Technical Memo

Date:	Friday, March 11, 2016
Project:	Big Lake Intersection Traffic Study
To: Cc:	John Burd, P.E. Lance Mearig, P.E.
From:	Josh Shippy, P.E.
Subject:	Big Lake Intersection Traffic Study
Job No:	231814/273439

The following is a summary of traffic study for two intersections in the Matanuska-Susitna Borough, Alaska. Figure 1 shows the location map for the two study intersections:

- #1 - Big Lake Road/Northshore Drive Intersection
- #2 - Big Lake Road/Hollywood Road/Big Lake Lodge Road Intersection

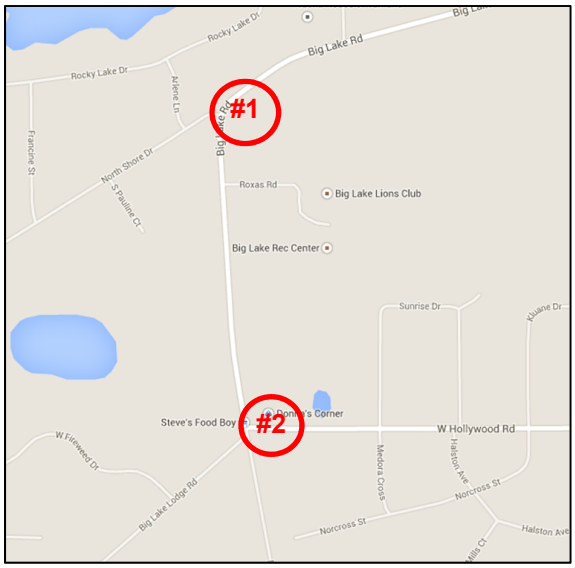


Figure 1. Location Map

Existing Conditions

The existing intersection of Big Lake Road and Northshore Drive is a three-legged intersection with a stop sign controling the west approach on Northshore Drive. There is one lane at all three approaches at the study intersection. The speed limit is 30 mph on Big Lake Road and 35 mph on Northshore Drive. The existing condition at Big Lake Road and Northshore Drive is shown in Figure 2.

Figure 2. Intersection #1 at Big Lake Road/Northshore Drive

The existing intersection of Big Lake Road, Hollywood Road, and Big Lake Lodge Road is located around one-half mile south of the intersection of Big Lake Road and Northshore Drive. It is a four-legged intersection with a stop sign controlling the east approach on Hollywood Road and west approach on Big Lake Lodge Road. There is one lane at all four approaches at this intersection. In the study area, the speed limit is 45 mph on Big Lake Road, 40 mph on Hollywood Road, and 35 mph on Big Lake Lodge Road. The existing condition at the Big Lake Road/Hollywood Road /Big Lake Lodge Road intersection is shown in Figure 3.

Figure 3. Intersection #2 at Big Lake Road/ Hollywood Road/Big Lake Lodge Road

Peak Hour Level of Service (LOS) analyses were conducted at these two study intersections for existing conditions based on the traffic count data collected June 5 and July 29, 2014. Data were collected from 7:30 AM to 9:30 AM and 4:00 PM to 6:00 PM. The AM Peak Hour is identified to be between 8:30 AM and 9:30 AM, and the PM Peak Hour is identified to be 4:30 PM to 5:30 PM. The study assumes a Peak Hour Factor of 0.95 and 2 percent Heavy Vehicle.

Highway Capacity Software (HCS, 2010) is used to evaluate and report intersection delays under the existing conditions. Table 1 and Table 2 show the HCS results of the two

intersections' capacity analyses for the existing conditions in the AM and PM Peak Hours. Appendix A provides the turning movement traffic count data. HCS results are shown in Appendix B.

Table 1. 2014 Existing AM and PM Peak Hour HCS Analysis – Intersection #1

2014 Existing	Intersection #1 – Big Lake Road/Northshore Drive					
	Big Lake Road Northbound		Big Lake Road Southbound		Northshore Drive Eastbound	
	left	thru	thru	right	left	right
AM Peak Hour (8:30 AM and 9:30 AM)						
Total Volumes (vph)	14	130	123	16	23	17
Control Delay (sec/veh)	7.5				10	
Movement LOS	A				A	
Approach Delay (sec/veh)	-				10	
Approach LOS	-				A	
PM Peak Hour (4:30 PM and 5:30 PM)						
Total Volumes (vph)	24	205	212	42	36	25
Control Delay (sec/veh)	7.8				11.7	
Movement LOS	A				B	
Approach Delay (sec/veh)	-				11.7	
Approach LOS	-				B	

vph = vehicles per hour
sec/veh = seconds per vehicle

Table 2. 2014 Existing AM and PM Peak Hour HCS analysis – Intersection #2

2014 Existing	Intersection #2 - Big Lake Road/Hollywood Road/Big Lake Lodge Road									
	Big Lake Road Northbound			Big Lake Road Southbound			Big Lake Lodge Road Eastbound		Hollywood Road Westbound	
	Left	Through	Right	Left	Through	Right	Left	Right	Left	Right
AM Peak Hour (8:30 AM and 9:30 AM)										
Total Volumes (vph)	0	62	22	28	25	9	16	1	17	17
Control Delay (sec/veh)	7.3			7.4			9.7		9.3	
Movement LOS	A			A			A		A	
Approach Delay (sec/veh)	-			-			9.7		9.3	
Approach LOS	-			-			A		A	
PM Peak Hour (4:30 PM and 5:30 PM)										
Total Volumes (vph)	3	86	33	52	79	25	26	2	55	57
Control Delay (sec/veh)	7.4			7.6			11.7		10.7	
Movement LOS	A			A			B		B	
Approach Delay (sec/veh)	-			-			11.7		10.7	
Approach LOS	-			-			B		B	

Need for Improvements

Existing safety and capacity at this intersection are generally recognized to be satisfactory; however, seasonal traffic does cause congestion at this location. An Alaska Department of Transportation and Public Facilities memorandum dated April 5, 2014, from Scott Thomas to Jennifer Witt titled “2014 Central Region HSIP Unsignalized Intersections” identifies the 100 higher-volume, higher-conflict unsignalized intersections in the region. Big Lake Road and Northshore Drive (Intersection #1) and Hollywood Road and Big Lake Road (Intersection #2) are the 55th and 54th intersections on this list. Intersection #1 meets the Summer Season average daily traffic (ADT) for Warrant 1, Condition B: Interruption of Continuous Traffic. Intersection #2 partially meets this same warrant, and also partially meets the Annual ADT warrant for Condition B. As such, these intersections should be considered for potential improvements.

Future Conditions

Existing AM and PM Peak Hour volumes were adjusted with a straight line growth factor of 5 percent per year for 20 years to get the Future 2034 Peak Hour volumes. The 2034 ADT for Intersection #1 at Big Lake Road/Northshore Drive is approximately 10,900, and for Intersection #2 at Big Lake Road/Hollywood Road/Big Lake Lodge Road is approximately 8,400.

Future year traffic capacity analysis was performed for three options:

- Option 1: Existing intersection geometry and stop control analyzed with HCS 2010
- Option 2: Proposed single-lane roundabout analyzed with Sidra Version 5.1
- Option 3: Existing intersection geometry and a proposed traffic signal analyzed with Synchro Version 7

Option 1

Table 3 and Table 4 show the HCS results for the two study intersections with the Future 2034 volume and existing lane geometry and stop control. HCS results are shown in Appendix C.

Table 3. 2034 Option 1 (No Build) AM and PM Peak Hour HCS Analysis – Intersection #1

Option 1 2034 Future	**Intersection #1 - Big Lake Road/Northshore Drive**					
	Big Lake Road Northbound		Big Lake Road Southbound		Northshore Drive Eastbound	
	Left	Thru	Thru	Right	Left	Right
AM Peak Hour (8:30 AM and 9:30 AM)						
Total Volumes (vph)	28	260	246	32	46	34
Control Delay (sec/veh)	7.9				12.8	
Movement LOS	A				B	
Approach Delay (sec/veh)	-				12.8	
Approach LOS	-				B	
PM Peak Hour (4:30 PM and 5:30 PM)						
Total Volumes (vph)	48	410	424	84	72	50
Control Delay (sec/veh)	8.7				23	
Movement LOS	A				C	
Approach Delay (sec/veh)	-				23	
Approach LOS	-				C	

Table 4. 2034 Option 1 (No Build) AM and PM Peak Hour HCS analysis – Intersection #2

Option 1 (No Build) Two-way Stop Control 2034 Future	Intersection #2 - Big Lake Road/Hollywood Road/Big Lake Lodge Road									
	Big Lake Road Northbound			Big Lake Road Southbound			Big Lake Lodge Road Eastbound		Hollywood Road Westbound	
	Left	Thru	Right	Left	Thru	Right	Left	Right	Left	Right
AM Peak Hour (8:30 AM and 9:30 AM)										
Total Volumes (vph)	0	124	44	56	50	18	32	2	34	34
Control Delay (sec/veh)	7.4			7.7			11.6		10.6	
Movement LOS	A			A			B		B	
Approach Delay (sec/veh)	-			-			11.6		10.6	
Approach LOS	-			-			B		B	
PM Peak Hour (4:30 PM and 5:30 PM)										
Total Volumes (vph)	6	172	66	104	158	50	52	4	110	114
Control Delay (sec/veh)	7.7			8			20.2		18.3	
Movement LOS	A			A			C		C	
Approach Delay (sec/veh)	-			-			20.2		18.3	
Approach LOS	-			-			C		C	

Option 2

Sidra analysis was performed for the two study intersections with a proposed single-lane roundabout (Option 2) and the future 2034 traffic volume.

Intersection #1 at Big Lake Road and Northshore Drive is proposed to have a fourth leg at the north approach with the proposed Diane Lane. Diane Lane will connect between the roundabout and Arlene Lane. The posted speed limit is 25 mph with one lane in each direction.

