



ALDRIDGE TRANSPORTATION CONSULTANTS, LLC

Advanced Transportation Planning and Traffic Engineering

Traffic Impact Study

**Dutch Bros. Coffee Shop
Aurora, Colorado**

for

**Cole Valley Partners
2188 SW Park Place, Suite 100
Portland, OR 97205**

by

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ATC is a professional service firm specializing in traffic engineering and transportation planning. ATC's principal, John M.W. Aldridge, is a Colorado licensed professional engineer. In the past 20 years, ATC has prepared over 1,200 traffic impact studies, designed over 120 traffic signals, and provided expert witness testimony on engineering design and access issues on multi-million-dollar interchange and highway projects in Kansas and Colorado.





INTRODUCTION

Cole Valley Partners LLC is proposing to develop a Dutch Bros. Coffee Shop on the northeast corner of S. Aurora Pkwy. and S. Elk Way in Aurora. Figure 1 shows the location and the surrounding streets and intersections. The Dutch Bros. Coffee Shop building is small at 980 square feet. The coffee shop entrance will be on a private road, about 75 feet north of the S. Elk Way flow line, next to the property line and cannot be moved further north. The private road will circle northward then turn westward and connect to S. Aurora Pkwy. at a right in/right out only intersection. The insert provides a description of the private road layout. There will be no direct access to S. Aurora Parkway or S. Elk Way for Dutch Bros.



Figure 1 Site Location



EXISTING CONDITIONS

S. Aurora Parkway is a six-lane major arterial road, separated by a raised concrete median. This section of the roadway accommodates approximately 20,000 average daily trips (ADT) and has a speed limit of 45 mph. Although S. Elk Way is not yet fully constructed, the western segment is developed as a two-lane local road. Except for the westbound approach, the intersection is fully developed, featuring left-turn lanes and signalization. The traffic signal configuration includes all necessary equipment for the westbound approach in anticipation of the roadway's future opening.

Traffic counts during AM and PM peak hours were recorded by All Traffic Data on February 18, 2025. Currently, only construction vehicles use S. Elk Way on the east side. There is no residential or commercial development at the present time.

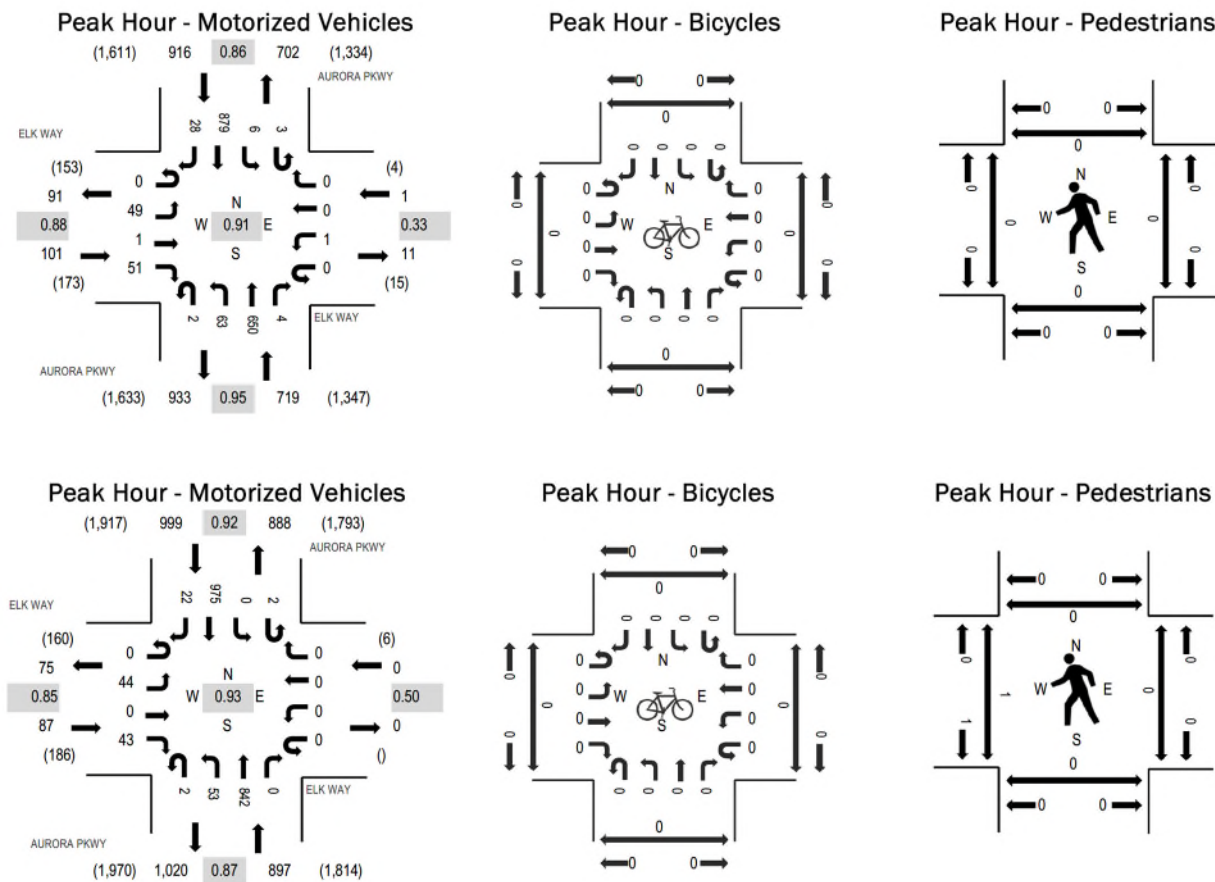


Table 1 in the EVALUATION section provides a Level of Service (LOS) summary, indicating that the intersection currently operates at an overall LOS A/A.



BACKGROUND CONDITIONS

Future growth factors were derived from the DRCOG Model Assigned 2020 and 2050 All-Day Traffic Volumes. The annual growth rate is 2.6%. This is higher than Aurora's default value of 2.0%. The 20-year growth factor is 1.674 and a 2-year growth factor is 1.053.

Aurora staff instructed us to use data from the May 2020 traffic study by HKS for Mr. Larry Jacobson's development, spanning both sides of S. Aurora Parkway. The west side is fully developed with altered road configuration, while the east side is being graded according to 2025 aerials. The study included 102 multifamily residential units and a 115,000 square foot office building. Traffic volumes from the east side were added to existing traffic volumes for the initial background scenario. The HKS volumes are provided in the appendix.

Staff asked us to use data from an unapproved TIS for the northwest development on the private drive and S. Aurora Pkwy. This includes a new auto parts store, a fast-food restaurant, trip generation from the HKS study, and Dutch Bros. coffee shop. The new access wouldn't significantly impact Dutch Bros. traffic; it would be used occasionally without affecting this study's conclusions.

Table 1 in the EVALUATION section presents a summary of the Level of Service (LOS) for the intersection. It shows that, with traffic assignments from the HKS study and no traffic assignment from Dutch Bros., the intersection operates at an overall LOS A/B under current conditions, LOS A/B in the 2027 scenario, and LOS B/B in the 2045 scenario.

PROPOSED CONDITIONS

The following table presents the trip generation based on the ITE Trip Generation Manual, 11th Edition. The table shows the average daily traffic (ADT) and the AM and PM peak hour traffic.

Trip Generation Worksheet										
ITE CODE	LAND USE	UNIT	QUANTITY	ADT	AM			PM		
					IN	OUT	TOTAL	IN	OUT	TOTAL
937	Coffee Shop	KSF	1	533.37	43.80	42.08		19.50	19.50	
				533	44	42	86	20	20	39
Total Trips				533	44	42	86	20	20	39

In the AM peak hour, based on the current directional distribution of traffic on Aurora Parkway, it is expected that 25 vehicles per hour will turn left from the southbound approach and 20 vehicles per hour will turn right from the northbound approach. Most traffic is expected to be pass-by, with 24 vehicles per hour turning left and 18 vehicles per hour turning right when exiting.



During the PM peak hour, approximately 12 vehicles per hour (vph) will turn left into the location from the southbound approach and 8 vph will turn right in from the northbound approach. When exiting, 12 vph will turn left out and 8 vph will turn right out.

FUTURE PROPOSED CONDITIONS

The Synchro v.12 traffic operations model was utilized to assess the level of service (LOS) characteristics at the South Aurora Parkway and Elk Way intersection, incorporating the HKS assignment and the additional trips generated by Dutch Bros. Table 1 in the EVALUATION section indicates that with the additional trips from Dutch Bros. the intersection will continue to provide excellent operational LOS B/B in the 2027 and 2045 Total scenarios.

EVALUATION

Synchro v.12 is developed based on procedures and methodologies outlined in the **Highway Capacity Manual 7th Edition (HCM)**. It evaluates intersection operations by determining the level of service (LOS), which is rated from A to F. LOS A indicates free-flow traffic conditions with no delays at intersections, whereas LOS F represents heavy traffic congestion with significant delays. The LOS for signalized intersections reflects overall operations, with LOS D generally considered the benchmark for acceptable performance during weekday AM/PM peak hours.

For unsignalized intersections, the LOS is determined by the critical movement, typically the left turn from the minor street, rather than overall operations. Caution should be exercised when interpreting LOS F at unsignalized intersections; the HCM recommends considering additional measures such as control delay, volume-to-capacity ratio, and the 95th percentile queue length to make informed traffic control decisions. It is not uncommon for LOS F to occur during weekday peak hours at unsignalized intersections. The operations analysis data are included in Synchro graphics in the appendix, along with the Synchro worksheet reports.

Table 1 provides a summary of the overall LOS and seconds of delay for the signalized intersection. It also shows the LOS for the left turn movements. Right turn movements are shared with the through movement on each approach.

Table 1 – LOS Summary

LOS Summary												
Delay in Seconds per Vehicle <10=A, >10-20=B, >20-35=C, >35-55=D, >55-80=E, >80=F												
S. Aurora Pkwy./S. Elk Way	Existing		Existing w/BKG		2027 w/BKG		2045 w/BKG		2027 TOTAL		2045 TOTAL	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Overall	A	A	A	B	A	B	B	B	B	B	B	B
Eastbound Left	B	B	B	B	B	B	B	B	B	B	B	B
Westbound Left	B	NO VOL	B	B	B	B	B	C	B	B	B	C
Southbound Left	A	NO VOL	A	A	A	A	A	A	A	A	A	A
Northbound Left	A	A	A	A	A	A	A	A	A	A	A	A

The 95th Percentile Queue Length as described on queuing summary in the Synchro reports does not exceed two vehicles' lengths on any of the left turn movements during any of the analyzed scenarios including the 2027 and 2045 AM and PM Total scenarios.



The entrance to the coffee shop from the private road will be controlled by a two-way stop sign. No delays are expected due to low traffic volumes accessing nearby businesses. Even at peak hours, with additional traffic considered, the maximum volume would be 100 vph (50 vph northbound and 50 vph southbound). This level is too low to affect delays and the level of service.

