

**APPENDIX R-2: ALTERNATIVE D INTERSECTION CAPACITY  
ANALYSES – HCS PRINTOUTS – PM PEAK HOUR**

# HCM Signalized Intersection Capacity Analysis

## 1. X NH 102 & Exit 4 SB Off

12/28/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↘	↗
Traffic Volume (vph)	0	1285	1405	0	125	1295
Future Volume (vph)	0	1285	1405	0	125	1295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	16	12
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	0.88
Fr <sub>t</sub>		1.00	1.00		1.00	0.85
Fl <sub>t</sub> Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3471	3406		1930	2682
Fl <sub>t</sub> Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		3471	3406		1930	2682
Peak-hour factor, PHF	0.93	0.93	0.88	0.88	0.89	0.89
Adj. Flow (vph)	0	1382	1597	0	140	1455
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	1382	1597	0	140	1455
Heavy Vehicles (%)	4%	4%	6%	6%	6%	6%
Turn Type		NA	NA		Prot	Prot
Protected Phases		2	6		4	4
Permitted Phases						
Actuated Green, G (s)		60.0	60.0		68.0	68.0
Effective Green, g (s)		60.0	60.0		68.0	68.0
Actuated g/C Ratio		0.43	0.43		0.49	0.49
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1487	1459		937	1302
v/s Ratio Prot		0.40	c0.47		0.07	c0.54
v/s Ratio Perm						
v/c Ratio		0.93	1.09		0.15	1.12
Uniform Delay, d <sub>1</sub>		38.0	40.0		20.0	36.0
Progression Factor		0.74	0.08		1.00	1.00
Incremental Delay, d <sub>2</sub>		7.9	43.8		0.1	63.8
Delay (s)		35.8	47.1		20.0	99.8
Level of Service		D	D		C	F
Approach Delay (s)		35.8	47.1		92.8	
Approach LOS		D	D		F	

### Intersection Summary

HCM 2000 Control Delay	59.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		


















c Critical Lane Group



## HCM Signalized Intersection Capacity Analysis

### 2. NH 102 & Exit 4 NB Off

12/28/2017













											
Movement	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	1245	0	1005	0	0	1050	360	0	0	500	235
Future Volume (vph)	1245	0	1005	0	0	1050	360	0	0	500	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0			6.0	6.0			6.0	4.0
Lane Util. Factor	0.97		0.88			0.97	0.95			0.95	1.00
Frt	1.00		0.85			1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00			0.95	1.00			1.00	1.00
Satd. Flow (prot)	3242		2632			3335	3438			3505	1568
Flt Permitted	0.95		1.00			0.95	1.00			1.00	1.00
Satd. Flow (perm)	3242		2632			3335	3438			3505	1568
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	1415	0	1142	0	0	1117	383	0	0	543	255
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1415	0	1142	0	0	1117	383	0	0	543	255
Heavy Vehicles (%)	8%	8%	8%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot		Prot			Prot	NA			NA	Free
Protected Phases	8		8			5	2			6	
Permitted Phases											Free
Actuated Green, G (s)	55.0		55.0			42.0	73.0			25.0	140.0
Effective Green, g (s)	55.0		55.0			42.0	73.0			25.0	140.0
Actuated g/C Ratio	0.39		0.39			0.30	0.52			0.18	1.00
Clearance Time (s)	6.0		6.0			6.0	6.0			6.0	
Vehicle Extension (s)	3.0		3.0			3.0	3.0			3.0	
Lane Grp Cap (vph)	1273		1034			1000	1792			625	1568
v/s Ratio Prot	c0.44		0.43			c0.33	0.11			c0.15	
v/s Ratio Perm											0.16
v/c Ratio	1.11		1.10			1.12	0.21			0.87	0.16
Uniform Delay, d1	42.5		42.5			49.0	18.0			55.9	0.0
Progression Factor	1.00		1.00			0.44	0.21			1.00	1.00
Incremental Delay, d2	61.7		61.2			60.1	0.1			15.2	0.2
Delay (s)	104.2		103.7			81.8	3.9			71.1	0.2
Level of Service	F		F			F	A			E	A
Approach Delay (s)		103.9		0.0			61.9			48.4	
Approach LOS		F		A			E			D	
<b>Intersection Summary</b>											
HCM 2000 Control Delay			81.8			HCM 2000 Level of Service				F	
HCM 2000 Volume to Capacity ratio			1.06								
Actuated Cycle Length (s)			140.0			Sum of lost time (s)				18.0	
Intersection Capacity Utilization			95.3%			ICU Level of Service				F	
Analysis Period (min)			15								
c Critical Lane Group											



### HCM Signalized Intersection Capacity Analysis

3 Exit 5 SB On/Exit 5 SB Off & NH 28

12/28/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↘	↑↑					↘↘		↘
Traffic Volume (vph)	0	650	460	165	580	0	0	0	0	185	0	390
Future Volume (vph)	0	650	460	165	580	0	0	0	0	185	0	390
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.0	6.0					6.0		6.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.97		1.00
Fr <sub>t</sub>		1.00	0.85	1.00	1.00					1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (prot)		3471	1553	1719	3438					3367		1553
Flt Permitted		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (perm)		3471	1553	1719	3438					3367		1553
Peak-hour factor, PHF	0.87	0.87	0.87	0.86	0.86	0.86	0.92	0.92	0.92	0.91	0.91	0.91
Adj. Flow (vph)	0	747	529	192	674	0	0	0	0	203	0	429
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	179
Lane Group Flow (vph)	0	747	529	192	674	0	0	0	0	203	0	250
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	4%	4%	4%
Turn Type		NA	Free	Prot	NA					Prot		Prot
Protected Phases		2		1	6					4		4
Permitted Phases			Free									
Actuated Green, G (s)		37.2	90.0	14.4	57.6					20.4		20.4
Effective Green, g (s)		37.2	90.0	14.4	57.6					20.4		20.4
Actuated g/C Ratio		0.41	1.00	0.16	0.64					0.23		0.23
Clearance Time (s)		6.0		6.0	6.0					6.0		6.0
Vehicle Extension (s)		5.0		3.0	5.0					3.0		3.0
Lane Grp Cap (vph)		1434	1553	275	2200					763		352
v/s Ratio Prot		c0.22		c0.11	0.20					0.06		c0.16
v/s Ratio Perm			0.34									
v/c Ratio		0.52	0.34	0.70	0.31					0.27		0.71
Uniform Delay, d1		19.7	0.0	35.7	7.3					28.6		32.1
Progression Factor		1.00	1.00	0.33	0.03					1.00		1.00
Incremental Delay, d2		1.4	0.6	6.1	0.2					0.2		6.6
Delay (s)		21.1	0.6	18.0	0.4					28.8		38.7
Level of Service		C	A	B	A					C		D
Approach Delay (s)		12.6			4.3			0.0				35.5
Approach LOS		B			A			A				D
<b>Intersection Summary</b>												
HCM 2000 Control Delay			15.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				18.0		
Intersection Capacity Utilization			72.6%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												



# HCM Signalized Intersection Capacity Analysis

4 Exit 5 NB Off & NH 28

12/28/2017




















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	445	390	0	0	385	235	360	0	380	0	0	0
Future Volume (vph)	445	390	0	0	385	235	360	0	380	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	4.0	6.0		6.0			
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00		1.00			
Frt	1.00	1.00			1.00	0.85	1.00		0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (prot)	1752	3505			3505	1568	1703		1524			
Flt Permitted	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	1752	3505			3505	1568	1703		1524			
Peak-hour factor, PHF	0.92	0.92	0.92	0.91	0.91	0.91	0.67	0.67	0.67	0.92	0.92	0.92
Adj. Flow (vph)	484	424	0	0	423	258	537	0	567	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	289	0	0	0
Lane Group Flow (vph)	484	424	0	0	423	258	537	0	298	0	0	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	6%	6%	6%	2%	2%	2%
Turn Type	Prot	NA			NA	Free	Prot		Prot			
Protected Phases	5	2			6		8		8			
Permitted Phases		2			6	Free						
Actuated Green, G (s)	25.0	48.6			17.6	90.0	29.4		29.4			
Effective Green, g (s)	25.0	48.6			17.6	90.0	29.4		29.4			
Actuated g/C Ratio	0.28	0.54			0.20	1.00	0.33		0.33			
Clearance Time (s)	6.0	6.0			6.0		6.0		6.0			
Vehicle Extension (s)	5.0	5.0			5.0		3.0		3.0			
Lane Grp Cap (vph)	486	1892			685	1568	556		497			
v/s Ratio Prot	c0.28	0.12			c0.12		c0.32		0.20			
v/s Ratio Perm						0.16						
v/c Ratio	1.00	0.22			0.62	0.16	0.97		0.60			
Uniform Delay, d1	32.4	10.8			33.1	0.0	29.8		25.4			
Progression Factor	0.33	0.34			1.00	1.00	1.00		1.00			
Incremental Delay, d2	36.8	0.3			4.1	0.2	29.4		2.0			
Delay (s)	47.5	3.9			37.3	0.2	59.2		27.4			
Level of Service	D	A			D	A	E		C			
Approach Delay (s)		27.1			23.2			42.9			0.0	
Approach LOS		C			C			D			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		32.6										
HCM 2000 Volume to Capacity ratio		0.89										
Actuated Cycle Length (s)		90.0							18.0			
Intersection Capacity Utilization		72.6%										
Analysis Period (min)		15										
c Critical Lane Group												



# HCM Signalized Intersection Capacity Analysis

5 9: NH 102 & St. Charles Street/Londonderry Road

12/28/2017

													
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR	
Lane Configurations													
Traffic Volume (vph)	10	5	210	10	0	10	410	910	120	5	650	120	
Future Volume (vph)	10	5	210	10	0	10	410	910	120	5	650	120	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0		
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95		
Frt		1.00	0.85		0.93		1.00	0.98		1.00	0.98		
Flt Protected		0.97	1.00		0.98		0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1801	1583		1729		1770	3478		1770	3457		
Flt Permitted		0.88	1.00		0.83		0.95	1.00		0.95	1.00		
Satd. Flow (perm)		1636	1583		1477		1770	3478		1770	3457		
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	11	5	228	40	0	40	446	989	130	5	707	130	
RTOR Reduction (vph)	0	0	138	0	75	0	0	8	0	0	14	0	
Lane Group Flow (vph)	0	16	90	0	5	0	446	1111	0	5	823	0	
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	2%	2%	2%	
Turn Type	Perm	NA	custom	Perm	NA		Prot	NA		Prot	NA		
Protected Phases		8			4		5	2		1	6		
Permitted Phases	8		6	4									
Actuated Green, G (s)		4.9	30.5		4.9		23.6	53.2		0.9	30.5		
Effective Green, g (s)		4.9	30.5		4.9		23.6	53.2		0.9	30.5		
Actuated g/C Ratio		0.06	0.40		0.06		0.31	0.69		0.01	0.40		
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0		
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)		104	627		93		542	2402		20	1369		
v/s Ratio Prot							c0.25	0.32		0.00	c0.24		
v/s Ratio Perm		c0.01	0.06		0.00								
v/c Ratio		0.15	0.14		0.05		0.82	0.46		0.25	0.60		
Uniform Delay, d1		34.1	14.9		33.9		24.8	5.4		37.7	18.4		
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00		
Incremental Delay, d2		0.7	0.1		0.2		9.8	0.1		6.5	0.7		
Delay (s)		34.8	15.0		34.1		34.5	5.5		44.2	19.2		
Level of Service		C	B		C		C	A		D	B		
Approach Delay (s)		16.3			34.1			13.8			19.3		
Approach LOS		B			C			B			B		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			16.3									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.65										
Actuated Cycle Length (s)			77.0									Sum of lost time (s)	18.0
Intersection Capacity Utilization			71.1%									ICU Level of Service	C
Analysis Period (min)			15										
c Critical Lane Group													



# HCM Signalized Intersection Capacity Analysis

10: NH 102 & Fordway/Madden Hill Road

12/28/2017

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	20	30	5	260	0	40	0	790	130	15	420	0
Future Volume (vph)	20	30	5	260	0	40	0	790	130	15	420	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			6.0			6.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.99			0.98			0.98			1.00	
Flt Protected		0.98			0.96			1.00			1.00	
Satd. Flow (prot)		1808			1736			1726			1806	
Flt Permitted		0.87			0.74			1.00			0.80	
Satd. Flow (perm)		1610			1338			1726			1455	
Peak-hour factor, PHF	0.60	0.60	0.60	0.96	0.96	0.96	0.89	0.89	0.89	0.86	0.86	0.86
Adj. Flow (vph)	33	50	8	271	0	42	0	888	146	17	488	0
RTOR Reduction (vph)	0	4	0	0	28	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	87	0	0	285	0	0	1027	0	0	505	0
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	8%	8%	8%	5%	5%	5%
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4						2		
Actuated Green, G (s)		20.1			20.1			55.8			55.8	
Effective Green, g (s)		20.1			20.1			55.8			55.8	
Actuated g/C Ratio		0.23			0.23			0.63			0.63	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		368			305			1095			923	
v/s Ratio Prot								0.60				
v/s Ratio Perm		0.05			0.21						0.35	
v/c Ratio		0.24			0.94			0.94			0.55	
Uniform Delay, d1		27.6			33.3			14.5			9.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			34.6			14.6			0.7	
Delay (s)		28.0			67.9			29.1			9.6	
Level of Service		C			E			C			A	
Approach Delay (s)		28.0			67.9			29.1			9.6	
Approach LOS		C			E			C			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			30.2					HCM 2000 Level of Service			C	
HCM 2000 Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			87.9					Sum of lost time (s)			12.0	
Intersection Capacity Utilization			86.3%					ICU Level of Service			E	
Analysis Period (min)			15									
c Critical Lane Group												



Zone 3  
7: NH 102 (E Broadway) & Birch St/Crystal Av












2040 Alt D Zone 3 PM Peak  
HCM Signalized Intersection Capacity Analysis

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	70	320	30	110	370	40	100	450	40	50	340	80
Future Volume (vph)	70	320	30	110	370	40	100	450	40	50	340	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1821		1752	1845	1568	1787	1858		1787	1828	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1752	1821		1752	1845	1568	1787	1858		1787	1828	
Peak-hour factor, PHF	0.91	0.91	0.91	0.93	0.93	0.93	0.95	0.95	0.95	0.94	0.94	0.94
Adj. Flow (vph)	77	352	33	118	398	43	105	474	42	53	362	85
RTOR Reduction (vph)	0	4	0	0	0	29	0	3	0	0	9	0
Lane Group Flow (vph)	77	381	0	118	398	14	105	513	0	53	438	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	3	8		7	4	5	5	2		1	6	
Permitted Phases						4						
Actuated Green, G (s)	7.1	18.4		7.9	19.2	26.4	7.2	29.5		2.8	25.1	
Effective Green, g (s)	7.1	18.4		7.9	19.2	26.4	7.2	29.5		2.8	25.1	
Actuated g/C Ratio	0.09	0.22		0.10	0.23	0.32	0.09	0.36		0.03	0.30	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	150	405		167	428	615	155	663		60	555	
v/s Ratio Prot	0.04	0.21		c0.07	c0.22	0.00	c0.06	c0.28		0.03	0.24	
v/s Ratio Perm						0.01						
v/c Ratio	0.51	0.94		0.71	0.93	0.02	0.68	0.77		0.88	0.79	
Uniform Delay, d1	36.1	31.6		36.2	31.0	19.3	36.6	23.6		39.7	26.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	30.1		12.8	26.5	0.0	11.1	8.6		75.4	7.3	
Delay (s)	39.0	61.6		49.0	57.5	19.3	47.7	32.1		115.1	33.7	
Level of Service	D	E		D	E	B	D	C		F	C	
Approach Delay (s)		57.9			52.8			34.8			42.3	
Approach LOS		E			D			C			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			46.2	HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			82.6	Sum of lost time (s)				24.0				
Intersection Capacity Utilization			89.4%	ICU Level of Service				E				
Analysis Period (min)			15									
c Critical Lane Group												



Zone 3  
8: N.High St/N. High St & Ash St Ext

2040 Alt D Zone 3 PM Peak  
Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	790	10	5	160	100	350
Future Volume (vph)	790	10	5	160	100	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	120	0			220
Storage Lanes	1	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950			0.998		
Satd. Flow (prot)	1787	1599	0	1859	1881	1599
Flt Permitted	0.950			0.998		
Satd. Flow (perm)	1787	1599	0	1859	1881	1599
Link Speed (mph)	30			30	30	
Link Distance (ft)	322			309	354	
Travel Time (s)	7.3			7.0	8.0	
Peak Hour Factor	0.90	0.90	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	1%	1%	2%	2%	1%	1%
Adj. Flow (vph)	878	11	6	184	115	402
Shared Lane Traffic (%)						
Lane Group Flow (vph)	878	11	0	190	115	402
Sign Control	Stop			Stop	Stop	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 65.6% ICU Level of Service C  
 Analysis Period (min) 15

Intersection

Intersection Delay, s/veh	205.3
Intersection LOS	F

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘	↗		↖	↗	↘
Traffic Vol, veh/h	790	10	5	160	100	350
Future Vol, veh/h	790	10	5	160	100	350
Peak Hour Factor	0.90	0.90	0.87	0.87	0.87	0.87
Heavy Vehicles, %	1	1	2	2	1	1
Mvmt Flow	878	11	6	184	115	402
Number of Lanes	1	1	0	1	1	1










Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	2
HCM Control Delay	351.4	17.2	23.2
HCM LOS	F	C	C

Lane	NBLn1	EBLn1	EBLn2	SBLn1	SBLn2
Vol Left, %	3%	100%	0%	0%	0%
Vol Thru, %	97%	0%	0%	100%	0%
Vol Right, %	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	165	790	10	100	350
LT Vol	5	790	0	0	0
Through Vol	160	0	0	100	0
RT Vol	0	0	10	0	350
Lane Flow Rate	190	878	11	115	402
Geometry Grp	4	7	7	7	7
Degree of Util (X)	0.372	1.733	0.018	0.217	0.683
Departure Headway (Hd)	8.951	7.109	5.891	8.584	7.859
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	406	518	611	421	463
Service Time	6.951	4.809	3.591	6.284	5.559
HCM Lane V/C Ratio	0.468	1.695	0.018	0.273	0.868
HCM Control Delay	17.2	355.7	8.7	13.6	25.9
HCM Lane LOS	C	F	A	B	D
HCM 95th-tile Q	1.7	52.6	0.1	0.8	5.1



Zone 3  
9: N High St & Madden Rd

2040 Alt D Zone 3 PM Peak  
Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	0	0	950	450	10
Future Volume (vph)	10	0	0	950	450	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.997	
Flt Protected	0.950					
Satd. Flow (prot)	1703	0	0	1881	1876	0
Flt Permitted	0.950					
Satd. Flow (perm)	1703	0	0	1881	1876	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	160			224	319	
Travel Time (s)	3.6			5.1	7.3	
Peak Hour Factor	0.50	0.50	0.93	0.93	0.86	0.86
Heavy Vehicles (%)	6%	6%	1%	1%	1%	1%
Adj. Flow (vph)	20	0	0	1022	523	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	20	0	0	1022	535	0
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	66.4%			ICU Level of Service C		
Analysis Period (min)	15					

**Intersection**

Int Delay, s/veh 0.5

**Movement** EBL EBR NBL NBT SBT SBR

Lane Configurations	Y				↑	↑
Traffic Vol, veh/h	10	0	0	950	450	10
Future Vol, veh/h	10	0	0	950	450	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	50	93	93	86	86
Heavy Vehicles, %	6	6	1	1	1	1
Mvmt Flow	20	0	0	1022	523	12

**Major/Minor** Minor2 Major1 Major2

Conflicting Flow All	1551	529	535	0	-	0
Stage 1	529	-	-	-	-	-
Stage 2	1022	-	-	-	-	-
Critical Hdwy	6.46	6.26	4.11	-	-	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	2.209	-	-	-
Pot Cap-1 Maneuver	122	542	1038	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	341	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	122	542	1038	-	-	-
Mov Cap-2 Maneuver	122	-	-	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	341	-	-	-	-	-


















**Approach** EB NB SB

HCM Control Delay, s	40.2	0	0
HCM LOS	E		

**Minor Lane/Major Mvmt** NBL NBT EBLn1 SBT SBR

Capacity (veh/h)	1038	-	122	-	-
HCM Lane V/C Ratio	-	-	0.164	-	-
HCM Control Delay (s)	0	-	40.2	-	-
HCM Lane LOS	A	-	E	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-



													
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR	
Lane Configurations													
Traffic Volume (vph)	50	900	10	20	260	10	50	20	170	30	10	10	
Future Volume (vph)	50	900	10	20	260	10	50	20	170	30	10	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	150		150	150		150	0		0	150		150	
Storage Lanes	0		0	0		0	0		0	0		0	
Taper Length (ft)	25			25			25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.999			0.995			0.904			0.973		
Flt Protected		0.997			0.997			0.990			0.971		
Satd. Flow (prot)	0	1874	0	0	1848	0	0	1700	0	0	1795	0	
Flt Permitted		0.997			0.997			0.990			0.971		
Satd. Flow (perm)	0	1874	0	0	1848	0	0	1700	0	0	1795	0	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		327			240			246			251		
Travel Time (s)		7.4			5.5			5.6			5.7		
Peak Hour Factor	0.94	0.94	0.94	0.88	0.88	0.88	0.67	0.67	0.67	0.82	0.82	0.82	
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	0%	0%	0%	
Adj. Flow (vph)	53	957	11	23	295	11	75	30	254	37	12	12	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	1021	0	0	329	0	0	359	0	0	61	0	
Sign Control		Free			Free			Stop			Stop		

**Intersection Summary**

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 84.6%

ICU Level of Service E

Analysis Period (min) 15

Intersection												
Int Delay, s/veh	37.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	50	900	10	20	260	10	50	20	170	30	10	10
Future Vol, veh/h	50	900	10	20	260	10	50	20	170	30	10	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	88	88	88	67	67	67	82	82	82
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	0	0	0
Mvmt Flow	53	957	11	23	295	11	75	30	254	37	12	12

Major/Minor	Major1	Major2	Minor2	Minor1
Conflicting Flow All	306	0	0	968
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	4.11	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.209	-	2.218	-
Pot Cap-1 Maneuver	1260	-	712	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	1260	-	712	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	0.4	0.7	160.2	146
HCM LOS			F	F
























Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SELn1
Capacity (veh/h)	76	1260	-	-	712	-	-	295
HCM Lane V/C Ratio	0.802	0.042	-	-	0.032	-	-	1.214
HCM Control Delay (s)	146	8	0	-	10.2	0	-	160.2
HCM Lane LOS	F	A	A	-	B	A	-	F
HCM 95th %tile Q(veh)	3.9	0.1	-	-	0.1	-	-	16.2



