Appendix A

Air Quality

Construction Schedule

Phase	Project			
	Start	End	Calendar Days	Work Days
Grubbing/Land Clearing	9/1/2021	9/13/2021	8	8
Grading/Excavation	9/14/2021	4/13/2022	151	30
Draining/Utilities/Subgrade	9/1/2021	5/13/2022	182	81
Paving	3/23/2022	5/9/2022	33	11
Overpass construction	9/16/2021	2/17/2022	110	110

General RCEM Construction Inputs

Input	Roadway	Overpass
Construction Year	2021	2021
Project Length	0.75	0.75
Total Project Area	12	12
Maximum Area Disturbed/Day	2	2
Soil Imported/Exported by Phase		
Grubbing/Land Clearing	3,000	0
Grading/Excavation	2,800	0
Draining/Utilities/Subgrade	0	0
Paving	0	0
Asphalt Imported/ Exported by Phase		
Grubbing/Land Clearing	0	0
Grading/Excavation	0	0
Draining/Utilities/Subgrade	0	0
Paving	840	0
Average Truck Capacity	40	0

Construction Vehicles

Phase	Haul Trucks		Employees		Water Trucks		
	Trips per Day	Miles per Trip	Number per Day	Trips per Day	Number per Day	Trips per Day	Miles per Trip
Grubbing/Land Clearing	72	20	15	30	2	5	8
Grading/Excavation	70	20	15	30	2	5	8
Draining/Utilities/Subgrade			15	30	1	5	8
Paving	21	20	15	30			
Overpass construction			15	30			

Construction Equipment

General Category	Number per Day (all at 8 hours per day)				
	Grub/Clearing	Grading/Ex	D/U/S	Paving	Overpass
Bore/Drill Rig	0	0	1	0	1
Cement/Mortar Mixer	0	0	0	0	5
Crane	0	0	0	0	2
Excavator	0	0	0	0	2
Generator	0	0	1	0	1
Graders	2	2	2	0	0
Off-Highway Truck	0	0	0	0	1
Other Construction Equip	0	0	1	2	0
Paver	0	0	0	1	0
Rollers	5	5	2	5	0
RT Dozer	2	2	1	0	0
RT Loader	1	0	0	0	1
Scraper	2	2	0	0	0
Skid Loader	2	2	3	2	0
Tractor/Loader/Backhoe	0	0	1	0	0
Trencher	0	0	1	0	0

SACOG Daily Regional VMT

Speed Bin	VMT			
(mph)	Existing	Existing Plus Project	Cumulative	Cumulative Plus Project
0 - 5	60,346	58,720	137,246	139,041
6-10	210,302	211,922	496,988	485,540
11-15	553,753	554,700	876,659	855,837
16-20	6,343,883	6,329,167	9,235,620	9,311,394
21-25	2,624,297	2,684,968	5,095,415	4,959,937
26 - 30	3,217,681	3,080,908	4,663,045	4,626,881
31 - 35	4,745,766	4,774,379	7,889,099	7,989,642
36 - 40	5,039,756	5,077,098	11,789,195	11,811,546
41 - 45	4,987,786	5,017,969	6,877,824	6,771,279
46 - 50	5,356,132	5,368,057	7,591,704	7,584,217
51 - 55	10,259,529	10,245,607	8,888,074	8,997,508
56 - 60	5,299,843	5,290,663	5,836,391	5,741,593
61 - 65	1,518,200	1,517,869	3,860,390	3,942,264
66+	1,872,276	1,873,096	209,706	209,717
Total	52,089,549	52,085,122	73,447,356	73,426,397

Source: Weir, Matt (Kimley-Horn)

CT-EMFAC2017 Output

	Running (RUNEX, PMTW, PMBW, RD) grams per mile						
Year/Speed	ROG	NOx	CO2	CH4	PM10 Ex	PM10 D	N2O
2011							
5	0.84	1.84	1,057	0.11	0.08	1.07	0.06
10	0.59	1.58	872	0.08	0.06	1.07	0.05
15	0.37	1.25	707	0.05	0.05	1.07	0.04
20	0.23	1.07	589	0.04	0.03	1.07	0.04
25	0.18	1.00	507	0.03	0.03	1.07	0.03
30	0.14	0.96	454	0.02	0.02	1.07	0.03
35	0.12	0.93	423	0.02	0.02	1.07	0.03
40	0.11	0.91	408	0.02	0.02	1.07	0.03
45	0.10	0.91	407	0.02	0.02	1.07	0.03
50	0.09	0.91	416	0.02	0.02	1.07	0.03
55	0.10	0.93	430	0.02	0.02	1.07	0.03
60	0.10	0.95	444	0.02	0.02	1.07	0.03
65	0.11	0.97	456	0.02	0.02	1.07	0.03
70	0.12	0.98	459	0.02	0.02	1.07	0.03
75	0.12	0.98	459	0.02	0.02	1.07	0.03
2035							
5	0.09	0.66	648	0.00	0.01	1.12	0.03
10	0.06	0.51	530	0.00	0.00	1.12	0.03
15	0.04	0.37	427	0.00	0.00	1.12	0.02
20	0.03	0.29	357	0.00	0.00	1.12	0.02
25	0.02	0.24	307	0.00	0.00	1.12	0.02
30	0.02	0.19	272	0.00	0.00	1.12	0.02
35	0.01	0.14	251	0.00	0.00	1.12	0.01
40	0.01	0.11	240	0.00	0.00	1.12	0.01
45	0.01	0.09	237	0.00	0.00	1.12	0.01
50	0.01	0.08	242	0.00	0.00	1.12	0.01
55	0.01	0.09	251	0.00	0.00	1.12	0.01
60	0.01	0.10	263	0.00	0.00	1.12	0.01
65	0.01	0.12	275	0.00	0.00	1.12	0.01
70	0.01	0.12	277	0.00	0.00	1.12	0.01
75	0.01	0.12	277	0.00	0.00	1.12	0.01
2035 with SAFE Rule*							
5	0.10	0.67			0.01		
10	0.06	0.51			0.00		
15	0.04	0.37			0.00		
20	0.03	0.30			0.00		
25	0.02	0.24			0.00		
30	0.02	0.19			0.00		
35	0.01	0.15			0.00		
40	0.01	0.12			0.00		
45	0.01	0.09			0.00		
50	0.01	0.09			0.00		
55	0.01	0.09			0.00		
60	0.01	0.10			0.00		
65	0.01	0.12			0.00		
70	0.01	0.12			0.00		
75	0.01	0.12			0.00		

* Conservatively applied to all vehicle emissions (not just light-duty gasoline).

No Project Emissions Calculations*

	No Project						
Year	ROG	NOx	CO2	CH4	PM10 Ex	PM10 D	N2O
2011							
5	112	245	22,140	2	11	143	1
10	274	734	63,611	6	30	498	4
15	449	1,532	135,931	10	55	1,311	8
20	3,267	14,944	1,296,068	82	454	15,025	83
25	1,021	5,784	462,087	26	154	6,215	31
30	1,015	6,803	506,844	26	165	7,621	35
35	1,262	9,738	696,625	33	220	11,240	50
40	1,178	10,153	714,264	31	220	11,936	51
45	1,073	9,979	704,020	28	214	11,813	49
50	1,117	10,763	772,529	29	238	12,685	52
55	2,184	20,936	1,529,436	55	491	24,298	101
60	1,204	11,054	816,854	30	269	12,552	53
65	380	3,247	240,254	9	78	3,596	16
70	500	4,060	298,488	12	98	4,434	20
Total	15,036	109,971	8,259,150	381	2,698	123,367	554
2035							
5	29	203	30,863	0	2	338	2
10	69	563	91,322	0	4	1,224	5
15	78	714	129,881	0	5	2,159	7
20	553	6,051	1,145,291	1	41	22,746	62
25	228	2,680	543,408	1	18	12,549	30
30	166	1,920	440,544	0	14	11,485	25
35	234	2,534	686,488	1	22	19,430	38
40	307	2,991	980,865	1	32	29,036	53
45	166	1,440	566,524	1	20	16,939	30
50	178	1,427	638,012	1	24	18,698	32
55	214	1,684	775,524	1	33	21,890	39
60	152	1,249	532,258	1	25	14,374	27
65	114	1,009	367,931	1	20	9,508	19
70	7	55	20,133	0	1	516	1
Total	2,493	24,521	6,949,044	8	259	180,893	368

*ROG, NOx, and PM10 are pound per day; CO2, CH4, and N2O are metric tons per year (annualized over 347 days per year).

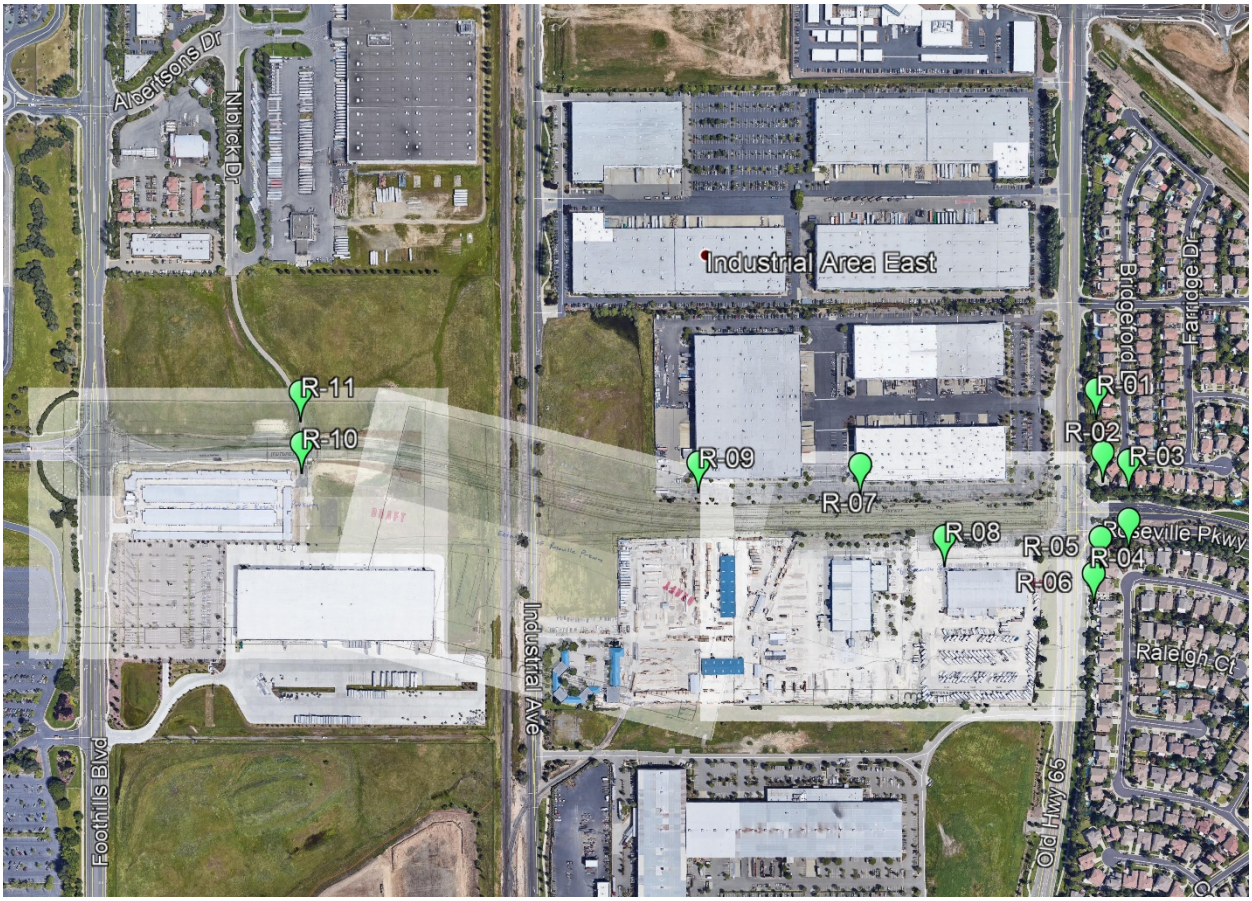
With Project Emissions Calculations*

	With Project						
Year	ROG	NOx	CO2	CH4	PM10 Ex	PM10 D	N2O
2011							
5	109	238	21,544	2	10	139	1
10	276	739	64,101	6	30	502	4
15	450	1,534	136,164	10	56	1,314	8
20	3,259	14,909	1,293,061	82	453	14,990	83
25	1,044	5,918	472,770	27	158	6,359	32
30	972	6,514	485,299	25	158	7,297	34
35	1,270	9,796	700,826	33	221	11,307	50
40	1,187	10,228	719,556	31	221	12,024	51
45	1,080	10,040	708,280	28	216	11,884	49
50	1,119	10,787	774,249	29	238	12,714	52
55	2,181	20,908	1,527,360	55	491	24,265	101
60	1,202	11,035	815,439	30	268	12,530	53
65	380	3,246	240,202	9	78	3,595	16
70	500	4,062	298,618	12	98	4,436	20
Total	15,029	109,954	8,257,469	380	2,697	123,357	554
2035							
5	29	205	31,266	0	2	342	2
10	67	550	89,218	0	4	1,196	5
15	76	697	126,796	0	5	2,108	7
20	558	6,101	1,154,687	1	41	22,933	62
25	222	2,609	528,960	1	17	12,216	29
30	164	1,906	437,128	0	14	11,396	24
35	237	2,566	695,237	1	22	19,678	39
40	308	2,997	982,725	1	32	29,091	53
45	163	1,418	557,748	1	20	16,677	29
50	178	1,425	637,383	1	24	18,679	32
55	216	1,705	785,072	1	33	22,160	39
60	149	1,229	523,613	1	25	14,141	26
65	116	1,031	375,735	1	20	9,709	20
70	7	55	20,134	0	1	517	1
Total	2,490	24,494	6,945,702	8	259	180,842	368

*ROG, NOx, and PM10 are pound per day; CO2, CH4, and N2O are metric tons per year (annualized over 347 days per year).

