TECHNICAL MEMORANDUM

TO: 10169448 Manitoba Ltd.
c/o Danny Serhal
Serhal Consulting Inc.

FROM: Stephen Chapman, P. Eng, RSP[1]
DATE: January 25, 2024
SUBJECT Transportation Impact Study Addendum for 4025 Roblin Boulevard
Technical Memorandum – Traffic Operation Analysis - Final

This technical memorandum is prepared as an addendum to the 4025 Roblin Boulevard Transportation Impact Study (TIS) issued in November 2021. The addendum was requested by the City of Winnipeg to update analysis results based on a proposed decrease in density from 300 multi-family units proposed in 2021 to the current 2024 proposal for 101 multi-family units and 18 townhouses. The addendum quantifies the difference in estimated vehicle trips between the 2021 development plan and the 2024 development plan, and, using updated volume projections and analysis, determines if prior recommendations are anticipated to still be required in the context of updated development plans.

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January 25, 2024

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1 INTRODUCTION

MORR Transportation Consulting Ltd. (MORR) was retained by 10169448 Manitoba Ltd.to prepare an addendum to the 4025 Roblin Boulevard Transportation Impact Study (TIS) issued in November 2021. The property at 4025 Roblin Boulevard is in the northwest quadrant of William R. Clement Parkway (Route 96) and Roblin Boulevard intersection, in the Charleswood neighbourhood of Winnipeg, Manitoba. The property currently accommodates 20 condo bungalow buildings at the north end of the site and a 30-suite assisted living facility in a heritage building mid-site which are to remain post development.

The 2024 proposed development plan for 4025 Roblin Boulevard features 101 multi-family units and 18 townhouses. This represents a reduction from the 300 multi-family units proposed for the site in 2021. The 2024 proposed vehicle access configuration for 4025 Roblin Boulevard is an all-directional private approach on McQuaker Drive for the pre-existing land uses and a right-in/right-out private approach on Roblin Boulevard for the new development.

The city has requested an updated TIS based on the proposed lower unit count. Consequently, the purpose of the addendum is to confirm whether the conclusions and recommendations from the original TIS still applies with the lower unit count and proposed vehicle access layout. The addendum objectives are to:

- Quantify the difference in estimated vehicles trips between the 2021 development plan and the 2024 development plan.
- Using volume projections and analysis determine if any changes are required on the public street network to accommodate the 2024 proposed development.

This TIS addendum is organized into the following sections:

- Study Context documents the 2024 development plan relative to the 2021 development plan in terms of number and type of units, and vehicular access.
- Traffic Volumes estimates the amount of traffic the 2024 development plan will generate and compares it to 2021 development plan estimates in tabular form. This section includes future background traffic volumes to forecast total post development traffic volumes based on the 2024 development plan.
- Analysis Results presents the findings at the study intersections based on the 2024 development plan and determines an updated recommendation.
- Summary & Recommendations presents the key findings and recommendations stemming from the addendum.

2 STUDY CONTEXT

The proposed development is in the north Charleswood neighborhood, on the north side of Roblin Boulevard between William R Clement Parkway and McQuaker Drive. The site currently contains 20 condo bungalow buildings at the north end of the site and a 30-suite assisted living facility in a heritage building mid-site, both of which are proposed to remain post-development. The existing access features a right-in/right-out (RIRO) access to Roblin Boulevard.

Figure 1 shows the development location.



FIGURE 1: DEVELOPMENT LOCATION

Lands near the development are developed primarily with single-family homes, with some commercial buildings along Roblin Boulevard east of William R Clement Parkway.

The previous November 2021 TIS was based on a site plan that with 300 multi-family units with full development anticipated in 2028. The updated 2024 site plan indicates 101 multi-family units in a four-storey building, and 18 townhouses in three separate buildings with vehicle access for the site via a right-in/right-out approach to Roblin Boulevard. The existing developments on site are proposed to be re-routed to an all-directional approach to McQuaker Boulevard. Full build out of the development is anticipated in 2026.

Figure 2 illustrates the 2024 development site plan.

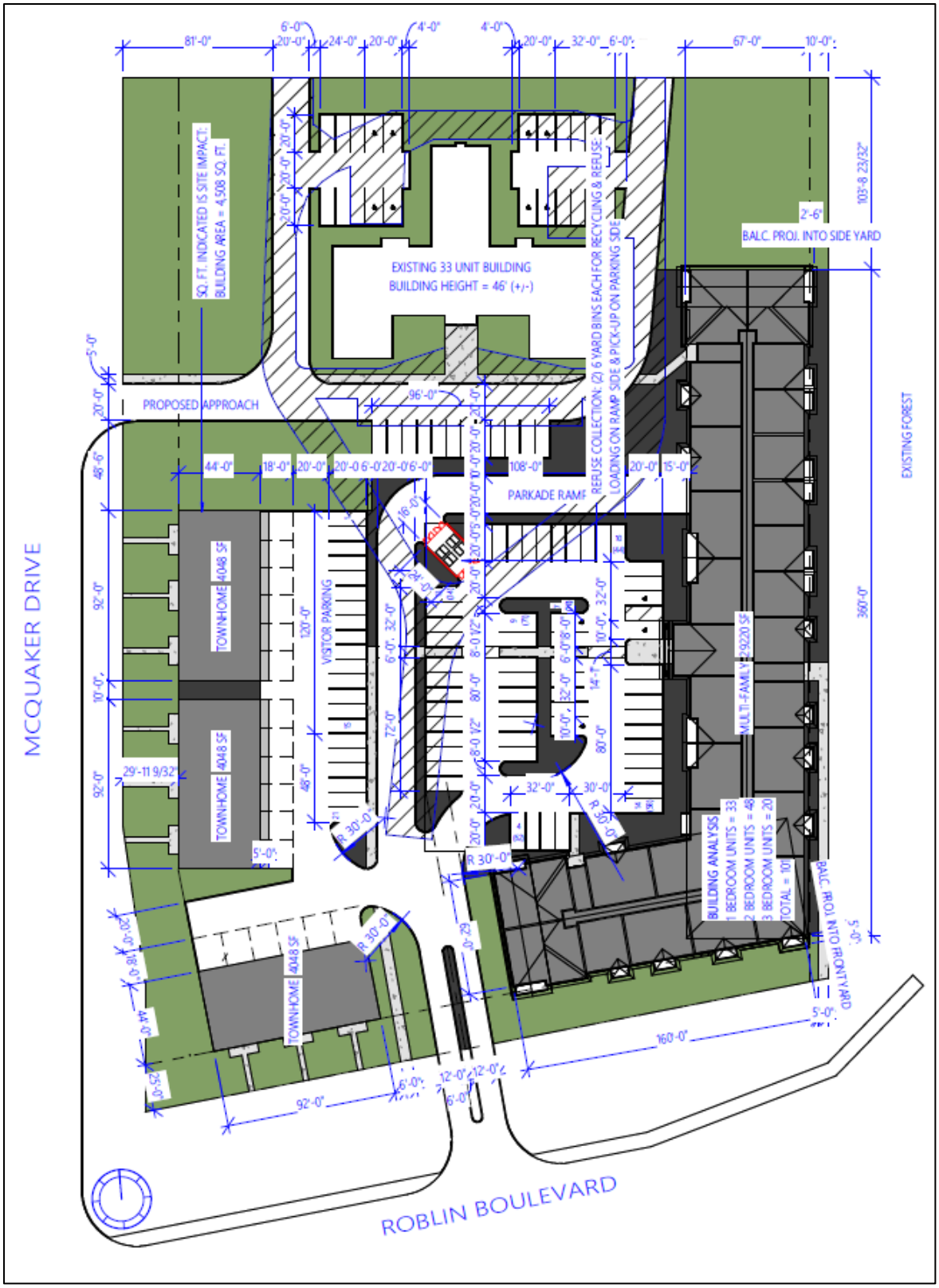


FIGURE 2: 2024 DEVELOPMENT SITE PLAN

3 VOLUMES

Figure 3 shows the forecast 2025 background study area traffic volumes from the November 2021 TIS. Volumes are shown first for the weekday AM peak hour, with PM peak hour volumes following in parentheses.



FIGURE 3: FUTURE 2025 BACKGROUND VOLUMES

Full build out of the 2024 concept plan is anticipated in 2026. Background volumes at the full build out year based on a previously approved 1.0% compound annual growth rate on Roblin Boulevard are illustrated in Figure Figure 4.



FIGURE 4: 2026 BACKGROUND VOLUMES

The development generated volumes were estimated from the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition* which is the industry standard for estimating traffic. The following land uses were used for the anticipated land uses:

- #221 Multi-family development to represent the multi-family units
- *#215 Single Family Attached Housing* to represent the Townhouses.

Table 1 shows the trip generation estimates for both the 2021 and 2024 site plans.

