	11
Sign Control	
Grade	
Peak Hour Factor	0.92
Hourly flow rate (vph)	12
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage veh)	
Upstream signal (m)	
pX, platoon unblocked	
vC, conflicting volume	
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	
tC, single (s)	
tC, 2 stage (s)	
tF (s)	
p0 queue free %	
cM capacity (veh/h)	
Direction, Lane #	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	227	109	42	448	112	59
Future Volume (Veh/h)	227	109	42	448	112	59
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	247	118	46	487	122	64
Pedestrians	9					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	742	102	195			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	742	102	195			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	27	87	97			
cM capacity (veh/h)	336	925	1363			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	365	46	487	81	105
Volume Left	247	46	0	0	0
Volume Right	118	0	0	0	64
cSH	423	1363	1700	1700	1700
Volume to Capacity	0.86	0.03	0.29	0.05	0.06
Queue Length 95th (m)	65.4	0.8	0.0	0.0	0.0
Control Delay (s)	47.7	7.7	0.0	0.0	0.0
Lane LOS	E	A			
Approach Delay (s)	47.7	0.7		0.0	
Approach LOS	E				

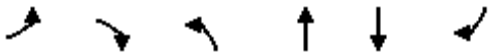
Intersection Summary			
Average Delay	16.4		
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	136	9	96	57	4	71	13	309	30	21	166	42
Future Volume (Veh/h)	136	9	96	57	4	71	13	309	30	21	166	42
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	148	10	104	62	4	77	14	336	33	23	180	46
Pedestrians		4			4			3			3	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	622	654	120	616	644	343	230			373		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	622	654	120	616	644	343	230			373		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	53	97	88	80	99	88	99			98		
cM capacity (veh/h)	313	370	903	313	375	648	1330			1177		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	262	143	14	336	33	23	120	106
Volume Left	148	62	14	0	0	23	0	0
Volume Right	104	77	0	0	33	0	0	46
cSH	426	437	1330	1700	1700	1177	1700	1700
Volume to Capacity	0.62	0.33	0.01	0.20	0.02	0.02	0.07	0.06
Queue Length 95th (m)	30.5	10.7	0.2	0.0	0.0	0.5	0.0	0.0
Control Delay (s)	26.1	17.2	7.7	0.0	0.0	8.1	0.0	0.0
Lane LOS	D	C	A			A		
Approach Delay (s)	26.1	17.2	0.3			0.7		
Approach LOS	D	C						

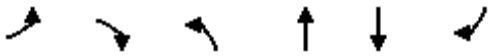
Intersection Summary				
Average Delay	9.2			
Intersection Capacity Utilization	44.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	270	204	21	81	291	35
Future Volume (Veh/h)	270	204	21	81	291	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	293	222	23	88	316	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	450	316	316			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	450	316	316			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	47	69	98			
cM capacity (veh/h)	556	724	1244			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	515	23	88	316	38
Volume Left	293	23	0	0	0
Volume Right	222	0	0	0	38
cSH	618	1244	1700	1700	1700
Volume to Capacity	0.83	0.02	0.05	0.19	0.02
Queue Length 95th (m)	67.4	0.4	0.0	0.0	0.0
Control Delay (s)	33.2	7.9	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	33.2	1.6		0.0	
Approach LOS	D				

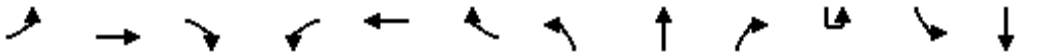
Intersection Summary			
Average Delay	17.6		
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	29	0	381	724	74
Future Volume (Veh/h)	0	29	0	381	724	74
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	32	0	414	787	80
Pedestrians				11	11	
Lane Width (m)				3.7	3.7	
Walking Speed (m/s)				1.1	1.1	
Percent Blockage				1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1045	444	787			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1045	444	787			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	94	100			
cM capacity (veh/h)	222	555	828			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	32	207	207	525	342
Volume Left	0	0	0	0	0
Volume Right	32	0	0	0	80
cSH	555	1700	1700	1700	1700
Volume to Capacity	0.06	0.12	0.12	0.31	0.20
Queue Length 95th (m)	1.4	0.0	0.0	0.0	0.0
Control Delay (s)	11.9	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.9	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	35.4%	ICU Level of Service	A
Analysis Period (min)	15		

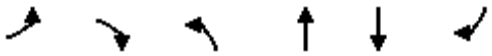


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	42	2	5	9	0	68	13	306	10	10	105	589
Future Volume (Veh/h)	42	2	5	9	0	68	13	306	10	10	105	589
Sign Control		Stop			Stop			Free				Free
Grade		0%			0%			0%				0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	2	5	10	0	74	14	333	11	0	114	640
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				None
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked										0.00		
vC, conflicting volume	1271	1282	362	915	1313	333	724			0	344	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1271	1282	362	915	1313	333	724			0	344	
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			0.0	4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			0.0	2.2	
p0 queue free %	55	99	99	95	100	89	98			0	91	
cM capacity (veh/h)	102	146	635	205	140	663	874			0	1212	

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	53	84	14	333	11	114	427	297
Volume Left	46	10	14	0	0	114	0	0
Volume Right	5	74	0	0	11	0	0	84
cSH	112	524	874	1700	1700	1212	1700	1700
Volume to Capacity	0.47	0.16	0.02	0.20	0.01	0.09	0.25	0.17
Queue Length 95th (m)	16.0	4.3	0.4	0.0	0.0	2.4	0.0	0.0
Control Delay (s)	63.4	13.2	9.2	0.0	0.0	8.3	0.0	0.0
Lane LOS	F	B	A			A		
Approach Delay (s)	63.4	13.2	0.4			1.1		
Approach LOS	F	B						

Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	41.9%	ICU Level of Service		A
Analysis Period (min)	15			

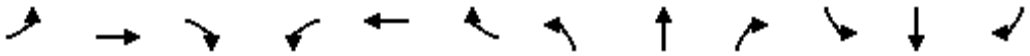
Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	77
Future Volume (Veh/h)	77
Sign Control	
Grade	
Peak Hour Factor	0.92
Hourly flow rate (vph)	84
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage veh)	
Upstream signal (m)	
pX, platoon unblocked	
vC, conflicting volume	
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	
tC, single (s)	
tC, 2 stage (s)	
tF (s)	
p0 queue free %	
cM capacity (veh/h)	
Direction, Lane #	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	76	37	99	196	469	137
Future Volume (Veh/h)	76	37	99	196	469	137
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	83	40	108	213	510	149
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1014	330	659			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1014	330	659			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	60	94	88			
cM capacity (veh/h)	208	666	925			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	123	108	213	340	319
Volume Left	83	108	0	0	0
Volume Right	40	0	0	0	149
cSH	267	925	1700	1700	1700
Volume to Capacity	0.46	0.12	0.13	0.20	0.19
Queue Length 95th (m)	17.3	3.0	0.0	0.0	0.0
Control Delay (s)	29.4	9.4	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	29.4	3.2		0.0	
Approach LOS	D				

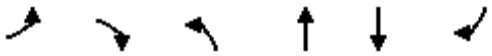
Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	12	18	35	7	53	92	198	61	109	286	127
Future Volume (Veh/h)	47	12	18	35	7	53	92	198	61	109	286	127
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	51	13	20	38	8	58	100	215	66	118	311	138
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1035	1097	224	833	1100	215	449			281		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1035	1097	224	833	1100	215	449			281		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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	93	97	82	95	93	91			91		
cM capacity (veh/h)	144	175	779	208	174	790	1108			1278		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	84	104	100	215	66	118	207	242
Volume Left	51	38	100	0	0	118	0	0
Volume Right	20	58	0	0	66	0	0	138
cSH	185	345	1108	1700	1700	1278	1700	1700
Volume to Capacity	0.45	0.30	0.09	0.13	0.04	0.09	0.12	0.14
Queue Length 95th (m)	16.2	9.5	2.3	0.0	0.0	2.3	0.0	0.0
Control Delay (s)	39.6	19.9	8.6	0.0	0.0	8.1	0.0	0.0
Lane LOS	E	C	A			A		
Approach Delay (s)	39.6	19.9	2.2			1.7		
Approach LOS	E	C						

Intersection Summary				
Average Delay	6.3			
Intersection Capacity Utilization	34.2%	ICU Level of Service		A
Analysis Period (min)	15			

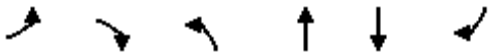


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	95	52	137	266	106	212
Future Volume (Veh/h)	95	52	137	266	106	212
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	57	149	289	115	230
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	702	115	115			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	702	115	115			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	72	94	90			
cM capacity (veh/h)	364	937	1474			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	160	149	289	115	230
Volume Left	103	149	0	0	0
Volume Right	57	0	0	0	230
cSH	465	1474	1700	1700	1700
Volume to Capacity	0.34	0.10	0.17	0.07	0.14
Queue Length 95th (m)	11.5	2.6	0.0	0.0	0.0
Control Delay (s)	16.8	7.7	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	16.8	2.6		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	29.4%	ICU Level of Service	A
Analysis Period (min)	15		

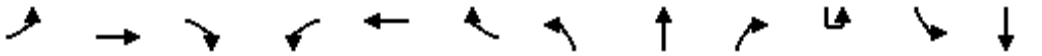
Appendix B SYNCHRO REPORTS: 2028 BASELINE CONDITIONS



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	83	0	1120	209	17
Future Volume (Veh/h)	0	83	0	1120	209	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	90	0	1217	227	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	844	122	227			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	844	122	227			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	302	906	1339			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	90	608	608	151	94
Volume Left	0	0	0	0	0
Volume Right	90	0	0	0	18
cSH	906	1700	1700	1700	1700
Volume to Capacity	0.10	0.36	0.36	0.09	0.06
Queue Length 95th (m)	2.5	0.0	0.0	0.0	0.0
Control Delay (s)	9.4	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.4	0.0		0.0	
Approach LOS	A				

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	34.3%	ICU Level of Service		A
Analysis Period (min)	15			

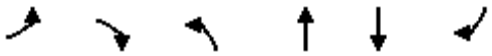


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	73	0	17	11	0	134	1	940	5	37	18	215
Future Volume (Veh/h)	73	0	17	11	0	134	1	940	5	37	18	215
Sign Control		Stop			Stop			Free				Free
Grade		0%			0%			0%				0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	79	0	18	12	0	146	1	1022	5	0	20	234
Pedestrians								4				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												
Median type								None				None
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked										0.00		
vC, conflicting volume	1305	1310	128	1203	1312	1022	248			0	1027	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1305	1310	128	1203	1312	1022	248			0	1027	
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			0.0	4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			0.0	2.2	
p0 queue free %	0	100	98	91	100	37	100			0	97	
cM capacity (veh/h)	43	153	895	133	153	233	1315			0	672	

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	97	158	1	1022	5	20	156	92
Volume Left	79	12	1	0	0	20	0	0
Volume Right	18	146	0	0	5	0	0	14
cSH	52	221	1315	1700	1700	672	1700	1700
Volume to Capacity	1.85	0.72	0.00	0.60	0.00	0.03	0.09	0.05
Queue Length 95th (m)	71.7	35.8	0.0	0.0	0.0	0.7	0.0	0.0
Control Delay (s)	573.4	53.9	7.7	0.0	0.0	10.5	0.0	0.0
Lane LOS	F	F	A			B		
Approach Delay (s)	573.4	53.9	0.0			0.8		
Approach LOS	F	F						

Intersection Summary				
Average Delay	41.5			
Intersection Capacity Utilization	73.4%	ICU Level of Service		D
Analysis Period (min)	15			

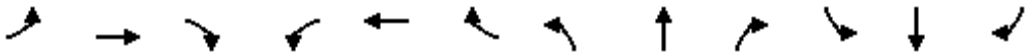
Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	13
Future Volume (Veh/h)	13
Sign Control	
Grade	
Peak Hour Factor	0.92
Hourly flow rate (vph)	14
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage veh)	
Upstream signal (m)	
pX, platoon unblocked	
vC, conflicting volume	
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	
tC, single (s)	
tC, 2 stage (s)	
tF (s)	
p0 queue free %	
cM capacity (veh/h)	
Direction, Lane #	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	277	133	51	613	159	72
Future Volume (Veh/h)	277	133	51	613	159	72
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	301	145	55	666	173	78
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	988	126	251			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	988	126	251			
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	84	96			
cM capacity (veh/h)	234	902	1311			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	446	55	666	115	136
Volume Left	301	55	0	0	0
Volume Right	145	0	0	0	78
cSH	308	1311	1700	1700	1700
Volume to Capacity	1.45	0.04	0.39	0.07	0.08
Queue Length 95th (m)	183.7	1.0	0.0	0.0	0.0
Control Delay (s)	250.8	7.9	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	250.8	0.6		0.0	
Approach LOS	F				

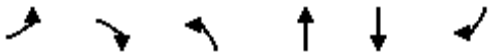
Intersection Summary			
Average Delay	79.2		
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	166	11	117	69	5	87	16	444	37	26	224	51
Future Volume (Veh/h)	166	11	117	69	5	87	16	444	37	26	224	51
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	180	12	127	75	5	95	17	483	40	28	243	55
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	846	884	149	828	871	483	298			523		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	846	884	149	828	871	483	298			523		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	10	96	85	64	98	82	99			97		
cM capacity (veh/h)	201	272	871	211	276	530	1260			1040		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	319	175	17	483	40	28	162	136
Volume Left	180	75	17	0	0	28	0	0
Volume Right	127	95	0	0	40	0	0	55
cSH	293	316	1260	1700	1700	1040	1700	1700
Volume to Capacity	1.09	0.55	0.01	0.28	0.02	0.03	0.10	0.08
Queue Length 95th (m)	96.2	23.9	0.3	0.0	0.0	0.6	0.0	0.0
Control Delay (s)	117.0	29.6	7.9	0.0	0.0	8.6	0.0	0.0
Lane LOS	F	D	A			A		
Approach Delay (s)	117.0	29.6	0.2			0.7		
Approach LOS	F	D						

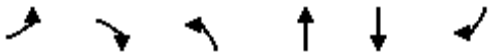
Intersection Summary				
Average Delay	31.5			
Intersection Capacity Utilization	53.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	329	249	26	166	377	43
Future Volume (Veh/h)	329	249	26	166	377	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	358	271	28	180	410	47
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	646	410	410			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	646	410	410			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	16	58	98			
cM capacity (veh/h)	425	642	1149			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	629	28	180	410	47
Volume Left	358	28	0	0	0
Volume Right	271	0	0	0	47
cSH	498	1149	1700	1700	1700
Volume to Capacity	1.26	0.02	0.11	0.24	0.03
Queue Length 95th (m)	194.7	0.6	0.0	0.0	0.0
Control Delay (s)	159.0	8.2	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	159.0	1.1		0.0	
Approach LOS	F				

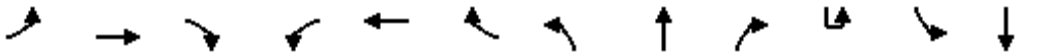
Intersection Summary				
Average Delay	77.5			
Intersection Capacity Utilization	61.7%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	35	0	508	958	90
Future Volume (Veh/h)	0	35	0	508	958	90
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	38	0	552	1041	98
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1366	570	1041			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1366	570	1041			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	92	100			
cM capacity (veh/h)	138	465	664			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	38	276	276	694	445
Volume Left	0	0	0	0	0
Volume Right	38	0	0	0	98
cSH	465	1700	1700	1700	1700
Volume to Capacity	0.08	0.16	0.16	0.41	0.26
Queue Length 95th (m)	2.0	0.0	0.0	0.0	0.0
Control Delay (s)	13.4	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	13.4	0.0		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	39.3%	ICU Level of Service		A
Analysis Period (min)	15			