Appendix B
Noise

Figure B-1. Noise Prediction Locations



Source Data			Reference Maximum Sound Level at 50 ft. (Lmax, dBA)	Utilization Factor (% of hour)	Equivalent Sound Level (Leq, dBA)
Construction Phase	Land Clearing/Grubbing				
Equipment Type #1	Scraper		85	0.50	82
Equipment Type #2	Grader		85	0.50	82
Equipment Type #3			0	0.50	-3
Average Height of Sources, ft.		10			
Average Height of Receiver, ft.		5			
Ground Type		soft			
Allowable Sound Level, daytime Leq		50			
Allowable Sound Level, nighttime Leq		45			

Calculated Data	
Combined Equipment Sound Level, Leq dBA at 50 ft.	85
Effective Source Height, ft.	7.50
Ground factor, G	0.62
Distance to Allowable Daytime Sound Level, ft.	1100
Distance to Allowable Nighttime Sound Level, ft.	1750

Distance Between Source and Receiver (ft.)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Equivalent Sound Level (Leq, dBA)
50	0	0	85
100	-6	-2	77
200	-12	-4	69
300	-16	-5	65
400	-18	-6	61
500	-20	-6	59
600	-22	-7	57
700	-23	-7	55
800	-24	-7	53
900	-25	-8	52
1000	-26	-8	51
1500	-30	-9	46
2000	-32	-10	43
2500	-34	-10	41
3000	-36	-11	38
4000	-38	-12	35

Calculations based on FTA 2018.
Note: This calculation does not include the effects, if any, of local shielding from walls, topography or other barriers which may reduce sound levels further.

Source Data			Reference Maximum Sound Level at 50 ft. (Lmax, dBA)	Utilization Factor (% of hour)	Equivalent Sound Level (Leq, dBA)
Construction Phase	Grading/Excavation				
Equipment Type #1	Scraper		85	0.50	82
Equipment Type #2	Grader		85	0.50	82
Equipment Type #3			0	1.00	0
Average Height of Sources, ft.		10			
Average Height of Receiver, ft.		5			
Ground Type		soft			
Allowable Sound Level, daytime Leq		50			
Allowable Sound Level, nighttime Leq		45			

Calculated Data	
Combined Equipment Sound Level, Leq dBA at 50 ft.	85
Effective Source Height, ft.	7.50
Ground factor, G	0.62
Distance to Allowable Daytime Sound Level, ft.	1100
Distance to Allowable Nighttime Sound Level, ft.	1750

Distance Between Source and Receiver (ft.)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Equivalent Sound Level (Leq, dBA)
50	0	0	85
100	-6	-2	77
200	-12	-4	69
300	-16	-5	65
400	-18	-6	61
500	-20	-6	59
600	-22	-7	57
700	-23	-7	55
800	-24	-7	53
900	-25	-8	52
1000	-26	-8	51
1500	-30	-9	46
2000	-32	-10	43
2500	-34	-10	41
3000	-36	-11	38
4000	-38	-12	35

Calculations based on FTA 2018.
Note: This calculation does not include the effects, if any, of local shielding from walls, topography or other barriers which may reduce sound levels further.

Source Data			Reference Maximum Sound Level at 50 ft. (Lmax, dBA)	Utilization Factor (% of hour)	Equivalent Sound Level (Leq, dBA)
Construction Phase	Draining/Utilities/Subgrade				
Equipment Type #1	Hoe Ram		90	0.20	83
Equipment Type #2	Dozer		85	0.50	82
Equipment Type #3			0	0.50	-3
Average Height of Sources, ft.		10			
Average Height of Receiver, ft.		5			
Ground Type		soft			
Allowable Sound Level, daytime Leq		50			
Allowable Sound Level, nighttime Leq		45			

Calculated Data	
Combined Equipment Sound Level, Leq dBA at 50 ft.	86
Effective Source Height, ft.	7.50
Ground factor, G	0.62
Distance to Allowable Daytime Sound Level, ft.	1150
Distance to Allowable Nighttime Sound Level, ft.	1850

Distance Between Source and Receiver (ft.)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Equivalent Sound Level (Leq, dBA)
50	0	0	86
100	-6	-2	78
200	-12	-4	70
300	-16	-5	65
400	-18	-6	62
500	-20	-6	59
600	-22	-7	57
700	-23	-7	56
800	-24	-7	54
900	-25	-8	53
1000	-26	-8	52
1500	-30	-9	47
2000	-32	-10	44
2500	-34	-10	41
3000	-36	-11	39
4000	-38	-12	36

Calculations based on FTA 2018.
Note: This calculation does not include the effects, if any, of local shielding from walls, topography or other barriers which may reduce sound levels further.

Source Data			Reference Maximum Sound Level at 50 ft. (Lmax, dBA)	Utilization Factor (% of hour)	Equivalent Sound Level (Leq, dBA)
Construction Phase	Paving				
Equipment Type #1	Paver		85	0.50	82
Equipment Type #2	Roller		85	0.50	82
Equipment Type #3			0	0.50	-3
Average Height of Sources, ft.		10			
Average Height of Receiver, ft.		5			
Ground Type		soft			
Allowable Sound Level, daytime Leq		50			
Allowable Sound Level, nighttime Leq		45			

Calculated Data	
Combined Equipment Sound Level, Leq dBA at 50 ft.	85
Effective Source Height, ft.	7.50
Ground factor, G	0.62
Distance to Allowable Daytime Sound Level, ft.	1100
Distance to Allowable Nighttime Sound Level, ft.	1700

Distance Between Source and Receiver (ft.)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Equivalent Sound Level (Leq, dBA)
50	0	0	85
100	-6	-2	77
200	-12	-4	69
300	-16	-5	65
400	-18	-6	61
500	-20	-6	59
600	-22	-7	57
700	-23	-7	55
800	-24	-7	53
900	-25	-8	52
1000	-26	-8	51
1500	-30	-9	46
2000	-32	-10	43
2500	-34	-10	41
3000	-36	-11	38
4000	-38	-12	35

Calculations based on FTA 2018.
Note: This calculation does not include the effects, if any, of local shielding from walls, topography or other barriers which may reduce sound levels further.

Source Data			Reference Maximum Sound Level at 50 ft. (Lmax, dBA)	Utilization Factor (% of hour)	Equivalent Sound Level (Leq, dBA)
Construction Phase	Overpass Construction				
Equipment Type #1	Rock Drill		95	0.50	92
Equipment Type #2	Excavator		85	0.50	82
Equipment Type #3			0	0.50	-3
Average Height of Sources, ft.		20			
Average Height of Receiver, ft.		5			
Ground Type		soft			
Allowable Sound Level, daytime Leq		50			
Allowable Sound Level, nighttime Leq		45			

Calculated Data	
Combined Equipment Sound Level, Leq dBA at 50 ft.	92
Effective Source Height, ft.	12.50
Ground factor, G	0.53
Distance to Allowable Daytime Sound Level, ft.	2450
Distance to Allowable Nighttime Sound Level, ft.	3900

Distance Between Source and Receiver (ft.)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Equivalent Sound Level (Leq, dBA)
50	0	0	92
100	-6	-2	85
200	-12	-3	77
300	-16	-4	73
400	-18	-5	70
500	-20	-5	67
600	-22	-6	65
700	-23	-6	63
800	-24	-6	62
900	-25	-7	61
1000	-26	-7	60
1500	-30	-8	55
2000	-32	-8	52
2500	-34	-9	49
3000	-36	-9	47
4000	-38	-10	44

Calculations based on FTA 2018.
Note: This calculation does not include the effects, if any, of local shielding from walls, topography or other barriers which may reduce sound levels further.

ICF 23 June 2020
ICF TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: Mark Thomas
RUN: Roseville Parkway Extension, Existing

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Foothills Boulevard SB	point1	1	912	45	19	45	19	45	0	0	0	0
	point2	2	912	45	19	45	19	45	0	0	0	0
	point3	3	912	45	19	45	19	45	0	0	0	0
	point4	4										
Driveway (future extension) EB	point16	16	29	45	1	45	1	45	0	0	0	0
	point15	15	29	45	1	45	1	45	0	0	0	0
	point14	14	29	45	1	45	1	45	0	0	0	0
	point13	13	29	45	1	45	1	45	0	0	0	0
	point12	12	29	45	1	45	1	45	0	0	0	0
	point11	11	29	45	1	45	1	45	0	0	0	0
	point10	10	29	45	1	45	1	45	0	0	0	0
	point9	9	29	45	1	45	1	45	0	0	0	0
	point8	8	29	45	1	45	1	45	0	0	0	0
	point7	7	29	45	1	45	1	45	0	0	0	0
	point6	6	29	45	1	45	1	45	0	0	0	0
	point5	5										
Driveway (future extension) WB	point30	30	29	45	1	45	1	45	0	0	0	0
	point29	29	29	45	1	45	1	45	0	0	0	0
	point28	28	29	45	1	45	1	45	0	0	0	0
	point27	27	29	45	1	45	1	45	0	0	0	0
	point26	26	29	45	1	45	1	45	0	0	0	0
	point25	25	29	45	1	45	1	45	0	0	0	0
	point24	24	29	45	1	45	1	45	0	0	0	0

	point23	23	29	45	1	45	1	45	0	0	0	0
	point22	22	29	45	1	45	1	45	0	0	0	0
	point21	21	29	45	1	45	1	45	0	0	0	0
	point20	20	29	45	1	45	1	45	0	0	0	0
	point19	19	29	45	1	45	1	45	0	0	0	0
	point18	18	29	45	1	45	1	45	0	0	0	0
	point17	17										
Washington Boulevard SB	point34	34	998	45	21	45	21	45	0	0	0	0
	point33	33	998	45	21	45	21	45	0	0	0	0
	point32	32	998	45	21	45	21	45	0	0	0	0
	point31	31										
Washington Boulevard NB	point35	35	989	45	21	45	21	45	0	0	0	0
	point36	36	989	45	21	45	21	45	0	0	0	0
	point37	37	989	45	21	45	21	45	0	0	0	0
	point38	38	989	45	21	45	21	45	0	0	0	0
	point39	39										
Roseville Parkway WB	point46	46	480	45	10	45	10	45	0	0	0	0
	point45	45	480	45	10	45	10	45	0	0	0	0
	point44	44	480	45	10	45	10	45	0	0	0	0
	point43	43	480	45	10	45	10	45	0	0	0	0
	point42	42	480	45	10	45	10	45	0	0	0	0
	point41	41	480	45	10	45	10	45	0	0	0	0
	point40	40										
Turn lane	point47	47	0	0	0	0	0	0	0	0	0	0
	point48	48										
Roseville Parkway EB	point53	53	624	45	13	45	13	45	0	0	0	0
	point52	52	624	45	13	45	13	45	0	0	0	0
	point51	51	624	45	13	45	13	45	0	0	0	0
	point50	50	624	45	13	45	13	45	0	0	0	0
	point49	49										
Foothills Boulevard NB	point55	55	662	45	14	45	14	45	0	0	0	0
	point56	56	662	45	14	45	14	45	0	0	0	0
	point57	57	662	45	14	45	14	45	0	0	0	0
	point58	58										

ICF 23 June 2020
ICF TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: Mark Thomas
RUN: Roseville Parkway Extension, Existing PP

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Foothills Boulevard SB	point1	1	998	45	21	45	21	45	0	0	0	0
	point2	2	998	45	21	45	21	45	0	0	0	0
	point3	3	998	45	21	45	21	45	0	0	0	0
	point4	4										
Roseville Parkway Extension EB	point16	16	509	45	11	45	11	45	0	0	0	0
	point15	15	509	45	11	45	11	45	0	0	0	0
	point14	14	509	45	11	45	11	45	0	0	0	0
	point13	13	509	45	11	45	11	45	0	0	0	0
	point12	12	509	45	11	45	11	45	0	0	0	0
	point11	11	509	45	11	45	11	45	0	0	0	0
	point10	10	509	45	11	45	11	45	0	0	0	0
	point9	9	509	45	11	45	11	45	0	0	0	0
	point8	8	509	45	11	45	11	45	0	0	0	0
	point7	7	509	45	11	45	11	45	0	0	0	0
	point6	6	509	45	11	45	11	45	0	0	0	0
	point5	5										
Roseville Parkway Extension WB	point30	30	317	45	7	45	7	45	0	0	0	0
	point29	29	317	45	7	45	7	45	0	0	0	0
	point28	28	317	45	7	45	7	45	0	0	0	0
	point27	27	317	45	7	45	7	45	0	0	0	0
	point26	26	317	45	7	45	7	45	0	0	0	0
	point25	25	317	45	7	45	7	45	0	0	0	0
	point24	24	317	45	7	45	7	45	0	0	0	0

	point23	23	317	45	7	45	7	45	0	0	0	0
	point22	22	317	45	7	45	7	45	0	0	0	0
	point21	21	317	45	7	45	7	45	0	0	0	0
	point20	20	317	45	7	45	7	45	0	0	0	0
	point19	19	317	45	7	45	7	45	0	0	0	0
	point18	18	317	45	7	45	7	45	0	0	0	0
	point17	17										
Washington Boulevard SB	point34	34	614	45	13	45	13	45	0	0	0	0
	point33	33	614	45	13	45	13	45	0	0	0	0
	point32	32	614	45	13	45	13	45	0	0	0	0
	point31	31										
Washington Boulevard NB	point35	35	893	45	19	45	19	45	0	0	0	0
	point36	36	893	45	19	45	19	45	0	0	0	0
	point37	37	893	45	19	45	19	45	0	0	0	0
	point38	38	893	45	19	45	19	45	0	0	0	0
	point39	39										
Roseville Parkway WB	point46	46	662	45	14	45	14	45	0	0	0	0
	point45	45	662	45	14	45	14	45	0	0	0	0
	point44	44	662	45	14	45	14	45	0	0	0	0
	point43	43	662	45	14	45	14	45	0	0	0	0
	point42	42	662	45	14	45	14	45	0	0	0	0
	point41	41	662	45	14	45	14	45	0	0	0	0
	point40	40										
Turn lane	point47	47	0	0	0	0	0	0	0	0	0	0
	point48	48										
Roseville Parkway EB	point53	53	557	45	12	45	12	45	0	0	0	0
	point52	52	557	45	12	45	12	45	0	0	0	0
	point51	51	557	45	12	45	12	45	0	0	0	0
	point50	50	557	45	12	45	12	45	0	0	0	0
	point49	49										
Foothills Boulevard NB	point54	54	672	45	14	45	14	45	0	0	0	0
	point55	55	672	45	14	45	14	45	0	0	0	0
	point56	56	672	45	14	45	14	45	0	0	0	0
	point57	57										