## Zone 4

## 11: Folsom Rd/Tsienneto Rd &amp; NH 28 S/NH 28

2040 Alt D Zone 4 PM Peak  
HCM Signalized Intersection Capacity Analysis

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	70	340	190	650	530	0	300	480	110	30	250	930
Future Volume (vph)	70	340	190	650	530	0	300	480	110	30	250	930
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	4.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.97	1.00	1.00	1.00	1.00	0.88
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	3433	3539		3433	1863	1583	1787	1881	2814
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	3433	3539		3433	1863	1583	1787	1881	2814
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.96	0.96	0.96	0.95	0.95	0.95
Adj. Flow (vph)	76	370	207	691	564	0	312	500	115	32	263	979
RTOR Reduction (vph)	0	0	151	0	0	0	0	0	0	0	0	57
Lane Group Flow (vph)	76	370	56	691	564	0	313	500	115	32	263	922
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA	Free	Prot	NA	pt+ov
Protected Phases	1	6	7	5	2		3	8		7	4	4 5
Permitted Phases		6	6		2			8	Free		4	
Actuated Green, G (s)	11.0	16.7	25.4	29.3	35.0		16.0	41.3	120.0	8.7	34.0	69.3
Effective Green, g (s)	11.0	16.7	25.4	29.3	35.0		16.0	41.3	120.0	8.7	34.0	69.3
Actuated g/C Ratio	0.09	0.14	0.21	0.24	0.29		0.13	0.34	1.00	0.07	0.28	0.58
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	162	492	414	838	1032		457	641	1583	129	532	1625
v/s Ratio Prot	0.04	c0.10	0.01	c0.20	0.16		c0.09	c0.27		0.02	0.14	0.33
v/s Ratio Perm			0.03						0.07			
v/c Ratio	0.47	0.75	0.14	0.82	0.55		0.68	0.78	0.07	0.25	0.49	0.57
Uniform Delay, d1	51.7	49.7	38.4	42.9	35.8		49.6	35.3	0.0	52.6	35.8	15.9
Progression Factor	1.00	1.00	1.00	1.13	0.76		1.00	1.00	1.00	1.47	0.67	0.62
Incremental Delay, d2	2.1	10.2	0.2	5.9	1.8		4.2	6.1	0.1	0.8	0.6	0.4
Delay (s)	53.9	59.8	38.5	54.5	28.9		53.8	41.4	0.1	78.0	24.7	10.3
Level of Service	D	E	D	D	C		D	D	A	E	C	B
Approach Delay (s)		52.4			43.0			40.5			14.9	
Approach LOS		D			D			D			B	

## Intersection Summary

HCM 2000 Control Delay	35.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Zone 4  
12: Tsienneto Rd & Pinkerton St

2040 Alt D Zone 4 PM Peak  
HCM Signalized Intersection Capacity Analysis

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	310	110	800	530	90	920
Future Volume (vph)	310	110	800	530	90	920
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1787	1599	3574	1599	1787	3574
Flt Permitted	0.95	1.00	1.00	1.00	0.16	1.00
Satd. Flow (perm)	1787	1599	3574	1599	295	3574
Peak-hour factor, PHF	0.86	0.86	0.96	0.96	0.85	0.85
Adj. Flow (vph)	360	128	833	552	106	1082
RTOR Reduction (vph)	0	20	0	0	0	0
Lane Group Flow (vph)	360	108	833	552	106	1082
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	pm+ov	NA	Free	pm+pt	NA
Protected Phases	1 2 5 6	7	8		7	3 4
Permitted Phases		1 2 5 6		Free	3 4	
Actuated Green, G (s)	52.0	60.7	41.3	120.0	56.0	56.0
Effective Green, g (s)	52.0	60.7	41.3	120.0	56.0	56.0
Actuated g/C Ratio	0.43	0.51	0.34	1.00	0.47	0.47
Clearance Time (s)		6.0	6.0		6.0	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)	774	888	1230	1599	245	1667
v/s Ratio Prot	c0.20	0.01	c0.23		0.03	c0.30
v/s Ratio Perm		0.06		0.35	0.17	
v/c Ratio	0.47	0.12	0.68	0.35	0.43	0.65
Uniform Delay, d1	24.1	15.6	33.7	0.0	21.4	24.5
Progression Factor	1.00	1.00	1.15	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	1.0	0.4	1.2	0.9
Delay (s)	24.6	15.7	39.8	0.4	22.6	25.4
Level of Service	C	B	D	A	C	C
Approach Delay (s)	22.2		24.1			25.1
Approach LOS	C		C			C
<b>Intersection Summary</b>						
HCM 2000 Control Delay			24.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.64			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	24.0
Intersection Capacity Utilization			61.0%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						



Zone 4  
13: Applebee's/Linlew Dr & NH 28

2040 Alt D Zone 4 PM Peak  
HCM Signalized Intersection Capacity Analysis

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	380	1475	5	20	1290	120	15	10	15	10	10	160
Future Volume (vph)	380	1475	5	20	1290	120	15	10	15	10	10	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.98	1.00
Satd. Flow (prot)	1787	3573		1787	3529			1844	1615		1835	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.80	1.00		0.83	1.00
Satd. Flow (perm)	1787	3573		1787	3529			1518	1615		1557	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.95	0.95	0.95	0.90	0.90	0.90	0.80	0.80	0.80
Adj. Flow (vph)	392	1521	5	21	1358	126	17	11	17	12	12	200
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	16	0	0	19
Lane Group Flow (vph)	392	1526	0	21	1479	0	0	28	1	0	26	181
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8			4	5
Permitted Phases							8		8	4	4	4
Actuated Green, G (s)	31.2	93.4		3.3	65.5			5.3	5.3		5.3	36.5
Effective Green, g (s)	31.2	93.4		3.3	65.5			5.3	5.3		5.3	36.5
Actuated g/C Ratio	0.26	0.78		0.03	0.55			0.04	0.04		0.04	0.30
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	464	2780		49	1926			67	71		68	566
v/s Ratio Prot	c0.22	0.43		0.01	c0.42							c0.08
v/s Ratio Perm								0.02	0.00		0.02	0.03
v/c Ratio	0.84	0.55		0.43	0.77			0.42	0.01		0.38	0.32
Uniform Delay, d1	42.1	5.1		57.4	21.3			55.8	54.8		55.8	32.2
Progression Factor	0.97	1.30		1.20	0.94			1.00	1.00		1.00	1.00
Incremental Delay, d2	7.6	0.4		4.6	2.3			4.2	0.1		3.6	0.3
Delay (s)	48.5	7.1		73.7	22.4			60.0	54.9		59.3	32.5
Level of Service	D	A		E	C			E	D		E	C
Approach Delay (s)		15.6			23.1			58.1			35.6	
Approach LOS		B			C			E			D	

Intersection Summary

HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c - Critical Lane Group			



Zone 4  
14: VIP Dr/Ashleigh Dr & NH 28

2040 Alt D Zone 4 PM Peak  
HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔		↔	↔	↔
Traffic Volume (vph)	150	1550	10	5	1240	410	40	10	10	200	5	280
Future Volume (vph)	150	1550	10	5	1240	410	40	10	10	200	5	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00
Satd. Flow (prot)	3467	3571		1770	3539	1583	1805	1758		1715	1723	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.45	1.00
Satd. Flow (perm)	3467	3571		1770	3539	1583	1805	1758		1715	813	1615
Peak-hour factor, PHF	0.84	0.84	0.84	0.90	0.90	0.90	0.78	0.78	0.78	0.86	0.86	0.86
Adj. Flow (vph)	179	1845	12	6	1378	456	51	13	13	233	6	326
RTOR Reduction (vph)	0	0	0	0	0	133	0	12	0	0	0	111
Lane Group Flow (vph)	179	1857	0	6	1378	323	51	14	0	119	120	215
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	pt+ov
Protected Phases	5	2		1	6	7	3	8		7	4	4.5
Permitted Phases		2			6	6		8				
Actuated Green, G (s)	9.1	63.0		1.0	54.9	76.8	7.7	10.1		21.9	38.0	39.4
Effective Green, g (s)	9.1	63.0		1.0	54.9	76.8	7.7	10.1		21.9	38.0	39.4
Actuated g/C Ratio	0.08	0.52		0.01	0.46	0.64	0.06	0.08		0.18	0.32	0.33
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	262	1874		14	1619	1092	115	147		312	423	530
v/s Ratio Prot	c0.05	c0.52		0.00	0.39	0.05	0.03	0.01		c0.07	0.05	c0.13
v/s Ratio Perm						0.15					0.04	
v/c Ratio	0.68	0.99		0.43	0.85	0.30	0.44	0.10		0.38	0.28	0.41
Uniform Delay, d1	54.0	28.2		59.2	28.9	9.6	54.1	50.7		43.1	30.8	31.2
Progression Factor	1.00	1.00		1.00	0.74	0.07	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	7.2	18.7		16.3	3.7	0.1	2.7	0.3		0.8	0.4	0.5
Delay (s)	61.2	46.9		75.5	25.1	0.8	56.8	51.0		43.9	31.2	31.7
Level of Service	E	D		E	C	A	E	D		D	C	C
Approach Delay (s)		48.2			19.3			54.8			34.2	
Approach LOS		D			B			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay	34.8			HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio	0.84											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)				24.0				
Intersection Capacity Utilization	74.7%			ICU Level of Service				D				
Analysis Period (min)	15											
c Critical Lane Group												



Zone 4  
15: NH 28 & Scobie Pond Rd

2040 Alt D Zone 4 PM Peak  
Lanes, Volumes, Timings



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	200	1770	1450	40	20	80
Future Volume (vph)	200	1770	1450	40	20	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300			0	0	175
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.996			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	3539	3525	0	1752	1568
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	3539	3525	0	1752	1568
Link Speed (mph)		30	30		30	
Link Distance (ft)		535	210		522	
Travel Time (s)		12.2	4.8		11.9	
Peak Hour Factor	0.91	0.91	0.90	0.90	0.75	0.75
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	220	1945	1611	44	27	107
Shared Lane Traffic (%)						
Lane Group Flow (vph)	220	1945	1655	0	27	107
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 65.8% ICU Level of Service C  
 Analysis Period (min) 15

Intersection						
Int Delay, s/veh	30.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑↑	↑↑		↘	↗
Traffic Vol, veh/h	200	1770	1450	40	20	80
Future Vol, veh/h	200	1770	1450	40	20	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	300	-	-	-	0	175
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	90	90	75	75
Heavy Vehicles, %	2	2	2	2	3	3
Mvmt Flow	220	1945	1611	44	27	107

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1655	0	-	0	3046 828
Stage 1	-	-	-	-	1633 -
Stage 2	-	-	-	-	1413 -
Critical Hdwy	4.14	-	-	-	6.86 6.96
Critical Hdwy Stg 1	-	-	-	-	5.86 -
Critical Hdwy Stg 2	-	-	-	-	5.86 -
Follow-up Hdwy	2.22	-	-	-	3.53 3.33
Pot Cap-1 Maneuver	386	-	-	-	~10 312
Stage 1	-	-	-	-	143 -
Stage 2	-	-	-	-	189 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	386	-	-	-	~4 312
Mov Cap-2 Maneuver	-	-	-	-	~4 -
Stage 1	-	-	-	-	61 -
Stage 2	-	-	-	-	189 -

Approach	EB	WB	SB
HCM Control Delay, s	2.6	0	\$ 869.9
HCM LOS			F

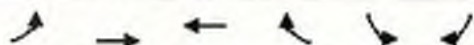
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	386	-	-	-	4	312
HCM Lane V/C Ratio	0.569	-	-	-	6.667	0.342
HCM Control Delay (s)	26	-	-	-	\$ 4259.8	22.4
HCM Lane LOS	D	-	-	-	F	C
HCM 95th %tile Q(veh)	3.4	-	-	-	4.9	1.5

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



Zone 4  
25: NH 28 & Rockingham Road

2040 Alt D Zone 4 PM Peak  
HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵	↕↕	↕↕		↵	↗
Traffic Volume (vph)	140	1360	1415	270	120	70
Future Volume (vph)	140	1360	1415	270	120	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3454		1770	1583
Flt Permitted	0.08	1.00	1.00		0.95	1.00
Satd. Flow (perm)	148	3539	3454		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	1478	1538	293	130	76
RTOR Reduction (vph)	0	0	20	0	0	27
Lane Group Flow (vph)	152	1478	1811	0	130	49
Turn Type	pm+pt	NA	NA		Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2					4
Actuated Green, G (s)	55.7	55.7	44.5		7.3	12.5
Effective Green, g (s)	55.7	55.7	44.5		7.3	12.5
Actuated g/C Ratio	0.74	0.74	0.59		0.10	0.17
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	222	2628	2049		172	390
v/s Ratio Prot	0.05	c0.42	c0.52		c0.07	0.01
v/s Ratio Perm	0.46					0.02
v/c Ratio	0.68	0.56	0.88		0.76	0.13
Uniform Delay, d1	15.1	4.3	13.0		33.0	26.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	8.4	0.3	4.9		17.1	0.1
Delay (s)	23.6	4.5	18.0		50.1	26.7
Level of Service	C	A	B		D	C
Approach Delay (s)		6.3	18.0		41.5	
Approach LOS		A	B		D	

Intersection Summary

HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Zone 6 - Exit 4A Ramps  
20: Exit 4A SB On/Exit 4A SB Off & Connector Road

2040 Alternative D - PM Peak  
HCM Signalized Intersection Capacity Analysis

















	↑	↗	↘	↓	↙	↖
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations			↗↘		↗↘	
Traffic Volume (vph)	0	0	1380	0	375	0
Future Volume (vph)	0	0	1380	0	375	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			6.0		6.0	
Lane Util. Factor			0.97		0.97	
Frt			1.00		1.00	
Flt Protected			0.95		0.95	
Satd. Flow (prot)			3433		3433	
Flt Permitted			0.95		0.95	
Satd. Flow (perm)			3433		3433	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	0	1468	0	399	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1468	0	399	0
Turn Type			Prot		Prot	
Protected Phases			4		2	
Permitted Phases						
Actuated Green, G (s)			56.0		22.0	
Effective Green, g (s)			56.0		22.0	
Actuated g/C Ratio			0.62		0.24	
Clearance Time (s)			6.0		6.0	
Vehicle Extension (s)			3.0		3.0	
Lane Grp Cap (vph)			2136		839	
v/s Ratio Prot			c0.43		c0.12	
v/s Ratio Perm						
v/c Ratio			0.69		0.48	
Uniform Delay, d1			11.2		29.1	
Progression Factor			1.00		1.21	
Incremental Delay, d2			1.8		1.9	
Delay (s)			13.0		37.2	
Level of Service			B		D	
Approach Delay (s)	0.0			13.0	37.2	
Approach LOS	A			B	D	
<b>Intersection Summary</b>						
HCM 2000 Control Delay			18.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			90.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			112.7%		ICU Level of Service	H
Analysis Period (min)			15			

c Critical Lane Group



Zone 6 - Exit 4A Ramps  
21: Connector Road & Exit 4A NB Off & Exit 4A NB On

2040 Alternative D - PM Peak  
HCM Signalized Intersection Capacity Analysis

										
Movement	SBL	SBR	NWL	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations										
Traffic Volume (vph)	0	0	0	120	0	1380	0	0	375	1110
Future Volume (vph)	0	0	0	120	0	1380	0	0	375	1110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			6.0	6.0		6.0			6.0	6.0
Lane Util. Factor			1.00	0.95		0.95			0.95	0.88
Frt			0.85	0.85		1.00			1.00	0.85
Flt Protected			1.00	1.00		1.00			1.00	1.00
Satd. Flow (prot)			1583	1504		3539			3539	2787
Flt Permitted			1.00	1.00		1.00			1.00	1.00
Satd. Flow (perm)			1583	1504		3539			3539	2787
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	0	0	128	0	1468	0	0	399	1181
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	226
Lane Group Flow (vph)	0	0	64	64	0	1468	0	0	399	955
Turn Type			Prot	Prot	Perm	NA			NA	Perm
Protected Phases			4	4		2			2	
Permitted Phases					2					2
Actuated Green, G (s)			10.2	10.2		67.8			67.8	67.8
Effective Green, g (s)			10.2	10.2		67.8			67.8	67.8
Actuated g/C Ratio			0.11	0.11		0.75			0.75	0.75
Clearance Time (s)			6.0	6.0		6.0			6.0	6.0
Vehicle Extension (s)			3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)			179	170		2666			2666	2099
v/s Ratio Prot			0.04	c0.04		c0.41			0.11	
v/s Ratio Perm										0.34
v/c Ratio			0.36	0.38		0.55			0.15	0.46
Uniform Delay, d1			36.9	37.0		4.7			3.1	4.2
Progression Factor			1.00	1.00		0.50			1.00	1.00
Incremental Delay, d2			1.2	1.4		0.6			0.1	0.7
Delay (s)			38.1	38.4		2.9			3.2	4.9
Level of Service			D	D		A			A	A
Approach Delay (s)	0.0		38.2			2.9			4.5	
Approach LOS	A		D			A			A	
<b>Intersection Summary</b>										
HCM 2000 Control Delay			5.1			HCM 2000 Level of Service			A	
HCM 2000 Volume to Capacity ratio			0.53							
Actuated Cycle Length (s)			90.0			Sum of lost time (s)		12.0		
Intersection Capacity Utilization			88.2%			ICU Level of Service		E		
Analysis Period (min)			15							

c Critical Lane Group



## Zone 5

2040 Alt D Zone 5 PM Peak

16: NH 102 W/NH 102 E &amp; Bypass 28 S/Bypass 28 N &amp; E Derry Rd

Lanes, Volumes, Timings

Lane Group	WBL2	WBL	WBR	WBR2	NBL	NBT	NBR	NBR2	SBL2	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	220	360	30	80	120	70	10	10	390	190	30
Future Volume (vph)	10	220	360	30	80	120	70	10	10	390	190	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.915				0.962					0.993	
Flt Protected		0.982				0.986					0.969	
Satd. Flow (prot)	0	1690	0	0	0	1767	0	0	0	0	1810	0
Flt Permitted		0.982				0.986					0.969	
Satd. Flow (perm)	0	1690	0	0	0	1767	0	0	0	0	1810	0
Link Speed (mph)		30				30					30	
Link Distance (ft)		449				456					370	
Travel Time (s)		10.2				10.4					8.4	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.87	0.87	0.87	0.87	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%	2%	2%	1%	1%	1%	1%
Adj. Flow (vph)	11	242	396	33	92	138	80	11	11	424	207	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	682	0	0	0	321	0	0	0	0	675	0
Sign Control		Yield				Yield					Yield	

## Intersection Summary

Area Type: Other

Control Type: Roundabout

Intersection Capacity Utilization 137.4%

ICU Level of Service H

Analysis Period (min) 15

Lane Group	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations								
Traffic Volume (vph)	30	180	320	70	10	30	170	15
Future Volume (vph)	30	180	320	70	10	30	170	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.912					0.991	
Flt Protected		0.998					0.991	
Satd. Flow (prot)	0	1712	0	0	0	0	1829	0
Flt Permitted		0.998					0.991	
Satd. Flow (perm)	0	1712	0	0	0	0	1829	0
Link Speed (mph)		30					30	
Link Distance (ft)		390					523	
Travel Time (s)		8.9					11.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%	2%	2%
Adj. Flow (vph)	33	200	356	78	11	33	187	16
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	667	0	0	0	0	247	0
Sign Control		Yield					Yield	

## Intersection Summary

01/05/2018

MCC

Synchro 9 Report

Page 1



## Intersection

Intersection Delay, s/veh38.3

Intersection LOS E

Approach	WB	NB	SB	NE	SW
Entry Lanes	1	1	1	1	1
Conflicting Circle Lanes	1	1	1	1	1
Adj Approach Flow, veh/h	682	321	675	667	247
Demand Flow Rate, veh/h	688	328	681	674	252
Vehicles Circulating, veh/h	563	1045	585	704	923
Vehicles Exiting, veh/h	810	333	590	562	328
Ped Vol Crossing Leg, #/h	0	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000	1.000
Approach Delay, s/veh	33.6	26.7	35.6	60.1	15.0
Approach LOS	D	D	E	F	C

Lane	Left	Left	Left	Left	Left
Designated Moves	LR	LTR	LTR	LTR	LTR
Assumed Moves	LR	LTR	LTR	LTR	LTR
RT Channelized					
Lane Util	1.000	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976	4.976
Entry Flow, veh/h	688	328	681	674	252
Cap Entry Lane, veh/h	777	475	760	673	538
Entry HV Adj Factor	0.991	0.979	0.991	0.990	0.980
Flow Entry, veh/h	682	321	675	667	247
Cap Entry, veh/h	770	466	753	666	528
V/C Ratio	0.885	0.690	0.896	1.001	0.468
Control Delay, s/veh	33.6	26.7	35.6	60.1	15.0
LOS	D	D	E	F	C
95th %tile Queue, veh	11	5	12	16	2

## Zone 5

2040 Alt D Zone 5 PM Peak

17: NH Byp 28 NB/NH Byp 28 SB &amp; Pinkerton St/Nesmith Rd

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	50	500	10	30	20	320	130	10	25	110	10
Future Volume (vph)	5	50	500	10	30	20	320	130	10	25	110	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		50	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.956			0.997			0.991	
Flt Protected		0.995			0.992			0.966			0.992	
Satd. Flow (prot)	0	1853	1583	0	1802	0	0	1812	0	0	1849	0
Flt Permitted		0.995			0.992			0.966			0.992	
Satd. Flow (perm)	0	1853	1583	0	1802	0	0	1812	0	0	1849	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		168			453			475			436	
Travel Time (s)		3.8			10.3			10.8			9.9	
Peak Hour Factor	0.88	0.88	0.88	0.82	0.82	0.82	0.93	0.93	0.93	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	6	57	568	12	37	24	344	140	11	27	121	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	63	568	0	73	0	0	495	0	0	159	0
Sign Control		Stop			Stop			Free			Free	

## Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 51.9%

ICU Level of Service A

Analysis Period (min) 15



## Intersection

Int Delay, s/veh 14.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔	↔		↔	↔
Traffic Vol, veh/h	5	50	500	10	30	20	320	130	10	25	110	10
Future Vol, veh/h	5	50	500	10	30	20	320	130	10	25	110	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	50	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	82	82	82	93	93	93	91	91	91
Heavy Vehicles, %	2	2	2	0	0	0	1	1	1	1	1	1
Mvmt Flow	6	57	568	12	37	24	344	140	11	27	121	11

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	1045	1020	127	1327
Stage 1	181	181	-	834
Stage 2	864	839	-	493
Critical Hdwy	7.12	6.52	6.22	7.1
Critical Hdwy Stg 1	6.12	5.52	-	6.1
Critical Hdwy Stg 2	6.12	5.52	-	6.1
Follow-up Hdwy	3.518	4.018	3.318	3.5
Pot Cap-1 Maneuver	207	237	923	134
Stage 1	821	750	-	365
Stage 2	349	381	-	562
Platoon blocked, %				
Mov Cap-1 Maneuver	134	172	923	31
Mov Cap-2 Maneuver	134	172	-	31
Stage 1	609	735	-	271
Stage 2	220	283	-	195

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.2	78.3	5.7	1.3
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1459	-	-	168	923	116	1436	-	-
HCM Lane V/C Ratio	0.236	-	-	0.372	0.616	0.631	0.019	-	-
HCM Control Delay (s)	8.2	0	-	38.6	14.9	78.3	7.6	0	-
HCM Lane LOS	A	A	-	E	B	F	A	A	-
HCM 95th %tile Q(veh)	0.9	-	-	1.6	4.4	3.2	0.1	-	-

























## Zone 5

## 18: Tsienneto Rd &amp; NH 28 Byp NB/NH 28 Byp SB

## 2040 Alt D Zone 5 PM Peak

## HCM Signalized Intersection Capacity Analysis

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	30	70	30	50	40	210	90	840	70	20	360	40
Future Volume (vph)	30	70	30	50	40	210	90	840	70	20	360	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1780		1787	1881	1599	1805	3568		1805	3556	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1780		1787	1881	1599	1805	3568		1805	3556	
Peak-hour factor, PHF	0.99	0.99	0.99	0.95	0.95	0.95	0.89	0.89	0.89	0.93	0.93	0.93
Adj. Flow (vph)	30	71	30	53	42	221	101	944	79	22	387	43
RTOR Reduction (vph)	0	18	0	0	0	125	0	7	0	0	11	0
Lane Group Flow (vph)	30	83	0	53	42	96	101	1016	0	22	419	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	1	6		5	2	2 3	3	8		7	4	
Permitted Phases		6			2							
Actuated Green, G (s)	2.6	14.8		4.2	16.4	31.3	8.9	26.1		2.6	19.8	
Effective Green, g (s)	2.6	14.8		4.2	16.4	31.3	8.9	26.1		2.6	19.8	
Actuated g/C Ratio	0.04	0.21		0.06	0.23	0.44	0.12	0.36		0.04	0.28	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	64	367		104	430	698	224	1298		65	981	
v/s Ratio Prot	0.02	c0.05		c0.03	0.02	0.06	c0.06	c0.28		0.01	0.12	
v/s Ratio Perm												
v/c Ratio	0.47	0.23		0.51	0.10	0.14	0.45	0.78		0.34	0.43	
Uniform Delay, d1	33.9	23.7		32.8	21.8	12.1	29.1	20.3		33.7	21.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.3	0.3		3.9	0.5	0.1	1.4	3.2		3.1	0.3	
Delay (s)	39.2	24.0		36.6	22.3	12.2	30.6	23.4		36.8	21.6	
Level of Service	D	C		D	C	B	C	C		D	C	
Approach Delay (s)		27.5			17.6			24.1			22.3	
Approach LOS		C			B			C			C	