TABLE 1: TRIP GENERATION ESTIMATES

Land Use (ITE Category)	Quantity	Trip Generation Rate	% In	Trip Generation Estimates
2021 Site Plan				
Multifamily (#221)	300 units	Taken from Previous TIS	26% AM 61% PM	**108 AM trips (28 in, 80 out)** **132 PM trips (81 in, 51 out)**
2024 Site Plan				
Multifamily (#221)	101 units	0.37 AM trips per unit 0.39 PM trips per unit	23% AM 61% PM	38 AM trips (9 in, 29 out) 39 PM trips (24 in, 15 out)
Townhouses (#215)	18 units	0.48 AM trips per unit 0.57 PM trips per unit	25% AM 59% PM	8 AM trips (2 in, 6 out) 10 PM trips (6 in, 4 out)
			Total	**46 AM trips (11 in, 35 out)** **49 PM trips (30 in, 19 out)**

The development generated volumes from the 2024 site plan is 43% and 37% of the 2021 site plan during the AM and PM peak hours, respectively.

In the 2024 site plan, there is no vehicle connection from the proposed development to the existing developments on the north portion of the site. The study team also understands that the McQuaker Drive approach is part of the application approval process, and therefore subject to being approved or denied. Consequently, distribution was completed for two access scenarios:

1. Existing development trips utilize an approved McQuaker Drive all-directional access with proposed development trips all utilizing the RIRO access on Roblin Boulevard.
2. All trips (existing and proposed) utilize the RIRO access on Roblin Boulevard, assuming McQuaker Drive access is denied.

Both scenarios assume that westbound Roblin Boulevard u-turns will be restricted at McQuaker Drive and will continue to be permitted at Oakdale Drive. The following trip distributions were taken from the previous TIS report and carried through to the addendum for the updated proposed development:

- 70% East
- 30% West



FIGURE 5: DEVELOPMENT GENERATED VOLUMES - TWO ACCESSES



FIGURE 6: DEVELOPMENT GENERATED VOLUMES - RIRO ACCESS

Post development volumes were calculated by summing the 2026 background and the development generated volumes from the 2024 site plan. For existing 4025 Roblin traffic from the 40 existing condos and 30 existing assisted living suites it is estimated that between 200 to 250 trips per day will be routed to McQuaker Drive if an access is approved. For context, based on the literature, the nine existing houses on McQuaker compute to about 100 trips per day.

J. C.

February 14, 2024



FIGURE 7: 2026 POST DEVELOPMENT VOLUMES - TWO ACCESSES



FIGURE 8: 2026 POST DEVELOPMENT VOLUMES – RIRO ACCESS

4 ANALYSIS RESULTS

Traffic operations at the study area intersections during the AM and PM peak hours were analyzed based on the methodology outlined in the U.S. Transportation Research Board's *Highway Capacity Manual* (HCM), using the *Synchro Studio 9* software package. Synchro returned performance measures including delay, LOS, volume to capacity (v/c) ratios, and queue estimates.

Analysis was completed for the 2026 post development scenarios based on the two access scenarios.

Table 2 shows the post development traffic operation analysis results. Synchro performance metrics for "notable movements" are shown in LOS, v/c ratio, with 95th percentile queue length from SimTraffic. Notable movements refer to any individual movement that enters/exits the development site.

TABLE 2: TRAFFIC OPERATION PERFORMANCE RESULTS – POST DEVELOPMENT

Intersection	Notable Movement	AM Peak Hour	PM Peak Hour
		LOS / Delay / v/c ratio / 95th Queue	
Two Access Scenario			
Roblin Boulevard at RIRO Access	SBR	A / 9 / 0.04 / 10 m	C / 15 / 0.06 / 10 m
Roblin Boulevard at McQuaker Drive	SB	B / 13 / 0.05 / 10 m	D / 27 / 0.09 / 10 m
	EBL	A / 8 / 0.00 / 5 m	B / 13 / 0.02 / 10 m
Roblin Boulevard at Oakdale Drive	WBL/U	B / 10 / 0.01 / 10 m	A / 8 / 0.02 / 10 m
RIRO Access Scenario			
Roblin Boulevard at RIRO Access	SBR	A / 9 / 0.04 / 15 m	C / 16 / 0.09 / 10 m
Roblin Boulevard at McQuaker Drive	SB	B / 13 / 0.05 / 10 m	C / 25 / 0.02 / 5 m
	EBL	A / 8 / 0.00 / 5 m	B / 13 / 0.02 / 5 m
Roblin Boulevard at Oakdale Drive	WBL/U	B / 10 / 0.01 / 15 m	A / 8 / 0.02 / 10 m

The post development results indicate that the eastbound left turn queue length at McQuaker Drive is approximately 5 – 10 m or equivalent to one vehicle length. The existing median on Roblin Boulevard at McQuaker Drive has a B-nose and is wide enough to store one vehicle without impeding eastbound through traffic. As such, the study team deemed an eastbound left storage lane at Roblin Boulevard/McQuaker Drive is not required based on the 2024 site plan.

The study team notes that with the expected increase of westbound U-turns at Oakdale Drive post-development the south side curb of Roblin Boulevard east of Oakdale Drive could be modified to accommodate the U-turn maneuver more comfortably. Figure 9 illustrates the curb modification required based on AutoTURN analysis.

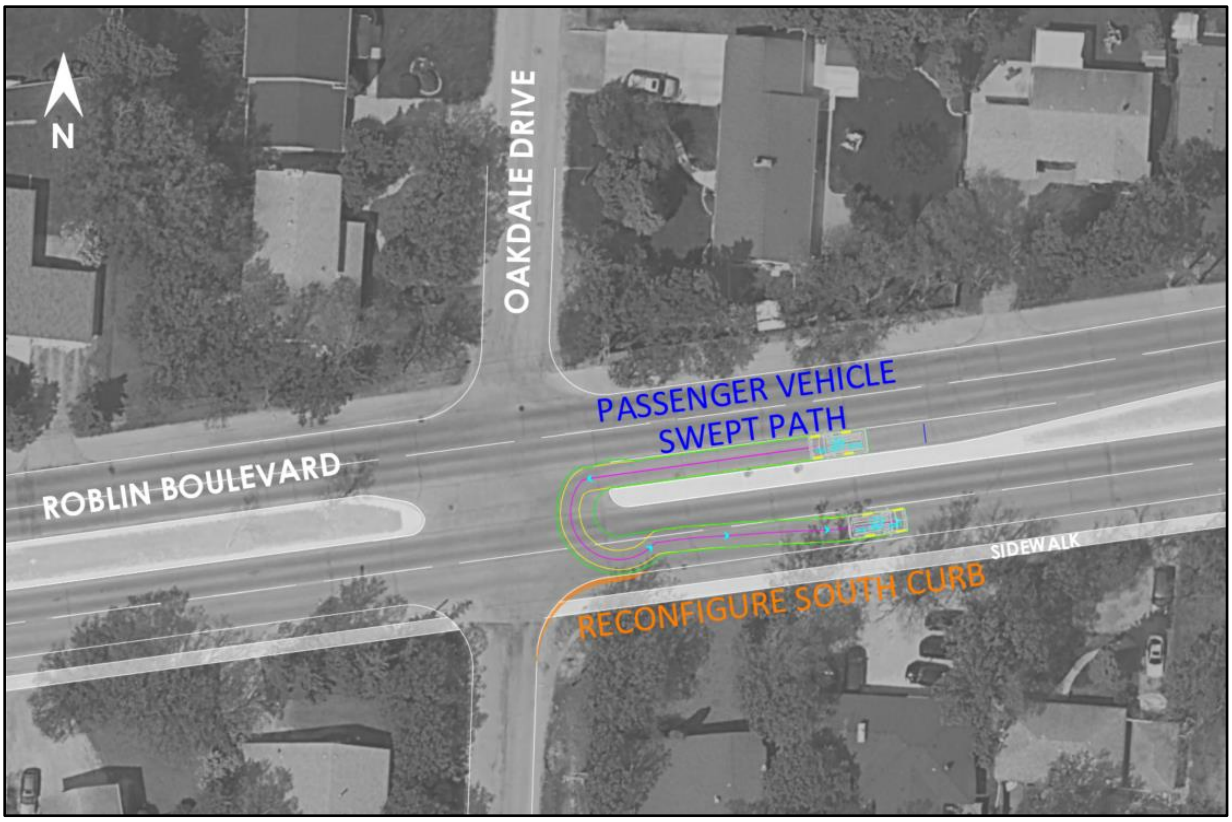


FIGURE 9: ROBLIN BOULEVARD SOUTH SIDE CURB MODIFICATION

5 SUMMARY & RECOMMENDATIONS

The addendum summarizes the following findings:

- The proposed 2024 development is anticipated to generate 46 AM trips, and 49 PM trips. This in comparison is 43% and 37% of the 2021 site plan in the AM and PM peak hours, respectively.
- Traffic operation performance results indicates that an eastbound left turn storage is not required on Roblin Boulevard at McQuaker Drive – regardless of access scenario for the proposed 2024 development.
- To better accommodate the increase of U-turns on Roblin Boulevard at Oakdale Drive, the south curb is recommended to be reconfigured as per Figure 9.