ICF 23 June 2020
ICF TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: Mark Thomas
RUN: Roseville Parkway Extension, Cumulative

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Foothills Boulevard SB	point1	1	1776	45	37	45	37	45	0	0	0	0
	point2	2	1776	45	37	45	37	45	0	0	0	0
	point3	3	1776	45	37	45	37	45	0	0	0	0
	point4	4										
Roseville Parkway Extension EB	point16	16	1193	45	25	45	25	45	0	0	0	0
	point15	15	1193	45	25	45	25	45	0	0	0	0
	point14	14	1193	45	25	45	25	45	0	0	0	0
	point13	13	1193	45	25	45	25	45	0	0	0	0
	point12	12	1193	45	25	45	25	45	0	0	0	0
	point11	11	1193	45	25	45	25	45	0	0	0	0
	point10	10	1193	45	25	45	25	45	0	0	0	0
	point9	9	1193	45	25	45	25	45	0	0	0	0
	point8	8	1193	45	25	45	25	45	0	0	0	0
	point7	7	1193	45	25	45	25	45	0	0	0	0
	point6	6	1193	45	25	45	25	45	0	0	0	0
	point5	5										
Roseville Parkway Extension WB	point30	30	1454	45	30	45	30	45	0	0	0	0
	point29	29	1454	45	30	45	30	45	0	0	0	0
	point28	28	1454	45	30	45	30	45	0	0	0	0
	point27	27	1454	45	30	45	30	45	0	0	0	0
	point26	26	1454	45	30	45	30	45	0	0	0	0
	point25	25	1454	45	30	45	30	45	0	0	0	0
	point24	24	1454	45	30	45	30	45	0	0	0	0

	point23	23	1454	45	30	45	30	45	0	0	0	0
	point22	22	1454	45	30	45	30	45	0	0	0	0
	point21	21	1454	45	30	45	30	45	0	0	0	0
	point20	20	1454	45	30	45	30	45	0	0	0	0
	point19	19	1454	45	30	45	30	45	0	0	0	0
	point18	18	1454	45	30	45	30	45	0	0	0	0
	point17	17										
Washington Boulevard SB	point34	34	1229	45	26	45	26	45	0	0	0	0
	point33	33	1229	45	26	45	26	45	0	0	0	0
	point32	32	1229	45	26	45	26	45	0	0	0	0
	point31	31										
Washington Boulevard NB	point35	35	1595	45	33	45	33	45	0	0	0	0
	point36	36	1595	45	33	45	33	45	0	0	0	0
	point37	37	1595	45	33	45	33	45	0	0	0	0
	point38	38	1595	45	33	45	33	45	0	0	0	0
	point39	39										
Roseville Parkway WB	point46	46	1524	45	32	45	32	45	0	0	0	0
	point45	45	1524	45	32	45	32	45	0	0	0	0
	point44	44	1524	45	32	45	32	45	0	0	0	0
	point43	43	1524	45	32	45	32	45	0	0	0	0
	point42	42	1524	45	32	45	32	45	0	0	0	0
	point41	41	1524	45	32	45	32	45	0	0	0	0
	point40	40										
Turn lane	point47	47	0	0	0	0	0	0	0	0	0	0
	point48	48										
Roseville Parkway EB	point53	53	1323	45	28	45	28	45	0	0	0	0
	point52	52	1323	45	28	45	28	45	0	0	0	0
	point51	51	1323	45	28	45	28	45	0	0	0	0
	point50	50	1323	45	28	45	28	45	0	0	0	0
	point49	49										
Foothills Boulevard NB	point54	54	1306	45	27	45	27	45	0	0	0	0
	point55	55	1306	45	27	45	27	45	0	0	0	0
	point56	56	1306	45	27	45	27	45	0	0	0	0
	point57	57										

Table B-3A. Predicted Exterior Noise Levels, Existing Year (2020)

Receiver I.D.	Land Use	Address	Existing Noise Level, Ldn	Existing-year plus project Noise Level, Ldn	Existing-year with-project minus Existing no-project, dB	Exterior Threshold, Ldn	Impact Type
R-01	Single family residence	Highland Reserve	57	56	- 1	60	None
R-02	Single family residence	Highland Reserve	57	57	0	60	None
R-03	Single family residence	Highland Reserve	56	57	+ 1	60	None
R-04	Single family residence	Highland Reserve	57	56	- 1	60	None
R-05	Single family residence	Highland Reserve	58	57	- 1	60	None
R-06	Single family residence	Highland Reserve	57	57	0	60	None
R-07	Commercial/Industrial	Roseville Parkway Extension	51	55	+ 4	N/A	None
R-08	Commercial/Industrial	Roseville Parkway Extension	50	58	+ 8	N/A	None
R-09	Commercial/Industrial	Roseville Parkway Extension	47	57	+ 10	N/A	None
R-10	Commercial/Industrial	Roseville Parkway Extension	52	62	+ 10	N/A	None
R-11	Undeveloped	Roseville Parkway Extension	51	60	+ 9	N/A	None

Table B-3B. Impact Assessment and Predicted Exterior Noise Levels, Existing Year (2020) and Cumulative (2035)

Receiver I.D.	Land Use	Address	Existing year plus project noise level, Ldn	Cumulative plus project noise level, Ldn	Cumulative with-project minus Existing plus project, dB	Cumulative with-project minus Existing Year no-project, dB	Exterior Threshold, Ldn	Impact Type
R-01	Single family residence	Highland Reserve	56	59	+ 3	+ 2	60	None
R-02	Single family residence	Highland Reserve	57	60	+ 3	+ 3	60	None
R-03	Single family residence	Highland Reserve	57	60	+ 3	+ 4	60	None
R-04	Single family residence	Highland Reserve	56	60	+ 4	+ 3	60	None
R-05	Single family residence	Highland Reserve	57	60	+ 3	+ 2	60	None
R-06	Single family residence	Highland Reserve	57	59	+ 2	+ 2	60	None
R-07	Commercial/Industrial	Roseville Parkway Extension	55	60	+ 5	+ 9	N/A	None
R-08	Commercial/Industrial	Roseville Parkway Extension	58	63	+ 5	+ 13	N/A	None
R-09	Commercial/Industrial	Roseville Parkway Extension	57	62	+ 5	+ 15	N/A	None
R-10	Commercial/Industrial	Roseville Parkway Extension	62	67	+ 5	+ 15	N/A	None
R-11	Undeveloped	Roseville Parkway Extension	60	66	+ 6	+ 15	N/A	None

Table B-3C. Estimated Interior Noise Levels, Existing Year (2020) and Cumulative (2035)

Receiver I.D.	Land Use	Address	Existing year plus project noise level, Exterior Ldn	Cumulative plus project noise level, Exterior Ldn	Existing year plus project noise level, Interior Ldn	Design-year plus project noise level, Interior Ldn	Interior Threshold, Ldn	Required Outdoor-to-Indoor Noise Reduction, dB (1) (2)	Estimated Outdoor-to-Indoor Noise Reduction, dB (3)	Potential Exceedence of Maximum Allowable Interior Level?
R-01	Single family residence	Highland Reserve	56	59	26	29	45	14	30	No
R-02	Single family residence	Highland Reserve	57	60	27	30	45	15	30	No
R-03	Single family residence	Highland Reserve	57	60	27	30	45	15	30	No
R-04	Single family residence	Highland Reserve	56	60	26	30	45	15	30	No
R-05	Single family residence	Highland Reserve	57	60	27	30	45	15	30	No
R-06	Single family residence	Highland Reserve	57	59	27	29	45	14	30	No
R-07	Commercial/Industrial	Roseville Parkway Extension	55	60	N/A	N/A	N/A	N/A	N/A	No
R-08	Commercial/Industrial	Roseville Parkway Extension	58	63	N/A	N/A	N/A	N/A	N/A	No
R-09	Commercial/Industrial	Roseville Parkway Extension	57	62	N/A	N/A	N/A	N/A	N/A	No
R-10	Commercial/Industrial	Roseville Parkway Extension	62	67	N/A	N/A	N/A	N/A	N/A	No
R-11	Undeveloped	Roseville Parkway Extension	60	66	N/A	N/A	N/A	N/A	N/A	No

Notes:

(1) As indicated in the General Plan Noise Element, when it is not practical to mitigate exterior noise levels at the patios or balconies of multi-family dwellings, a common area or onsite park may be designated as the outdoor activity area. For noise-sensitive land uses that do not include outdoor activity areas, only the interior noise standard shall apply.

(2) Calculated value: Exterior Ldn at location minus Maximum Allowable Interior Ldn

(3) Assumes a building noise reduction factor of 30 dB, based on HUD values for standard framing and double hung windows (HUD 2009)

Appendix C
Traffic

Kimley»Horn

Memorandum

To: Raul Cervantes, Mark Thomas
Mark Morse, ICF

From: Matt Weir, P.E., T.E., PTOE
Curtis Yee, E.I.T.

Re: Roseville Parkway Extension
DRAFT *Traffic Evaluation*

Date: June 5, 2020

We have prepared this memorandum to document our evaluation of focused traffic operations associated with the proposed Roseville Parkway Extension project in the City of Roseville. This traffic evaluation was limited to the two primary project intersections, one at each end of the extension facility, for the purposes of documenting project consistency with prior, more comprehensive environmental studies, and to inform the intersections' lane geometries to achieve acceptable operations. This evaluation was performed in a manner consistent with the Project Development Team's (PDT) direction[1] and is understood to be provided in support of the Initial Study/Mitigated Negative Declaration (IS/MND) being prepared by others.

Project Description & Study Overview

The City of Roseville proposes to construct the Roseville Parkway Extension Project (Proposed Project) in the North Industrial Planning Area of the City. The Project would extend Roseville Parkway by approximately 0.75-mile from its current terminus at Washington Boulevard westerly to Foothills Boulevard. The project includes construction of an overpass of the Union Pacific Railroad (UPRR) tracks and Industrial Avenue.

The study facilities for this focused evaluation included the following intersections (see **Exhibit 1**):

1. Roseville Parkway @ Foothills Boulevard
2. Roseville Parkway @ Washington Boulevard

The primary focus of this study was to document project consistency with a prior environmental study related to the two primary project intersections, and to inform these intersections' lane geometries to achieve acceptable operations. Accordingly, this traffic evaluation considered the following analysis scenarios:

A. Existing (2020) Conditions
Conditions representative of on-the-ground conditions established using traffic count data provided by the City's Intelligent Transportation System (ITS) from February 2020.

B. Existing (2020) plus Proposed Project Conditions
Conditions representative of year 2020 conditions resulting from the addition of and network connectivity achieve from the Roseville Parkway Extension. Traffic volumes were approximated using the City's Travel Demand Model (TDM) to establish these "plus project" conditions.

C. Cumulative (2035) plus Proposed Project Conditions
Conditions obtained directly from the *Amoruso Ranch Specific Plan*[2] in which the Roseville Parkway Extension is included.

[1] Project Development Team Meetings, February 3, March 16, and April 20, 2020.
[2] *Final Traffic Study for the Amoruso Ranch Specific Plan*, Fehr & Peers, February 16, 2016.

Analysis Methodology

This traffic evaluation was performed in accordance with the City's preferred methodologies and general guidelines for the preparation of traffic studies[3].

Analysis of transportation facility operations is based on the concept of Level of Service (LOS). The LOS of a facility is a qualitative measure used to describe operational conditions. LOS ranges from A (best), which represents minimal delay, to F (worst), which represents heavy delay and a facility that is operating at or near its functional capacity. Levels of Service for this study were determined using methods defined in the *Highway Capacity Manual (HCM) 6th Edition*. The HCM includes procedures for analyzing a variety of intersection traffic control, including traffic signals. The signalized intersection procedures define LOS as a function of average control delay for the intersection as a whole. **Table 1** presents intersection LOS definitions as defined in the HCM. LOS was determined using the Synchro® traffic analysis software.

Table 1 – Intersection Level of Service Criteria

Level of Service (LOS)	Signalized
	Average Control Delay (sec/veh)
A	≤ 10
B	> 10 – 20
C	> 20 – 35
D	> 35 – 55
E	> 55 – 80
F	> 80

Source: Highway Capacity Manual, 6th Edition

Technical Results

The following is a summary of the technical analyses completed for the study intersections. As outlined above, these facilities were analyzed under Existing (2020) Conditions with and without the Proposed Project, and Cumulative (2035) Conditions with the Proposed Project. **Exhibit 2** depicts the study intersections' lane geometries, while **Exhibit 3** and **Exhibit 4** present the analysis scenarios' peak-hour intersection turning movement volumes. The traffic count data sheets are provided in **Appendix A**. **Appendices B-E** include the scenarios' analysis worksheets. The results of the intersection LOS analyses are presented in **Table 2**. Vehicle queuing results are provided in **Table 3**.

As shown in **Table 2**, the study intersections operate at acceptable LOS D or better during both peak-hours, for all analysis scenarios. In addition, the queuing results summarized in **Table 3** confirms the required storage needed at the intersections' various exclusive turning pockets.

Table 2 – Intersection Levels of Service

ID	Intersection	Peak Hour	Existing (2020)		Existing (2020) plus Project		Cumulative (2035) plus Project	
			Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	Roseville Parkway @ Foothills Boulevard	AM	13.8	B	17.2	B	37.5	D
		PM	16.0	B	18.3	B	42.2	D
2	Roseville Parkway @ Washington Boulevard	AM	15.4	B	19.0	B	25.5	C
		PM	15.2	B	20.0	C	37.3	D

[3] *Section 4 Traffic Impact Studies, City of Roseville Design Standards*, January 2020.