## Intersection Summary

HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	71.7	Sum of lost time (s)	24.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Zone 5  
19: NH 102 EB/NH 102 & Tsienneto Rd

2040 Alt D Zone 5 PM Peak  
HCM Signalized Intersection Capacity Analysis

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	710	5	10	260	200	340
Future Volume (vph)	710	5	10	260	200	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	4.0	4.0	6.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	0.95		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1790		1770	1863	1845	1568
Flt Permitted	0.95		0.52	1.00	1.00	1.00
Satd. Flow (perm)	1790		962	1863	1845	1568
Peak-hour factor, PHF	0.90	0.90	0.87	0.87	0.89	0.89
Adj. Flow (vph)	789	6	11	299	225	382
RTOR Reduction (vph)	1	0	0	0	0	74
Lane Group Flow (vph)	794	0	11	299	225	308
Heavy Vehicles (%)	1%	1%	2%	2%	3%	3%
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	8		1	6.7	2.7	7.8
Permitted Phases			6.7			2
Actuated Green, G (s)	41.2		27.3	26.4	27.3	70.5
Effective Green, g (s)	41.2		23.3	26.4	27.3	70.5
Actuated g/C Ratio	0.47		0.27	0.30	0.31	0.81
Clearance Time (s)	6.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	843		264	562	576	1264
v/s Ratio Prot	c0.44		c0.00	c0.16	0.12	0.15
v/s Ratio Perm			0.01			0.05
v/c Ratio	0.94		0.04	0.53	0.39	0.24
Uniform Delay, d1	22.0		23.7	25.4	23.5	2.0
Progression Factor	1.00		1.00	1.00	1.13	0.18
Incremental Delay, d2	18.5		0.1	1.0	0.4	0.1
Delay (s)	40.4		23.8	26.3	27.0	0.5
Level of Service	D		C	C	C	A
Approach Delay (s)	40.4			26.2	10.3	
Approach LOS	D			C	B	
<b>Intersection Summary</b>						
HCM 2000 Control Delay			27.2	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio			0.81			
Actuated Cycle Length (s)			87.4	Sum of lost time (s)	22.0	
Intersection Capacity Utilization			61.7%	ICU Level of Service	B	
Analysis Period (min)			15			
c Critical Lane Group						

Zone 5  
26: NH 102 & North Shore Road











2040 Alt D Zone 5 PM Peak  
HCM Signalized Intersection Capacity Analysis

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘		↑	↗	↘	↑
Traffic Volume (vph)	50	10	810	160	20	490
Future Volume (vph)	50	10	810	160	20	490
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		4.0	4.0	6.0	4.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	0.85	1.00	1.00
Flt Protected	0.96		1.00	1.00	0.95	1.00
Satd. Flow (prot)	1762		1900	1615	1805	1900
Flt Permitted	0.96		1.00	1.00	0.22	1.00
Satd. Flow (perm)	1762		1900	1615	415	1900
Peak-hour factor, PHF	0.87	0.67	0.95	0.84	0.73	0.96
Adj. Flow (vph)	57	15	853	190	27	510
RTOR Reduction (vph)	10	0	0	41	0	0
Lane Group Flow (vph)	62	0	853	149	27	510
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%
Turn Type	Prot		NA	Perm	custom	NA
Protected Phases	7		6 8		5	2 8
Permitted Phases				6 8	2	
Actuated Green, G (s)	5.0		58.6	58.6	20.1	59.5
Effective Green, g (s)	5.0		58.6	58.6	20.1	59.5
Actuated g/C Ratio	0.06		0.67	0.67	0.23	0.68
Clearance Time (s)	6.0				6.0	
Vehicle Extension (s)	3.0				3.0	
Lane Grp Cap (vph)	100		1273	1082	124	1293
v/s Ratio Prot	c0.03		c0.45		c0.00	0.27
v/s Ratio Perm				0.09	0.05	
v/c Ratio	0.62		0.67	0.14	0.22	0.39
Uniform Delay, d1	40.3		8.6	5.2	27.5	6.1
Progression Factor	1.00		0.35	0.52	1.00	1.00
Incremental Delay, d2	10.8		0.8	0.0	0.9	0.2
Delay (s)	51.0		3.9	2.8	28.4	6.3
Level of Service	D		A	A	C	A
Approach Delay (s)	51.0		3.7			7.4
Approach LOS	D		A			A
<b>Intersection Summary</b>						
HCM 2000 Control Delay			6.9		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.65			
Actuated Cycle Length (s)			87.4		Sum of lost time (s)	22.0
Intersection Capacity Utilization			55.1%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						



Zone 5  
 27: NH 102/NH 102 WB & English Range Road

2040 Alt D Zone 5 PM Peak  
 Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	10	40	780	500	10
Future Volume (vph)	10	10	40	780	500	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.939				0.996	
Flt Protected	0.973		0.950			
Satd. Flow (prot)	1736	0	1787	1900	1874	0
Flt Permitted	0.973		0.950			
Satd. Flow (perm)	1736	0	1787	1900	1874	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	332			288	365	
Travel Time (s)	7.5			6.5	8.3	
Peak Hour Factor	0.64	0.77	0.71	0.90	0.75	0.55
Heavy Vehicles (%)	0%	0%	1%	0%	1%	0%
Adj. Flow (vph)	16	13	56	867	667	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	29	0	56	867	685	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 51.1% ICU Level of Service A  
 Analysis Period (min) 15

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y		Y	↑	↑	
Traffic Vol, veh/h	10	10	40	780	500	10
Future Vol, veh/h	10	10	40	780	500	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	64	77	71	90	75	55
Heavy Vehicles, %	0	0	1	0	1	0
Mvmt Flow	16	13	56	867	667	18

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1655	676	685	0	-	0
Stage 1	676	-	-	-	-	-
Stage 2	979	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.209	-	-	-
Pot Cap-1 Maneuver	109	457	913	-	-	-
Stage 1	509	-	-	-	-	-
Stage 2	367	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	102	457	913	-	-	-
Mov Cap-2 Maneuver	102	-	-	-	-	-
Stage 1	478	-	-	-	-	-
Stage 2	367	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	32.8	0.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	913	-	158	-	-
HCM Lane V/C Ratio	0.062	-	0.181	-	-
HCM Control Delay (s)	9.2	-	32.8	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-

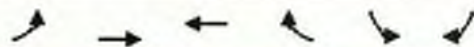


## **APPENDIX R-3: ALTERNATIVE D INTERSECTION CAPACITY ANALYSES – SYNCHRO PRINTOUTS – AM PEAK HOUR**

## Lanes, Volumes, Timings

X: NH 102 &amp; Exit 4 SB Off

01/23/2018



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector 3 Extend (s)		0.0	0.0		0.0	0.0
Turn Type		NA	NA		Prot	Prot
Protected Phases		2	6		4	4
Permitted Phases						
Detector Phase		2	6		4	4
Switch Phase						
Minimum Initial (s)		8.0	8.0		5.0	5.0
Minimum Split (s)		14.0	21.0		27.0	27.0
Total Split (s)		38.0	38.0		37.0	37.0
Total Split (%)		50.7%	50.7%		49.3%	49.3%
Maximum Green (s)		32.0	32.0		31.0	31.0
Yellow Time (s)		2.0	2.0		2.0	2.0
All-Red Time (s)		4.0	4.0		4.0	4.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Min	C-Min		None	None
Walk Time (s)			7.0		7.0	7.0
Flash Dont Walk (s)			8.0		14.0	14.0
Pedestrian Calls (#/hr)			0		0	0
Act Effct Green (s)		32.0	32.0		31.0	31.0
Actuated g/C Ratio		0.43	0.43		0.41	0.41
v/c Ratio		0.99	0.63		0.16	1.00
Control Delay		35.7	22.6		14.6	50.9
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		35.7	22.6		14.6	50.9
LOS		D	C		B	D
Approach Delay		35.7	22.6		47.1	
Approach LOS		D	C		D	
Queue Length 50th (ft)		340	424		37	282
Queue Length 95th (ft)		m#465	m409		69	#431
Internal Link Dist (ft)		632	308		132	
Turn Bay Length (ft)						
Base Capacity (vph)		1480	1453		797	1108
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.99	0.63		0.16	1.00

## Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00



# Lanes, Volumes, Timings

## ! X: NH 102 & Exit 4 SB Off

01/23/2018

Intersection Signal Delay: 36.3

Intersection LOS: D

Intersection Capacity Utilization 68.7%

ICU Level of Service C

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.


















Splits and Phases: 7: NH 102 & Exit 4 SB Off



## Lanes, Volumes, Timings

## 2 NH 102 &amp; Exit 4 NB Off

01/23/2018

											
Lane Group	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	455	0	330	0	0	1310	170	0	0	1080	360
Future Volume (vph)	455	0	330	0	0	1310	170	0	0	1080	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	0	0	0	550		0	0		0
Storage Lanes		2	2	0	0	2		0	0		1
Taper Length (ft)		25		25		25		25			
Lane Util. Factor	0.97	1.00	0.88	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Flt Protected	0.950					0.950					
Satd. Flow (prot)	3242	0	2632	0	0	3335	3438	0	0	3505	1568
Flt Permitted	0.950					0.950					
Satd. Flow (perm)	3242	0	2632	0	0	3335	3438	0	0	3505	1568
Right Turn on Red			No					Yes			Yes
Satd. Flow (RTOR)											167
Link Speed (mph)		25		30			30			30	
Link Distance (ft)		856		390			760			857	
Travel Time (s)		23.3		8.9			17.3			19.5	
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Heavy Vehicles (%)	8%	8%	8%	2%	2%	5%	5%	5%	3%	3%	3%
Adj. Flow (vph)	517	0	375	0	0	1394	181	0	0	1174	391
Shared Lane Traffic (%)											
Lane Group Flow (vph)	517	0	375	0	0	1394	181	0	0	1174	391
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Right	Right
Median Width(ft)		24		0			24			24	
Link Offset(ft)		12		0			0			0	
Crosswalk Width(ft)		16		16			16			16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15	25	15	9	15		9	15		25
Number of Detectors	3		3			3	3			3	0
Detector Template											
Leading Detector (ft)	256		256			256	256			256	0
Trailing Detector (ft)	-5		-5			-5	-5			-5	0
Detector 1 Position(ft)	-5		-5			-5	-5			-5	-5
Detector 1 Size(ft)	55		55			55	55			55	50
Detector 1 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0		0.0			0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0		0.0			0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0		0.0			0.0	0.0			0.0	0.0
Detector 2 Position(ft)	125		125			125	125			125	
Detector 2 Size(ft)	6		6			6	6			6	
Detector 2 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex	
Detector 2 Channel											
Detector 2 Extend (s)	0.0		0.0			0.0	0.0			0.0	
Detector 3 Position(ft)	250		250			250	250			250	
Detector 3 Size(ft)	6		6			6	6			6	



## Lanes, Volumes, Timings

2. NH 102 &amp; Exit 4 NB Off

01/23/2018



Lane Group	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Detector 3 Type	CI+Ex		CI+Ex			CI+Ex	CI+Ex			CI+Ex	
Detector 3 Channel											
Detector 3 Extend (s)	0.0		0.0			0.0	0.0			0.0	
Turn Type	Prot		Prot			Prot	NA			NA	Free
Protected Phases	8		8			5	2			6	
Permitted Phases											Free
Detector Phase	8		2			5	2			6	
Switch Phase											
Minimum Initial (s)	10.0		10.0			5.0	8.0			8.0	
Minimum Split (s)	16.0		16.0			11.0	42.0			31.0	
Total Split (s)	29.0		29.0			66.0	121.0			55.0	
Total Split (%)	19.3%		19.3%			44.0%	80.7%			36.7%	
Maximum Green (s)	23.0		23.0			60.0	115.0			49.0	
Yellow Time (s)	2.0		2.0			2.0	2.0			2.0	
All-Red Time (s)	4.0		4.0			4.0	4.0			4.0	
Lost Time Adjust (s)	0.0		0.0			0.0	0.0			0.0	
Total Lost Time (s)	6.0		6.0			6.0	6.0			6.0	
Lead/Lag						Lead				Lag	
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0		3.0			3.0	3.0			3.0	
Recall Mode	None		None			None	C-Min			C-Min	
Walk Time (s)							7.0			7.0	
Flash Dont Walk (s)							29.0			17.0	
Pedestrian Calls (#/hr)							0			0	
Act Effct Green (s)	23.0		23.0			60.0	115.0			49.0	150.0
Actuated g/C Ratio	0.15		0.15			0.40	0.77			0.33	1.00
v/c Ratio	1.04		0.93			1.04	0.07			1.03	0.25
Control Delay	111.4		92.5			56.7	7.5			82.5	0.4
Queue Delay	0.0		0.0			0.0	0.0			0.0	0.0
Total Delay	111.4		92.5			56.7	7.5			82.5	0.4
LOS	F		F			E	A			F	A
Approach Delay		103.4					51.1			62.0	
Approach LOS		F					D			E	
Queue Length 50th (ft)	-280		209			-738	30			-642	0
Queue Length 95th (ft)	#384		#305			m#763	m32			#782	0
Internal Link Dist (ft)		776		310			680			777	
Turn Bay Length (ft)						550					
Base Capacity (vph)	497		403			1334	2635			1144	1568
Starvation Cap Reductn	0		0			0	0			0	0
Spillback Cap Reductn	0		0			0	0			0	0
Storage Cap Reductn	0		0			0	0			0	0
Reduced v/c Ratio	1.04		0.93			1.04	0.07			1.03	0.25

## Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 6 (4%), Referenced to phase 2:NET and 6:SWT, Start of Yellow

Natural Cycle: 150

## Lanes, Volumes, Timings

2.8: NH 102 & Exit 4 NB Off

01/23/2018

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 66.9

Intersection LOS: E

Intersection Capacity Utilization 96.2%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

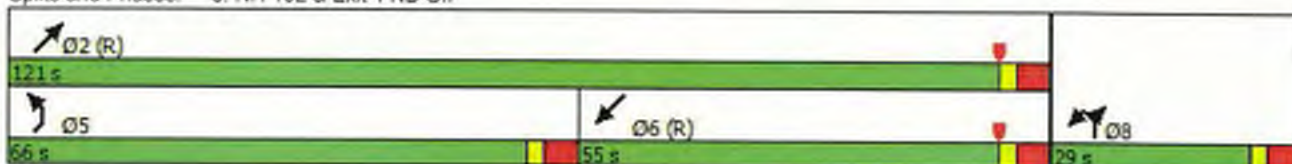
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: NH 102 & Exit 4 NB Off





### Lanes, Volumes, Timings

3 Exit 5 SB On/Exit 5 SB Off & NH 28

01/23/2018

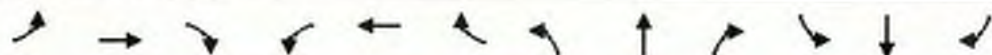
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑					↑↑		↑
Traffic Volume (vph)	0	585	460	285	685	0	0	0	0	110	0	360
Future Volume (vph)	0	585	460	285	685	0	0	0	0	110	0	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		350	0		0	0			0		0
Storage Lanes	0		1	1		0	0			2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Fr			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3167	1417	1687	3374	0	0	0	0	3303	0	1524
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3167	1417	1687	3374	0	0	0	0	3303	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			500									134
Link Speed (mph)		30			30			30				35
Link Distance (ft)		851			693			486				581
Travel Time (s)		19.3			15.8			11.0				11.3
Peak Hour Factor	0.92	0.92	0.92	0.73	0.73	0.73	0.92	0.92	0.92	0.74	0.74	0.74
Heavy Vehicles (%)	14%	14%	14%	7%	7%	7%	2%	2%	2%	6%	6%	6%
Adj. Flow (vph)	0	636	500	390	938	0	0	0	0	149	0	486
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	636	500	390	938	0	0	0	0	149	0	486
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Right
Median Width(ft)		36			36			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		25	15		9	15			9	15	9
Number of Detectors		3	2	3	3					3		2
Detector Template		Thru	Right	Left	Thru					Left		
Leading Detector (ft)		256	131	256	256					256		206
Trailing Detector (ft)		-5	-5	-5	-5					-5		-5
Detector 1 Position(ft)		-5	-5	-5	-5					-5		-5
Detector 1 Size(ft)		50	50	50	50					50		50
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 2 Position(ft)		125	125	125	125					125		200
Detector 2 Size(ft)		6	6	6	6					6		6
Detector 2 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 3 Position(ft)		250		250	250					250		
Detector 3 Size(ft)		6		6	6					6		



## Lanes, Volumes, Timings

3 Exit 5 SB On/Exit 5 SB Off &amp; NH 28

01/23/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type		Cl+Ex		Cl+Ex	Cl+Ex					Cl+Ex		
Detector 3 Channel												
Detector 3 Extend (s)		0.0		0.0	0.0					0.0		
Turn Type		NA	Free	Prot	NA					Prot		Prot
Protected Phases		2		1	6					4		4
Permitted Phases			Free									
Detector Phase		2		1	6					4		4
Switch Phase												
Minimum Initial (s)		9.0		4.0	9.0					4.0		4.0
Minimum Split (s)		21.0		10.0	21.0					10.0		10.0
Total Split (s)		34.0		37.0	71.0					39.0		39.0
Total Split (%)		30.9%		33.6%	64.5%					35.5%		35.5%
Maximum Green (s)		28.0		31.0	65.0					33.0		33.0
Yellow Time (s)		4.0		4.0	4.0					4.0		4.0
All-Red Time (s)		2.0		2.0	2.0					2.0		2.0
Lost Time Adjust (s)		0.0		0.0	0.0					0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0					6.0		6.0
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0		3.0	5.0					3.0		3.0
Recall Mode		C-Min		None	C-Min					None		None
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		8.0			8.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)		32.1	110.0	28.8	66.9					31.1		31.1
Actuated g/C Ratio		0.29	1.00	0.26	0.61					0.28		0.28
v/c Ratio		0.69	0.35	0.88	0.46					0.16		0.92
Control Delay		40.5	0.7	34.3	1.4					29.4		52.0
Queue Delay		0.0	0.0	0.0	0.0					0.0		0.0
Total Delay		40.5	0.7	34.3	1.4					29.4		52.0
LOS		D	A	C	A					C		D
Approach Delay		23.0			11.0						46.7	
Approach LOS		C			B						D	
Queue Length 50th (ft)		221	0	48	12					39		247
Queue Length 95th (ft)		290	0	m41	11					52		273
Internal Link Dist (ft)		771			613			406			501	
Turn Bay Length (ft)			350									
Base Capacity (vph)		925	1417	475	2051					990		551
Starvation Cap Reductn		0	0	0	0					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.69	0.35	0.82	0.46					0.15		0.88

## Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 61 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90



### Lanes, Volumes, Timings

## 3 2: Exit 5 SB On/Exit 5 SB Off & NH 28

01/23/2018

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 22.7

Intersection Capacity Utilization 71.4%

Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service C

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Exit 5 SB On/Exit 5 SB Off & NH 28



4 Lanes, Volumes, Timings  
 X: Exit 5 NB Off & NH 28

01/23/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	485	210	0	0	520	350	450	0	160	0	0	0
Future Volume (vph)	485	210	0	0	520	350	450	0	160	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1641	3282	0	0	3438	1538	1656	0	1482	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1641	3282	0	0	3438	1538	1656	0	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						389			193			
Link Speed (mph)		30			30			35			30	
Link Distance (ft)		693			542			867			392	
Travel Time (s)		15.8			12.3			16.9			8.9	
Peak Hour Factor	0.87	0.87	0.87	0.90	0.90	0.90	0.78	0.78	0.78	0.92	0.92	0.92
Heavy Vehicles (%)	10%	10%	10%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	557	241	0	0	578	389	577	0	205	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	557	241	0	0	578	389	577	0	205	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Right	Right	Left	Right	Left	Left	Right
Median Width(ft)		36			42			12			12	
Link Offset(ft)		0			0			0			36	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		25	15		9	15		9
Number of Detectors	3	3			3	2	3		0			
Detector Template	Left	Thru			Thru	Right	Left					
Leading Detector (ft)	256	256			256	131	256		0			
Trailing Detector (ft)	-5	-5			-5	-5	-5		0			
Detector 1 Position(ft)	-5	-5			-5	-5	-5		-5			
Detector 1 Size(ft)	50	50			50	50	50		50			
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 2 Position(ft)	125	125			125	125	125					
Detector 2 Size(ft)	6	6			6	6	6					
Detector 2 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex					
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0			0.0	0.0	0.0					
Detector 3 Position(ft)	250	250			250		250					
Detector 3 Size(ft)	6	6			6		6					
Detector 3 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0			0.0		0.0					



4 X Lanes, Volumes, Timings  
Exit 5 NB Off & NH 28

01/23/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA			NA	Free	Prot		Prot			
Protected Phases	5	2			6		8		8			
Permitted Phases		2			6	Free						
Detector Phase	5	2			6		8		8			
Switch Phase												
Minimum Initial (s)	4.0	16.0			16.0		4.0		4.0			
Minimum Split (s)	10.0	23.0			23.0		10.0		10.0			
Total Split (s)	42.0	67.0			25.0		43.0		43.0			
Total Split (%)	38.2%	60.9%			22.7%		39.1%		39.1%			
Maximum Green (s)	36.0	61.0			19.0		37.0		37.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0			5.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		10.0			10.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)	36.0	61.0			19.0	110.0	37.0		37.0			
Actuated g/C Ratio	0.33	0.55			0.17	1.00	0.34		0.34			
v/c Ratio	1.04	0.13			0.97	0.25	1.04		0.33			
Control Delay	57.4	2.2			77.1	0.4	84.5		6.1			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	57.4	2.2			77.1	0.4	84.5		6.1			
LOS	E	A			E	A	F		A			
Approach Delay		40.7			46.3			63.9				
Approach LOS		D			D			E				
Queue Length 50th (ft)	~419	3			215	0	~440		6			
Queue Length 95th (ft)	#573	4			#331	0	#512		35			
Internal Link Dist (ft)		613			462			787			312	
Turn Bay Length (ft)												
Base Capacity (vph)	537	1820			593	1538	557		626			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.04	0.13			0.97	0.25	1.04		0.33			

Intersection Summary

Area Type: Other  
 Cycle Length: 110  
 Actuated Cycle Length: 110  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.04  
 Intersection Signal Delay: 50.0  
 Intersection LOS: D

Lanes, Volumes, Timings

4 X Exit 5 NB Off & NH 28

01/23/2018

Intersection Capacity Utilization 71.4%

ICU Level of Service C

Analysis Period (min) 15

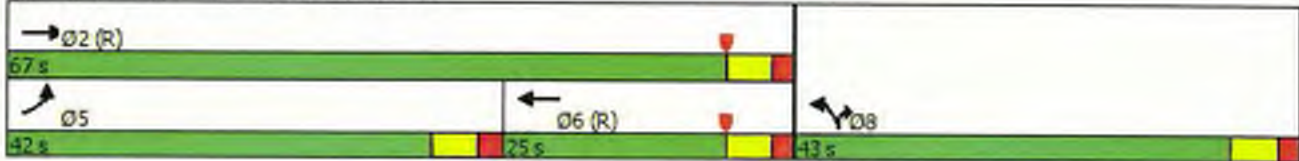
- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Exit 5 NB Off & NH 28

