Frontier Service Automotive currently has an access on Northshore Drive. After Diane Lane is added to the roundabout, the auto shop will have direct access on Diane Lane.

To project the traffic for the proposed four-leg roundabout, we applied the following assumptions and approaches:

1. We assumed that turning movements at the existing T-intersection will keep the same travel path; i.e., no traffic diversion for the proposed Diane Lane.
2. Frontier Service Automotive was closed when we collected the existing traffic counts, so trips were projected for the auto shop, and then distributed as entering/exiting trips at the north leg of the roundabout for the likely worst-case scenario.
3. ITE Trip Generation Manual (Version 8) was used to generate the trips. Land use #942 – Automobile Care Center was applied in this memo for the existing Frontier Service Automotive. Measured from Google Maps, the auto shop occupies around 5,000 square

feet of land. Assuming (conservatively) that it is a two-story building, it comes up with 10,000 square feet of occupied leasable area. Based on the 10,000 square feet of occupied leasable area, the auto shop will generate 32 AM peak trips (20 entering and 12 exiting) and 40 PM peak trips (20 entering and 20 exiting) under existing conditions.

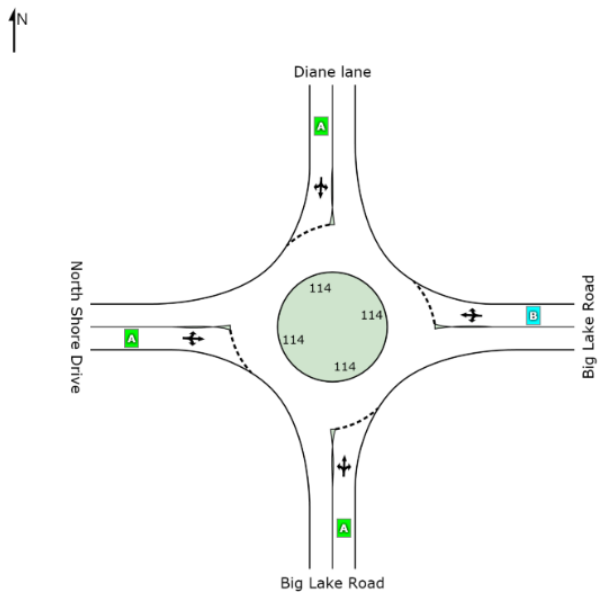
4. Assuming any possible expansion in the future, we projected existing trips to future year 2034 with a straight line growth factor of 5 percent annually, which is consistent with growth for the intersection traffic.

Sidra results for the two study intersections are summarized below and included in Appendix D.

The Sidra results are presented in Figure 4 and Figure 5.

LEVEL OF SERVICE SUMMARY

2034 Future AM Peak Hour
Roundabout

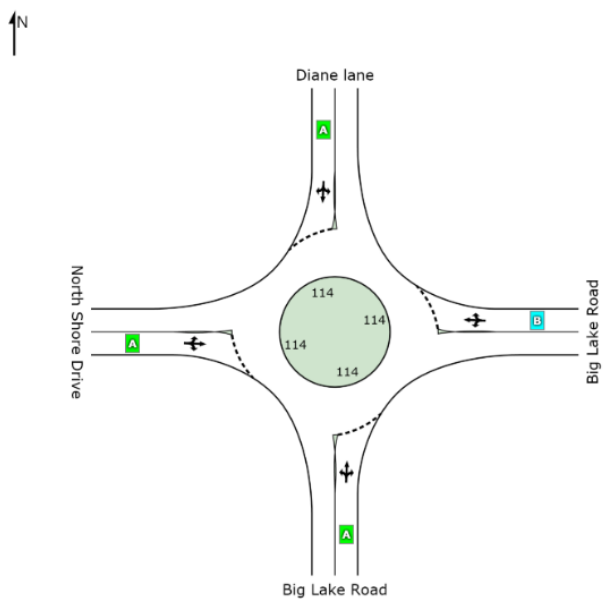


	South	East	North	West	Intersection
LOS	A	B	A	A	B

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

LEVEL OF SERVICE SUMMARY

2034 Future PM Peak Hour
Roundabout



	South	East	North	West	Intersection
LOS	A	B	A	A	B

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

LANE SUMMARY

Site: Big Lake Road and North Shore Drive - Future AM Peak Hour

2034 Future AM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Lane Length ft	SL Type	Cap. Adj. %	Prob. Block. %
South: Big Lake Road																
Lane 1	29	18	274	321	2.0	1318	0.244	100	8.1	LOS A	0.8	20.0	1600	–	0.0	0.0
Approach	29	18	274	321	2.0		0.244		8.1	LOS A	0.8	20.0				
East: Big Lake Road																
Lane 1	259	34	17	309	2.0	1346	0.230	100	12.9	LOS B	0.7	17.8	1600	–	0.0	0.0
Approach	259	34	17	309	2.0		0.230		12.9	LOS B	0.7	17.8				
North: Diane lane																
Lane 1	13	12	3	27	2.0	1079	0.025	100	6.4	LOS A	0.1	1.8	1600	–	0.0	0.0
Approach	13	12	3	27	2.0		0.025		6.4	LOS A	0.1	1.8				
West: North Shore Drive																
Lane 1	5	48	36	89	2.0	1096	0.082	100	7.8	LOS A	0.2	6.1	1600	–	0.0	0.0
Approach	5	48	36	89	2.0		0.082		7.8	LOS A	0.2	6.1				
Intersection				747	2.0		0.244		10.0	LOS B	0.8	20.0				

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

LANE SUMMARY

Site: Big Lake Road and North Shore Drive - Future PM Peak Hour

2034 Future PM Peak Hour
Roundabout

Lane Use and Performance

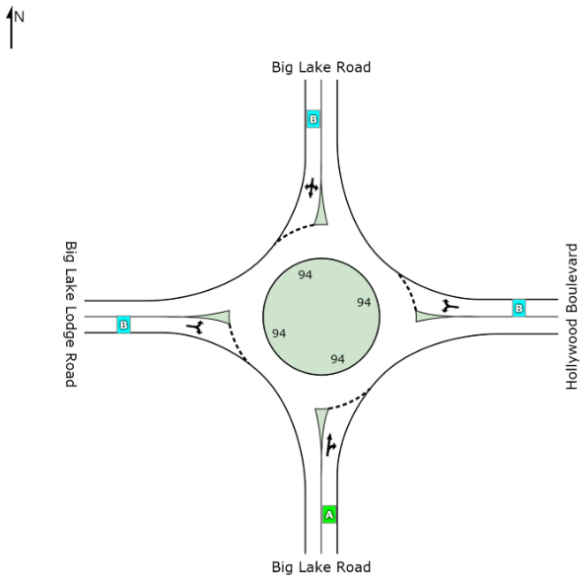
	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Lane Length ft	SL Type	Cap. Adj. %	Prob. Block. %
South: Big Lake Road																
Lane 1	51	17	432	499	2.0	1297	0.385	100	8.4	LOS A	1.6	39.4	1600	–	0.0	0.0
Approach	51	17	432	499	2.0		0.385		8.4	LOS A	1.6	39.4				
East: Big Lake Road																
Lane 1	446	88	19	554	2.0	1356	0.408	100	12.8	LOS B	1.6	40.8	1600	–	0.0	0.0
Approach	446	88	19	554	2.0		0.408		12.8	LOS B	1.6	40.8				
North: Diane lane																
Lane 1	19	18	5	42	2.0	919	0.046	100	7.4	LOS A	0.2	4.2	1600	–	0.0	0.0
Approach	19	18	5	42	2.0		0.046		7.4	LOS A	0.2	4.2				
West: North Shore Drive																
Lane 1	4	76	53	133	2.0	984	0.135	100	8.5	LOS A	0.5	12.2	1600	–	0.0	0.0
Approach	4	76	53	133	2.0		0.135		8.5	LOS A	0.5	12.2				
Intersection				1227	2.0		0.408		10.3	LOS B	1.6	40.8				

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

Figure 4. Sidra Analysis Results for Intersection #1 at Big Lake Road/Northshore Drive

LEVEL OF SERVICE SUMMARY

2034 Future AM Peak Hour
Roundabout

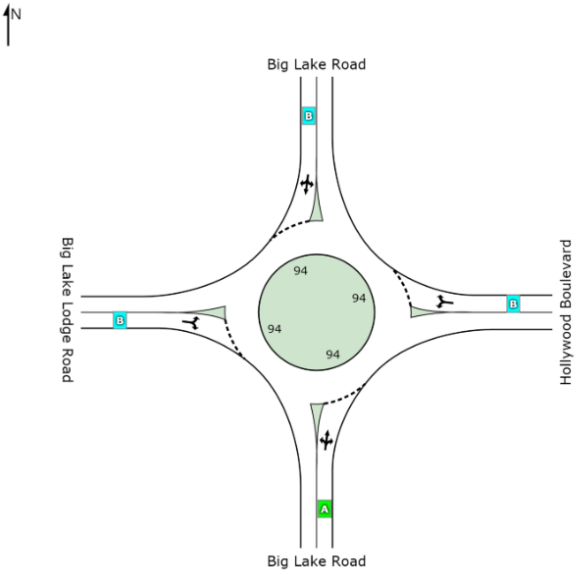


	South	East	North	West	Intersection
LOS	A	B	B	B	A

Level of Service (LOS) Method: Delay (HCM 2000).

LEVEL OF SERVICE SUMMARY

2034 Future PM Peak Hour
Roundabout



	South	East	North	West	Intersection
LOS	A	B	B	B	B

Level of Service (LOS) Method: Delay (HCM 2000).