Table 3 – Intersection Queuing

Intersection / Analysis Scenario	Movement	AM Peak-Hour		PM Peak-Hour	
		Available Storage (ft)	95th % Queue (ft)	Available Storage (ft)	95th % Queue (ft)
#1, Roseville Parkway @ Foothills Boulevard	EBL				
Existing (2020)		220	19	220	30
Existing (2020) plus Project			17		17
Cumulative (2035) plus Project			37		42
	EBT				
Existing (2020)		345	10	345	10
Existing (2020) plus Project			56		63
Cumulative (2035) plus Project			117		206
	EBR				
Existing (2020)		230	3	230	47
Existing (2020) plus Project			18		36
Cumulative (2035) plus Project			51		96
	WBL				
Existing (2020)		220	9	220	10
Existing (2020) plus Project			17		37
Cumulative (2035) plus Project			204		201
	WBR				
Existing (2020)		230	0	230	0
Existing (2020) plus Project			7		15
Cumulative (2035) plus Project			176		411
	NBL				
Existing (2020)		265	35	265	30
Existing (2020) plus Project			36		37
Cumulative (2035) plus Project			113		132
	NBR				
Existing (2020)		265	0	265	0
Existing (2020) plus Project			11		0
Cumulative (2035) plus Project			147		147
	SBL				
Existing (2020)		255	19	255	20
Existing (2020) plus Project			103		111
Cumulative (2035) plus Project			294		204
	SBR				
Existing (2020)		160	18	160	0
Existing (2020) plus Project			0		0
Cumulative (2035) plus Project			0		0
#2, Roseville Parkway @ Washington Boulevard	EBL				
Existing (2020)		200	-	200	-
Existing (2020) plus Project			18		9
Cumulative (2035) plus Project			26		37
	WBL				
Existing (2020)		235	34	235	36
Existing (2020) plus Project			25		29
Cumulative (2035) plus Project			18		31
	NBL				
Existing (2020)		260	21	260	22
Existing (2020) plus Project			27		44
Cumulative (2035) plus Project			40		6
	SBL				
Existing (2020)		245	171	245	180
Existing (2020) plus Project			99		100
Cumulative (2035) plus Project			139		287

As shown in **Table 3**, the Cumulative (2035) plus Project Conditions exhibit three movements with 95th percentile queues that exceed their respective storage lengths. At Intersection #1 (Roseville Parkway @ Foothills Boulevard), both the westbound right-turn and southbound left-turn exceed the assumed storage by 8 and 2 vehicles, respectively. Should these conditions persist in 2035, consideration should be given to extending both turn pockets to contain the documented queuing within their respective lanes. At Intersection #2 (Roseville Parkway @ Washington Boulevard), the southbound left-turn exceeds the assumed storage by 2 vehicles. Similarly, the City should monitor these conditions and, if they persist in 2035, extend the subject turn pocket.

CEQA Compliance

The following is an assessment of the Proposed Project using the current CEQA Guidelines' "checklist" as pertains to Transportation (XVII. TRANSPORTATION).

a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities? ***No Impact***

The Proposed Project, through its extension of Roseville Parkway between Foothills Boulevard and Washington Boulevard, does not conflict with the City of Roseville's applicable planning documents including the *General Plan 2035*, *Bicycle Master Plan*, *Pedestrian Master Plan*, and *Short Range Transit Plan*. The following is an overview of the project's consistency with these guiding documents:

- Circulation System
  - Consistent with the Proposed Project, the facility is indicated to have 4 future lanes (Figure III-3, *General Plan 2035 Circulation Element*, Page III-17)
  - Additionally, consistent with the Proposed Project, the facility is designated as a 4-lane facility in the Year 2035 mitigated network (Table III-4, *General Plan 2035 Circulation Element*, Page III-31)
- Transit Facilities
  - Although not a designated transit route, the Proposed Project connects to Roseville Transit Route R that operates weekdays in both directions along Foothills Boulevard. There is currently a southbound bus stop located south of the Proposed Project intersection with Foothills Boulevard.
- Bicycle Facilities
  - Consistent with the Proposed Project, the facility is indicated to have Class II Bike Lanes along the entire stretch of Roseville Parkway, as well as along both Foothills Boulevard and Washington Boulevard (Figure III-6, *General Plan 2035 Circulation Element*, Page III-53, and Figure 5, *City of Roseville Bicycle Master Plan*, Page 45).
  - Additionally, the Proposed Project includes a separated 10-foot multi-use path that further supports the City's *General Plan* and *Bicycle Master Plan* goals.
- Pedestrian Facilities
  - The Proposed Project includes both an attached 8-foot sidewalk and a separated 10-foot multi-use path. Through its inclusion of these facilities, the Proposed Project supports the City's *General Plan* and *Pedestrian Master Plan* goals.

b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)? ***No Impact***

Senate Bill 743 (SB 743) was enacted by the California legislature in 2013 and required the Office of Planning and Research (OPR) to adopt new guidelines for assessing CEQA-related transportation impacts. The City has determined[4] that the Proposed Project does not require additional VMT analyses in response to SB 743 for the following reasons:

[4] Email from Mark Johnson, City of Roseville, April 22, 2020.

- The Proposed Project is included in the MTP/SCS recently adopted by SACOG.
- The Proposed Project is included in the Amoruso Ranch Specific Plan EIR which is also incorporated into the current General Plan and the pending General Plan Update.
- The General Plan Update, scheduled to be adopted in Fall 2020, includes "grandfathering" of all previously adopted specific plans and will also include a VMT Policy that will only apply to new project proposals.

As a result, the Proposed Project is considered to be consistent with CEQA Guidelines.

c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)? ***No Impact***

The Proposed Project has been designed in a manner consistent with all applicable, published design standards at the onset of this project including the City of Roseville's *Design and Construction Standards*, Caltrans' *Highway Design Manual*, and the American Association of State Highway and Transportation Officials' (AASHTO) *A Policy on Geometric Design of Highways and Streets*. Consistent with the City's expansive transportation system, the Proposed Project will support all compatible uses and the surrounding land uses that are reasonably anticipated to contribute traffic to and rely on this facility are compatible with the design considerations. Accordingly, through its consistency with these standards, as well as resulting from its improved network connectivity, the Proposed Project does not increase hazards and supports all compatible uses.

d) Result in inadequate emergency access? ***No Impact***

The City previously analyzed the Proposed Project's effect on the emergency response times and access during the project development phase[5]. Through a comprehensive sensitivity analysis, the City documented the Proposed Project's, as well as other significance projects', effects on peak-hour travel times and general vehicular access to emergency and medical service facilities, with a focus on travel times between the northwest portion of the City and two emergency hospital providers (Sutter Roseville and Kaiser Roseville). These previous efforts concluded the following as relates to the Proposed Projects' improvements to emergency access:

> "The Roseville Parkway extension project provides congestion reductions on the Blue Oaks Boulevard/Industrial Avenue overcrossing by reducing the 10-year peak-hour traffic volumes on the Blue Oaks Boulevard bridge. Furthermore, Roseville Parkway serves as another means to get from the west side of the City to the east side without having to access State Route 65. This parallel capacity would be helpful in emergency situations and as an alternate route during construction of the Blue Oaks Boulevard bridge widening."

Conclusions

The Proposed Project provides a vital network connection by linking Washington Boulevard and Foothills Boulevard in the North Industrial Planning Area. This connectivity is currently only provided by Blue Oaks Boulevard to the north. This traffic evaluation considered the effects of the addition of the Proposed Project on both Existing (2020) and Cumulative (2035) Conditions. The City's travel demand model was used to approximate the effect of the project on existing conditions, while the effect of the project under Cumulative (2035) Conditions was previously documented in the *Amoruso Ranch Specific Plan*[2]. As documented herein, the study intersections operate at LOS D or better with three movements exceeding their assumed storages under Cumulative (2035) Conditions. The intersections' lane configurations, including the required storage lengths, are depicted in **Exhibit 5.**

[5] *Roadway System Capital Improvements Project Sensitivity Analysis Update*, City of Roseville City Council Meeting, April 17, 2019.

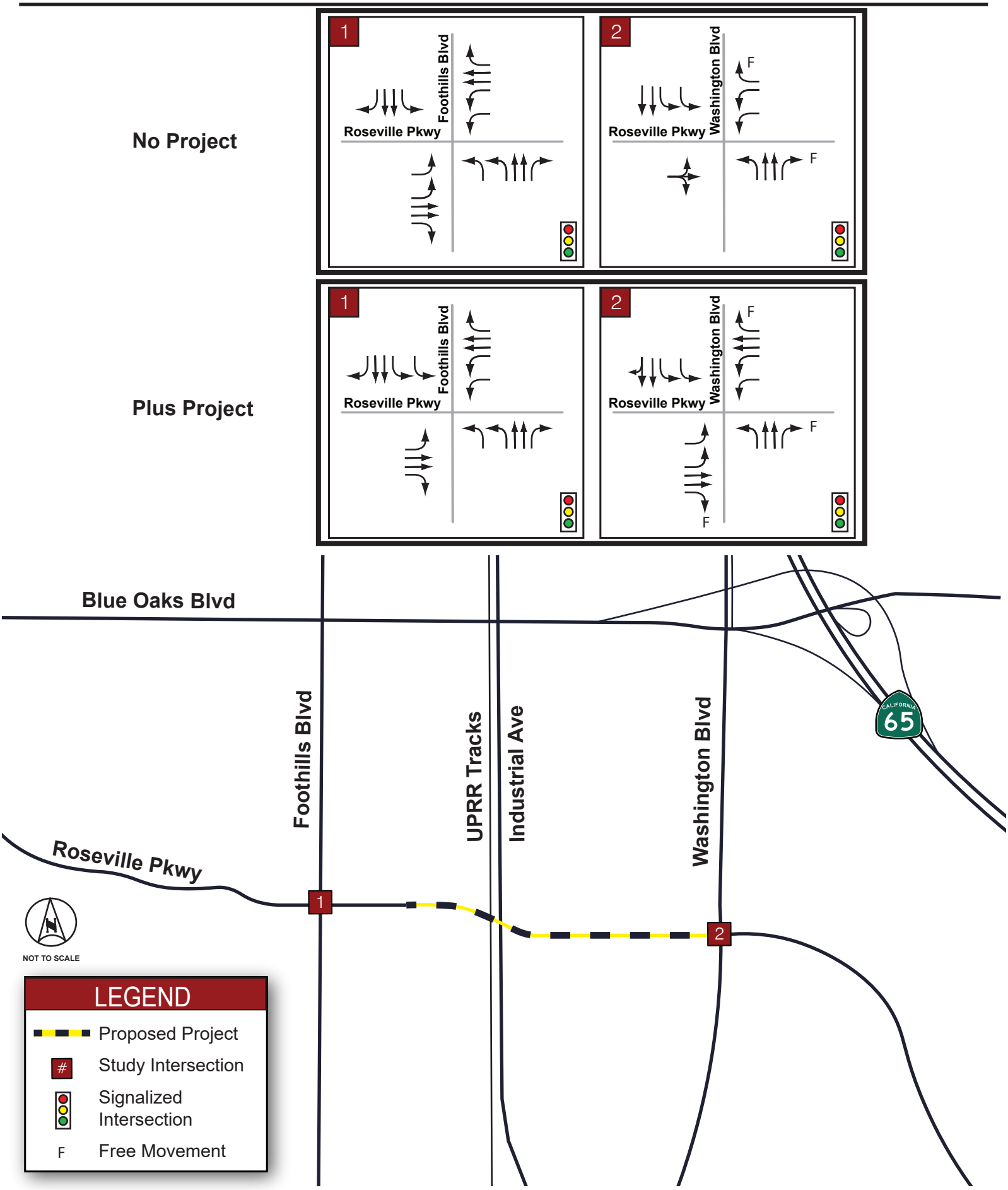
Attachments:

Exhibit 1 – Project Vicinity Map
Exhibit 2 – Study Intersections, Traffic Control, and Lane Geometries
Exhibit 3 – Existing (2020) Conditions Peak-Hour Volumes
Exhibit 4 – Cumulative (2035) plus Proposed Project Conditions Peak-Hour Volumes
Exhibit 5 – Recommended Intersection Lane Configurations

Appendix A – Traffic Count Data Sheets
Appendix B – Analysis Worksheets for Existing (2020) Conditions
Appendix C – Analysis Worksheets for Existing (2020) plus Proposed Project Conditions
Appendix D – Analysis Worksheets for Cumulative (2035) plus Proposed Project Conditions

Kimley»Horn

Exhibit 1
Project Vicinity Map

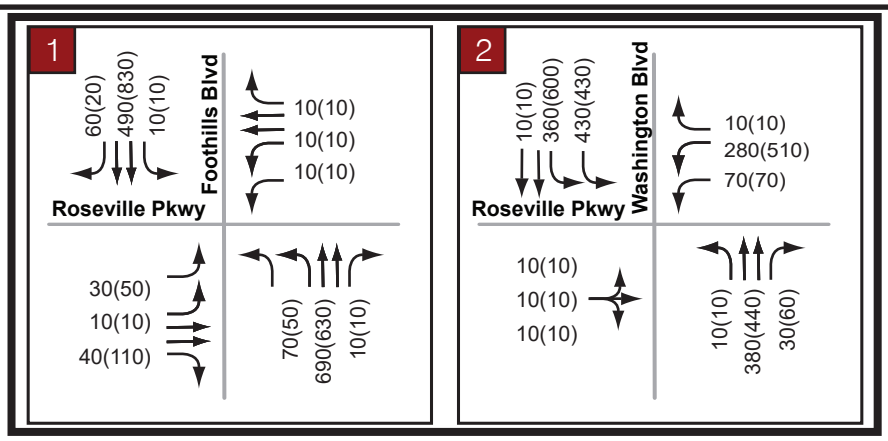


Kimley»Horn

Exhibit 2

Study Intersections, Traffic Control, and Lane Geometries

Existing (2020)



