



April 19, 2016

Kyle Hafen  
Sycamores  
470 Country Lane #6  
Santa Clara, UT 84765

RE: Sycamores Development Level of Service Analysis

Dear Mr. Hafen,

A development is currently proposed south of Santa Clara Drive along Gates Lane in Santa Clara, Utah. An analysis has been conducted to help determine the traffic impact at an existing intersection that would result from the proposed housing development. The intersection analyzed is Santa Clara Dr. and Gates Lane. Currently, Santa Clara Dr. and Gates Lane is a two-way stop intersection with stop signs for Gates Lane as they enter onto Santa Clara Dr.

Traffic counts were conducted at each intersection during two periods, AM and PM. Counts were conducted over two hours during those periods. Once the results were analyzed, only the peak hour during those two hours was selected to be the "peak" period for analysis. Trip generations were generated from this count data. It was assumed that there would be 300 condo/townhome dwelling units developed along Gates Lane.

Three factors have been used to determine the overall impact on this intersection from the proposed residential development: Level of Service, Delay, and Intersection Capacity Utilization. Level of service (LOS) is the sum of time required to serve all movements at saturation given a reference cycle length and then dividing that by the reference cycle. To receive a LOS of A, this ratio would need to be less than or equal to 0.55. LOS B has a ratio between 0.55 and 0.64. The higher the ratio the lower the LOS. The delay represents the average delay a motorist experiences in a given intersection or leg of that intersection. The intersection capacity utilization represents a comparison between the current volume to the intersection's ultimate capacity. Below is a table showing the intersection with these factors before and after the proposed improvements. Also included in this table is the results for a particular leg that represents the worst case approach.

Santa Clara Dr. & Gates Ln.

	AM Peak Period		PM Peak Period	
	Existing	Proposed	Existing	Proposed
Average Level of Service (LOS)	A	A	A	A
Average Delay (seconds)	0.80	3.50	0.90	3.00
Intersection Capacity Utilization	23.50%	32.80%	39.80%	47.40%
Worst Case Approach Leg	South Bound		South Bound	
Worst Case Approach LOS	B	B	B	C
Worst Case Approach Delay	10.8	12.9	12.8	15.8

From this table one can infer that the level of service remains essentially the same during the peak periods studied. The average delay and intersection capacity utilization for the whole intersection shows a little bit of change, but not enough to change the LOS. The worst case approach leg changes the worst case approach LOS from a B to a C during the PM peak hour and increases the delay for that leg by 3.0 seconds.

The full results of the analysis have been enclosed with this letter. These enclosures include the following: an exhibit showing traffic counts for each peak period (existing and proposed) with the intersection level of service, an exhibit showing a report from the modeling software showing the individual lanes, volumes, and a report from the modeling software showing the HCM intersection capacity analysis (existing and proposed).

If you have any further questions regarding the results of the analysis please don't hesitate to call.

Sincerely,

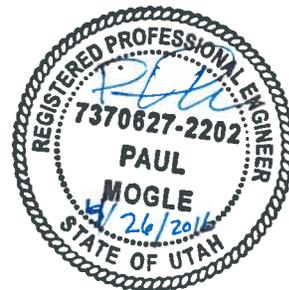


Dustyn W. Shaffer, P.E.  
Service Center Manager



Paul Mogle, P. E.  
Project Manager

enclosure(s)

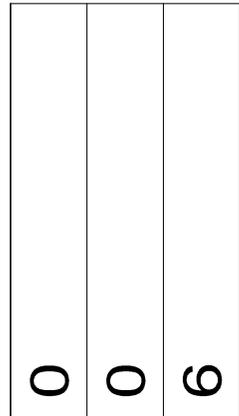


# EXISTING LEVEL OF SERVICE - AM PEAK

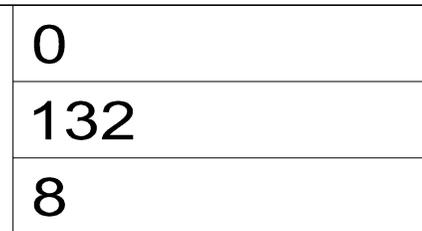
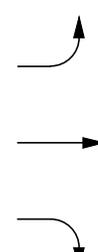
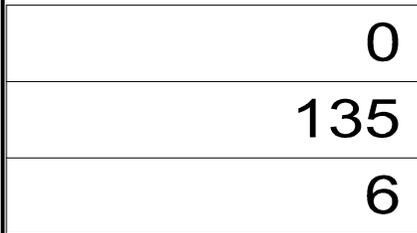
CLIENT NAME: SYCAMORES