LANE SUMMARY

Site: Future AM #2

2034 Future AM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Lane Length ft	St. Type	Cap. Adj. %	Prob. Block. %
South: Big Lake Road																
Lane 1	0	131	48	178	2.0	1079	P	100	7.8	LOS A	0.9	23.3	1600	–	0.0	0.0
Approach	0	131	48	178	2.0		0.165		7.8	LOS A	0.9	23.3				
East: Hollywood Boulevard																
Lane 1	37	0	37	74	2.0	972	P	100	10.4	LOS B	0.4	9.5	1600	–	0.0	0.0
Approach	37	0	37	74	2.0		0.076		10.4	LOS B	0.4	9.5				
North: Big Lake Road																
Lane 1	61	53	19	132	2.0	1205	P	100	10.4	LOS B	0.6	15.7	1600	–	0.0	0.0
Approach	61	53	19	132	2.0		0.110		10.4	LOS B	0.6	15.7				
West: Big Lake Lodge Road																
Lane 1	34	0	2	36	2.0	979	P	100	11.1	LOS B	0.2	4.6	1600	–	0.0	0.0
Approach	34	0	2	36	2.0		0.037		11.1	LOS B	0.2	4.6				
Intersection				421	2.0		0.165		9.4	LOS A	0.9	23.3				

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Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

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SIDRA INTERSECTION 5.1.13.2093
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SIDRA INTERSECTION

LANE SUMMARY — **Site: Future PM #2**

2034 Future PM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Lane Length ft	SL Type	Cap. Adj. %	Prob. Block. %
South: Big Lake Road																
Lane 1	6	181	72	259	2.0	975	0.266	100	8.7	LOS A	1.6	41.4	1600	–	0.0	0.0
Approach	6	181	72	259	2.0		0.266		8.7	LOS A	1.6	41.4				
East: Hollywood Boulevard																
Lane 1	120	0	124	243	2.0	894	0.272	100	11.3	LOS B	1.6	40.2	1600	–	0.0	0.0
Approach	120	0	124	243	2.0		0.272		11.3	LOS B	1.6	40.2				
North: Big Lake Road																
Lane 1	113	166	53	332	2.0	1058	0.314	100	10.4	LOS B	2.1	54.2	1600	–	0.0	0.0
Approach	113	166	53	332	2.0		0.314		10.4	LOS B	2.1	54.2				
West: Big Lake Lodge Road																
Lane 1	55	0	4	59	2.0	754	0.078	100	13.0	LOS B	0.4	10.4	1600	–	0.0	0.0
Approach	55	0	4	59	2.0		0.078		13.0	LOS B	0.4	10.4				
Intersection				894	2.0		0.314		10.3	LOS B	2.1	54.2				

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

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SIDRA INTERSECTION

Figure 5. Sidra Analysis Results for Intersection #2 at Big Lake Road/ Hollywood Road/Big Lake Lodge Road

Sidra results for the two study intersections are also summarized in Table 5 and Table 6.

Table 5. 2034 Option 2 AM and PM Peak Hour SIDRA Analysis – Intersection #1

Option 2 2034 Future	**Intersection #1 - Big Lake Road/Northshore Drive**											
	Big Lake Road Northbound			Diane Lane Southbound			Northshore Drive Eastbound			Big Lake Road Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
AM Peak Hour (8:30 AM and 9:30 AM)												
Total Volumes (vph)	28	17	260	12	11	3	5	46	34	246	32	16
Approach Delay (sec/veh)	8.1			6.4			7.8			12.9		
Approach LOS	A			A			A			B		
Intersection Delay (sec/veh)	10											
Intersection LOS	B											
PM Peak Hour (4:30 PM and 5:30 PM)												
Total Volumes (vph)	48	16	410	18	17	5	4	72	50	424	84	18
Approach Delay (sec/veh)	8.4			7.4			8.5			12.8		
Approach LOS	A			A			A			B		
Approach Delay (sec/veh)	10.3											
Approach LOS	B											

Table 6. 2034 Option 2 AM and PM Peak Hour SIDRA Analysis – Intersection #2

Option 2 (Build) Proposed Roundabout 2034 Future	**Intersection #2 - Big Lake Road/Hollywood Road/Big Lake Lodge Road**									
	Big Lake Road Northbound			Big Lake Road Southbound			Big Lake Lodge Road Eastbound		Hollywood Road Westbound	
	Left	Thru	Right	Left	Thru	Right	Left	Right	Left	Right
AM Peak Hour (8:30 AM and 9:30 AM)										
Total Volumes (vph)	0	124	44	56	50	18	32	2	34	34
Approach Delay (sec/veh)	7.8			10.4			11.1		10.4	
Approach LOS	A			B			B		B	
Intersection Delay (sec/veh)	9.4									
Intersection LOS	A									
PM Peak Hour (4:30 PM and 5:30 PM)										
Total Volumes (vph)	6	172	66	104	158	50	52	4	110	114
Approach Delay (sec/veh)	8.7			10.4			13		10.4	
Approach LOS	A			B			B		B	
Intersection Delay (sec/veh)	10.3									
Intersection LOS	B									

Option 3

A traffic signal is proposed at the two study intersections for Option 3. Synchro (Version 7) is used to evaluate and report intersection delay for Option 3. Table 7 and Table 8 show the Synchro model results of the intersection operational analyses for the Build 2034 conditions PM peak hour. Synchro results are shown in Appendix E.

Table 7. 2034 Option 3 AM and PM Peak Hour Synchro Analysis – Intersection #1

Option 3 2034 Future	Intersection #1 - Big Lake Road/Northshore Drive					
	Big Lake Road Northbound		Big Lake Road Southbound		Northshore Drive Eastbound	
	Left	Thru	Thru	Right	Left	Right
AM Peak Hour (8:30 AM and 9:30 AM)						
Total Volumes (vph)	28	260	246	32	46	34
Approach Delay (sec/veh)	6.7		6.0		13.5	
Approach LOS	A		A		B	
Intersection Delay (sec/veh)	7.2					
Intersection LOS	A					
PM Peak Hour (4:30 PM and 5:30 PM)						
Total Volumes (vph)	48	410	424	84	72	50
Approach Delay (sec/veh)	7.3		6.8		16	
Approach LOS	A		A		B	
Approach Delay (sec/veh)	8.1					
Approach LOS	A					

Table 8. 2034 Option 3 AM and PM Peak Hour Synchro Analysis – Intersection #2

Option 3 (Build) Proposed Traffic Signal 2034 Future	Intersection #2 - Big Lake Road/Hollywood Road/Big Lake Lodge Road									
	Big Lake Road Northbound			Big Lake Road Southbound			Big Lake Lodge Road Eastbound		Hollywood Road Westbound	
	Left	Thru	Right	Left	Thru	Right	Left	Right	Left	Right
AM Peak Hour (8:30 AM and 9:30 AM)										
Total Volumes (vph)	0	124	44	56	50	18	32	2	34	34
Approach Delay (sec/veh)	8			8.2			12.4		8.3	
Approach LOS	A			A			B		A	
Intersection Delay (sec/veh)	8.5									
Intersection LOS	A									
PM Peak Hour (4:30 PM and 5:30 PM)										
Total Volumes (vph)	6	172	66	104	158	50	52	4	110	114
Approach Delay (sec/veh)	9.2			12.1			13.8		11.9	
Approach LOS	A			B			B		B	
Intersection Delay (sec/veh)	11.3									
Intersection LOS	B									

Conclusion

The three option analyses are compared in Table 9 and Table 10 for the two study intersections at Big Lake Road/Northshore Drive (Intersection #1) and Big Lake Road/Hollywood Road/Big Lake Lodge Road (Intersection #2). While the three options operate at acceptable LOS for the two study intersections, the no-build options (Option 1) do show considerable increases in PM Peak Hour delays, especially at Intersection #1.

Given that funding is currently available – but may not be in the future – consider improvements to Intersection #1 first, due to meeting the seasonal warrant. From a driver's perspective, the roundabout will appear to have the smoothest traffic operation, especially during non-peak hours. The safest option, with respect to collisions, would be a roundabout. The few collisions that occur in roundabouts are typically minor and cause few injuries since they occur at such low speeds. The life cycle costs, construction, and maintenance for a roundabout will be significantly less than for a traffic signal.

Improvements to Intersection #2 should be re-evaluated as funding becomes available. Consider that a minor realignment of Hollywood Road and/or Big Lake Lodge Road to lessen the offset between these intersections along Big Lake Road would reduce conflicting movements and may improve level of service under the stop control option.

Table 9. 2034 PM Peak Intersection Operation Analysis Results Comparison – Intersection #1

Option 2 2034 Future	**Intersection #1 - Big Lake Road/Northshore Drive**												
	Big Lake Road Northbound			Diane Lane Southbound			Northshore Drive Eastbound			Big Lake Road Westbound			**Intersection Overall**
	Left	Thru*	Right	Left*	Thru*	Right*	Left*	Thru	Right	Left	Thru	Right*	
PM Peak Hour (4:30 PM and 5:30 PM)													
Total Volumes (vph)	48	16	410	18	17	5	4	72	50	424	84	18	1166
Option 1 - Stop Control	8.7 A	-	-	-			23.0 C			-			-
Option 2 - Roundabout	8.4 A			7.4 A			8.5 A			12.8 B			10.3 B
Option 3 - Traffic Signal	7.3 A			-			16.0 B			6.8 A			8.1 A

Table 10. 2034 PM Peak Intersection Operation Analysis Results Comparison – Intersection #2

3 Options Comparison 2034 Future	Intersection #2 - Big Lake Road/Hollywood Road/Big Lake Lodge Road										
	Big Lake Road Northbound			Big Lake Road Southbound			Big Lake Lodge Road Eastbound		Hollywood Road Westbound		Intersection Overall
	Left	Thru	Right	Left	Thru	Right	Left	Right	Left	Right	
PM Peak Hour (4:30 PM and 5:30 PM)											
Total Volumes (vph)	6	172	66	104	158	50	52	4	110	114	**836**
Option 1 - Stop Control	7.7 A	-	-	8.0 A	-	-	20.2 C		18.3 C		**-**
Option 2 - Roundabout	8.7 A			10.4 B			13.0 B		10.4 B		**10.3 B**
Option 3 - Traffic Signal	9.2 A			12.1 B			13.8 B		11.9 B		**11.3 B**