Existing (2020) Plus Proposed Project

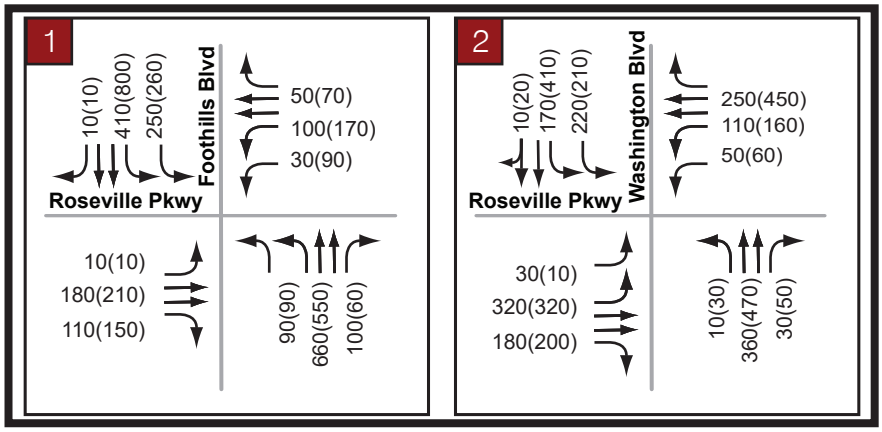
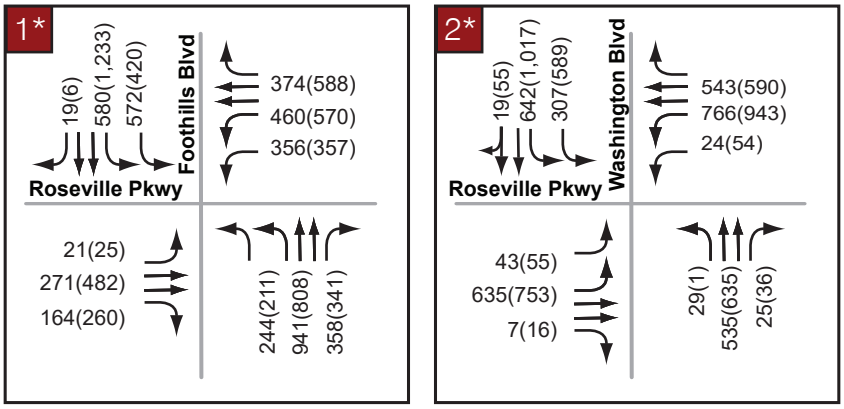


Exhibit 3
Existing (2020) Conditions Peak-Hour Volumes

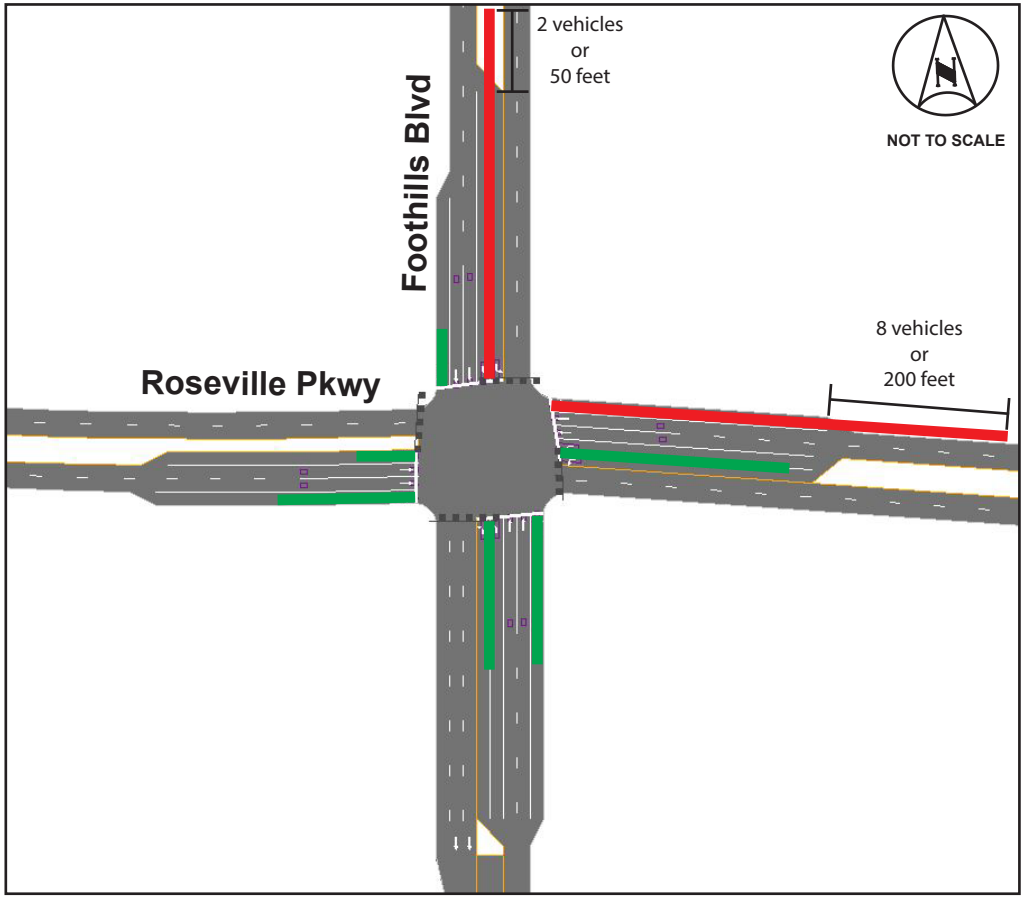


*Peak-Hour Volumes were obtained directly from the Amoruso Ranch Traffic Study's 2035 Cumulative Plus Project Conditions

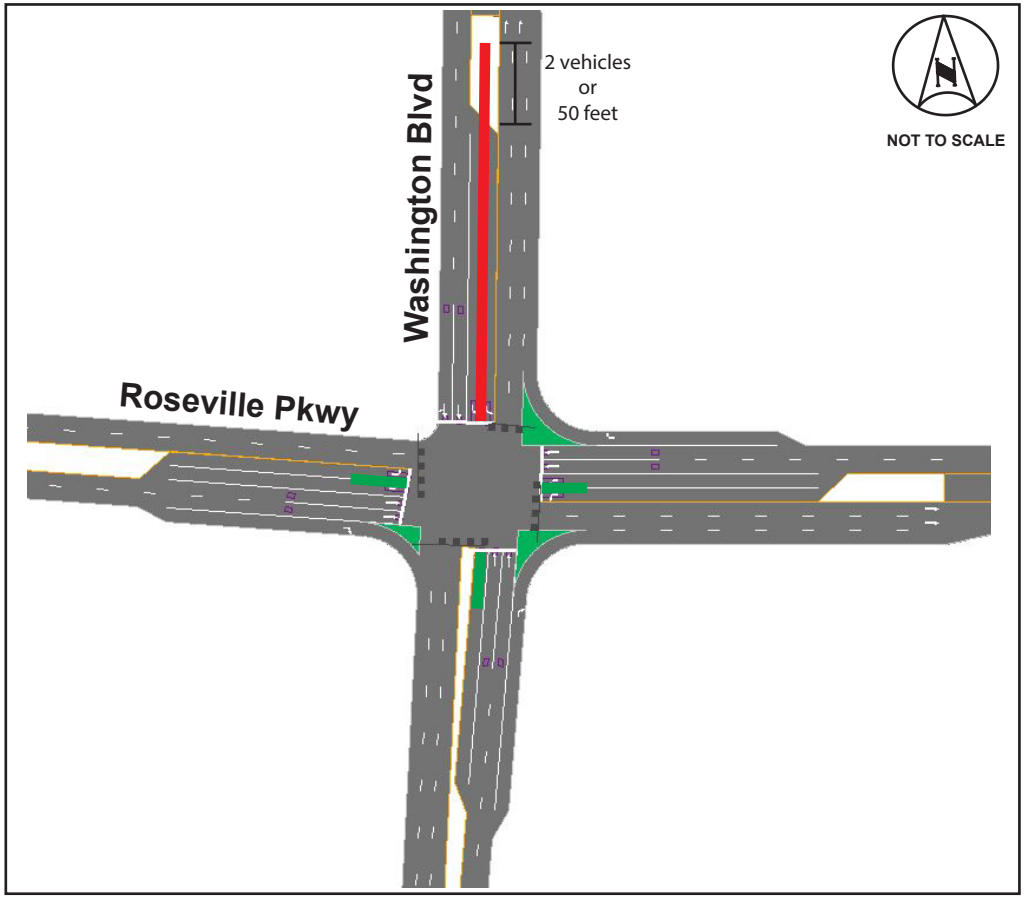
Kimley»Horn

Exhibit 4

Cumulative (2035) plus Proposed Project Conditions Peak-Hour Volumes



Intersection #1
Roseville Parkway @ Foothills Boulevard



Intersection #2
Roseville Parkway @ Washington Blvd

LEGEND

- Max 95th Percentile Queue Contained
- Max 95th Percentile Queue Exceeds Storage

Note: All reported queues are representative of Cumulative (2035) plus Proposed Project Conditions. See Table 3.

Kimley»Horn

Exhibit 5
Recommended Intersection Lane Configurations

Appendix A

Traffic Count Data Sheets

Turning Movement Volume Report

Report Date: 5/26/2020 12:49:09 PM

From 2/19/2020 to 2/19/2020

Intersection: 10

	N				S				E				W				
Time	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Int Total
19/02/20 00:00-01:00	4	29	1	34	2	29	0	31	1	1	10	12	0	0	1	1	78
19/02/20 01:00-02:00	2	19	1	22	0	22	0	22	1	0	1	2	0	0	0	0	46
19/02/20 02:00-03:00	0	19	0	19	3	39	2	44	0	0	1	1	0	1	0	1	65
19/02/20 03:00-04:00	1	16	0	17	1	21	2	24	1	0	3	4	0	0	0	0	45
19/02/20 04:00-05:00	1	36	0	37	1	34	2	37	3	0	5	8	0	0	0	0	82
19/02/20 05:00-06:00	32	100	0	132	2	111	17	130	5	0	4	9	0	0	0	0	271
19/02/20 06:00-07:00	59	275	1	335	5	229	25	259	5	0	15	20	0	0	1	1	615
19/02/20 07:00-08:00	45	497	0	542	8	524	36	568	12	6	48	66	0	1	0	1	1177
19/02/20 08:00-09:00	71	694	1	766	5	487	55	547	26	10	43	79	2	1	0	3	1395
19/02/20 09:00-10:00	40	411	2	453	4	355	49	408	21	1	55	77	2	0	0	2	940
19/02/20 10:00-11:00	16	302	1	319	6	280	21	307	8	1	26	35	0	0	2	2	663
19/02/20 11:00-12:00	26	340	2	368	6	347	20	373	31	2	39	72	0	1	2	3	816
19/02/20 12:00-13:00	43	426	0	469	12	390	28	430	42	1	42	85	1	0	3	4	988
19/02/20 13:00-14:00	44	394	3	441	8	402	29	439	22	3	35	60	5	0	2	7	947
19/02/20 14:00-15:00	21	341	0	362	9	461	17	487	38	4	86	128	2	0	4	6	983
19/02/20 15:00-16:00	48	485	1	534	14	635	12	661	23	1	92	116	0	0	1	1	1312
19/02/20 16:00-17:00	44	537	4	585	28	809	14	851	41	0	107	148	1	0	4	5	1589
19/02/20 17:00-18:00	48	627	0	675	11	830	21	862	54	0	109	163	0	0	0	0	1700
19/02/20 18:00-19:00	61	489	2	552	12	494	15	521	30	1	57	88	1	0	2	3	1164
19/02/20 19:00-20:00	44	289	2	335	5	264	3	272	25	0	35	60	2	0	2	4	671
19/02/20 20:00-21:00	31	227	0	258	5	178	3	186	7	0	16	23	0	4	0	4	471
19/02/20 21:00-22:00	18	151	0	169	3	165	7	175	5	0	22	27	0	0	0	0	371
19/02/20 22:00-23:00	3	90	0	93	1	76	2	79	3	0	3	6	0	0	0	0	178
19/02/20 23:00-00:00	5	55	1	61	2	49	0	51	1	0	4	5	0	0	0	0	117
Summary	707	6849	22	7578	153	7231	380	7764	405	31	858	1294	16	8	24	48	16684

Turning Movement Volume Report

Report Date: 5/26/2020 12:50:07 PM

From 2/19/2020 to 2/19/2020

Intersection: 83

	N				S				E				W				
Time	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Int Total
19/02/20 00:00-01:00	0	19	1	20	3	30		33	0	0	0	0	1		14	15	68
19/02/20 01:00-02:00	0	6	1	7	5	21		26	0	0	0	0	1		6	7	40
19/02/20 02:00-03:00	0	10	0	10	2	7		9	0	0	0	0	0		5	5	24
19/02/20 03:00-04:00	0	6	0	6	4	3		7	0	0	0	0	1		3	4	17
19/02/20 04:00-05:00	1	35	1	37	11	20		31	0	0	0	0	2		9	11	79
19/02/20 05:00-06:00	10	73	0	83	34	106		140	0	0	0	0	14		37	51	274
19/02/20 06:00-07:00	15	165	7	187	85	226		311	0	0	0	0	29		95	124	622
19/02/20 07:00-08:00	12	267	19	298	540	391		931	0	0	0	0	42		191	233	1462
19/02/20 08:00-09:00	6	375	29	410	433	361		794	0	0	0	0	65		275	340	1544
19/02/20 09:00-10:00	13	258	40	311	339	323		662	0	0	0	0	48		167	215	1188
19/02/20 10:00-11:00	5	198	24	227	265	257		522	0	0	0	0	38		198	236	985
19/02/20 11:00-12:00	13	272	43	328	320	327		647	0	0	0	0	53		258	311	1286
19/02/20 12:00-13:00	9	230	54	293	314	304		618	0	0	0	0	54		326	380	1291
19/02/20 13:00-14:00	3	277	42	322	267	332		599	0	0	0	0	49		321	370	1291
19/02/20 14:00-15:00	6	261	34	301	307	404		711	0	0	0	0	46		283	329	1341
19/02/20 15:00-16:00	6	386	64	456	418	478		896	0	0	0	0	55		373	428	1780
19/02/20 16:00-17:00	2	409	49	460	466	526		992	0	0	0	0	51		437	488	1940
19/02/20 17:00-18:00	2	438	55	495	432	602		1034	0	0	0	0	68		507	575	2104
19/02/20 18:00-19:00	2	337	44	383	263	434		697	0	0	0	0	27		402	429	1509
19/02/20 19:00-20:00	3	240	21	264	152	232		384	0	0	0	0	35		287	322	970
19/02/20 20:00-21:00	1	191	18	210	92	182		274	0	0	0	0	16		196	212	696
19/02/20 21:00-22:00	0	162	24	186	63	125		188	0	0	0	0	13		136	149	523
19/02/20 22:00-23:00	1	72	9	82	36	82		118	0	0	0	0	5		66	71	271
19/02/20 23:00-00:00	0	36	5	41	20	64		84	0	0	0	0	3		24	27	152
Summary	110	4723	584	5417	4871	5837	0	10708	0	0	0	0	716	0	4616	5332	21457