DATE: 4/11/2016

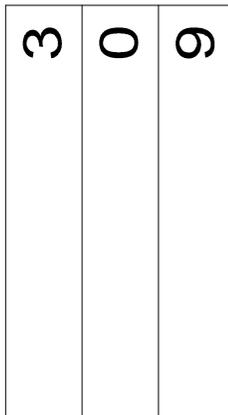
TIME: AM PEAK  
(8:00 am to 9:00 am)



L.O.S. = "A"

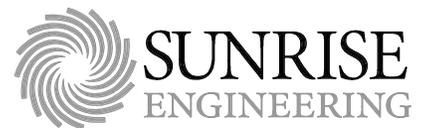


SANTA CLARA DRIVE



GATES LANE

NOTE: NUMBERS SHOWN HERE REPRESENT TRAFFIC COUNTS DURING AM PEAK PERIOD FOR EACH TRAVEL LANE.



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HCM Unsignalized Intersection Capacity Analysis  
 3: Gates Ln. & Santa Clara Drive

Existing AM Level of Service

4/8/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Volume (veh/h)	0	135	6	8	132	0	3	0	9	6	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	147	7	9	143	0	3	0	10	7	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	143			153			311	311	150	321	314	143
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	143			153			311	311	150	321	314	143
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	100	99	99	100	100
cM capacity (veh/h)	1439			1427			639	600	896	622	598	904
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	153	152	13	7								
Volume Left	0	9	3	7								
Volume Right	7	0	10	0								
cSH	1700	1427	814	622								
Volume to Capacity	0.09	0.01	0.02	0.01								
Queue Length 95th (ft)	0	0	1	1								
Control Delay (s)	0.0	0.5	9.5	10.8								
Lane LOS		A	A	B								
Approach Delay (s)	0.0	0.5	9.5	10.8								
Approach LOS			A	B								
<b>Intersection Summary</b>												
Average Delay			0.8									
Intersection Capacity Utilization			23.5%		ICU Level of Service				A			
Analysis Period (min)			15									

# EXISTING LEVEL OF SERVICE - PM PEAK

CLIENT NAME: SYCAMORES

DATE: 4/11/2016

TIME: PM PEAK  
(5:00 pm to 6:00 pm)



3	0	1
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L.O.S. = "A"

0
184
9



3
298
17



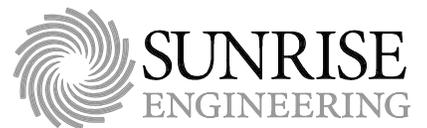
SANTA CLARA DRIVE



12	0	9
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GATES LANE

**NOTE:** NUMBERS SHOWN HERE REPRESENT TRAFFIC COUNTS DURING PM PEAK PERIOD FOR EACH TRAVEL LANE.



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# HCM Unsignalized Intersection Capacity Analysis

## 3: Gates Ln. & Santa Clara Drive

Existing PM Level of Service

4/8/2016

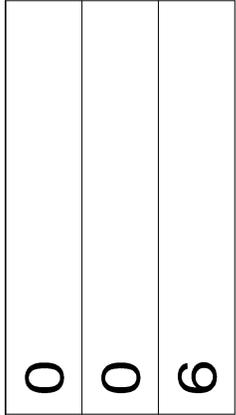
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Volume (veh/h)	0	184	9	17	298	3	12	0	9	3	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	200	10	18	324	3	13	0	10	3	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	327			210			568	569	205	577	572	326
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	327			210			568	569	205	577	572	326
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			97	100	99	99	100	100
cM capacity (veh/h)	1232			1361			428	426	836	418	424	716
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	210	346	23	4								
Volume Left	0	18	13	3								
Volume Right	10	3	10	1								
cSH	1700	1361	541	467								
Volume to Capacity	0.12	0.01	0.04	0.01								
Queue Length 95th (ft)	0	1	3	1								
Control Delay (s)	0.0	0.5	11.9	12.8								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	0.5	11.9	12.8								
Approach LOS			B	B								
<b>Intersection Summary</b>												
Average Delay			0.9									
Intersection Capacity Utilization			39.8%		ICU Level of Service				A			
Analysis Period (min)			15									