APPENDIX A:
EXISTING PEAK HOUR TRAFFIC COUNTS
AND
PROJECTED FUTURE 2034 TRAFFIC VOLUMES

Vehicle Traffic Counts for the Intersection of South Big Lake Road and West North Shore Drive

Direction	**South Big Lake Road** South Bound Through	**South Big Lake Road** South Bound Right Turn	**South Big Lake Road** North Bound Through	**South Big Lake Road** North Bound Left Turn	**West North Shore Drive** Left	**West North Shore Drive** Right		
Time							**Intersection Totals**	
7:38 am - 8:08 am	36	6	38	5	8	2	**95**	
8:08 am - 8:38 am	40	4	49	2	12	5	**112**	
8:38 am - 9:08 am	62	7	56	4	15	9	**153**	
9:08 am - 9:38 am	61	9	74	10	8	8	**170**	
3:54 pm - 4:24 pm	104	19	86	8	23	16	**256**	
4:24 pm - 4:54 pm	110	22	93	9	16	11	**261**	
4:54 pm - 5:24 pm	102	20	112	15	20	14	**283**	
5:24 pm - 5:54 pm	89	14	104	14	18	13	**252**	
2014 Existing Hourly Volumes								
7:30 AM - 8:30 AM	76	10	87	7	20	7	**207**	
8:00 AM - 9:00 AM	102	11	105	6	27	14	**265**	
8:30 AM - 9:30 AM	123	16	130	14	23	17	**323**	**AM Peak Hour**
4:00 PM - 5:00 PM	214	41	179	17	39	27	**517**	
4:30 PM - 5:30 PM	212	42	205	24	36	25	**544**	**PM Peak Hour**
5:00 PM - 6:00 PM	191	34	216	29	38	27	**535**	
		Growth Rate	**Duration**					
2034 Future Hourly Volumes		**5%/year**	**20 years**	**1**				
AM Peak Hour	246	32	260	28	46	34	**646**	
PM Peak Hour	424	84	410	48	72	50	**1088**	

- Future analysis 20 years out; straight line growth @ 5% per year

Vehicle Traffic Counts for the Intersection of South Big Lake Road and Hollywood

Direction	SB			NB			WB		EB			
Time	South Big Lake Road South Bound Through	South Big Lake Road South Bound Right Turn	South Big Lake Road South Bound Left Turn	South Big Lake Road North Bound Through	South Big Lake Road North Bound Left Turn	South Big Lake Road North Bound Right Turn	W Hollywood Road Left	W Hollywood Road Right	W Big Lake Lodge Road Left	W Big Lake Lodge Road Right	**Intersection Totals**	
7:20 am - 7:50 am	9	4	14	27	0	11	3	9	6	0	**83**	
7:50 am - 8:20 am	14	3	11	27	0	11	6	8	7	1	**88**	
8:20 am - 8:50 am	12	4	13	32	0	10	8	9	8	0	**96**	
8:50 am - 9:20 am	13	5	15	30	0	12	9	8	8	1	**101**	
4:00 pm - 4:30 pm	44	7	28	31	2	14	27	17	8	3	**181**	
4:30 pm - 5:00 pm	41	12	32	46	1	17	23	35	12	0	**219**	
5:00 pm - 5:30 pm	38	13	20	40	2	16	32	22	14	2	**199**	
5:30 pm - 6:00 pm	45	12	12	40	0	24	36	24	6	2	**201**	
2014 Existing Hourly Volumes												
7:30 AM - 8:30 AM	23	7	25	54	0	22	9	17	13	1	**171**	
8:00 AM - 9:00 AM	26	7	24	59	0	21	14	17	15	1	**184**	
8:30 AM - 9:30 AM	25	9	28	62	0	22	17	17	16	1	**197**	**AM Peak Hour**
4:00 PM - 5:00 PM	85	19	60	77	3	31	50	52	20	3	**400**	
4:30 PM - 5:30 PM	79	25	52	86	3	33	55	57	26	2	**418**	**PM Peak Hour**
5:00 PM - 6:00 PM	83	25	32	80	2	40	68	46	20	4	**400**	
		Growth Rate	**Duration**									
2034 Future Hourly Volumes		**5%/year**	**20 years**	**1**								
AM Peak Hour	50	18	56	124	0	44	34	34	32	2	**394**	
PM Peak Hour	158	50	104	172	6	66	110	114	52	4	**836**	

- Future analysis 20 years out; straight line growth @ 5% per year

APPENDIX B:
HCS RESULTS
EXISTING

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Haiyan Zhen*
Agency/Co.	*HDR*
Date Performed	*7/2/2014*
Analysis Time Period	*8:30 - 9:30 AM*

Site Information

Intersection	*Big Lake Rd. & North Shore Dr.*
Jurisdiction	*City of Wasilla*
Analysis Year	*2014 Existing*

Project Description

East/West Street: *North Shore Drive* | North/South Street: *Big Lake Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*14*	*130*			*123*	*16*
Peak-Hour Factor, PHF	*0.95*	*0.95*	*1.00*	*1.00*	*0.95*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*14*	*136*	*0*	*0*	*129*	*16*
Percent Heavy Vehicles	*2*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*23*		*17*			
Peak-Hour Factor, PHF	*0.95*	*1.00*	*0.95*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*24*	*0*	*17*	*0*	*0*	*0*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*14*						*41*	
C (m) (veh/h)	*1437*						*763*	
v/c	*0.01*						*0.05*	
95% queue length	*0.03*						*0.17*	
Control Delay (s/veh)	*7.5*						*10.0*	
LOS	*A*						*A*	
Approach Delay (s/veh)	--	--				*10.0*		
Approach LOS	--	--				*A*		

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Existing AM Peak Hour

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Haiyan Zhen*
Agency/Co.	*HDR*
Date Performed	*7/2/2014*
Analysis Time Period	*4:30 - 5:30 PM*

Site Information

Intersection	*Big Lake Rd. & North Shore Dr.*
Jurisdiction	*City of Wasilla*
Analysis Year	*2014 Existing*

Project Description

East/West Street: *North Shore Drive* | North/South Street: *Big Lake Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*24*	*205*			*212*	*42*
Peak-Hour Factor, PHF	*0.95*	*0.95*	*1.00*	*1.00*	*0.95*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*25*	*215*	*0*	*0*	*223*	*44*
Percent Heavy Vehicles	*2*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*36*		*25*			
Peak-Hour Factor, PHF	*0.95*	*1.00*	*0.95*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*37*	*0*	*26*	*0*	*0*	*0*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*25*						*63*	
C (m) (veh/h)	*1297*						*601*	
v/c	*0.02*						*0.10*	
95% queue length	*0.06*						*0.35*	
Control Delay (s/veh)	*7.8*						*11.7*	
LOS	*A*						*B*	
Approach Delay (s/veh)	--	--	*11.7*					
Approach LOS	--	--	*B*					

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Existing PM Peak Hour

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Haiyan Zhen*
Agency/Co.	*HDR*
Date Performed	*8/5/2014*
Analysis Time Period	*8:30 - 9:30 AM*

Site Information

Intersection	*Big Lake Rd. & Hollywood Blvd*
Jurisdiction	*City of Wasilla*
Analysis Year	*2014 Existing*

Project Description

East/West Street: *Hollywood Blvd/Big Lake Lodge*	North/South Street: *Big Lake Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*62*	*22*	*28*	*25*	*9*
Peak-Hour Factor, PHF	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*0*	*65*	*23*	*29*	*26*	*9*
Percent Heavy Vehicles	*2*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*16*		*1*	*17*		*17*
Peak-Hour Factor, PHF	*0.95*	*1.00*	*0.95*	*0.95*	*1.00*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*16*	*0*	*1*	*17*	*0*	*17*
Percent Heavy Vehicles	*2*	*0*	*2*	*2*	*0*	*2*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*			*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LR*			*LR*	
v (veh/h)	*0*	*29*		*34*			*17*	
C (m) (veh/h)	*1576*	*1508*		*875*			*777*	
v/c	*0.00*	*0.02*		*0.04*			*0.02*	
95% queue length	*0.00*	*0.06*		*0.12*			*0.07*	
Control Delay (s/veh)	*7.3*	*7.4*		*9.3*			*9.7*	
LOS	*A*	*A*		*A*			*A*	
Approach Delay (s/veh)	--	--	*9.3*			*9.7*		
Approach LOS	--	--	*A*			*A*		

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Existing AM Peak Hour

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Haiyan Zhen*
Agency/Co.	*HDR*
Date Performed	*8/5/2014*
Analysis Time Period	*4:30 - 5:30 PM*

Site Information

Intersection	*Big Lake Rd. & Hollywood Blvd*
Jurisdiction	*City of Wasilla*
Analysis Year	*2014 Existing*

Project Description

East/West Street: *Hollywood Blvd/Big Lake Lodge* | North/South Street: *Big Lake Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*3*	*86*	*33*	*52*	*79*	*25*
Peak-Hour Factor, PHF	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*3*	*90*	*34*	*54*	*83*	*26*
Percent Heavy Vehicles	*2*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*26*		*2*	*55*		*57*
Peak-Hour Factor, PHF	*0.95*	*1.00*	*0.95*	*0.95*	*1.00*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*27*	*0*	*2*	*57*	*0*	*60*
Percent Heavy Vehicles	*2*	*0*	*2*	*2*	*0*	*2*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*			*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LR*			*LR*	
v (veh/h)	*3*	*54*		*117*			*29*	
C (m) (veh/h)	*1481*	*1463*		*749*			*568*	
v/c	*0.00*	*0.04*		*0.16*			*0.05*	
95% queue length	*0.01*	*0.11*		*0.55*			*0.16*	
Control Delay (s/veh)	*7.4*	*7.6*		*10.7*			*11.7*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay (s/veh)	--	--	*10.7*			*11.7*		
Approach LOS	--	--	*B*			*B*		