Appendix B

Analysis Worksheets for Existing (2020) Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	10	40	10	10	10	70	690	10	10	490	60
Future Volume (veh/h)	30	10	40	10	10	10	70	690	10	10	490	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	33	11	43	11	11	11	76	750	11	11	533	65
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	253	623	278	87	452	202	453	1360	606	50	993	443
Arrive On Green	0.07	0.18	0.18	0.03	0.13	0.13	0.13	0.39	0.39	0.03	0.28	0.28
Sat Flow, veh/h	3401	3497	1560	3401	3497	1560	3401	3497	1560	1753	3497	1560
Grp Volume(v), veh/h	33	11	43	11	11	11	76	750	11	11	533	65
Grp Sat Flow(s),veh/h/ln	1700	1749	1560	1700	1749	1560	1700	1749	1560	1753	1749	1560
Q Serve(g_s), s	0.4	0.1	1.1	0.2	0.1	0.3	0.9	7.9	0.2	0.3	6.1	1.5
Cycle Q Clear(g_c), s	0.4	0.1	1.1	0.2	0.1	0.3	0.9	7.9	0.2	0.3	6.1	1.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	253	623	278	87	452	202	453	1360	606	50	993	443
V/C Ratio(X)	0.13	0.02	0.15	0.13	0.02	0.05	0.17	0.55	0.02	0.22	0.54	0.15
Avail Cap(c_a), veh/h	1433	1473	657	1433	1473	657	1433	3315	1479	738	3315	1479
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.5	16.1	16.5	22.6	18.1	18.1	18.2	11.3	8.9	22.5	14.4	12.7
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.2	0.0	0.0	0.1	0.5	0.0	0.8	0.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.4	0.1	0.0	0.1	0.3	2.2	0.1	0.1	1.9	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.6	16.1	16.6	22.9	18.1	18.2	18.3	11.8	8.9	23.4	15.0	12.9
LnGrp LOS	C	B	B	C	B	B	B	B	A	C	B	B
Approach Vol, veh/h		87			33			837			609	
Approach Delay, s/veh		18.1			19.7			12.3			14.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.4	24.5	5.2	12.5	10.3	19.5	7.5	10.1
Change Period (Y+Rc), s	4.0	6.0	4.0	4.0	4.0	6.0	4.0	4.0
Max Green Setting (Gmax), s	20.0	45.0	20.0	20.0	20.0	45.0	20.0	20.0
Max Q Clear Time (g_c+I1), s	2.3	9.9	2.2	3.1	2.9	8.1	2.4	2.3
Green Ext Time (p_c), s	0.0	7.6	0.0	0.1	0.1	5.4	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	13.8
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	10	10	70	10	280	10	380	30	430	360	10
Future Volume (veh/h)	10	10	10	70	10	280	10	380	30	430	360	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	11	11	11	76	11	0	11	413	0	467	391	11
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	34	34	34	384	0		55	848		755	1505	42
Arrive On Green	0.06	0.06	0.06	0.11	0.11	0.00	0.03	0.24	0.00	0.22	0.43	0.43
Sat Flow, veh/h	570	570	570	3401	0	1560	1753	3497	1560	3401	3474	98
Grp Volume(v), veh/h	33	0	0	76	0	0	11	413	0	467	196	206
Grp Sat Flow(s),veh/h/ln	1710	0	0	1700	0	1560	1753	1749	1560	1700	1749	1823
Q Serve(g_s), s	0.9	0.0	0.0	1.0	0.0	0.0	0.3	5.0	0.0	6.1	3.5	3.6
Cycle Q Clear(g_c), s	0.9	0.0	0.0	1.0	0.0	0.0	0.3	5.0	0.0	6.1	3.5	3.6
Prop In Lane	0.33		0.33	1.00		1.00	1.00		1.00	1.00		0.05
Lane Grp Cap(c), veh/h	101	0	0	384	0		55	848		755	758	790
V/C Ratio(X)	0.33	0.00	0.00	0.20	0.00		0.20	0.49		0.62	0.26	0.26
Avail Cap(c_a), veh/h	691	0	0	1375	0		673	3181		1306	1590	1658
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.3	0.0	0.0	19.9	0.0	0.0	23.4	16.1	0.0	17.4	9.0	9.0
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.1	0.0	0.0	0.7	0.8	0.0	0.3	0.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.0	0.3	0.0	0.0	0.1	1.7	0.0	2.0	1.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.0	0.0	0.0	20.0	0.0	0.0	24.0	16.9	0.0	17.7	9.3	9.3
LnGrp LOS	C	A	A	C	A		C	B		B	A	A
Approach Vol, veh/h		33			76	A		424	A		869	
Approach Delay, s/veh		23.0			20.0			17.1			13.8	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.0	18.0		6.9	5.5	27.4		9.6
Change Period (Y+Rc), s	4.0	6.0		4.0	4.0	6.0		4.0
Max Green Setting (Gmax), s	19.0	45.0		20.0	19.0	45.0		20.0
Max Q Clear Time (g_c+I1), s	8.1	7.0		2.9	2.3	5.6		3.0
Green Ext Time (p_c), s	0.7	5.0		0.1	0.0	4.4		0.1

Intersection Summary	
HCM 6th Ctrl Delay	15.4
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	33	11	43	11	11	11	76	750	11	11	533	65
v/c Ratio	0.04	0.01	0.09	0.02	0.02	0.03	0.10	0.31	0.01	0.03	0.26	0.07
Control Delay	24.6	22.1	0.8	26.1	26.0	0.1	23.6	9.6	0.0	25.6	13.6	3.6
Queue Delay	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 Delay	24.6	22.1	0.8	26.1	26.0	0.1	23.6	9.6	0.0	25.6	13.6	3.6
Queue Length 50th (ft)	3	1	0	1	1	0	8	49	0	2	64	0
Queue Length 95th (ft)	19	10	3	9	10	0	35	197	0	19	135	18
Internal Link Dist (ft)		1797			980			312			2459	
Turn Bay Length (ft)	220		230	220		230	265		265	255		160
Base Capacity (vph)	1497	1575	758	1497	1543	745	1497	2927	1322	772	2927	1322
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.01	0.06	0.01	0.01	0.01	0.05	0.26	0.01	0.01	0.18	0.05

Intersection Summary

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	33	76	11	304	11	413	33	467	402
v/c Ratio	0.15	0.09	no cap	0.50	0.04	0.51	0.08	0.62	0.24
Control Delay	28.6	24.3		6.8	32.9	28.1	0.4	31.5	14.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.6	24.3	Error	6.8	32.9	28.1	0.4	31.5	14.1
Queue Length 50th (ft)	10	14	0	0	5	97	0	111	59
Queue Length 95th (ft)	39	34	0	63	21	145	2	171	122
Internal Link Dist (ft)	602		342			3613			349
Turn Bay Length (ft)		235			200		220	245	
Base Capacity (vph)	524	1013	1	679	496	2334	1070	962	2325
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.08	11.00	0.45	0.02	0.18	0.03	0.49	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	10	110	10	10	10	50	630	10	10	830	20
Future Volume (veh/h)	50	10	110	10	10	10	50	630	10	10	830	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	54	11	120	11	11	11	54	685	11	11	902	22
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	329	720	321	85	469	252	329	1600	714	49	1359	606
Arrive On Green	0.10	0.21	0.21	0.02	0.13	0.13	0.10	0.46	0.46	0.03	0.39	0.39
Sat Flow, veh/h	3401	3497	1560	3401	3497	1560	3401	3497	1560	1753	3497	1560
Grp Volume(v), veh/h	54	11	120	11	11	11	54	685	11	11	902	22
Grp Sat Flow(s),veh/h/ln	1700	1749	1560	1700	1749	1560	1700	1749	1560	1753	1749	1560
Q Serve(g_s), s	0.9	0.2	4.2	0.2	0.2	0.4	0.9	8.4	0.2	0.4	13.5	0.6
Cycle Q Clear(g_c), s	0.9	0.2	4.2	0.2	0.2	0.4	0.9	8.4	0.2	0.4	13.5	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	329	720	321	85	469	252	329	1600	714	49	1359	606
V/C Ratio(X)	0.16	0.02	0.37	0.13	0.02	0.04	0.16	0.43	0.02	0.23	0.66	0.04
Avail Cap(c_a), veh/h	1073	1103	492	1073	1103	535	1073	2482	1107	553	2482	1107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.3	20.1	21.7	30.2	23.9	22.4	26.3	11.6	9.4	30.2	16.0	12.0
Incr Delay (d2), s/veh	0.1	0.0	0.3	0.3	0.0	0.0	0.1	0.3	0.0	0.9	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.1	1.5	0.1	0.1	0.1	0.3	2.6	0.1	0.2	4.5	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.4	20.1	21.9	30.5	23.9	22.5	26.4	11.9	9.4	31.0	16.7	12.1
LnGrp LOS	C	C	C	C	C	C	C	B	A	C	B	B
Approach Vol, veh/h		185			33			750			935	
Approach Delay, s/veh		23.1			25.6			12.9			16.8	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.8	35.0	5.6	17.1	10.1	30.6	10.1	12.5
Change Period (Y+Rc), s	4.0	6.0	4.0	4.0	4.0	6.0	4.0	4.0
Max Green Setting (Gmax), s	20.0	45.0	20.0	20.0	20.0	45.0	20.0	20.0
Max Q Clear Time (g_c+I1), s	2.4	10.4	2.2	6.2	2.9	15.5	2.9	2.4
Green Ext Time (p_c), s	0.0	6.7	0.0	0.2	0.1	9.2	0.1	0.0

Intersection Summary	
HCM 6th Ctrl Delay	16.0
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	10	10	70	10	510	10	440	60	430	600	10
Future Volume (veh/h)	10	10	10	70	10	510	10	440	60	430	600	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	11	11	11	76	11	0	11	478	0	467	652	11
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	33	33	33	376	0		55	939		725	1586	27
Arrive On Green	0.06	0.06	0.06	0.11	0.11	0.00	0.03	0.27	0.00	0.21	0.45	0.45
Sat Flow, veh/h	570	570	570	3401	0	1560	1753	3497	1560	3401	3519	59
Grp Volume(v), veh/h	33	0	0	76	0	0	11	478	0	467	324	339
Grp Sat Flow(s),veh/h/ln	1710	0	0	1700	0	1560	1753	1749	1560	1700	1749	1830
Q Serve(g_s), s	1.0	0.0	0.0	1.0	0.0	0.0	0.3	6.0	0.0	6.5	6.4	6.4
Cycle Q Clear(g_c), s	1.0	0.0	0.0	1.0	0.0	0.0	0.3	6.0	0.0	6.5	6.4	6.4
Prop In Lane	0.33		0.33	1.00		1.00	1.00		1.00	1.00		0.03
Lane Grp Cap(c), veh/h	100	0	0	376	0		55	939		725	788	825
V/C Ratio(X)	0.33	0.00	0.00	0.20	0.00		0.20	0.51		0.64	0.41	0.41
Avail Cap(c_a), veh/h	664	0	0	1320	0		646	3054		1254	1527	1598
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.3	0.0	0.0	20.8	0.0	0.0	24.3	16.0	0.0	18.5	9.5	9.5
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.1	0.0	0.0	0.7	0.8	0.0	0.4	0.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.0	0.4	0.0	0.0	0.1	2.0	0.0	2.1	1.9	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.0	0.0	0.0	20.9	0.0	0.0	25.0	16.8	0.0	18.8	10.2	10.2
LnGrp LOS	C	A	A	C	A		C	B		B	B	B
Approach Vol, veh/h		33			76	A		489	A		1130	
Approach Delay, s/veh		24.0			20.9			17.0			13.8	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.0	19.8		7.0	5.6	29.2		9.7
Change Period (Y+Rc), s	4.0	6.0		4.0	4.0	6.0		4.0
Max Green Setting (Gmax), s	19.0	45.0		20.0	19.0	45.0		20.0
Max Q Clear Time (g_c+I1), s	8.5	8.0		3.0	2.3	8.4		3.0
Green Ext Time (p_c), s	0.7	5.9		0.1	0.0	7.9		0.1

Intersection Summary	
HCM 6th Ctrl Delay	15.2
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	54	11	120	11	11	11	54	685	11	11	902	22
v/c Ratio	0.08	0.02	0.30	0.02	0.02	0.02	0.08	0.33	0.01	0.03	0.47	0.02
Control Delay	25.8	27.0	9.3	27.9	27.9	0.1	25.8	10.2	0.0	27.4	13.1	0.1
Queue Delay	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 Delay	25.8	27.0	9.3	27.9	27.9	0.1	25.8	10.2	0.0	27.4	13.1	0.1
Queue Length 50th (ft)	8	1	0	1	1	0	8	43	0	3	124	0
Queue Length 95th (ft)	30	10	47	10	10	0	30	174	0	20	242	0
Internal Link Dist (ft)		1797			980			312			2459	
Turn Bay Length (ft)	220		230	220		230	265		265	255		160
Base Capacity (vph)	1337	1378	689	1337	1378	803	1337	2828	1280	689	2828	1280
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.01	0.17	0.01	0.01	0.01	0.04	0.24	0.01	0.02	0.32	0.02