## Lanes, Volumes, Timings

5 NH 102 &amp; St. Charles Street/Londonderry Road

01/23/2018

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	0	160	0	0	1	100	500	5	5	1110	30
Future Volume (vph)	10	0	160	0	0	1	100	500	5	5	1110	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		225	0		0	350		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.865			0.999			0.996	
Flt Protected		0.950					0.950			0.950		
Satd. Flow (prot)	0	1770	1583	0	1644	0	1770	3536	0	1770	3525	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1863	1583	0	1644	0	1770	3536	0	1770	3525	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182		381			2			4	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		593			447			750			330	
Travel Time (s)		13.5			10.2			17.0			7.5	
Peak Hour Factor	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	11	0	174	0	0	4	109	543	5	5	1207	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	11	174	0	4	0	109	548	0	5	1240	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	3	1	3	1		3	3		3	3	
Detector Template	Left	Thru	Right	Left			Left	Thru		Left	Thru	
Leading Detector (ft)	256	256	45	256	45		256	256		256	256	
Trailing Detector (ft)	-5	-5	-5	-5	-5		-5	-5		-5	-5	
Detector 1 Position(ft)	-5	-5	-5	-5	-5		-5	-5		-5	-5	
Detector 1 Size(ft)	50	50	50	50	50		50	50		50	50	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)	125	125		125			125	125		125	125	
Detector 2 Size(ft)	6	6		6			6	6		6	6	
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0			0.0	0.0		0.0	0.0	
Detector 3 Position(ft)	250	250		250			250	250		250	250	
Detector 3 Size(ft)	6	6		6			6	6		6	6	



## Lanes, Volumes, Timings

5 NH 102 &amp; St. Charles Street/Londonderry Road

01/23/2018

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 3 Type	CI+Ex	CI+Ex		CI+Ex			CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0		0.0			0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	custom		NA		Prot	NA		Prot	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		6	4								
Detector Phase	8	8	6	4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	8.0	5.0	5.0		5.0	8.0		5.0	8.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		24.0	24.0		11.0	24.0	
Total Split (s)	24.0	24.0	42.0	24.0	24.0		24.0	55.0		11.0	42.0	
Total Split (%)	26.7%	26.7%	46.7%	26.7%	26.7%		26.7%	61.1%		12.2%	46.7%	
Maximum Green (s)	18.0	18.0	36.0	18.0	18.0		18.0	49.0		5.0	36.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag			Lag				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	Min	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0			0	
Act Effct Green (s)		6.3	42.7		6.0		9.3	57.0		5.1	42.7	
Actuated g/C Ratio		0.10	0.69		0.10		0.15	0.92		0.08	0.69	
v/c Ratio		0.06	0.15		0.01		0.41	0.17		0.03	0.51	
Control Delay		27.9	1.9		0.0		29.7	2.3		29.8	8.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		27.9	1.9		0.0		29.7	2.3		29.8	8.8	
LOS		C	A		A		C	A		C	A	
Approach Delay		3.5						6.9			8.9	
Approach LOS		A						A			A	
Queue Length 50th (ft)		3	0		0		34	0		2	104	
Queue Length 95th (ft)		19	27		0		89	82		13	305	
Internal Link Dist (ft)		513			367			670			250	
Turn Bay Length (ft)			225				350			100		
Base Capacity (vph)		552	1146		755		524	3276		145	2428	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.02	0.15		0.01		0.21	0.17		0.03	0.51	

## Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 62  
 Natural Cycle: 80  
 Control Type: Actuated-Uncoordinated



Lanes, Volumes, Timings

9: NH 102 & St. Charles Street/Londonderry Road

01/23/2018

Maximum w/c Ratio: 0.51

Intersection Signal Delay: 7.8

Intersection LOS: A

Intersection Capacity Utilization 64.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 9: NH 102 & St. Charles Street/Londonderry Road



6 Lanes, Volumes, Timings  
 10: NH 102 & Fordway/Madden Hill Road

01/23/2018

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		⇄			⇄			⇄			⇄	
Traffic Volume (vph)	10	20	10	350	0	30	0	420	110	15	585	0
Future Volume (vph)	10	20	10	350	0	30	0	420	110	15	585	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.966			0.989			0.972				
Flt Protected		0.987			0.956						0.999	
Satd. Flow (prot)	0	1776	0	0	1744	0	0	1710	0	0	1808	0
Flt Permitted		0.874			0.694						0.981	
Satd. Flow (perm)	0	1573	0	0	1266	0	0	1710	0	0	1775	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			36			21				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		356			493			1124			603	
Travel Time (s)		8.1			11.2			25.5			13.7	
Peak Hour Factor	0.60	0.60	0.60	0.96	0.96	0.96	0.89	0.89	0.89	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	8%	8%	8%	5%	5%	5%
Adj. Flow (vph)	17	33	17	365	0	31	0	472	124	17	680	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	67	0	0	396	0	0	596	0	0	697	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		-22			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	1		3	2			2		3	2	
Detector Template	Left			Left						Left		
Leading Detector (ft)	256	45		256	131			131		256	131	
Trailing Detector (ft)	-5	-5		-5	-5			-5		-5	-5	
Detector 1 Position(ft)	-5	-5		-5	-5			-5		-5	-5	
Detector 1 Size(ft)	50	50		50	50			50		50	50	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Detector 2 Position(ft)	125			125	125			125		125	125	
Detector 2 Size(ft)	6			6	6			6		6	6	
Detector 2 Type	Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0	0.0			0.0		0.0	0.0	
Detector 3 Position(ft)	250			250						250		
Detector 3 Size(ft)	6			6						6		
Detector 3 Type	Cl+Ex			Cl+Ex						Cl+Ex		
Detector 3 Channel												
Detector 3 Extend (s)	0.0			0.0						0.0		



## Lanes, Volumes, Timings

10: NH 102 &amp; Fordway/Madden Hill Road

01/23/2018

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4						2		
Detector Phase	4	4		4	4			2		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0			24.0		24.0	24.0	
Total Split (s)	39.0	39.0		39.0	39.0			51.0		51.0	51.0	
Total Split (%)	43.3%	43.3%		43.3%	43.3%			56.7%		56.7%	56.7%	
Maximum Green (s)	33.0	33.0		33.0	33.0			45.0		45.0	45.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)		27.3			27.3			38.5			38.5	
Actuated g/C Ratio		0.35			0.35			0.49			0.49	
v/c Ratio		0.12			0.85			0.70			0.80	
Control Delay		15.4			41.6			21.0			26.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		15.4			41.6			21.0			26.0	
LOS		B			D			C			C	
Approach Delay		15.4			41.6			21.0			26.0	
Approach LOS		B			D			C			C	
Queue Length 50th (ft)		18			183			238			311	
Queue Length 95th (ft)		28			#345			356			428	
Internal Link Dist (ft)		276			413			1044			523	
Turn Bay Length (ft)												
Base Capacity (vph)		706			581			1041			1072	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.09			0.68			0.57			0.65	

## Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 78.4

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 27.4

Intersection Capacity Utilization 82.1%

Intersection LOS: C

ICU Level of Service E

Lanes, Volumes, Timings

10: NH 102 & Fordway/Madden Hill Road

01/23/2018

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 10: NH 102 & Fordway/Madden Hill Road





## Zone 3

## 2040 Alt D Zone 3 AM Peak

## 7: Birch St/Crystal Ave &amp; NH 102 (E Broadway)

Lanes, Volumes, Timings

	↖	→	↘	↙	←	↖	↗	↑	↘	↓	↙	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
Traffic Volume (vph)	80	200	90	20	520	60	60	290	30	70	240	30
Future Volume (vph)	80	200	90	20	520	60	60	290	30	70	240	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	390		0	110		0	70		0	245		245
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fit		0.953			0.984			0.986				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1661	0	1703	1764	0	1719	1784	0	1703	1792	1524
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1656	1661	0	1703	1764	0	1719	1784	0	1703	1792	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			7			5				182
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		505			530			361			411	
Travel Time (s)		11.5			12.0			8.2			9.3	
Peak Hour Factor	0.96	0.96	0.96	0.94	0.94	0.94	0.85	0.85	0.85	0.91	0.91	0.91
Heavy Vehicles (%)	9%	9%	9%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Parking (#/hr)			0									
Adj. Flow (vph)	83	208	94	21	553	64	71	341	35	77	264	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	302	0	21	617	0	71	376	0	77	264	33
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	4.0	5.0		4.0	10.0		4.0	10.0		4.0	9.0	9.0
Minimum Split (s)	10.0	30.0		10.0	30.0		10.0	25.0		10.0	25.0	25.0
Total Split (s)	12.0	39.0		12.0	39.0		14.0	25.0		14.0	25.0	25.0
Total Split (%)	13.3%	43.3%		13.3%	43.3%		15.6%	27.8%		15.6%	27.8%	27.8%
Maximum Green (s)	6.0	33.0		6.0	33.0		8.0	19.0		8.0	19.0	19.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		Min	None		Min	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	7.0
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		10			10			0			10	10
Act Effct Green (s)	6.1	36.0		5.9	31.5		7.4	19.3		7.5	19.3	19.3
Actuated g/C Ratio	0.07	0.42		0.07	0.37		0.09	0.23		0.09	0.23	0.23
v/c Ratio	0.71	0.42		0.18	0.94		0.48	0.93		0.52	0.65	0.07
Control Delay	74.1	19.0		43.5	52.4		50.4	66.0		52.2	40.8	0.3



Zone 3  
7: Birch St/Crystal Ave & NH 102 (E Broadway)

2040 Alt D Zone 3 AM Peak  
Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	74.1	19.0		43.5	52.4		50.4	66.0		52.2	40.8	0.3
LOS	E	B		D	D		D	E		D	D	A
Approach Delay		30.9			52.1			63.6			39.6	
Approach LOS		C			D			E			D	
Queue Length 50th (ft)	47	89		12	332		39	212		43	140	0
Queue Length 95th (ft)	#125	193		35	#554		77	#360		87	#240	0
Internal Link Dist (ft)		425			450			281			331	
Turn Bay Length (ft)	390			110			70			245		245
Base Capacity (vph)	117	753		120	693		162	404		161	404	485
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	0.71	0.40		0.17	0.89		0.44	0.93		0.48	0.65	0.07

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 85.6  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.94  
 Intersection Signal Delay: 47.9  
 Intersection LOS: D  
 Intersection Capacity Utilization 76.4%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 7: Birch St/Crystal Ave & NH 102 (E Broadway)

↙ 01 12 s	→ 02 39 s	↖ 03 14 s	↓ 04 25 s
↗ 05 12 s	← 06 39 s	↘ 07 14 s	↑ 08 25 s



## Zone 4

## 2040 Alt D Zone 4 AM Peak

## 11: Folsom Rd/Tsienneto Rd &amp; Crystal Av/NH 28

Lanes, Volumes, Timings

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	20	200	140	590	190	0	160	220	30	30	310	770
Future Volume (vph)	20	200	140	590	190	0	160	220	30	30	310	770
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	80		180	525		190	200		200	160		0
Storage Lanes	1		1	2		0	2		1	1		2
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.97	1.00	1.00	1.00	1.00	0.88
Frt			0.850						0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3471	1553	3335	3438	0	3400	1845	1568	1752	1845	2760
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1736	3471	1553	3335	3438	0	3400	1845	1568	1752	1845	2760
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182						327			243
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		639			723			532			387	
Travel Time (s)		14.5			16.4			12.1			8.8	
Peak Hour Factor	0.84	0.84	0.84	0.79	0.79	0.79	0.86	0.86	0.86	0.99	0.99	0.99
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	24	238	167	747	241	0	186	256	35	30	313	778
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	238	167	747	241	0	186	256	35	30	313	778
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA	Free	Prot	NA	pt+ov
Protected Phases	1	6	7	5	2		3	8		7	4	4 5
Permitted Phases		6	6		2			8	Free		4	
Detector Phase	1	6	7	5	2		3	8		7	4	4 5
Switch Phase												
Minimum Initial (s)	8.0	5.0	7.0	7.0	5.0		7.0	5.0		7.0	5.0	
Minimum Split (s)	14.0	20.0	13.0	13.0	20.0		13.0	20.0		13.0	20.0	
Total Split (s)	19.0	22.0	13.0	28.0	31.0		13.0	27.0		13.0	27.0	
Total Split (%)	21.1%	24.4%	14.4%	31.1%	34.4%		14.4%	30.0%		14.4%	30.0%	
Maximum Green (s)	13.0	16.0	7.0	22.0	25.0		7.0	21.0		7.0	21.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lead	Lag	Lag	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	C-Max		None	None		None	None	
Act Effct Green (s)	12.7	15.1	28.6	22.9	25.3		7.0	20.5	90.0	7.5	21.0	43.9
Actuated g/C Ratio	0.14	0.17	0.32	0.25	0.28		0.08	0.23	1.00	0.08	0.23	0.49
v/c Ratio	0.10	0.41	0.27	0.88	0.25		0.70	0.61	0.02	0.21	0.73	0.53
Control Delay	34.6	35.5	4.2	42.6	23.1		56.0	38.1	0.0	30.9	29.0	4.3
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	34.6	35.5	4.2	42.6	23.1		56.0	38.1	0.0	30.9	29.0	4.3
LOS	C	D	A	D	C		E	D	A	C	C	A
Approach Delay		23.3			37.8			42.3			11.9	



Zone 4  
11: Folsom Rd/Tsienneto Rd & Crystal Av/NH 28

2040 Alt D Zone 4 AM Peak  
Lanes, Volumes, Timings

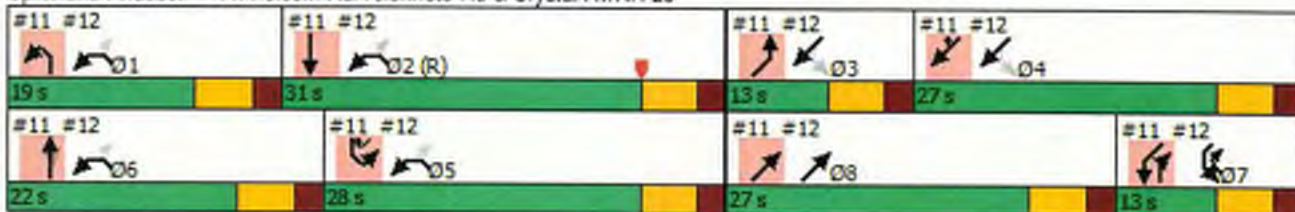


Lane Group	NBL	NBT	NSR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR	
Approach LOS		C			D			D			B		
Queue Length 50th (ft)	12	63	0	217	46		54	130	0	14	100	30	
Queue Length 95th (ft)	32	92	28	#212	74		#92	198	0	m22	m196	75	
Internal Link Dist (ft)		559			643			452			307		
Turn Bay Length (ft)	80		180	525			200		200	160			
Base Capacity (vph)	250	617	617	850	966		264	430	1568	146	430	1471	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	27	
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	0.39	0.27	0.88	0.25		0.70	0.60	0.02	0.21	0.73	0.54	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 38 (42%), Referenced to phase 2:SBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 26.8  
 Intersection LOS: C  
 Intersection Capacity Utilization 64.5%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Folsom Rd/Tsienneto Rd & Crystal Av/NH 28

















## Zone 4

## 12: Tsienneto Rd &amp; Pinkerton St

## 2040 Alt D Zone 4 AM Peak

Lanes, Volumes, Timings

							Ø1	Ø2	Ø3	Ø4	Ø5	Ø6
Lane Group	NWL	NWR	NET	NER	SWL	SWT						
Lane Configurations												
Traffic Volume (vph)	300	70	580	370	60	810						
Future Volume (vph)	300	70	580	370	60	810						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900						
Storage Length (ft)	90	0		0	175							
Storage Lanes	1	1		1	1							
Taper Length (ft)	25				25							
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95						
Frt		0.850		0.850								
Flt Protected	0.950				0.950							
Satd. Flow (prot)	1770	1583	3505	1568	1770	3539						
Flt Permitted	0.950				0.230							
Satd. Flow (perm)	1770	1583	3505	1568	428	3539						
Right Turn on Red		Yes		Yes								
Satd. Flow (RTOR)		21		430								
Link Speed (mph)	30		30			30						
Link Distance (ft)	408		387			258						
Travel Time (s)	9.3		8.8			5.9						
Peak Hour Factor	0.83	0.83	0.86	0.86	0.81	0.81						
Heavy Vehicles (%)	2%	2%	3%	3%	2%	2%						
Adj. Flow (vph)	361	84	674	430	74	1000						
Shared Lane Traffic (%)												
Lane Group Flow (vph)	361	84	674	430	74	1000						
Turn Type	Prot	pm+ov	NA	Free	pm+pt	NA						
Protected Phases	1 2 5 6	7	8		7	3 4	1	2	3	4	5	6
Permitted Phases		1 2 5 6		Free	3 4							
Detector Phase	1 2 5 6	7	8		7	3 4						
Switch Phase												
Minimum Initial (s)		7.0	5.0		7.0		8.0	5.0	7.0	5.0	7.0	5.0
Minimum Split (s)		13.0	20.0		13.0		14.0	20.0	13.0	20.0	13.0	20.0
Total Split (s)		13.0	27.0		13.0		19.0	31.0	13.0	27.0	28.0	22.0
Total Split (%)		14.4%	30.0%		14.4%		21%	34%	14%	30%	31%	24%
Maximum Green (s)		7.0	21.0		7.0		13.0	25.0	7.0	21.0	22.0	16.0
Yellow Time (s)		4.0	4.0		4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)		2.0	2.0		2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0							
Total Lost Time (s)		6.0	6.0		6.0							
Lead/Lag		Lag	Lead		Lag		Lead	Lag	Lead	Lag	Lag	Lead
Lead-Lag Optimize?		Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode		None	None		None		None	C-Max	None	None	None	None
Act Effct Green (s)	41.6	55.1	20.5	90.0	34.0	34.0						
Actuated g/C Ratio	0.46	0.61	0.23	1.00	0.38	0.38						
v/c Ratio	0.44	0.09	0.85	0.27	0.27	0.75						
Control Delay	17.0	5.2	27.4	0.4	25.8	28.6						
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0						
Total Delay	17.0	5.2	27.4	0.4	25.8	28.6						
LOS	B	A	C	A	C	C						
Approach Delay	14.8		16.9			28.4						

Zone 4  
12: Tsienneto Rd & Pinkerton St

2040 Alt D Zone 4 AM Peak  
Lanes, Volumes, Timings

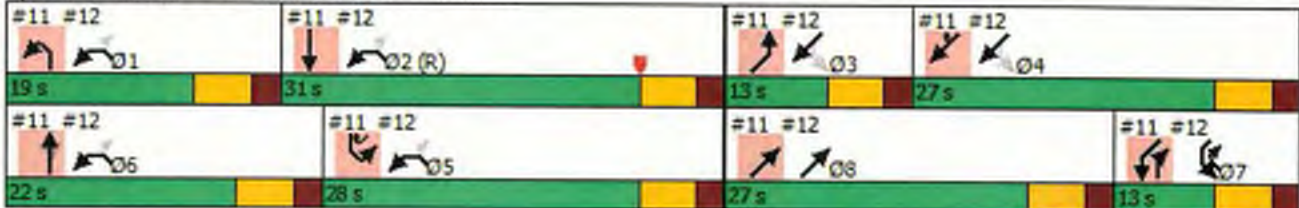


Lane Group	NWL	NWR	NET	NER	SWL	SWT	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6
Approach LOS	B		B		C							
Queue Length 50th (ft)	126	12	173	0	27	254						
Queue Length 95th (ft)	175	26	m227	m0	50	282						
Internal Link Dist (ft)	328		307		178							
Turn Bay Length (ft)	90				175							
Base Capacity (vph)	812	977	817	1568	274	1336						
Starvation Cap Reductn	0	0	0	0	0	0						
Spillback Cap Reductn	0	0	0	0	0	0						
Storage Cap Reductn	0	0	0	0	0	0						
Reduced v/c Ratio	0.44	0.09	0.82	0.27	0.27	0.75						

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 38 (42%), Referenced to phase 2: SBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 21.2  
 Intersection LOS: C  
 Intersection Capacity Utilization 53.5%  
 ICU Level of Service A  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Tsienneto Rd & Pinkerton St





Zone 4  
13: Applebees/Linlew Dr & NH 28

2040 Alt D Zone 4 AM Peak  
Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↖	↕		↖	↕			↖	↗		↖	↗
Traffic Volume (vph)	160	980	0	0	980	50	5	0	5	20	0	180
Future Volume (vph)	160	980	0	0	980	50	5	0	5	20	0	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	115		150	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		1
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frnt					0.993				0.850			0.850
Flt Protected	0.950							0.950			0.950	
Satd. Flow (prot)	1687	3374	0	1863	3514	0	0	1805	1615	0	1787	1599
Flt Permitted	0.950											
Satd. Flow (perm)	1687	3374	0	1863	3514	0	0	1900	1615	0	1881	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					7				182			109
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		463			420			218			433	
Travel Time (s)		10.5			9.5			5.0			9.8	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.50	0.50	0.50	0.90	0.90	0.90
Heavy Vehicles (%)	7%	7%	7%	2%	2%	2%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	193	1181	0	0	1065	54	10	0	10	22	0	200
Shared Lane Traffic (%)												
Lane Group Flow (vph)	193	1181	0	0	1119	0	0	10	10	0	22	200
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8			4	5
Permitted Phases					6		8	8	8	4		4
Detector Phase	5	2		1	6		8	8	8	4	4	5
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		5.0	5.0	5.0	5.0	5.0	8.0
Minimum Split (s)	14.0	46.0		11.0	43.0		33.0	33.0	33.0	33.0	33.0	14.0
Total Split (s)	14.0	46.0		11.0	43.0		33.0	33.0	33.0	33.0	33.0	14.0
Total Split (%)	15.6%	51.1%		12.2%	47.8%		36.7%	36.7%	36.7%	36.7%	36.7%	15.6%
Maximum Green (s)	8.0	40.0		5.0	37.0		27.0	27.0	27.0	27.0	27.0	8.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	6.0
Lead/Lag	Lag	Lag		Lead	Lead							Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max		None	None		None	None	None	None	None	None
Act Effct Green (s)	18.9	81.8			53.3			6.8	6.8		7.0	24.7
Actuated g/C Ratio	0.21	0.91			0.59			0.08	0.08		0.08	0.27
v/c Ratio	0.55	0.39			0.54			0.07	0.03		0.15	0.39
Control Delay	41.6	4.0			17.0			38.6	0.2		40.2	14.9
Queue Delay	0.0	0.0			0.0			0.0	0.0		0.0	0.0
Total Delay	41.6	4.0			17.0			38.6	0.2		40.2	14.9
LOS	D	A			B			D	A		D	B
Approach Delay		9.3			17.0			19.4			17.5	

Zone 4  
13: Applebees/Linlew Dr & NH 28

2040 Alt D Zone 4 AM Peak  
Lanes, Volumes, Timings

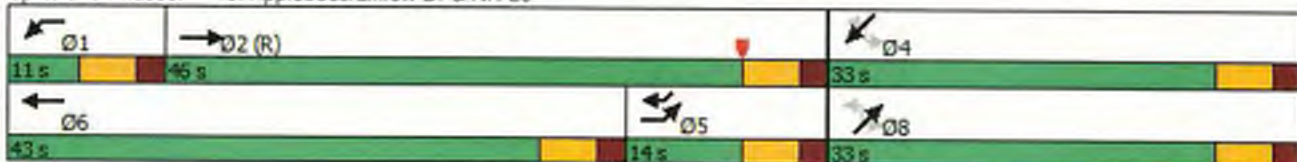


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Approach LOS		A			B			B			B	
Queue Length 50th (ft)	94	0			244			6	0		12	41
Queue Length 95th (ft)	#242	274			283			12	0		34	101
Internal Link Dist (ft)		383			340			138			353	
Turn Bay Length (ft)	300											
Base Capacity (vph)	353	3066			2085			570	611		564	517
Starvation Cap Reductn	0	0			0			0	0		0	0
Spillback Cap Reductn	0	0			0			0	0		0	0
Storage Cap Reductn	0	0			0			0	0		0	0
Reduced v/c Ratio	0.55	0.39			0.54			0.02	0.02		0.04	0.39

