Appendix C

Background Future Levels of Service

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1531	72	0	4024	0	0	0	0	0	82	798
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0						5.0	5.0
Lane Util. Factor		0.86			0.86						0.95	0.95
Frt		0.99			1.00						0.88	0.85
Flt Protected		1.00			1.00						1.00	1.00
Satd. Flow (prot)		6365			6408						1553	1504
Flt Permitted		1.00			1.00						1.00	1.00
Satd. Flow (perm)		6365			6408						1553	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1664	78	0	4374	0	0	0	0	0	89	867
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	125	191
Lane Group Flow (vph)	0	1737	0	0	4374	0	0	0	0	0	363	277
Turn Type												Perm
Protected Phases		4			8						6	
Permitted Phases												6
Actuated Green, G (s)		80.0			80.0						16.0	16.0
Effective Green, g (s)		80.0			80.0						16.0	16.0
Actuated g/C Ratio		0.62			0.62						0.12	0.12
Clearance Time (s)		6.0			6.0						5.0	5.0
Lane Grp Cap (vph)		3917			3943						191	185
v/s Ratio Prot		0.27			c0.68						c0.23	
v/s Ratio Perm												0.18
v/c Ratio		0.44			1.11						1.90	1.50
Uniform Delay, d1		13.2			25.0						57.0	57.0
Progression Factor		1.00			0.44						1.00	1.00
Incremental Delay, d2		0.4			50.2						425.3	249.6
Delay (s)		13.6			61.3						482.3	306.6
Level of Service		B			E						F	F
Approach Delay (s)		13.6			61.3			0.0			396.3	
Approach LOS		B			E			A			F	

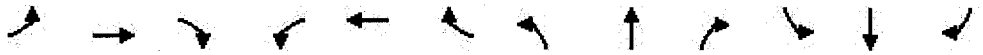
Intersection Summary			
HCM Average Control Delay	94.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	100.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↱			↑↑↑↑						↱	↱
Volume (vph)	0	3358	593	0	1816	0	0	0	0	0	248	278
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0						5.0	5.0
Lane Util. Factor		0.86			0.86						0.95	0.95
Frt		0.98			1.00						0.98	0.85
Flt Protected		1.00			1.00						1.00	1.00
Satd. Flow (prot)		6263			6408						1738	1504
Flt Permitted		1.00			1.00						1.00	1.00
Satd. Flow (perm)		6263			6408						1738	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3650	645	0	1974	0	0	0	0	0	270	302
RTOR Reduction (vph)	0	25	0	0	0	0	0	0	0	0	4	201
Lane Group Flow (vph)	0	4270	0	0	1974	0	0	0	0	0	302	65
Turn Type												Perm
Protected Phases		4			8						6	
Permitted Phases												6
Actuated Green, G (s)		80.0			80.0						16.0	16.0
Effective Green, g (s)		80.0			80.0						16.0	16.0
Actuated g/C Ratio		0.62			0.62						0.12	0.12
Clearance Time (s)		6.0			6.0						5.0	5.0
Lane Grp Cap (vph)		3854			3943						214	185
v/s Ratio Prot		c0.68			0.31						c0.17	
v/s Ratio Perm												0.04
v/c Ratio		1.11			0.50						1.41	0.35
Uniform Delay, d1		25.0			13.9						57.0	52.3
Progression Factor		1.00			1.25						1.00	1.00
Incremental Delay, d2		53.0			0.0						211.4	5.2
Delay (s)		78.0			17.4						268.4	57.5
Level of Service		E			B						F	E
Approach Delay (s)		78.0			17.4			0.0			170.3	
Approach LOS		E			B			A			F	

Intersection Summary			
HCM Average Control Delay	68.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↱			↑↑↑↑						↱	↱
Volume (vph)	0	1531	72	0	4024	0	0	0	0	0	82	798
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0						5.0	5.0
Lane Util. Factor		0.86			0.86						0.95	0.95
Frt		0.99			1.00						0.88	0.85
Flt Protected		1.00			1.00						1.00	1.00
Satd. Flow (prot)		6365			6408						1553	1504
Flt Permitted		1.00			1.00						1.00	1.00
Satd. Flow (perm)		6365			6408						1553	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1664	78	0	4374	0	0	0	0	0	89	867
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	89	134
Lane Group Flow (vph)	0	1737	0	0	4374	0	0	0	0	0	399	334
Turn Type												Perm
Protected Phases		4			8						6	
Permitted Phases												6
Actuated Green, G (s)		98.0			98.0						41.0	41.0
Effective Green, g (s)		98.0			98.0						41.0	41.0
Actuated g/C Ratio		0.65			0.65						0.27	0.27
Clearance Time (s)		6.0			6.0						5.0	5.0
Vehicle Extension (s)		3.0			3.0						3.0	3.0
Lane Grp Cap (vph)		4158			4187						424	411
v/s Ratio Prot		0.27			c0.68						c0.26	
v/s Ratio Perm												0.22
v/c Ratio		0.42			1.04						0.94	0.81
Uniform Delay, d1		12.4			26.0						53.3	50.9
Progression Factor		1.00			0.37						1.00	1.00
Incremental Delay, d2		0.3			22.3						29.3	11.6
Delay (s)		12.7			32.0						82.7	62.4
Level of Service		B			C						F	E
Approach Delay (s)		12.7			32.0			0.0			72.8	
Approach LOS		B			C			A			E	