Intersection Summary

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	33	76	11	554	11	478	65	467	663
v/c Ratio	0.16	0.10	no cap	0.70	0.04	0.54	0.14	0.64	0.38
Control Delay	30.0	26.0		8.4	34.8	27.8	5.3	33.2	14.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.0	26.0	Error	8.4	34.8	27.8	5.3	33.2	14.7
Queue Length 50th (ft)	11	15	0	0	5	115	0	116	107
Queue Length 95th (ft)	40	36	0	95	22	167	23	180	204
Internal Link Dist (ft)	602		342			3613			349
Turn Bay Length (ft)		235			200		220	245	
Base Capacity (vph)	507	980	1	844	480	2266	1042	931	2263
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.08	11.00	0.66	0.02	0.21	0.06	0.50	0.29

Intersection Summary

Appendix C

Analysis Worksheets for
Existing (2020) plus Proposed Project Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	180	110	30	100	50	90	660	100	250	410	10
Future Volume (veh/h)	10	180	110	30	100	50	90	660	100	250	410	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	11	196	120	33	109	54	98	717	109	272	446	11
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	25	474	211	125	553	425	252	1248	556	389	1388	619
Arrive On Green	0.01	0.14	0.14	0.04	0.16	0.16	0.07	0.36	0.36	0.11	0.40	0.40
Sat Flow, veh/h	1753	3497	1560	3401	3497	1560	3401	3497	1560	3401	3497	1560
Grp Volume(v), veh/h	11	196	120	33	109	54	98	717	109	272	446	11
Grp Sat Flow(s),veh/h/ln	1753	1749	1560	1700	1749	1560	1700	1749	1560	1700	1749	1560
Q Serve(g_s), s	0.3	2.6	3.6	0.5	1.4	1.3	1.4	8.4	2.4	3.9	4.4	0.2
Cycle Q Clear(g_c), s	0.3	2.6	3.6	0.5	1.4	1.3	1.4	8.4	2.4	3.9	4.4	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	25	474	211	125	553	425	252	1248	556	389	1388	619
V/C Ratio(X)	0.44	0.41	0.57	0.26	0.20	0.13	0.39	0.57	0.20	0.70	0.32	0.02
Avail Cap(c_a), veh/h	174	1248	556	337	1248	735	357	1248	556	404	1388	619
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.7	20.0	20.4	23.6	18.5	13.8	22.3	13.1	11.2	21.5	10.5	9.2
Incr Delay (d2), s/veh	11.9	0.6	2.4	1.1	0.2	0.1	1.0	1.9	0.8	5.1	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.0	1.3	0.2	0.5	0.4	0.5	2.8	0.8	1.6	1.4	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.6	20.5	22.8	24.8	18.6	14.0	23.3	15.1	12.0	26.6	11.1	9.3
LnGrp LOS	D	C	C	C	B	B	C	B	B	C	B	A
Approach Vol, veh/h		327			196			924			729	
Approach Delay, s/veh		21.9			18.4			15.6			16.9	
Approach LOS		C			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.3	22.5	6.4	11.3	8.2	24.5	5.2	12.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.0	18.0	5.0	18.0	5.3	18.7	5.0	18.0
Max Q Clear Time (g_c+I1), s	5.9	10.4	2.5	5.6	3.4	6.4	2.3	3.4
Green Ext Time (p_c), s	0.0	2.9	0.0	1.2	0.0	2.1	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	17.2
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	320	180	50	140	250	20	360	30	220	170	20
Future Volume (veh/h)	30	320	180	50	140	250	20	360	30	220	170	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	33	348	0	54	152	0	22	391	0	239	185	22
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	123	564		176	617		46	1211		348	1332	156
Arrive On Green	0.04	0.16	0.00	0.05	0.18	0.00	0.03	0.35	0.00	0.10	0.42	0.42
Sat Flow, veh/h	3401	3497	1560	3401	3497	1560	1753	3497	1560	3401	3153	370
Grp Volume(v), veh/h	33	348	0	54	152	0	22	391	0	239	102	105
Grp Sat Flow(s),veh/h/ln	1700	1749	1560	1700	1749	1560	1753	1749	1560	1700	1749	1774
Q Serve(g_s), s	0.5	4.9	0.0	0.8	2.0	0.0	0.7	4.4	0.0	3.6	1.9	1.9
Cycle Q Clear(g_c), s	0.5	4.9	0.0	0.8	2.0	0.0	0.7	4.4	0.0	3.6	1.9	1.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	123	564		176	617		46	1211		348	739	749
V/C Ratio(X)	0.27	0.62		0.31	0.25		0.48	0.32		0.69	0.14	0.14
Avail Cap(c_a), veh/h	320	1184		320	1184		165	1211		358	739	749
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	20.8	0.0	24.3	18.8	0.0	25.5	12.8	0.0	23.0	9.4	9.4
Incr Delay (d2), s/veh	1.1	1.1	0.0	1.0	0.2	0.0	7.6	0.7	0.0	5.2	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.9	0.0	0.3	0.7	0.0	0.3	1.5	0.0	1.5	0.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.1	21.9	0.0	25.3	19.0	0.0	33.2	13.5	0.0	28.2	9.8	9.8
LnGrp LOS	C	C		C	B		C	B		C	A	A
Approach Vol, veh/h		381	A		206	A		413	A		446	
Approach Delay, s/veh		22.2			20.7			14.5			19.7	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.9	22.9	7.2	13.1	5.9	27.0	6.4	13.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.6	18.4	5.0	18.0	5.0	19.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	5.6	6.4	2.8	6.9	2.7	3.9	2.5	4.0
Green Ext Time (p_c), s	0.0	1.8	0.0	1.6	0.0	0.8	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	19.0
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	196	120	33	109	54	98	717	109	272	446	11
v/c Ratio	0.06	0.34	0.30	0.10	0.16	0.08	0.27	0.56	0.16	0.66	0.27	0.01
Control Delay	24.4	20.8	3.7	23.8	17.2	1.3	24.7	16.0	1.5	33.0	11.7	0.0
Queue Delay	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 Delay	24.4	20.8	3.7	23.8	17.2	1.3	24.7	16.0	1.5	33.0	11.7	0.0
Queue Length 50th (ft)	3	24	0	4	13	0	12	70	0	35	38	0
Queue Length 95th (ft)	17	56	18	17	35	7	36	167	11	#103	98	0
Internal Link Dist (ft)		1797			3594			312			2459	
Turn Bay Length (ft)	220		230	220		230	265		265	255		160
Base Capacity (vph)	177	1276	682	344	1286	704	364	1276	682	412	1634	824
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.15	0.18	0.10	0.08	0.08	0.27	0.56	0.16	0.66	0.27	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	33	348	196	54	152	272	22	391	33	239	207
v/c Ratio	0.10	0.50	0.13	0.17	0.19	0.18	0.13	0.33	0.02	0.68	0.12
Control Delay	26.4	22.5	0.2	26.8	18.0	0.2	28.1	15.7	0.0	37.7	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.4	22.5	0.2	26.8	18.0	0.2	28.1	15.7	0.0	37.7	9.7
Queue Length 50th (ft)	5	57	0	9	18	0	7	54	0	42	16
Queue Length 95th (ft)	18	92	0	25	44	0	27	95	0	#99	49
Internal Link Dist (ft)		3594			342			340			349
Turn Bay Length (ft)	260		260	235		200	200		220	245	
Base Capacity (vph)	316	1173	1553	316	1203	1553	163	1200	1553	354	1734
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.30	0.13	0.17	0.13	0.18	0.13	0.33	0.02	0.68	0.12

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	210	150	90	170	70	90	550	60	260	800	10
Future Volume (veh/h)	10	210	150	90	170	70	90	550	60	260	800	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	11	228	163	98	185	76	98	598	65	283	870	11
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	25	561	250	241	760	507	241	1159	517	367	1289	575
Arrive On Green	0.01	0.16	0.16	0.07	0.22	0.22	0.07	0.33	0.33	0.11	0.37	0.37
Sat Flow, veh/h	1753	3497	1560	3401	3497	1560	3401	3497	1560	3401	3497	1560
Grp Volume(v), veh/h	11	228	163	98	185	76	98	598	65	283	870	11
Grp Sat Flow(s),veh/h/ln	1753	1749	1560	1700	1749	1560	1700	1749	1560	1700	1749	1560
Q Serve(g_s), s	0.3	3.2	5.4	1.5	2.4	1.9	1.5	7.5	1.6	4.4	11.4	0.2
Cycle Q Clear(g_c), s	0.3	3.2	5.4	1.5	2.4	1.9	1.5	7.5	1.6	4.4	11.4	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	25	561	250	241	760	507	241	1159	517	367	1289	575
V/C Ratio(X)	0.45	0.41	0.65	0.41	0.24	0.15	0.41	0.52	0.13	0.77	0.68	0.02
Avail Cap(c_a), veh/h	160	1152	514	311	1152	682	311	1159	517	367	1289	575
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.7	20.6	21.5	24.3	17.7	13.1	24.3	14.7	12.7	23.7	14.5	11.0
Incr Delay (d2), s/veh	12.1	0.5	2.9	1.1	0.2	0.1	1.1	1.6	0.5	9.6	2.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.2	2.0	0.6	0.9	0.6	0.6	2.6	0.6	2.0	4.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.8	21.1	24.4	25.4	17.8	13.2	25.4	16.4	13.2	33.3	17.4	11.0
LnGrp LOS	D	C	C	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		402			359			761			1164	
Approach Delay, s/veh		22.9			18.9			17.3			21.2	
Approach LOS		C			B			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.4	22.6	8.4	13.3	8.4	24.6	5.3	16.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.9	18.1	5.0	18.0	5.0	19.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	6.4	9.5	3.5	7.4	3.5	13.4	2.3	4.4
Green Ext Time (p_c), s	0.0	2.5	0.0	1.4	0.0	2.6	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	20.0
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	320	200	60	260	450	40	470	50	210	410	30
Future Volume (veh/h)	10	320	200	60	260	450	40	470	50	210	410	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	11	348	0	65	283	0	43	511	0	228	446	33
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	48	562		197	715		77	1210		336	1323	98
Arrive On Green	0.01	0.16	0.00	0.06	0.20	0.00	0.04	0.35	0.00	0.10	0.40	0.40
Sat Flow, veh/h	3401	3497	1560	3401	3497	1560	1753	3497	1560	3401	3302	244
Grp Volume(v), veh/h	11	348	0	65	283	0	43	511	0	228	236	243
Grp Sat Flow(s),veh/h/ln	1700	1749	1560	1700	1749	1560	1753	1749	1560	1700	1749	1797
Q Serve(g_s), s	0.2	5.0	0.0	1.0	3.7	0.0	1.3	6.0	0.0	3.5	5.0	5.0
Cycle Q Clear(g_c), s	0.2	5.0	0.0	1.0	3.7	0.0	1.3	6.0	0.0	3.5	5.0	5.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.14
Lane Grp Cap(c), veh/h	48	562		197	715		77	1210		336	701	720
V/C Ratio(X)	0.23	0.62		0.33	0.40		0.56	0.42		0.68	0.34	0.34
Avail Cap(c_a), veh/h	318	1177		318	1177		164	1210		350	701	720
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.1	20.9	0.0	24.2	18.4	0.0	25.0	13.4	0.0	23.3	11.1	11.1
Incr Delay (d2), s/veh	2.4	1.1	0.0	1.0	0.4	0.0	6.1	1.1	0.0	5.0	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.9	0.0	0.4	1.3	0.0	0.6	2.0	0.0	1.4	1.7	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.5	22.0	0.0	25.2	18.8	0.0	31.1	14.5	0.0	28.2	12.4	12.4
LnGrp LOS	C	C		C	B		C	B		C	B	B
Approach Vol, veh/h		359	A		348	A		554	A		707	
Approach Delay, s/veh		22.2			20.0			15.8			17.5	
Approach LOS		C			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.8	23.0	7.6	13.1	6.9	25.9	5.3	15.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.5	18.5	5.0	18.0	5.0	19.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	5.5	8.0	3.0	7.0	3.3	7.0	2.2	5.7
Green Ext Time (p_c), s	0.0	2.2	0.0	1.6	0.0	2.0	0.0	1.2

Intersection Summary	
HCM 6th Ctrl Delay	18.3
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	228	163	98	185	76	98	598	65	283	870	11
v/c Ratio	0.07	0.39	0.40	0.31	0.20	0.10	0.31	0.51	0.10	0.76	0.63	0.02
Control Delay	25.6	22.8	6.9	27.6	16.4	2.3	27.6	17.4	0.3	41.6	18.5	0.0
Queue Delay	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 Delay	25.6	22.8	6.9	27.6	16.4	2.3	27.6	17.4	0.3	41.6	18.5	0.0
Queue Length 50th (ft)	3	36	0	15	22	0	15	84	0	48	131	0
Queue Length 95th (ft)	17	63	36	37	53	15	37	138	0	#111	#212	0
Internal Link Dist (ft)		1797			3594			312			2459	
Turn Bay Length (ft)	220		230	220		230	265		265	255		160
Base Capacity (vph)	161	1165	638	314	1187	772	314	1171	640	370	1380	723
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.20	0.26	0.31	0.16	0.10	0.31	0.51	0.10	0.76	0.63	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	11	348	217	65	283	489	43	511	54	228	479
v/c Ratio	0.04	0.47	0.43	0.21	0.29	0.67	0.27	0.43	0.08	0.67	0.30
Control Delay	27.2	21.5	6.3	28.2	16.4	8.8	31.4	17.3	0.3	38.6	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	21.5	6.3	28.2	16.4	8.8	31.4	17.3	0.3	38.6	13.2
Queue Length 50th (ft)	2	57	0	11	35	17	15	75	0	41	48
Queue Length 95th (ft)	9	91	44	29	75	105	44	132	0	#100	119
Internal Link Dist (ft)		3594			342			3613			349
Turn Bay Length (ft)	200		200	235		200	200		220	245	
Base Capacity (vph)	311	1153	661	311	1260	828	160	1185	646	341	1607
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.30	0.33	0.21	0.22	0.59	0.27	0.43	0.08	0.67	0.30