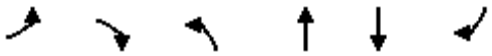


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	51	2	6	11	0	83	16	417	12	12	128	793
Future Volume (Veh/h)	51	2	6	11	0	83	16	417	12	12	128	793
Sign Control		Stop			Stop			Free				Free
Grade		0%			0%			0%				0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	2	7	12	0	90	17	453	13	0	139	862
Pedestrians								4				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												
Median type								None				None
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked										0.00		
vC, conflicting volume	1678	1691	486	1208	1729	453	964			0	466	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1678	1691	486	1208	1729	453	964			0	466	
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			0.0	4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			0.0	2.2	
p0 queue free %	0	97	99	90	100	84	98			0	87	
cM capacity (veh/h)	46	79	525	119	74	554	710			0	1092	

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	64	102	17	453	13	139	575	389
Volume Left	55	12	17	0	0	139	0	0
Volume Right	7	90	0	0	13	0	0	102
cSH	52	387	710	1700	1700	1092	1700	1700
Volume to Capacity	1.23	0.26	0.02	0.27	0.01	0.13	0.34	0.23
Queue Length 95th (m)	43.5	7.9	0.6	0.0	0.0	3.3	0.0	0.0
Control Delay (s)	330.7	17.6	10.2	0.0	0.0	8.8	0.0	0.0
Lane LOS	F	C	B			A		
Approach Delay (s)	330.7	17.6	0.4			1.1		
Approach LOS	F	C						

Intersection Summary				
Average Delay	13.9			
Intersection Capacity Utilization	49.7%	ICU Level of Service		A
Analysis Period (min)	15			

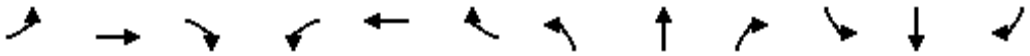
Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	94
Future Volume (Veh/h)	94
Sign Control	
Grade	
Peak Hour Factor	0.92
Hourly flow rate (vph)	102
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage veh)	
Upstream signal (m)	
pX, platoon unblocked	
vC, conflicting volume	
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	
tC, single (s)	
tC, 2 stage (s)	
tF (s)	
p0 queue free %	
cM capacity (veh/h)	
Direction, Lane #	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	93	45	121	283	647	167
Future Volume (Veh/h)	93	45	121	283	647	167
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	101	49	132	308	703	182
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1366	442	885			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1366	442	885			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	12	91	83			
cM capacity (veh/h)	114	563	760			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	150	132	308	469	416
Volume Left	101	132	0	0	0
Volume Right	49	0	0	0	182
cSH	155	760	1700	1700	1700
Volume to Capacity	0.97	0.17	0.18	0.28	0.24
Queue Length 95th (m)	54.9	4.8	0.0	0.0	0.0
Control Delay (s)	122.8	10.7	0.0	0.0	0.0
Lane LOS	F	B			
Approach Delay (s)	122.8	3.2		0.0	
Approach LOS	F				

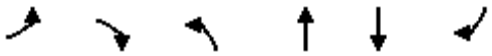
Intersection Summary			
Average Delay	13.5		
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	15	22	43	9	65	112	285	74	133	424	155
Future Volume (Veh/h)	57	15	22	43	9	65	112	285	74	133	424	155
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	62	16	24	47	10	71	122	310	80	145	461	168
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1394	1469	314	1106	1473	310	629			390		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1394	1469	314	1106	1473	310	629			390		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	9	83	96	59	90	90	87			88		
cM capacity (veh/h)	68	96	681	114	96	686	949			1165		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	102	128	122	310	80	145	307	322
Volume Left	62	47	122	0	0	145	0	0
Volume Right	24	71	0	0	80	0	0	168
cSH	92	207	949	1700	1700	1165	1700	1700
Volume to Capacity	1.11	0.62	0.13	0.18	0.05	0.12	0.18	0.19
Queue Length 95th (m)	52.0	27.2	3.3	0.0	0.0	3.2	0.0	0.0
Control Delay (s)	210.1	47.2	9.4	0.0	0.0	8.5	0.0	0.0
Lane LOS	F	E	A			A		
Approach Delay (s)	210.1	47.2	2.2			1.6		
Approach LOS	F	E						

Intersection Summary				
Average Delay	19.7			
Intersection Capacity Utilization	41.6%	ICU Level of Service		A
Analysis Period (min)	15			

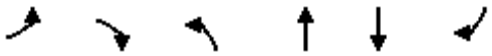


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	116	63	167	368	204	258
Future Volume (Veh/h)	116	63	167	368	204	258
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	126	68	182	400	222	280
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	986	222	222			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	986	222	222			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	47	92	86			
cM capacity (veh/h)	238	818	1347			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	194	182	400	222	280
Volume Left	126	182	0	0	0
Volume Right	68	0	0	0	280
cSH	316	1347	1700	1700	1700
Volume to Capacity	0.61	0.14	0.24	0.13	0.16
Queue Length 95th (m)	29.0	3.6	0.0	0.0	0.0
Control Delay (s)	32.9	8.1	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	32.9	2.5		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		

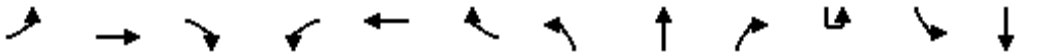
Appendix C SYNCHRO REPORTS: 2038 BASELINE CONDITIONS



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	101	0	1451	283	21
Future Volume (Veh/h)	0	101	0	1451	283	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	110	0	1577	308	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1108	166	308			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1108	166	308			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	87	100			
cM capacity (veh/h)	204	850	1249			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	110	788	788	205	126
Volume Left	0	0	0	0	0
Volume Right	110	0	0	0	23
cSH	850	1700	1700	1700	1700
Volume to Capacity	0.13	0.46	0.46	0.12	0.07
Queue Length 95th (m)	3.4	0.0	0.0	0.0	0.0
Control Delay (s)	9.9	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.9	0.0		0.0	
Approach LOS	A				

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	43.4%	ICU Level of Service		A
Analysis Period (min)	15			

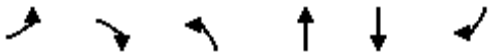


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	89	0	21	13	0	163	1	1231	6	45	22	291
Future Volume (Veh/h)	89	0	21	13	0	163	1	1231	6	45	22	291
Sign Control		Stop			Stop			Free				Free
Grade		0%			0%			0%				0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	0	23	14	0	177	1	1338	7	0	24	316
Pedestrians								4				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												
Median type								None				None
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked										0.00		
vC, conflicting volume	1712	1720	170	1573	1721	1338	333			0	1345	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1712	1720	170	1573	1721	1338	333			0	1345	
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			0.0	4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			0.0	2.2	
p0 queue free %	0	100	97	80	100	0	100			0	95	
cM capacity (veh/h)	0	84	840	69	84	143	1223			0	508	

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	120	191	1	1338	7	24	211	122
Volume Left	97	14	1	0	0	24	0	0
Volume Right	23	177	0	0	7	0	0	17
cSH	0	133	1223	1700	1700	508	1700	1700
Volume to Capacity	Err	1.44	0.00	0.79	0.00	0.05	0.12	0.07
Queue Length 95th (m)	Err	97.7	0.0	0.0	0.0	1.1	0.0	0.0
Control Delay (s)	Err	296.0	7.9	0.0	0.0	12.4	0.0	0.0
Lane LOS	F	F	A			B		
Approach Delay (s)	Err	296.0	0.0			0.8		
Approach LOS	F	F						

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	91.8%	ICU Level of Service	F	
Analysis Period (min)	15			

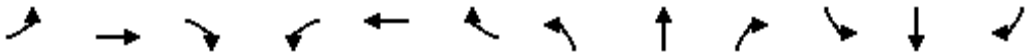
Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	16
Future Volume (Veh/h)	16
Sign Control	
Grade	
Peak Hour Factor	0.92
Hourly flow rate (vph)	17
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage veh)	
Upstream signal (m)	
pX, platoon unblocked	
vC, conflicting volume	
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	
tC, single (s)	
tC, 2 stage (s)	
tF (s)	
p0 queue free %	
cM capacity (veh/h)	
Direction, Lane #	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	337	162	62	833	222	88
Future Volume (Veh/h)	337	162	62	833	222	88
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	366	176	67	905	241	96
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1328	168	337			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1328	168	337			
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	79	95			
cM capacity (veh/h)	138	846	1219			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	542	67	905	161	176
Volume Left	366	67	0	0	0
Volume Right	176	0	0	0	96
cSH	190	1219	1700	1700	1700
Volume to Capacity	2.85	0.05	0.53	0.09	0.10
Queue Length 95th (m)	366.4	1.3	0.0	0.0	0.0
Control Delay (s)	885.4	8.1	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	885.4	0.6		0.0	
Approach LOS	F				

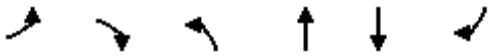
Intersection Summary			
Average Delay	259.6		
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	202	13	143	85	6	106	19	626	45	31	303	62
Future Volume (Veh/h)	202	13	143	85	6	106	19	626	45	31	303	62
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	220	14	155	92	7	115	21	680	49	34	329	67
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1156	1202	198	1116	1186	680	396			729		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1156	1202	198	1116	1186	680	396			729		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	0	92	81	22	96	71	98			96		
cM capacity (veh/h)	100	173	810	118	177	393	1159			871		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	389	214	21	680	49	34	219	177
Volume Left	220	92	21	0	0	34	0	0
Volume Right	155	115	0	0	49	0	0	67
cSH	157	192	1159	1700	1700	871	1700	1700
Volume to Capacity	2.48	1.11	0.02	0.40	0.03	0.04	0.13	0.10
Queue Length 95th (m)	253.8	79.2	0.4	0.0	0.0	0.9	0.0	0.0
Control Delay (s)	730.8	149.3	8.2	0.0	0.0	9.3	0.0	0.0
Lane LOS	F	F	A			A		
Approach Delay (s)	730.8	149.3	0.2			0.7		
Approach LOS	F	F						

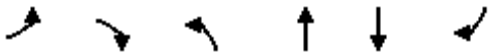
Intersection Summary				
Average Delay	177.6			
Intersection Capacity Utilization	66.9%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	401	303	31	287	488	52
Future Volume (Veh/h)	401	303	31	287	488	52
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	436	329	34	312	530	57
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	910	530	530			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	910	530	530			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	40	97			
cM capacity (veh/h)	295	549	1037			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	765	34	312	530	57
Volume Left	436	34	0	0	0
Volume Right	329	0	0	0	57
cSH	368	1037	1700	1700	1700
Volume to Capacity	2.08	0.03	0.18	0.31	0.03
Queue Length 95th (m)	416.8	0.8	0.0	0.0	0.0
Control Delay (s)	518.0	8.6	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	518.0	0.8		0.0	
Approach LOS	F				

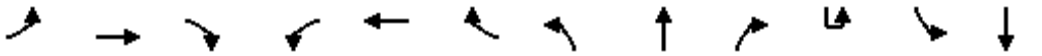
Intersection Summary				
Average Delay	233.6			
Intersection Capacity Utilization	73.2%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	43	0	676	1263	110
Future Volume (Veh/h)	0	43	0	676	1263	110
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	47	0	735	1373	120
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1800	746	1373			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1800	746	1373			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	87	100			
cM capacity (veh/h)	71	356	496			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	47	368	368	915	578
Volume Left	0	0	0	0	0
Volume Right	47	0	0	0	120
cSH	356	1700	1700	1700	1700
Volume to Capacity	0.13	0.22	0.22	0.54	0.34
Queue Length 95th (m)	3.4	0.0	0.0	0.0	0.0
Control Delay (s)	16.7	0.0	0.0	0.0	0.0
Lane LOS	C				
Approach Delay (s)	16.7	0.0		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

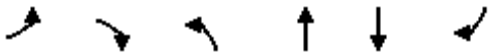


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	62	3	7	13	0	101	19	565	15	15	156	1062
Future Volume (Veh/h)	62	3	7	13	0	101	19	565	15	15	156	1062
Sign Control		Stop			Stop			Free				Free
Grade		0%			0%			0%				0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	3	8	14	0	110	21	614	16	0	170	1154
Pedestrians								4				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												
Median type								None				None
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked										0.00		
vC, conflicting volume	2212	2228	643	1586	2274	614	1278			0	630	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2212	2228	643	1586	2274	614	1278			0	630	
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			0.0	4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			0.0	2.2	
p0 queue free %	0	91	98	75	100	75	96			0	82	
cM capacity (veh/h)	15	33	415	55	31	435	539			0	948	

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	78	124	21	614	16	170	769	509
Volume Left	67	14	21	0	0	170	0	0
Volume Right	8	110	0	0	16	0	0	124
cSH	17	245	539	1700	1700	948	1700	1700
Volume to Capacity	4.51	0.51	0.04	0.36	0.01	0.18	0.45	0.30
Queue Length 95th (m)	Err	19.9	0.9	0.0	0.0	4.9	0.0	0.0
Control Delay (s)	Err	33.8	11.9	0.0	0.0	9.6	0.0	0.0
Lane LOS	F	D	B			A		
Approach Delay (s)	Err	33.8	0.4			1.1		
Approach LOS	F	D						

Intersection Summary				
Average Delay	341.6			
Intersection Capacity Utilization	59.9%	ICU Level of Service		B
Analysis Period (min)	15			

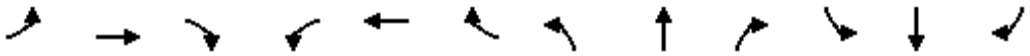
Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	114
Future Volume (Veh/h)	114
Sign Control	
Grade	
Peak Hour Factor	0.92
Hourly flow rate (vph)	124
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage veh)	
Upstream signal (m)	
pX, platoon unblocked	
vC, conflicting volume	
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	
tC, single (s)	
tC, 2 stage (s)	
tF (s)	
p0 queue free %	
cM capacity (veh/h)	
Direction, Lane #	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	113	55	147	401	884	204
Future Volume (Veh/h)	113	55	147	401	884	204
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	123	60	160	436	961	222
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1828	592	1183			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1828	592	1183			
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	87	73			
cM capacity (veh/h)	50	450	586			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	183	160	436	641	542
Volume Left	123	160	0	0	0
Volume Right	60	0	0	0	222
cSH	70	586	1700	1700	1700
Volume to Capacity	2.62	0.27	0.26	0.38	0.32
Queue Length 95th (m)	136.5	8.4	0.0	0.0	0.0
Control Delay (s)	860.0	13.4	0.0	0.0	0.0
Lane LOS	F	B			
Approach Delay (s)	860.0	3.6		0.0	
Approach LOS	F				

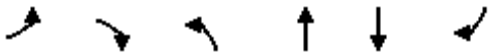
Intersection Summary			
Average Delay	81.3		
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	18	27	52	10	79	137	404	91	162	612	189
Future Volume (Veh/h)	70	18	27	52	10	79	137	404	91	162	612	189
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	76	20	29	57	11	86	149	439	99	176	665	205
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1862	1956	435	1460	1959	439	870			538		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1862	1956	435	1460	1959	439	870			538		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	0	53	95	0	74	85	81			83		
cM capacity (veh/h)	23	42	569	41	42	566	770			1026		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	125	154	149	439	99	176	443	427
Volume Left	76	57	149	0	0	176	0	0
Volume Right	29	86	0	0	99	0	0	205
cSH	33	85	770	1700	1700	1026	1700	1700
Volume to Capacity	3.84	1.80	0.19	0.26	0.06	0.17	0.26	0.25
Queue Length 95th (m)	Err	98.9	5.4	0.0	0.0	4.7	0.0	0.0
Control Delay (s)	Err	486.6	10.8	0.0	0.0	9.2	0.0	0.0
Lane LOS	F	F	B			A		
Approach Delay (s)	Err	486.6	2.3			1.6		
Approach LOS	F	F						

Intersection Summary				
Average Delay	660.1			
Intersection Capacity Utilization	51.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	141	77	204	505	345	315
Future Volume (Veh/h)	141	77	204	505	345	315
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	153	84	222	549	375	342
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1368	375	375			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1368	375	375			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	87	81			
cM capacity (veh/h)	131	671	1183			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	237	222	549	375	342
Volume Left	153	222	0	0	0
Volume Right	84	0	0	0	342
cSH	184	1183	1700	1700	1700
Volume to Capacity	1.29	0.19	0.32	0.22	0.20
Queue Length 95th (m)	101.2	5.2	0.0	0.0	0.0
Control Delay (s)	214.5	8.7	0.0	0.0	0.0
Lane LOS	F	A			
Approach Delay (s)	214.5	2.5		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	30.6		
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D SIGNAL WARRANT ANALYSIS