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Existing PM Peak Hour

APPENDIX C:
HCS RESULTS
FUTURE YEAR - OPTION 1

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Haiyan Zhen*
Agency/Co.	*HDR*
Date Performed	*7/2/2014*
Analysis Time Period	*8:30 - 9:30 AM*

Site Information

Intersection	*Big Lake Rd. & North Shore Dr.*
Jurisdiction	*City of Wasilla*
Analysis Year	*2034 Future*

Project Description

East/West Street: *North Shore Drive* | North/South Street: *Big Lake Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*28*	*260*			*246*	*32*
Peak-Hour Factor, PHF	*0.95*	*0.95*	*1.00*	*1.00*	*0.95*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*29*	*273*	*0*	*0*	*258*	*33*
Percent Heavy Vehicles	*2*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*46*		*34*			
Peak-Hour Factor, PHF	*0.95*	*1.00*	*0.95*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*48*	*0*	*35*	*0*	*0*	*0*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*29*						*83*	
C (m) (veh/h)	*1271*						*545*	
v/c	*0.02*						*0.15*	
95% queue length	*0.07*						*0.53*	
Control Delay (s/veh)	*7.9*						*12.8*	
LOS	*A*						*B*	
Approach Delay (s/veh)	--	--				*12.8*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Haiyan Zhen*
Agency/Co.	*HDR*
Date Performed	*7/2/2014*
Analysis Time Period	*4:30 - 5:30 PM*

Site Information

Intersection	*Big Lake Rd. & North Shore Dr.*
Jurisdiction	*City of Wasilla*
Analysis Year	*2034 Future*

Project Description

East/West Street: *North Shore Drive* | North/South Street: *Big Lake Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*48*	*410*			*424*	*84*
Peak-Hour Factor, PHF	*0.95*	*0.95*	*1.00*	*1.00*	*0.95*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*50*	*431*	*0*	*0*	*446*	*88*
Percent Heavy Vehicles	*2*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*72*		*50*			
Peak-Hour Factor, PHF	*0.95*	*1.00*	*0.95*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*75*	*0*	*52*	*0*	*0*	*0*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*50*						*127*	
C (m) (veh/h)	*1034*						*325*	
v/c	*0.05*						*0.39*	
95% queue length	*0.15*						*1.79*	
Control Delay (s/veh)	*8.7*						*23.0*	
LOS	*A*						*C*	
Approach Delay (s/veh)	--	--	*23.0*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Haiyan Zhen*
Agency/Co.	*HDR*
Date Performed	*8/5/2014*
Analysis Time Period	*8:30 - 9:30 AM*

Site Information

Intersection	*Big Lake Rd. & Hollywood Blvd*
Jurisdiction	*City of Wasilla*
Analysis Year	*2034 No Build*

Project Description

East/West Street: *Hollywood Blvd/Big Lake Lodge* | North/South Street: *Big Lake Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*124*	*44*	*56*	*50*	*18*
Peak-Hour Factor, PHF	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*0*	*130*	*46*	*58*	*52*	*18*
Percent Heavy Vehicles	*2*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*32*		*2*	*34*		*34*
Peak-Hour Factor, PHF	*0.95*	*1.00*	*0.95*	*0.95*	*1.00*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*33*	*0*	*2*	*35*	*0*	*35*
Percent Heavy Vehicles	*2*	*0*	*2*	*2*	*0*	*2*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*			*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LR*			*LR*	
v (veh/h)	*0*	*58*		*70*			*35*	
C (m) (veh/h)	*1531*	*1400*		*718*			*578*	
v/c	*0.00*	*0.04*		*0.10*			*0.06*	
95% queue length	*0.00*	*0.13*		*0.32*			*0.19*	
Control Delay (s/veh)	*7.4*	*7.7*		*10.6*			*11.6*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay (s/veh)	--	--	*10.6*			*11.6*		
Approach LOS	--	--	*B*			*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Haiyan Zhen*
Agency/Co.	*HDR*
Date Performed	*8/5/2014*
Analysis Time Period	*4:30 - 5:30 PM*

Site Information

Intersection	*Big Lake Rd. & Hollywood Blvd*
Jurisdiction	*City of Wasilla*
Analysis Year	*2034 No Build*

Project Description

East/West Street: *Hollywood Blvd/Big Lake Lodge* | North/South Street: *Big Lake Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*6*	*172*	*66*	*104*	*158*	*50*
Peak-Hour Factor, PHF	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*6*	*181*	*69*	*109*	*166*	*52*
Percent Heavy Vehicles	*2*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*52*		*4*	*110*		*114*
Peak-Hour Factor, PHF	*0.95*	*1.00*	*0.95*	*0.95*	*1.00*	*0.95*
Hourly Flow Rate, HFR (veh/h)	*54*	*0*	*4*	*115*	*0*	*120*
Percent Heavy Vehicles	*2*	*0*	*2*	*2*	*0*	*2*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*			*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LR*			*LR*	
v (veh/h)	*6*	*109*		*235*			*58*	
C (m) (veh/h)	*1352*	*1316*		*502*			*294*	
v/c	*0.00*	*0.08*		*0.47*			*0.20*	
95% queue length	*0.01*	*0.27*		*2.46*			*0.72*	
Control Delay (s/veh)	*7.7*	*8.0*		*18.3*			*20.2*	
LOS	*A*	*A*		*C*			*C*	
Approach Delay (s/veh)	--	--	*18.3*			*20.2*		
Approach LOS	--	--	*C*			*C*		

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APPENDIX D:
SIDRA RESULTS
FUTURE YEAR - OPTION 2

INTERSECTION SUMMARY

Site: Big Lake Road and North Shore Drive - Future AM Peak Hour

2034 Future AM Peak Hour
Roundabout

Intersection Performance - Hourly Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	747	veh/h	1113	pers/h
Percent Heavy Vehicles	2.0	%		
Degree of Saturation	0.244			
Practical Spare Capacity	249.0	%		
Effective Intersection Capacity	3069	veh/h		
Control Delay (Total)	2.08	veh-h/h	2.49	pers-h/h
Control Delay (Average)	10.0	sec	8.1	sec
Control Delay (Worst Lane)	12.9	sec		
Control Delay (Worst Movement)	14.2	sec	14.2	sec
Geometric Delay (Average)	9.8	sec		
Stop-Line Delay (Average)	0.2	sec		
Intersection Level of Service (LOS)	LOS B			
95% Back of Queue - Vehicles (Worst Lane)	0.8	veh		
95% Back of Queue - Distance (Worst Lane)	20.0	ft		
Total Effective Stops	451	veh/h	541	pers/h
Effective Stop Rate	0.60	per veh	0.49	per pers
Proportion Queued	0.14		0.12	
Performance Index	12.3		12.3	
Travel Distance (Total)	305.5	veh-mi/h	366.6	pers-mi/h
Travel Distance (Average)	2159	ft	1740	ft
Travel Time (Total)	9.1	veh-h/h	11.0	pers-h/h
Travel Time (Average)	44.0	sec	35.4	sec
Travel Speed	33.5	mph	33.5	mph
Cost (Total)	215.93	$/h	215.93	$/h
Fuel Consumption (Total)	18.2	gal/h		
Carbon Dioxide (Total)	172.4	kg/h		
Hydrocarbons (Total)	0.256	kg/h		
Carbon Monoxide (Total)	14.30	kg/h		
NOx (Total)	0.489	kg/h		

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

Intersection Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	358,737	veh/y	534,164	pers/y
Delay	998	veh-h/y	1,197	pers-h/y
Effective Stops	216,507	veh/y	259,809	pers/y
Travel Distance	146,656	veh-mi/y	175,987	pers-mi/y
Travel Time	4,383	veh-h/y	5,260	pers-h/y
Cost	103,645	$/y	103,645	$/y
Fuel Consumption	8,736	gal/y		
Carbon Dioxide	82,743	kg/y		
Hydrocarbons	123	kg/y		
Carbon Monoxide	6,864	kg/y		
NOx	235	kg/y		

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MOVEMENT SUMMARY

Site: Big Lake Road and North Shore Drive - Future AM Peak Hour

2034 Future AM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Big Lake Road											
3	L	29	2.0	0.244	14.2	LOS B	0.8	20.0	0.13	0.81	31.9
8	T	18	2.0	0.244	5.6	LOS A	0.8	20.0	0.13	0.40	36.6
18	R	274	2.0	0.244	7.6	LOS A	0.8	20.0	0.13	0.53	35.8
Approach		321	2.0	0.244	8.1	LOS A	0.8	20.0	0.13	0.55	35.4
East: Big Lake Road											
1	L	259	2.0	0.230	14.2	LOS B	0.7	17.8	0.11	0.73	31.7
6	T	34	2.0	0.230	6.5	LOS A	0.7	17.8	0.11	0.41	36.7
16	R	17	2.0	0.230	6.6	LOS A	0.7	17.8	0.11	0.46	35.8
Approach		309	2.0	0.230	12.9	LOS B	0.7	17.8	0.11	0.68	32.4
North: Diane lane											
7	L	13	2.0	0.025	10.5	LOS B	0.1	1.8	0.27	0.75	23.6
4	T	12	2.0	0.025	2.7	LOS A	0.1	1.8	0.27	0.30	25.3
14	R	3	2.0	0.025	3.7	LOS A	0.1	1.8	0.27	0.40	24.9
Approach		27	2.0	0.025	6.4	LOS A	0.1	1.8	0.27	0.52	24.4
West: North Shore Drive											
5	L	5	2.0	0.082	11.5	LOS B	0.2	6.1	0.26	0.89	31.4
2	T	48	2.0	0.082	7.1	LOS A	0.2	6.1	0.26	0.51	35.8
12	R	36	2.0	0.082	8.2	LOS A	0.2	6.1	0.26	0.59	35.2
Approach		89	2.0	0.082	7.8	LOS A	0.2	6.1	0.26	0.57	35.3
All Vehicles		747	2.0	0.244	10.0	LOS B	0.8	20.0	0.14	0.60	33.5