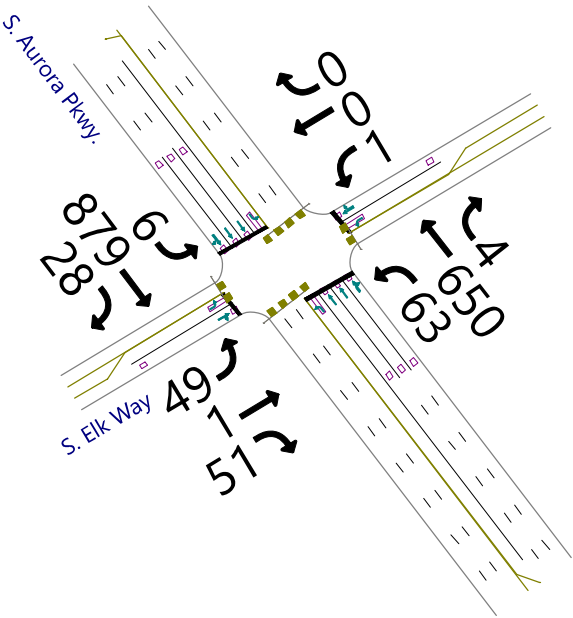
The site plan includes dual entry for the drive-up window aisle, accommodating 17 vehicles without congestion. According to Spack Solutions' study, the average maximum queue is 9.57 vehicles, ranging from 7 to 13 vehicles, with a standard deviation of 1.9 vehicles. Therefore, the aisle can handle up to 13 vehicles effectively. The data analysis is attached.

CONCLUSIONS/RECOMMENDATIONS

Based on the analysis herein and in my professional opinion, the additional traffic from the Dutch Bros Coffee Shop development is minor and will not negatively impact nearby streets and intersections. No further improvements are needed beyond what is already programmed.





































APPENDIX



Dutch Bros.
3: S. Elk Way & S. Aurora Pkwy.

Existing AM Peak Hour
03/11/2025

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	49	1	51	1	0	0	6	879	28	63	650	4
Future Volume (vph)	49	1	51	1	0	0	6	879	28	63	650	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.853						0.995			0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1589	0	1770	1863	0	1770	5060	0	1770	5080	0
Flt Permitted	0.950			0.000			0.370			0.241		
Satd. Flow (perm)	1770	1589	0	0	1863	0	689	5060	0	449	5080	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		55						7			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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)	53	1	55	1	0	0	7	955	30	68	707	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	56	0	1	0	0	7	985	0	68	711	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt			pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.5	22.5		9.5	22.5		9.5	23.0		10.0	23.5	
Total Split (%)	14.6%	34.6%		14.6%	34.6%		14.6%	35.4%		15.4%	36.2%	
Maximum Green (s)	5.0	18.0		5.0	18.0		5.0	18.5		5.5	19.0	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effect Green (s)	7.3	6.2		5.1			28.7	27.7		31.1	33.3	
Actuated g/C Ratio	0.18	0.15		0.12			0.69	0.66		0.75	0.80	
v/c Ratio	0.17	0.20		0.00			0.01	0.29		0.13	0.18	
Control Delay (s/veh)	15.7	9.2		20.0			4.8	7.5		4.6	4.9	
Queue Delay	0.0	0.0		0.0			0.0	0.0		0.0	0.0	
Total Delay (s/veh)	15.7	9.2		20.0			4.8	7.5		4.6	4.9	
LOS	B	A		B			A	A		A	A	
Approach Delay (s/veh)		12.4			20.0			7.5			4.9	
Approach LOS		B			B			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 41.7

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.29

Intersection Signal Delay (s/veh): 6.7









Intersection LOS: A

Intersection Capacity Utilization 42.4%

ICU Level of Service A

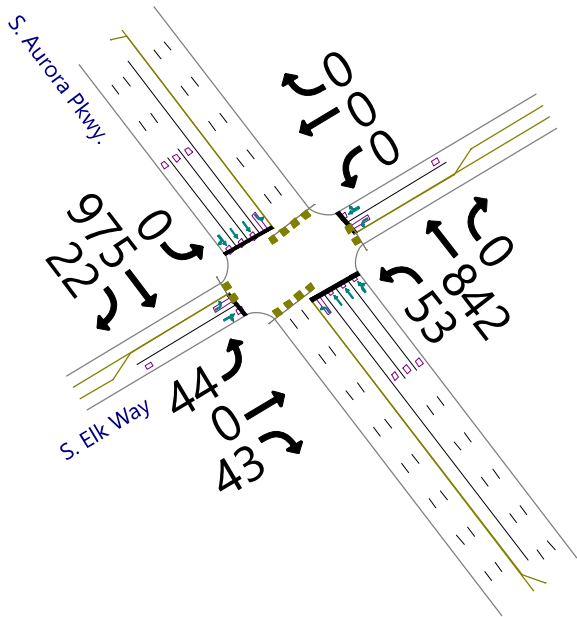
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




















Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.

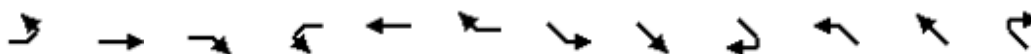
 Ø1	 Ø2	 Ø3	 Ø4
9.5 s	23.5 s	9.5 s	22.5 s
 Ø5	 Ø6	 Ø7	 Ø8
10 s	23 s	9.5 s	22.5 s



Lane Group	EBL	EBT	WBL	SEL	SET	NWL	NWT
Lane Group Flow (vph)	53	56	1	7	985	68	711
v/c Ratio	0.17	0.20	0.00	0.01	0.29	0.13	0.18
Control Delay (s/veh)	15.7	9.2	20.0	4.8	7.5	4.6	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	15.7	9.2	20.0	4.8	7.5	4.6	4.9
Queue Length 50th (ft)	8	0	0	0	26	0	0
Queue Length 95th (ft)	32	26	4	6	129	25	89
Internal Link Dist (ft)		141			173		278
Turn Bay Length (ft)	100		100	300		300	
Base Capacity (vph)	307	736	218	607	3363	514	4062
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	0.17	0.08	0.00	0.01	0.29	0.13	0.18
Intersection Summary							



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	44	0	43	0	0	0	0	975	22	53	842	0
Future Volume (vph)	44	0	43	0	0	0	0	975	22	53	842	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.850						0.997				
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1770	1583	0	1863	1863	0	1863	5070	0	1770	5085	0
Flt Permitted	0.950									0.212		
Satd. Flow (perm)	1770	1583	0	1863	1863	0	1863	5070	0	395	5085	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		387						5				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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)	48	0	47	0	0	0	0	1060	24	58	915	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	47	0	0	0	0	0	1084	0	58	915	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt			pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.5	22.5		9.5	22.5		9.5	23.0		10.0	23.5	
Total Split (%)	14.6%	34.6%		14.6%	34.6%		14.6%	35.4%		15.4%	36.2%	
Maximum Green (s)	5.0	18.0		5.0	18.0		5.0	18.5		5.5	19.0	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	5.2	5.6						30.0		30.7	33.7	
Actuated g/C Ratio	0.13	0.14						0.77		0.79	0.87	
v/c Ratio	0.20	0.08						0.28		0.11	0.21	
Control Delay (s/veh)	18.1	0.3						4.9		2.5	1.7	
Queue Delay	0.0	0.0						0.0		0.0	0.0	
Total Delay (s/veh)	18.1	0.3						4.9		2.5	1.7	
LOS	B	A						A		A	A	
Approach Delay (s/veh)		9.3						4.9			1.8	
Approach LOS		A						A			A	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 38.9

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.28

Intersection Signal Delay (s/veh): 3.7









Intersection LOS: A

Intersection Capacity Utilization 38.9%

ICU Level of Service A

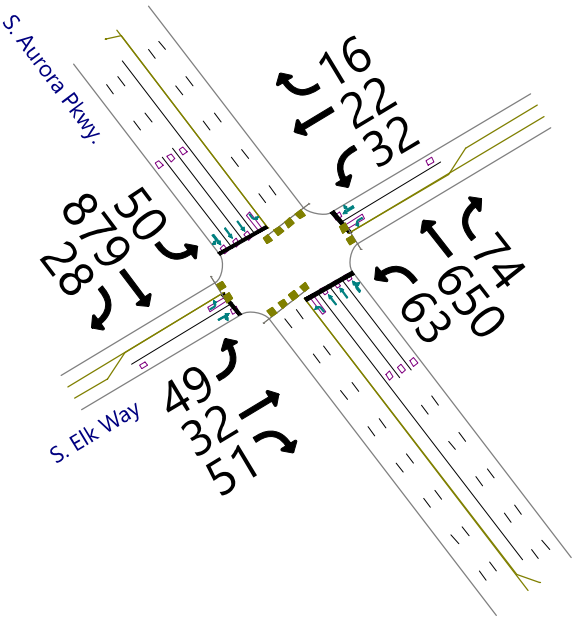
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



















Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.













 Ø1	 Ø2	 Ø3	 Ø4
9.5 s	23.5 s	9.5 s	22.5 s
 Ø5	 Ø6	 Ø7	 Ø8
10 s	23 s	9.5 s	22.5 s







Lane Group	EBL	EBT	SET	NWL	NWT
Lane Group Flow (vph)	48	47	1084	58	915
v/c Ratio	0.20	0.08	0.28	0.11	0.21
Control Delay (s/veh)	18.1	0.3	4.9	2.5	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	18.1	0.3	4.9	2.5	1.7
Queue Length 50th (ft)	7	0	0	0	0
Queue Length 95th (ft)	33	0	92	10	35
Internal Link Dist (ft)		141	173		278
Turn Bay Length (ft)	100			300	
Base Capacity (vph)	238	947	3916	508	4399
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	0.20	0.05	0.28	0.11	0.21
Intersection Summary					

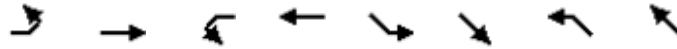


												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	49	32	51	32	22	16	50	879	28	63	650	74
Future Volume (vph)	49	32	51	32	22	16	50	879	28	63	650	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.908			0.938			0.995			0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1691	0	1770	1747	0	1770	5060	0	1770	5009	0
Flt Permitted	0.976			0.976			0.342			0.243		
Satd. Flow (perm)	1818	1691	0	1818	1747	0	637	5060	0	453	5009	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		55			17			7			30	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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)	53	35	55	35	24	17	54	955	30	68	707	80
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	90	0	35	41	0	54	985	0	68	787	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		

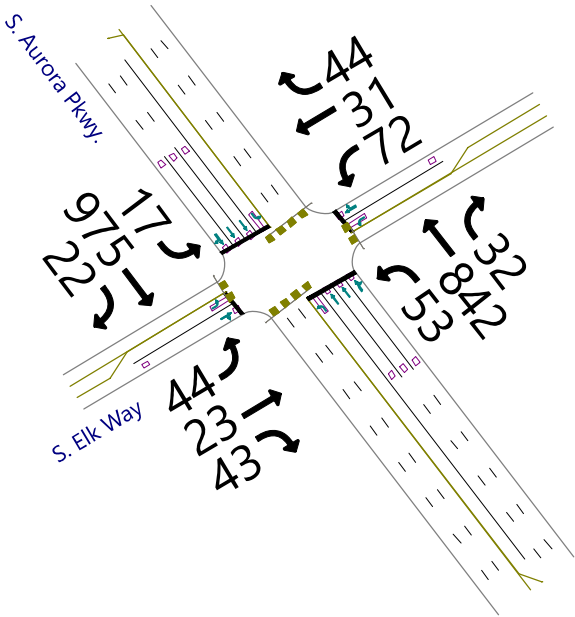
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.5	22.5		9.5	22.5		9.5	23.0		10.0	23.5	
Total Split (%)	14.6%	34.6%		14.6%	34.6%		14.6%	35.4%		15.4%	36.2%	
Maximum Green (s)	5.0	18.0		5.0	18.0		5.0	18.5		5.5	19.0	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	8.3	7.0		8.3	7.0		27.8	27.6		29.2	29.8	
Actuated g/C Ratio	0.19	0.16		0.19	0.16		0.62	0.62		0.65	0.67	
v/c Ratio	0.16	0.29		0.11	0.14		0.10	0.31		0.15	0.23	
Control Delay (s/veh)	15.0	13.4		14.4	15.7		6.6	10.2		6.6	8.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	15.0	13.4		14.4	15.7		6.6	10.2		6.6	8.3	
LOS	B	B		B	B		A	B		A	A	
Approach Delay (s/veh)		14.0			15.1			10.0			8.1	
Approach LOS		B			B			B			A	
Intersection Summary												
Area Type: Other												
Cycle Length: 65												
Actuated Cycle Length: 44.7												
Natural Cycle: 65												
Control Type: Semi Act-Uncoord												
Maximum v/c Ratio: 0.31												
Intersection Signal Delay (s/veh): 9.7												
Intersection Capacity Utilization 42.4%												
Analysis Period (min) 15												
						Intersection LOS: A						
						ICU Level of Service A						























Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.