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Appendix D

Analysis Worksheets for
Cumulative (2035) plus Proposed Project Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	271	164	356	460	374	244	941	358	572	580	19
Future Volume (veh/h)	21	271	164	356	460	374	244	941	358	572	580	19
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	23	295	178	387	500	407	265	1023	389	622	630	21
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	43	522	233	434	882	703	351	1091	487	675	1425	635
Arrive On Green	0.02	0.15	0.15	0.13	0.25	0.25	0.10	0.31	0.31	0.20	0.41	0.41
Sat Flow, veh/h	1753	3497	1560	3401	3497	1560	3401	3497	1560	3401	3497	1560
Grp Volume(v), veh/h	23	295	178	387	500	407	265	1023	389	622	630	21
Grp Sat Flow(s),veh/h/ln	1753	1749	1560	1700	1749	1560	1700	1749	1560	1700	1749	1560
Q Serve(g_s), s	1.1	6.6	9.3	9.5	10.6	16.4	6.4	24.1	19.3	15.2	11.0	0.7
Cycle Q Clear(g_c), s	1.1	6.6	9.3	9.5	10.6	16.4	6.4	24.1	19.3	15.2	11.0	0.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	43	522	233	434	882	703	351	1091	487	675	1425	635
V/C Ratio(X)	0.53	0.57	0.76	0.89	0.57	0.58	0.76	0.94	0.80	0.92	0.44	0.03
Avail Cap(c_a), veh/h	114	744	332	434	963	739	502	1091	487	675	1425	635
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.8	33.4	34.6	36.3	27.6	17.3	36.9	28.3	26.7	33.3	18.1	15.1
Incr Delay (d2), s/veh	9.8	1.0	6.5	20.1	0.7	1.0	4.0	15.9	12.9	18.1	1.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	2.8	3.9	5.1	4.4	5.7	2.7	11.5	8.6	7.5	4.2	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.5	34.4	41.0	56.4	28.3	18.3	40.9	44.2	39.6	51.4	19.1	15.2
LnGrp LOS	D	C	D	E	C	B	D	D	D	D	B	B
Approach Vol, veh/h		496			1294			1677			1273	
Approach Delay, s/veh		37.5			33.6			42.6			34.8	
Approach LOS		D			C			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.3	30.9	15.3	17.1	13.2	39.0	6.6	25.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	16.8	26.4	10.8	18.0	12.5	30.7	5.5	23.3
Max Q Clear Time (g_c+I1), s	17.2	26.1	11.5	11.3	8.4	13.0	3.1	18.4
Green Ext Time (p_c), s	0.0	0.2	0.0	1.4	0.3	3.7	0.0	2.2

Intersection Summary	
HCM 6th Ctrl Delay	37.5
HCM 6th LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	43	635	7	24	766	543	29	535	25	307	642	19
Future Volume (veh/h)	43	635	7	24	766	543	29	535	25	307	642	19
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	47	690	0	26	833	0	32	582	0	334	698	21
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	146	1047		97	996		58	1007		427	1318	40
Arrive On Green	0.04	0.30	0.00	0.03	0.28	0.00	0.03	0.29	0.00	0.13	0.38	0.38
Sat Flow, veh/h	3401	3497	1560	3401	3497	1560	1753	3497	1560	3401	3466	104
Grp Volume(v), veh/h	47	690	0	26	833	0	32	582	0	334	352	367
Grp Sat Flow(s),veh/h/ln	1700	1749	1560	1700	1749	1560	1753	1749	1560	1700	1749	1822
Q Serve(g_s), s	0.9	12.0	0.0	0.5	15.5	0.0	1.2	9.9	0.0	6.6	10.9	10.9
Cycle Q Clear(g_c), s	0.9	12.0	0.0	0.5	15.5	0.0	1.2	9.9	0.0	6.6	10.9	10.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.06
Lane Grp Cap(c), veh/h	146	1047		97	996		58	1007		427	665	693
V/C Ratio(X)	0.32	0.66		0.27	0.84		0.55	0.58		0.78	0.53	0.53
Avail Cap(c_a), veh/h	245	1132		245	1132		129	1007		465	665	693
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.3	21.3	0.0	33.1	23.3	0.0	33.1	21.1	0.0	29.5	16.7	16.7
Incr Delay (d2), s/veh	1.3	1.3	0.0	1.5	5.1	0.0	7.9	2.4	0.0	7.8	3.0	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	4.8	0.0	0.2	6.3	0.0	0.6	3.9	0.0	2.9	4.3	4.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.5	22.5	0.0	34.5	28.4	0.0	41.0	23.6	0.0	37.3	19.7	19.6
LnGrp LOS	C	C		C	C		D	C		D	B	B
Approach Vol, veh/h		737	A		859	A		614	A		1053	
Approach Delay, s/veh		23.2			28.6			24.5			25.3	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.2	24.5	6.5	25.3	6.8	30.9	7.5	24.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.5	20.0	5.0	22.5	5.1	24.4	5.0	22.5
Max Q Clear Time (g_c+I1), s	8.6	11.9	2.5	14.0	3.2	12.9	2.9	17.5
Green Ext Time (p_c), s	0.1	2.2	0.0	3.0	0.0	3.1	0.0	2.2

Intersection Summary	
HCM 6th Ctrl Delay	25.5
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	23	295	178	387	500	407	265	1023	389	622	630	21
v/c Ratio	0.21	0.56	0.46	0.90	0.50	0.46	0.60	0.95	0.58	0.93	0.48	0.03
Control Delay	43.7	37.5	8.9	64.1	28.2	10.8	41.4	47.9	12.3	57.6	22.5	0.1
Queue Delay	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 Delay	43.7	37.5	8.9	64.1	28.2	10.8	41.4	47.9	12.3	57.6	22.5	0.1
Queue Length 50th (ft)	12	77	0	105	108	71	68	275	48	168	132	0
Queue Length 95th (ft)	37	117	51	#204	181	176	113	#447	147	#294	203	0
Internal Link Dist (ft)		1797			3594			312			2459	
Turn Bay Length (ft)	220		230	220		230	265		265	255		160
Base Capacity (vph)	112	735	472	428	1021	892	495	1079	666	666	1312	700
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.40	0.38	0.90	0.49	0.46	0.54	0.95	0.58	0.93	0.48	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	47	690	8	26	833	590	32	582	27	334	719
v/c Ratio	0.19	0.60	0.01	0.11	0.78	0.86	0.25	0.58	0.05	0.74	0.48
Control Delay	34.8	22.7	0.0	33.9	29.0	27.1	38.2	25.3	0.2	41.9	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.8	22.7	0.0	33.9	29.0	27.1	38.2	25.3	0.2	41.9	17.8
Queue Length 50th (ft)	10	116	0	6	186	133	14	125	0	78	115
Queue Length 95th (ft)	26	203	0	18	#256	#332	40	177	0	#139	204
Internal Link Dist (ft)		3594			342			395			349
Turn Bay Length (ft)	260		260	235		200	200		220	245	
Base Capacity (vph)	242	1210	641	242	1122	703	127	997	555	459	1508
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.57	0.01	0.11	0.74	0.84	0.25	0.58	0.05	0.73	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	482	260	357	570	588	211	808	341	420	1233	6
Future Volume (veh/h)	25	482	260	357	570	588	211	808	341	420	1233	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	27	524	283	388	620	639	229	878	371	457	1340	7
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	48	699	312	420	1035	704	265	1123	501	530	1395	622
Arrive On Green	0.03	0.20	0.20	0.12	0.30	0.30	0.08	0.32	0.32	0.16	0.40	0.40
Sat Flow, veh/h	1753	3497	1560	3401	3497	1560	3401	3497	1560	3401	3497	1560
Grp Volume(v), veh/h	27	524	283	388	620	639	229	878	371	457	1340	7
Grp Sat Flow(s),veh/h/ln	1753	1749	1560	1700	1749	1560	1700	1749	1560	1700	1749	1560
Q Serve(g_s), s	1.4	12.7	16.0	10.2	13.7	26.6	6.0	20.5	19.1	11.8	33.6	0.2
Cycle Q Clear(g_c), s	1.4	12.7	16.0	10.2	13.7	26.6	6.0	20.5	19.1	11.8	33.6	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	48	699	312	420	1035	704	265	1123	501	530	1395	622
V/C Ratio(X)	0.56	0.75	0.91	0.92	0.60	0.91	0.87	0.78	0.74	0.86	0.96	0.01
Avail Cap(c_a), veh/h	105	700	312	420	1035	704	265	1123	501	563	1395	622
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.2	33.9	35.2	39.0	27.1	22.9	41.0	27.7	27.2	37.0	26.3	16.3
Incr Delay (d2), s/veh	10.0	4.5	28.7	26.2	1.0	15.5	24.6	5.4	9.5	12.5	16.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	5.6	8.4	5.7	5.7	14.7	3.3	8.7	8.2	5.6	15.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.3	38.4	63.9	65.2	28.1	38.5	65.6	33.1	36.7	49.6	42.7	16.4
LnGrp LOS	D	D	E	E	C	D	E	C	D	D	D	B
Approach Vol, veh/h		834			1647			1478			1804	
Approach Delay, s/veh		47.5			40.9			39.1			44.3	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.5	33.4	15.6	22.5	11.5	40.4	7.0	31.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	14.9	28.0	11.1	18.0	7.0	35.9	5.4	23.7
Max Q Clear Time (g_c+I1), s	13.8	22.5	12.2	18.0	8.0	35.6	3.4	28.6
Green Ext Time (p_c), s	0.2	3.1	0.0	0.0	0.0	0.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	42.4
HCM 6th LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	753	16	45	943	590	1	635	36	589	1017	55
Future Volume (veh/h)	55	753	16	45	943	590	1	635	36	589	1017	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	60	818	0	49	1025	0	1	690	0	640	1105	60
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
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	149	1123		135	1109		2	795		706	1462	79
Arrive On Green	0.04	0.32	0.00	0.04	0.32	0.00	0.00	0.23	0.00	0.21	0.43	0.43
Sat Flow, veh/h	3401	3497	1560	3401	3497	1560	1753	3497	1560	3401	3373	183
Grp Volume(v), veh/h	60	818	0	49	1025	0	1	690	0	640	573	592
Grp Sat Flow(s),veh/h/ln	1700	1749	1560	1700	1749	1560	1753	1749	1560	1700	1749	1808
Q Serve(g_s), s	1.5	18.2	0.0	1.2	24.9	0.0	0.1	16.7	0.0	16.2	24.3	24.3
Cycle Q Clear(g_c), s	1.5	18.2	0.0	1.2	24.9	0.0	0.1	16.7	0.0	16.2	24.3	24.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	149	1123		135	1109		2	795		706	758	784
V/C Ratio(X)	0.40	0.73		0.36	0.92		0.42	0.87		0.91	0.76	0.76
Avail Cap(c_a), veh/h	193	1132		193	1132		100	795		715	758	784
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.0	26.5	0.0	41.2	29.0	0.0	43.9	32.7	0.0	34.0	21.0	21.0
Incr Delay (d2), s/veh	1.8	2.4	0.0	1.6	12.4	0.0	86.6	12.4	0.0	15.2	6.9	6.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	7.7	0.0	0.5	11.4	0.0	0.1	7.9	0.0	7.7	10.2	10.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.7	28.9	0.0	42.8	41.4	0.0	130.5	45.1	0.0	49.2	27.9	27.7
LnGrp LOS	D	C		D	D		F	D		D	C	C
Approach Vol, veh/h		878	A		1074	A		691	A		1805	
Approach Delay, s/veh		29.8			41.5			45.2			35.4	
Approach LOS		C			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.8	24.5	8.0	32.8	4.6	42.7	8.3	32.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	18.5	20.0	5.0	28.5	5.0	33.5	5.0	28.5
Max Q Clear Time (g_c+I1), s	18.2	18.7	3.2	20.2	2.1	26.3	3.5	26.9
Green Ext Time (p_c), s	0.1	0.6	0.0	3.5	0.0	3.9	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	37.3
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	27	524	283	388	620	639	229	878	371	457	1340	7
v/c Ratio	0.26	0.79	0.58	0.92	0.55	0.72	0.87	0.80	0.57	0.82	0.96	0.01
Control Delay	46.8	44.0	12.6	69.0	28.2	19.2	72.2	34.7	13.2	50.0	43.0	0.0
Queue Delay	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 Delay	46.8	44.0	12.6	69.0	28.2	19.2	72.2	34.7	13.2	50.0	43.0	0.0
Queue Length 50th (ft)	15	148	22	114	138	182	67	240	58	130	384	0
Queue Length 95th (ft)	42	206	96	#201	225	#411	#132	315	147	#204	#538	0
Internal Link Dist (ft)		1797			3594			312			2459	
Turn Bay Length (ft)	220		230	220		230	265		265	255		160
Base Capacity (vph)	105	702	502	420	1119	893	264	1100	653	563	1399	734
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.75	0.56	0.92	0.55	0.72	0.87	0.80	0.57	0.81	0.96	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	60	818	17	49	1025	641	1	690	39	640	1165
v/c Ratio	0.31	0.69	0.01	0.25	0.92	0.41	0.01	0.86	0.03	0.91	0.72
Control Delay	45.3	29.2	0.0	44.2	43.9	0.8	40.0	45.8	0.0	53.1	23.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.3	29.2	0.0	44.2	43.9	0.8	40.0	45.8	0.0	53.1	23.3
Queue Length 50th (ft)	17	217	0	13	295	0	1	201	0	185	262
Queue Length 95th (ft)	37	286	0	31	#423	0	6	#302	0	#287	#455
Internal Link Dist (ft)		3594			342			284			349
Turn Bay Length (ft)	260		260	235		200	200		220	245	
Base Capacity (vph)	194	1213	1553	194	1140	1553	100	800	1553	718	1623
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.67	0.01	0.25	0.90	0.41	0.01	0.86	0.03	0.89	0.72

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.