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS	Road Authority:	City of Whitehorse
Side Street (name)	Heron Dr	Direction (EW or NS)	EW	City:	Whitehorse, YT
Quadrant / Int #		Comments	Scenario 1 (Existing)	Analysis Date:	2018 Aug 02, Thu
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	
				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
Hamilton Boulevard	NB	1		1			1		1
Hamilton Boulevard	SB	1		1		1			2
Heron Dr	WB				1				
Heron Dr	EB				1				
Are the Heron Dr WB right turns significantly impeded by through movements? (y/n)							n		
Are the Heron Dr 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	(#)	25,000
Central Business District	(y/n)	n

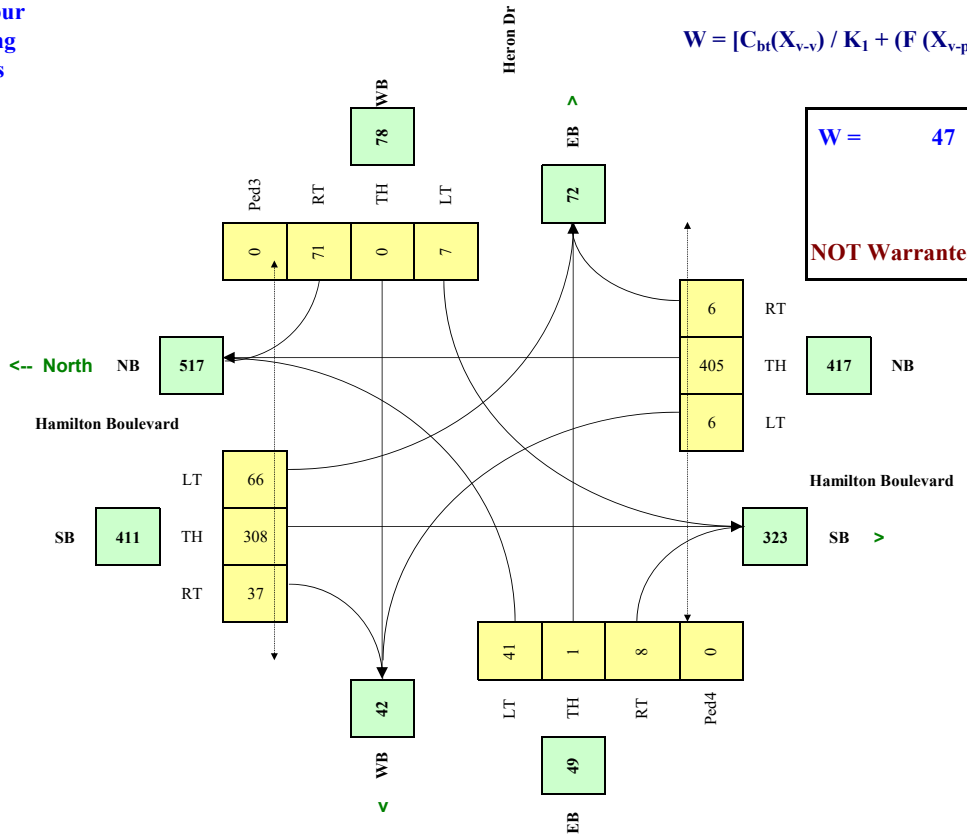
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Heron Dr	EW	50	2.0%	n	

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
press 'Set Peak Hours' Button to set the peak hour periods	1	516	3	32	114	8	6	0	79	43	0	10	0	0	0	0
	1	716	4	45	158	11	9	0	110	60	0	14	0	0	0	0
	1	430	2	27	95	7	5	0	66	36	0	8	0	0	0	0
	8	184	6	69	353	46	5	0	41	25	1	3	0	0	0	0
	13	306	10	115	589	77	9	0	68	42	2	5	0	0	0	0
	12	282	9	106	542	71	8	0	63	39	2	5	0	0	0	0
Total (6-hour peak)	**35**	**2,432**	**34**	**394**	**1,851**	**220**	**44**	**0**	**427**	**245**	**5**	**45**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**6**	**405**	**6**	**66**	**308**	**37**	**7**	**0**	**71**	**41**	**1**	**8**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements

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



W =	47	47	0
		Veh	*Ped*

NOT Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS	Road Authority:	City of Whitehorse
Side Street (name)	Falcon Dr (N)	Direction (EW or NS)	EW	City:	Whitehorse, YT
Quadrant / Int #		Comments	Scenario 1 (Existing)	Analysis Date:	2018 Aug 02, Thu
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	
				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
Hamilton Boulevard	NB	1		1					1
Hamilton Boulevard	SB			1		1			2
Falcon Dr (N)	WB								
Falcon Dr (N)	EB				1				
							n		

Are the Falcon Dr (N) EB right turns significantly impeded by through movements? (y/n) n

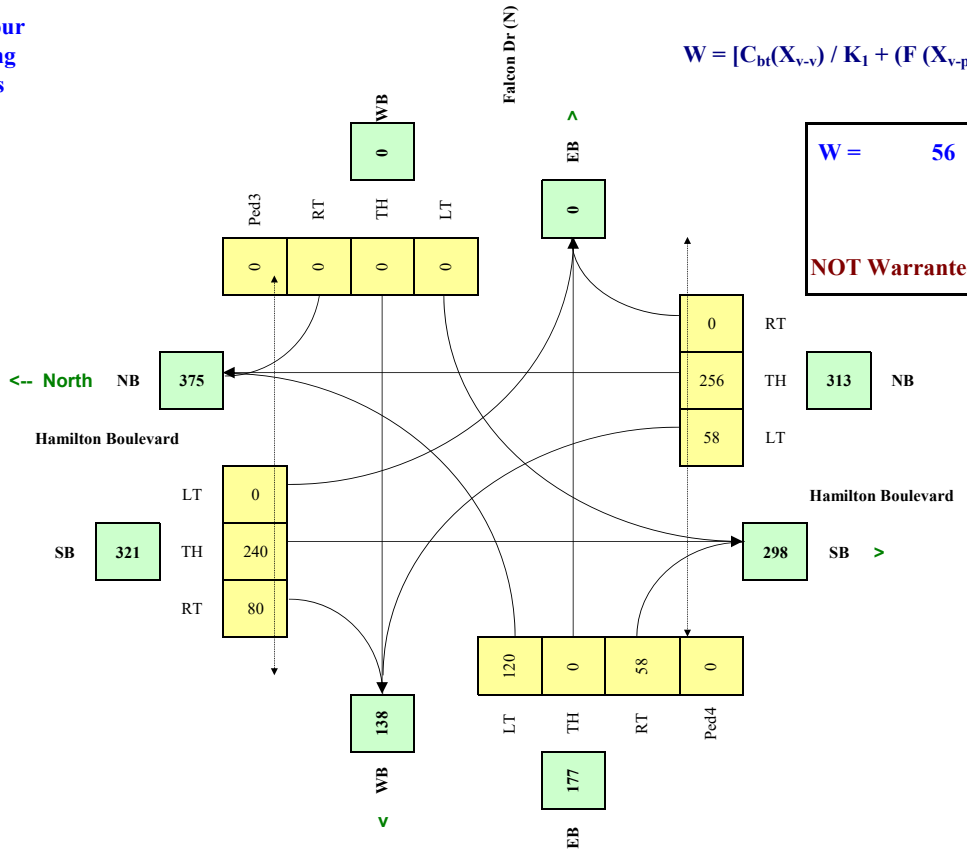
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	25,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Falcon Dr (N)	EW	50	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
press 'Set Peak Hours' Button to set the peak hour periods	30	323	0	0	81	42	0	0	0	163	0	78	0	0	0	0
	42	448			112	59				227		109	0	0	0	0
	25	269	0	0	67	35	0	0	0	136	0	65	0	0	0	0
	59	118	0	0	281	82	0	0	0	46	0	22	0	0	0	0
	99	196			469	137				76		37	0	0	0	0
	91	180	0	0	431	126	0	0	0	70	0	34	0	0	0	0
Total (6-hour peak)	**347**	**1,533**	**0**	**0**	**1,442**	**482**	**0**	**0**	**0**	**718**	**0**	**346**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**58**	**256**	**0**	**0**	**240**	**80**	**0**	**0**	**0**	**120**	**0**	**58**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements



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

W =	56	56	0
		Veh	*Ped*

NOT Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS
Side Street (name)	Lazulite Drive	Direction (EW or NS)	EW
Quadrant / Int #		Comments	Scenario 1 (Existing)

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CHECK SHEET

Road Authority:	City of Whitehorse
City:	Whitehorse, YT
Analysis Date:	2018 Aug 02, Thu
Count Date:	
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
Hamilton Boulevard	NB	1		1					1
Hamilton Boulevard	SB	1		1		1			2
Lazulite Drive	WB				1				
Lazulite Drive	EB				1				
Are the Lazulite Drive WB right turns significantly impeded by through movements? (y/n)							n		
Are the Lazulite Drive EB right turns significantly impeded by through movements? (y/n)							n		

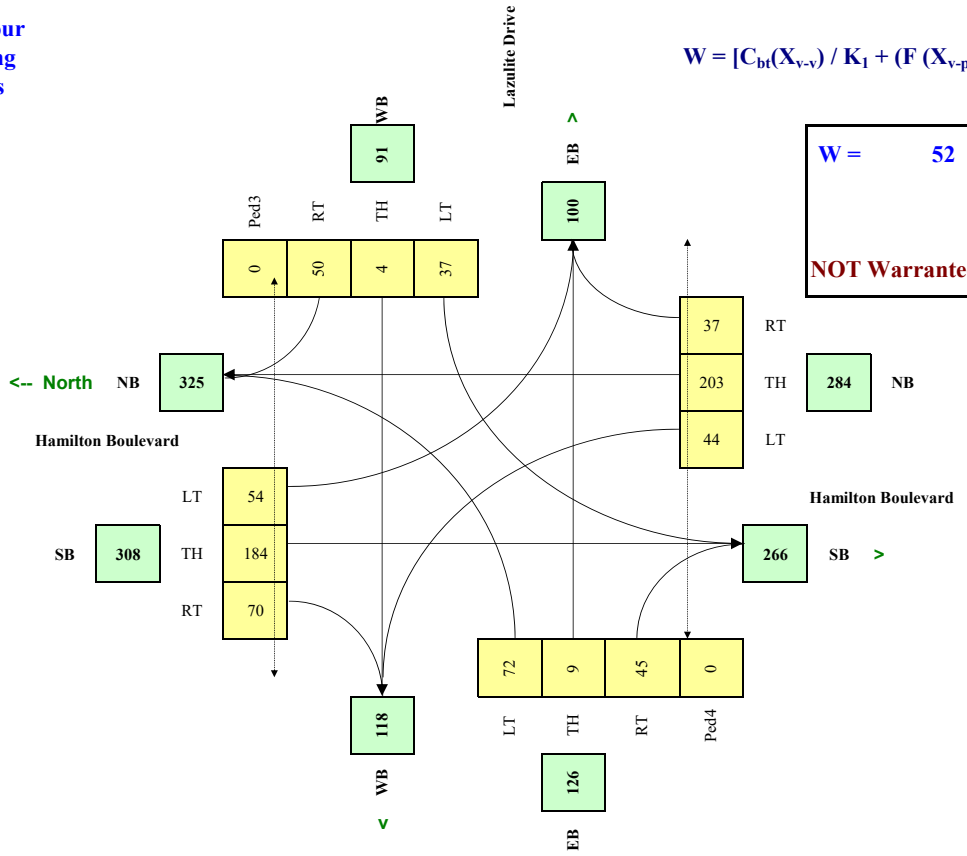
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	25,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Lazulite Drive	EW	50	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
press 'Set Peak Hours' Button to set the peak hour periods	9	222	22	15	120	30	41	3	51	98	6	69	0	0	0	0
	13	309	30	21	166	42	57	4	71	136	9	96	0	0	0	0
	8	185	18	13	100	25	34	2	43	82	5	58	0	0	0	0
	55	119	37	65	172	76	21	4	32	28	7	11	0	0	0	0
	92	198	61	109	286	127	35	7	53	47	12	18	0	0	0	0
	85	182	56	100	263	117	32	6	49	43	11	17	0	0	0	0
Total (6-hour peak)	**262**	**1,216**	**223**	**323**	**1,106**	**417**	**220**	**27**	**298**	**434**	**51**	**268**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**44**	**203**	**37**	**54**	**184**	**70**	**37**	**4**	**50**	**72**	**9**	**45**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements



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

W =	52	52	0
		Veh	*Ped*

NOT Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS	Road Authority:	City of Whitehorse
Side Street (name)	Falcon Drive (S)	Direction (EW or NS)	EW	City:	Whitehorse, YT
Quadrant / Int #		Comments	Scenario 1 (Existing)	Analysis Date:	2018 Aug 02, Thu
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	
				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
Hamilton Boulevard	NB	1		1			1		1
Hamilton Boulevard	SB	1		1		1			2
Falcon Drive (S)	WB				1				
Falcon Drive (S)	EB				1				
Are the Falcon Drive (S) WB right turns significantly impeded by through movements? (y/n)							n		
Are the Falcon Drive (S) 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	(#)	25,000
Central Business District	(y/n)	n

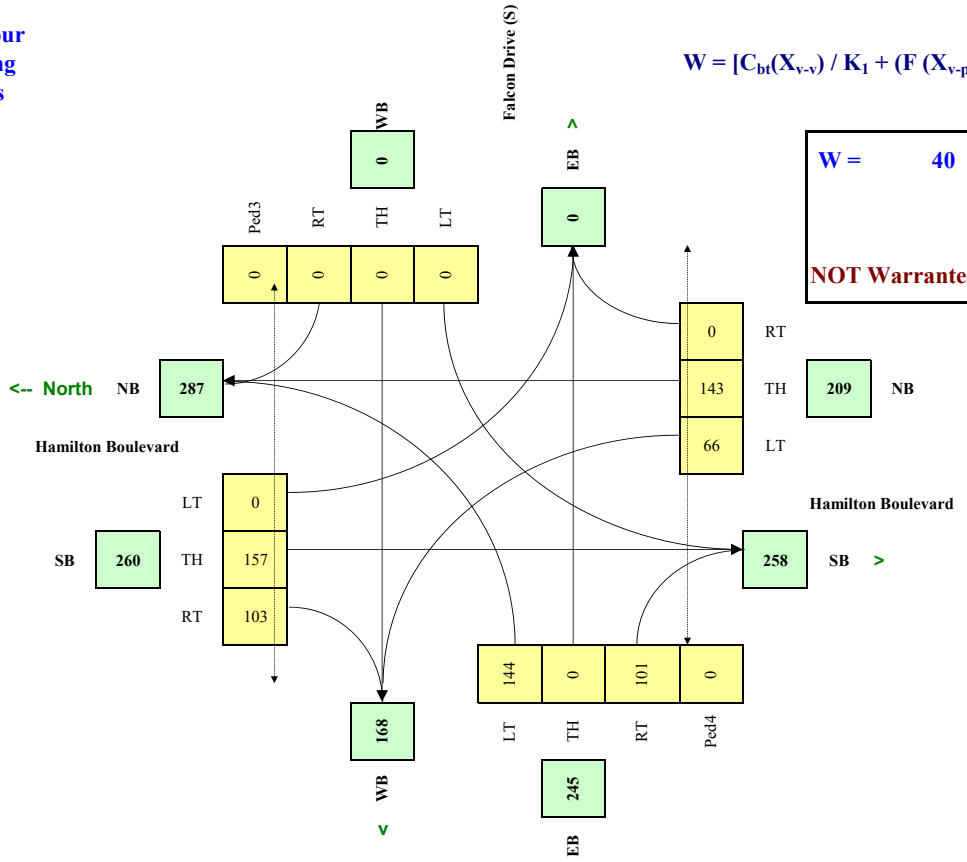
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Falcon Drive (S)	EW	50	2.0%	n	