 Ø1	 Ø2	 Ø3	 Ø4
9.5 s	23.5 s	9.5 s	22.5 s
 Ø5	 Ø6	 Ø7	 Ø8
10 s	23 s	9.5 s	22.5 s



Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Group Flow (vph)	53	90	35	41	54	985	68	787
v/c Ratio	0.16	0.29	0.11	0.14	0.10	0.31	0.15	0.23
Control Delay (s/veh)	15.0	13.4	14.4	15.7	6.6	10.2	6.6	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	15.0	13.4	14.4	15.7	6.6	10.2	6.6	8.3
Queue Length 50th (ft)	12	8	8	5	4	59	5	21
Queue Length 95th (ft)	32	43	24	29	22	135	27	102
Internal Link Dist (ft)		141		181		173		278
Turn Bay Length (ft)	100		100		300		300	
Base Capacity (vph)	333	749	333	751	530	3127	466	3349
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.12	0.11	0.05	0.10	0.31	0.15	0.23
Intersection Summary								



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	44	23	43	72	31	44	17	975	22	53	842	32
Future Volume (vph)	44	23	43	72	31	44	17	975	22	53	842	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.902			0.912			0.997			0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1680	0	1770	1699	0	1770	5070	0	1770	5055	0
Flt Permitted	0.833			0.714			0.289			0.204		
Satd. Flow (perm)	1552	1680	0	1330	1699	0	538	5070	0	380	5055	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		47			48			5			9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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)	48	25	47	78	34	48	18	1060	24	58	915	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	72	0	78	82	0	18	1084	0	58	950	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.5	22.5		9.5	22.5		9.5	23.0		10.0	23.5	
Total Split (%)	14.6%	34.6%		14.6%	34.6%		14.6%	35.4%		15.4%	36.2%	
Maximum Green (s)	5.0	18.0		5.0	18.0		5.0	18.5		5.5	19.0	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effect Green (s)	9.2	7.0		10.0	8.6		27.9	27.9		29.8	31.4	
Actuated g/C Ratio	0.20	0.15		0.22	0.19		0.60	0.60		0.64	0.68	
v/c Ratio	0.14	0.25		0.23	0.23		0.04	0.35		0.14	0.28	
Control Delay (s/veh)	14.4	13.3		15.2	12.8		7.1	11.5		7.2	7.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	14.4	13.3		15.2	12.8		7.1	11.5		7.2	7.9	
LOS	B	B		B	B		A	B		A	A	
Approach Delay (s/veh)		13.7			14.0			11.4			7.8	
Approach LOS		B			B			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 46.3

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.35

Intersection Signal Delay (s/veh): 10.2






Intersection LOS: B

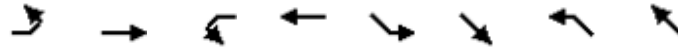
Intersection Capacity Utilization 45.4%

ICU Level of Service A

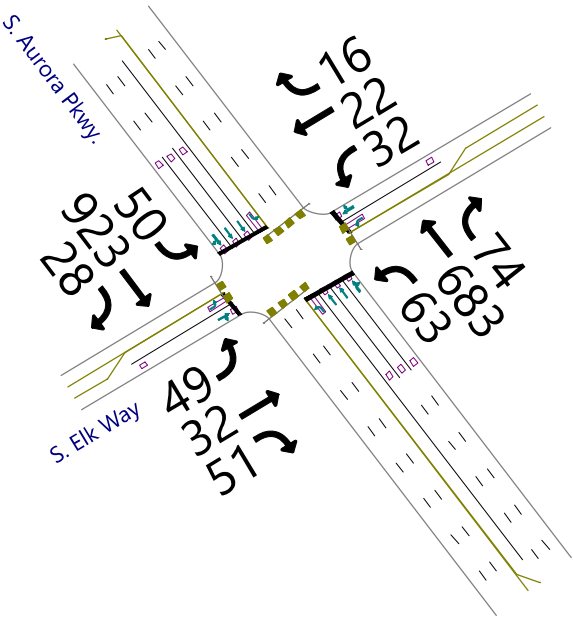
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




















Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.













 Ø1	 Ø2	 Ø3	 Ø4
9.5 s	23.5 s	9.5 s	22.5 s
 Ø5	 Ø6	 Ø7	 Ø8
10 s	23 s	9.5 s	22.5 s



Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Group Flow (vph)	48	72	78	82	18	1084	58	950
v/c Ratio	0.14	0.25	0.23	0.23	0.04	0.35	0.14	0.28
Control Delay (s/veh)	14.4	13.3	15.2	12.8	7.1	11.5	7.2	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	14.4	13.3	15.2	12.8	7.1	11.5	7.2	7.9
Queue Length 50th (ft)	11	7	18	8	2	100	8	54
Queue Length 95th (ft)	29	37	43	41	11	150	23	126
Internal Link Dist (ft)		141		181		173		278
Turn Bay Length (ft)	100		100		300		300	
Base Capacity (vph)	334	725	338	733	466	3059	421	3435
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.10	0.23	0.11	0.04	0.35	0.14	0.28
Intersection Summary								



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	49	32	51	32	22	16	50	879	28	63	650	74
Future Volume (vph)	49	32	51	32	22	16	50	879	28	63	650	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.908			0.938			0.996			0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1691	0	1770	1747	0	1770	5065	0	1770	5009	0
Flt Permitted	0.976			0.976			0.330			0.230		
Satd. Flow (perm)	1818	1691	0	1818	1747	0	615	5065	0	428	5009	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		55			17			7			28	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	105%	100%	100%	105%	100%
Adj. Flow (vph)	53	35	55	35	24	17	54	1003	30	68	742	80
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	90	0	35	41	0	54	1033	0	68	822	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.5	22.5		9.5	22.5		9.5	23.4		9.6	23.5	
Total Split (%)	14.6%	34.6%		14.6%	34.6%		14.6%	36.0%		14.8%	36.2%	
Maximum Green (s)	5.0	18.0		5.0	18.0		5.0	18.9		5.1	19.0	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effect Green (s)	8.3	7.0		8.3	7.0		28.1	27.8		29.1	29.8	
Actuated g/C Ratio	0.19	0.16		0.19	0.16		0.63	0.62		0.65	0.67	
v/c Ratio	0.16	0.29		0.11	0.14		0.10	0.33		0.15	0.25	
Control Delay (s/veh)	15.0	13.4		14.4	15.7		6.5	10.1		6.8	8.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	15.0	13.4		14.4	15.7		6.5	10.1		6.8	8.3	
LOS	B	B		B	B		A	B		A	A	
Approach Delay (s/veh)		14.0			15.1			9.9			8.2	
Approach LOS		B			B			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 44.7

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.33

Intersection Signal Delay (s/veh): 9.7









Intersection LOS: A

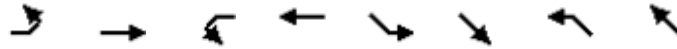
Intersection Capacity Utilization 43.3%

ICU Level of Service A

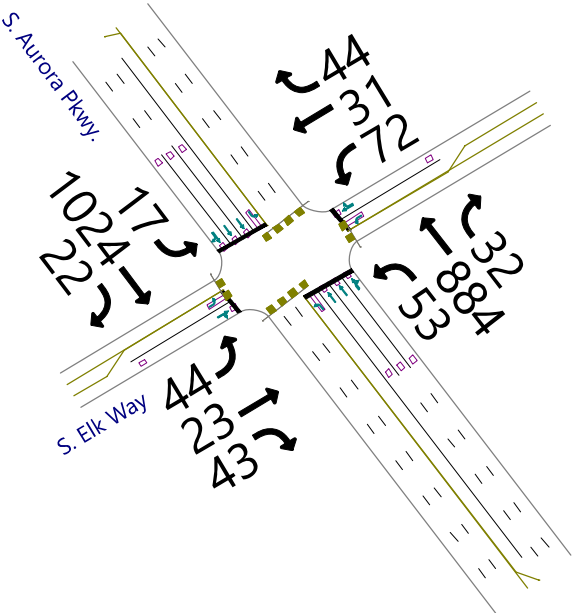
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




















Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.













 Ø1	 Ø2	 Ø3	 Ø4
9.5 s	23.5 s	9.5 s	22.5 s
 Ø5	 Ø6	 Ø7	 Ø8
9.6 s	23.4 s	9.5 s	22.5 s



Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Group Flow (vph)	53	90	35	41	54	1033	68	822
v/c Ratio	0.16	0.29	0.11	0.14	0.10	0.33	0.15	0.25
Control Delay (s/veh)	15.0	13.4	14.4	15.7	6.5	10.1	6.8	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	15.0	13.4	14.4	15.7	6.5	10.1	6.8	8.3
Queue Length 50th (ft)	12	8	8	5	4	61	5	22
Queue Length 95th (ft)	32	43	24	29	22	141	27	107
Internal Link Dist (ft)		141		181		173		278
Turn Bay Length (ft)	100		100		300		300	
Base Capacity (vph)	333	749	333	751	522	3154	439	3349
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.12	0.11	0.05	0.10	0.33	0.15	0.25
Intersection Summary								