The study team recommends proceeding with the modification to the curb on the south side of Roblin Boulevard just east of Oakdale Drive with implementation of the 2024 development plan.

APPENDIX A – DATA & CALCULATIONS

Input Needed
Formulated

AM

Raw Counts

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
1	Roblin Boulevard & William R	2025			7	1053	126		452	761	179		569	296	11	0	23	188	499	4164
2	Roblin Boulevard Access	2025			0	0	0		0	0	16		0	876	0	0	0	366	8	1266
3	Roblin Boulevard & McQuake	2025			0	0	0		5	0	2		1	860	0	11	0	369	2	1250
4	Roblin Boulevard & Oakdale E	2025			5	5	25		5	5	5		5	831	0	0	8	358	5	1257

Peak Hour Factor

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
1	Roblin Boulevard & William R	2025	0:00																	0.92
2	Roblin Boulevard Access	2025	0:00																	0.92
3	Roblin Boulevard & McQuake	2025	0:00																	0.92
4	Roblin Boulevard & Oakdale E	2025	0																	0.92

Future CAGR

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
1	Roblin Boulevard & William R	2025	0:00		1.00%	1.00%	1.00%		1.00%	1.00%	1.00%		1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	
2	Roblin Boulevard Access	2025	0:00																	
3	Roblin Boulevard & McQuake	2025	0:00																	
4	Roblin Boulevard & Oakdale E	2025	0																	
0	0	0	0																	
0	0	0	0																	
0	0	0	0																	

- EBT and WBT along Roblin were balanced to west side of William Clement

2026 Background

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
1	Roblin Boulevard & William R	2026	0:00	0	7	1064	127	0	457	769	181	0	575	299	11	0	23	190	504	4207
2	Roblin Boulevard Access	2026	0:00	0	0	0	0	0	0	0	16	0	0	885	0	0	0	370	8	1279
3	Roblin Boulevard & McQuake	2026	0:00	0	0	0	0	0	5	0	2	0	1	874	0	11	0	373	2	1268
4	Roblin Boulevard & Oakdale E	2026	0:00	0	5	5	25	0	5	5	5	0	5	850	0	0	8	362	5	1280
0	0	2026	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2026	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2026	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Trips Generated - Two Access

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access			0	0	0	0	0	0	0	20	0	0	36	0	0	0	6	3	65
3	Roblin Boulevard & McQuaker Drive			0	0	0	0	0	11	0	5	0	2	20	0	-11	0	31	6	64
4	Roblin Boulevard & Oakdale Drive			0	0	0	0	0	0	0	0	0	0	5	0	25	0	16	0	46

Trips Generated - RIRO Only

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	2024	0:00	0	0	0	0	0	0	0	36	0	0	25	0	0	0	0	11	72
3	Roblin Boulevard & McQuake	2024	0:00	0	0	0	0	0	0	0	0	0	0	39	0	-11	0	47	0	75
4	Roblin Boulevard & Oakdale E	2024	0:00	0	0	0	0	0	0	0	0	0	0	3	0	36	0	11	0	50

2026 Post Development Two Access

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	2026	0:00	0	0	0	0	0	0	0	20	0	0	921	0	0	0	376	3	1336
3	Roblin Boulevard & McQuake	2026	0:00	0	0	0	0	0	16	0	7	0	3	894	0	0	0	404	8	1332
4	Roblin Boulevard & Oakdale E	2026	0:00	0	5	5	25	0	5	5	5	0	5	855	0	25	8	378	5	1326

2026 Post Development RIRO Access

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	2026	0:00	0	0	0	0	0	0	0	52	0	0	910	0	0	0	370	19	1351
3	Roblin Boulevard & McQuake	2026	0:00	0	0	0	0	0	5	0	2	0	1	913	0	0	0	420	2	1343
4	Roblin Boulevard & Oakdale E	2026	0:00	0	5	5	25	0	5	5	5	0	5	853	0	36	8	373	5	1330

Input Needed
Formulated

PM

Raw Counts

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
1	Roblin Boulevard & William R Clement Par	2025			16	693	48		678	1166	914		213	145	0	0	87	462	439	4861
2	Roblin Boulevard Access	2025			0	0	0		0	0	13		0	358	0	0	0	1375	17	1763
3	Roblin Boulevard & McQuaker Drive	2025			0	0	0		2	0	1		2	347	0	9	0	1374	5	1740
4	Roblin Boulevard & Oakdale Drive	2025			0	5	16		5	5	5		5	328	5	0	25	1345	5	1749

Peak Hour Factor

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
1	Roblin Boulevard & William R Clement Par	2025	0:00																	0.92
2	Roblin Boulevard Access	2025	0:00																	0.92
3	Roblin Boulevard & McQuaker Drive	2025	0:00																	0.92
4	Roblin Boulevard & Oakdale Drive	2025	0																	0.92

Future CAGR

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
1	Roblin Boulevard & William R Clement Par	2025	0:00		1.00%	1.00%	1.00%		1.00%	1.00%	1.00%		1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	
2	Roblin Boulevard Access	2025	0:00																	
3	Roblin Boulevard & McQuaker Drive	2025	0:00																	
4	Roblin Boulevard & Oakdale Drive	2025	0																	
0	0		0	0																
0	0		0	0																
0	0		0	0																

- EBT and WBT along Roblin were balanced to west side of William Clement

2026 Background

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
1	Roblin Boulevard & William R Clement Par	2026	0:00	0	16	700	48	0	685	1178	923	0	215	146	0	0	88	467	443	4909
2	Roblin Boulevard Access	2026	0:00	0	0	0	0	0	0	0	13	0	0	361	0	0	0	1389	17	1780
3	Roblin Boulevard & McQuaker Drive	2026	0:00	0	0	0	0	0	2	0	1	0	2	350	0	9	0	1388	5	1757
4	Roblin Boulevard & Oakdale Drive	2026	0:00	0	0	5	16	0	5	5	5	0	5	336	5	0	25	1359	5	1771
0	0	2026	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2026	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2026	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Trips Generated - Two Access

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access			0	0	0	0	0	0	0	6	0	0	22	0	0	0	12	13	53
3	Roblin Boulevard & McQuaker Drive			0	0	0	0	0	9	0	4	0	5	5	0	-9	0	15	12	41
4	Roblin Boulevard & Oakdale Drive			0	0	0	0	0	0	0	0	0	0	14	0	13	0	10	0	37

Trips Generated - RIRO Only

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	2024	0:00	0	0	0	0	0	0	0	19	0	0	13	0	0	0	0	30	62
3	Roblin Boulevard & McQuaker Drive	2024	0:00	0	0	0	0	0	0	0	0	0	0	31	0	-9	0	28	0	50
4	Roblin Boulevard & Oakdale Drive	2024	0:00	0	0	0	0	0	0	0	0	0	0	9	0	22	0	6	0	37

2026 Post Development Two Access

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	2029	0:00	0	0	0	0	0	0	0	6	0	0	383	0	0	0	1401	13	1816
3	Roblin Boulevard & McQuaker Drive	2029	0:00	0	0	0	0	0	11	0	5	0	7	355	0	0	0	1403	17	1798
4	Roblin Boulevard & Oakdale Drive	2029	0:00	0	0	5	16	0	5	5	5	0	5	350	5	13	25	1369	5	1808

2026 Post Development RIRO Access

ID	Intersection	Year	Time	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	2026	0:00	0	0	0	0	0	0	0	32	0	0	374	0	0	0	1389	47	1842
3	Roblin Boulevard & McQuaker Drive	2026	0:00	0	0	0	0	0	2	0	1	0	2	381	0	0	0	1416	5	1807
4	Roblin Boulevard & Oakdale Drive	2026	0:00	0	0	5	16	0	5	5	5	0	5	345	5	22	25	1365	5	1808

ITE Rates

Type	ITE Code	Independent Var	Week Rate	Week % In	AM Rate	AM % In	PM Rate	PM % In	Week In	Week Out	AM In	AM Out	PM In	PM Out	
Multifamily - 2023 Plan	221	101	4.54	50%	0.37	23%	0.39	61%	229	229	9	29	24	15	
Townhouses - 2023 Plan	215	18	7.2	50%	0.48	25%	0.57	59%	65	65	2	6	6	4	
Existing Developments									0	0	8	16	17	13	Taken from previous TIS
							Proposed Development		294	294	11	35	30	19	-less than half the traffic from 2021 site plan
							Existing Development		0	0	8	16	17	13	

Directional Distribution

Movements	%	Week In	Week Out	AM In	AM Out	PM In	PM Out
East	70%	206	206	8	25	21	13
West	30%	88	88	3	11	9	6
Existing East	70%	0	0	6	11	12	9
Existing West	30%	0	0	2	5	5	4

- assume existing trip use McQuaker, and proposed development trips use RIRO. No WBU at McQuaker