Intersection Summary			
HCM Average Control Delay	32.7	HCM Level of Service	C
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	100.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↱			↑↑↑↑						↑↱	↱
Volume (vph)	0	3358	593	0	1816	0	0	0	0	0	248	278
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0						5.0	5.0
Lane Util. Factor		0.86			0.86						0.95	0.95
Frt		0.98			1.00						0.98	0.85
Flt Protected		1.00			1.00						1.00	1.00
Satd. Flow (prot)		6263			6408						1738	1504
Flt Permitted		1.00			1.00						1.00	1.00
Satd. Flow (perm)		6263			6408						1738	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3650	645	0	1974	0	0	0	0	0	270	302
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	3	150
Lane Group Flow (vph)	0	4276	0	0	1974	0	0	0	0	0	303	116
Turn Type												Perm
Protected Phases		4			8						6	
Permitted Phases												6
Actuated Green, G (s)		99.0			99.0						40.0	40.0
Effective Green, g (s)		99.0			99.0						40.0	40.0
Actuated g/C Ratio		0.66			0.66						0.27	0.27
Clearance Time (s)		6.0			6.0						5.0	5.0
Vehicle Extension (s)		3.0			3.0						3.0	3.0
Lane Grp Cap (vph)		4134			4229						463	401
v/s Ratio Prot		c0.68			0.31						c0.17	
v/s Ratio Perm												0.08
v/c Ratio		1.03			0.47						0.65	0.29
Uniform Delay, d1		25.5			12.5						48.9	43.7
Progression Factor		1.00			1.00						1.00	1.00
Incremental Delay, d2		23.9			0.4						3.3	0.4
Delay (s)		49.4			12.9						52.2	44.1
Level of Service		D			B						D	D
Approach Delay (s)		49.4			12.9			0.0			48.4	
Approach LOS		D			B			A			D	

Intersection Summary			
HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBU	EBL	EBT	EBR	WBT	WBR	NEL	NET	NER
Lane Configurations									
Volume (vph)	103	263	907	258	3379	10	645	114	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Lane Util. Factor		0.97	0.91	1.00	0.86		0.91	0.91	
Frt		1.00	1.00	0.85	1.00		1.00	1.00	
Flt Protected		0.95	1.00	1.00	1.00		0.95	0.97	
Satd. Flow (prot)		3433	5085	1583	6405		1610	3257	
Flt Permitted		0.95	1.00	1.00	1.00		0.95	0.97	
Satd. Flow (perm)		3433	5085	1583	6405		1610	3257	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	112	286	986	280	3673	11	701	124	16
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	398	986	280	3684	0	350	491	0
Turn Type	Prot	Prot		Perm			Perm		
Protected Phases		7	4		8			2	
Permitted Phases				4			2		
Actuated Green, G (s)		16.0	94.0	94.0	74.0		25.0	25.0	
Effective Green, g (s)		16.0	94.0	94.0	74.0		25.0	25.0	
Actuated g/C Ratio		0.12	0.72	0.72	0.57		0.19	0.19	
Clearance Time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Lane Grp Cap (vph)		423	3677	1145	3646		310	626	
v/s Ratio Prot		c0.12	0.19		c0.58				
v/s Ratio Perm				0.18			c0.22	0.15	
v/c Ratio		0.94	0.27	0.24	1.01		1.13	1.09dl	
Uniform Delay, d1		56.5	6.2	6.1	28.0		52.5	49.9	
Progression Factor		1.08	0.15	0.13	1.00		1.00	1.00	
Incremental Delay, d2		29.4	0.2	0.5	17.5		90.6	9.5	
Delay (s)		90.7	1.1	1.3	45.5		143.1	59.5	
Level of Service		F	A	A	D		F	E	
Approach Delay (s)			22.5		45.5			94.3	
Approach LOS			C		D			F	

Intersection Summary			
HCM Average Control Delay	45.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBU	EBL	EBT	EBR	WBT	WBR	NEL	NET	NER
Lane Configurations									
Volume (vph)	5	577	2361	414	1522	25	295	315	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Lane Util. Factor		0.97	0.91	1.00	0.86		0.91	0.91	
Frt		1.00	1.00	0.85	1.00		1.00	0.98	
Flt Protected		0.95	1.00	1.00	1.00		0.95	0.99	
Satd. Flow (prot)		3433	5085	1583	6392		1610	3294	
Flt Permitted		0.95	1.00	1.00	1.00		0.95	0.99	
Satd. Flow (perm)		3433	5085	1583	6392		1610	3294	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	627	2566	450	1654	27	321	342	67
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	632	2566	450	1679	0	241	489	0
Turn Type	Prot	Prot		Perm			Perm		
Protected Phases	7	7	4		8			2	
Permitted Phases				4			2		
Actuated Green, G (s)		57.0	90.0	90.0	29.0		29.0	29.0	
Effective Green, g (s)		57.0	90.0	90.0	29.0		29.0	29.0	
Actuated g/C Ratio		0.44	0.69	0.69	0.22		0.22	0.22	
Clearance Time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Lane Grp Cap (vph)		1505	3520	1096	1426		359	735	
v/s Ratio Prot		0.18	c0.50		c0.26				
v/s Ratio Perm				0.28			c0.15	0.15	
v/c Ratio		0.42	0.73	0.41	1.18		0.67	0.67	
Uniform Delay, d1		25.1	12.4	8.6	50.5		46.1	46.1	
Progression Factor		1.71	2.40	2.18	1.00		1.00	1.00	
Incremental Delay, d2		0.1	0.1	0.1	87.6		9.6	4.7	
Delay (s)		42.9	30.0	18.9	138.1		55.8	50.8	
Level of Service		D	C	B	F		E	D	
Approach Delay (s)			30.9		138.1			52.4	
Approach LOS			C		F			D	