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
press 'Set Peak Hours' Button to set the peak hour periods	15	58	0	0	210	25	0	0	0	194	0	147	0	0	0	0
	21	81			291	35				270		204	0	0	0	0
	13	49	0	0	175	21	0	0	0	162	0	122	0	0	0	0
	82	160	0	0	64	127	0	0	0	57	0	31	0	0	0	0
	137	266			106	212				95		52	0	0	0	0
	126	245	0	0	98	195	0	0	0	87	0	48	0	0	0	0
Total (6-hour peak)	**394**	**858**	**0**	**0**	**942**	**615**	**0**	**0**	**0**	**866**	**0**	**604**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**66**	**143**	**0**	**0**	**157**	**103**	**0**	**0**	**0**	**144**	**0**	**101**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements

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



W =	40	40	0
		Veh	*Ped*

NOT Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS
Side Street (name)	Heron Dr	Direction (EW or NS)	EW
Quadrant / Int #		Comments	Scenario 1 (2028 Horizon)

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Road Authority:	City of Whitehorse	
City:	Whitehorse, YT	
Analysis Date:	2018 Aug 02, Thu	
Count Date:		
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
Hamilton Boulevard	NB	1		1			1		1
Hamilton Boulevard	SB	1		1		1			2
Heron Dr	WB				1				
Heron Dr	EB				1				

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

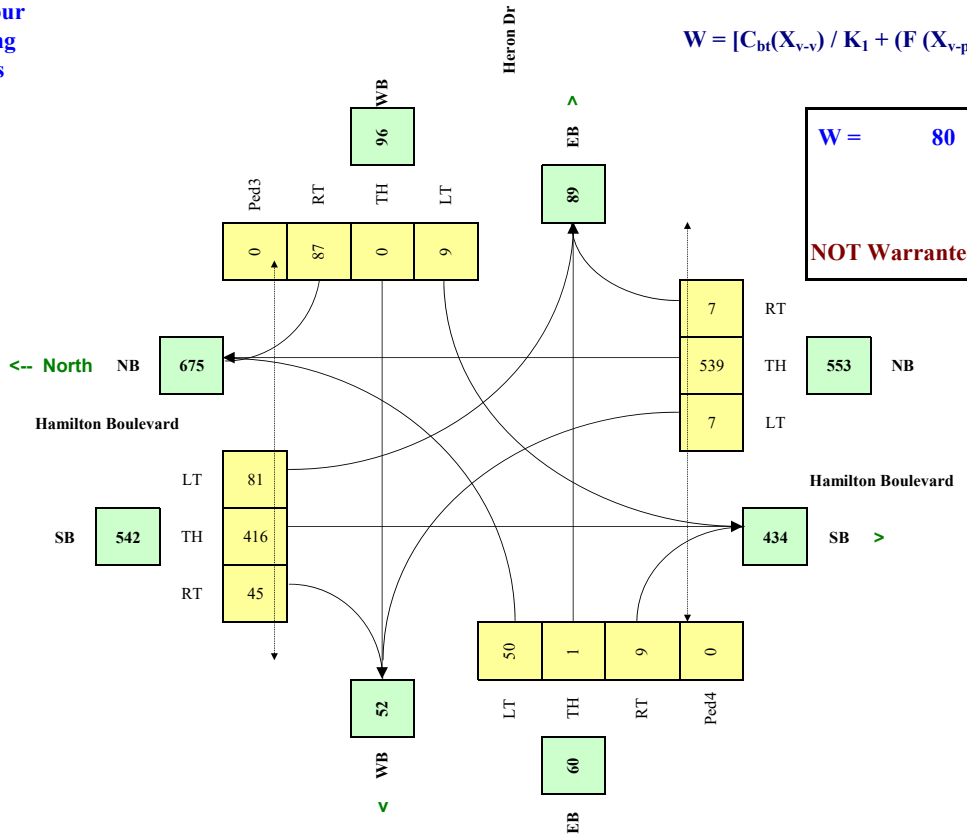
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	25,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Heron Dr	EW	50	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
press 'Set Peak Hours' Button to set the peak hour periods	1	677	4	41	155	9	8	0	96	53	0	12	0	0	0	0
	1	940	5	57	215	13	11	0	134	73	0	17	0	0	0	0
	1	564	3	34	129	8	7	0	80	44	0	10	0	0	0	0
	10	250	7	84	476	56	7	0	50	31	1	4	0	0	0	0
	16	417	12	140	793	94	11	0	83	51	2	6	0	0	0	0
	15	384	11	129	730	86	10	0	76	47	2	6	0	0	0	0
Total (6-hour peak)	**43**	**3,232**	**42**	**485**	**2,497**	**267**	**53**	**0**	**520**	**298**	**5**	**55**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**7**	**539**	**7**	**81**	**416**	**45**	**9**	**0**	**87**	**50**	**1**	**9**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements



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

W =	80	80	0
		Veh	*Ped*

NOT Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS
Side Street (name)	Falcon Dr (N)	Direction (EW or NS)	EW
Quadrant / Int #		Comments	Scenario 1 (Existing)

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Road Authority:	City of Whitehorse
City:	Whitehorse, YT
Analysis Date:	2018 Aug 02, Thu
Count Date:	
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
Hamilton Boulevard	NB	1		1					1
Hamilton Boulevard	SB			1		1			2
Falcon Dr (N)	WB								
Falcon Dr (N)	EB				1				

Are the Falcon Dr (N) 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	(#)	25,000
Central Business District	(y/n)	n

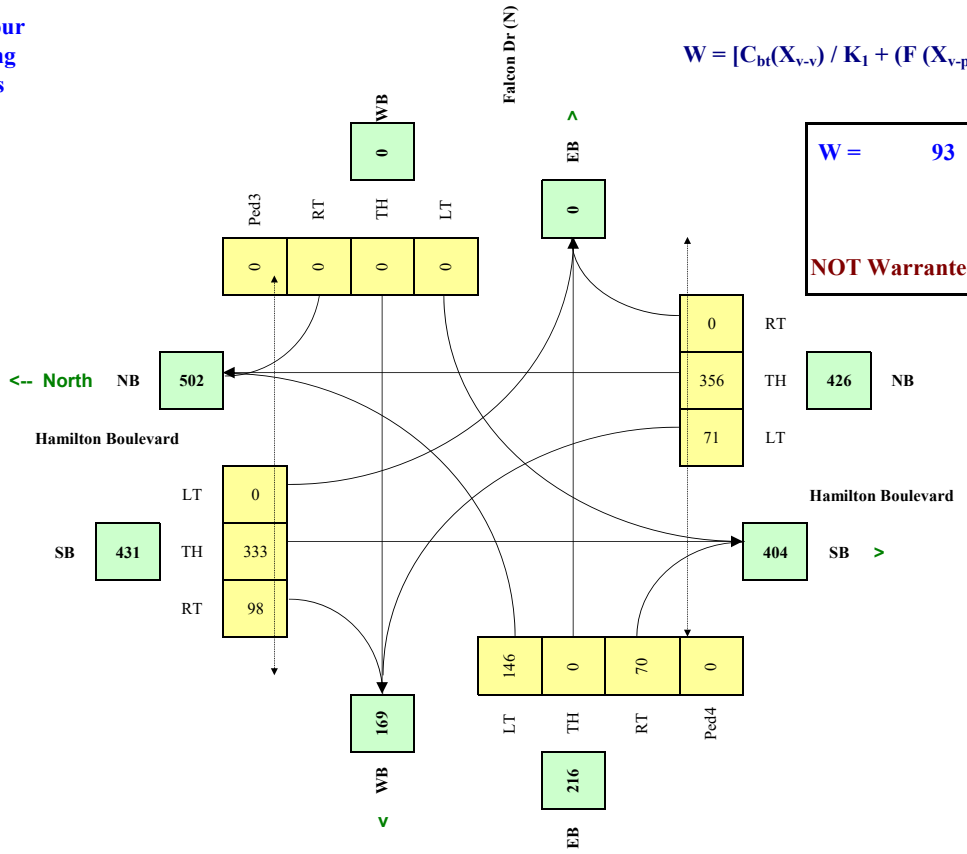
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Falcon Dr (N)	EW	50	2.0%	n	

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
press 'Set Peak Hours' Button to set the peak hour periods	37	441	0	0	114	52	0	0	0	199	0	96	0	0	0	0
	51	613			159	72				277		133	0	0	0	0
	31	368	0	0	95	43	0	0	0	166	0	80	0	0	0	0
	73	170	0	0	388	100	0	0	0	56	0	27	0	0	0	0
	121	283			647	167				93		45	0	0	0	0
	111	260	0	0	595	154	0	0	0	86	0	41	0	0	0	0
Total (6-hour peak)	423	2,135	0	0	1,999	588	0	0	0	877	0	422	0	0	0	0
Average (6-hour peak)	71	356	0	0	333	98	0	0	0	146	0	70	0	0	0	0

Average 6-hour Peak Turning Movements

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



W =	93	93	0
		Veh	Ped

NOT Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS
Side Street (name)	Lazulite Drive	Direction (EW or NS)	EW
Quadrant / Int #		Comments	Scenario 1 (2028 Horizon)

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Road Authority:	City of Whitehorse
City:	Whitehorse, YT
Analysis Date:	2018 Aug 02, Thu
Count Date:	
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
Hamilton Boulevard	NB	1		1					1
Hamilton Boulevard	SB	1		1		1			2
Lazulite Drive	WB				1				
Lazulite Drive	EB				1				
Are the Lazulite Drive WB right turns significantly impeded by through movements? (y/n)							n		
Are the Lazulite Drive EB right turns significantly impeded by through movements? (y/n)							n		

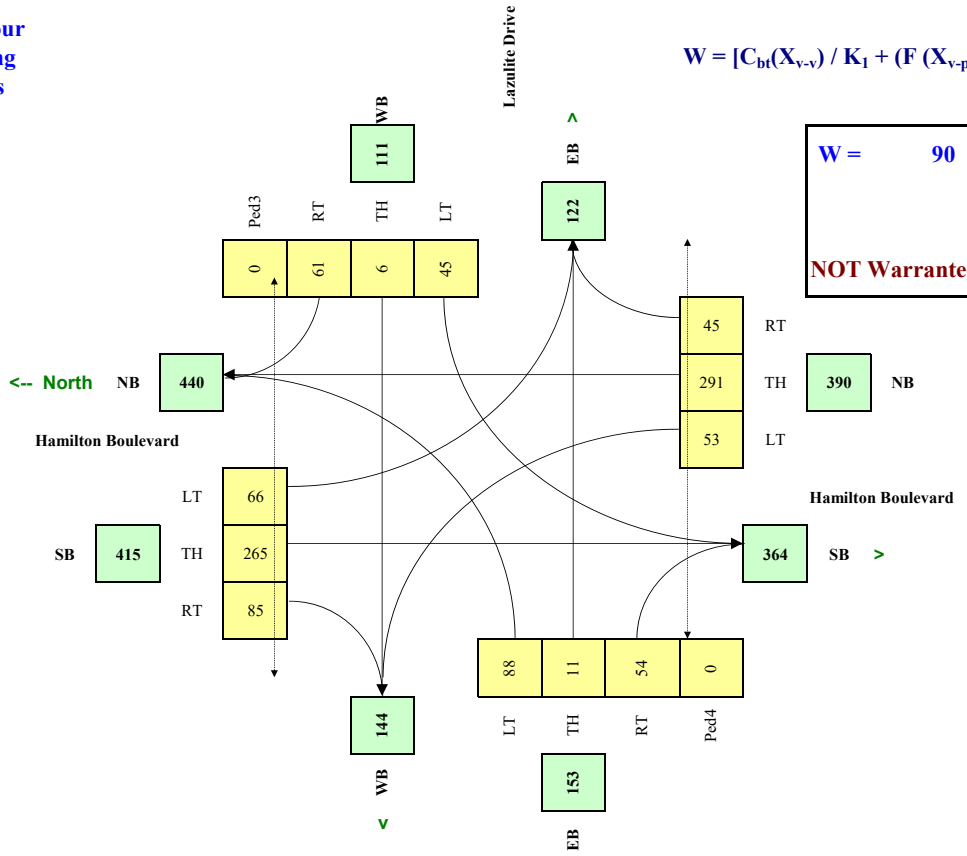
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	25,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Lazulite Drive	EW	50	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
press 'Set Peak Hours' Button to set the peak hour periods	12	320	27	19	161	37	50	4	63	120	8	84	0	0	0	0
	16	444	37	26	224	51	69	5	87	166	11	117	0	0	0	0
	10	266	22	16	134	31	41	3	52	100	7	70	0	0	0	0
	67	171	44	80	254	93	26	5	39	34	9	13	0	0	0	0
	112	285	74	133	424	155	43	9	65	57	15	22	0	0	0	0
	103	262	68	122	390	143	40	8	60	52	14	20	0	0	0	0
Total (6-hour peak)	**319**	**1,748**	**272**	**395**	**1,588**	**509**	**268**	**34**	**366**	**529**	**63**	**327**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**53**	**291**	**45**	**66**	**265**	**85**	**45**	**6**	**61**	**88**	**11**	**54**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements



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

W =	90	90	0
		Veh	*Ped*

NOT Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS
Side Street (name)	Falcon Drive (S)	Direction (EW or NS)	EW
Quadrant / Int #		Comments	Scenario 1 (2028 Horizon)

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Road Authority:	City of Whitehorse
City:	Whitehorse, YT
Analysis Date:	2018 Aug 02, Thu
Count Date:	
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
Hamilton Boulevard	NB	1		1			1		1
Hamilton Boulevard	SB	1		1		1			2
Falcon Drive (S)	WB				1				
Falcon Drive (S)	EB				1				

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

Are the Falcon Drive (S) 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	(#)	25,000
Central Business District	(y/n)	n

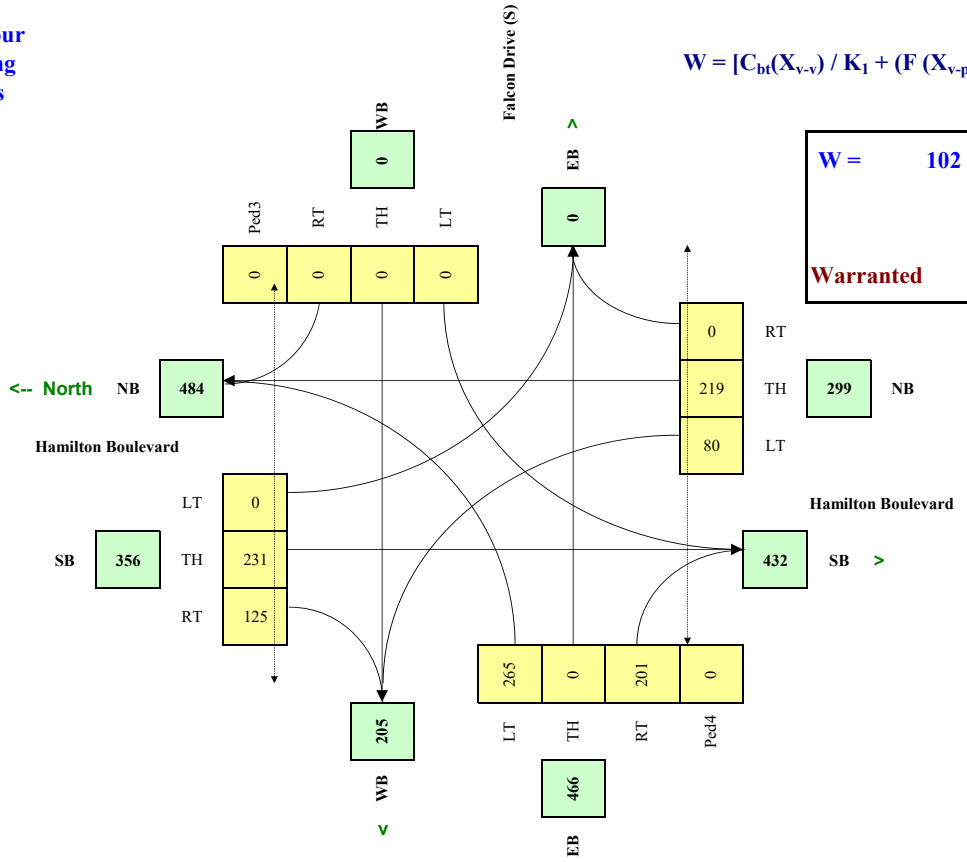
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Falcon Drive (S)	EW	50	2.0%	n	