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	44	23	43	72	31	44	17	975	22	53	842	32
Future Volume (vph)	44	23	43	72	31	44	17	975	22	53	842	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.902			0.912			0.997			0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1680	0	1770	1699	0	1770	5070	0	1770	5060	0
Flt Permitted	0.851			0.714			0.272			0.191		
Satd. Flow (perm)	1585	1680	0	1330	1699	0	507	5070	0	356	5060	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		47			48			5			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	105%	100%	100%	105%	100%
Adj. Flow (vph)	48	25	47	78	34	48	18	1113	24	58	961	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	72	0	78	82	0	18	1137	0	58	996	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.5	22.5		9.6	22.6		9.5	23.3		9.6	23.4	
Total Split (%)	14.6%	34.6%		14.8%	34.8%		14.6%	35.8%		14.8%	36.0%	
Maximum Green (s)	5.0	18.0		5.1	18.1		5.0	18.8		5.1	18.9	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effect Green (s)	9.2	6.9		10.1	8.6		28.0	28.0		29.7	31.3	
Actuated g/C Ratio	0.20	0.15		0.22	0.19		0.61	0.61		0.64	0.68	
v/c Ratio	0.14	0.25		0.23	0.23		0.04	0.37		0.15	0.29	
Control Delay (s/veh)	14.3	13.3		15.1	12.8		7.1	11.4		7.3	8.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	14.3	13.3		15.1	12.8		7.1	11.4		7.3	8.0	
LOS	B	B		B	B		A	B		A	A	
Approach Delay (s/veh)		13.7			13.9			11.4			7.9	
Approach LOS		B			B			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 46.2

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.37

Intersection Signal Delay (s/veh): 10.2








Intersection LOS: B

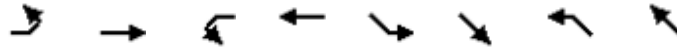
Intersection Capacity Utilization 46.3%

ICU Level of Service A

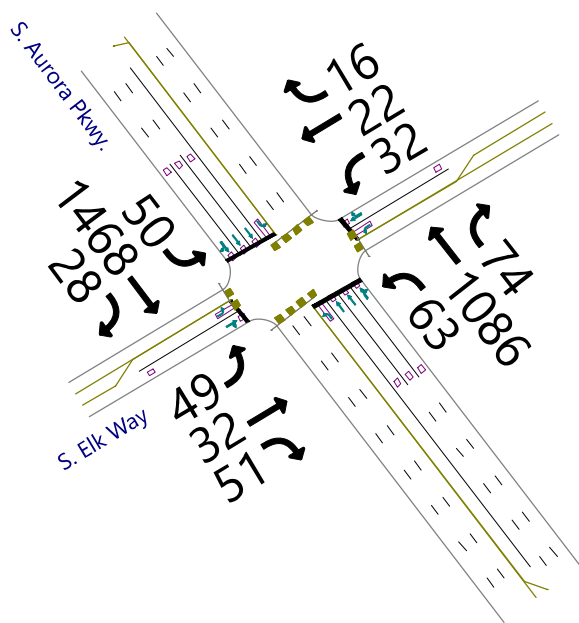
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



















Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.













 Ø1	 Ø2	 Ø3	 Ø4
9.5 s	23.4 s	9.6 s	22.5 s
 Ø5	 Ø6	 Ø7	 Ø8
9.6 s	23.3 s	9.5 s	22.6 s



Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Group Flow (vph)	48	72	78	82	18	1137	58	996
v/c Ratio	0.14	0.25	0.23	0.23	0.04	0.37	0.15	0.29
Control Delay (s/veh)	14.3	13.3	15.1	12.8	7.1	11.4	7.3	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	14.3	13.3	15.1	12.8	7.1	11.4	7.3	8.0
Queue Length 50th (ft)	11	7	18	8	2	105	8	58
Queue Length 95th (ft)	29	37	43	41	11	157	23	134
Internal Link Dist (ft)		141		181		173		278
Turn Bay Length (ft)	100		100		300		300	
Base Capacity (vph)	337	726	343	738	453	3077	395	3434
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.10	0.23	0.11	0.04	0.37	0.15	0.29
Intersection Summary								



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	49	32	51	32	22	16	50	879	28	63	650	74
Future Volume (vph)	49	32	51	32	22	16	50	879	28	63	650	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.908			0.938			0.997			0.990	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1691	0	1770	1747	0	1770	5070	0	1770	5034	0
Flt Permitted	0.952			0.952			0.187			0.125		
Satd. Flow (perm)	1773	1691	0	1773	1747	0	348	5070	0	233	5034	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		55			17			4			16	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	167%	100%	100%	167%	100%
Adj. Flow (vph)	53	35	55	35	24	17	54	1596	30	68	1180	80
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	90	0	35	41	0	54	1626	0	68	1260	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.6	22.6		9.6	22.6		9.6	28.2		9.6	28.2	
Total Split (%)	13.7%	32.3%		13.7%	32.3%		13.7%	40.3%		13.7%	40.3%	
Maximum Green (s)	5.1	18.1		5.1	18.1		5.1	23.7		5.1	23.7	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	8.5	7.0		8.5	7.0		32.7	32.3		33.6	34.3	
Actuated g/C Ratio	0.17	0.14		0.17	0.14		0.66	0.65		0.68	0.69	
v/c Ratio	0.17	0.31		0.12	0.16		0.14	0.49		0.21	0.36	
Control Delay (s/veh)	17.4	15.0		16.8	17.6		6.5	11.3		7.2	8.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	17.4	15.0		16.8	17.6		6.5	11.3		7.2	8.7	
LOS	B	B		B	B		A	B		A	A	
Approach Delay (s/veh)		15.9			17.2			11.2			8.6	
Approach LOS		B			B			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 49.5

Natural Cycle: 70

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.49

Intersection Signal Delay (s/veh): 10.5

Intersection LOS: B

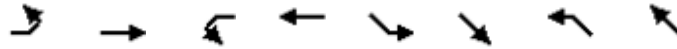
Intersection Capacity Utilization 53.8%

ICU Level of Service A

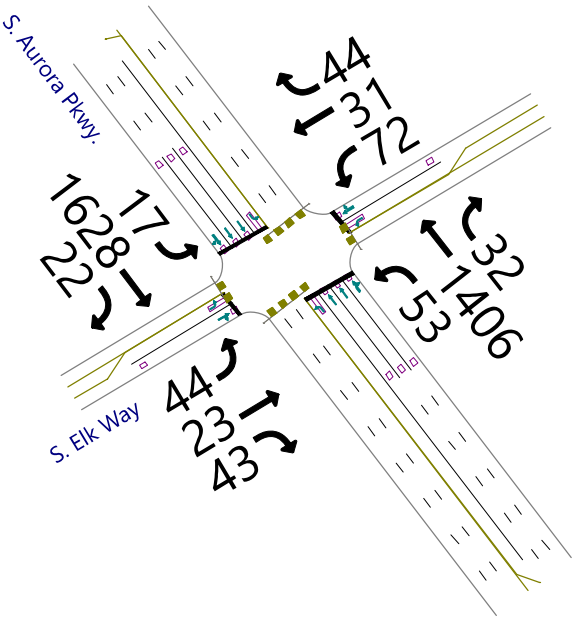
Analysis Period (min) 15























Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.

















Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Group Flow (vph)	53	90	35	41	54	1626	68	1260
v/c Ratio	0.17	0.31	0.12	0.16	0.14	0.49	0.21	0.36
Control Delay (s/veh)	17.4	15.0	16.8	17.6	6.5	11.3	7.2	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	17.4	15.0	16.8	17.6	6.5	11.3	7.2	8.7
Queue Length 50th (ft)	14	9	9	6	4	115	5	39
Queue Length 95th (ft)	35	46	26	31	22	251	26	177
Internal Link Dist (ft)		141		181		173		278
Turn Bay Length (ft)	100		100		300		300	
Base Capacity (vph)	303	681	303	679	383	3314	324	3492
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.13	0.12	0.06	0.14	0.49	0.21	0.36
Intersection Summary								



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	44	23	43	72	31	44	17	975	22	53	842	32
Future Volume (vph)	44	23	43	72	31	44	17	975	22	53	842	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.902			0.912			0.998			0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1680	0	1770	1699	0	1770	5075	0	1770	5070	0
Flt Permitted	0.952			0.952			0.128			0.104		
Satd. Flow (perm)	1773	1680	0	1773	1699	0	238	5075	0	194	5070	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		47			48			3			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	167%	100%	100%	167%	100%
Adj. Flow (vph)	48	25	47	78	34	48	18	1770	24	58	1528	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	72	0	78	82	0	18	1794	0	58	1563	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.6	22.6		9.6	22.6		9.6	33.2		9.6	33.2	
Total Split (%)	12.8%	30.1%		12.8%	30.1%		12.8%	44.3%		12.8%	44.3%	
Maximum Green (s)	5.1	18.1		5.1	18.1		5.1	28.7		5.1	28.7	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	9.6	7.2		9.6	7.2		37.6	37.4		39.2	40.7	
Actuated g/C Ratio	0.17	0.13		0.17	0.13		0.67	0.67		0.70	0.72	
v/c Ratio	0.16	0.28		0.26	0.32		0.06	0.53		0.20	0.43	
Control Delay (s/veh)	19.0	16.3		20.3	17.6		6.4	12.0		7.4	8.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	19.0	16.3		20.3	17.6		6.4	12.0		7.4	8.0	
LOS	B	B		C	B		A	B		A	A	
Approach Delay (s/veh)		17.4			18.9			11.9			8.0	
Approach LOS		B			B			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 56.2

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.53

Intersection Signal Delay (s/veh): 10.7

Intersection LOS: B

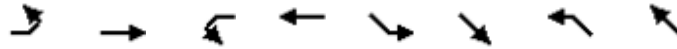
Intersection Capacity Utilization 58.0%

ICU Level of Service B

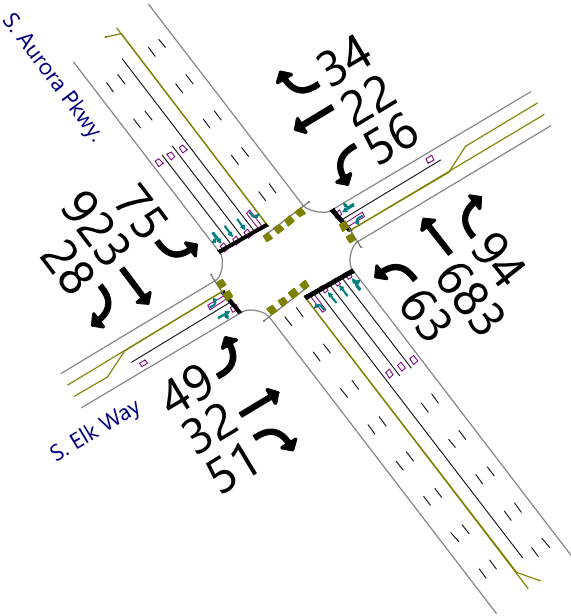
Analysis Period (min) 15























Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.

















Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Group Flow (vph)	48	72	78	82	18	1794	58	1563
v/c Ratio	0.16	0.28	0.26	0.32	0.06	0.53	0.20	0.43
Control Delay (s/veh)	19.0	16.3	20.3	17.6	6.4	12.0	7.4	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.0	16.3	20.3	17.6	6.4	12.0	7.4	8.0
Queue Length 50th (ft)	14	9	23	12	2	204	8	110
Queue Length 95th (ft)	37	42	53	47	10	286	23	234
Internal Link Dist (ft)		141		181		173		278
Turn Bay Length (ft)	100		100		300		300	
Base Capacity (vph)	302	599	302	605	305	3374	285	3674
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.12	0.26	0.14	0.06	0.53	0.20	0.43
Intersection Summary								



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	49	32	51	56	22	34	75	879	28	63	650	94
Future Volume (vph)	49	32	51	56	22	34	75	879	28	63	650	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.908			0.909			0.996			0.982	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1691	0	1770	1693	0	1770	5065	0	1770	4994	0
Flt Permitted							0.308			0.237		
Satd. Flow (perm)	1863	1691	0	1863	1693	0	574	5065	0	441	4994	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		55			37			7			38	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	105%	100%	100%	105%	100%
Adj. Flow (vph)	53	35	55	61	24	37	82	1003	30	68	742	102
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	90	0	61	61	0	82	1033	0	68	844	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.5	22.5		9.5	22.5		9.6	23.4		9.6	23.4	
Total Split (%)	14.6%	34.6%		14.6%	34.6%		14.8%	36.0%		14.8%	36.0%	
Maximum Green (s)	5.0	18.0		5.0	18.0		5.1	18.9		5.1	18.9	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effect Green (s)	9.4	7.2		9.4	7.2		27.8	27.8		27.8	27.8	
Actuated g/C Ratio	0.20	0.16		0.20	0.16		0.61	0.61		0.61	0.61	
v/c Ratio	0.14	0.29		0.16	0.21		0.17	0.34		0.16	0.28	
Control Delay (s/veh)	14.1	13.7		14.3	13.7		7.4	11.2		7.5	10.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	14.1	13.7		14.3	13.7		7.4	11.2		7.5	10.3	
LOS	B	B		B	B		A	B		A	B	
Approach Delay (s/veh)		13.9			14.0			10.9			10.1	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 45.9

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.34

Intersection Signal Delay (s/veh): 10.9









Intersection LOS: B

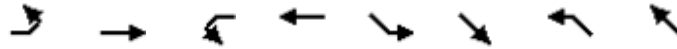
Intersection Capacity Utilization 43.6%

ICU Level of Service A

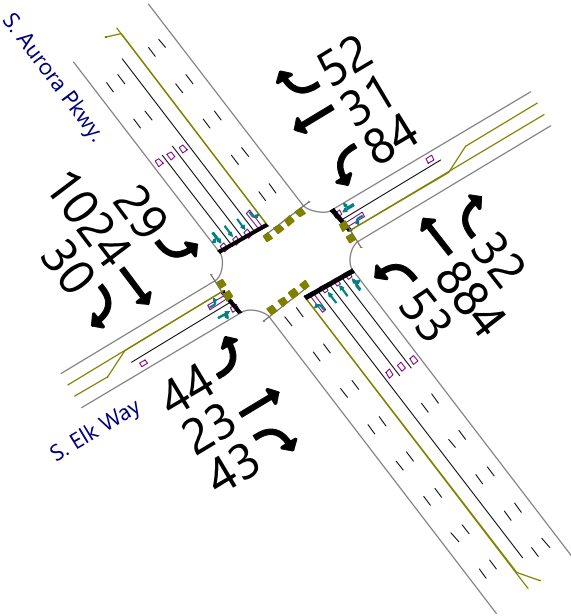
Analysis Period (min) 15






















Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.













 Ø1	 Ø2	 Ø3	 Ø4
9.6 s	23.4 s	9.5 s	22.5 s
 Ø5	 Ø6	 Ø7	 Ø8
9.6 s	23.4 s	9.5 s	22.5 s



Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Group Flow (vph)	53	90	61	61	82	1033	68	844
v/c Ratio	0.14	0.29	0.16	0.21	0.17	0.34	0.16	0.28
Control Delay (s/veh)	14.1	13.7	14.3	13.7	7.4	11.2	7.5	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	14.1	13.7	14.3	13.7	7.4	11.2	7.5	10.3
Queue Length 50th (ft)	12	10	14	7	11	93	9	69
Queue Length 95th (ft)	32	43	35	34	31	141	27	109
Internal Link Dist (ft)		141		181		173		278
Turn Bay Length (ft)	100		100		300		300	
Base Capacity (vph)	370	753	370	743	491	3074	427	3044
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.12	0.16	0.08	0.17	0.34	0.16	0.28
Intersection Summary								



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	44	23	43	84	31	52	29	975	30	53	842	32
Future Volume (vph)	44	23	43	84	31	52	29	975	30	53	842	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.902			0.906			0.996			0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1680	0	1770	1688	0	1770	5065	0	1770	5060	0
Flt Permitted	0.851			0.714			0.259			0.194		
Satd. Flow (perm)	1585	1680	0	1330	1688	0	482	5065	0	361	5060	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		47			57			7			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	105%	100%	100%	105%	100%
Adj. Flow (vph)	48	25	47	91	34	57	32	1113	33	58	961	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	72	0	91	91	0	32	1146	0	58	996	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.5	22.5		9.6	22.6		9.5	23.4		9.5	23.4	
Total Split (%)	14.6%	34.6%		14.8%	34.8%		14.6%	36.0%		14.6%	36.0%	
Maximum Green (s)	5.0	18.0		5.1	18.1		5.0	18.9		5.0	18.9	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	9.3	7.1		10.2	8.8		27.8	27.9		28.6	29.6	
Actuated g/C Ratio	0.20	0.15		0.22	0.19		0.60	0.61		0.62	0.64	
v/c Ratio	0.14	0.24		0.26	0.25		0.07	0.37		0.15	0.31	
Control Delay (s/veh)	14.2	13.2		15.3	12.2		7.2	11.4		7.5	9.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	14.2	13.2		15.3	12.2		7.2	11.4		7.5	9.6	
LOS	B	B		B	B		A	B		A	A	
Approach Delay (s/veh)		13.6			13.8			11.3			9.5	
Approach LOS		B			B			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 46

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.37

Intersection Signal Delay (s/veh): 10.9




Intersection LOS: B

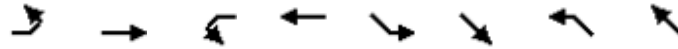
Intersection Capacity Utilization 47.2%

ICU Level of Service A

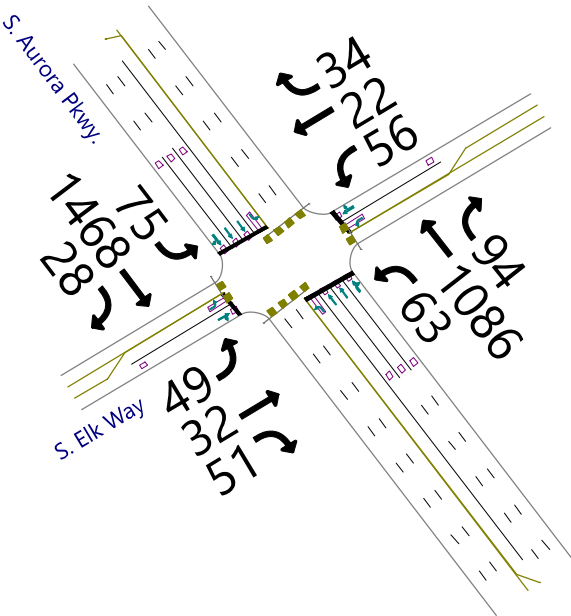
Analysis Period (min) 15























Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.













 Ø1	 Ø2	 Ø3	 Ø4
9.5 s	23.4 s	9.6 s	22.5 s
 Ø5	 Ø6	 Ø7	 Ø8
9.5 s	23.4 s	9.5 s	22.6 s



Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Group Flow (vph)	48	72	91	91	32	1146	58	996
v/c Ratio	0.14	0.24	0.26	0.25	0.07	0.37	0.15	0.31
Control Delay (s/veh)	14.2	13.2	15.3	12.2	7.2	11.4	7.5	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	14.2	13.2	15.3	12.2	7.2	11.4	7.5	9.6
Queue Length 50th (ft)	11	7	21	8	4	105	8	58
Queue Length 95th (ft)	29	36	48	42	15	159	24	135
Internal Link Dist (ft)		141		181		173		278
Turn Bay Length (ft)	100		100		300		300	
Base Capacity (vph)	342	739	348	752	443	3078	390	3255
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.10	0.26	0.12	0.07	0.37	0.15	0.31
Intersection Summary								



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	49	32	51	56	22	34	75	879	28	63	650	94
Future Volume (vph)	49	32	51	56	22	34	75	879	28	63	650	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.908			0.909			0.997			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1691	0	1770	1693	0	1770	5070	0	1770	5024	0
Flt Permitted	0.976			0.976			0.169			0.134		
Satd. Flow (perm)	1818	1691	0	1818	1693	0	315	5070	0	250	5024	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		55			37			4			22	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	167%	100%	100%	167%	100%
Adj. Flow (vph)	53	35	55	61	24	37	82	1596	30	68	1180	102
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	90	0	61	61	0	82	1626	0	68	1282	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.6	22.6		9.6	22.6		9.6	28.2		9.6	28.2	
Total Split (%)	13.7%	32.3%		13.7%	32.3%		13.7%	40.3%		13.7%	40.3%	
Maximum Green (s)	5.1	18.1		5.1	18.1		5.1	23.7		5.1	23.7	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effect Green (s)	9.6	7.2		9.6	7.2		32.4	32.4		32.4	32.4	
Actuated g/C Ratio	0.19	0.14		0.19	0.14		0.64	0.64		0.64	0.64	
v/c Ratio	0.16	0.31		0.18	0.23		0.23	0.50		0.21	0.40	
Control Delay (s/veh)	16.5	15.4		16.8	15.3		7.8	12.5		7.8	10.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	16.5	15.4		16.8	15.3		7.8	12.5		7.8	10.9	
LOS	B	B		B	B		A	B		A	B	
Approach Delay (s/veh)		15.8			16.0			12.3			10.8	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 50.8

Natural Cycle: 70

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.50

Intersection Signal Delay (s/veh): 12.0

Intersection LOS: B

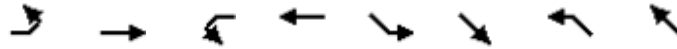
Intersection Capacity Utilization 54.2%

ICU Level of Service A

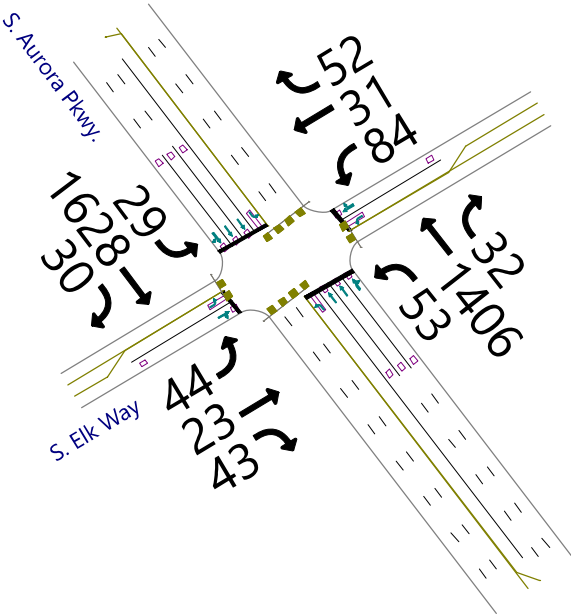
Analysis Period (min) 15






















Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.

















Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Group Flow (vph)	53	90	61	61	82	1626	68	1282
v/c Ratio	0.16	0.31	0.18	0.23	0.23	0.50	0.21	0.40
Control Delay (s/veh)	16.5	15.4	16.8	15.3	7.8	12.5	7.8	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	16.5	15.4	16.8	15.3	7.8	12.5	7.8	10.9
Queue Length 50th (ft)	14	11	16	8	11	174	10	123
Queue Length 95th (ft)	35	46	39	36	31	251	26	180
Internal Link Dist (ft)		141		181		173		278
Turn Bay Length (ft)	100		100		300		300	
Base Capacity (vph)	337	680	337	670	357	3231	323	3209
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.13	0.18	0.09	0.23	0.50	0.21	0.40
Intersection Summary								



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	44	23	43	84	31	52	29	975	30	53	842	32
Future Volume (vph)	44	23	43	84	31	52	29	975	30	53	842	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Frt		0.902			0.906			0.997			0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1680	0	1770	1688	0	1770	5070	0	1770	5070	0
Flt Permitted	0.930			0.930			0.122			0.110		
Satd. Flow (perm)	1732	1680	0	1732	1688	0	227	5070	0	205	5070	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		47			57			4			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		221			261			253			358	
Travel Time (s)		5.0			5.9			5.8			8.1	
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	167%	100%	100%	167%	100%
Adj. Flow (vph)	48	25	47	91	34	57	32	1770	33	58	1528	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	72	0	91	91	0	32	1803	0	58	1563	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	9.6	22.6		9.6	22.6		9.6	33.2		9.6	33.2	
Total Split (%)	12.8%	30.1%		12.8%	30.1%		12.8%	44.3%		12.8%	44.3%	
Maximum Green (s)	5.1	18.1		5.1	18.1		5.1	28.7		5.1	28.7	
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		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Don't Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	9.7	7.2		9.7	7.2		37.4	37.2		38.2	38.9	
Actuated g/C Ratio	0.17	0.13		0.17	0.13		0.67	0.66		0.68	0.69	
v/c Ratio	0.16	0.28		0.30	0.34		0.11	0.54		0.20	0.44	
Control Delay (s/veh)	19.0	16.2		20.9	16.9		6.7	12.1		7.5	9.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	19.0	16.2		20.9	16.9		6.7	12.1		7.5	9.7	
LOS	B	B		C	B		A	B		A	A	
Approach Delay (s/veh)		17.3			18.9			12.0			9.6	
Approach LOS		B			B			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 56

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.54

Intersection Signal Delay (s/veh): 11.5

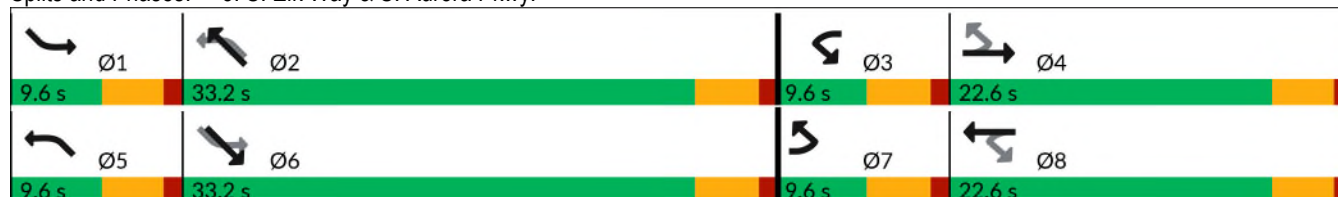
Intersection LOS: B

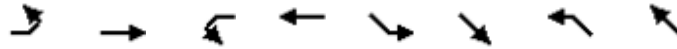
Intersection Capacity Utilization 58.9%

ICU Level of Service B

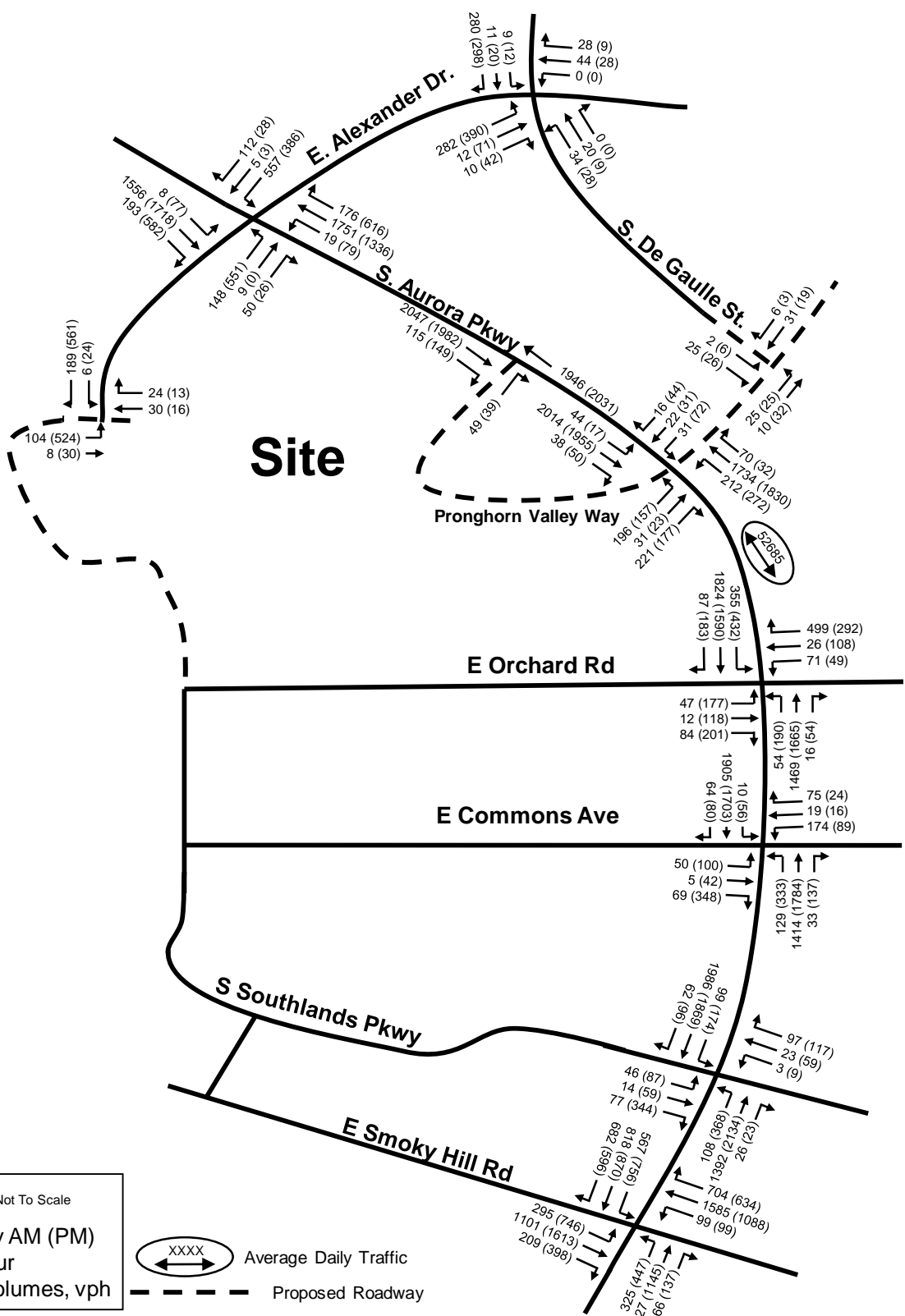
Analysis Period (min) 15

Splits and Phases: 3: S. Elk Way & S. Aurora Pkwy.





Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Group Flow (vph)	48	72	91	91	32	1803	58	1563
v/c Ratio	0.16	0.28	0.30	0.34	0.11	0.54	0.20	0.44
Control Delay (s/veh)	19.0	16.2	20.9	16.9	6.7	12.1	7.5	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.0	16.2	20.9	16.9	6.7	12.1	7.5	9.7
Queue Length 50th (ft)	14	9	28	12	4	205	8	110
Queue Length 95th (ft)	37	42	59	49	15	290	23	235
Internal Link Dist (ft)		141		181		173		278
Turn Bay Length (ft)	100		100		300		300	
Base Capacity (vph)	302	604	302	614	300	3369	290	3522
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.12	0.30	0.15	0.11	0.54	0.20	0.44
Intersection Summary								



Pomeroy
Larry Jacobson
HKS #170220

**2037 Total Traffic Volumes
(With Alexander Connection)**



ALL TRAFFIC DATA SERVICES

(303) 216-2439

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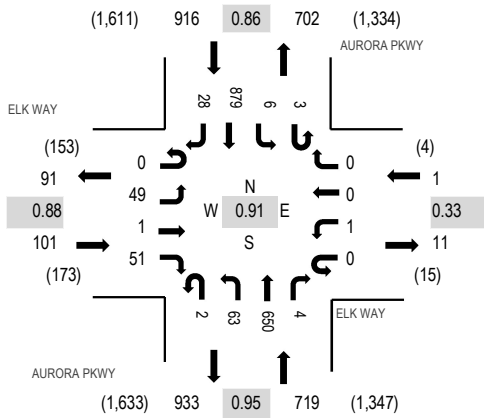
Location: 1 AURORA PKWY & ELK WAY AM

Date: Tuesday, February 18, 2025

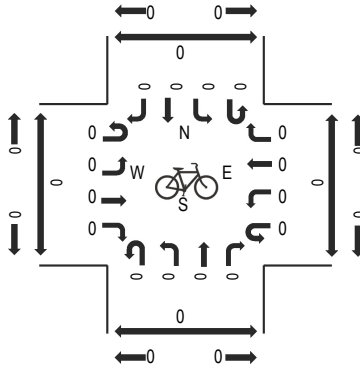
Peak Hour: 07:30 AM - 08:30 AM

Peak 15-Minutes: 07:45 AM - 08:00 AM

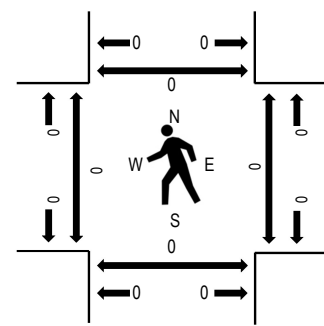
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	ELK WAY Eastbound				ELK WAY Westbound				AURORA PKWY Northbound				AURORA PKWY Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	13	0	6	0	0	0	0	0	11	161	0	0	1	122	9	323	1,600	0	0	0	0
7:15 AM	0	7	0	8	0	0	0	0	0	7	160	0	0	2	169	5	358	1,699	0	0	0	0
7:30 AM	0	7	0	13	0	0	0	0	0	11	179	0	0	1	225	5	441	1,737	0	0	0	0
7:45 AM	0	16	0	13	0	0	0	0	1	16	163	2	0	2	254	11	478	1,651	0	0	0	0
8:00 AM	0	13	0	13	0	1	0	0	1	16	160	1	2	3	210	2	422	1,535	0	0	0	0
8:15 AM	0	13	1	12	0	0	0	0	0	20	148	1	1	0	190	10	396		0	0	0	0
8:30 AM	0	13	0	8	0	1	1	1	0	11	131	0	1	0	185	3	355		0	0	0	0
8:45 AM	0	6	0	11	0	0	0	0	0	9	137	1	2	0	190	6	362		0	0	0	0
Count Total	0	88	1	84	0	2	1	1	2	101	1,239	5	6	9	1,545	51	3,135		0	0	0	0
Peak Hour	0	49	1	51	0	1	0	0	2	63	650	4	3	6	879	28	1,737		0	0	0	0