Intersection Summary			
HCM Average Control Delay	63.2	HCM Level of Service	E
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBU	EBL	EBT	EBR	WBT	WBR	NEL	NET	NER
Lane Configurations									
Volume (vph)	103	263	907	258	3379	10	645	114	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Lane Util. Factor		0.97	0.91	1.00	0.86		0.91	0.91	
Frt		1.00	1.00	0.85	1.00		1.00	1.00	
Flt Protected		0.95	1.00	1.00	1.00		0.95	0.97	
Satd. Flow (prot)		3433	5085	1583	6405		1610	3257	
Flt Permitted		0.95	1.00	1.00	1.00		0.95	0.97	
Satd. Flow (perm)		3433	5085	1583	6405		1610	3257	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	112	286	986	280	3673	11	701	124	16
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	398	986	280	3684	0	350	491	0
Turn Type	Prot	Prot		Perm			Perm		
Protected Phases	7	7	4		8			2	
Permitted Phases				4			2		
Actuated Green, G (s)		17.0	105.2	105.2	84.2		33.8	33.8	
Effective Green, g (s)		17.0	105.2	105.2	84.2		33.8	33.8	
Actuated g/C Ratio		0.11	0.70	0.70	0.56		0.23	0.23	
Clearance Time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		389	3566	1110	3595		363	734	
v/s Ratio Prot		c0.12	0.19		c0.58				
v/s Ratio Perm				0.18			c0.22	0.15	
v/c Ratio		1.02	0.28	0.25	1.02		0.96	0.93dl	
Uniform Delay, d1		66.5	8.3	8.1	32.9		57.5	53.0	
Progression Factor		0.91	0.01	0.01	1.00		1.00	1.00	
Incremental Delay, d2		49.9	0.2	0.5	21.7		37.5	2.3	
Delay (s)		110.1	0.2	0.6	54.6		95.0	55.3	
Level of Service		F	A	A	D		F	E	
Approach Delay (s)			26.6		54.6			71.8	
Approach LOS			C		D			E	

Intersection Summary			
HCM Average Control Delay	49.4	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBU	EBL	EBT	EBR	WBT	WBR	NEL	NET	NER
Lane Configurations									
Volume (vph)	5	577	2361	414	1522	25	295	315	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Lane Util. Factor		0.97	0.91	1.00	0.86		0.91	0.91	
Frt		1.00	1.00	0.85	1.00		1.00	0.98	
Flt Protected		0.95	1.00	1.00	1.00		0.95	0.99	
Satd. Flow (prot)		3433	5085	1583	6392		1610	3294	
Flt Permitted		0.95	1.00	1.00	1.00		0.95	0.99	
Satd. Flow (perm)		3433	5085	1583	6392		1610	3294	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	627	2566	450	1654	27	321	342	67
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	632	2566	450	1679	0	241	489	0
Turn Type	Prot	Prot		Perm			Perm		
Protected Phases	7	7	4		8			2	
Permitted Phases				4			2		
Actuated Green, G (s)		30.0	91.7	91.7	57.7		27.3	27.3	
Effective Green, g (s)		30.0	91.7	91.7	57.7		27.3	27.3	
Actuated g/C Ratio		0.23	0.71	0.71	0.44		0.21	0.21	
Clearance Time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		792	3587	1117	2837		338	692	
v/s Ratio Prot		c0.18	c0.50		0.26				
v/s Ratio Perm				0.28			c0.15	0.15	
v/c Ratio		0.80	0.72	0.40	0.59		0.71	0.71	
Uniform Delay, d1		47.1	11.4	7.9	27.3		47.7	47.6	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.6	1.2	1.1	0.9		7.0	3.3	
Delay (s)		52.8	12.6	9.0	28.2		54.7	50.9	
Level of Service		D	B	A	C		D	D	
Approach Delay (s)			19.1		28.2			52.2	
Approach LOS			B		C			D	

Intersection Summary			
HCM Average Control Delay	25.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↱			↑↑↑	↱			↱			
Volume (veh/h)	0	1692	44	0	4321	502	0	0	27	0	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	1839	48	0	4697	546	0	0	29	0	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)					433							
pX, platoon unblocked	0.38						0.38	0.38		0.38	0.38	0.38
vC, conflicting volume	4697			1887			3429	6560	484	5186	6584	1566
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	5016			1887			1690	9902	484	6299	9965	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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			100			100	100	94	100	100	100
cM capacity (veh/h)	6			313			23	0	529	0	0	413

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	525	525	525	311	1566	1566	1566	546	29
Volume Left	0	0	0	0	0	0	0	0	0
Volume Right	0	0	0	48	0	0	0	546	29
cSH	1700	1700	1700	1700	1700	1700	1700	1700	529
Volume to Capacity	0.31	0.31	0.31	0.18	0.92	0.92	0.92	0.32	0.06
Queue Length 95th (ft)	0	0	0	0	0	0	0	0	4
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.2
Lane LOS									B
Approach Delay (s)	0.0				0.0				12.2
Approach LOS									B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	3784	78	0	1595	500	0	0	39	0	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	4113	85	0	1734	543	0	0	42	0	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)					433							
pX, platoon unblocked	0.83						0.83	0.83		0.83	0.83	0.83
vC, conflicting volume	1734			4198			4733	5889	1071	2804	5932	578
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1179			4198			4780	6168	1071	2464	6219	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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			100			100	100	80	100	100	100
cM capacity (veh/h)	490			36			0	0	217	10	0	903

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	1175	1175	1175	672	578	578	578	543	42
Volume Left	0	0	0	0	0	0	0	0	0
Volume Right	0	0	0	85	0	0	0	543	42
cSH	1700	1700	1700	1700	1700	1700	1700	1700	217
Volume to Capacity	0.69	0.69	0.69	0.40	0.34	0.34	0.34	0.32	0.20
Queue Length 95th (ft)	0	0	0	0	0	0	0	0	18
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.6
Lane LOS									D
Approach Delay (s)	0.0				0.0				25.6
Approach LOS									D