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
press 'Set Peak Hours' Button to set the peak hour periods	19	120	0	0	271	31	0	0	0	237	0	179	0	0	0	0
	26	166			377	43				329		249	0	0	0	0
	16	100	0	0	226	26	0	0	0	197	0	149	0	0	0	0
	100	221	0	0	122	155	0	0	0	197	0	149	0	0	0	0
	167	368			204	258				329		249	0	0	0	0
	154	339	0	0	188	237	0	0	0	303	0	229	0	0	0	0
Total (6-hour peak)	481	1,312	0	0	1,389	750	0	0	0	1,592	0	1,205	0	0	0	0
Average (6-hour peak)	80	219	0	0	231	125	0	0	0	265	0	201	0	0	0	0

Average 6-hour Peak Turning Movements

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



W =	102	102	0
		Veh	Ped

Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS	Road Authority:	City of Whitehorse
Side Street (name)	Falcon Drive (S)	Direction (EW or NS)	EW	City:	Whitehorse, YT
Quadrant / Int #		Comments	Scenario 1 (2028 Horizon)	Analysis Date:	2018 Aug 02, Thu
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	
				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
Hamilton Boulevard	NB	1		1			1		1
Hamilton Boulevard	SB	1		1		1			2
Falcon Drive (S)	WB				1				
Falcon Drive (S)	EB				1				
Are the Falcon Drive (S) WB right turns significantly impeded by through movements? (y/n)							n		
Are the Falcon Drive (S) 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	(#)	25,000
Central Business District	(y/n)	n

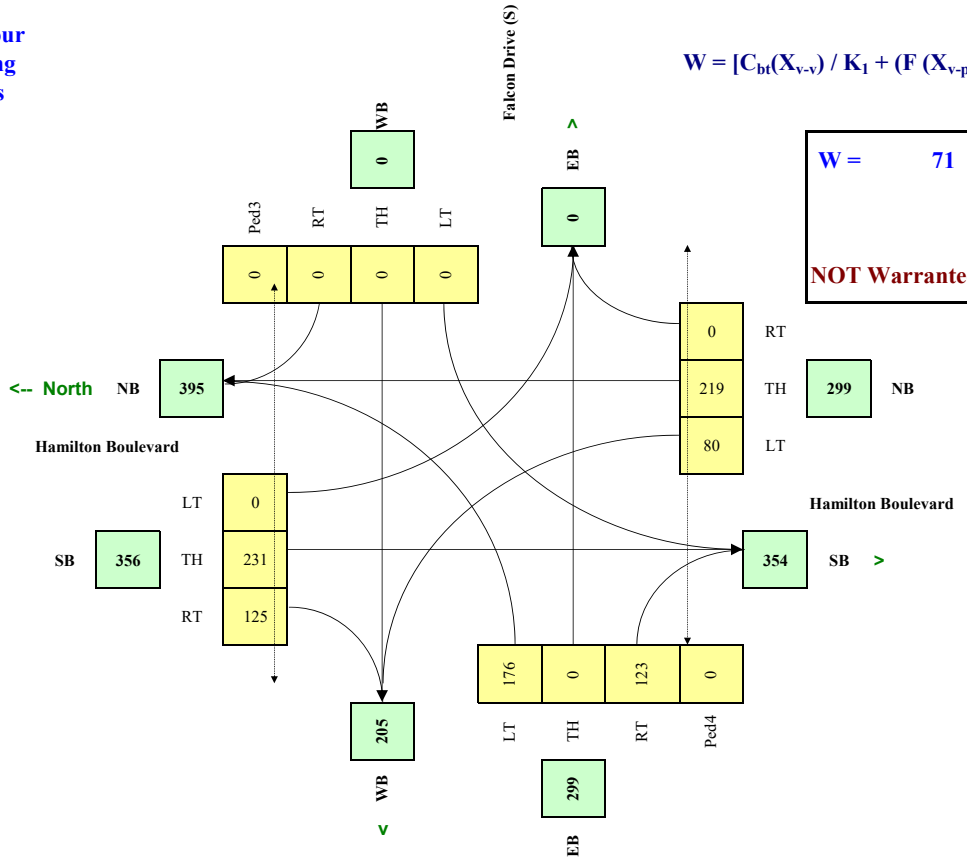
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Falcon Drive (S)	EW	50	2.0%	n	

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
press 'Set Peak Hours' Button to set the peak hour periods	19	120	0	0	271	31	0	0	0	237	0	179	0	0	0	0
	26	166			377	43				329		249	0	0	0	0
	16	100	0	0	226	26	0	0	0	197	0	149	0	0	0	0
	100	221	0	0	122	155	0	0	0	70	0	38	0	0	0	0
	167	368			204	258				116		63	0	0	0	0
	154	339	0	0	188	237	0	0	0	107	0	58	0	0	0	0
Total (6-hour peak)	**481**	**1,312**	**0**	**0**	**1,389**	**750**	**0**	**0**	**0**	**1,056**	**0**	**736**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**80**	**219**	**0**	**0**	**231**	**125**	**0**	**0**	**0**	**176**	**0**	**123**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements

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



W =	71	71	0
		Veh	*Ped*

NOT Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS	Road Authority:	City of Whitehorse
Side Street (name)	Heron Dr	Direction (EW or NS)	EW	City:	Whitehorse, YT
Quadrant / Int #		Comments	Scenario 1 (2038 Horizon)	Analysis Date:	2018 Aug 02, Thu
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	
				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
Hamilton Boulevard	NB	1		1			1		1
Hamilton Boulevard	SB	1		1		1			2
Heron Dr	WB				1				
Heron Dr	EB				1				
Are the Heron Dr WB right turns significantly impeded by through movements? (y/n)							n		
Are the Heron Dr 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	(#)	25,000
Central Business District	(y/n)	n

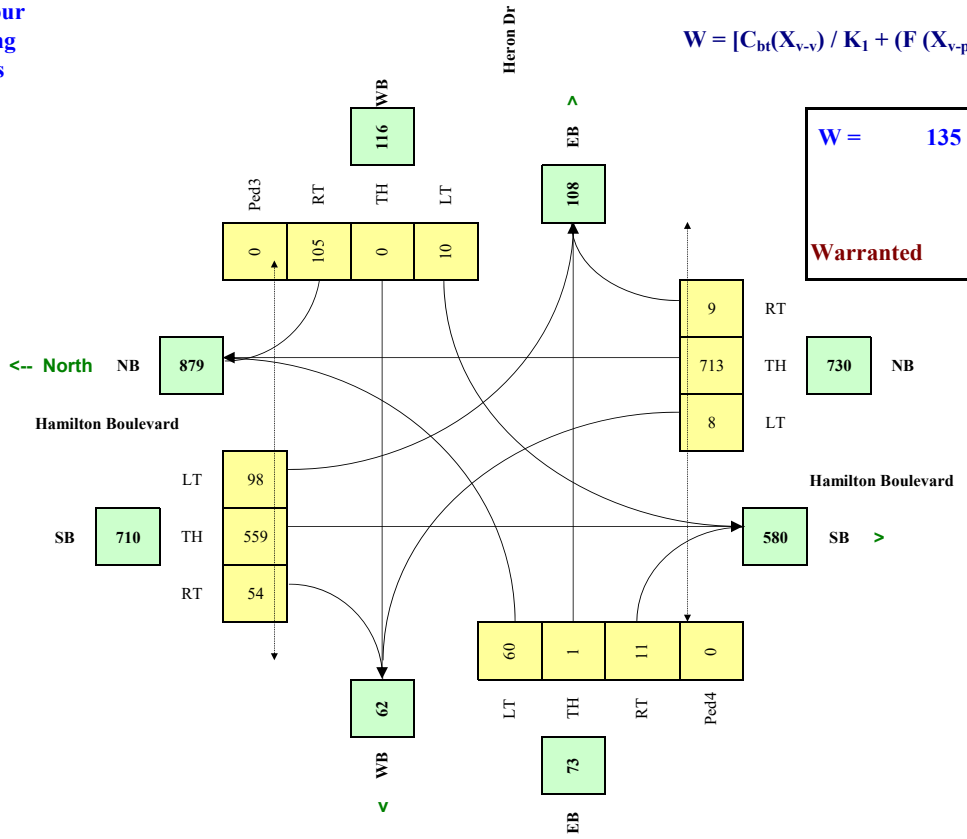
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Heron Dr	EW	50	2.0%	n	

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
press 'Set Peak Hours' Button to set the peak hour periods	1	886	4	48	210	12	9	0	117	64	0	15	0	0	0	0
	1	1231	6	67	291	16	13	0	163	89	0	21	0	0	0	0
	1	739	4	40	175	10	8	0	98	53	0	13	0	0	0	0
	11	339	9	103	637	68	8	0	61	37	2	4	0	0	0	0
	19	565	15	171	1062	114	13	0	101	62	3	7	0	0	0	0
	17	520	14	157	977	105	12	0	93	57	3	6	0	0	0	0
Total (6-hour peak)	50	4,280	52	586	3,351	324	63	0	633	363	8	66	0	0	0	0
Average (6-hour peak)	8	713	9	98	559	54	10	0	105	60	1	11	0	0	0	0

Average 6-hour Peak Turning Movements

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



W =	135	135	0
		Veh	Ped

Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS
Side Street (name)	Falcon Dr (N)	Direction (EW or NS)	EW
Quadrant / Int #		Comments	Scenario 1 (2038 Horizon)

for Warrant Calculation Results, please hit 'Page Down'

CHECK SHEET

Road Authority:	City of Whitehorse
City:	Whitehorse, YT
Analysis Date:	2018 Aug 02, Thu
Count Date:	
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
Hamilton Boulevard	NB	1		1					1
Hamilton Boulevard	SB			1		1			2
Falcon Dr (N)	WB								
Falcon Dr (N)	EB				1				

Are the Falcon Dr (N) EB right turns significantly impeded by through movements? (y/n) n

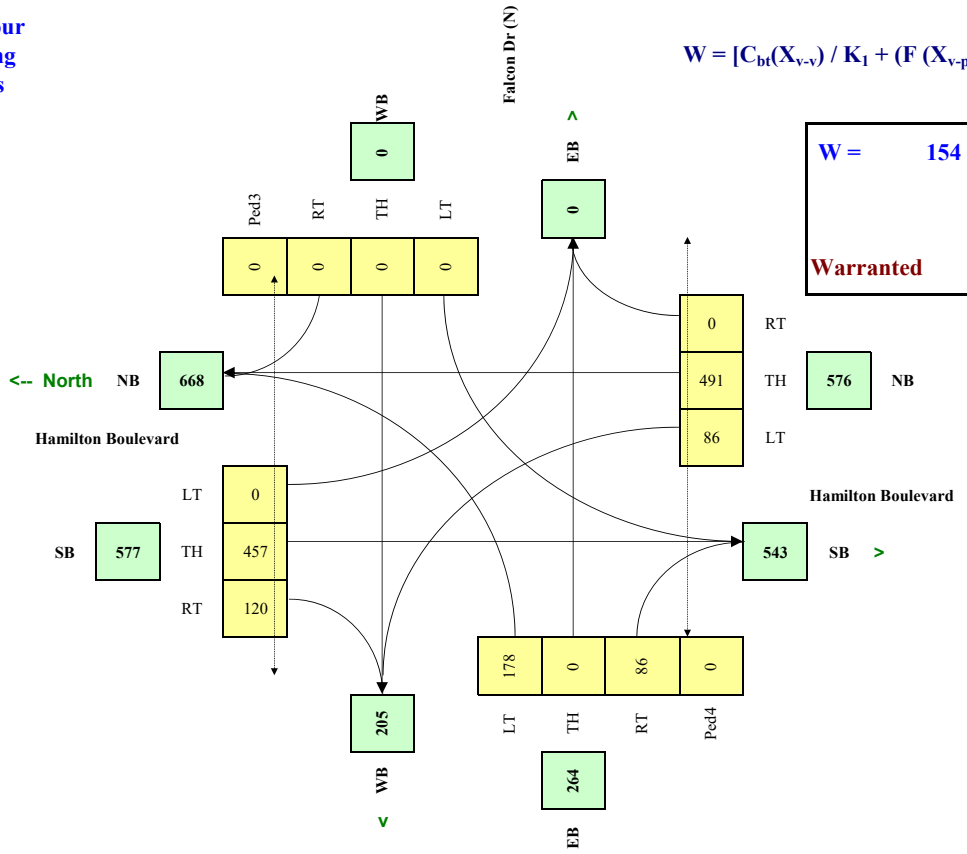
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	25,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Falcon Dr (N)	EW	50	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
press 'Set Peak Hours' Button to set the peak hour periods	45	600	0	0	160	63	0	0	0	243	0	117	0	0	0	0
	62	833			222	88				337		162	0	0	0	0
	37	500	0	0	133	53	0	0	0	202	0	97	0	0	0	0
	88	241	0	0	530	122	0	0	0	68	0	33	0	0	0	0
	147	401			884	204				113		55	0	0	0	0
	135	369	0	0	813	188	0	0	0	104	0	51	0	0	0	0
Total (6-hour peak)	**514**	**2,943**	**0**	**0**	**2,743**	**718**	**0**	**0**	**0**	**1,067**	**0**	**514**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**86**	**491**	**0**	**0**	**457**	**120**	**0**	**0**	**0**	**178**	**0**	**86**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements



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

W =	154	154	0
		Veh	*Ped*

Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS	Road Authority:	City of Whitehorse
Side Street (name)	Lazulite Drive	Direction (EW or NS)	EW	City:	Whitehorse, YT
Quadrant / Int #		Comments	Scenario 1 (2038 Horizon)	Analysis Date:	2018 Aug 02, Thu
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	
				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
Hamilton Boulevard	NB	1		1					1
Hamilton Boulevard	SB	1		1		1			2
Lazulite Drive	WB				1				
Lazulite Drive	EB				1				
Are the Lazulite Drive WB right turns significantly impeded by through movements? (y/n)							n		
Are the Lazulite Drive EB right turns significantly impeded by through movements? (y/n)							n		