Destination	Intersection	Movement	Portion	AM Out	PM Out	Week Out	Movement	AM In	PM In	Week In
West	Roblin Boulevard Access	SBR	1	11	6	88	WBR	3	9	88
West	Roblin Boulevard & McQuaker Drive	WBT	1	11	6	88	EBT	3	9	88
West	Roblin Boulevard & Oakdale Drive	WBT	1	11	6	88	EBT	3	9	88
East	Roblin Boulevard Access	SBR	1	25	13	206	WBR	8	21	206
East	Roblin Boulevard & McQuaker Drive	WBT	1	25	13	206				
East	Roblin Boulevard & Oakdale Drive	WBU	1	25	13	206				
East	Roblin Boulevard & McQuaker Drive	EBT	1	25	13	206				
East	Roblin Boulevard Access	EBT	1	25	13	206				
Existing East	Roblin Boulevard & McQuaker Drive	WBT	1	11	9	0				
Existing East	Roblin Boulevard & Oakdale Drive	WBU	1	11	9	0				
Existing East	Roblin Boulevard & McQuaker Drive	EBT	1	11	9	0				
				0	0	0				
Existing West	Roblin Boulevard Access	SBR		0	0	0	WBR	0	0	0
Existing West	Roblin Boulevard & McQuaker Drive	WBT		0	0	0	EBT	0	0	0
Existing East	Roblin Boulevard Access	SBR		0	0	0	WBR	0	0	0
Existing East	Roblin Boulevard & McQuaker Drive	WBU	-1	-11	-9	0				

Route Assignment - AM

ID	Intersection	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	0	0	0	0	0	0	0	36	0	0	25	0	0	0	0	11	72
3	Roblin Boulevard & McQuaker Drive	0	0	0	0	0	0	0	0	0	0	39	0	-11	0	47	0	75
4	Roblin Boulevard & Oakdale Drive	0	0	0	0	0	0	0	0	0	0	3	0	36	0	11	0	50

Route Assignment - PM

ID	Intersection	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	0	0	0	0	0	0	0	19	0	0	13	0	0	0	0	30	62
3	Roblin Boulevard & McQuaker Drive	0	0	0	0	0	0	0	0	0	0	31	0	-9	0	28	0	50
4	Roblin Boulevard & Oakdale Drive	0	0	0	0	0	0	0	0	0	0	9	0	22	0	6	0	37

Route Assignment - Weekday

ID	Intersection	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Roblin Boulevard & McQuaker Drive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Roblin Boulevard & Oakdale Drive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ITE Rates

Type	ITE Code	Independent Var	Week Rate	Week % In	AM Rate	AM % In	PM Rate	PM % In	Week In	Week Out	AM In	AM Out	PM In	PM Out	
Multifamily - 2023 Plan	221	101	4.54	50%	0.37	23%	0.39	61%	229	229	9	29	24	15	
Townhouses - 2023 Plan	215	18	7.2	50%	0.48	25%	0.57	59%	65	65	2	6	6	4	
Existing Developments									0	0	8	16	17	13	Taken from previous TIS
							Proposed Development		294	294	11	35	30	19	-less than half the traffic from 2021 site plan
							Existing Development		0	0	8	16	17	13	

Directional Distribution

Movements	%	Week In	Week Out	AM In	AM Out	PM In	PM Out
East	70%	206	206	8	25	21	13
West	30%	88	88	3	11	9	6
Existing East	70%	0	0	6	11	12	9
Existing West	30%	0	0	2	5	5	4

- assume existing trip use McQuaker, and proposed development trips use RIRO. No WBU at McQuaker

Destination	Intersection	Movement	Portion	AM Out	PM Out	Week Out	Movement	AM In	PM In	Week In
West	Roblin Boulevard Access	SBR	1	11	6	88	WBR	3	9	88
West	Roblin Boulevard & McQuaker Drive	WBT	1	11	6	88	EBT	3	9	88
West	Roblin Boulevard & Oakdale Drive	WBT	1	11	6	88	EBT	3	9	88
East	Roblin Boulevard Access	SBR	1	25	13	206	WBR	8	21	206
East	Roblin Boulevard & McQuaker Drive	WBT	1	25	13	206				
East	Roblin Boulevard & Oakdale Drive	WBU	1	25	13	206				
East	Roblin Boulevard & McQuaker Drive	EBT	1	25	13	206				
East	Roblin Boulevard Access	EBT	1	25	13	206				
Existing West	Roblin Boulevard & McQuaker Drive	SBR	1	5	4	0	EBL	2	5	0
Existing West	Roblin Boulevard & Oakdale Drive	WBT	1	5	4	0	EBT	2	5	0
Existing East	Roblin Boulevard & McQuaker Drive	SBL	1	11	9	0	WBR	6	12	0
Existing East	Roblin Boulevard Access	EBT	1	11	9	0	WBT	6	12	0
Existing West	Roblin Boulevard Access	SBR	-1	-5	-4	0	WBR	-2	-5	0
Existing West	Roblin Boulevard & McQuaker Drive	WBT	-1	-5	-4	0	EBT	-2	-5	0
Existing East	Roblin Boulevard Access	SBR	-1	-11	-9	0	WBR	-6	-12	0
Existing East	Roblin Boulevard & McQuaker Drive	WBU	-1	-11	-9	0	EBT	-6	-12	0

Route Assignment - AM

ID	Intersection	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	0	0	0	0	0	0	0	20	0	0	36	0	0	0	6	3	65
3	Roblin Boulevard & McQuaker Drive	0	0	0	0	0	11	0	5	0	2	20	0	-11	0	31	6	64
4	Roblin Boulevard & Oakdale Drive	0	0	0	0	0	0	0	0	0	0	5	0	25	0	16	0	46

Route Assignment - PM

ID	Intersection	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	0	0	0	0	0	0	0	6	0	0	22	0	0	0	12	13	53
3	Roblin Boulevard & McQuaker Drive	0	0	0	0	0	9	0	4	0	5	5	0	-9	0	15	12	41
4	Roblin Boulevard & Oakdale Drive	0	0	0	0	0	0	0	0	0	0	14	0	13	0	10	0	37

Route Assignment - Weekday

ID	Intersection	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	Total
2	Roblin Boulevard Access	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Roblin Boulevard & McQuaker Drive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Roblin Boulevard & Oakdale Drive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX B – SYNCHRO ANALYSIS REPORTS



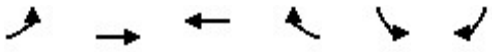
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	5	853	5	36	8	373	5	5	5	25	5	5
Future Volume (Veh/h)	5	853	5	36	8	373	5	5	5	25	5	5
Sign Control		Free				Free			Stop			Stop
Grade		0%				0%			0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	927	5	0	9	405	5	5	5	27	5	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised				Raised						
Median storage veh)		1				1						
Upstream signal (m)						303						
pX, platoon unblocked	1.00			0.00				1.00	1.00		1.00	1.00
vC, conflicting volume	410			0	932			1168	1368	466	928	1368
vC1, stage 1 conf vol								940	940		426	426
vC2, stage 2 conf vol								228	428		503	942
vCu, unblocked vol	409			0	932			1167	1367	466	928	1367
tC, single (s)	4.1			0.0	4.1			7.5	6.5	6.9	7.5	6.5
tC, 2 stage (s)								6.5	5.5		6.5	5.5
tF (s)	2.2			0.0	2.2			3.5	4.0	3.3	3.5	4.0
p0 queue free %	100			0	99			98	98	95	98	98
cM capacity (veh/h)	1146			0	730			234	253	543	329	250

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	468	468	9	270	140	37	15
Volume Left	5	0	9	0	0	5	5
Volume Right	0	5	0	0	5	27	5
cSH	1146	1700	730	1700	1700	407	362
Volume to Capacity	0.00	0.28	0.01	0.16	0.08	0.09	0.04
Queue Length 95th (m)	0.1	0.0	0.3	0.0	0.0	2.3	1.0
Control Delay (s)	0.1	0.0	10.0	0.0	0.0	14.7	15.4
Lane LOS	A		A			B	C
Approach Delay (s)	0.1		0.2			14.7	15.4
Approach LOS						B	C

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	46.6%	ICU Level of Service	A	
Analysis Period (min)	15			



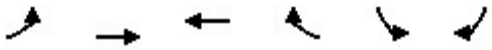
Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	5
Future Volume (Veh/h)	5
Sign Control	
Grade	
Peak Hour Factor	0.92
Hourly flow rate (vph)	5
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage veh)	
Upstream signal (m)	
pX, platoon unblocked	1.00
vC, conflicting volume	205
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	204
tC, single (s)	6.9
tC, 2 stage (s)	
tF (s)	3.3
p0 queue free %	99
cM capacity (veh/h)	803
Direction, Lane #	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	913	420	2	5	2
Future Volume (Veh/h)	1	913	420	2	5	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	992	457	2	5	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (m)			187			
pX, platoon unblocked	0.96				0.96	0.96
vC, conflicting volume	459				956	230
vC1, stage 1 conf vol					458	
vC2, stage 2 conf vol					498	
vCu, unblocked vol	364				879	126
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1148				404	869