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

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LANE SUMMARY

Site: Big Lake Road and North Shore Drive - Future AM Peak Hour

2034 Future AM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Lane Length ft	SL Type	Cap. Adj. %	Prob. Block. %
South: Big Lake Road																
Lane 1	29	18	274	321	2.0	1318	0.244	100	8.1	LOS A	0.8	20.0	1600	–	0.0	0.0
Approach	29	18	274	321	2.0		0.244		8.1	LOS A	0.8	20.0				
East: Big Lake Road																
Lane 1	259	34	17	309	2.0	1346	0.230	100	12.9	LOS B	0.7	17.8	1600	–	0.0	0.0
Approach	259	34	17	309	2.0		0.230		12.9	LOS B	0.7	17.8				
North: Diane lane																
Lane 1	13	12	3	27	2.0	1079	0.025	100	6.4	LOS A	0.1	1.8	1600	–	0.0	0.0
Approach	13	12	3	27	2.0		0.025		6.4	LOS A	0.1	1.8				
West: North Shore Drive																
Lane 1	5	48	36	89	2.0	1096	0.082	100	7.8	LOS A	0.2	6.1	1600	–	0.0	0.0
Approach	5	48	36	89	2.0		0.082		7.8	LOS A	0.2	6.1				
Intersection				747	2.0		0.244		10.0	LOS B	0.8	20.0				

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

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INTERSECTION SUMMARY

Site: Big Lake Road and North Shore Drive - Future PM Peak Hour

2034 Future PM Peak Hour
Roundabout

Intersection Performance - Hourly Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	1227	veh/h	1689	pers/h
Percent Heavy Vehicles	2.0	%		
Degree of Saturation	0.408			
Practical Spare Capacity	108.1	%		
Effective Intersection Capacity	3005	veh/h		
Control Delay (Total)	3.53	veh-h/h	4.23	pers-h/h
Control Delay (Average)	10.3	sec	9.0	sec
Control Delay (Worst Lane)	12.8	sec		
Control Delay (Worst Movement)	14.4	sec	14.4	sec
Geometric Delay (Average)	9.9	sec		
Stop-Line Delay (Average)	0.4	sec		
Intersection Level of Service (LOS)	LOS B			
95% Back of Queue - Vehicles (Worst Lane)	1.6	veh		
95% Back of Queue - Distance (Worst Lane)	40.8	ft		
Total Effective Stops	760	veh/h	911	pers/h
Effective Stop Rate	0.62	per veh	0.54	per pers
Proportion Queued	0.22		0.19	
Performance Index	20.8		20.8	
Travel Distance (Total)	504.1	veh-mi/h	604.9	pers-mi/h
Travel Distance (Average)	2168	ft	1891	ft
Travel Time (Total)	15.2	veh-h/h	18.2	pers-h/h
Travel Time (Average)	44.6	sec	38.9	sec
Travel Speed	33.1	mph	33.1	mph
Cost (Total)	360.17	$/h	360.17	$/h
Fuel Consumption (Total)	30.4	gal/h		
Carbon Dioxide (Total)	287.9	kg/h		
Hydrocarbons (Total)	0.430	kg/h		
Carbon Monoxide (Total)	24.15	kg/h		
NOx (Total)	0.819	kg/h		

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

Intersection Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	589,137	veh/y	810,644	pers/y
Delay	1,692	veh-h/y	2,030	pers-h/y
Effective Stops	364,583	veh/y	437,499	pers/y
Travel Distance	241,952	veh-mi/y	290,342	pers-mi/y
Travel Time	7,299	veh-h/y	8,759	pers-h/y
Cost	172,882	$/y	172,882	$/y
Fuel Consumption	14,592	gal/y		
Carbon Dioxide	138,201	kg/y		
Hydrocarbons	206	kg/y		
Carbon Monoxide	11,593	kg/y		
NOx	393	kg/y		

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MOVEMENT SUMMARY

Site: Big Lake Road and North Shore Drive - Future PM Peak Hour

2034 Future PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Big Lake Road											
3	L	51	2.0	0.385	14.4	LOS B	1.6	39.4	0.20	0.80	31.8
8	T	17	2.0	0.385	5.8	LOS A	1.6	39.4	0.20	0.42	35.9
18	R	432	2.0	0.385	7.8	LOS A	1.6	39.4	0.20	0.54	35.4
Approach		499	2.0	0.385	8.4	LOS A	1.6	39.4	0.20	0.56	34.9
East: Big Lake Road											
1	L	446	2.0	0.408	14.3	LOS B	1.6	40.8	0.16	0.73	31.6
6	T	88	2.0	0.408	6.6	LOS A	1.6	40.8	0.16	0.42	36.2
16	R	19	2.0	0.408	6.7	LOS A	1.6	40.8	0.16	0.47	35.4
Approach		554	2.0	0.408	12.8	LOS B	1.6	40.8	0.16	0.67	32.3
North: Diane lane											
7	L	19	2.0	0.046	11.6	LOS B	0.2	4.2	0.44	0.78	23.4
4	T	18	2.0	0.046	3.8	LOS A	0.2	4.2	0.44	0.43	24.7
14	R	5	2.0	0.046	4.8	LOS A	0.2	4.2	0.44	0.51	24.5
Approach		42	2.0	0.046	7.4	LOS A	0.2	4.2	0.44	0.60	24.0
West: North Shore Drive											
5	L	4	2.0	0.135	12.3	LOS B	0.5	12.2	0.40	0.91	31.1
2	T	76	2.0	0.135	7.9	LOS A	0.5	12.2	0.40	0.59	34.9
12	R	53	2.0	0.135	9.0	LOS A	0.5	12.2	0.40	0.66	34.6
Approach		133	2.0	0.135	8.5	LOS A	0.5	12.2	0.40	0.63	34.7
All Vehicles		1227	2.0	0.408	10.3	LOS B	1.6	40.8	0.22	0.62	33.1

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

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LANE SUMMARY

Site: Big Lake Road and North Shore Drive - Future PM Peak Hour

2034 Future PM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Lane Length ft	SL Type	Cap. Adj. %	Prob. Block. %
South: Big Lake Road																
Lane 1	51	17	432	499	2.0	1297	0.385	100	8.4	LOS A	1.6	39.4	1600	–	0.0	0.0
Approach	51	17	432	499	2.0		0.385		8.4	LOS A	1.6	39.4				
East: Big Lake Road																
Lane 1	446	88	19	554	2.0	1356	0.408	100	12.8	LOS B	1.6	40.8	1600	–	0.0	0.0
Approach	446	88	19	554	2.0		0.408		12.8	LOS B	1.6	40.8				
North: Diane lane																
Lane 1	19	18	5	42	2.0	919	0.046	100	7.4	LOS A	0.2	4.2	1600	–	0.0	0.0
Approach	19	18	5	42	2.0		0.046		7.4	LOS A	0.2	4.2				
West: North Shore Drive																
Lane 1	4	76	53	133	2.0	984	0.135	100	8.5	LOS A	0.5	12.2	1600	–	0.0	0.0
Approach	4	76	53	133	2.0		0.135		8.5	LOS A	0.5	12.2				
Intersection				1227	2.0		0.408		10.3	LOS B	1.6	40.8				

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

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INTERSECTION SUMMARY

Site: Big Lake Road and Hollywood Boulevard - Future AM Peak Hour

2034 Future AM Peak Hour
Roundabout

Intersection Performance - Hourly Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	421	veh/h	505	pers/h
Percent Heavy Vehicles	2.0	%		
Degree of Saturation	0.165			
Practical Spare Capacity	414.3	%		
Effective Intersection Capacity	2544	veh/h		
Control Delay (Total)	1.09	veh-h/h	1.31	pers-h/h
Control Delay (Average)	9.4	sec	9.4	sec
Control Delay (Worst Lane)	11.1	sec		
Control Delay (Worst Movement)	14.1	sec	14.1	sec
Geometric Delay (Average)	P	sec		
Stop-Line Delay (Average)	P	sec		
Intersection Level of Service (LOS)	LOS A			
95% Back of Queue - Vehicles (Worst Lane)	0.9	veh		
95% Back of Queue - Distance (Worst Lane)	23.3	ft		
Total Effective Stops	240	veh/h	288	pers/h
Effective Stop Rate	0.57	per veh	0.57	per pers
Proportion Queued	0.27		0.27	
Performance Index	7.2		7.2	
Travel Distance (Total)	168.0	veh-mi/h	201.6	pers-mi/h
Travel Distance (Average)	2109	ft	2109	ft
Travel Time (Total)	5.1	veh-h/h	6.1	pers-h/h
Travel Time (Average)	43.5	sec	43.5	sec
Travel Speed	33.0	mph	33.0	mph
Cost (Total)	118.26	$/h	118.26	$/h
Fuel Consumption (Total)	9.8	gal/h		
Carbon Dioxide (Total)	93.0	kg/h		
Hydrocarbons (Total)	0.140	kg/h		
Carbon Monoxide (Total)	7.72	kg/h		
NOx (Total)	0.260	kg/h		

P: You need to Process this Site (F9) for this variable to be computed.