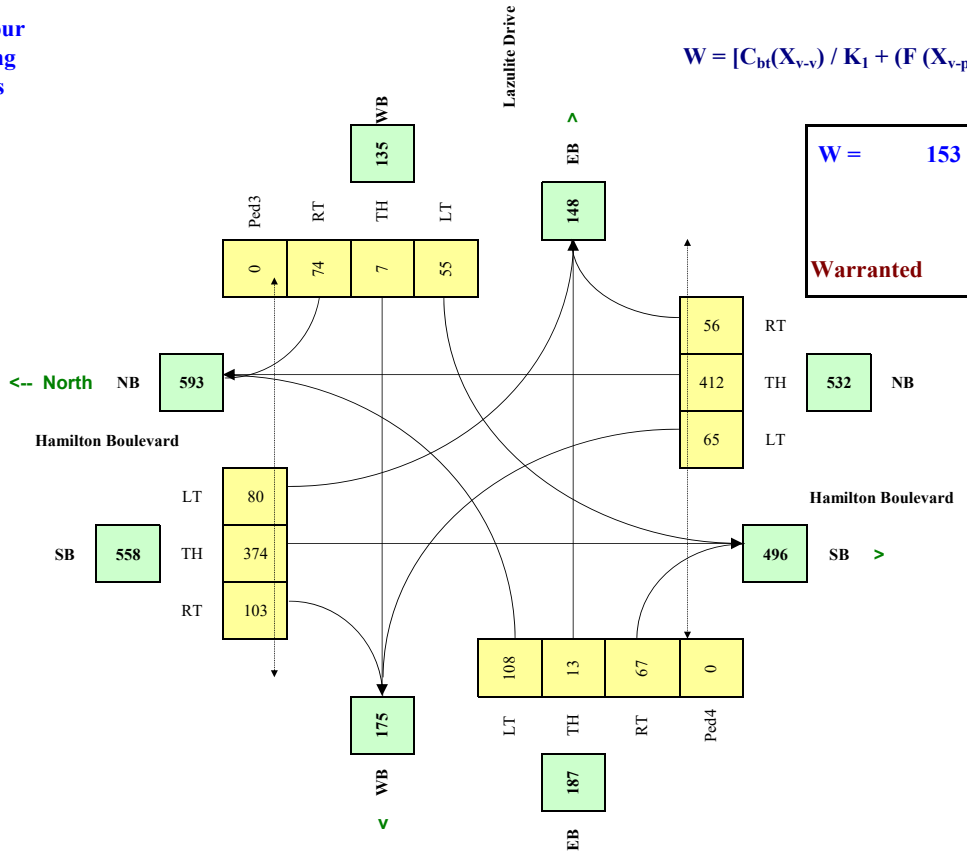
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	25,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Lazulite Drive	EW	50	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
press 'Set Peak Hours' Button to set the peak hour periods	14	451	32	22	218	45	61	4	76	145	9	103	0	0	0	0
	19	626	45	31	303	62	85	6	106	202	13	143	0	0	0	0
	11	376	27	19	182	37	51	4	64	121	8	86	0	0	0	0
	82	242	55	97	367	113	31	6	47	42	11	16	0	0	0	0
	137	404	91	162	612	189	52	10	79	70	18	27	0	0	0	0
	126	372	84	149	563	174	48	9	73	64	17	25	0	0	0	0
Total (6-hour peak)	**389**	**2,470**	**334**	**480**	**2,245**	**620**	**328**	**39**	**445**	**645**	**76**	**400**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**65**	**412**	**56**	**80**	**374**	**103**	**55**	**7**	**74**	**108**	**13**	**67**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements



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

W =	153	153	0
		Veh	*Ped*

Warranted

RESET SHEET

City of Whitehorse - Traffic Signal Warrant Analysis

Main Street (name)	Hamilton Boulevard	Direction (EW or NS)	NS	Road Authority:	City of Whitehorse
Side Street (name)	Falcon Drive (S)	Direction (EW or NS)	EW	City:	Whitehorse, YT
Quadrant / Int #		Comments	Scenario 1 (2038 Horizon)	Analysis Date:	2018 Aug 02, Thu
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	
				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
Hamilton Boulevard	NB	1		1			1		1
Hamilton Boulevard	SB	1		1		1			2
Falcon Drive (S)	WB				1				
Falcon Drive (S)	EB				1				
Are the Falcon Drive (S) WB right turns significantly impeded by through movements? (y/n)							n		
Are the Falcon Drive (S) 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	(#)	25,000
Central Business District	(y/n)	n

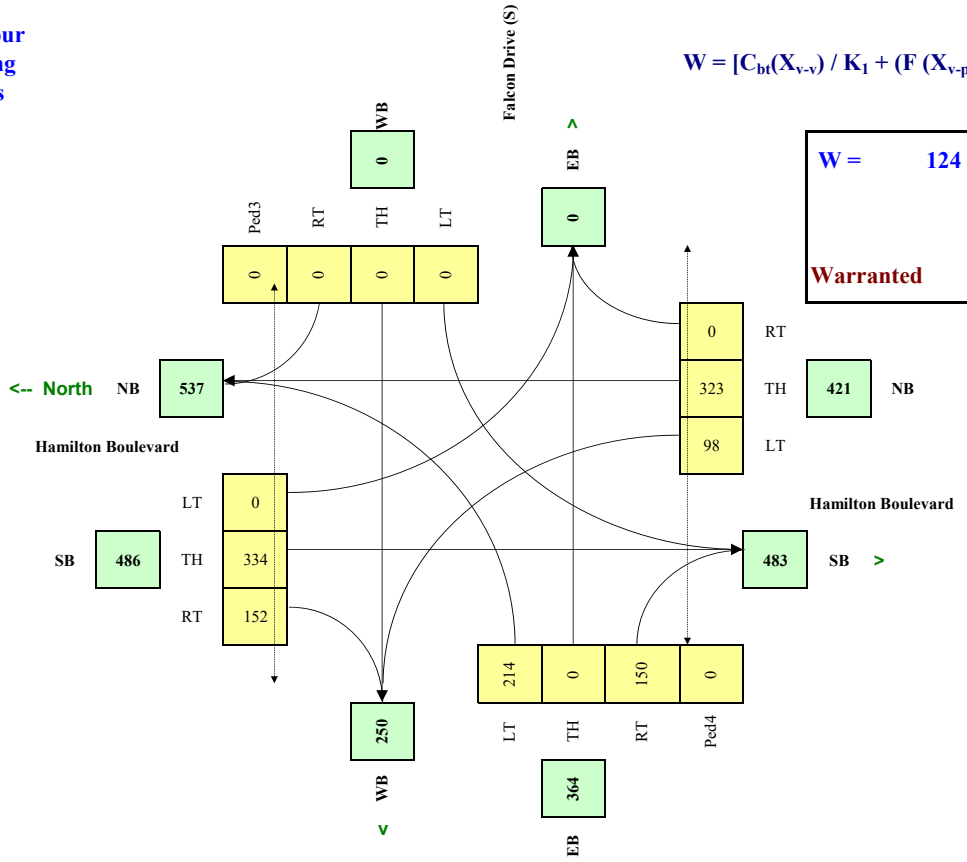
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Hamilton Boulevard	NS	60	5.0%	n	
Falcon Drive (S)	EW	50	2.0%	n	

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
press 'Set Peak Hours' Button to set the peak hour periods	22	207	0	0	351	37	0	0	0	289	0	218	0	0	0	0
	31	287			488	52				401		303	0	0	0	0
	19	172	0	0	293	31	0	0	0	241	0	182	0	0	0	0
	122	303	0	0	207	189	0	0	0	85	0	46	0	0	0	0
	204	505			345	315				141		77	0	0	0	0
	188	465	0	0	317	290	0	0	0	130	0	71	0	0	0	0
Total (6-hour peak)	586	1,938	0	0	2,002	914	0	0	0	1,286	0	897	0	0	0	0
Average (6-hour peak)	98	323	0	0	334	152	0	0	0	214	0	150	0	0	0	0

Average 6-hour Peak Turning Movements

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

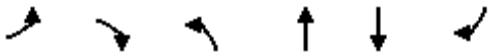


W =	124	124	0
		Veh	Ped

Warranted

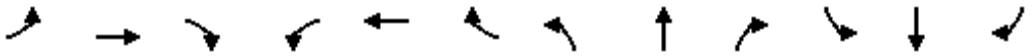
RESET SHEET

Appendix ESYNCHRO REPORTS: 2038 WITH SIGNALIZATION



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	101	0	1451	283	21
Future Volume (vph)	0	101	0	1451	283	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.865			0.990	
Flt Protected						
Satd. Flow (prot)	0	1629	0	3579	3543	0
Flt Permitted						
Satd. Flow (perm)	0	1629	0	3579	3543	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	157.2			144.3	198.8	
Travel Time (s)	11.3			8.7	11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	110	0	1577	308	23
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	110	0	1577	331	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.4%		ICU Level of Service A	
Analysis Period (min) 15			



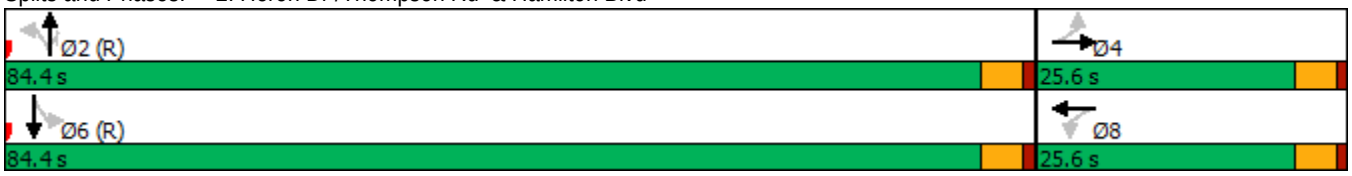
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	0	21	13	0	185	1	1231	6	44	291	39
Future Volume (vph)	112	0	21	13	0	185	1	1231	6	44	291	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	131.0		131.0	85.0		0.0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (m)	7.6			7.6			25.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor					1.00							
Frt		0.979			0.874				0.850		0.982	
Flt Protected		0.960			0.997		0.950			0.950		
Satd. Flow (prot)	0	1770	0	0	1641	0	1789	1883	1601	1789	3514	0
Flt Permitted		0.394			0.977		0.538			0.050		
Satd. Flow (perm)	0	726	0	0	1608	0	1013	1883	1601	94	3514	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			95				15		34	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		147.9			150.7			240.8			144.3	
Travel Time (s)		10.6			10.9			14.4			8.7	
Confl. Peds. (#/hr)				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
Adj. Flow (vph)	122	0	23	14	0	201	1	1338	7	48	316	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	145	0	0	215	0	1	1338	7	48	358	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	L NA	Left	Right	Left	Left	Right	Left	L NA	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5	22.5	22.5	22.5	
Total Split (s)	25.6	25.6		25.6	25.6		84.4	84.4	84.4	84.4	84.4	
Total Split (%)	23.3%	23.3%		23.3%	23.3%		76.7%	76.7%	76.7%	76.7%	76.7%	
Maximum Green (s)	21.1	21.1		21.1	21.1		79.9	79.9	79.9	79.9	79.9	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.5			4.5		4.5	4.5	4.5	4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		21.1			21.1		79.9	79.9	79.9	79.9	79.9	

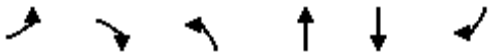
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio		0.19			0.19		0.73	0.73	0.73	0.73	0.73	
v/c Ratio		0.96			0.56		0.00	0.98	0.01	0.71	0.14	
Control Delay		104.8			28.3		4.0	35.3	1.0	65.4	4.3	
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		104.8			28.3		4.0	35.3	1.0	65.4	4.3	
LOS		F			C		A	D	A	E	A	
Approach Delay		104.8			28.3			35.1			11.5	
Approach LOS		F			C			D			B	
Queue Length 50th (m)		28.2			22.9		0.1	235.7	0.0	5.0	9.5	
Queue Length 95th (m)		#67.9			47.1		0.5	#371.7	0.7	#15.6	13.7	
Internal Link Dist (m)		123.9			126.7			216.8			120.3	
Turn Bay Length (m)							131.0		131.0	85.0		
Base Capacity (vph)		151			385		735	1367	1167	68	2561	
Starvation Cap Reductn		0			0		0	0	0	0	0	
Spillback Cap Reductn		0			0		0	0	0	0	0	
Storage Cap Reductn		0			0		0	0	0	0	0	
Reduced v/c Ratio		0.96			0.56		0.00	0.98	0.01	0.71	0.14	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Pretimed
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 34.7 Intersection LOS: C
Intersection Capacity Utilization 95.7% 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: 2: Heron Dr /Thompson Rd & Hamilton Blvd



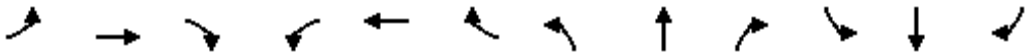


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	337	162	62	833	222	88
Future Volume (vph)	337	162	62	833	222	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	150.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.6		7.6			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt	0.956				0.957	
Flt Protected	0.967		0.950			
Satd. Flow (prot)	1741	0	1789	1883	3425	0
Flt Permitted	0.967		0.549			
Satd. Flow (perm)	1741	0	1034	1883	3425	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	29				96	
Link Speed (k/h)	50			60	60	
Link Distance (m)	141.7			334.0	112.3	
Travel Time (s)	10.2			20.0	6.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	366	176	67	905	241	96
Shared Lane Traffic (%)						
Lane Group Flow (vph)	542	0	67	905	337	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	L NA	Right	Left	R NA	Left	Right
Median Width(m)	3.7			7.4	3.7	
Link Offset(m)	0.0			2.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	35.0		55.0	55.0	55.0	
Total Split (%)	38.9%		61.1%	61.1%	61.1%	
Maximum Green (s)	30.5		50.5	50.5	50.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		4.5	4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	30.5		50.5	50.5	50.5	
Actuated g/C Ratio	0.34		0.56	0.56	0.56	
v/c Ratio	0.89		0.12	0.86	0.17	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Control Delay	45.7		10.0	26.9	7.0	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	45.7		10.0	26.9	7.0	
LOS	D		A	C	A	
Approach Delay	45.7			25.7	7.0	
Approach LOS	D			C	A	
Queue Length 50th (m)	83.6		5.1	123.3	9.6	
Queue Length 95th (m)	#143.0		11.2	#206.3	15.8	
Internal Link Dist (m)	117.7			310.0	88.3	
Turn Bay Length (m)			150.0			
Base Capacity (vph)	609		580	1056	1963	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.89		0.12	0.86	0.17	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Pretimed			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 28.2		Intersection LOS: C	
Intersection Capacity Utilization 79.9%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Falcon Dr (N) & Hamilton Blvd

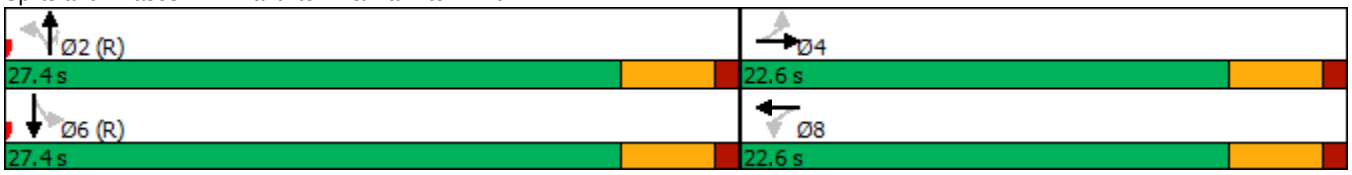


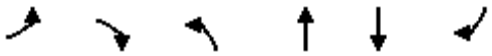
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	202	13	143	85	6	106	19	626	45	31	303	62
Future Volume (vph)	202	13	143	85	6	106	19	626	45	31	303	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	100.0		100.0	85.0		0.0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (m)	7.6			7.6			25.0			25.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.946			0.927				0.850		0.975	
Flt Protected		0.973			0.979		0.950			0.950		
Satd. Flow (prot)	0	1734	0	0	1709	0	1789	1883	1601	1789	3489	0
Flt Permitted		0.737			0.758		0.518			0.194		
Satd. Flow (perm)	0	1313	0	0	1323	0	976	1883	1601	365	3489	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		75			115				49		63	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		161.9			116.5			314.5			136.7	
Travel Time (s)		11.7			8.4			18.9			8.2	
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
Adj. Flow (vph)	220	14	155	92	7	115	21	680	49	34	329	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	389	0	0	214	0	21	680	49	34	396	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	L NA	Left	Right	L NA	Left	Right	Left	L NA	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5	22.5	22.5	22.5	
Total Split (s)	22.6	22.6		22.6	22.6		27.4	27.4	27.4	27.4	27.4	
Total Split (%)	45.2%	45.2%		45.2%	45.2%		54.8%	54.8%	54.8%	54.8%	54.8%	
Maximum Green (s)	18.1	18.1		18.1	18.1		22.9	22.9	22.9	22.9	22.9	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.5			4.5		4.5	4.5	4.5	4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		18.1			18.1		22.9	22.9	22.9	22.9	22.9	
Actuated g/C Ratio		0.36			0.36		0.46	0.46	0.46	0.46	0.46	
v/c Ratio		0.74			0.39		0.05	0.79	0.06	0.20	0.24	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		22.7			8.3		7.9	20.6	3.2	11.9	7.3	
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		22.7			8.3		7.9	20.6	3.2	11.9	7.3	
LOS		C			A		A	C	A	B	A	
Approach Delay		22.7			8.3			19.1			7.7	
Approach LOS		C			A			B			A	
Queue Length 50th (m)		23.1			5.9		1.0	47.6	0.0	1.7	8.6	
Queue Length 95th (m)		#61.0			17.9		3.7	#98.9	3.9	6.5	15.1	
Internal Link Dist (m)		137.9			92.5			290.5			112.7	
Turn Bay Length (m)							100.0		100.0	85.0		
Base Capacity (vph)		523			552		447	862	759	167	1632	
Starvation Cap Reductn		0			0		0	0	0	0	0	
Spillback Cap Reductn		0			0		0	0	0	0	0	
Storage Cap Reductn		0			0		0	0	0	0	0	
Reduced v/c Ratio		0.74			0.39		0.05	0.79	0.06	0.20	0.24	