# PROPOSED LEVEL OF SERVICE - AM PEAK

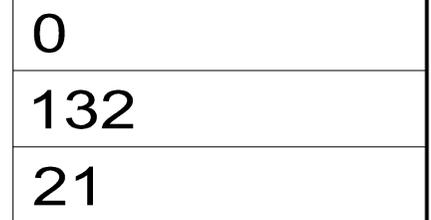
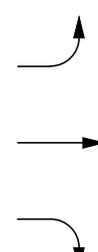
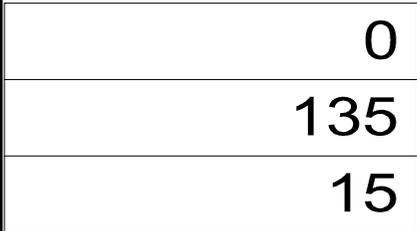
CLIENT NAME: SYCAMORES

DATE: 4/11/2016

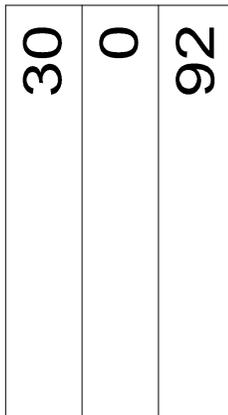
TIME: AM PEAK  
(8:00 am to 9:00 am)



L.O.S. = "A"

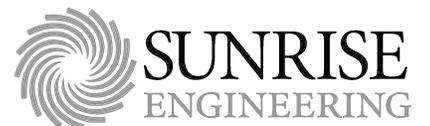


SANTA CLARA DRIVE



GATES LANE

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HCM Unsignalized Intersection Capacity Analysis  
 3: Gates Ln. & Santa Clara Drive

Proposed AM Level of Service  
 4/18/2016

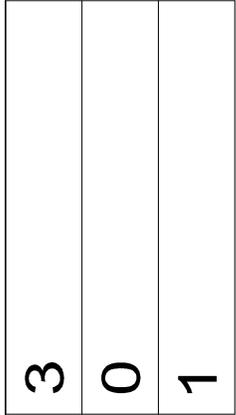
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Volume (veh/h)	0	135	15	21	132	0	30	0	92	6	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	147	16	23	143	0	33	0	100	7	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	143			163			344	344	155	444	352	143
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	143			163			344	344	155	444	352	143
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			95	100	89	99	100	100
cM capacity (veh/h)	1439			1416			603	569	891	460	563	904
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	163	166	133	7								
Volume Left	0	23	33	7								
Volume Right	16	0	100	0								
cSH	1700	1416	797	460								
Volume to Capacity	0.10	0.02	0.17	0.01								
Queue Length 95th (ft)	0	1	15	1								
Control Delay (s)	0.0	1.2	10.4	12.9								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	1.2	10.4	12.9								
Approach LOS			B	B								
<b>Intersection Summary</b>												
Average Delay			3.5									
Intersection Capacity Utilization			32.8%		ICU Level of Service				A			
Analysis Period (min)			15									

# PROPOSED LEVEL OF SERVICE - PM PEAK

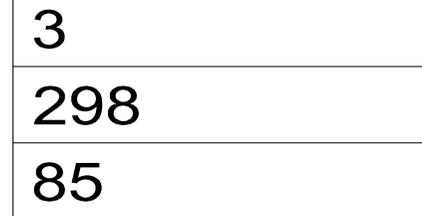
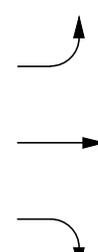
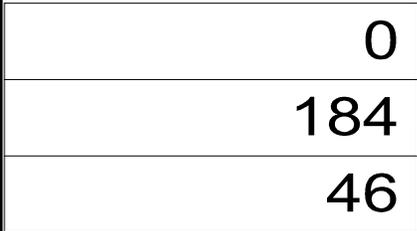
CLIENT NAME: SYCAMORES