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

Intersection Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	201,842	veh/y	242,210	pers/y
Delay	525	veh-h/y	630	pers-h/y
Effective Stops	115,291	veh/y	138,350	pers/y
Travel Distance	80,637	veh-mi/y	96,765	pers-mi/y
Travel Time	2,441	veh-h/y	2,929	pers-h/y
Cost	56,763	$/y	56,763	$/y
Fuel Consumption	4,712	gal/y		
Carbon Dioxide	44,628	kg/y		
Hydrocarbons	67	kg/y		
Carbon Monoxide	3,704	kg/y		
NOx	125	kg/y		

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MOVEMENT SUMMARY

Site: Big Lake Road and Hollywood Boulevard - Future AM Peak Hour

2034 Future AM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Big Lake Road											
8	T	131	2.0	0.165	7.5	LOS A	0.9	23.3	0.30	0.50	35.3
18	R	48	2.0	0.165	8.6	LOS A	0.9	23.3	0.30	0.58	34.8
Approach		178	2.0	0.165	7.8	LOS A	0.9	23.3	0.30	0.52	35.2
East: Hollywood Boulevard											
1	L	37	2.0	0.076	13.3	LOS B	0.4	9.5	0.36	0.71	29.3
16	R	37	2.0	0.076	7.6	LOS A	0.4	9.5	0.36	0.52	31.8
Approach		74	2.0	0.076	10.4	LOS B	0.4	9.5	0.36	0.62	30.5
North: Big Lake Road											
7	L	61	2.0	0.110	14.1	LOS B	0.6	15.7	0.17	0.77	31.7
4	T	53	2.0	0.110	7.0	LOS A	0.6	15.7	0.17	0.44	35.9
14	R	19	2.0	0.110	8.2	LOS A	0.6	15.7	0.17	0.53	35.2
Approach		132	2.0	0.110	10.4	LOS B	0.6	15.7	0.17	0.60	33.7
West: Big Lake Lodge Road											
5	L	34	2.0	0.037	11.4	LOS B	0.2	4.6	0.34	0.63	27.0
12	R	2	2.0	0.037	5.9	LOS A	0.2	4.6	0.34	0.44	29.2
Approach		36	2.0	0.037	11.1	LOS B	0.2	4.6	0.34	0.62	27.1
All Vehicles		421	2.0	0.165	9.4	LOS A	0.9	23.3	0.27	0.57	33.0

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

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LANE SUMMARY

Site: Big Lake Road and Hollywood Boulevard - Future AM Peak Hour

2034 Future AM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Lane Length ft	SL Type	Cap. Adj. %	Prob. Block. %
South: Big Lake Road																
Lane 1	0	131	48	178	2.0	1079	P	100	7.8	LOS A	0.9	23.3	1600	–	0.0	0.0
Approach	0	131	48	178	2.0		0.165		7.8	LOS A	0.9	23.3				
East: Hollywood Boulevard																
Lane 1	37	0	37	74	2.0	972	P	100	10.4	LOS B	0.4	9.5	1600	–	0.0	0.0
Approach	37	0	37	74	2.0		0.076		10.4	LOS B	0.4	9.5				
North: Big Lake Road																
Lane 1	61	53	19	132	2.0	1205	P	100	10.4	LOS B	0.6	15.7	1600	–	0.0	0.0
Approach	61	53	19	132	2.0		0.110		10.4	LOS B	0.6	15.7				
West: Big Lake Lodge Road																
Lane 1	34	0	2	36	2.0	979	P	100	11.1	LOS B	0.2	4.6	1600	–	0.0	0.0
Approach	34	0	2	36	2.0		0.037		11.1	LOS B	0.2	4.6				
Intersection				421	2.0		0.165		9.4	LOS A	0.9	23.3				

P: You need to Process this Site (F9) for this variable to be computed.

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

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INTERSECTION SUMMARY

Site: Big Lake Road and Hollywood Boulevard - Future PM Peak Hour

2034 Future PM Peak Hour
Roundabout

Intersection Performance - Hourly Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	894	veh/h	1072	pers/h
Percent Heavy Vehicles	2.0	%		
Degree of Saturation	0.314			
Practical Spare Capacity	170.8	%		
Effective Intersection Capacity	2847	veh/h		
Control Delay (Total)	2.56	veh-h/h	3.08	pers-h/h
Control Delay (Average)	10.3	sec	10.3	sec
Control Delay (Worst Lane)	13.0	sec		
Control Delay (Worst Movement)	15.2	sec	15.2	sec
Geometric Delay (Average)	P	sec		
Stop-Line Delay (Average)	P	sec		
Intersection Level of Service (LOS)	LOS B			
95% Back of Queue - Vehicles (Worst Lane)	2.1	veh		
95% Back of Queue - Distance (Worst Lane)	54.2	ft		
Total Effective Stops	563	veh/h	676	pers/h
Effective Stop Rate	0.63	per veh	0.63	per pers
Proportion Queued	0.46		0.46	
Performance Index	16.3		16.3	
Travel Distance (Total)	356.3	veh-mi/h	427.5	pers-mi/h
Travel Distance (Average)	2105	ft	2105	ft
Travel Time (Total)	11.1	veh-h/h	13.3	pers-h/h
Travel Time (Average)	44.7	sec	44.7	sec
Travel Speed	32.1	mph	32.1	mph
Cost (Total)	254.84	$/h	254.84	$/h
Fuel Consumption (Total)	20.9	gal/h		
Carbon Dioxide (Total)	197.9	kg/h		
Hydrocarbons (Total)	0.304	kg/h		
Carbon Monoxide (Total)	16.68	kg/h		
NOx (Total)	0.550	kg/h		

P: You need to Process this Site (F9) for this variable to be computed.

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

Intersection Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total)	428,892	veh/y	514,670	pers/y
Delay	1,231	veh-h/y	1,477	pers-h/y
Effective Stops	270,459	veh/y	324,550	pers/y
Travel Distance	171,014	veh-mi/y	205,217	pers-mi/y
Travel Time	5,329	veh-h/y	6,395	pers-h/y
Cost	122,325	$/y	122,325	$/y
Fuel Consumption	10,032	gal/y		
Carbon Dioxide	95,016	kg/y		
Hydrocarbons	146	kg/y		
Carbon Monoxide	8,005	kg/y		
NOx	264	kg/y		

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MOVEMENT SUMMARY

Site: Big Lake Road and Hollywood Boulevard - Future PM Peak Hour

2034 Future PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Big Lake Road											
3	L	6	0.0	0.266	15.2	LOS B	1.6	41.4	0.44	0.82	31.6
8	T	181	2.0	0.266	8.2	LOS A	1.6	41.4	0.44	0.56	34.5
18	R	72	2.0	0.266	9.4	LOS A	1.6	41.4	0.44	0.62	34.1
Approach		259	2.0	0.266	8.7	LOS A	1.6	41.4	0.44	0.58	34.3
East: Hollywood Boulevard											
1	L	120	2.0	0.272	14.2	LOS B	1.6	40.2	0.51	0.76	29.0
16	R	124	2.0	0.272	8.5	LOS A	1.6	40.2	0.51	0.62	31.2
Approach		243	2.0	0.272	11.3	LOS B	1.6	40.2	0.51	0.69	30.0
North: Big Lake Road											
7	L	113	2.0	0.314	14.9	LOS B	2.1	54.2	0.42	0.77	31.5
4	T	166	2.0	0.314	7.9	LOS A	2.1	54.2	0.42	0.52	34.4
14	R	53	2.0	0.314	9.0	LOS A	2.1	54.2	0.42	0.58	34.0
Approach		332	2.0	0.314	10.4	LOS B	2.1	54.2	0.42	0.61	33.3
West: Big Lake Lodge Road											
5	L	55	2.0	0.078	13.4	LOS B	0.4	10.4	0.57	0.72	26.3
12	R	4	2.0	0.078	7.9	LOS A	0.4	10.4	0.57	0.59	28.2
Approach		59	2.0	0.078	13.0	LOS B	0.4	10.4	0.57	0.71	26.4
All Vehicles		894	2.0	0.314	10.3	LOS B	2.1	54.2	0.46	0.63	32.1

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

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LANE SUMMARY

Site: Big Lake Road and Hollywood Boulevard - Future PM Peak Hour

2034 Future PM Peak Hour
Roundabout

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Lane Length ft	SL Type	Cap. Adj. %	Prob. Block. %
South: Big Lake Road																
Lane 1	6	181	72	259	2.0	975	P	100	8.7	LOS A	1.6	41.4	1600	–	0.0	0.0
Approach	6	181	72	259	2.0		0.266		8.7	LOS A	1.6	41.4				
East: Hollywood Boulevard																
Lane 1	120	0	124	243	2.0	894	P	100	11.3	LOS B	1.6	40.2	1600	–	0.0	0.0
Approach	120	0	124	243	2.0		0.272		11.3	LOS B	1.6	40.2				
North: Big Lake Road																
Lane 1	113	166	53	332	2.0	1058	P	100	10.4	LOS B	2.1	54.2	1600	–	0.0	0.0
Approach	113	166	53	332	2.0		0.314		10.4	LOS B	2.1	54.2				
West: Big Lake Lodge Road																
Lane 1	55	0	4	59	2.0	754	P	100	13.0	LOS B	0.4	10.4	1600	–	0.0	0.0
Approach	55	0	4	59	2.0		0.078		13.0	LOS B	0.4	10.4				
Intersection				894	2.0		0.314		10.3	LOS B	2.1	54.2				

P: You need to Process this Site (F9) for this variable to be computed.