Intersection Summary			
Area Type:	Other		
Cycle Length: 50			
Actuated Cycle Length: 50			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 15.8		Intersection LOS: B	
Intersection Capacity Utilization 67.7%		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: 4: Lazulite Dr & Hamilton Blvd



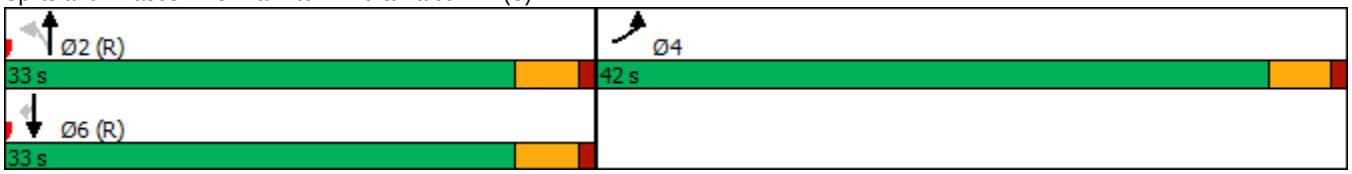


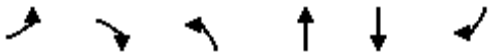
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	401	303	31	287	488	52
Future Volume (vph)	401	303	31	287	488	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	75.0			0.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.6		7.6			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.942					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1725	0	1789	1883	1883	1601
Flt Permitted	0.972		0.223			
Satd. Flow (perm)	1725	0	420	1883	1883	1601
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	72					57
Link Speed (k/h)	50			60	60	
Link Distance (m)	181.3			246.7	314.5	
Travel Time (s)	13.1			14.8	18.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	436	329	34	312	530	57
Shared Lane Traffic (%)						
Lane Group Flow (vph)	765	0	34	312	530	57
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases			2			6
Minimum Split (s)	22.5		22.5	22.5	22.5	22.5
Total Split (s)	42.0		33.0	33.0	33.0	33.0
Total Split (%)	56.0%		44.0%	44.0%	44.0%	44.0%
Maximum Green (s)	37.5		28.5	28.5	28.5	28.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effct Green (s)	37.5		28.5	28.5	28.5	28.5
Actuated g/C Ratio	0.50		0.38	0.38	0.38	0.38
v/c Ratio	0.85		0.21	0.44	0.74	0.09

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Control Delay	26.3		20.0	19.7	27.8	5.0
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	26.3		20.0	19.7	27.8	5.0
LOS	C		C	B	C	A
Approach Delay	26.3			19.7	25.6	
Approach LOS	C			B	C	
Queue Length 50th (m)	81.3		3.2	32.0	63.2	0.0
Queue Length 95th (m)	#151.8		9.8	52.4	98.2	6.4
Internal Link Dist (m)	157.3			222.7	290.5	
Turn Bay Length (m)			75.0			
Base Capacity (vph)	898		159	715	715	643
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.85		0.21	0.44	0.74	0.09

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 24.7		Intersection LOS: C	
Intersection Capacity Utilization 74.0%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

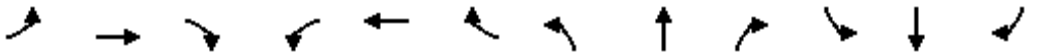
Splits and Phases: 5: Hamilton Blvd & Falcon Dr (S)





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	43	0	676	1263	110
Future Volume (vph)	0	43	0	676	1263	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.865			0.988	
Flt Protected						
Satd. Flow (prot)	0	1629	0	3579	3536	0
Flt Permitted						
Satd. Flow (perm)	0	1629	0	3579	3536	0
Link Speed (k/h)	50			60	60	
Link Distance (m)	157.2			144.3	198.8	
Travel Time (s)	11.3			8.7	11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	47	0	735	1373	120
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	47	0	735	1493	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 48.4%		ICU Level of Service A	
Analysis Period (min) 15			

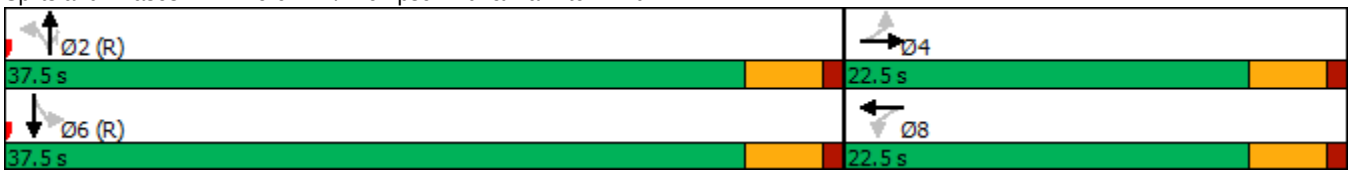


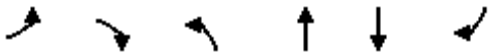
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	3	7	13	0	109	19	565	15	164	1062	122
Future Volume (vph)	70	3	7	13	0	109	19	565	15	164	1062	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	131.0		131.0	85.0		0.0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (m)	7.6			7.6			25.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor					1.00							
Frt		0.988			0.879				0.850		0.984	
Flt Protected		0.958			0.995		0.950			0.950		
Satd. Flow (prot)	0	1783	0	0	1647	0	1789	1883	1601	1789	3521	0
Flt Permitted		0.703			0.972		0.138			0.308		
Satd. Flow (perm)	0	1308	0	0	1609	0	260	1883	1601	580	3521	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			118				27		33	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		147.9			208.7			240.8			144.3	
Travel Time (s)		10.6			15.0			14.4			8.7	
Confl. Peds. (#/hr)				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
Adj. Flow (vph)	76	3	8	14	0	118	21	614	16	178	1154	133
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	87	0	0	132	0	21	614	16	178	1287	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	L NA	Left	Right	Left	Left	Right	Left	L NA	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5	22.5	22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		37.5	37.5	37.5	37.5	37.5	
Total Split (%)	37.5%	37.5%		37.5%	37.5%		62.5%	62.5%	62.5%	62.5%	62.5%	
Maximum Green (s)	18.0	18.0		18.0	18.0		33.0	33.0	33.0	33.0	33.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.5			4.5		4.5	4.5	4.5	4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		18.0			18.0		33.0	33.0	33.0	33.0	33.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio		0.30			0.30		0.55	0.55	0.55	0.55	0.55	
v/c Ratio		0.22			0.23		0.15	0.59	0.02	0.56	0.66	
Control Delay		16.4			5.8		9.7	12.0	2.1	17.2	11.3	
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		16.4			5.8		9.7	12.0	2.1	17.2	11.3	
LOS		B			A		A	B	A	B	B	
Approach Delay		16.4			5.8			11.7			12.0	
Approach LOS		B			A			B			B	
Queue Length 50th (m)		6.4			1.1		1.0	40.4	0.0	11.4	45.8	
Queue Length 95th (m)		15.6			10.9		4.4	66.9	1.5	30.2	64.3	
Internal Link Dist (m)		123.9			184.7			216.8			120.3	
Turn Bay Length (m)							131.0		131.0	85.0		
Base Capacity (vph)		398			565		143	1035	892	319	1951	
Starvation Cap Reductn		0			0		0	0	0	0	0	
Spillback Cap Reductn		0			0		0	0	0	0	0	
Storage Cap Reductn		0			0		0	0	0	0	0	
Reduced v/c Ratio		0.22			0.23		0.15	0.59	0.02	0.56	0.66	

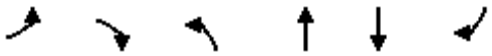
Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 11.7		Intersection LOS: B	
Intersection Capacity Utilization 61.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Heron Dr /Thompson Rd & Hamilton Blvd





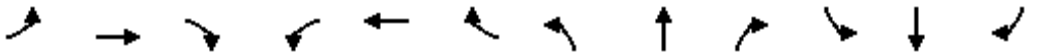
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	113	55	147	401	884	204
Future Volume (vph)	113	55	147	401	884	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	150.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.6		7.6			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt	0.956				0.972	
Flt Protected	0.967		0.950			
Satd. Flow (prot)	1741	0	1789	1883	3478	0
Flt Permitted	0.967		0.195			
Satd. Flow (perm)	1741	0	367	1883	3478	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28				74	
Link Speed (k/h)	50			60	60	
Link Distance (m)	141.7			334.0	112.3	
Travel Time (s)	10.2			20.0	6.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	60	160	436	961	222
Shared Lane Traffic (%)						
Lane Group Flow (vph)	183	0	160	436	1183	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	L NA	Right	Left	R NA	Left	Right
Median Width(m)	3.7			7.4	3.7	
Link Offset(m)	0.0			2.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	22.5		57.5	57.5	57.5	
Total Split (%)	28.1%		71.9%	71.9%	71.9%	
Maximum Green (s)	18.0		53.0	53.0	53.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		4.5	4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	18.0		53.0	53.0	53.0	
Actuated g/C Ratio	0.22		0.66	0.66	0.66	
v/c Ratio	0.44		0.66	0.35	0.51	



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Control Delay	26.4		24.7	6.9	7.3	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	26.4		24.7	6.9	7.3	
LOS	C		C	A	A	
Approach Delay	26.4			11.7	7.3	
Approach LOS	C			B	A	
Queue Length 50th (m)	20.1		12.6	25.2	38.5	
Queue Length 95th (m)	38.3		#47.7	39.0	51.4	
Internal Link Dist (m)	117.7			310.0	88.3	
Turn Bay Length (m)			150.0			
Base Capacity (vph)	413		243	1247	2329	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.44		0.66	0.35	0.51	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 70			
Control Type: Pretimed			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 10.4		Intersection LOS: B	
Intersection Capacity Utilization 60.0%		ICU Level of Service B	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Falcon Dr (N) & Hamilton Blvd

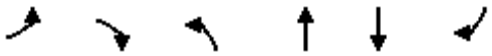


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	18	27	52	10	79	137	404	91	162	612	189
Future Volume (vph)	70	18	27	52	10	79	137	404	91	162	612	189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	100.0		100.0	85.0		0.0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (m)	7.6			7.6			25.0			25.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.969			0.925				0.850		0.965	
Flt Protected		0.970			0.982		0.950			0.950		
Satd. Flow (prot)	0	1770	0	0	1711	0	1789	1883	1601	1789	3453	0
Flt Permitted		0.780			0.853		0.289			0.456		
Satd. Flow (perm)	0	1424	0	0	1486	0	544	1883	1601	859	3453	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			86				99		106	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		161.9			116.5			314.5			136.7	
Travel Time (s)		11.7			8.4			18.9			8.2	
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
Adj. Flow (vph)	76	20	29	57	11	86	149	439	99	176	665	205
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	125	0	0	154	0	149	439	99	176	870	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	L NA	Left	Right	L NA	Left	Right	Left	L NA	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5	22.5	22.5	22.5	
Total Split (s)	23.0	23.0		23.0	23.0		47.0	47.0	47.0	47.0	47.0	
Total Split (%)	32.9%	32.9%		32.9%	32.9%		67.1%	67.1%	67.1%	67.1%	67.1%	
Maximum Green (s)	18.5	18.5		18.5	18.5		42.5	42.5	42.5	42.5	42.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.5			4.5		4.5	4.5	4.5	4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		18.5			18.5		42.5	42.5	42.5	42.5	42.5	
Actuated g/C Ratio		0.26			0.26		0.61	0.61	0.61	0.61	0.61	
v/c Ratio		0.32			0.34		0.45	0.38	0.10	0.34	0.41	

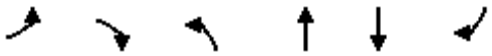
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		19.8			12.5		12.9	8.3	1.7	9.0	6.9	
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		19.8			12.5		12.9	8.3	1.7	9.0	6.9	
LOS		B			B		B	A	A	A	A	
Approach Delay		19.8			12.5			8.3			7.2	
Approach LOS		B			B			A			A	
Queue Length 50th (m)		10.8			6.9		9.3	26.0	0.0	10.1	23.4	
Queue Length 95th (m)		23.7			20.3		23.3	41.7	4.6	20.9	33.7	
Internal Link Dist (m)		137.9			92.5			290.5			112.7	
Turn Bay Length (m)							100.0		100.0	85.0		
Base Capacity (vph)		391			456		330	1143	1010	521	2138	
Starvation Cap Reductn		0			0		0	0	0	0	0	
Spillback Cap Reductn		0			0		0	0	0	0	0	
Storage Cap Reductn		0			0		0	0	0	0	0	
Reduced v/c Ratio		0.32			0.34		0.45	0.38	0.10	0.34	0.41	

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 70			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 0.45			
Intersection Signal Delay: 8.8		Intersection LOS: A	
Intersection Capacity Utilization 52.5%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 4: Lazulite Dr & Hamilton Blvd



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	141	77	204	505	345	315
Future Volume (vph)	141	77	204	505	345	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	75.0			0.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.6		7.6			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.952					0.850
Flt Protected	0.969		0.950			
Satd. Flow (prot)	1737	0	1789	1883	1883	1601
Flt Permitted	0.969		0.492			
Satd. Flow (perm)	1737	0	927	1883	1883	1601
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	38					342
Link Speed (k/h)	50			60	60	
Link Distance (m)	181.3			246.7	314.5	
Travel Time (s)	13.1			14.8	18.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	153	84	222	549	375	342
Shared Lane Traffic (%)						
Lane Group Flow (vph)	237	0	222	549	375	342
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases			2			6
Minimum Split (s)	22.5		22.5	22.5	22.5	22.5
Total Split (s)	27.0		48.0	48.0	48.0	48.0
Total Split (%)	36.0%		64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	22.5		43.5	43.5	43.5	43.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effct Green (s)	22.5		43.5	43.5	43.5	43.5
Actuated g/C Ratio	0.30		0.58	0.58	0.58	0.58
v/c Ratio	0.43		0.41	0.50	0.34	0.32

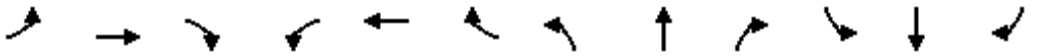


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Control Delay	20.5		11.6	11.4	9.4	1.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	20.5		11.6	11.4	9.4	1.8
LOS	C		B	B	A	A
Approach Delay	20.5			11.4	5.7	
Approach LOS	C			B	A	
Queue Length 50th (m)	22.1		15.7	41.8	25.2	0.0
Queue Length 95th (m)	40.9		30.7	64.9	40.4	9.3
Internal Link Dist (m)	157.3			222.7	290.5	
Turn Bay Length (m)			75.0			
Base Capacity (vph)	547		537	1092	1092	1072
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.43		0.41	0.50	0.34	0.32

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 10.3		Intersection LOS: B	
Intersection Capacity Utilization 53.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 5: Hamilton Blvd & Falcon Dr (S)