DATE: 4/11/2016

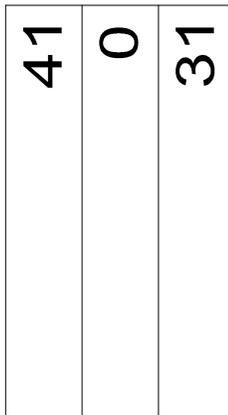
TIME: PM PEAK  
(5:00 pm to 6:00 pm)



L.O.S. = "A"



SANTA CLARA DRIVE



GATES LANE

NOTE: NUMBERS SHOWN HERE REPRESENT TRAFFIC COUNTS PLUS ANTICIPATED DEMAND FROM THE PROPOSED DEVELOPMENT DURING PM PEAK PERIOD FOR EACH TRAVEL LANE.



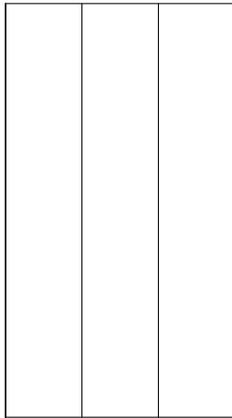
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HCM Unsignalized Intersection Capacity Analysis  
 3: Gates Ln. & Santa Clara Drive

Proposed PM Level of Service  
 4/18/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Volume (veh/h)	0	184	46	85	298	3	41	0	31	3	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	200	50	92	324	3	45	0	34	3	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	327			250			736	737	225	769	760	326
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	327			250			736	737	225	769	760	326
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			93			86	100	96	99	100	100
cM capacity (veh/h)	1232			1316			316	322	814	289	312	716
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	250	420	78	4								
Volume Left	0	92	45	3								
Volume Right	50	3	34	1								
cSH	1700	1316	429	339								
Volume to Capacity	0.15	0.07	0.18	0.01								
Queue Length 95th (ft)	0	6	16	1								
Control Delay (s)	0.0	2.3	15.3	15.8								
Lane LOS		A	C	C								
Approach Delay (s)	0.0	2.3	15.3	15.8								
Approach LOS			C	C								
<b>Intersection Summary</b>												
Average Delay			3.0									
Intersection Capacity Utilization			47.4%		ICU Level of Service				A			
Analysis Period (min)			15									

# TRIP GENERATED - AM PEAK SANTA CLARA DR. & GATES LN.



L.O.S. = "A"

9

13

SANTA CLARA DRIVE

27

83

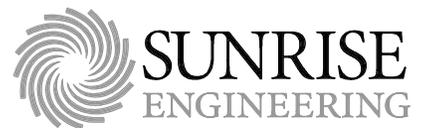
GATES LANE

■ = IN

■ = OUT

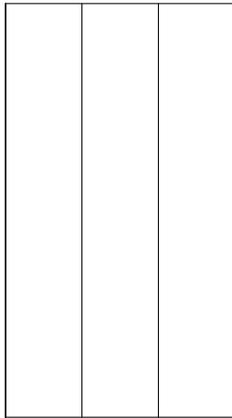
**NOTES:**

1. ITE CODE - RESIDENTIAL CONDOMINIUM / TOWNHOUSE 230.
2. NUMBERS SHOWN HERE REPRESENT TRIPS GENERATED BY THE PROPOSED DEVELOPMENT DURING PEAK PERIODS FOR AM TIMES.



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# TRIP GENERATED - PM PEAK SANTA CLARA DR. & GATES LN.



L.O.S. = "A"

37

68

SANTA CLARA DRIVE

29

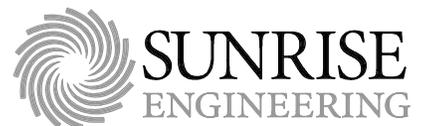
22

GATES LANE

■ = IN  
■ = OUT

**NOTES:**

1. ITE CODE - RESIDENTIAL CONDOMINIUM / TOWNHOUSE 230.
2. NUMBERS SHOWN HERE REPRESENT TRIPS GENERATED BY THE PROPOSED DEVELOPMENT DURING PEAK PERIODS FOR PM TIMES.



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