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	1	496	496	305	154	7
Volume Left	1	0	0	0	0	5
Volume Right	0	0	0	0	2	2
cSH	1148	1700	1700	1700	1700	477
Volume to Capacity	0.00	0.29	0.29	0.18	0.09	0.01
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.3
Control Delay (s)	8.1	0.0	0.0	0.0	0.0	12.7
Lane LOS	A					B
Approach Delay (s)	0.0			0.0		12.7
Approach LOS						B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	910	370	19	0	52
Future Volume (Veh/h)	0	910	370	19	0	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	989	402	21	0	57
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (m)			130			
pX, platoon unblocked	0.95				0.95	0.95
vC, conflicting volume	423				907	212
vC1, stage 1 conf vol					412	
vC2, stage 2 conf vol					494	
vCu, unblocked vol	299				806	77
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	94
cM capacity (veh/h)	1201				426	924

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	494	494	268	155	57
Volume Left	0	0	0	0	0
Volume Right	0	0	0	21	57
cSH	1700	1700	1700	1700	924
Volume to Capacity	0.29	0.29	0.16	0.09	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.0	1.5
Control Delay (s)	0.0	0.0	0.0	0.0	9.2
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.2
Approach LOS					A

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	28.5%	ICU Level of Service	A
Analysis Period (min)	15		

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:00	7:00	7:00	7:00	7:00	7:00
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	4353	4374	4294	4318	4226	4315
Vehs Exited	4356	4334	4302	4347	4237	4318
Starting Vehs	96	76	117	110	107	100
Ending Vehs	93	116	109	81	96	97
Travel Distance (km)	1683	1699	1679	1676	1623	1672
Travel Time (hr)	109.4	104.4	104.9	99.1	99.7	103.5
Total Delay (hr)	70.7	65.4	66.4	60.7	62.6	65.2
Total Stops	3716	3954	3914	3601	3530	3744
Fuel Used (l)	218.0	215.2	214.3	208.5	205.5	212.3

Interval #0 Information Seed

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Anti

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1086	1086	1077	1090	1054	1076
Vehs Exited	1087	1074	1091	1093	1049	1078
Starting Vehs	96	76	117	110	107	100
Ending Vehs	95	88	103	107	112	101
Travel Distance (km)	418	421	420	422	400	416
Travel Time (hr)	25.2	24.2	26.0	27.0	22.1	24.9
Total Delay (hr)	15.6	14.5	16.4	17.3	13.0	15.3
Total Stops	912	942	943	872	851	903
Fuel Used (l)	52.9	51.4	53.3	54.3	48.5	52.1

Interval #2 Information PHF

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1183	1145	1113	1135	1131	1139
Vehs Exited	1151	1122	1113	1150	1119	1130
Starting Vehs	95	88	103	107	112	101
Ending Vehs	127	111	103	92	124	111
Travel Distance (km)	449	445	437	443	426	440
Travel Time (hr)	32.8	26.3	33.3	27.5	27.8	29.6
Total Delay (hr)	22.5	16.2	23.1	17.4	18.1	19.5
Total Stops	1093	977	1211	1006	980	1052
Fuel Used (l)	61.1	55.7	61.5	56.6	55.6	58.1

Interval #3 Information Anti

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1034	1044	1030	1054	1036	1040
Vehs Exited	1062	1037	1056	1043	1075	1056
Starting Vehs	127	111	103	92	124	111
Ending Vehs	99	118	77	103	85	95
Travel Distance (km)	411	407	410	402	409	408
Travel Time (hr)	28.0	24.2	23.1	22.8	28.8	25.4
Total Delay (hr)	18.6	14.9	13.7	13.6	19.4	16.0
Total Stops	838	925	867	900	885	885
Fuel Used (l)	54.1	50.8	50.3	49.5	55.3	52.0

Interval #4 Information Anti

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1050	1099	1074	1039	1005	1055
Vehs Exited	1056	1101	1042	1061	994	1052
Starting Vehs	99	118	77	103	85	95
Ending Vehs	93	116	109	81	96	97
Travel Distance (km)	405	426	412	409	388	408
Travel Time (hr)	23.3	29.7	22.6	21.8	21.0	23.7
Total Delay (hr)	14.0	19.9	13.2	12.4	12.1	14.3
Total Stops	873	1110	893	823	814	904
Fuel Used (l)	49.8	57.3	49.3	48.2	46.0	50.1

3: Oakdale Dr & Roblin Blvd Performance by movement

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.4	0.4	0.2	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Del/Veh (s)	4.0	0.6	0.0	10.9	5.8	0.3	0.1	15.8	14.1	8.6	11.7	13.7

3: Oakdale Dr & Roblin Blvd Performance by movement

Movement	SBR	All
Denied Delay (hr)	0.0	0.1
Denied Del/Veh (s)	0.2	0.3
Total Delay (hr)	0.0	0.4
Total Del/Veh (s)	4.5	1.2

7: Roblin Blvd & McQuaker Dr Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Delay (hr)	0.0	0.2	0.0	0.0	0.0	0.0	0.2
Total Del/Veh (s)	13.0	0.7	0.2	0.2	18.5	2.7	0.6

8: Roblin Blvd Performance by movement

Movement	EBT	WBT	WBR	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.0
Total Delay (hr)	0.2	0.7	0.0	0.0	1.0
Total Del/Veh (s)	0.8	6.9	6.5	2.9	2.7

Total Zone Performance

Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.4
Total Delay (hr)	1.7
Total Del/Veh (s)	263.0

Intersection: 3: Oakdale Dr & Roblin Blvd

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	UL	LTR	LTR
Maximum Queue (m)	16.3	7.8	17.2	14.1	10.1
Average Queue (m)	1.1	0.3	6.3	5.9	3.2
95th Queue (m)	10.1	5.7	15.0	12.1	9.1
Link Distance (m)	106.3	106.3		101.0	197.7
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)			35.0		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Roblin Blvd & McQuaker Dr

Movement	EB	EB	EB	SB
Directions Served	L	T	T	LR
Maximum Queue (m)	3.7	24.5	12.1	8.8
Average Queue (m)	0.1	1.7	0.4	1.7
95th Queue (m)	1.9	20.5	8.8	6.9
Link Distance (m)		105.5	105.5	184.8
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		0		
Storage Bay Dist (m)	10.0			
Storage Blk Time (%)	0	1		
Queuing Penalty (veh)	0	0		

Intersection: 8: Roblin Blvd

Movement	EB	EB	SB
Directions Served	T	T	R
Maximum Queue (m)	38.2	17.1	13.7
Average Queue (m)	3.2	1.4	5.9
95th Queue (m)	21.6	13.5	12.1
Link Distance (m)	44.4	44.4	87.8
Upstream Blk Time (%)	1	0	
Queuing Penalty (veh)	3	0	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 3



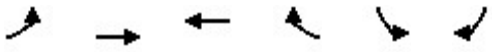
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	5	345	5	22	25	1365	5	0	5	16	5	5
Future Volume (Veh/h)	5	345	5	22	25	1365	5	0	5	16	5	5
Sign Control		Free				Free			Stop			Stop
Grade		0%				0%			0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	375	5	0	27	1484	5	0	5	17	5	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised				Raised						
Median storage veh)		1				1						
Upstream signal (m)						303						
pX, platoon unblocked	0.99			0.00				0.99	0.99		0.99	0.99
vC, conflicting volume	1489			0	380			1191	1930	190	1758	1930
vC1, stage 1 conf vol								388	388		1540	1540
vC2, stage 2 conf vol								804	1543		217	390
vCu, unblocked vol	1469			0	380			1167	1916	190	1741	1916
tC, single (s)	4.1			0.0	4.1			7.5	6.5	6.9	7.5	6.5
tC, 2 stage (s)								6.5	5.5		6.5	5.5
tF (s)	2.2			0.0	2.2			3.5	4.0	3.3	3.5	4.0
p0 queue free %	99			0	98			100	96	98	95	96
cM capacity (veh/h)	449			0	1175			247	137	820	103	140

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	192	192	27	989	500	22	15
Volume Left	5	0	27	0	0	0	5
Volume Right	0	5	0	0	5	17	5
cSH	449	1700	1175	1700	1700	385	154
Volume to Capacity	0.01	0.11	0.02	0.58	0.29	0.06	0.10
Queue Length 95th (m)	0.3	0.0	0.5	0.0	0.0	1.4	2.4
Control Delay (s)	0.5	0.0	8.1	0.0	0.0	14.9	31.0
Lane LOS	A		A			B	D
Approach Delay (s)	0.2		0.1			14.9	31.0
Approach LOS						B	D

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	50.9%	ICU Level of Service	A	
Analysis Period (min)	15			