Appendix F SYNCHRO REPORTS: 2038 WITH IMPROVEMENTS

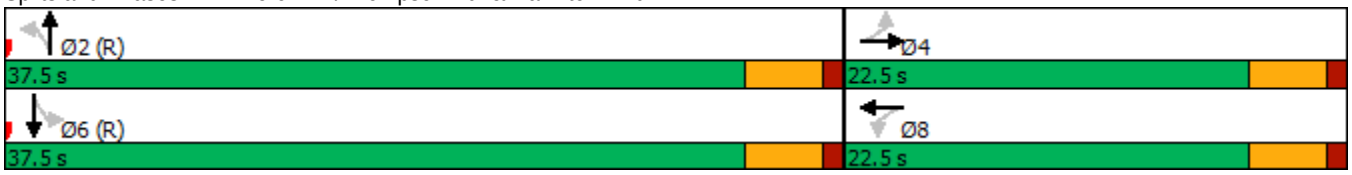


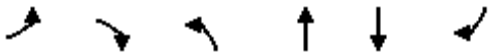
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	0	21	13	0	185	1	1231	6	44	291	39
Future Volume (vph)	112	0	21	13	0	185	1	1231	6	44	291	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	131.0		131.0	85.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.6			7.6			25.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor					1.00							
Frt		0.979			0.874			0.999			0.982	
Flt Protected		0.960			0.997		0.950			0.950		
Satd. Flow (prot)	0	1770	0	0	1641	0	1789	3575	0	1789	3514	0
Flt Permitted		0.604			0.980		0.538			0.123		
Satd. Flow (perm)	0	1114	0	0	1613	0	1013	3575	0	232	3514	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			41			1			38	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		147.9			150.7			240.8			144.3	
Travel Time (s)		10.6			10.9			14.4			8.7	
Confl. Peds. (#/hr)				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
Adj. Flow (vph)	122	0	23	14	0	201	1	1338	7	48	316	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	145	0	0	215	0	1	1345	0	48	358	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	L NA	Left	Right	Left	Left	Right	Left	L NA	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		37.5	37.5		37.5	37.5	
Total Split (%)	37.5%	37.5%		37.5%	37.5%		62.5%	62.5%		62.5%	62.5%	
Maximum Green (s)	18.0	18.0		18.0	18.0		33.0	33.0		33.0	33.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		18.0			18.0		33.0	33.0		33.0	33.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio		0.30			0.30		0.55	0.55		0.55	0.55	
v/c Ratio		0.41			0.42		0.00	0.68		0.38	0.18	
Control Delay		17.8			16.5		6.0	12.0		18.4	6.3	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		17.8			16.5		6.0	12.0		18.4	6.3	
LOS		B			B		A	B		B	A	
Approach Delay		17.8			16.5			12.0			7.7	
Approach LOS		B			B			B			A	
Queue Length 50th (m)		10.1			14.8		0.1	50.2		2.7	8.2	
Queue Length 95th (m)		23.7			30.8		0.6	70.0		11.5	13.6	
Internal Link Dist (m)		123.9			126.7			216.8			120.3	
Turn Bay Length (m)							131.0			85.0		
Base Capacity (vph)		353			512		557	1966		127	1949	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.41			0.42		0.00	0.68		0.38	0.18	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 12.0		Intersection LOS: B	
Intersection Capacity Utilization 67.5%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Heron Dr /Thompson Rd & Hamilton Blvd



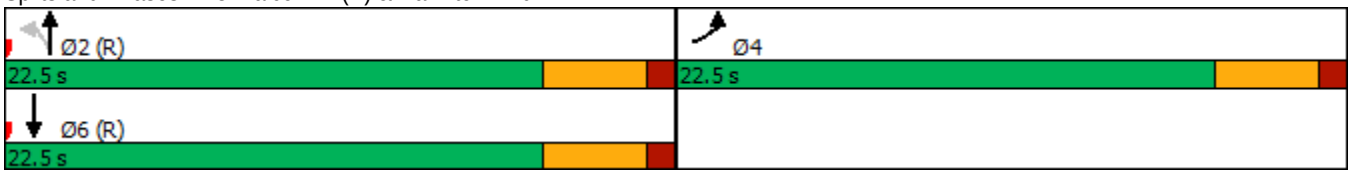


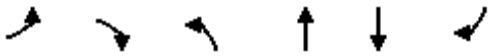
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	337	162	62	833	222	88
Future Volume (vph)	337	162	62	833	222	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	150.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.6		7.6			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt	0.956				0.957	
Flt Protected	0.967		0.950			
Satd. Flow (prot)	1741	0	1789	3579	3425	0
Flt Permitted	0.967		0.549			
Satd. Flow (perm)	1741	0	1034	3579	3425	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	64				96	
Link Speed (k/h)	50			60	60	
Link Distance (m)	134.9			334.0	112.3	
Travel Time (s)	9.7			20.0	6.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	366	176	67	905	241	96
Shared Lane Traffic (%)						
Lane Group Flow (vph)	542	0	67	905	337	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	L NA	Right	Left	R NA	Left	Right
Median Width(m)	3.7			7.4	3.7	
Link Offset(m)	0.0			2.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	22.5		22.5	22.5	22.5	
Total Split (%)	50.0%		50.0%	50.0%	50.0%	
Maximum Green (s)	18.0		18.0	18.0	18.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		4.5	4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	18.0		18.0	18.0	18.0	
Actuated g/C Ratio	0.40		0.40	0.40	0.40	
v/c Ratio	0.74		0.16	0.63	0.24	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Control Delay	18.4		10.0	13.3	6.8	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	18.4		10.0	13.3	6.8	
LOS	B		A	B	A	
Approach Delay	18.4			13.1	6.8	
Approach LOS	B			B	A	
Queue Length 50th (m)	29.6		3.2	28.3	6.0	
Queue Length 95th (m)	#71.3		8.9	42.9	12.1	
Internal Link Dist (m)	110.9			310.0	88.3	
Turn Bay Length (m)			150.0			
Base Capacity (vph)	734		413	1431	1427	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.74		0.16	0.63	0.24	

Intersection Summary			
Area Type:	Other		
Cycle Length: 45			
Actuated Cycle Length: 45			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 45			
Control Type: Pretimed			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 13.5		Intersection LOS: B	
Intersection Capacity Utilization 59.1%		ICU Level of Service B	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Falcon Dr (N) & Hamilton Blvd



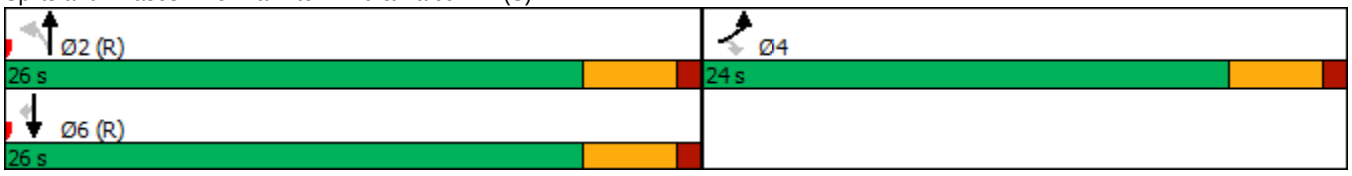


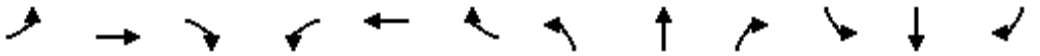
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	401	303	31	287	488	52
Future Volume (vph)	401	303	31	287	488	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	50.0	75.0			0.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.6		7.6			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1883	1601
Flt Permitted	0.950		0.306			
Satd. Flow (perm)	1789	1601	576	1883	1883	1601
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		218				57
Link Speed (k/h)	50			60	60	
Link Distance (m)	181.3			246.7	317.3	
Travel Time (s)	13.1			14.8	19.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	436	329	34	312	530	57
Shared Lane Traffic (%)						
Lane Group Flow (vph)	436	329	34	312	530	57
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	24.0	24.0	26.0	26.0	26.0	26.0
Total Split (%)	48.0%	48.0%	52.0%	52.0%	52.0%	52.0%
Maximum Green (s)	19.5	19.5	21.5	21.5	21.5	21.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	19.5	19.5	21.5	21.5	21.5	21.5
Actuated g/C Ratio	0.39	0.39	0.43	0.43	0.43	0.43
v/c Ratio	0.63	0.43	0.14	0.39	0.66	0.08

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Control Delay	17.2	6.2	10.5	11.5	16.9	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	6.2	10.5	11.5	16.9	3.8
LOS	B	A	B	B	B	A
Approach Delay	12.4			11.4	15.6	
Approach LOS	B			B	B	
Queue Length 50th (m)	29.9	6.2	1.7	17.8	34.8	0.2
Queue Length 95th (m)	53.4	19.6	6.0	32.7	m61.0	m2.8
Internal Link Dist (m)	157.3			222.7	293.3	
Turn Bay Length (m)		50.0	75.0			
Base Capacity (vph)	697	757	247	809	809	720
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.43	0.14	0.39	0.66	0.08

Intersection Summary			
Area Type:	Other		
Cycle Length: 50			
Actuated Cycle Length: 50			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 13.3		Intersection LOS: B	
Intersection Capacity Utilization 55.5%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 5: Hamilton Blvd & Falcon Dr (S)



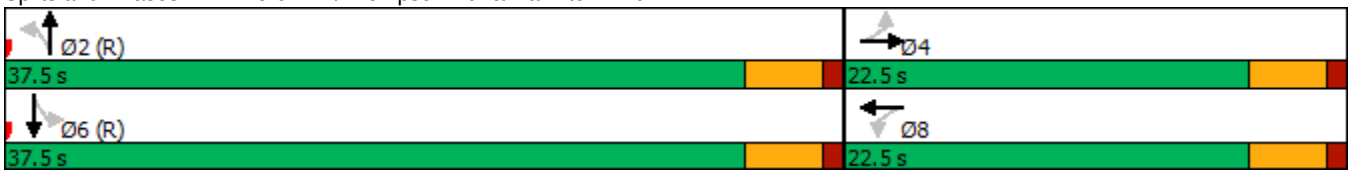


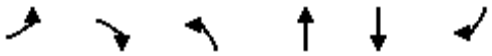
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	3	7	13	0	109	19	565	15	164	1062	122
Future Volume (vph)	70	3	7	13	0	109	19	565	15	164	1062	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	131.0		131.0	85.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.6			7.6			25.0			30.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor					1.00							
Frt		0.988			0.879			0.996			0.984	
Flt Protected		0.958			0.995		0.950			0.950		
Satd. Flow (prot)	0	1783	0	0	1647	0	1789	3564	0	1789	3521	0
Flt Permitted		0.703			0.972		0.138			0.393		
Satd. Flow (perm)	0	1308	0	0	1609	0	260	3564	0	740	3521	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			118			7			33	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		147.9			208.7			240.8			144.3	
Travel Time (s)		10.6			15.0			14.4			8.7	
Confl. Peds. (#/hr)				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
Adj. Flow (vph)	76	3	8	14	0	118	21	614	16	178	1154	133
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	87	0	0	132	0	21	630	0	178	1287	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	L NA	Left	Right	Left	Left	Right	Left	L NA	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		37.5	37.5		37.5	37.5	
Total Split (%)	37.5%	37.5%		37.5%	37.5%		62.5%	62.5%		62.5%	62.5%	
Maximum Green (s)	18.0	18.0		18.0	18.0		33.0	33.0		33.0	33.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		18.0			18.0		33.0	33.0		33.0	33.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio		0.30			0.30		0.55	0.55		0.55	0.55	
v/c Ratio		0.22			0.23		0.15	0.32		0.44	0.66	
Control Delay		16.4			5.8		9.7	7.8		12.3	11.3	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		16.4			5.8		9.7	7.8		12.3	11.3	
LOS		B			A		A	A		B	B	
Approach Delay		16.4			5.8			7.9			11.4	
Approach LOS		B			A			A			B	
Queue Length 50th (m)		6.4			1.1		1.0	17.6		10.4	45.8	
Queue Length 95th (m)		15.6			10.9		4.4	25.9		24.1	64.3	
Internal Link Dist (m)		123.9			184.7			216.8			120.3	
Turn Bay Length (m)							131.0			85.0		
Base Capacity (vph)		398			565		143	1963		407	1951	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.22			0.23		0.15	0.32		0.44	0.66	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 10.3		Intersection LOS: B	
Intersection Capacity Utilization 59.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Heron Dr /Thompson Rd & Hamilton Blvd



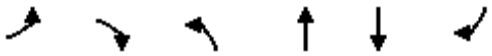


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	113	55	147	401	884	204
Future Volume (vph)	113	55	147	401	884	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	150.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.6		7.6			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt	0.956				0.972	
Flt Protected	0.967		0.950			
Satd. Flow (prot)	1741	0	1789	3579	3478	0
Flt Permitted	0.967		0.195			
Satd. Flow (perm)	1741	0	367	3579	3478	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28				74	
Link Speed (k/h)	50			60	60	
Link Distance (m)	141.7			334.0	112.3	
Travel Time (s)	10.2			20.0	6.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	60	160	436	961	222
Shared Lane Traffic (%)						
Lane Group Flow (vph)	183	0	160	436	1183	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	L NA	Right	Left	R NA	Left	Right
Median Width(m)	3.7			7.4	3.7	
Link Offset(m)	0.0			2.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	22.5		57.5	57.5	57.5	
Total Split (%)	28.1%		71.9%	71.9%	71.9%	
Maximum Green (s)	18.0		53.0	53.0	53.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.5		4.5	4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	18.0		53.0	53.0	53.0	
Actuated g/C Ratio	0.22		0.66	0.66	0.66	
v/c Ratio	0.44		0.66	0.18	0.51	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Control Delay	26.4		24.7	5.4	7.3	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	26.4		24.7	5.4	7.3	
LOS	C		C	A	A	
Approach Delay	26.4			10.6	7.3	
Approach LOS	C			B	A	
Queue Length 50th (m)	20.1		12.6	11.6	38.5	
Queue Length 95th (m)	38.3		#47.7	16.7	51.4	
Internal Link Dist (m)	117.7			310.0	88.3	
Turn Bay Length (m)			150.0			
Base Capacity (vph)	413		243	2371	2329	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.44		0.66	0.18	0.51	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 70			
Control Type: Pretimed			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 10.1		Intersection LOS: B	
Intersection Capacity Utilization 60.0%		ICU Level of Service B	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Falcon Dr (N) & Hamilton Blvd



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	141	77	204	505	345	315
Future Volume (vph)	141	77	204	505	345	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	50.0	75.0			0.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.6		7.6			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1883	1601
Flt Permitted	0.950		0.478			
Satd. Flow (perm)	1789	1601	900	1883	1883	1601
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		84				342
Link Speed (k/h)	50			60	60	
Link Distance (m)	181.3			246.7	314.5	
Travel Time (s)	13.1			14.8	18.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	153	84	222	549	375	342
Shared Lane Traffic (%)						
Lane Group Flow (vph)	153	84	222	549	375	342
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24	14	24			14
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.5	22.5	27.5	27.5	27.5	27.5
Total Split (%)	45.0%	45.0%	55.0%	55.0%	55.0%	55.0%
Maximum Green (s)	18.0	18.0	23.0	23.0	23.0	23.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	18.0	18.0	23.0	23.0	23.0	23.0
Actuated g/C Ratio	0.36	0.36	0.46	0.46	0.46	0.46
v/c Ratio	0.24	0.13	0.54	0.63	0.43	0.37

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Control Delay	12.5	3.9	15.7	14.4	11.1	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.5	3.9	15.7	14.4	11.1	2.5
LOS	B	A	B	B	B	A
Approach Delay	9.4			14.8	7.0	
Approach LOS	A			B	A	
Queue Length 50th (m)	9.2	0.0	13.1	34.5	20.8	0.0
Queue Length 95th (m)	19.3	6.3	30.2	60.3	37.4	10.0
Internal Link Dist (m)	157.3			222.7	290.5	
Turn Bay Length (m)		50.0	75.0			
Base Capacity (vph)	644	630	414	866	866	921
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.13	0.54	0.63	0.43	0.37

Intersection Summary			
Area Type:	Other		
Cycle Length: 50			
Actuated Cycle Length: 50			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 10.8		Intersection LOS: B	
Intersection Capacity Utilization 48.5%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 5: Hamilton Blvd & Falcon Dr (S)