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	3	0	7	4	11	11	1	16	0	0	64	2
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)	3	0	8	4	12	12	1	17	0	0	70	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	11	28	18	72
Volume Left (vph)	3	4	1	0
Volume Right (vph)	8	12	0	2
Hadj (s)	-0.33	-0.19	0.05	0.02
Departure Headway (s)	3.8	3.9	4.1	4.0
Degree Utilization, x	0.01	0.03	0.02	0.08
Capacity (veh/h)	920	894	856	883
Control Delay (s)	6.8	7.0	7.2	7.4
Approach Delay (s)	6.8	7.0	7.2	7.4
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.2		
HCM Level of Service	A		
Intersection Capacity Utilization	13.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configura ions		↕			↕			↰↑			↑	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	0	11	6	28	12	1	16	0	0	98	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	0	12	7	30	13	1	17	0	0	107	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	23	50	18	108
Volume Left (vp ı)	11	7	1	0
Volume Right (vph)	12	13	0	1
Hadj (s)	-0.19	-0.10	0.05	0.03
Departure Heac way (s)	4.0	4.1	4.2	4.1
Degree Utilizatic n, x	0.03	0.06	0.02	0.12
Capacity (veh/h)	856	848	826	859
Control Delay (s)	7.1	7.3	7.3	7.7
Approach Delay (s)	7.1	7.3	7.3	7.7
Approach LOS	A	A	A	A

Intersection Sum mary				
Delay			7.5	
HCM Level of S ervice			A	
Intersection Cap acity Utilization			15.2%	ICU Level of Service A
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	659	18	9	140	6	2	1	113	0	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)	1	716	20	10	152	7	2	1	123	0	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)					503							
pX, platoon unblocked												
vC, conflicting volume	159			736			824	907	368	659	913	79
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	159			736			824	907	368	659	913	79
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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	80	100	100	100
cM capacity (veh/h)	1418			865			263	271	629	278	269	965

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	359	378	86	83	126
Volume Left	1	0	10	0	2
Volume Right	0	20	0	7	123
cSH	1418	1700	865	1700	608
Volume to Capacity	0.00	0.22	0.01	0.05	0.21
Queue Length 95th (ft)	0	0	1	0	19
Control Delay (s)	0.0	0.0	1.1	0.0	12.5
Lane LOS	A		A		B
Approach Delay (s)	0.0		0.6		12.5
Approach LOS					B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				
Volume (veh/h)	25	657	6	81	726	34	5	3	4	0	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)	27	714	7	88	789	37	5	3	15	0	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)					503							
pX, platoon unblocked												
vC, conflicting volume	826			721			1342	1774	360	1412	1759	413
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	826			721			1342	1774	360	1412	1759	413
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	97			90			95	95	98	100	100	100
cM capacity (veh/h)	800			877			99	71	636	83	73	588

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	384	364	483	432	24
Volume Left	27	0	88	0	5
Volume Right	0	7	0	37	15
cSH	800	1700	877	1700	192
Volume to Capacity	0.03	0.21	0.10	0.25	0.12
Queue Length 95th (ft)	3	0	8	0	10
Control Delay (s)	1.1	0.0	2.8	0.0	26.4
Lane LOS	A		A		D
Approach Delay (s)	0.5		1.5		26.4
Approach LOS					D

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix D

Total Future Levels of Service

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↱			↑↑↑↑						↱	↱
Volume (vph)	0	1540	74	0	4029	0	0	0	0	0	82	798
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0						5.0	5.0
Lane Util. Factor		0.86			0.86						0.95	0.95
Frt		0.99			1.00						0.88	0.85
Flt Protected		1.00			1.00						1.00	1.00
Satd. Flow (prot)		6364			6408						1553	1504
Flt Permitted		1.00			1.00						1.00	1.00
Satd. Flow (perm)		6364			6408						1553	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1674	80	0	4379	0	0	0	0	0	89	867
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	89	134
Lane Group Flow (vph)	0	1749	0	0	4379	0	0	0	0	0	399	334
Turn Type												Perm
Protected Phases		4			8						6	
Permitted Phases												6
Actuated Green, G (s)		98.0			98.0						41.0	41.0
Effective Green, g (s)		98.0			98.0						41.0	41.0
Actuated g/C Ratio		0.65			0.65						0.27	0.27
Clearance Time (s)		6.0			6.0						5.0	5.0
Vehicle Extension (s)		3.0			3.0						3.0	3.0
Lane Grp Cap (vph)		4158			4187						424	411
v/s Ratio Prot		0.27			c0.68						c0.26	
v/s Ratio Perm												0.22
v/c Ratio		0.42			1.05						0.94	0.81
Uniform Delay, d1		12.4			26.0						53.3	50.9
Progression Factor		1.00			0.37						1.00	1.00
Incremental Delay, d2		0.3			22.8						29.3	11.6
Delay (s)		12.7			32.4						82.7	62.4
Level of Service		B			C						F	E
Approach Delay (s)		12.7			32.4			0.0			72.8	
Approach LOS		B			C			A			E	

Intersection Summary			
HCM Average Control Delay	33.0	HCM Level of Service	C
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	100.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↱			↑↑↑↑						↱	↱
Volume (vph)	0	3365	594	0	1820	0	0	0	0	0	250	278
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0						5.0	5.0
Lane Util. Factor		0.86			0.86						0.95	0.95
Frt		0.98			1.00						0.98	0.85
Flt Protected		1.00			1.00						1.00	1.00
Satd. Flow (prot)		6264			6408						1739	1504
Flt Permitted		1.00			1.00						1.00	1.00
Satd. Flow (perm)		6264			6408						1739	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3658	646	0	1978	0	0	0	0	0	272	302
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	3	149
Lane Group Flow (vph)	0	4285	0	0	1978	0	0	0	0	0	305	117
Turn Type												Perm
Protected Phases		4			8						6	
Permitted Phases												6
Actuated Green, G (s)		98.8			98.8						40.2	40.2
Effective Green, g (s)		98.8			98.8						40.2	40.2
Actuated g/C Ratio		0.66			0.66						0.27	0.27
Clearance Time (s)		6.0			6.0						5.0	5.0
Vehicle Extension (s)		3.0			3.0						3.0	3.0
Lane Grp Cap (vph)		4126			4221						466	403
v/s Ratio Prot		c0.68			0.31						c0.18	
v/s Ratio Perm												0.08
v/c Ratio		1.04			0.47						0.65	0.29
Uniform Delay, d1		25.6			12.6						48.7	43.6
Progression Factor		1.00			1.00						1.00	1.00
Incremental Delay, d2		25.3			0.4						3.3	0.4
Delay (s)		50.9			13.0						52.0	44.0
Level of Service		D			B						D	D
Approach Delay (s)		50.9			13.0			0.0			48.3	
Approach LOS		D			B			A			D	