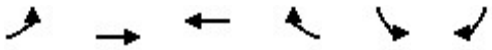
Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	5
Future Volume (Veh/h)	5
Sign Control	
Grade	
Peak Hour Factor	0.92
Hourly flow rate (vph)	5
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage veh)	
Upstream signal (m)	
pX, platoon unblocked	0.99
vC, conflicting volume	744
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	714
tC, single (s)	6.9
tC, 2 stage (s)	
tF (s)	3.3
p0 queue free %	99
cM capacity (veh/h)	369
Direction, Lane #	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	381	1411	5	2	1
Future Volume (Veh/h)	2	381	1411	5	2	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	414	1534	5	2	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (m)			187			
pX, platoon unblocked	0.96				0.96	0.96
vC, conflicting volume	1539				1748	770
vC1, stage 1 conf vol					1536	
vC2, stage 2 conf vol					211	
vCu, unblocked vol	1482				1699	683
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	433				145	377

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	2	207	207	1023	516	3
Volume Left	2	0	0	0	0	2
Volume Right	0	0	0	0	5	1
cSH	433	1700	1700	1700	1700	183
Volume to Capacity	0.00	0.12	0.12	0.60	0.30	0.02
Queue Length 95th (m)	0.1	0.0	0.0	0.0	0.0	0.4
Control Delay (s)	13.4	0.0	0.0	0.0	0.0	25.0
Lane LOS	B					D
Approach Delay (s)	0.1			0.0		25.0
Approach LOS						D

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	374	1389	47	0	32
Future Volume (Veh/h)	0	374	1389	47	0	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	407	1510	51	0	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (m)			130			
pX, platoon unblocked	0.95				0.95	0.95
vC, conflicting volume	1561				1739	780
vC1, stage 1 conf vol					1536	
vC2, stage 2 conf vol					204	
vCu, unblocked vol	1492				1678	673
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	91
cM capacity (veh/h)	426				147	379

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	204	204	1007	554	35
Volume Left	0	0	0	0	0
Volume Right	0	0	0	51	35
cSH	1700	1700	1700	1700	379
Volume to Capacity	0.12	0.12	0.59	0.33	0.09
Queue Length 95th (m)	0.0	0.0	0.0	0.0	2.3
Control Delay (s)	0.0	0.0	0.0	0.0	15.5
Lane LOS					C
Approach Delay (s)	0.0		0.0		15.5
Approach LOS					C

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:00	7:00	7:00	7:00	7:00	7:00
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5225	5376	5436	5239	5209	5297
Vehs Exited	5263	5379	5442	5238	5206	5306
Starting Vehs	110	111	109	94	97	104
Ending Vehs	72	108	103	95	100	96
Travel Distance (km)	1814	1859	1882	1813	1801	1834
Travel Time (hr)	103.0	115.3	119.3	98.9	97.2	106.8
Total Delay (hr)	61.7	73.1	76.5	57.7	56.4	65.1
Total Stops	3340	3436	3607	3196	3305	3375
Fuel Used (l)	222.6	236.1	241.5	217.0	216.6	226.8

Interval #0 Information Seed

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Anti

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1279	1337	1300	1215	1234	1275
Vehs Exited	1292	1343	1313	1219	1244	1283
Starting Vehs	110	111	109	94	97	104
Ending Vehs	97	105	96	90	87	94
Travel Distance (km)	449	468	451	430	426	445
Travel Time (hr)	24.5	27.1	27.0	20.5	22.0	24.2
Total Delay (hr)	14.3	16.5	16.6	10.7	12.4	14.1
Total Stops	846	857	926	721	795	829
Fuel Used (l)	54.4	57.4	57.1	48.4	50.2	53.5

Interval #2 Information PHF

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1456	1348	1422	1422	1444	1418
Vehs Exited	1420	1325	1365	1391	1399	1381
Starting Vehs	97	105	96	90	87	94
Ending Vehs	133	128	153	121	132	132
Travel Distance (km)	498	455	483	481	492	482
Travel Time (hr)	31.3	34.1	31.0	28.5	30.5	31.1
Total Delay (hr)	20.0	23.8	20.0	17.5	19.4	20.1
Total Stops	983	814	1007	912	978	937
Fuel Used (l)	63.4	63.0	61.9	59.5	63.0	62.1

Interval #3 Information Anti

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1270	1335	1357	1282	1279	1306
Vehs Exited	1308	1369	1383	1295	1321	1334
Starting Vehs	133	128	153	121	132	132
Ending Vehs	95	94	127	108	90	102
Travel Distance (km)	446	474	483	448	450	460
Travel Time (hr)	26.5	27.1	30.4	26.0	24.0	26.8
Total Delay (hr)	16.2	16.3	19.5	15.8	13.8	16.3
Total Stops	772	849	912	727	788	810
Fuel Used (l)	55.7	58.6	62.0	55.5	54.0	57.2

Interval #4 Information Anti

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1220	1356	1357	1320	1252	1303
Vehs Exited	1243	1342	1381	1333	1242	1307
Starting Vehs	95	94	127	108	90	102
Ending Vehs	72	108	103	95	100	96
Travel Distance (km)	421	463	465	454	433	447
Travel Time (hr)	20.8	27.0	31.0	24.0	20.6	24.7
Total Delay (hr)	11.2	16.5	20.4	13.6	10.8	14.5
Total Stops	739	916	762	836	744	800
Fuel Used (l)	49.0	57.2	60.5	53.8	49.4	54.0

3: Oakdale Dr & Roblin Blvd Performance by movement

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	12.9	0.3	0.0	2.9	3.2	0.4	0.2	20.3	3.5	30.8	26.4	7.7

3: Oakdale Dr & Roblin Blvd Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	0.3
Total Del/Veh (s)	0.7

7: Roblin Blvd & McQuaker Dr Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Delay (hr)	0.0	0.0	0.1	0.0	0.0	0.0	0.1
Total Del/Veh (s)	8.1	0.2	0.2	0.1	39.1	6.2	0.3

8: Roblin Blvd Performance by movement

Movement	EBT	WBT	WBR	SBR	All
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.2
Denied Del/Veh (s)	0.0	0.4	0.7	0.1	0.3
Total Delay (hr)	0.0	0.9	0.0	0.0	1.0
Total Del/Veh (s)	0.1	2.4	2.3	4.8	2.0

Total Zone Performance

Denied Delay (hr)	0.2
Denied Del/Veh (s)	0.4
Total Delay (hr)	1.5
Total Del/Veh (s)	174.1

Intersection: 3: Oakdale Dr & Roblin Blvd

Movement	EB	WB	NB	SB
Directions Served	LT	UL	LTR	LTR
Maximum Queue (m)	15.7	12.0	11.2	8.5
Average Queue (m)	1.1	3.5	3.9	2.4
95th Queue (m)	7.1	9.8	10.1	7.8
Link Distance (m)	106.3		101.0	197.7
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)		35.0		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Roblin Blvd & McQuaker Dr

Movement	EB	SB
Directions Served	L	LR
Maximum Queue (m)	3.7	7.7
Average Queue (m)	0.3	1.2
95th Queue (m)	2.7	5.7
Link Distance (m)		184.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	10.0	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	1	

Intersection: 8: Roblin Blvd

Movement	SB
Directions Served	R
Maximum Queue (m)	19.2
Average Queue (m)	5.4
95th Queue (m)	12.4
Link Distance (m)	87.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 1



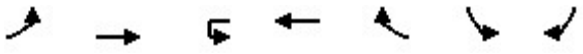
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	5	855	5	25	8	378	5	0	5	16	5	5
Future Volume (Veh/h)	5	855	5	25	8	378	5	0	5	16	5	5
Sign Control		Free				Free			Stop			Stop
Grade		0%				0%			0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	929	5	0	9	411	5	0	5	17	5	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised				Raised						
Median storage veh)		1				1						
Upstream signal (m)						303						
pX, platoon unblocked	1.00			0.00				1.00	1.00		1.00	1.00
vC, conflicting volume	416			0	934			1172	1376	467	926	1376
vC1, stage 1 conf vol								942	942		432	432
vC2, stage 2 conf vol								231	434		494	944
vCu, unblocked vol	412			0	934			1169	1373	467	922	1373
tC, single (s)	4.1			0.0	4.1			7.5	6.5	6.9	7.5	6.5
tC, 2 stage (s)								6.5	5.5		6.5	5.5
tF (s)	2.2			0.0	2.2			3.5	4.0	3.3	3.5	4.0
p0 queue free %	100			0	99			100	98	97	99	98
cM capacity (veh/h)	1142			0	729			233	252	542	336	249

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	470	470	9	274	142	22	15
Volume Left	5	0	9	0	0	0	5
Volume Right	0	5	0	0	5	17	5
cSH	1142	1700	729	1700	1700	430	364
Volume to Capacity	0.00	0.28	0.01	0.16	0.08	0.05	0.04
Queue Length 95th (m)	0.1	0.0	0.3	0.0	0.0	1.2	1.0
Control Delay (s)	0.1	0.0	10.0	0.0	0.0	13.8	15.3
Lane LOS	A		B			B	C
Approach Delay (s)	0.1		0.2			13.8	15.3
Approach LOS						B	C

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	39.3%	ICU Level of Service	A	
Analysis Period (min)	15			