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 14 (16%), Referenced to phase 2:EBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.55  
 Intersection Signal Delay: 13.2  
 Intersection LOS: B  
 Intersection Capacity Utilization 60.3%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 13: Applebees/Linlew Dr & NH 28




























## Zone 4

## 2040 Alt D Zone 4 AM Peak

## 14: VIP Dr/Ashleigh Dr &amp; NH 28

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	990	20	5	940	340	10	5	5	110	5	180
Future Volume (vph)	140	990	20	5	940	340	10	5	5	110	5	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		150	205		150	0		0	325		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	200			25			25			25		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.997				0.850		0.925				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.957	
Satd. Flow (prot)	3303	3395	0	1736	3471	1553	1805	1758	0	1665	1677	1568
Flt Permitted	0.950			0.950			0.950			0.950	0.000	
Satd. Flow (perm)	3303	3395	0	1736	3471	1553	1805	1758	0	1665	0	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				351		7				182
Link Speed (mph)		30			30			30				30
Link Distance (ft)		412			486			151				446
Travel Time (s)		9.4			11.0			3.4				10.1
Peak Hour Factor	0.83	0.83	0.83	0.97	0.97	0.97	0.67	0.67	0.67	0.90	0.90	0.90
Heavy Vehicles (%)	6%	6%	6%	4%	4%	4%	0%	0%	0%	3%	3%	3%
Adj. Flow (vph)	169	1193	24	5	969	351	15	7	7	122	6	200
Shared Lane Traffic (%)										48%		
Lane Group Flow (vph)	169	1217	0	5	969	351	15	14	0	63	65	200
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	pt+ov
Protected Phases	5	2		1	6	7	3	8		7	4	4 5
Permitted Phases						6		8				
Detector Phase	5	2		1	6	7	3	8		7	4	4 5
Switch Phase												
Minimum Initial (s)	5.0	8.0		5.0	8.0	8.0	5.0	5.0		8.0	8.0	
Minimum Split (s)	11.0	14.0		11.0	14.0	14.0	11.0	11.0		14.0	14.0	
Total Split (s)	15.0	52.0		11.0	48.0	16.0	15.0	11.0		16.0	12.0	
Total Split (%)	16.7%	57.8%		12.2%	53.3%	17.8%	16.7%	12.2%		17.8%	13.3%	
Maximum Green (s)	9.0	46.0		5.0	42.0	10.0	9.0	5.0		10.0	6.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	Min	None	None	None		None	None	
Act Effct Green (s)	9.2	65.0		5.6	52.0	65.4	6.3	5.6		8.6	8.6	23.3
Actuated g/C Ratio	0.10	0.72		0.06	0.58	0.73	0.07	0.06		0.10	0.10	0.26
v/c Ratio	0.50	0.50		0.05	0.48	0.29	0.12	0.12		0.40	0.41	0.37
Control Delay	43.5	8.1		44.0	11.8	4.2	40.8	31.7		45.8	46.1	7.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	43.5	8.1		44.0	11.8	4.2	40.8	31.7		45.8	46.1	7.7
LOS	D	A		D	B	A	D	C		D	D	A
Approach Delay		12.4			9.9			36.4			22.6	



Zone 4  
14: VIP Dr/Ashleigh Dr & NH 28

2040 Alt D Zone 4 AM Peak  
Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			A			D			C	
Queue Length 50th (ft)	47	96		3	231	80	8	4		36	37	8
Queue Length 95th (ft)	73	296		m6	310	101	20	16		76	78	61
Internal Link Dist (ft)		332			406			71			366	
Turn Bay Length (ft)	200			205		150				325		150
Base Capacity (vph)	354	2452		107	2004	1242	180	116		185	160	547
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.48	0.50		0.05	0.48	0.28	0.08	0.12		0.34	0.41	0.37

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 25 (28%), Referenced to phase 2:EBT, Start of Yellow  
 Natural Cycle: 65  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.50  
 Intersection Signal Delay: 12.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 57.0%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 14: VIP Dr/Ashleigh Dr & NH 28





Zone 4  
25: NH 28 & Rockingham Road

2040 Alt D Zone 4 AM Peak  
Lanes, Volumes, Timings

	↖	→	←	↗	↘	↙
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↕	↕		↖	↗
Traffic Volume (vph)	55	1630	1560	210	90	105
Future Volume (vph)	55	1630	1560	210	90	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200			0	360	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.982			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	3539	3476	0	1770	1583
Flt Permitted	0.099				0.950	
Satd. Flow (perm)	184	3539	3476	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			40			18
Link Speed (mph)		30	30		30	
Link Distance (ft)		463	580		704	
Travel Time (s)		10.5	13.2		16.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	1772	1696	228	98	114
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	1772	1924	0	98	114
Turn Type	pm+pt	NA	NA		Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2					4
Detector Phase	5	2	6		4	5
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	11.0	20.0	20.0		11.0	11.0
Total Split (s)	8.0	48.0	40.0		12.0	8.0
Total Split (%)	13.3%	80.0%	66.7%		20.0%	13.3%
Maximum Green (s)	2.0	42.0	34.0		6.0	2.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	None		None	None
Act Effct Green (s)	40.3	42.1	36.2		6.1	10.9
Actuated g/C Ratio	0.73	0.76	0.65		0.11	0.20
v/c Ratio	0.31	0.66	0.84		0.50	0.35
Control Delay	7.0	6.4	16.8		36.5	19.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	7.0	6.4	16.8		36.5	19.9
LOS	A	A	B		D	B
Approach Delay		6.4	16.8		27.6	
Approach LOS		A	B		C	

Zone 4  
25: NH 28 & Rockingham Road

2040 Alt D Zone 4 AM Peak  
Lanes, Volumes, Timings



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)	5	156	306		35	28
Queue Length 95th (ft)	13	220	#508		#88	66
Internal Link Dist (ft)		383	500		624	
Turn Bay Length (ft)	200				360	
Base Capacity (vph)	193	2689	2232		199	327
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.31	0.66	0.86		0.49	0.35

Intersection Summary

Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 55.4  
 Natural Cycle: 65  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 12.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 66.3%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 25: NH 28 & Rockingham Road




























## Zone 5

## 2040 Alt D Zone 5 AM Peak

## 18: Tsienneto Rd &amp; NH 28 Byp S/NH 28 Byp N

Lanes, Volumes, Timings

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	30	50	20	80	40	200	40	310	70	70	570	50
Future Volume (vph)	30	50	20	80	40	200	40	310	70	70	570	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	145		110	280		280	360		0	120		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.958				0.850		0.972			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1767	0	1736	1827	1553	1770	3440	0	1787	3531	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1752	1767	0	1736	1827	1553	1770	3440	0	1787	3531	0
Right Turn on Red			Yes			Yes		Yes				Yes
Satd. Flow (RTOR)		21				201		36			12	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		481			484			479			371	
Travel Time (s)		10.9			11.0			10.9			8.4	
Peak Hour Factor	0.82	0.82	0.82	0.81	0.81	0.81	0.68	0.68	0.68	0.78	0.78	0.78
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	2%	2%	2%	1%	1%	1%
Adj. Flow (vph)	37	61	24	99	49	247	59	456	103	90	731	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	85	0	99	49	247	59	559	0	90	795	0
Turn Type	Prot	NA		Prot	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	1	6		5	2	2 3	3	8		7	4	
Permitted Phases												
Detector Phase	1	6		5	2	2 3	3	8		7	4	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	14.0	20.0		14.0	20.0		14.0	20.0		14.0	20.0	
Total Split (s)	14.0	20.0		14.0	20.0		14.0	32.0		14.0	32.0	
Total Split (%)	17.5%	25.0%		17.5%	25.0%		17.5%	40.0%		17.5%	40.0%	
Maximum Green (s)	8.0	14.0		8.0	14.0		8.0	26.0		8.0	26.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	Max		None	None		None	None	
Act Effect Green (s)	8.2	13.0		8.2	16.0	30.4	8.2	25.6		8.2	21.8	
Actuated g/C Ratio	0.11	0.18		0.11	0.22	0.42	0.11	0.36		0.11	0.30	
v/c Ratio	0.19	0.25		0.50	0.12	0.32	0.29	0.45		0.45	0.74	
Control Delay	35.1	24.7		43.6	27.9	6.2	37.1	20.1		40.9	27.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	35.1	24.7		43.6	27.9	6.2	37.1	20.1		40.9	27.3	
LOS	D	C		D	C	A	D	C		D	C	
Approach Delay		27.9			18.3			21.7			28.7	

## Zone 5

2040 Alt D Zone 5 AM Peak

## 18: Tsienneto Rd &amp; NH 28 Byp S/NH 28 Byp N

Lanes, Volumes, Timings

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	17	27		47	20	15	27	108		43	176	
Queue Length 95th (ft)	41	59		86	45	49	48	108		76	197	
Internal Link Dist (ft)		401			404			399			291	
Turn Bay Length (ft)	145			280		280	360			120		
Base Capacity (vph)	199	367		197	406	770	201	1320		202	1310	
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	0.19	0.23		0.50	0.12	0.32	0.29	0.42		0.45	0.61	

## Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 72.1

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 24.5

Intersection LOS: C

Intersection Capacity Utilization 51.4%

ICU Level of Service A

Analysis Period (min) 15












Splits and Phases: 18: Tsienneto Rd &amp; NH 28 Byp S/NH 28 Byp N

Ø1	Ø2	Ø3	Ø4
14 s	20 s	14 s	32 s
Ø5	Ø6	Ø7	Ø8
14 s	20 s	14 s	32 s



Zone 5  
19: NH 102 EB/NH 102 & Tsienneto Rd

2040 Alt D Zone 5 AM Peak  
Lanes, Volumes, Timings

							Ø2	Ø5	Ø6	Ø7
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR				
Lane Configurations										
Traffic Volume (vph)	240	0	10	120	260	520				
Future Volume (vph)	240	0	10	120	260	520				
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900				
Storage Length (ft)	200	0	100			90				
Storage Lanes	0	0	1			1				
Taper Length (ft)	25		25							
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Frt						0.850				
Flt Protected	0.950		0.950							
Satd. Flow (prot)	1787	0	1770	1863	1845	1568				
Flt Permitted	0.950		0.498							
Satd. Flow (perm)	1787	0	928	1863	1845	1568				
Right Turn on Red		Yes				Yes				
Satd. Flow (RTOR)						584				
Link Speed (mph)	30			30	30					
Link Distance (ft)	392			704	263					
Travel Time (s)	8.9			16.0	6.0					
Peak Hour Factor	0.90	0.90	0.87	0.87	0.89	0.89				
Heavy Vehicles (%)	1%	1%	2%	2%	3%	3%				
Adj. Flow (vph)	267	0	11	138	292	584				
Shared Lane Traffic (%)										
Lane Group Flow (vph)	267	0	11	138	292	584				
Turn Type	Prot		pm+pt	NA	NA	custom				
Protected Phases	8		1	6 7	2 7	7 8	2	5	6	7
Permitted Phases			6 7			2				
Detector Phase	8		1	6 7	2 7	7 8				
Switch Phase										
Minimum Initial (s)	5.0		5.0				5.0	5.0	5.0	5.0
Minimum Split (s)	26.5		11.0				9.0	11.0	9.0	11.0
Total Split (s)	27.9		11.0				34.1	11.0	34.1	17.0
Total Split (%)	31.0%		12.2%				38%	12%	38%	19%
Maximum Green (s)	21.9		5.0				30.1	5.0	30.1	11.0
Yellow Time (s)	4.0		4.0				3.0	4.0	3.0	4.0
All-Red Time (s)	2.0		2.0				1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0		0.0							
Total Lost Time (s)	6.0		6.0							
Lead/Lag	Lag		Lead				Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes		Yes				Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0		3.0				3.0	3.0	3.0	3.0
Recall Mode	None		None				Min	None	Min	None
Act Effct Green (s)	22.0		32.4	33.7	33.7	65.1				
Actuated g/C Ratio	0.32		0.48	0.50	0.50	0.96				
w/c Ratio	0.46		0.02	0.15	0.32	0.38				
Control Delay	24.4		7.7	9.9	11.7	0.8				
Queue Delay	0.0		0.0	0.0	1.0	0.1				
Total Delay	24.4		7.7	9.9	12.7	0.9				
LOS	C		A	A	B	A				
Approach Delay	24.4			9.7	4.8					

Zone 5  
19: NH 102 EB/NH 102 & Tsienneto Rd

2040 Alt D Zone 5 AM Peak  
Lanes, Volumes, Timings

							Ø2	Ø5	Ø6	Ø7
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR				
Approach LOS	C			A						
Queue Length 50th (ft)	82		2	27	81	0				
Queue Length 95th (ft)	217		8	66	122	19				
Internal Link Dist (ft)	312			624	183					
Turn Bay Length (ft)	200		100			90				
Base Capacity (vph)	595		508	985	975	1494				
Starvation Cap Reductn	0		0	0	449	142				
Spillback Cap Reductn	0		0	0	0	0				
Storage Cap Reductn	0		0	0	0	0				
Reduced v/c Ratio	0.45		0.02	0.14	0.56	0.43				

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 67.7  
 Natural Cycle: 60  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.59  
 Intersection Signal Delay: 9.4  
 Intersection Capacity Utilization 46.4%  
 Analysis Period (min) 15

Intersection LOS: A  
 ICU Level of Service A

Splits and Phases: 19: NH 102 EB/NH 102 & Tsienneto Rd





Zone 5  
26: NH 102 & North Shore Road

2040 Alt D Zone 5 AM Peak  
Lanes, Volumes, Timings

	↙	↖	↑	↗	↘	↓				
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø1	Ø2	Ø6	Ø8
Lane Configurations	↙		↑	↗	↘	↓				
Traffic Volume (vph)	60	10	330	30	10	720				
Future Volume (vph)	60	10	330	30	10	720				
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900				
Storage Length (ft)	0	0		90	100					
Storage Lanes	1	0		1	1					
Taper Length (ft)	25				25					
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Frt	0.976			0.850						
Flt Protected	0.961				0.950					
Satd. Flow (prot)	1768	0	1900	1615	1805	1900				
Flt Permitted	0.961				0.432					
Satd. Flow (perm)	1768	0	1900	1615	821	1900				
Right Turn on Red		Yes		Yes						
Satd. Flow (RTOR)	10			36						
Link Speed (mph)	30		30			30				
Link Distance (ft)	524		263			288				
Travel Time (s)	11.9		6.0			6.5				
Peak Hour Factor	0.87	0.67	0.95	0.84	0.73	0.96				
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%				
Adj. Flow (vph)	69	15	347	36	14	750				
Shared Lane Traffic (%)										
Lane Group Flow (vph)	84	0	347	36	14	750				
Turn Type	Prot		NA	Perm	custom	NA				
Protected Phases	7		6 8		5	2 8	1	2	6	8
Permitted Phases				6 8	2					
Detector Phase	7		6 8	6 8	5	2 8				
Switch Phase										
Minimum Initial (s)	5.0				5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	11.0				11.0		11.0	9.0	9.0	26.5
Total Split (s)	17.0				11.0		11.0	34.1	34.1	27.9
Total Split (%)	18.9%				12.2%		12%	38%	38%	31%
Maximum Green (s)	11.0				5.0		5.0	30.1	30.1	21.9
Yellow Time (s)	4.0				4.0		4.0	3.0	3.0	4.0
All-Red Time (s)	2.0				2.0		2.0	1.0	1.0	2.0
Lost Time Adjust (s)	0.0				0.0					
Total Lost Time (s)	6.0				6.0					
Lead/Lag	Lead				Lead		Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes				Yes		Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode	None				None		None	Min	Min	None
Act Effct Green (s)	10.0		45.2	45.2	16.2	45.2				
Actuated g/C Ratio	0.15		0.67	0.67	0.24	0.67				
v/c Ratio	0.31		0.27	0.03	0.05	0.59				
Control Delay	29.9		1.9	0.2	17.5	7.8				
Queue Delay	0.0		0.1	0.0	0.0	0.0				
Total Delay	29.9		2.0	0.2	17.5	7.8				
LOS	C		A	A	B	A				
Approach Delay	29.9		1.9			8.0				

Zone 5  
26: NH 102 & North Shore Road

2040 Alt D Zone 5 AM Peak  
Lanes, Volumes, Timings

Lane Group	WBL	WBR	NBT	NBR	SBL	S&T	Ø1	Ø2	Ø6	Ø8
Approach LOS	C		A			A				
Queue Length 50th (ft)	26		13	0	4	129				
Queue Length 95th (ft)	81		21	m0	12	191				
Internal Link Dist (ft)	444		183			208				
Turn Bay Length (ft)				90	100					
Base Capacity (vph)	304		1608	1372	271	1608				
Starvation Cap Reductn	0		460	0	0	0				
Spillback Cap Reductn	0		0	0	0	0				
Storage Cap Reductn	0		0	0	0	0				
Reduced v/c Ratio	0.28		0.30	0.03	0.05	0.47				

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 67.7  
 Natural Cycle: 60  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.59  
 Intersection Signal Delay: 7.6  
 Intersection Capacity Utilization 50.4%  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: NH 102 & North Shore Road





## **APPENDIX R-4: ALTERNATIVE D INTERSECTION CAPACITY ANALYSES – SYNCHRO PRINTOUTS – PM PEAK HOUR**

Lanes, Volumes, Timings  
 X: NH 102 & Exit 4 SB Off

01/23/2018



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↙	↘
Traffic Volume (vph)	0	1285	1405	0	125	1295
Future Volume (vph)	0	1285	1405	0	125	1295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3471	3406	0	1930	2682
Flt Permitted					0.950	
Satd. Flow (perm)	0	3471	3406	0	1930	2682
Right Turn on Red				Yes		No
Satd. Flow (RTOR)						
Link Speed (mph)		30	30		25	
Link Distance (ft)		712	388		212	
Travel Time (s)		16.2	8.8		5.8	
Peak Hour Factor	0.93	0.93	0.88	0.88	0.89	0.89
Heavy Vehicles (%)	4%	4%	6%	6%	6%	6%
Adj. Flow (vph)	0	1382	1597	0	140	1455
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1382	1597	0	140	1455
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		24	24		16	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	0.85	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors		3	3		3	3
Detector Template		Thru	Thru		Left	
Leading Detector (ft)		256	256		256	256
Trailing Detector (ft)		-5	-5		-5	-5
Detector 1 Position(ft)		-5	-5		-5	-5
Detector 1 Size(ft)		50	50		50	50
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)		0.0	0.0		0.0	0.0
Detector 1 Queue (s)		0.0	0.0		0.0	0.0
Detector 1 Delay (s)		0.0	0.0		0.0	0.0
Detector 2 Position(ft)		125	125		125	125
Detector 2 Size(ft)		6	6		6	6
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0		0.0	0.0
Detector 3 Position(ft)		250	250		250	250
Detector 3 Size(ft)		6	6		6	6
Detector 3 Type		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 3 Channel						



## Lanes, Volumes, Timings

X: NH 102 &amp; Exit 4 SB Off

01/23/2018



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector 3 Extend (s)		0.0	0.0		0.0	0.0
Turn Type		NA	NA		Prot	Prot
Protected Phases		2	6		4	4
Permitted Phases						
Detector Phase		2	6		4	4
Switch Phase						
Minimum Initial (s)		8.0	8.0		5.0	5.0
Minimum Split (s)		14.0	21.0		27.0	27.0
Total Split (s)		66.0	66.0		74.0	74.0
Total Split (%)		47.1%	47.1%		52.9%	52.9%
Maximum Green (s)		60.0	60.0		68.0	68.0
Yellow Time (s)		2.0	2.0		2.0	2.0
All-Red Time (s)		4.0	4.0		4.0	4.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Min	C-Min		None	None
Walk Time (s)			7.0		7.0	7.0
Flash Dont Walk (s)			8.0		14.0	14.0
Pedestrian Calls (#/hr)			0		0	0
Act Effct Green (s)		60.0	60.0		68.0	68.0
Actuated g/C Ratio		0.43	0.43		0.49	0.49
v/c Ratio		0.93	1.09		0.15	1.12
Control Delay		36.3	52.2		20.5	98.2
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		36.3	52.2		20.5	98.2
LOS		D	D		C	F
Approach Delay		36.3	52.2		91.4	
Approach LOS		D	D		F	
Queue Length 50th (ft)		440	-843		69	-863
Queue Length 95th (ft)		m629	m#104		110	#994
Internal Link Dist (ft)		632	308		132	
Turn Bay Length (ft)						
Base Capacity (vph)		1487	1459		937	1302
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.93	1.09		0.15	1.12

## Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.12

## Lanes, Volumes, Timings

X: NH 102 & Exit 4 SB Off

01/23/2018

Intersection Signal Delay: 61.1

Intersection LOS: E

Intersection Capacity Utilization 96.1%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: NH 102 & Exit 4 SB Off





2.8 Lanes, Volumes, Timings  
NH 102 & Exit 4 NB Off

01/23/2018

Lane Group	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR	
Lane Configurations												
Traffic Volume (vph)	1245	0	1005	0	0	1050	360	0	0	500	235	
Future Volume (vph)	1245	0	1005	0	0	1050	360	0	0	500	235	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	0	0	0	550		0	0		0	
Storage Lanes		2	2	0	0	2		0	0		1	
Taper Length (ft)		25		25		25		25				
Lane Util. Factor	0.97	1.00	0.88	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00	
Frnt			0.850								0.850	
Flt Protected	0.950					0.950						
Satd. Flow (prot)	3242	0	2632	0	0	3335	3438	0	0	3505	1568	
Flt Permitted	0.950					0.950						
Satd. Flow (perm)	3242	0	2632	0	0	3335	3438	0	0	3505	1568	
Right Turn on Red			No					Yes			Yes	
Satd. Flow (RTOR)											252	
Link Speed (mph)		25		30			30			30		
Link Distance (ft)		856		390			760			857		
Travel Time (s)		23.3		8.9			17.3			19.5		
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92	
Heavy Vehicles (%)	8%	8%	8%	2%	2%	5%	5%	5%	3%	3%	3%	
Adj. Flow (vph)	1415	0	1142	0	0	1117	383	0	0	543	255	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1415	0	1142	0	0	1117	383	0	0	543	255	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Right	Right	
Median Width(ft)		24		0			24			24		
Link Offset(ft)		12		0			0			0		
Crosswalk Width(ft)		16		16			16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15	15	25	15	9	15		9	15		25	
Number of Detectors	3		3			3	3			3	0	
Detector Template												
Leading Detector (ft)	256		256			256	256			256	0	
Trailing Detector (ft)	-5		-5			-5	-5			-5	0	
Detector 1 Position(ft)	-5		-5			-5	-5			-5	-5	
Detector 1 Size(ft)	55		55			55	55			55	50	
Detector 1 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0			0.0	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0		0.0			0.0	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0		0.0			0.0	0.0			0.0	0.0	
Detector 2 Position(ft)	125		125			125	125			125		
Detector 2 Size(ft)	6		6			6	6			6		
Detector 2 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0			0.0	0.0			0.0		
Detector 3 Position(ft)	250		250			250	250			250		
Detector 3 Size(ft)	6		6			6	6			6		