Intersection Summary			
HCM Average Control Delay	39.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBU	EBL	EBT	EBR	WBT	WBR	NEL	NET	NER
Lane Configurations									
Volume (vph)	103	266	908	261	3384	10	645	114	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Lane Util. Factor		0.97	0.91	1.00	0.86		0.91	0.91	
Frt		1.00	1.00	0.85	1.00		1.00	1.00	
Flt Protected		0.95	1.00	1.00	1.00		0.95	0.97	
Satd. Flow (prot)		3433	5085	1583	6405		1610	3257	
Flt Permitted		0.95	1.00	1.00	1.00		0.95	0.97	
Satd. Flow (perm)		3433	5085	1583	6405		1610	3257	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	112	289	987	284	3678	11	701	124	16
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	401	987	284	3689	0	350	491	0
Turn Type	Prot	Prot		Perm			Perm		
Protected Phases	7	7	4		8			2	
Permitted Phases				4			2		
Actuated Green, G (s)		17.0	105.2	105.2	84.2		33.8	33.8	
Effective Green, g (s)		17.0	105.2	105.2	84.2		33.8	33.8	
Actuated g/C Ratio		0.11	0.70	0.70	0.56		0.23	0.23	
Clearance Time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		389	3566	1110	3595		363	734	
v/s Ratio Prot		c0.12	0.19		c0.58				
v/s Ratio Perm				0.18			c0.22	0.15	
v/c Ratio		1.03	0.28	0.26	1.03		0.96	0.93dl	
Uniform Delay, d1		66.5	8.3	8.2	32.9		57.5	53.0	
Progression Factor		0.90	0.01	0.01	1.00		1.00	1.00	
Incremental Delay, d2		52.0	0.2	0.5	22.1		37.5	2.3	
Delay (s)		112.2	0.2	0.6	55.0		95.0	55.3	
Level of Service		F	A	A	E		F	E	
Approach Delay (s)			27.1		55.0			71.8	
Approach LOS			C		E			E	

Intersection Summary			
HCM Average Control Delay	49.8	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	90.1%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBU	EBL	EBT	EBR	WBT	WBR	NEL	NET	NER
Lane Configurations									
Volume (vph)	5	580	2362	417	1526	26	295	315	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Lane Util. Factor		0.97	0.91	1.00	0.86		0.91	0.91	
Frt		1.00	1.00	0.85	1.00		1.00	0.98	
Flt Protected		0.95	1.00	1.00	1.00		0.95	0.99	
Satd. Flow (prot)		3433	5085	1583	6392		1610	3294	
Flt Permitted		0.95	1.00	1.00	1.00		0.95	0.99	
Satd. Flow (perm)		3433	5085	1583	6392		1610	3294	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	630	2567	453	1659	28	321	342	67
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	635	2567	453	1685	0	241	489	0
Turn Type	Prot	Prot		Perm			Perm		
Protected Phases		7	4		8			2	
Permitted Phases				4			2		
Actuated Green, G (s)		30.0	91.7	91.7	57.7		27.3	27.3	
Effective Green, g (s)		30.0	91.7	91.7	57.7		27.3	27.3	
Actuated g/C Ratio		0.23	0.71	0.71	0.44		0.21	0.21	
Clearance Time (s)		5.0	5.0	5.0	4.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		792	3587	1117	2837		338	692	
v/s Ratio Prot		c0.18	c0.50		0.26				
v/s Ratio Perm				0.29			c0.15	0.15	
v/c Ratio		0.80	0.72	0.41	0.59		0.71	0.71	
Uniform Delay, d1		47.2	11.4	7.9	27.3		47.7	47.6	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.9	1.3	1.1	0.9		7.0	3.3	
Delay (s)		53.1	12.6	9.0	28.2		54.7	50.9	
Level of Service		D	B	A	C		D	D	
Approach Delay (s)			19.2		28.2			52.2	
Approach LOS			B		C			D	

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↱			↑↑↑	↱			↱			
Volume (veh/h)	0	1692	52	0	4326	502	0	0	38	0	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	1839	57	0	4702	546	0	0	41	0	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)					433							
pX, platoon unblocked	0.35						0.35	0.35		0.35	0.35	0.35
vC, conflicting volume	4702			1896			3435	6570	488	5203	6598	1567
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	5083			1896			1427	10471	488	6529	10552	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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			100			100	100	92	100	100	100
cM capacity (veh/h)	5			311			33	0	526	0	0	376

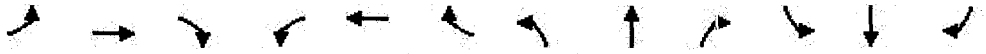
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	525	525	525	319	1567	1567	1567	546	41
Volume Left	0	0	0	0	0	0	0	0	0
Volume Right	0	0	0	57	0	0	0	546	41
cSH	1700	1700	1700	1700	1700	1700	1700	1700	526
Volume to Capacity	0.31	0.31	0.31	0.19	0.92	0.92	0.92	0.32	0.08
Queue Length 95th (ft)	0	0	0	0	0	0	0	0	6
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4
Lane LOS									B
Approach Delay (s)	0.0				0.0				12.4
Approach LOS									B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	86.9%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	3784	110	0	1599	500	0	0	47	0	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	4113	120	0	1738	543	0	0	51	0	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)					433							
pX, platoon unblocked	0.85						0.85	0.85		0.85	0.85	0.85
vC, conflicting volume	1738			4233			4752	5911	1088	2817	5971	579
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1255			4233			4796	6158	1088	2523	6228	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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			100			100	100	76	100	100	100
cM capacity (veh/h)	468			35			0	0	211	9	0	923