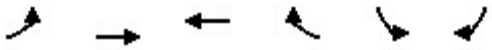
Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	5
Future Volume (Veh/h)	5
Sign Control	
Grade	
Peak Hour Factor	0.92
Hourly flow rate (vph)	5
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage veh)	
Upstream signal (m)	
pX, platoon unblocked	1.00
vC, conflicting volume	208
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	203
tC, single (s)	6.9
tC, 2 stage (s)	
tF (s)	3.3
p0 queue free %	99
cM capacity (veh/h)	802
Direction, Lane #	



Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (veh/h)	3	894	11	393	8	16	7
Future Volume (Veh/h)	3	894	11	393	8	16	7
Sign Control		Free		Free		Stop	
Grade		0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	972	0	427	9	17	8
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type		Raised		Raised			
Median storage veh)		1		1			
Upstream signal (m)				187			
pX, platoon unblocked	0.96		0.00			0.96	0.96
vC, conflicting volume	436		0			924	218
vC1, stage 1 conf vol						432	
vC2, stage 2 conf vol						492	
vCu, unblocked vol	335		0			842	108
tC, single (s)	4.1		0.0			6.8	6.9
tC, 2 stage (s)						5.8	
tF (s)	2.2		0.0			3.5	3.3
p0 queue free %	100		0			96	99
cM capacity (veh/h)	1175		0			415	890

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	3	486	486	285	151	25
Volume Left	3	0	0	0	0	17
Volume Right	0	0	0	0	9	8
cSH	1175	1700	1700	1700	1700	501
Volume to Capacity	0.00	0.29	0.29	0.17	0.09	0.05
Queue Length 95th (m)	0.1	0.0	0.0	0.0	0.0	1.2
Control Delay (s)	8.1	0.0	0.0	0.0	0.0	12.6
Lane LOS	A					B
Approach Delay (s)	0.0			0.0		12.6
Approach LOS						B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	921	376	11	0	36
Future Volume (Veh/h)	0	921	376	11	0	36
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1001	409	12	0	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (m)			130			
pX, platoon unblocked	0.95				0.95	0.95
vC, conflicting volume	421				916	210
vC1, stage 1 conf vol					415	
vC2, stage 2 conf vol					500	
vCu, unblocked vol	297				815	76
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	96
cM capacity (veh/h)	1204				423	925

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	500	500	273	148	39
Volume Left	0	0	0	0	0
Volume Right	0	0	0	12	39
cSH	1700	1700	1700	1700	925
Volume to Capacity	0.29	0.29	0.16	0.09	0.04
Queue Length 95th (m)	0.0	0.0	0.0	0.0	1.0
Control Delay (s)	0.0	0.0	0.0	0.0	9.1
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.1
Approach LOS					A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)	15		

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:00	7:00	7:00	7:00	7:00	7:00
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	4290	4344	4335	4324	4383	4336
Vehs Exited	4297	4356	4352	4337	4361	4339
Starting Vehs	100	109	108	107	78	102
Ending Vehs	93	97	91	94	100	92
Travel Distance (km)	1667	1682	1676	1688	1692	1681
Travel Time (hr)	122.4	108.1	106.4	103.3	121.1	112.3
Total Delay (hr)	84.2	69.6	68.1	64.7	82.3	73.8
Total Stops	3354	3587	3448	3708	4180	3656
Fuel Used (l)	228.0	217.5	215.1	211.9	230.4	220.6

Interval #0 Information Seed

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Anti

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1052	1067	1030	1038	1018	1042
Vehs Exited	1058	1092	1041	1044	986	1042
Starting Vehs	100	109	108	107	78	102
Ending Vehs	94	84	97	101	110	97
Travel Distance (km)	404	419	392	408	384	401
Travel Time (hr)	30.8	24.2	21.7	26.8	21.4	25.0
Total Delay (hr)	21.5	14.5	12.7	17.5	12.6	15.8
Total Stops	800	900	831	845	839	843
Fuel Used (l)	56.4	51.5	47.4	52.6	46.6	50.9

Interval #2 Information PHF

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1145	1143	1177	1153	1250	1173
Vehs Exited	1124	1125	1146	1135	1203	1146
Starting Vehs	94	84	97	101	110	97
Ending Vehs	115	102	128	119	157	122
Travel Distance (km)	443	434	455	456	475	453
Travel Time (hr)	40.3	30.5	30.1	28.1	35.6	32.9
Total Delay (hr)	30.2	20.6	19.7	17.7	24.8	22.6
Total Stops	870	981	948	1056	1211	1013
Fuel Used (l)	67.4	58.7	59.3	57.4	65.9	61.7

Interval #3 Information Anti

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1059	1052	1058	1074	1065	1061
Vehs Exited	1071	1061	1078	1098	1096	1082
Starting Vehs	115	102	128	119	157	122
Ending Vehs	103	93	108	95	126	103
Travel Distance (km)	412	412	409	413	415	412
Travel Time (hr)	27.7	26.3	29.2	25.3	38.2	29.3
Total Delay (hr)	18.1	16.9	19.8	15.8	28.7	19.9
Total Stops	813	812	849	924	1246	928
Fuel Used (l)	54.1	53.3	55.5	52.2	64.7	56.0

Interval #4 Information Anti

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1034	1082	1070	1059	1050	1056
Vehs Exited	1044	1078	1087	1060	1076	1068
Starting Vehs	103	93	108	95	126	103
Ending Vehs	93	97	91	94	100	92
Travel Distance (km)	407	417	420	412	417	415
Travel Time (hr)	23.7	27.1	25.4	23.1	25.9	25.0
Total Delay (hr)	14.4	17.6	15.8	13.7	16.3	15.6
Total Stops	871	894	820	883	884	866
Fuel Used (l)	50.1	54.0	52.9	49.7	53.2	52.0

3: Oakdale Dr & Roblin Blvd Performance by movement

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.4	0.4	0.1	0.1	0.2	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	3.9	0.6	0.1	10.5	8.2	0.3	0.3	17.1	6.8	22.5	14.9	3.7

3: Oakdale Dr & Roblin Blvd Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.3
Total Delay (hr)	0.4
Total Del/Veh (s)	1.1

7: Roblin Blvd & McQuaker Dr Performance by movement

Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Delay (hr)	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.4
Total Del/Veh (s)	4.2	0.9	12.6	0.5	0.1	15.5	5.0	1.1

8: Roblin Blvd Performance by movement

Movement	EBT	WBT	WBR	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.0
Total Delay (hr)	0.3	0.7	0.0	0.0	1.0
Total Del/Veh (s)	1.1	6.9	5.7	2.7	2.7

Total Zone Performance

Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.4
Total Delay (hr)	1.8
Total Del/Veh (s)	407.2

Intersection: 3: Oakdale Dr & Roblin Blvd

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	UL	LTR	LTR
Maximum Queue (m)	19.6	9.1	17.1	12.8	13.3
Average Queue (m)	1.1	0.3	5.0	4.3	3.0
95th Queue (m)	8.9	6.7	13.2	10.8	9.8
Link Distance (m)	106.3	106.3		101.0	197.7
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)			35.0		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Roblin Blvd & McQuaker Dr

Movement	EB	EB	EB	WB	WB	SB
Directions Served	L	T	T	UT	TR	LR
Maximum Queue (m)	6.7	38.2	5.5	22.9	4.9	11.2
Average Queue (m)	0.3	2.4	0.2	3.4	0.2	4.2
95th Queue (m)	3.3	21.4	4.0	13.2	3.6	11.2
Link Distance (m)		105.5	105.5	44.4	44.4	184.8
Upstream Blk Time (%)		0				
Queuing Penalty (veh)		0				
Storage Bay Dist (m)	15.0					
Storage Blk Time (%)		1				
Queuing Penalty (veh)		0				

Intersection: 8: Roblin Blvd

Movement	EB	EB	WB	SB
Directions Served	T	T	T	R
Maximum Queue (m)	38.3	17.6	3.2	12.5
Average Queue (m)	5.1	2.4	0.1	4.9
95th Queue (m)	27.4	18.0	2.4	10.5
Link Distance (m)	44.4	44.4	103.4	87.8
Upstream Blk Time (%)	1	0		
Queuing Penalty (veh)	6	0		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 6



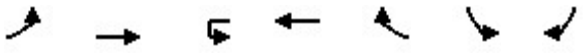
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	5	350	5	13	25	1369	5	0	5	16	5	5
Future Volume (Veh/h)	5	350	5	13	25	1369	5	0	5	16	5	5
Sign Control		Free				Free			Stop			Stop
Grade		0%				0%			0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	380	5	0	27	1488	5	0	5	17	5	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised				Raised						
Median storage veh)		1				1						
Upstream signal (m)						303						
pX, platoon unblocked	0.99			0.00				0.99	0.99		0.99	0.99
vC, conflicting volume	1493			0	385			1198	1940	192	1764	1940
vC1, stage 1 conf vol								392	392		1544	1544
vC2, stage 2 conf vol								806	1547		220	395
vCu, unblocked vol	1471			0	385			1172	1924	192	1746	1924
tC, single (s)	4.1			0.0	4.1			7.5	6.5	6.9	7.5	6.5
tC, 2 stage (s)								6.5	5.5		6.5	5.5
tF (s)	2.2			0.0	2.2			3.5	4.0	3.3	3.5	4.0
p0 queue free %	99			0	98			100	96	98	95	96
cM capacity (veh/h)	448			0	1170			246	137	817	103	139