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

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APPENDIX E:
SYNCHRO RESULTS
FUTURE YEAR - OPTION 3

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	46	34	28	260	246	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.942				0.984	
Flt Protected	0.972			0.995		
Satd. Flow (prot)	1706	0	0	1853	1833	0
Flt Permitted	0.972			0.957		
Satd. Flow (perm)	1706	0	0	1783	1833	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	36				20	
Link Speed (mph)	35			30	30	
Link Distance (ft)	806			1087	900	
Travel Time (s)	15.7			24.7	20.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	48	36	29	274	259	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	84	0	0	303	293	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type			Perm			
Protected Phases	4			2	6	
Permitted Phases			2			
Minimum Split (s)	12.0		15.0	15.0	15.0	
Total Split (s)	19.0	0.0	41.0	41.0	41.0	0.0
Total Split (%)	31.7%	0.0%	68.3%	68.3%	68.3%	0.0%
Maximum Green (s)	14.0		36.0	36.0	36.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	4.0	5.0	5.0	5.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Act Effct Green (s)	14.0			36.0	36.0	
Actuated g/C Ratio	0.23			0.60	0.60	
v/c Ratio	0.20			0.28	0.26	
Control Delay	13.5			6.7	6.0	
Queue Delay	0.0			0.0	0.0	
Total Delay	13.5			6.7	6.0	
LOS	B			A	A	
Approach Delay	13.5			6.7	6.0	
Approach LOS	B			A	A	
Stops (vph)	42			127	112	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Fuel Used(gal)	1			4	3	
CO Emissions (g/hr)	70			247	204	
NOx Emissions (g/hr)	14			48	40	
VOC Emissions (g/hr)	16			57	47	
Dilemma Vehicles (#)	0			0	0	
Queue Length 50th (ft)	14			46	40	
Queue Length 95th (ft)	44			81	72	
Internal Link Dist (ft)	726			1007	820	
Turn Bay Length (ft)						
Base Capacity (vph)	426			1070	1108	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.20			0.28	0.26	

Intersection Summary	
Area Type: Other	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 40	
Control Type: Pretimed	
Maximum v/c Ratio: 0.28	
Intersection Signal Delay: 7.2	Intersection LOS: A
Intersection Capacity Utilization 48.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: North Shore Drive & Big Lake Road

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	72	50	48	410	424	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.945				0.978	
Flt Protected	0.971			0.995		
Satd. Flow (prot)	1709	0	0	1853	1822	0
Flt Permitted	0.971			0.915		
Satd. Flow (perm)	1709	0	0	1704	1822	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	52				32	
Link Speed (mph)	35			30	30	
Link Distance (ft)	806			1087	900	
Travel Time (s)	15.7			24.7	20.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	76	53	51	432	446	88
Shared Lane Traffic (%)						
Lane Group Flow (vph)	129	0	0	483	534	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type			Perm			
Protected Phases	4			2	6	
Permitted Phases			2			
Minimum Split (s)	12.0		15.0	15.0	15.0	
Total Split (s)	17.0	0.0	43.0	43.0	43.0	0.0
Total Split (%)	28.3%	0.0%	71.7%	71.7%	71.7%	0.0%
Maximum Green (s)	12.0		38.0	38.0	38.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	4.0	5.0	5.0	5.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Act Effct Green (s)	12.0			38.0	38.0	
Actuated g/C Ratio	0.20			0.63	0.63	
v/c Ratio	0.34			0.45	0.46	
Control Delay	16.0			7.3	6.8	
Queue Delay	0.0			0.0	0.0	
Total Delay	16.0			7.3	6.8	
LOS	B			A	A	
Approach Delay	16.0			7.3	6.8	
Approach LOS	B			A	A	
Stops (vph)	67			216	225	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Fuel Used(gal)	2			6	6	
CO Emissions (g/hr)	113			403	385	
NOx Emissions (g/hr)	22			78	75	
VOC Emissions (g/hr)	26			93	89	
Dilemma Vehicles (#)	0			0	0	
Queue Length 50th (ft)	24			75	77	
Queue Length 95th (ft)	64			128	132	
Internal Link Dist (ft)	726			1007	820	
Turn Bay Length (ft)						
Base Capacity (vph)	383			1079	1166	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.34			0.45	0.46	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 40
Control Type: Pretimed
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 8.1 Intersection LOS: A
Intersection Capacity Utilization 71.2% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: North Shore Drive & Big Lake Road

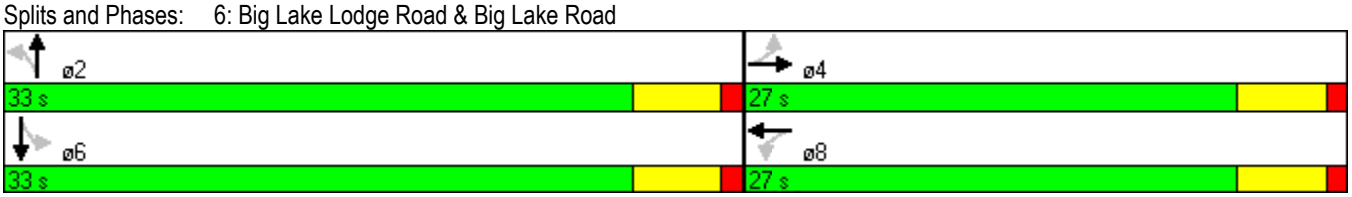
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	0	2	34	0	34	0	124	44	56	50	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993			0.932			0.965			0.980	
Flt Protected		0.955			0.976						0.978	
Satd. Flow (prot)	0	1766	0	0	1694	0	0	1798	0	0	1785	0
Flt Permitted		0.787			0.878						0.828	
Satd. Flow (perm)	0	1456	0	0	1524	0	0	1798	0	0	1512	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			36			40			19	
Link Speed (mph)		35			40			45			45	
Link Distance (ft)		825			1076			912			2004	
Travel Time (s)		16.1			18.3			13.8			30.4	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	34	0	2	36	0	36	0	131	46	59	53	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	0	72	0	0	177	0	0	131	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)		0			0			0			0	
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
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	27.0	27.0	0.0	27.0	27.0	0.0	33.0	33.0	0.0	33.0	33.0	0.0
Total Split (%)	45.0%	45.0%	0.0%	45.0%	45.0%	0.0%	55.0%	55.0%	0.0%	55.0%	55.0%	0.0%
Maximum Green (s)	22.0	22.0		22.0	22.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
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	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		22.0			22.0			28.0			28.0	
Actuated g/C Ratio		0.37			0.37			0.47			0.47	
v/c Ratio		0.07			0.12			0.21			0.18	
Control Delay		12.4			8.3			8.0			8.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		12.4			8.3			8.0			8.2	
LOS		B			A			A			A	
Approach Delay		12.4			8.3			8.0			8.2	
Approach LOS		B			A			A			A	
Stops (vph)		23			26			70			72	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Fuel Used(gal)		0			1			2			3	
CO Emissions (g/hr)		32			61			149			218	
NOx Emissions (g/hr)		6			12			29			42	
VOC Emissions (g/hr)		7			14			35			50	
Dilemma Vehicles (#)		3			6			14			7	
Queue Length 50th (ft)		8			8			27			27	
Queue Length 95th (ft)		24			31			58			61	
Internal Link Dist (ft)		745			996			832			1924	
Turn Bay Length (ft)												
Base Capacity (vph)		535			582			860			716	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.07			0.12			0.21			0.18	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 45
Control Type: Pretimed
Maximum v/c Ratio: 0.21
Intersection Signal Delay: 8.5 Intersection LOS: A
Intersection Capacity Utilization 38.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 6: Big Lake Lodge Road & Big Lake Road



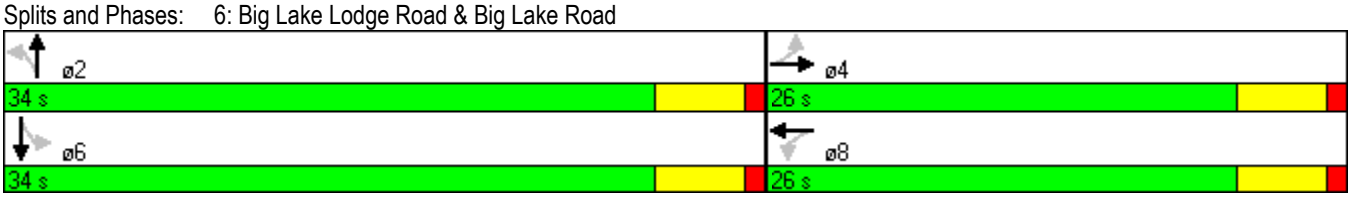
Lanes, Volumes, Timings
6: Big Lake Lodge Road & Big Lake Road

Option 3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	0	4	110	0	114	16	172	66	104	158	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Frt		0.991			0.931			0.965			0.978	
Flt Protected		0.955			0.976			0.997			0.984	
Satd. Flow (prot)	0	1763	0	0	1693	0	0	1792	0	0	1793	0
Flt Permitted		0.662			0.818			0.972			0.805	
Satd. Flow (perm)	0	1222	0	0	1419	0	0	1747	0	0	1467	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			95			41			22	
Link Speed (mph)		30			40			45			45	
Link Distance (ft)		527			710			711			2003	
Travel Time (s)		12.0			12.1			10.8			30.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	0	4	120	0	124	17	187	72	113	172	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	61	0	0	244	0	0	276	0	0	339	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)		0			0			0			0	
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
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	26.0	26.0	0.0	26.0	26.0	0.0	34.0	34.0	0.0	34.0	34.0	0.0
Total Split (%)	43.3%	43.3%	0.0%	43.3%	43.3%	0.0%	56.7%	56.7%	0.0%	56.7%	56.7%	0.0%
Maximum Green (s)	21.0	21.0		21.0	21.0		29.0	29.0		29.0	29.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
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	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		21.0			21.0			29.0			29.0	
Actuated g/C Ratio		0.35			0.35			0.48			0.48	
v/c Ratio		0.14			0.44			0.32			0.47	
Control Delay		13.8			11.9			9.2			12.1	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		13.8			11.9			9.2			12.1	
LOS		B			B			A			B	
Approach Delay		13.8			11.9			9.2			12.1	
Approach LOS		B			B			A			B	
Stops (vph)		37			105			123			225	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Fuel Used(gal)		1			3			3			8	
CO Emissions (g/hr)		41			185			222			593	
NOx Emissions (g/hr)		8			36			43			115	
VOC Emissions (g/hr)		10			43			51			137	
Dilemma Vehicles (#)		0			19			21			18	
Queue Length 50th (ft)		14			38			47			85	
Queue Length 95th (ft)		37			92			90			165	
Internal Link Dist (ft)		447			630			631			1923	
Turn Bay Length (ft)												
Base Capacity (vph)		430			558			866			720	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.14			0.44			0.32			0.47	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 45
Control Type: Pretimed
Maximum v/c Ratio: 0.47
Intersection Signal Delay: 11.3 Intersection LOS: B
Intersection Capacity Utilization 55.6% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 6: Big Lake Lodge Road & Big Lake Road