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	1175	1175	1175	707	579	579	579	543	51
Volume Left	0	0	0	0	0	0	0	0	0
Volume Right	0	0	0	120	0	0	0	543	51
cSH	1700	1700	1700	1700	1700	1700	1700	1700	211
Volume to Capacity	0.69	0.69	0.69	0.42	0.34	0.34	0.34	0.32	0.24
Queue Length 95th (ft)	0	0	0	0	0	0	0	0	23
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.4
Lane LOS									D
Approach Delay (s)	0.0				0.0				27.4
Approach LOS									D

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	3	0	7	4	11	11	1	16	0	0	71	2
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)	3	0	8	4	12	12	1	17	0	0	77	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	11	28	18	79
Volume Left (vph)	3	4	1	0
Volume Right (vph)	8	12	0	2
Hadj (s)	-0.33	-0.19	0.05	0.02
Departure Headway (s)	3.8	3.9	4.1	4.0
Degree Utilization, x	0.01	0.03	0.02	0.09
Capacity (veh/h)	914	889	854	883
Control Delay (s)	6.9	7.1	7.2	7.4
Approach Delay (s)	6.9	7.1	7.2	7.4
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.3		
HCM Level of Service	A		
Intersection Capacity Utilization	13.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	0	11	6	28	14	1	7	0	0	104	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	0	12	7	30	15	1	8	0	0	113	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	23	52	9	114
Volume Left (vph)	11	7	1	0
Volume Right (vph)	12	15	0	1
Hadj (s)	-0.19	-0.12	0.06	0.03
Departure Headway (s)	4.0	4.1	4.2	4.1
Degree Utilization, x	0.03	0.06	0.01	0.13
Capacity (veh/h)	858	854	820	860
Control Delay (s)	7.1	7.3	7.3	7.7
Approach Delay (s)	7.1	7.3	7.3	7.7
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.5		
HCM Level of Service	A		
Intersection Capacity Utilization	15.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				
Volume (veh/h)	1	659	18	9	157	6	2	1	113	0	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)	1	716	20	10	171	7	2	1	123	0	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)					503							
pX, platoon unblocked												
vC, conflicting volume	177			736			833	925	363	677	932	89
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	177			736			833	925	363	677	932	89
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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	80	100	100	100
cM capacity (veh/h)	1396			865			259	264	629	269	262	952

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	359	378	95	92	126
Volume Left	1	0	10	0	2
Volume Right	0	20	0	7	123
cSH	1396	1700	865	1700	607
Volume to Capacity	0.00	0.22	0.01	0.05	0.21
Queue Length 95th (ft)	0	0	1	0	19
Control Delay (s)	0.0	0.0	1.0	0.0	12.5
Lane LOS	A		A		B
Approach Delay (s)	0.0		0.5		12.5
Approach LOS					B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				
Volume (veh/h	27	657	6	81	739	34	5	3	14	0	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)	29	714	7	88	803	37	5	3	15	0	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)					503							
pX, platoon unblocked												
vC, conflicting volume	840			721			1354	1792	360	1430	1777	420
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	840			721			1354	1792	360	1430	1777	420
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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 %	96			90			94	95	98	100	100	100
cM capacity (veh/h)	791			877			97	69	636	80	71	582

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	386	364	490	439	24
Volume Left	29	0	88	0	5
Volume Right	0	7	0	37	15
cSH	791	1700	877	1700	188
Volume to Capacity	0.04	0.21	0.10	0.26	0.13
Queue Length 95th (ft)	3	0	8	0	11
Control Delay (s)	1.2	0.0	2.8	0.0	26.9
Lane LOS	A		A		D
Approach Delay (s)	0.6		1.5		26.9
Approach LOS					D

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	56.3%	ICU Level of Service	3
Analysis Period (min)	15		

List of Witnesses

1. Mr Tim Chapman, President, Chapman Development
2. Ms. Pelin Asatoy, Compu.tecture, Inc.
3. John R. Heinrichs, P.E., Executive Vice President, Phoenix Engineering, Inc
4. Joseph J. Plumpe RLA, Studio 39 Landscape Architecture, P.C.
5. Christopher L. Kabatt, P.E., Senior Associate, Wells + Associates

Outline of Testimony of

Mr. Tim Chapman
President, Chapman Development

I. Introduction of Applicant

II. Summary of Plans for Site

   a. Neighborhood/Location

   b. Brief Description of Project

   c. DHCD Funding

   d. Community Participation

   e. Benefits and Amenities of Project

III. Conclusion

Outline of Testimony of

Ms. Pelin Asatoy
Compu.tecture, Inc.

I. Introduction

II. Overview of Architectural Plans

   a. Site Description/Location/Uses

   b. Floor Plans

   c. Elevations

   d. Sections

   e. Materials

   f. Renderings

III. Parking & Loading Description

IV. Explanation of LEED Elements of Plans

V. Conclusion

Outline of Testimony of

John R. Heinrichs, P.E.
Executive Vice President, Phoenix Engineering, Inc

I. Introduction

II. Current Site Conditions

III. Erosion Control Measures & Grading Plan

IV. Storm Water Retention Plan

V. Conclusion

John R. Heinrichs, P.E.
Executive Vice President
Phoenix Engineering, Inc.