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	195	195	27	992	501	22	15
Volume Left	5	0	27	0	0	0	5
Volume Right	0	5	0	0	5	17	5
cSH	448	1700	1170	1700	1700	383	153
Volume to Capacity	0.01	0.11	0.02	0.58	0.29	0.06	0.10
Queue Length 95th (m)	0.3	0.0	0.5	0.0	0.0	1.4	2.4
Control Delay (s)	0.5	0.0	8.1	0.0	0.0	15.0	31.1
Lane LOS	A		A			B	D
Approach Delay (s)	0.2		0.1			15.0	31.1
Approach LOS						B	D

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	49.9%	ICU Level of Service	A	
Analysis Period (min)	15			



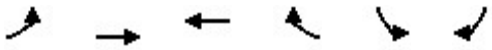
Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	5
Future Volume (Veh/h)	5
Sign Control	
Grade	
Peak Hour Factor	0.92
Hourly flow rate (vph)	5
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage veh)	
Upstream signal (m)	
pX, platoon unblocked	0.99
vC, conflicting volume	746
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	714
tC, single (s)	6.9
tC, 2 stage (s)	
tF (s)	3.3
p0 queue free %	99
cM capacity (veh/h)	368
Direction, Lane #	



Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (veh/h)	7	355	9	1394	17	11	5
Future Volume (Veh/h)	7	355	9	1394	17	11	5
Sign Control		Free		Free		Stop	
Grade		0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	386	0	1515	18	12	5
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type		Raised		Raised			
Median storage veh)		1		1			
Upstream signal (m)				187			
pX, platoon unblocked	0.96		0.00			0.96	0.96
vC, conflicting volume	1533		0			1733	766
vC1, stage 1 conf vol						1524	
vC2, stage 2 conf vol						209	
vCu, unblocked vol	1474		0			1682	677
tC, single (s)	4.1		0.0			6.8	6.9
tC, 2 stage (s)						5.8	
tF (s)	2.2		0.0			3.5	3.3
p0 queue free %	98		0			92	99
cM capacity (veh/h)	436		0			147	380

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	8	193	193	1010	523	17
Volume Left	8	0	0	0	0	12
Volume Right	0	0	0	0	18	5
cSH	436	1700	1700	1700	1700	180
Volume to Capacity	0.02	0.11	0.11	0.59	0.31	0.09
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	2.3
Control Delay (s)	13.4	0.0	0.0	0.0	0.0	27.1
Lane LOS	B					D
Approach Delay (s)	0.3			0.0		27.1
Approach LOS						D

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	383	1401	30	0	19
Future Volume (Veh/h)	0	383	1401	30	0	19
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	416	1523	33	0	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (m)			130			
pX, platoon unblocked	0.95				0.95	0.95
vC, conflicting volume	1556				1748	778
vC1, stage 1 conf vol					1540	
vC2, stage 2 conf vol					208	
vCu, unblocked vol	1486				1687	671
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	94
cM capacity (veh/h)	428				146	381

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	208	208	1015	541	21
Volume Left	0	0	0	0	0
Volume Right	0	0	0	33	21
cSH	1700	1700	1700	1700	381
Volume to Capacity	0.12	0.12	0.60	0.32	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.0	1.3
Control Delay (s)	0.0	0.0	0.0	0.0	15.0
Lane LOS					C
Approach Delay (s)	0.0		0.0		15.0
Approach LOS					C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:00	7:00	7:00	7:00	7:00	7:00
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5292	5526	5350	5254	5180	5320
Vehs Exited	5312	5478	5334	5279	5188	5318
Starting Vehs	103	89	99	113	97	101
Ending Vehs	83	137	115	88	89	101
Travel Distance (km)	1837	1898	1847	1829	1791	1840
Travel Time (hr)	119.8	118.0	107.0	101.9	110.4	111.4
Total Delay (hr)	77.9	74.9	65.1	60.1	69.7	69.5
Total Stops	3439	3431	3272	3500	3203	3368
Fuel Used (l)	238.7	241.7	228.1	222.9	227.7	231.8

Interval #0 Information Seed

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Anti

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1315	1322	1251	1298	1252	1286
Vehs Exited	1312	1308	1261	1319	1250	1290
Starting Vehs	103	89	99	113	97	101
Ending Vehs	106	103	89	92	99	96
Travel Distance (km)	460	461	444	453	432	450
Travel Time (hr)	27.9	25.0	21.4	25.3	22.0	24.3
Total Delay (hr)	17.4	14.5	11.3	15.0	12.2	14.1
Total Stops	766	803	750	910	780	801
Fuel Used (l)	58.4	55.5	51.0	55.6	50.4	54.2

Interval #2 Information PHF

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1454	1503	1410	1409	1430	1440
Vehs Exited	1453	1483	1381	1362	1392	1414
Starting Vehs	106	103	89	92	99	96
Ending Vehs	107	123	118	139	137	124
Travel Distance (km)	511	515	475	480	492	494
Travel Time (hr)	36.8	31.6	25.2	28.5	36.1	31.6
Total Delay (hr)	25.2	19.9	14.4	17.6	24.9	20.4
Total Stops	1017	906	897	981	883	935
Fuel Used (l)	68.8	64.9	56.3	60.2	67.6	63.6

Interval #3 Information Anti

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1259	1325	1300	1251	1274	1282
Vehs Exited	1269	1345	1319	1288	1332	1312
Starting Vehs	107	123	118	139	137	124
Ending Vehs	97	103	99	102	79	92
Travel Distance (km)	432	460	454	445	447	447
Travel Time (hr)	32.5	25.1	31.3	24.4	30.7	28.8
Total Delay (hr)	22.5	14.7	21.0	14.2	20.6	18.6
Total Stops	866	814	829	774	751	807
Fuel Used (l)	59.6	55.8	60.7	53.6	60.0	57.9

Interval #4 Information Anti

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1264	1376	1389	1296	1224	1308
Vehs Exited	1278	1342	1373	1310	1214	1303
Starting Vehs	97	103	99	102	79	92
Ending Vehs	83	137	115	88	89	101
Travel Distance (km)	434	463	474	451	421	448
Travel Time (hr)	22.6	36.3	29.2	23.6	21.7	26.7
Total Delay (hr)	12.7	25.7	18.4	13.3	12.0	16.4
Total Stops	790	908	796	835	789	822
Fuel Used (l)	51.9	65.5	60.2	53.4	49.7	56.1

3: Oakdale Dr & Roblin Blvd Performance by movement

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	13.5	0.7	0.0	2.9	2.8	0.5	0.2	20.1	4.1	22.6	28.4	4.4

3: Oakdale Dr & Roblin Blvd Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	0.4
Total Del/Veh (s)	0.8

7: Roblin Blvd & McQuaker Dr Performance by movement

Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Delay (hr)	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.3
Total Del/Veh (s)	11.3	0.3	3.0	0.4	0.2	27.3	5.4	0.6

8: Roblin Blvd Performance by movement

Movement	EBT	WBT	WBR	SBR	All
Denied Delay (hr)	0.0	0.2	0.0	0.0	0.2
Denied Del/Veh (s)	0.0	0.4	0.9	0.1	0.3
Total Delay (hr)	0.0	1.0	0.0	0.0	1.1
Total Del/Veh (s)	0.3	2.5	1.8	5.0	2.1

Total Zone Performance

Denied Delay (hr)	0.2
Denied Del/Veh (s)	0.5
Total Delay (hr)	1.8
Total Del/Veh (s)	199.2

Intersection: 3: Oakdale Dr & Roblin Blvd

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	UL	LTR	LTR
Maximum Queue (m)	38.2	9.5	9.5	13.9	8.4
Average Queue (m)	2.5	0.3	2.2	3.6	2.9
95th Queue (m)	19.2	7.0	7.5	10.6	8.6
Link Distance (m)	106.3	106.3		101.0	197.7
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)			35.0		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Roblin Blvd & McQuaker Dr

Movement	EB	WB	WB	SB
Directions Served	L	UT	TR	LR
Maximum Queue (m)	10.7	21.7	3.6	9.1
Average Queue (m)	1.3	2.2	0.1	2.8
95th Queue (m)	6.7	12.6	1.9	8.5
Link Distance (m)		44.4	44.4	184.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)	15.0			
Storage Blk Time (%)	0			
Queuing Penalty (veh)	0			

Intersection: 8: Roblin Blvd

Movement	EB	WB	WB	SB
Directions Served	T	T	TR	R
Maximum Queue (m)	7.6	2.5	2.3	6.8
Average Queue (m)	0.3	0.1	0.1	2.5
95th Queue (m)	4.0	1.8	1.7	7.7
Link Distance (m)	44.4	103.4	103.4	87.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0