2 Lanes, Volumes, Timings  
8: NH 102 & Exit 4 NB Off

01/23/2018



Lane Group	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Detector 3 Type	CI+Ex		CI+Ex			CI+Ex	CI+Ex			CI+Ex	
Detector 3 Channel											
Detector 3 Extend (s)	0.0		0.0			0.0	0.0			0.0	
Turn Type	Prot		Prot			Prot	NA			NA	Free
Protected Phases	8		8			5	2			6	
Permitted Phases											Free
Detector Phase	8		2			5	2			6	
Switch Phase											
Minimum Initial (s)	10.0		10.0			5.0	8.0			8.0	
Minimum Split (s)	16.0		16.0			11.0	42.0			31.0	
Total Split (s)	61.0		61.0			48.0	79.0			31.0	
Total Split (%)	43.6%		43.6%			34.3%	56.4%			22.1%	
Maximum Green (s)	55.0		55.0			42.0	73.0			25.0	
Yellow Time (s)	2.0		2.0			2.0	2.0			2.0	
All-Red Time (s)	4.0		4.0			4.0	4.0			4.0	
Lost Time Adjust (s)	0.0		0.0			0.0	0.0			0.0	
Total Lost Time (s)	6.0		6.0			6.0	6.0			6.0	
Lead/Lag						Lead				Lag	
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0		3.0			3.0	3.0			3.0	
Recall Mode	None		None			None	C-Min			C-Min	
Walk Time (s)							7.0			7.0	
Flash Dont Walk (s)							29.0			17.0	
Pedestrian Calls (#/hr)							0			0	
Act Effct Green (s)	55.0		55.0			42.0	73.0			25.0	140.0
Actuated g/C Ratio	0.39		0.39			0.30	0.52			0.18	1.00
v/c Ratio	1.11		1.10			1.12	0.21			0.87	0.16
Control Delay	101.4		101.0			83.6	3.9			71.2	0.2
Queue Delay	0.0		0.0			0.0	0.0			0.0	0.0
Total Delay	101.4		101.0			83.6	3.9			71.2	0.2
LOS	F		F			F	A			E	A
Approach Delay		101.2					63.3			48.5	
Approach LOS		F					E			D	
Queue Length 50th (ft)	~757		~671			~595	42			255	0
Queue Length 95th (ft)	#862		#790			m#674	m44			#347	0
Internal Link Dist (ft)		776		310			680			777	
Turn Bay Length (ft)						550					
Base Capacity (vph)	1273		1034			1000	1792			625	1568
Starvation Cap Reductn	0		0			0	0			0	0
Spillback Cap Reductn	0		0			0	0			0	0
Storage Cap Reductn	0		0			0	0			0	0
Reduced v/c Ratio	1.11		1.10			1.12	0.21			0.87	0.16

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 53 (38%), Referenced to phase 2:NET and 6:SWT, Start of Yellow  
 Natural Cycle: 150



## Lanes, Volumes, Timings

### 2 8: NH 102 & Exit 4 NB Off

01/23/2018

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.12

Intersection Signal Delay: 80.8

Intersection LOS: F

Intersection Capacity Utilization 95.3%

ICU Level of Service F

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: NH 102 & Exit 4 NB Off



## Lanes, Volumes, Timings

3 Exit 5 SB On/Exit 5 SB Off &amp; NH 28

01/23/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑					↑↑		↑
Traffic Volume (vph)	0	650	460	165	580	0	0	0	0	185	0	390
Future Volume (vph)	0	650	460	165	580	0	0	0	0	185	0	390
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		350	0		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Fr			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3471	1553	1719	3438	0	0	0	0	3367	0	1553
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3471	1553	1719	3438	0	0	0	0	3367	0	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			529									231
Link Speed (mph)		30			30			30				35
Link Distance (ft)		851			693			486				581
Travel Time (s)		19.3			15.8			11.0				11.3
Peak Hour Factor	0.87	0.87	0.87	0.86	0.86	0.86	0.92	0.92	0.92	0.91	0.91	0.91
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	747	529	192	674	0	0	0	0	203	0	429
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	747	529	192	674	0	0	0	0	203	0	429
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Right	Left	Right
Median Width(ft)		36			36			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		25	15		9	15		9	15		25
Number of Detectors		3	3	3	3					3		3
Detector Template		Thru	Right	Left	Thru					Left		Right
Leading Detector (ft)		256	256	256	256					256		256
Trailing Detector (ft)		-5	-5	-5	-5					-5		-5
Detector 1 Position(ft)		-5	-5	-5	-5					-5		-5
Detector 1 Size(ft)		50	50	50	50					50		50
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 2 Position(ft)		125	125	125	125					125		125
Detector 2 Size(ft)		6	6	6	6					6		6
Detector 2 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 3 Position(ft)		250	250	250	250					250		250
Detector 3 Size(ft)		6	6	6	6					6		6



## Lanes, Volumes, Timings

3 X: Exit 5 SB On/Exit 5 SB Off &amp; NH 28

01/23/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 3 Channel												
Detector 3 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Turn Type		NA	Free	Prot	NA					Prot		Prot
Protected Phases		2		1	6					4		4
Permitted Phases			Free									
Detector Phase		2		1	6					4		4
Switch Phase												
Minimum Initial (s)		9.0		4.0	9.0					4.0		4.0
Minimum Split (s)		21.0		10.0	21.0					10.0		10.0
Total Split (s)		34.0		23.0	57.0					33.0		33.0
Total Split (%)		37.8%		25.6%	63.3%					36.7%		36.7%
Maximum Green (s)		28.0		17.0	51.0					27.0		27.0
Yellow Time (s)		4.0		4.0	4.0					4.0		4.0
All-Red Time (s)		2.0		2.0	2.0					2.0		2.0
Lost Time Adjust (s)		0.0		0.0	0.0					0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0					6.0		6.0
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0		3.0	5.0					3.0		3.0
Recall Mode		C-Min		None	C-Min					None		None
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		8.0			8.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)		37.3	90.0	14.4	57.6					20.4		20.4
Actuated g/C Ratio		0.41	1.00	0.16	0.64					0.23		0.23
v/c Ratio		0.52	0.34	0.70	0.31					0.27		0.81
Control Delay		23.7	0.6	23.2	0.4					27.8		26.5
Queue Delay		0.0	0.0	0.0	0.0					0.0		0.0
Total Delay		23.7	0.6	23.2	0.4					27.8		26.5
LOS		C	A	C	A					C		C
Approach Delay		14.1			5.5						27.0	
Approach LOS		B			A						C	
Queue Length 50th (ft)		172	0	6	0					47		105
Queue Length 95th (ft)		247	0	0	m0					71		205
Internal Link Dist (ft)		771			613			406			501	
Turn Bay Length (ft)			350									
Base Capacity (vph)		1436	1553	324	2202					1010		627
Starvation Cap Reductn		0	0	0	0					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.52	0.34	0.59	0.31					0.20		0.68

## Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 52 (58%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 60

### Lanes, Volumes, Timings

## 3 2: Exit 5 SB On/Exit 5 SB Off & NH 28

01/23/2018

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 14.3

Intersection LOS: B

Intersection Capacity Utilization 72.6%

ICU Level of Service C

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Exit 5 SB On/Exit 5 SB Off & NH 28





4 Lanes, Volumes, Timings  
 Exit 5 NB Off & NH 28

01/23/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	445	390	0	0	385	235	360	0	380	0	0	0
Future Volume (vph)	445	390	0	0	385	235	360	0	380	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1752	3505	0	0	3505	1568	1703	0	1524	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1752	3505	0	0	3505	1568	1703	0	1524	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						258			399			
Link Speed (mph)		30			30			35			30	
Link Distance (ft)		693			542			867			392	
Travel Time (s)		15.8			12.3			16.9			8.9	
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.67	0.67	0.67	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	6%	6%	6%	2%	2%	2%
Adj. Flow (vph)	484	424	0	0	423	258	537	0	567	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	484	424	0	0	423	258	537	0	567	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Right	Left	Right	Left	Left	Right
Median Width(ft)		36			42			12			12	
Link Offset(ft)		0			0			0			36	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		25	15		25	15		9
Number of Detectors	3	3			3	3	3		0			
Detector Template	Left					Right	Left					
Leading Detector (ft)	256	256			256	256	256		0			
Trailing Detector (ft)	-5	-5			-5	-5	-5		0			
Detector 1 Position(ft)	-5	-5			-5	-5	-5		-5			
Detector 1 Size(ft)	50	50			50	50	50		50			
Detector 1 Type	CI+Ex	CI+Ex			CI+Ex	CI+Ex	CI+Ex		CI+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 2 Position(ft)	125	125			125	125	125					
Detector 2 Size(ft)	6	6			6	6	6					
Detector 2 Type	CI+Ex	CI+Ex			CI+Ex	CI+Ex	CI+Ex					
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0			0.0	0.0	0.0					
Detector 3 Position(ft)	250	250			250	250	250					
Detector 3 Size(ft)	6	6			6	6	6					
Detector 3 Type	CI+Ex	CI+Ex			CI+Ex	CI+Ex	CI+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0			0.0	0.0	0.0					



Lanes, Volumes, Timings

4 X Exit 5 NB Off & NH 28

01/23/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA			NA	Free	Prot		Prot			
Protected Phases	5	2			6		8		8			
Permitted Phases		2			6	Free						
Detector Phase	5	2			6		8		8			
Switch Phase												
Minimum Initial (s)	4.0	16.0			16.0		4.0		4.0			
Minimum Split (s)	10.0	23.0			23.0		11.0		11.0			
Total Split (s)	31.0	55.0			24.0		35.0		35.0			
Total Split (%)	34.4%	61.1%			26.7%		38.9%		38.9%			
Maximum Green (s)	25.0	49.0			18.0		29.0		29.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0			5.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		10.0			10.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)	25.0	48.6			17.6	90.0	29.4		29.4			
Actuated g/C Ratio	0.28	0.54			0.20	1.00	0.33		0.33			
v/c Ratio	1.00	0.22			0.62	0.16	0.97		0.74			
Control Delay	52.3	3.9			37.5	0.2	62.7		14.7			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	52.3	3.9			37.5	0.2	62.7		14.7			
LOS	D	A			D	A	E		B			
Approach Delay		29.7			23.3			38.0				
Approach LOS		C			C			D				
Queue Length 50th (ft)	273	16			115	0	300		76			
Queue Length 95th (ft)	#454	10			165	0	287		62			
Internal Link Dist (ft)		613			462			787			312	
Turn Bay Length (ft)												
Base Capacity (vph)	486	1908			701	1568	556		766			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.00	0.22			0.60	0.16	0.97		0.74			

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.00  
 Intersection Signal Delay: 31.5  
 Intersection LOS: C



# Lanes, Volumes, Timings

## 4 X Exit 5 NB Off & NH 28

01/23/2018

Intersection Capacity Utilization 72.6%

ICU Level of Service C

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.




















Splits and Phases: 3: Exit 5 NB Off & NH 28



## Lanes, Volumes, Timings

## 5 NH 102 &amp; St. Charles Street/Londonderry Road

01/23/2018

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	5	210	10	0	10	410	910	120	5	650	120
Future Volume (vph)	10	5	210	10	0	10	410	910	120	5	650	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		225	0		0	350		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.932			0.983			0.977	
Flt Protected		0.967			0.976		0.950			0.950		
Satd. Flow (prot)	0	1801	1583	0	1728	0	1770	3479	0	1770	3458	0
Flt Permitted		0.878			0.834		0.950			0.950		
Satd. Flow (perm)	0	1635	1583	0	1477	0	1770	3479	0	1770	3458	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			228		182			25			24	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		593			447			750			330	
Travel Time (s)		13.5			10.2			17.0			7.5	
Peak Hour Factor	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	11	5	228	40	0	40	446	989	130	5	707	130
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	16	228	0	80	0	446	1119	0	5	837	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	3	1	3	1		3	3		3	3	
Detector Template	Left	Thru	Right	Left			Left	Thru		Left	Thru	
Leading Detector (ft)	256	256	45	256	45		256	256		256	256	
Trailing Detector (ft)	-5	-5	-5	-5	-5		-5	-5		-5	-5	
Detector 1 Position(ft)	-5	-5	-5	-5	-5		-5	-5		-5	-5	
Detector 1 Size(ft)	50	50	50	50	50		50	50		50	50	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)	125	125		125			125	125		125	125	
Detector 2 Size(ft)	6	6		6			6	6		6	6	
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0			0.0	0.0		0.0	0.0	
Detector 3 Position(ft)	250	250		250			250	250		250	250	
Detector 3 Size(ft)	6	6		6			6	6		6	6	



## Lanes, Volumes, Timings

## 5 9: NH 102 &amp; St. Charles Street/Londonderry Road

01/23/2018



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 3 Type	Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0		0.0			0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	custom	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		6	4								
Detector Phase	8	8	6	4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	8.0	5.0	5.0		5.0	8.0		5.0	8.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		24.0	24.0		11.0	24.0	
Total Split (s)	24.0	24.0	32.0	24.0	24.0		34.0	55.0		11.0	32.0	
Total Split (%)	26.7%	26.7%	35.6%	26.7%	26.7%		37.8%	61.1%		12.2%	35.6%	
Maximum Green (s)	18.0	18.0	26.0	18.0	18.0		28.0	49.0		5.0	26.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag			Lag				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	Min	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0			0	
Act Effct Green (s)		6.7	25.2		6.7		23.6	55.0		5.2	25.2	
Actuated g/C Ratio		0.09	0.36		0.09		0.33	0.78		0.07	0.36	
v/c Ratio		0.10	0.32		0.26		0.75	0.41		0.04	0.67	
Control Delay		34.6	4.5		2.1		31.3	4.9		35.6	23.7	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		34.6	4.5		2.1		31.3	4.9		35.6	23.7	
LOS		C	A		A		C	A		D	C	
Approach Delay		6.5			2.1			12.4			23.8	
Approach LOS		A			A			B			C	
Queue Length 50th (ft)		7	0		0		184	71		2	174	
Queue Length 95th (ft)		26	46		0		298	193		13	254	
Internal Link Dist (ft)		513			367			670			250	
Turn Bay Length (ft)			225				350			100		
Base Capacity (vph)		435	748		526		732	2712		131	1344	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.04	0.30		0.15		0.61	0.41		0.04	0.62	

## Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 70.7  
 Natural Cycle: 80  
 Control Type: Actuated-Uncoordinated

5 Lanes, Volumes, Timings  
 9: NH 102 & St. Charles Street/Londonderry Road

01/23/2018

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 15.1

Intersection LOS: B

Intersection Capacity Utilization 71.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 9: NH 102 & St. Charles Street/Londonderry Road

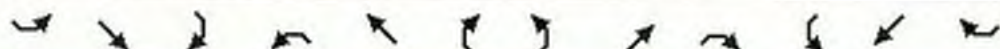




## Lanes, Volumes, Timings

19: NH 102 &amp; Fordway/Madden Hill Road

01/23/2018



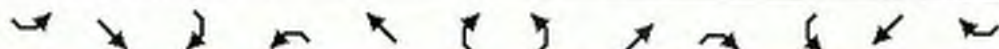
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	20	30	5	260	0	40	0	790	130	15	420	0
Future Volume (vph)	20	30	5	260	0	40	0	790	130	15	420	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.982			0.981				
Flt Protected		0.982			0.959						0.998	
Satd. Flow (prot)	0	1807	0	0	1737	0	0	1726	0	0	1806	0
Flt Permitted		0.875			0.739						0.804	
Satd. Flow (perm)	0	1610	0	0	1339	0	0	1726	0	0	1455	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			36			18				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		356			493			1124			603	
Travel Time (s)		8.1			11.2			25.5			13.7	
Peak Hour Factor	0.60	0.60	0.60	0.96	0.96	0.96	0.89	0.89	0.89	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	8%	8%	8%	5%	5%	5%
Adj. Flow (vph)	33	50	8	271	0	42	0	888	146	17	488	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	91	0	0	313	0	0	1034	0	0	505	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		-22			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	1		3	2			2		3	2	
Detector Template	Left			Left						Left		
Leading Detector (ft)	256	45		256	131			131		256	131	
Trailing Detector (ft)	-5	-5		-5	-5			-5		-5	-5	
Detector 1 Position(ft)	-5	-5		-5	-5			-5		-5	-5	
Detector 1 Size(ft)	50	50		50	50			50		50	50	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex			CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Detector 2 Position(ft)	125			125	125			125		125	125	
Detector 2 Size(ft)	6			6	6			6		6	6	
Detector 2 Type	CI+Ex			CI+Ex	CI+Ex			CI+Ex		CI+Ex	CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0	0.0			0.0		0.0	0.0	
Detector 3 Position(ft)	250			250						250		
Detector 3 Size(ft)	6			6						6		
Detector 3 Type	CI+Ex			CI+Ex						CI+Ex		
Detector 3 Channel												
Detector 3 Extend (s)	0.0			0.0						0.0		



## Lanes, Volumes, Timings

10: NH 102 &amp; Fordway/Madden Hill Road

01/23/2018



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4						2		
Detector Phase	4	4		4	4			2		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0			24.0		24.0	24.0	
Total Split (s)	26.0	26.0		26.0	26.0			64.0		64.0	64.0	
Total Split (%)	28.9%	28.9%		28.9%	28.9%			71.1%		71.1%	71.1%	
Maximum Green (s)	20.0	20.0		20.0	20.0			58.0		58.0	58.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)		20.0			20.0			55.7			55.7	
Actuated g/C Ratio		0.23			0.23			0.63			0.63	
v/c Ratio		0.25			0.94			0.94			0.55	
Control Delay		29.3			68.7			31.6			11.6	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		29.3			68.7			31.6			11.6	
LOS		C			E			C			B	
Approach Delay		29.3			68.7			31.6			11.6	
Approach LOS		C			E			C			B	
Queue Length 50th (ft)		40			159			456			140	
Queue Length 95th (ft)		52			#326			#786			204	
Internal Link Dist (ft)		276			413			1044			523	
Turn Bay Length (ft)												
Base Capacity (vph)		371			333			1148			963	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.25			0.94			0.90			0.52	

## Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 87.8

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 32.3

Intersection LOS: C

Intersection Capacity Utilization 86.3%

ICU Level of Service E



Lanes, Volumes, Timings

10: NH 102 & Fordway/Madden Hill Road

01/23/2018

Analysis Period (min) 15

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

Splits and Phases: 10: NH 102 & Fordway/Madden Hill Road
























## Zone 3

## 7: NH 102 (E Broadway) &amp; Birch St/Crystal Av

2040 Alt D Zone 3 PM Peak

Lanes, Volumes, Timings

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	70	320	30	110	370	40	100	450	40	50	340	80
Future Volume (vph)	70	320	30	110	370	40	100	450	40	50	340	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	70		0	245		245	390		0	110		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987				0.850		0.988			0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1821	0	1752	1845	1568	1787	1859	0	1787	1827	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1752	1821	0	1752	1845	1568	1787	1859	0	1787	1827	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				116		5			13	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		361			411			477			530	
Travel Time (s)		8.2			9.3			10.8			12.0	
Peak Hour Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.95	0.95	0.95	0.94	0.94	0.94
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	77	352	33	118	398	43	105	474	42	53	362	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	385	0	118	398	43	105	516	0	53	447	0
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	3	8		7	4	5	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	8		7	4	5	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	5.0		4.0	10.0	4.0	4.0	10.0		4.0	9.0	
Minimum Split (s)	17.0	24.0		11.0	24.0	16.0	16.0	24.0		11.0	24.0	
Total Split (s)	17.0	24.0		17.0	24.0	16.0	16.0	33.0		11.0	28.0	
Total Split (%)	20.0%	28.2%		20.0%	28.2%	18.8%	18.8%	38.8%		12.9%	32.9%	
Maximum Green (s)	11.0	18.0		11.0	18.0	10.0	10.0	27.0		5.0	22.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max		None	None	
Act Effct Green (s)	8.7	18.4		9.6	19.2	34.2	8.9	29.5		5.1	23.9	
Actuated g/C Ratio	0.11	0.23		0.12	0.24	0.43	0.11	0.37		0.06	0.30	
v/c Ratio	0.40	0.90		0.55	0.89	0.06	0.52	0.74		0.46	0.79	
Control Delay	41.1	57.6		45.2	55.6	0.1	45.2	32.3		52.3	40.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	41.1	57.6		45.2	55.6	0.1	45.2	32.3		52.3	40.7	
LOS	D	E		D	E	A	D	C		D	D	
Approach Delay		54.8			49.2			34.4			41.9	



Zone 3  
7: NH 102 (E Broadway) & Birch St/Crystal Av

2040 Alt D Zone 3 PM Peak  
Lanes, Volumes, Timings

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Approach LOS		D			D			C				D
Queue Length 50th (ft)	39	204		60	209	0	53	255		28	227	
Queue Length 95th (ft)	80	#386		113	#400	0	104	#435		#74	#408	
Internal Link Dist (ft)		281			331			397			450	
Turn Bay Length (ft)	70			245		245	390			110		
Base Capacity (vph)	250	430		250	449	772	232	699		116	564	
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	0.31	0.90		0.47	0.89	0.06	0.45	0.74		0.46	0.79	

Intersection Summary

Area Type: Other  
 Cycle Length: 85  
 Actuated Cycle Length: 78.7  
 Natural Cycle: 85  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.90  
 Intersection Signal Delay: 44.4  
 Intersection LOS: D  
 Intersection Capacity Utilization 89.4%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 7: NH 102 (E Broadway) & Birch St/Crystal Av

Ø1 11 s	Ø2 33 s	Ø3 17 s	Ø4 24 s
Ø5 16 s	Ø6 28 s	Ø7 17 s	Ø8 24 s


























## Zone 4

## 2040 Alt D Zone 4 PM Peak

## 11: Folsom Rd/Tsienneto Rd &amp; NH 28 S/NH 28

Lanes, Volumes, Timings

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	70	340	190	650	530	0	300	480	110	30	250	930
Future Volume (vph)	70	340	190	650	530	0	300	480	110	30	250	930
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	80		180	525		190	190		180	160		0
Storage Lanes	1		1	2		0	2		1	1		2
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.97	1.00	1.00	1.00	1.00	0.88
Frt			0.850						0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	0	3433	1863	1583	1787	1881	2814
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3539	0	3433	1863	1583	1787	1881	2814
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			191						300			136
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		639			801			532			387	
Travel Time (s)		14.5			18.2			12.1			8.8	
Peak Hour Factor	0.92	0.92	0.92	0.94	0.94	0.94	0.96	0.96	0.96	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Adj. Flow (vph)	76	370	207	691	564	0	313	500	115	32	263	979
Shared Lane Traffic (%)												
Lane Group Flow (vph)	76	370	207	691	564	0	313	500	115	32	263	979
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA	Free	Prot	NA	pt+ov
Protected Phases	1	6	7	5	2		3	8		7	4	4 5
Permitted Phases		6	6		2			8	Free			4
Detector Phase	1	6	7	5	2		3	8		7	4	4 5
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		8.0	5.0		8.0	5.0	
Minimum Split (s)	14.0	22.0	14.0	14.0	22.0		14.0	39.0		14.0	39.0	
Total Split (s)	17.0	22.0	15.0	36.0	41.0		22.0	47.0		15.0	40.0	
Total Split (%)	14.2%	18.3%	12.5%	30.0%	34.2%		18.3%	39.2%		12.5%	33.3%	
Maximum Green (s)	11.0	16.0	9.0	30.0	35.0		16.0	41.0		9.0	34.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			26.0			26.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	11.0	16.7	31.4	29.3	35.0		16.0	41.3	120.0	8.7	34.0	69.3
Actuated g/C Ratio	0.09	0.14	0.26	0.24	0.29		0.13	0.34	1.00	0.07	0.28	0.58
v/c Ratio	0.47	0.75	0.37	0.83	0.55		0.68	0.78	0.07	0.25	0.49	0.58
Control Delay	61.9	60.4	8.4	56.9	29.1		58.1	45.2	0.1	81.4	27.1	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	2.0	0.0	0.0	1.1	1.4

01/02/2018

MCC

Synchro 9 Report

Page 1



Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Total Delay	61.9	60.4	8.4	56.9	29.1		58.1	47.2	0.1	81.4	28.2	11.1
LOS	E	E	A	E	C		E	D	A	F	C	B
Approach Delay		44.1			44.4			45.0			16.4	
Approach LOS		D			D			D			B	
Queue Length 50th (ft)	57	147	9	236	143		120	346	0	26	152	283
Queue Length 95th (ft)	109	#214	70	339	190		170	484	0	m44	219	374
Internal Link Dist (ft)		559			721			452			307	
Turn Bay Length (ft)	80		180	525			190		180	160		
Base Capacity (vph)	162	492	558	858	1032		457	641	1583	134	532	1698
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	109	491
Spillback Cap Reductn	0	0	5	0	0		0	53	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced w/c Ratio	0.47	0.75	0.37	0.81	0.55		0.68	0.85	0.07	0.24	0.62	0.81

## Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 17 (14%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum w/c Ratio: 0.83

Intersection Signal Delay: 35.8

Intersection LOS: D

Intersection Capacity Utilization 79.9%

ICU Level of Service D

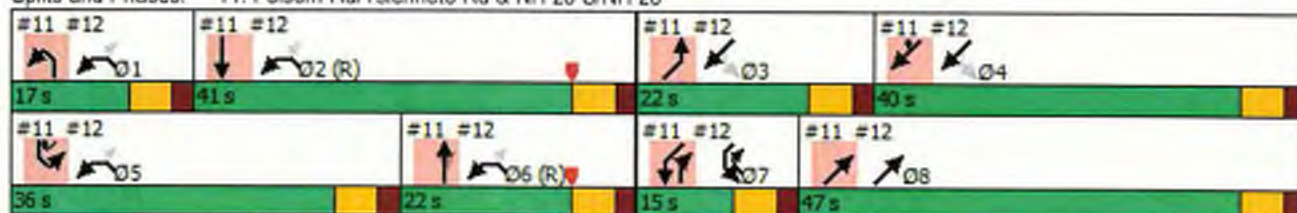
Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

## Splits and Phases: 11: Folsom Rd/Tsienneto Rd &amp; NH 28 S/NH 28





Zone 4  
12: Tsienneto Rd & Pinkerton St

2040 Alt D Zone 4 PM Peak  
Lanes, Volumes, Timings

Lane Group	NWL	NWR	NET	NER	SWL	SWT	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	310	110	800	530	90	920						
Future Volume (vph)	310	110	800	530	90	920						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900						
Storage Length (ft)	90	0		0	175							
Storage Lanes	1	1		1	1							
Taper Length (ft)	25				25							
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95						
Frt		0.850		0.850								
Flt Protected	0.950				0.950							
Satd. Flow (prot)	1787	1599	3574	1599	1787	3574						
Flt Permitted	0.950				0.157							
Satd. Flow (perm)	1787	1599	3574	1599	295	3574						
Right Turn on Red		Yes		Yes								
Satd. Flow (RTOR)		41		416								
Link Speed (mph)	30		30			30						
Link Distance (ft)	403		387			233						
Travel Time (s)	9.2		8.8			5.3						
Peak Hour Factor	0.86	0.86	0.96	0.96	0.85	0.85						
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%						
Adj. Flow (vph)	360	128	833	552	106	1082						
Shared Lane Traffic (%)												
Lane Group Flow (vph)	360	128	833	552	106	1082						
Turn Type	Prot	pm+ov	NA	Free	pm+pt	NA						
Protected Phases	1 2 5 6	7	8		7	3 4	1	2	3	4	5	6
Permitted Phases		1 2 5 6		Free	3 4							
Detector Phase	1 2 5 6	7	8		7	3 4						
Switch Phase												
Minimum Initial (s)		8.0	5.0		8.0		8.0	8.0	8.0	5.0	8.0	8.0
Minimum Split (s)		14.0	39.0		14.0		14.0	22.0	14.0	39.0	14.0	22.0
Total Split (s)		15.0	47.0		15.0		17.0	41.0	22.0	40.0	36.0	22.0
Total Split (%)		12.5%	39.2%		12.5%		14%	34%	18%	33%	30%	18%
Maximum Green (s)		9.0	41.0		9.0		11.0	35.0	16.0	34.0	30.0	16.0
Yellow Time (s)		4.0	4.0		4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)		2.0	2.0		2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0							
Total Lost Time (s)		6.0	6.0		6.0							
Lead/Lag		Lead	Lag		Lead		Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?		Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode		None	None		None		None	C-Max	None	None	None	C-Max
Walk Time (s)			7.0					5.0		7.0		5.0
Flash Dont Walk (s)			26.0					11.0		26.0		11.0
Pedestrian Calls (#/hr)			0					0		0		0
Act Effct Green (s)	52.0	66.7	41.3	120.0	56.0	56.0						
Actuated g/C Ratio	0.43	0.56	0.34	1.00	0.47	0.47						
v/c Ratio	0.47	0.14	0.68	0.35	0.43	0.65						
Control Delay	26.6	9.0	41.3	0.4	23.9	26.8						
Queue Delay	0.0	0.0	5.8	0.0	0.0	0.1						



Lane Group	NWL	NWR	NET	NER	SWL	SWT	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6
Total Delay	26.6	9.0	47.0	0.4	23.9	26.9						
LOS	C	A	D	A	C	C						
Approach Delay	22.0		28.4			26.6						
Approach LOS	C		C			C						
Queue Length 50th (ft)	194	30	251	0	45	328						
Queue Length 95th (ft)	265	57	348	m0	75	368						
Internal Link Dist (ft)	323		307			153						
Turn Bay Length (ft)	90				175							
Base Capacity (vph)	774	910	1231	1599	249	1667						
Starvation Cap Reductn	0	0	336	0	0	0						
Spillback Cap Reductn	0	0	0	0	0	74						
Storage Cap Reductn	0	0	0	0	0	0						
Reduced v/c Ratio	0.47	0.14	0.93	0.35	0.43	0.68						

## Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 17 (14%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 26.7

Intersection LOS: C

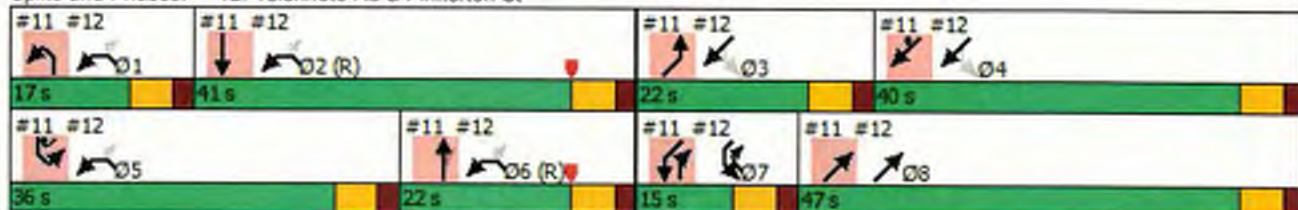
Intersection Capacity Utilization 61.0%

ICU Level of Service B

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

## Splits and Phases: 12: Tsienneto Rd &amp; Pinkerton St





Zone 4  
13: Applebee's/Linlew Dr & NH 28

2040 Alt D Zone 4 PM Peak  
Lanes, Volumes, Timings

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	380	1475	5	20	1290	120	15	10	15	10	10	160
Future Volume (vph)	380	1475	5	20	1290	120	15	10	15	10	10	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	115		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Fr					0.987				0.850			0.850
Flt Protected	0.950			0.950				0.971			0.976	
Satd. Flow (prot)	1787	3574	0	1787	3528	0	0	1845	1615	0	1836	1599
Flt Permitted	0.950			0.950				0.799			0.827	
Satd. Flow (perm)	1787	3574	0	1787	3528	0	0	1518	1615	0	1556	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			11				136			27
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		439			341			230			387	
Travel Time (s)		10.0			7.8			5.2			8.8	
Peak Hour Factor	0.97	0.97	0.97	0.95	0.95	0.95	0.90	0.90	0.90	0.80	0.80	0.80
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	392	1521	5	21	1358	126	17	11	17	13	13	200
Shared Lane Traffic (%)												
Lane Group Flow (vph)	392	1526	0	21	1484	0	0	28	17	0	26	200
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8			4	5
Permitted Phases							8		8	4	4	4
Detector Phase	5	2		1	6		8	8	8	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	8.0		5.0	8.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	26.0	63.0		11.0	48.0		21.0	21.0	21.0	21.0	21.0	26.0
Total Split (s)	37.0	88.0		11.0	62.0		21.0	21.0	21.0	21.0	21.0	37.0
Total Split (%)	30.8%	73.3%		9.2%	51.7%		17.5%	17.5%	17.5%	17.5%	17.5%	30.8%
Maximum Green (s)	31.0	82.0		5.0	56.0		15.0	15.0	15.0	15.0	15.0	31.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag							Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max		None	Max		None	None	None	None	None	None
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		11.0			11.0		8.0	8.0	8.0	8.0	8.0	
Pedestrian Calls (#/hr)		0			0		0	0	0	0	0	
Act Effct Green (s)	31.2	101.8		7.0	68.0			7.7	7.7		7.6	40.0
Actuated g/C Ratio	0.26	0.85		0.06	0.57			0.06	0.06		0.06	0.33
v/c Ratio	0.85	0.50		0.20	0.74			0.29	0.07		0.27	0.36
Control Delay	50.6	7.1		67.7	23.0			60.5	0.6		59.3	25.7
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0

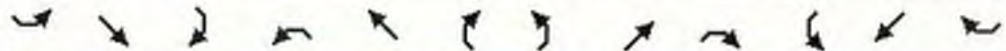


Zone 4

2040 Alt D Zone 4 PM Peak

13: Applebee's/Linlew Dr & NH 28

Lanes, Volumes, Timings



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Total Delay	50.6	7.1		67.7	23.0			60.5	0.6		59.3	25.7
LOS	D	A		E	C			E	A		E	C
Approach Delay		16.0			23.6			37.9			29.6	
Approach LOS		B			C			D			C	
Queue Length 50th (ft)	325	159		17	614			21	0		20	92
Queue Length 95th (ft)	m375	355		m26	720			51	0		43	120
Internal Link Dist (ft)		359			261			150			307	
Turn Bay Length (ft)	300			115								
Base Capacity (vph)	492	3032		103	2002			189	320		194	577
Starvation Cap Reductn	0	0		0	0			0	0		0	0
Spillback Cap Reductn	0	0		0	0			0	0		0	0
Storage Cap Reductn	0	0		0	0			0	0		0	0
Reduced v/c Ratio	0.80	0.50		0.20	0.74			0.15	0.05		0.13	0.35

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:SET, Start of Yellow  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 20.2  
 Intersection LOS: C  
 Intersection Capacity Utilization 83.6%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.
























Splits and Phases: 13: Applebee's/Linlew Dr & NH 28





Zone 4  
14: VIP Dr/Ashleigh Dr & NH 28

2040 Alt D Zone 4 PM Peak  
Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	1550	10	5	1240	410	40	10	10	200	5	280
Future Volume (vph)	150	1550	10	5	1240	410	40	10	10	200	5	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		150	205		150	0		0	325		150
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (ft)	150			25			25			25		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.999				0.850		0.925				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.955	
Satd. Flow (prot)	3467	3571	0	1770	3539	1583	1805	1758	0	1715	1724	1615
Flt Permitted	0.950			0.950			0.950			0.950	0.450	
Satd. Flow (perm)	3467	3571	0	1770	3539	1583	1805	1758	0	1715	812	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				369		13				165
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		877			314			151			476	
Travel Time (s)		19.9			7.1			3.4			10.8	
Peak Hour Factor	0.84	0.84	0.84	0.90	0.90	0.90	0.78	0.78	0.78	0.86	0.86	0.86
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	179	1845	12	6	1378	456	51	13	13	233	6	326
Shared Lane Traffic (%)										49%		
Lane Group Flow (vph)	179	1857	0	6	1378	456	51	26	0	119	120	326
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA		Prot	NA	pt+ov
Protected Phases	5	2		1	6	7	3	8		7	4	4 5
Permitted Phases		2			6	6		8				
Detector Phase	5	2		1	6	7	3	8		7	4	4 5
Switch Phase												
Minimum Initial (s)	5.0	8.0		5.0	8.0	8.0	5.0	5.0		8.0	8.0	
Minimum Split (s)	11.0	53.0		11.0	50.0	22.0	22.0	22.0		22.0	22.0	
Total Split (s)	15.0	65.0		11.0	61.0	22.0	22.0	22.0		22.0	22.0	
Total Split (%)	12.5%	54.2%		9.2%	50.8%	18.3%	18.3%	18.3%		18.3%	18.3%	
Maximum Green (s)	9.0	59.0		5.0	55.0	16.0	16.0	16.0		16.0	16.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	None	None	None	None		None	None	
Walk Time (s)												5.0
Flash Dont Walk (s)												11.0
Pedestrian Calls (#/hr)												0
Act Effct Green (s)	9.1	70.1		5.1	57.2	85.1	8.8	12.3		21.9	21.9	38.3
Actuated g/C Ratio	0.08	0.58		0.04	0.48	0.71	0.07	0.10		0.18	0.18	0.32
v/c Ratio	0.68	0.89		0.08	0.82	0.37	0.39	0.14		0.38	0.38	0.52
Control Delay	67.6	29.2		57.4	24.3	0.8	60.8	30.8		50.6	50.6	20.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0



Zone 4  
14: VIP Dr/Ashleigh Dr & NH 28

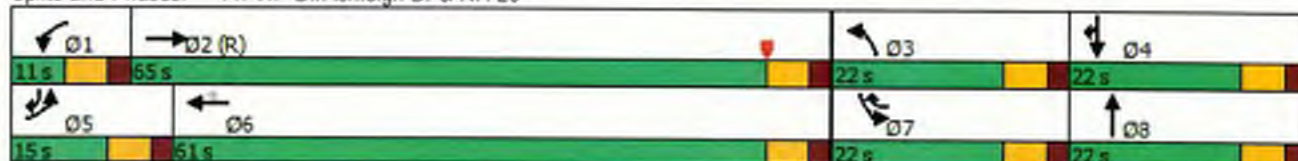
2040 Alt D Zone 4 PM Peak  
Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	67.6	29.2		57.4	24.3	0.8	60.8	30.8		50.6	50.6	20.1
LOS	E	C		E	C	A	E	C		D	D	C
Approach Delay		32.5			18.6			50.7			33.0	
Approach LOS		C			B			D			C	
Queue Length 50th (ft)	71	622		5	234	2	38	9		93	94	98
Queue Length 95th (ft)	102	#856		m10	365	4	67	30		150	151	181
Internal Link Dist (ft)		797			234			71			396	
Turn Bay Length (ft)	200			205		150				325		150
Base Capacity (vph)	267	2087		75	1687	1235	240	253		320	314	622
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.67	0.89		0.08	0.82	0.37	0.21	0.10		0.37	0.38	0.52

Intersection Summary












Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:EBT, Start of Yellow  
 Natural Cycle: 120  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 27.2  
 Intersection LOS: C  
 Intersection Capacity Utilization 74.7%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 14: VIP Dr/Ashleigh Dr & NH 28



Zone 4  
25: NH 28 & Rockingham Road

2040 Alt D Zone 4 PM Peak  
Lanes, Volumes, Timings

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	140	1360	1415	270	120	70
Future Volume (vph)	140	1360	1415	270	120	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200			150	360	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Fr			0.976			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	3539	3454	0	1770	1583
Flt Permitted	0.079				0.950	
Satd. Flow (perm)	147	3539	3454	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			48			32
Link Speed (mph)		30	30		30	
Link Distance (ft)		463	580		704	
Travel Time (s)		10.5	13.2		16.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	1478	1538	293	130	76
Shared Lane Traffic (%)						
Lane Group Flow (vph)	152	1478	1831	0	130	76
Turn Type	pm+pt	NA	NA		Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2					4
Detector Phase	5	2	6		4	5
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	11.0	20.0	20.0		11.0	11.0
Total Split (s)	11.0	64.0	53.0		16.0	11.0
Total Split (%)	13.8%	80.0%	66.3%		20.0%	13.8%
Maximum Green (s)	5.0	58.0	47.0		10.0	5.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	None		None	None
Act Effct Green (s)	55.7	57.5	44.2		9.3	16.9
Actuated g/C Ratio	0.76	0.78	0.60		0.13	0.23
v/c Ratio	0.67	0.53	0.87		0.59	0.20
Control Delay	27.5	5.4	19.2		44.9	16.4
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	27.5	5.4	19.2		44.9	16.4
LOS	C	A	B		D	B
Approach Delay		7.5	19.2		34.4	
Approach LOS		A	B		C	



Zone 4  
25: NH 28 & Rockingham Road

2040 Alt D Zone 4 PM Peak  
Lanes, Volumes, Timings



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)	21	148	372		62	17
Queue Length 95th (ft)	#111	194	#516		#126	49
Internal Link Dist (ft)		383	500		624	
Turn Bay Length (ft)	200				360	
Base Capacity (vph)	226	2764	2308		249	387
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.67	0.53	0.79		0.52	0.20

Intersection Summary

Area Type: Other  
 Cycle Length: 80  
 Actuated Cycle Length: 73.6  
 Natural Cycle: 65  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 14.8  
 Intersection LOS: B  
 Intersection Capacity Utilization 77.1%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 25: NH 28 & Rockingham Road



Zone 5  
18: Tsienneto Rd & NH 28 Byp NB/NH 28 Byp SB

2040 Alt D Zone 5 PM Peak  
Lanes, Volumes, Timings

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	30	70	30	50	40	210	90	840	70	20	360	40
Future Volume (vph)	30	70	30	50	40	210	90	840	70	20	360	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	145		110	280		280	360		0	120		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25		25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.955				0.850		0.988			0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1779	0	1787	1881	1599	1805	3567	0	1805	3556	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1779	0	1787	1881	1599	1805	3567	0	1805	3556	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23				221		11			15	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		481			490			479			371	
Travel Time (s)		10.9			11.1			10.9			8.4	
Peak Hour Factor	0.99	0.99	0.99	0.95	0.95	0.95	0.89	0.89	0.89	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	30	71	30	53	42	221	101	944	79	22	387	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	101	0	53	42	221	101	1023	0	22	430	0
Turn Type	Prot	NA		Prot	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	1	6		5	2	2 3	3	8		7	4	
Permitted Phases		6			2							
Detector Phase	1	6		5	2	2 3	3	8		7	4	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	14.0	20.0		14.0	20.0		14.0	28.0		14.0	14.0	
Total Split (s)	14.0	20.0		14.0	20.0		15.0	32.0		14.0	31.0	
Total Split (%)	17.5%	25.0%		17.5%	25.0%		18.8%	40.0%		17.5%	38.8%	
Maximum Green (s)	8.0	14.0		8.0	14.0		9.0	26.0		8.0	25.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	Max		None	None		None	None	
Walk Time (s)								7.0				
Flash Dont Walk (s)								15.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)	8.4	13.5		8.4	16.4	31.5	8.9	26.1		8.4	15.4	
Actuated g/C Ratio	0.13	0.21		0.13	0.26	0.49	0.14	0.41		0.13	0.24	
v/c Ratio	0.13	0.26		0.23	0.09	0.25	0.40	0.70		0.09	0.50	
Control Delay	32.3	23.5		33.2	24.9	3.7	35.3	22.0		32.2	22.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	



## Zone 5

2040 Alt D Zone 5 PM Peak

## 18: Tsienneto Rd &amp; NH 28 Byp NB/NH 28 Byp SB

Lanes, Volumes, Timings

	↶	↑	↷	↶	↓	↷	↶	↷	↶	↷	↶	↷
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Total Delay	32.3	23.5		33.2	24.9	3.7	35.3	22.0		32.2	22.3	
LOS	C	C		C	C	A	D	C		C	C	
Approach Delay		25.5			11.4			23.2			22.8	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	10	27		18	10	0	35	145		7	73	
Queue Length 95th (ft)	39	77		59	45	43	95	#355		32	123	
Internal Link Dist (ft)		401			410			399			291	
Turn Bay Length (ft)	145			280		280	360			120		
Base Capacity (vph)	232	425		234	481	912	266	1539		236	1465	
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	0.13	0.24		0.23	0.09	0.24	0.38	0.66		0.09	0.29	

## Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 64

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 21.4

Intersection LOS: C

Intersection Capacity Utilization 56.6%

ICU Level of Service B

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.







Queue shown is maximum after two cycles.

## Splits and Phases: 18: Tsienneto Rd &amp; NH 28 Byp NB/NH 28 Byp SB

↶ Ø1	↓ Ø2	↷ Ø3	↶ Ø4
14 s	20 s	15 s	31 s
↶ Ø5	↑ Ø6	↷ Ø7	↶ Ø8
14 s	20 s	14 s	32 s

Zone 5  
19: NH 102 EB/NH 102 & Tsienneto Rd

2040 Alt D Zone 5 PM Peak  
Lanes, Volumes, Timings

										
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø2	Ø5	Ø6	Ø7
Lane Configurations	↵		↶	↑	↑	↷				
Traffic Volume (vph)	710	5	10	260	200	340				
Future Volume (vph)	710	5	10	260	200	340				
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900				
Storage Length (ft)	200	0	100			90				
Storage Lanes	0	0	1			1				
Taper Length (ft)	25		25							
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Frt	0.999					0.850				
Flt Protected	0.953		0.950							
Satd. Flow (prot)	1791	0	1770	1863	1845	1568				
Flt Permitted	0.953		0.516							
Satd. Flow (perm)	1791	0	961	1863	1845	1568				
Right Turn on Red		Yes				Yes				
Satd. Flow (RTOR)	1					382				
Link Speed (mph)	30			30	30					
Link Distance (ft)	392			704	263					
Travel Time (s)	8.9			16.0	6.0					
Peak Hour Factor	0.90	0.90	0.87	0.87	0.89	0.89				
Heavy Vehicles (%)	1%	1%	2%	2%	3%	3%				
Adj. Flow (vph)	789	6	11	299	225	382				
Shared Lane Traffic (%)										
Lane Group Flow (vph)	795	0	11	299	225	382				
Turn Type	Prot		pm+pt	NA	NA	custom				
Protected Phases	8		1	6 7	2 7	7 8	2	5	6	7
Permitted Phases			6 7			2				
Detector Phase	8		1	6 7	2 7	7 8				
Switch Phase										
Minimum Initial (s)	5.0		5.0				5.0	5.0	5.0	5.0
Minimum Split (s)	26.5		11.0				9.0	11.0	9.0	11.0
Total Split (s)	47.0		11.0				21.0	11.0	21.0	11.0
Total Split (%)	52.2%		12.2%				23%	12%	23%	12%
Maximum Green (s)	41.0		5.0				17.0	5.0	17.0	5.0
Yellow Time (s)	4.0		4.0				3.0	4.0	3.0	4.0
All-Red Time (s)	2.0		2.0				1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0		0.0							
Total Lost Time (s)	6.0		6.0							
Lead/Lag	Lag		Lead				Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes		Yes				Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0		3.0				3.0	3.0	3.0	3.0
Recall Mode	None		None				Min	None	Min	None
Act Effct Green (s)	41.2		27.1	27.3	29.3	79.5				
Actuated g/C Ratio	0.50		0.33	0.33	0.35	0.96				
v/c Ratio	0.89		0.03	0.49	0.34	0.25				
Control Delay	34.8		16.5	26.2	24.5	0.4				
Queue Delay	0.0		0.0	0.0	1.3	0.0				
Total Delay	34.8		16.5	26.2	25.8	0.4				
LOS	C		B	C	C	A				
Approach Delay	34.8			25.9	9.8					



Zone 5  
19: NH 102 EB/NH 102 & Tsienneto Rd

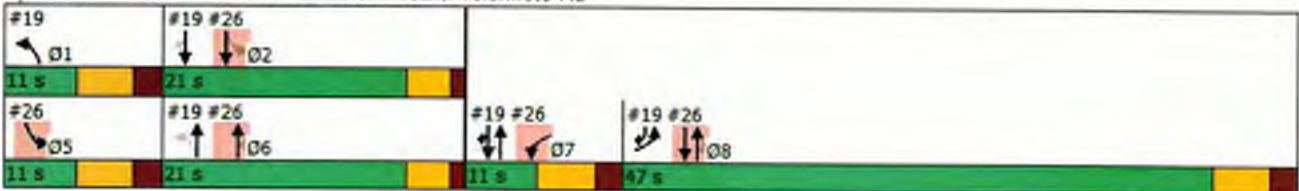
2040 Alt D Zone 5 PM Peak  
Lanes, Volumes, Timings