Education:
B.S. / 1984 / Civil Engineering

Professional Registrations:
1984/Professional Engineer/Maryland #14920
2001/Professional Engineer/District of Columbia #900351

Professional Experience:
Mr. Heinrichs has over 26 years experience in the engineering field. He manages Phoenix's Land Development and Civil Engineering Projects and the Computer and CADD Operations associated with the design of highways, bridges, sewer, storm drains, stormwater management, and erosion control projects. He is Familiar with the Howard County approval process and has worked on over 100 Site Development Plans. Relevant project experience includes:

- **Totten Towers, Washington, DC** – Revised the approved Site Plans showing the modifications to the site improvements, proposed buildings, driveways, sidewalks, storm drains and other site utilities based on the as-built utility information, revised architectural plans, and the existing topographic survey. The revisions included the construction details for connection into the existing public utility systems for water, sewer, and storm drains. A new concept for water quality was utilized to treat stormwater prior to releasing it into the public storm drain system. All utility tie-ins were coordinated with the MPE engineer.
- **3314 Mount Pleasant Street, NW, Washington, DC** – Prepared a Site Plan to maximize the number of parking spaces adjacent to the alley behind 3314 Mount Pleasant Street. The scope of services included reviewing photos and topography, making site visits to verify conditions and attempt to identify utility conflicts, and preparing sketches for alternate layouts.
- **2401 15th Street, NW, Washington, DC** – Prepared Site & Civil Engineering Plans for the conversion of the property from an Office Use to a Residential Use. The scope of services included obtaining and reviewing available utility and site drawings, making a site visit to confirm existing conditions, performing a topographic survey of the lot and adjacent right of way, preparing a Site Development Plan showing the location of existing and proposed improvements, preparing details for site improvements, preparing a Sediment and Erosion Control plan with appropriate notes and details, preparing construction plans for a new fire protection service including profiles and vault details, preparing a PEPCO site plan.
- **Kenilworth Terrace Apartments, Washington, DC** – Provided site and civil engineering for the construction of a new multi-story apartment building on a vacant lot. The scope of work for the project included performing site visits to photograph and verify current conditions and become familiar with the site, performing a site topography survey, prepared an ALTA regulated boundary survey, preparing a site development plan, performing a drainage analysis of the site and preparing construction drawings for a SWM facility to comply with DC Health Department requirements, performing traffic counts at the site and preparing a Critical Lane analysis of the intersection at Jay and Kenilworth Avenue to determine the affect of the increase in traffic on that intersection, preparing erosion and sediment control plans with required notes and details, preparing plans and profiles for water,

sewer, and storm drain connections to existing public utilities, and responding to RFIs as needed during construction.

- **2514 41st Street, NW, Washington, DC** – Prepared a Site Plan for up to 4 parking spaces adjacent to the alley behind 2514 41st Street. The scope of work included reviewing photos and topography, preparing sketches for alternate layouts, responding to comments and questions, and preparing a site plan to accompany grading permit application.
- **1331 G Street, NW, Washington, DC** – Prepared Site & Civil Engineering Plans for rehabilitation of an existing office building at 1331 G Street, NW. The scope of work included obtaining and reviewing available utility, property, and site drawings and performing a site visit to confirm existing conditions, performing a topographic survey of the lot and adjacent right of ways, preparing a Site Development Plan showing the location of existing and proposed site improvements, preparing construction plans for a new fire protection service including profiles, and responded to comments from reviewing agencies.
- **University of Maryland Access Road, Somerset County** – Design of approximately 1 mile new entrance road from MD 13 to the University Loop Road including storm drain, stormwater management, sediment control and a multi–cell culvert at Loretta Branch.
- **University of Maryland High Tech Center, Prince George's County** - Access Roads including connection to major expressways, site roads and utility design for the 400+ acre High Tech Center including design of 2 major dams for stormwater management.
- **College of Notre Dame, Baltimore, MD** – Development of a Master Plan for site infrastructure improvements including a stormwater management plan.
- **Benjamin Banneker Park Visitor Center, MD** – Design of entrance road, internal roads and parking, site lighting, storm drains, stormwater management and S & E control plans.
- **Supreme Sports Club Renovations, Columbia, MD** – Provided civil site engineering services to prepare red-line revisions to the existing Site Development Plans for the athletic facility and adjacent swimming pool. My responsibilities included performing a site visit to verify existing conditions, preparing site development plans, preparing cost estimates, and construction phase services.
- **Hobbits Glen Golf Course, Columbia, MD** – Provided civil engineering services for the improvements to 16 greens at Hobbits Glen Golf Course. My responsibilities included preparing sediment and erosion control plans and schematic grading plans for the improvements and submitting a waiver application to the site development plan process.
- **White Marsh Post Office, White Marsh, MD** – Provided civil site engineering services for the parking lot and drainage repairs needed at the White Marsh Post Office. Responsibilities included investigating existing conditions and preparing engineering plans of the repairs needed The engineering plans included Sediment and Erosion Control plans which were submitted for review by the County permitting agency. **Ellicott City Senior Center, Howard County, MD** – Provided civil site engineering for a new 12,500 sq. ft. senior center constructed behind an existing county library on Frederick Road in Ellicott City. The project included land acquisition documents, grading, sediment and erosion control, stormwater management, wetland delineation and joint permit applications, and relocation of existing utilities. Issues that affected the design included maintenance of traffic to the existing library, location adjacent to an existing stream, and access to Frederick Road.
- **Tiber Hudson Senior Housing and Community Center, Howard County, MD** – Provided civil site engineering for a new 22,000 sq. ft., 25-unit senior housing facility on Mt. Ida Drive in Ellicott City, Maryland. The project included grading, stormwater management, sediment and erosion control, retaining wall design, forest conservation calculations, and public utility extensions. Issues that affected the design included steep slopes, restricted building areas, relocation of existing utilities, and poor site distance.