ALL TRAFFIC DATA SERVICES

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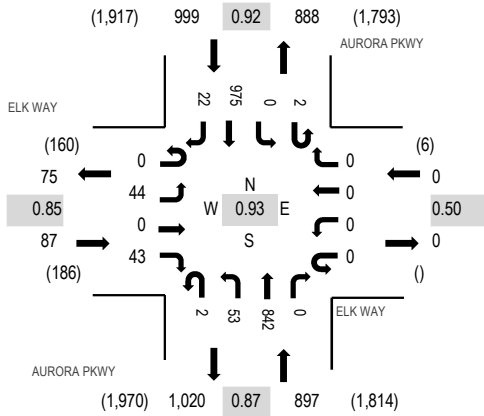
Location: 1 AURORA PKWY & ELK WAY PM

Date: Tuesday, February 18, 2025

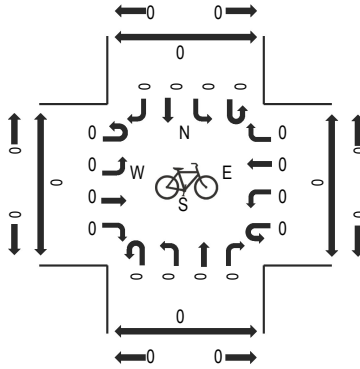
Peak Hour: 04:00 PM - 05:00 PM

Peak 15-Minutes: 04:00 PM - 04:15 PM

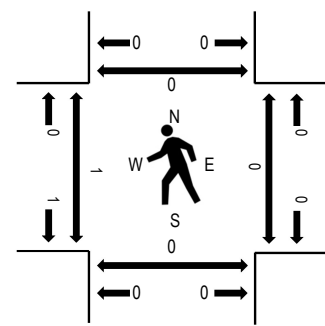
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	ELK WAY Eastbound				ELK WAY Westbound				AURORA PKWY Northbound				AURORA PKWY Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	16	0	9	0	0	0	0	2	13	240	0	0	0	247	8	535	1,983	0	0	0	0
4:15 PM	0	9	0	12	0	0	0	0	0	18	202	0	2	0	244	6	493	1,924	0	0	0	0
4:30 PM	0	10	0	14	0	0	0	0	0	14	199	0	0	0	269	3	509	1,970	0	0	0	0
4:45 PM	0	9	0	8	0	0	0	0	0	8	201	0	0	0	215	5	446	1,933	1	0	0	0
5:00 PM	0	6	0	16	0	0	0	0	0	12	221	0	0	0	210	11	476	1,940	0	0	0	0
5:15 PM	0	11	0	18	0	0	0	3	0	17	248	0	0	0	232	10	539		0	0	0	0
5:30 PM	0	10	0	13	0	1	0	2	2	16	182	0	2	0	241	3	472		1	0	0	0
5:45 PM	0	11	0	14	0	0	0	0	0	11	208	0	1	0	203	5	453		1	0	0	0
Count Total	0	82	0	104	0	1	0	5	4	109	1,701	0	5	0	1,861	51	3,923		3	0	0	0
Peak Hour	0	44	0	43	0	0	0	0	2	53	842	0	2	0	975	22	1,983		1	0	0	0

Drive-Thru Queue Generation

1.0 Introduction

This report provides queueing data for businesses with drive-thru services. It is intended to be an aid for site designers and reviewers, similar to the Institute of Transportation Engineers' *Trip Generation* and *Parking Generation* reports. The data presentation is modeled on the Parking Generation report and data is provided based on at least four days of data for each land use type.

2.0 Data Collection

Data was collected using COUNTcam2 video recording systems at a total of 16 drive-thru locations in Minneapolis, MN and several surrounding suburbs between November 2018 and March 2019, which should represent peak usage in the cold Minnesota winter. Videos of drive-thru lanes were collected at banks, coffee shops, fast food restaurants, pharmacies, and thrift stores. Each location was recorded for between one and four days where most locations were recorded for two consecutive days. The days of the week that each video was recorded on varies.

The 24-hour videos were watched at high speeds with COUNTpro software and maximum queues throughout the day were noted. Most of the COUNTcam2s were set up such that the entire queue lane could be seen, but at a few locations the drive-thru lanes wrapped around the building in a way that the entire queue length would not be able to be seen. For these situations, the COUNTcam2s were set up so that the ordering window and back of the queue could be seen and it was noted how many vehicles could fit between the ordering window and the front of the queue. For drive-thru locations with multiple lanes, the number of lanes was noted but the maximum queue is defined as the sum of the queues at each lane for any given point in time, not the queue per lane. This approach provides overall demand, which may assist designers in determining how many drive-thru lanes are appropriate in addition to determining how long they should be.

3.0 Data Analysis

3.1 Banks

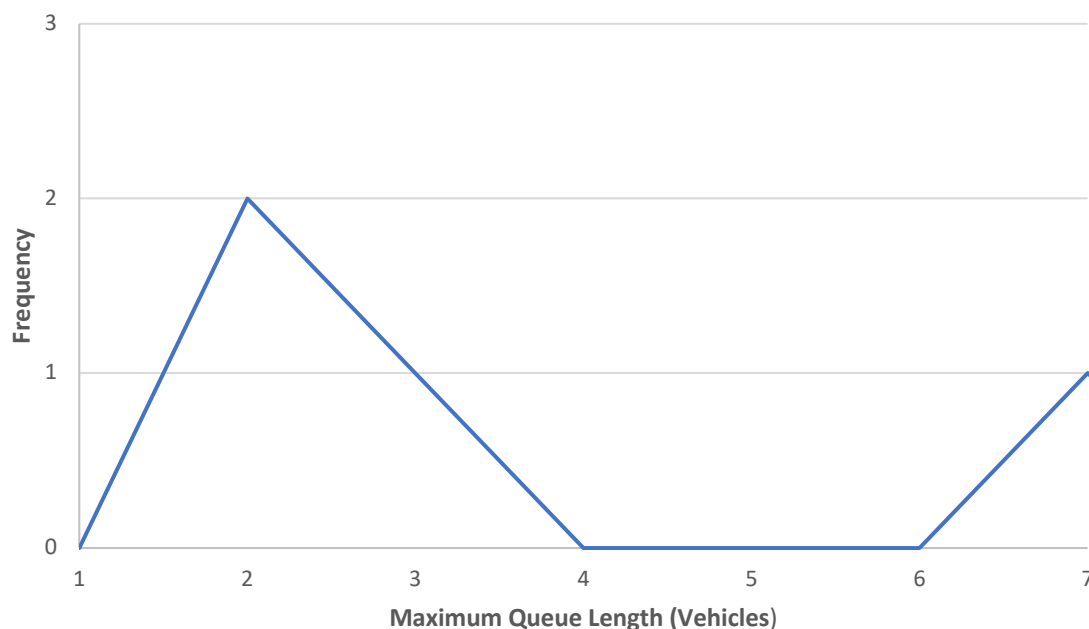
Data collection was done at two banks with drive-thru in February 2019. Four days of data were collected. The banks were located in the cities of Brooklyn Center and Edina, MN.

Both of the locations had a lane with a drive-thru ATM and at least two other lanes. Though service times may differ for ATM lanes compared to the regular lanes, the maximum queues were counted together. This is because based upon what was observed, vehicles would occasionally switch the lane they were in. For example, a vehicle waiting in the ATM line with a queue of three vehicles may move over to a regular line with a queue of only one vehicle. Much of what can be done at the bank's drive-thru lane can also be accomplished at that bank's ATM and vice versa.

Table 3.1 – Drive-Thru Bank Maximum Queue Statistics

Number of Data Points	4
Average Maximum Queue (Vehicles)	3.50
Standard Deviation (Vehicles)	2.38
Coefficient of Variation	68%
Range (Vehicles)	2 to 7
85th Percentile (Vehicles)	7.00
33rd Percentile (Vehicles)	2.00

Figure 3.1 – Drive-Thru Bank Maximum Queue Frequency



The number of available lanes at banks, not including the ATM lane, ranged from two to four lanes. Even though plenty of lanes were available, cars often stacked at the lane closest to the building, thus additional lanes may not result in shorter queues. With an 85th percentile maximum queue of seven vehicles, the data suggests that banks with drive-thru lanes should be able to accommodate 140 feet of vehicle stacking.

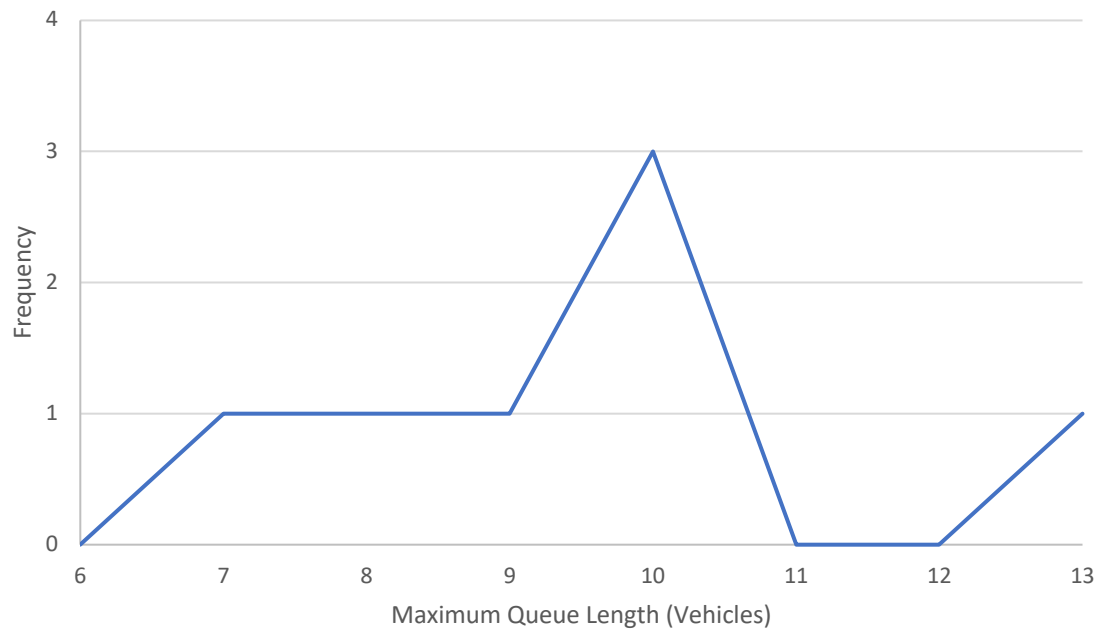
3.2 Coffee Shops

Data collection was done at four coffee shops with drive-thru services between November 2018 and March 2019. Seven days of data were collected. The coffee shops were located in the cities of Bloomington, Edina, Richfield, and West St. Paul, MN. Vehicles being served at the drive-thru window were counted as being in the queue.

Table 3.2 – Drive-Thru Coffee Shop Maximum Queue Statistics

Number of Data Points	7
Average Maximum Queue (Vehicles)	9.57
Standard Deviation (Vehicles)	1.90
Coefficient of Variation	20%
Range (Vehicles)	7 to 13
85th Percentile (Vehicles)	12.40
33rd Percentile (Vehicles)	8.64

Figure 3.2 – Drive-Thru Coffee Shop Maximum Queue Frequency



The maximum queues for coffee shops were concentrated between 7:00am and 10:00am. With an 85th percentile maximum queue of 12 vehicles, the data suggests that coffee shops with drive-thru lanes should be able to accommodate at least 240 feet of vehicle stacking during morning hours.