Outline of Testimony of

Joseph J. Plumpe, RLA
Studio 39 Landscape Architecture, P.C

I. Introduction

II. Overview of Landscape Plan:

   a. Pennsylvania Avenue & Prout Street

   b. Court Yard

   c. Side Yard

   d. Rear Yard

III. Description of Proposed Materials:

   a. Plantings

   b. Masonry Screen

   c. Pavers

IV. Conclusion

JOSEPH PLUMPE, RLA

Principal

EDUCATION:

Bachelor of Science
Landscape Architecture, 1981
Ohio State University

LICENSING:

Registered Landscape Architect
Maryland # 999
South Carolina # 694
Virginia # 888

EXPERIENCE & QUALIFICATIONS

Joseph Plumpe is a principal and the founder of STUDIO 39 Landscape Architecture, P.C., in Alexandria, Virginia. The firm was established in 1993 and is based on the 20 plus years of experience in the Washington, DC metropolitan area.

PROFESSIONAL EXPERIENCE:

2000 Wilson
Elm Street Development
Arlington, Virginia

American Trucking Association Headquarters
American Trucking Association
Washington, DC

Fallsgrove
E.Y.A. Development
Rockville, Maryland

Ford's Landing
EYA, Inc.
Alexandria, Virginia

Meridian at Carlyle
Paradigm Construction Company
Alexandria, Virginia

Metro Pike
Holladay Corporation
Rockville, Maryland

Monument Square
Gumenick Properties
Henrico County, Virginia

Park Potomac
EYA, Inc.
Foulger-Pratt Companies
Montgomery County, Maryland

Rhode Island Metro
A&R Development Corporations
Mid City Urban, LLC
Washington, DC

Staples Mill
Gumenick Properties
Henrico County, Virginia

Workhouse Arts Center at Lorton
Lorton Arts Foundation
Lorton, Virginia

Writ Rosslyn
Washington Real Estate Investment Trust
Arlington, Virginia

PRIOR EXPERIENCE:

Freddie Mac Coporate Headquarters
Federal Homes Loan Mortgage Corp.
& West Group, Inc.
Fairfax Co., Virginia

Tyson II
Lerner Enterprises
McLean, Virginia

Washington Center
The Acherman and Company
Montgomery Co. Maryland

PROFESSIONAL ACTIVITIES:

Instructor, George Washington University's Landscape Design Certificate Program

Member, American society of Landscape Architects, Potomac Chapter

Speaker, Pennsylvania APA State Conference, "The Design of Rural Hamlets"

Speaker, Landscape Contractor's Association, Graphic Techniques

Speaker, Washington Area Women's Garden Club, Perspective

STUDIO39

Resume...

Studio 39 Landscape Architecture, P.C. 6416 Grovedale Dr., Suite 100-A, Alexandria, Virginia 22310
Tel: 703.719.6500 Fax: 703.719.6503 www.studio39.com

Outline of Testimony of

Christopher L. Kabatt, P.E.
Senior Associate, Wells + Associates

I. Introduction

II. Description of Area

III. Existing Traffic Conditions

   a. Operation levels

   b. Metrobus lines

III. Impact of Proposed Development

V. Parking & Loading

IV. Conclusion

CHRISTOPHER L. KABATT, P.E.
SENIOR ASSOCIATE

PROFILE: Mr. Kabatt has 10 years of experience in traffic parking and transportation planning and engineering. He has worked for both private developers and public sector clients. This experience includes traffic impact studies, travel demand management studies, capacity analyses, directional distribution analyses, parking analyses and design, and data collection activities. Mr. Kabatt has provided expert testimony before administrative hearing officers, citizens groups, planning commissions, and zoning commissions.

EXPERIENCE:

Capacity Analyses. Conducted capacity analyses using Highway Capacity Software, Synchro and Critical Lane Volume methodologies. These analyses include intersections, ramps, and weaving sections.

Directional Distribution Analyses. Analyzed the directional distribution for large and small developments including Plano Center, Plano Texas; FedEx Field, Landover, Maryland; Rock Spring Centre, North Bethesda, Maryland; Potomac Station Mixed Use, and Leesburg, Virginia.

Parking Analyses/Design. Assisted in conducting parking needs, feasibility, and shared-use studies for commercial and residential developers, including: the District of Columbia; Arlington County; Fairfax County; and Montgomery County.

Data Collection Activities. Supervised traffic impact studies including turning movement counts, license plate surveys, parking counts, and parking occupancy counts.

Traffic Impact Studies. Conducted numerous traffic impact studies for large and small residential, commercial, and mixed-use projects in the Washington metropolitan area. This includes preparation of reports and expert testimony in support of rezoning, subdivisions, site plan approvals, and comprehensive plan and proffered condition amendments. Prepared tables, charts, and graphics using spreadsheet programs and AutoCAD. Local experience includes studies in Loudoun, Fairfax and Arlington Counties, Virginia; Montgomery County, Maryland; the cities of Leesburg, Rockville, and Gaithersburg; and the District of Columbia.

Travel Demand Management Studies. Developed travel demand management programs, including group riding, transit, flexible work hour, and other actions, for development projects in Arlington County, Virginia and Washington, D.C.

REGISTRATIONS: Registered Professional Engineer in Virginia

EDUCATION: Bachelor of Science, Civil Engineering, The Pennsylvania State University, University Park, Pennsylvania, December 1996.

AFFILIATIONS: Institute of Transportation Engineers

EMPLOYMENT HISTORY

2003 – Present
Wells & Associates, LLC
McLean, Virginia
Senior Associate
Coordinate the work of several professionals and/or non-professionals. Perform advanced specialized engineering/planning work. Plan, schedule, and conduct detailed phases of projects. Review the work of associates for technical accuracy and appropriateness of approach.

1997 – 2003
Wells & Associates, LLC
McLean, Virginia
Associate
Responsible for transportation planning, traffic engineering analyses, project administration, and supervision of data collection activities.

1994 – 1996 Summers
The Pennsylvania Department of Transportation
Saint David's, Pennsylvania
Engineering and Science Technical Intern
Responsible for traffic studies, technical analyses, and rating roads.