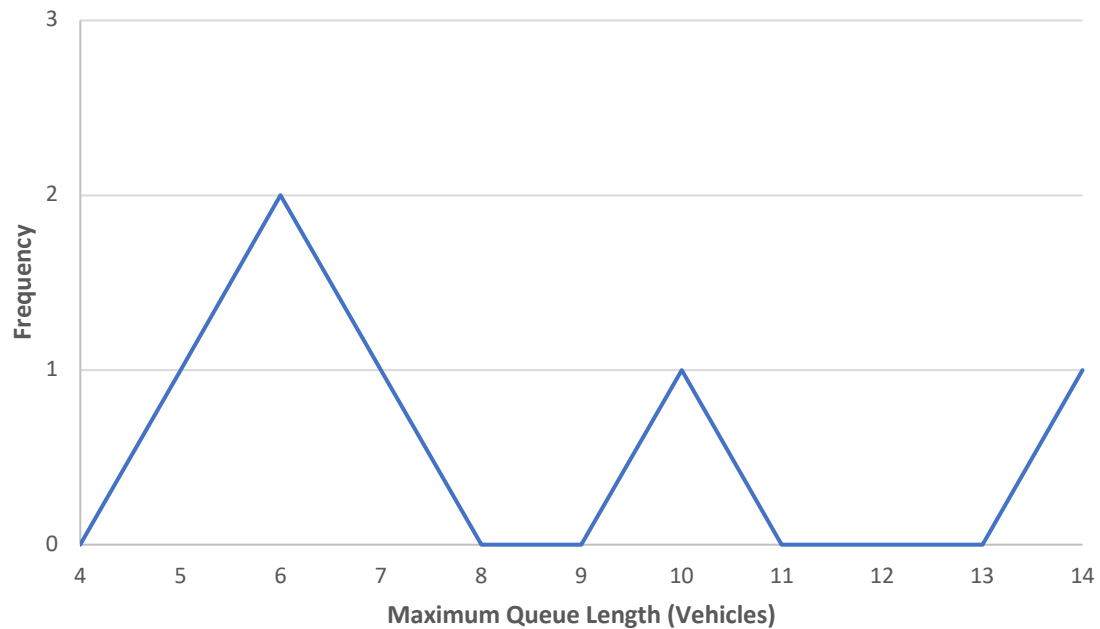
3.3 Fast Food Restaurants

Data collection was done at four fast food restaurants with drive-thru services in November 2018 and January 2019. Six days of data were collected. The restaurants were located in the cities of Bloomington and St. Paul, MN. Vehicles being served at the drive-thru window were counted as being in the queue.

Table 3.3 – Drive-Thru Fast Food Restaurant Maximum Queue Statistics

Number of Data Points	6
Average Maximum Queue (Vehicles)	8.00
Standard Deviation (Vehicles)	3.41
Coefficient of Variation	43%
Range (Vehicles)	5 to 14
85th Percentile (Vehicles)	13.80
33rd Percentile (Vehicles)	6.00

Figure 3.3 - Drive-Thru Fast Food Restaurant Maximum Queue Frequency



The maximum queues for fast food restaurants were spread throughout the afternoon from 12:00pm to 11:30pm. With an 85th percentile maximum queue of nearly 13 vehicles, the data suggests that fast food restaurants with drive-thru lanes should be able to accommodate 260 feet of vehicle stacking throughout the day.

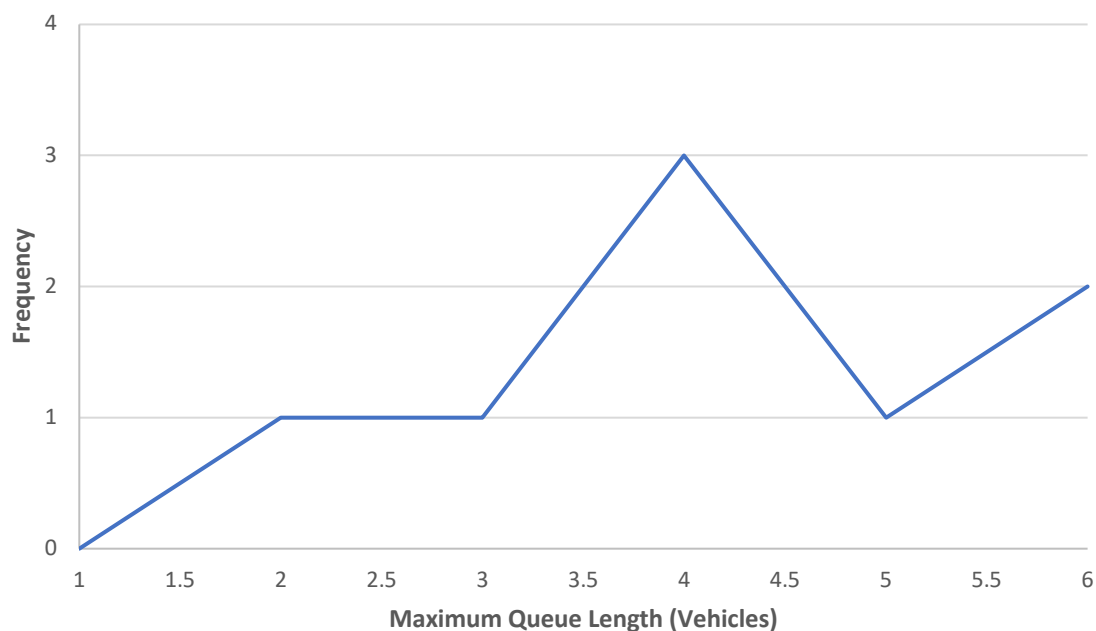
3.4 Pharmacies

Data collection was done at four pharmacies with drive-thru services in January and February 2019. Eight days of data were collected. The pharmacies were located in the cities of Bloomington, Mendota Heights, St. Paul, and West St. Paul, MN. Vehicles being served at the drive-thru window were counted as being in the queue.

Table 3.4 – Drive-Thru Pharmacy Maximum Queue Statistics

Number of Data Points	8
Average Maximum Queue (Vehicles)	4.25
Standard Deviation (Vehicles)	1.39
Coefficient of Variation	33%
Range (Vehicles)	3 to 6
85th Percentile (Vehicles)	6.00
33rd Percentile (Vehicles)	3.97

Figure 3.4 – Drive-Thru Pharmacy Maximum Queue Frequency



The maximum queues for pharmacies were spread throughout the day from 11:00am to 7:00pm. With an 85th percentile maximum queue of six vehicles, the data suggests that pharmacies with drive-thru lanes should be able to accommodate 120 feet of vehicle stacking throughout the day.

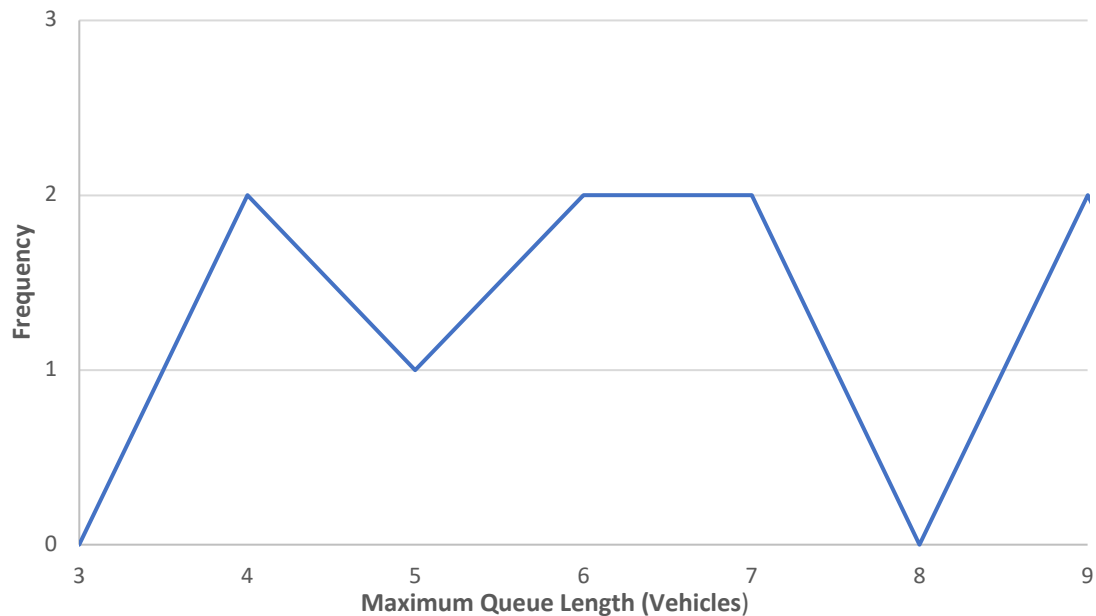
3.5 Thrift Stores

Data collection was done at two thrift stores with drive-thru donation services in March 2019. Eight days of data were collected, which included Saturdays and Sundays. The thrift stores were located in the cities of Roseville and Woodbury, MN. Vehicles being served in the donation garage were counted as being in the queue.

Table 3.5 – Drive-Thru Thrift Store Maximum Queue Statistics

Number of Data Points	8
Average Maximum Queue (Vehicles)	6.38
Standard Deviation (Vehicles)	2.00
Coefficient of Variation	31%
Range (Vehicles)	4 to 9
85th Percentile (Vehicles)	9.00
33rd Percentile (Vehicles)	4.97

Figure 3.4 – Drive-Thru Thrift Store Maximum Queue Frequency



The maximum queues for thrift store donations were spread throughout the day from 11:00am to 7:00pm. With an 85th percentile maximum queue of nine vehicles, the data suggests that thrift stores with drive-thru donation lanes should be able to accommodate 180 feet of vehicle stacking throughout the day. Data collected over the weekends typically showed a maximum queue of one vehicle greater than what occurred over the weekdays, however, the maximum queue did not increase by more than two vehicles between weekends and weekdays.

4.0 Conclusions

The observed 85th percentile maximum queue lengths for each land use are: 140 feet for banks (seven vehicles), 240 feet for coffee shops (12 vehicles), 260 feet for fast food restaurants (13 vehicles), 100 feet for pharmacies (six vehicles), and 180 feet for thrift stores (nine vehicles).

While some of the locations observed have an excess of space dedicated to drive-thru lanes (i.e. some banks and pharmacies), others could occasionally use additional space for drive-thru lanes (i.e. coffee shops in the morning).

Fast food restaurants and coffee shops have the longest maximum queues of the five land uses observed. Coffee shops were observed to have morning queues long enough spill out onto the street, though, as is expected, their afternoon and evening queues are minimal. Fast food restaurants also have large queues, but they tended to have enough dedicated space that stacking and rarely went beyond the designated queuing area.

The data collected for this paper in addition to the information presented in a 2012 study done by Spack Solutions will hopefully provide useful data for traffic engineers and others trying to analyze drive-thru queuing storage areas.

5.0 Drive-Thru Queue Generation – 2012 Study

6.0 Appendix – Detailed Count Results