	↖	↘	↙	↑	↓	↗	Ø2	Ø5	Ø6	Ø7
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR				
Approach LOS	C			C	A					
Queue Length 50th (ft)	318		4	111	87	0				
Queue Length 95th (ft)	#686		13	209	141	1				
Internal Link Dist (ft)	312			624	183					
Turn Bay Length (ft)	200		100			90				
Base Capacity (vph)	893		364	614	653	1523				
Starvation Cap Reductn	0		0	0	252	166				
Spillback Cap Reductn	1		0	0	0	0				
Storage Cap Reductn	0		0	0	0	0				
Reduced v/c Ratio	0.89		0.03	0.49	0.56	0.28				

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 82.6  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 24.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 61.7%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 19: NH 102 EB/NH 102 & Tsienneto Rd



Zone 5  
26: NH 102 & North Shore Road

2040 Alt D Zone 5 PM Peak  
Lanes, Volumes, Timings

	↙	↖	↑	↗	↘	↓	Ø1	Ø2	Ø6	Ø8
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT				
Lane Configurations	↙		↑	↗	↘	↑				
Traffic Volume (vph)	50	10	810	160	20	490				
Future Volume (vph)	50	10	810	160	20	490				
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900				
Storage Length (ft)	0	0		90	100					
Storage Lanes	1	0		1	1					
Taper Length (ft)	25				25					
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Frt	0.972			0.850						
Flt Protected	0.962				0.950					
Satd. Flow (prot)	1763	0	1900	1615	1805	1900				
Flt Permitted	0.962				0.219					
Satd. Flow (perm)	1763	0	1900	1615	416	1900				
Right Turn on Red		Yes		Yes						
Satd. Flow (RTOR)	11			123						
Link Speed (mph)	30		30			30				
Link Distance (ft)	524		263			288				
Travel Time (s)	11.9		6.0			6.5				
Peak Hour Factor	0.87	0.67	0.95	0.84	0.73	0.96				
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%				
Adj. Flow (vph)	57	15	853	190	27	510				
Shared Lane Traffic (%)										
Lane Group Flow (vph)	72	0	853	190	27	510				
Turn Type	Prot		NA	Perm	custom	NA				
Protected Phases	7		6 8		5	2 8	1	2	6	8
Permitted Phases				6 8	2					
Detector Phase	7		6 8	6 8	5	2 8				
Switch Phase										
Minimum Initial (s)	5.0				5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	11.0				11.0		11.0	9.0	9.0	26.5
Total Split (s)	11.0				11.0		11.0	21.0	21.0	47.0
Total Split (%)	12.2%				12.2%		12%	23%	23%	52%
Maximum Green (s)	5.0				5.0		5.0	17.0	17.0	41.0
Yellow Time (s)	4.0				4.0		4.0	3.0	3.0	4.0
All-Red Time (s)	2.0				2.0		2.0	1.0	1.0	2.0
Lost Time Adjust (s)	0.0				0.0					
Total Lost Time (s)	6.0				6.0					
Lead/Lag	Lead				Lead		Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes				Yes		Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0	3.0
Recall Mode	None				None		None	Min	Min	None
Act Effct Green (s)	5.0		62.0	62.0	17.2	64.8				
Actuated g/C Ratio	0.06		0.75	0.75	0.21	0.78				
v/c Ratio	0.62		0.60	0.15	0.16	0.34				
Control Delay	58.9		2.6	0.7	26.2	3.0				
Queue Delay	0.0		1.3	0.4	0.0	0.0				
Total Delay	58.9		3.8	1.1	26.2	3.0				
LOS	E		A	A	C	A				
Approach Delay	58.9		3.3			4.2				



Zone 5  
26: NH 102 & North Shore Road

2040 Alt D Zone 5 PM Peak  
Lanes, Volumes, Timings

	↙	↖	↑	↗	↘	↓	Ø1	Ø2	Ø6	Ø8
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT				
Approach LOS	E		A		A					
Queue Length 50th (ft)	30		17	0	11	44				
Queue Length 95th (ft)	#96		m77	m2	25	65				
Internal Link Dist (ft)	444		183			208				
Turn Bay Length (ft)				90	100					
Base Capacity (vph)	117		1445	1258	170	1509				
Starvation Cap Reductn	0		359	686	0	0				
Spillback Cap Reductn	0		0	0	0	16				
Storage Cap Reductn	0		0	0	0	0				
Reduced v/c Ratio	0.62		0.79	0.33	0.16	0.34				

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 82.6  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 6.0  
 Intersection LOS: A  
 Intersection Capacity Utilization 55.1%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: NH 102 & North Shore Road



**APPENDIX S-1: 2040 ALTERNATIVE F INTERSECTION CAPACITY  
ANALYSES – HCS PRINTOUTS – AM PEAK HOUR**



# HCM Signalized Intersection Capacity Analysis

X: NH 102 & Exit 4 SB Off

01/04/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↘	↗
Traffic Volume (vph)	0	1355	685	0	855	805
Future Volume (vph)	0	1355	685	0	855	805
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	16	12
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	0.88
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3471	3406		1930	2682
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		3471	3406		1930	2682
Peak-hour factor, PHF	0.93	0.93	0.88	0.88	0.89	0.89
Adj. Flow (vph)	0	1457	778	0	961	904
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	1457	778	0	961	904
Heavy Vehicles (%)	4%	4%	6%	6%	6%	6%
Turn Type		NA	NA		Prot	Prot
Protected Phases		2	6		4	4
Permitted Phases						
Actuated Green, G (s)		29.0	29.0		34.0	34.0
Effective Green, g (s)		29.0	29.0		34.0	34.0
Actuated g/C Ratio		0.39	0.39		0.45	0.45
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1342	1316		874	1215
v/s Ratio Prot		c0.42	0.23		c0.50	0.34
v/s Ratio Perm						
v/c Ratio		1.09	0.59		1.10	0.74
Uniform Delay, d1		23.0	18.3		20.5	16.9
Progression Factor		1.01	0.94		1.00	1.00
Incremental Delay, d2		44.9	0.2		61.4	2.5
Delay (s)		68.1	17.3		81.9	19.4
Level of Service		E	B		F	B
Approach Delay (s)		68.1	17.3		51.6	
Approach LOS		E	B		D	

## Intersection Summary

HCM 2000 Control Delay	51.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.8%	ICU Level of Service	F
Analysis Period (min)	15		


















c: Critical Lane Group



# HCM Signalized Intersection Capacity Analysis

2 **8**: NH 102 & Exit 4 NB Off

01/04/2018













											
Movement	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	455	0	365	0	0	1165	1045	0	0	1295	1155
Future Volume (vph)	455	0	365	0	0	1165	1045	0	0	1295	1155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0			6.0	6.0			6.0	4.0
Lane Util. Factor	0.97		0.88			0.97	0.95			0.95	1.00
Frt	1.00		0.85			1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00			0.95	1.00			1.00	1.00
Satd. Flow (prot)	3242		2632			3335	3438			3505	1568
Flt Permitted	0.95		1.00			0.95	1.00			1.00	1.00
Satd. Flow (perm)	3242		2632			3335	3438			3505	1568
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	517	0	415	0	0	1239	1112	0	0	1408	1255
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	517	0	415	0	0	1239	1112	0	0	1408	1255
Heavy Vehicles (%)	8%	8%	8%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot		Prot			Prot	NA			NA	Free
Protected Phases	8		8			5	2			6	
Permitted Phases											Free
Actuated Green, G (s)	22.0		22.0			52.0	116.0			58.0	150.0
Effective Green, g (s)	22.0		22.0			52.0	116.0			58.0	150.0
Actuated g/C Ratio	0.15		0.15			0.35	0.77			0.39	1.00
Clearance Time (s)	6.0		6.0			6.0	6.0			6.0	
Vehicle Extension (s)	3.0		3.0			3.0	3.0			3.0	
Lane Grp Cap (vph)	475		386			1156	2658			1355	1568
w/s Ratio Prot	c0.16		0.16			c0.37	0.32			c0.40	
w/s Ratio Perm											0.80
w/c Ratio	1.09		1.08			1.07	0.42			1.04	0.80
Uniform Delay, d1	64.0		64.0			49.0	5.7			46.0	0.0
Progression Factor	1.00		1.00			0.84	0.96			1.00	1.00
Incremental Delay, d2	67.3		67.3			34.3	0.0			35.2	4.4
Delay (s)	131.3		131.3			75.5	5.5			81.2	4.4
Level of Service	F		F			E	A			F	A
Approach Delay (s)		131.3		0.0			42.4			45.0	
Approach LOS		F		A			D			D	
<b>Intersection Summary</b>											
HCM 2000 Control Delay			57.5			HCM 2000 Level of Service				E	
HCM 2000 Volume to Capacity ratio			1.06								
Actuated Cycle Length (s)			150.0			Sum of lost time (s)				18.0	
Intersection Capacity Utilization			98.0%			ICU Level of Service				F	
Analysis Period (min)			15								
c Critical Lane Group											



### HCM Signalized Intersection Capacity Analysis

3 Exit 5 SB On/Exit 5 SB Off & NH 28

12/28/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑					↑↑		↑
Traffic Volume (vph)	0	795	360	390	615	0	0	0	0	495	0	500
Future Volume (vph)	0	795	360	390	615	0	0	0	0	495	0	500
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.0	6.0					6.0		6.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.97		1.00
Frt		1.00	0.85	1.00	1.00					1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (prot)		3167	1417	1687	3374					3303		1524
Flt Permitted		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (perm)		3167	1417	1687	3374					3303		1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.73	0.73	0.73	0.92	0.92	0.92	0.74	0.74	0.74
Adj. Flow (vph)	0	864	391	534	842	0	0	0	0	669	0	676
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	124
Lane Group Flow (vph)	0	864	391	534	842	0	0	0	0	669	0	552
Heavy Vehicles (%)	14%	14%	14%	7%	7%	7%	2%	2%	2%	6%	6%	6%
Turn Type		NA	Free	Prot	NA					Prot		Prot
Protected Phases		2		1	6					4		4
Permitted Phases			Free									
Actuated Green, G (s)		35.0	130.0	38.0	79.0					39.0		39.0
Effective Green, g (s)		35.0	130.0	38.0	79.0					39.0		39.0
Actuated g/C Ratio		0.27	1.00	0.29	0.61					0.30		0.30
Clearance Time (s)		6.0		6.0	6.0					6.0		6.0
Vehicle Extension (s)		5.0		3.0	5.0					3.0		3.0
Lane Grp Cap (vph)		852	1417	493	2050					990		457
v/s Ratio Prot		c0.27		c0.32	0.25					0.20		c0.36
v/s Ratio Perm			0.28									
w/c Ratio		1.01	0.28	1.08	0.41					0.68		1.21
Uniform Delay, d1		47.5	0.0	46.0	13.3					39.9		45.5
Progression Factor		1.00	1.00	0.31	0.08					1.00		1.00
Incremental Delay, d2		34.4	0.5	60.7	0.3					1.8		112.7
Delay (s)		81.9	0.5	74.8	1.3					41.8		158.2
Level of Service		F	A	E	A					D		F
Approach Delay (s)		56.5			29.8		0.0				100.3	
Approach LOS		E			C		A				F	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			62.1			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			1.10									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			85.2%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												



# HCM Signalized Intersection Capacity Analysis

4 X Exit 5 NB Off & NH 28

12/28/2017




















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↖↖			↖↖	↖	↖		↖				
Traffic Volume (vph)	605	685	0	0	625	790	380	0	160	0	0	0	
Future Volume (vph)	605	685	0	0	625	790	380	0	160	0	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	6.0	6.0			6.0	4.0	6.0		6.0				
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00		1.00				
Frt	1.00	1.00			1.00	0.85	1.00		0.85				
Flt Protected	0.95	1.00			1.00	1.00	0.95		1.00				
Satd. Flow (prot)	1641	3282			3438	1538	1656		1482				
Flt Permitted	0.95	1.00			1.00	1.00	0.95		1.00				
Satd. Flow (perm)	1641	3282			3438	1538	1656		1482				
Peak-hour factor, PHF	0.87	0.87	0.87	0.90	0.90	0.90	0.78	0.78	0.78	0.92	0.92	0.92	
Adj. Flow (vph)	695	787	0	0	694	878	487	0	205	0	0	0	
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	128	0	0	0	
Lane Group Flow (vph)	695	787	0	0	694	878	487	0	77	0	0	0	
Heavy Vehicles (%)	10%	10%	10%	5%	5%	5%	9%	9%	9%	2%	2%	2%	
Turn Type	Prot	NA			NA	Free	Prot		Prot				
Protected Phases	5	2			6		8		8				
Permitted Phases		2			6	Free							
Actuated Green, G (s)	51.0	83.0			26.0	130.0	35.0		35.0				
Effective Green, g (s)	51.0	83.0			26.0	130.0	35.0		35.0				
Actuated g/C Ratio	0.39	0.64			0.20	1.00	0.27		0.27				
Clearance Time (s)	6.0	6.0			6.0		6.0		6.0				
Vehicle Extension (s)	5.0	5.0			5.0		3.0		3.0				
Lane Grp Cap (vph)	643	2095			687	1538	445		399				
w/s Ratio Prot	c0.42	0.24			c0.20		c0.29		0.05				
w/s Ratio Perm						0.57							
w/c Ratio	1.08	0.38			1.01	0.57	1.09		0.19				
Uniform Delay, d1	39.5	11.2			52.0	0.0	47.5		36.6				
Progression Factor	0.22	0.00			1.00	1.00	1.00		1.00				
Incremental Delay, d2	44.0	0.3			36.9	1.5	70.7		0.2				
Delay (s)	52.6	0.3			88.9	1.5	118.2		36.9				
Level of Service	D	A			F	A	F		D				
Approach Delay (s)		24.9			40.1			94.1				0.0	
Approach LOS		C			D			F				A	
<b>Intersection Summary</b>													
HCM 2000 Control Delay			44.0									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			1.07										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	18.0
Intersection Capacity Utilization			85.2%									ICU Level of Service	E
Analysis Period (min)			15										
c Critical Lane Group													



# HCM Signalized Intersection Capacity Analysis

5 9: NH 102 & St. Charles Street/Londonderry Road

01/04/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	0	120	0	1	0	160	780	5	10	1550	40
Future Volume (vph)	10	0	120	0	1	0	160	780	5	10	1550	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00		1.00	1.00		1.00	1.00	
Flt Protected		0.95	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1770	1583		1900		1770	3536		1770	3526	
Flt Permitted		1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1863	1583		1900		1770	3536		1770	3526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	0	130	0	4	0	174	848	5	11	1685	43
RTOR Reduction (vph)	0	0	48	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	11	82	0	4	0	174	853	0	11	1727	0
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	custom		NA		Prot	NA		Prot	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		6	4								
Actuated Green, G (s)		1.3	54.2		1.3		12.6	66.0		0.8	54.2	
Effective Green, g (s)		1.3	54.2		1.3		12.6	66.0		0.8	54.2	
Actuated g/C Ratio		0.02	0.63		0.02		0.15	0.77		0.01	0.63	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		28	996		28		259	2710		16	2219	
w/s Ratio Prot					0.00		c0.10	0.24		0.01	c0.49	
w/s Ratio Perm		c0.01	0.05									
w/c Ratio		0.39	0.08		0.14		0.67	0.31		0.69	0.78	
Uniform Delay, d1		42.0	6.2		41.9		34.8	3.1		42.5	11.6	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.9	0.0		2.3		6.7	0.1		80.1	1.8	
Delay (s)		50.9	6.3		44.2		41.5	3.2		122.6	13.4	
Level of Service		D	A		D		D	A		F	B	
Approach Delay (s)		9.7			44.2		9.7				14.1	
Approach LOS		A			D		A				B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			12.3				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			86.1				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			77.9%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												



# HCM Signalized Intersection Capacity Analysis

10: NH 102 & Fordway/Madden Hill Road

01/04/2018

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	5	10	5	360	0	30	0	540	180	5	810	0
Future Volume (vph)	5	10	5	360	0	30	0	540	180	5	810	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0		4.5		6.0	6.0		6.0	
Lane Util. Factor		1.00		1.00		1.00		1.00	1.00		1.00	
Frt		0.97		1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.99		0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1780		1752		1568		1759	1495		1809	
Flt Permitted		0.99		0.74		1.00		1.00	1.00		1.00	
Satd. Flow (perm)		1780		1357		1568		1759	1495		1803	
Peak-hour factor, PHF	0.60	0.60	0.60	0.96	0.96	0.96	0.89	0.89	0.89	0.86	0.86	0.86
Adj. Flow (vph)	8	17	8	375	0	31	0	607	202	6	942	0
RTOR Reduction (vph)	0	6	0	0	0	21	0	0	67	0	0	0
Lane Group Flow (vph)	0	27	0	375	0	10	0	607	135	0	948	0
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	8%	8%	8%	5%	5%	5%
Turn Type	Perm	NA		D.Pm		Perm		NA	Perm	Perm	NA	
Protected Phases		4						2				2
Permitted Phases	4			4		8			2	2		
Actuated Green, G (s)		25.6		25.6		27.1		50.6	50.6		50.6	
Effective Green, g (s)		25.6		25.6		27.1		50.6	50.6		50.6	
Actuated g/C Ratio		0.29		0.29		0.31		0.57	0.57		0.57	
Clearance Time (s)		6.0		6.0		4.5		6.0	6.0		6.0	
Vehicle Extension (s)		3.0		3.0		3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		516		393		481		1009	857		1034	
v/s Ratio Prot								0.35				
v/s Ratio Perm		0.02		c0.28		0.01			0.09		c0.53	
v/c Ratio		0.05		0.95		0.02		0.60	0.16		0.92	
Uniform Delay, d1		22.6		30.7		21.3		12.2	8.8		16.9	
Progression Factor		1.00		1.00		1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0		33.5		0.0		1.0	0.1		12.4	
Delay (s)		22.6		64.2		21.3		13.3	8.9		29.3	
Level of Service		C		E		C		B	A		C	
Approach Delay (s)		22.6			60.9			12.2			29.3	
Approach LOS		C			E			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			28.7									
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			88.2						12.0			
Intersection Capacity Utilization			83.9%									
Analysis Period (min)			15									
c Critical Lane Group												



## Zone 3

## 7: Birch St/Crystal Ave &amp; NH 102 (E Broadway)

2040 Alt F AM Peak  
HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	270	130	30	500	200	200	100	40	100	100	120
Future Volume (vph)	130	270	130	30	500	200	200	100	40	100	100	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		0.97	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1656	1743	1333	1703	3260		3335	1732		1703	1792	1524
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1656	1743	1333	1703	3260		3335	1732		1703	1792	1524
Peak-hour factor, PHF	0.96	0.96	0.96	0.94	0.94	0.94	0.85	0.85	0.85	0.91	0.91	0.91
Adj. Flow (vph)	135	281	135	32	532	213	235	118	47	110	110	132
RTOR Reduction (vph)	0	0	62	0	49	0	0	16	0	0	0	98
Lane Group Flow (vph)	135	281	73	32	696	0	235	149	0	110	110	34
Heavy Vehicles (%)	9%	9%	9%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Parking (#/hr)			0									
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2	3	1	6		3	8		7	4	5
Permitted Phases			2									4
Actuated Green, G (s)	8.1	32.3	43.1	2.1	26.3		10.8	13.9		7.1	10.2	18.3
Effective Green, g (s)	8.1	32.3	43.1	2.1	26.3		10.8	13.9		7.1	10.2	18.3
Actuated g/C Ratio	0.10	0.41	0.54	0.03	0.33		0.14	0.18		0.09	0.13	0.23
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	168	709	824	45	1079		453	303		152	230	466
v/s Ratio Prot	c0.08	c0.16	0.01	0.02	c0.21		c0.07	c0.09		0.06	0.06	0.01
v/s Ratio Perm			0.04									0.01
v/c Ratio	0.80	0.40	0.09	0.71	0.64		0.52	0.49		0.72	0.48	0.07
Uniform Delay, d1	34.9	16.7	8.7	38.3	22.6		31.9	29.6		35.2	32.1	23.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	23.5	0.4	0.0	41.4	1.3		1.0	1.2		15.6	1.6	0.1
Delay (s)	58.4	17.0	8.8	79.7	23.9		32.9	30.8		50.8	33.7	24.0
Level of Service	E	B	A	E	C		C	C		D	C	C
Approach Delay (s)		25.1			26.2			32.0			35.4	
Approach LOS		C			C			C			D	












## Intersection Summary

HCM 2000 Control Delay	28.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	79.4	Sum of lost time (s)	24.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Zone 3  
8: N.High St/N. High St & Ash St Ext

2040 Alt F AM Peak  
Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	350	20	5	40	140	440
Future Volume (vph)	350	20	5	40	140	440
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	120	0			220
Storage Lanes	1	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950			0.995		
Satd. Flow (prot)	1719	1538	0	1818	1863	1583
Flt Permitted	0.950			0.995		
Satd. Flow (perm)	1719	1538	0	1818	1863	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	322			309	292	
Travel Time (s)	7.3			7.0	6.6	
Peak Hour Factor	0.89	0.89	0.91	0.91	0.93	0.93
Heavy Vehicles (%)	5%	5%	4%	4%	2%	2%
Adj. Flow (vph)	393	22	5	44	151	473
Shared Lane Traffic (%)						
Lane Group Flow (vph)	393	22	0	49	151	473
Sign Control	Stop			Stop	Stop	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 37.2% ICU Level of Service A  
 Analysis Period (min) 15



Intersection	
Intersection Delay, s/veh	20.7
Intersection LOS	C










Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↶	↷		↶	↷	↷
Traffic Vol, veh/h	350	20	5	40	140	440
Future Vol, veh/h	350	20	5	40	140	440
Peak Hour Factor	0.89	0.89	0.91	0.91	0.93	0.93
Heavy Vehicles, %	5	5	4	4	2	2
Mvmt Flow	393	22	5	44	151	473
Number of Lanes	1	1	0	1	1	1

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	2
HCM Control Delay	26.1	10.5	17.9
HCM LOS	D	B	C

Lane	NBLn1	EBLn1	EBLn2	SBLn1	SBLn2
Vol Left, %	11%	100%	0%	0%	0%
Vol Thru, %	89%	0%	0%	100%	0%
Vol Right, %	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	45	350	20	140	440
LT Vol	5	350	0	0	0
Through Vol	40	0	0	140	0
RT Vol	0	0	20	0	440
Lane Flow Rate	49	393	22	151	473
Geometry Grp	4	7	7	7	7
Degree of Util (X)	0.093	0.747	0.035	0.255	0.707
Departure Headway (Hd)	6.734	6.836	5.624	6.087	5.378
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	530	531	636	589	672
Service Time	4.799	4.571	3.359	3.835	3.126
HCM Lane V/C Ratio	0.092	0.74	0.035	0.256	0.704
HCM Control Delay	10.5	27.1	8.6	10.9	20.1
HCM Lane LOS	B	D	A	B	C
HCM 95th-tile Q	0.3	6.4	0.1	1	5.8

Zone 3  
9: N High St & Madden Rd

2040 Alt F AM Peak  
Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	0	0	390	580	10
Future Volume (vph)	10	0	0	390	580	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.998	
Flt Protected	0.950					
Satd. Flow (prot)	1008	0	0	1827	1789	0
Flt Permitted	0.950					
Satd. Flow (perm)	1008	0	0	1827	1789	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	160			224	319	
Travel Time (s)	3.6			5.1	7.3	
Peak Hour Factor	0.44	0.44	0.95	0.95	0.96	0.96
Heavy Vehicles (%)	79%	79%	4%	4%	6%	6%
Adj. Flow (vph)	23	0	0	411	604	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	23	0	0	411	614	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 41.1% ICU Level of Service A  
 Analysis Period (min) 15



**Intersection**

Int Delay, s/veh 0.6

**Movement** EBL EBR NBL NBT SBT SBR

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			4	4	
Traffic Vol, veh/h	10	0	0	390	580	10
Future Vol, veh/h	10	0	0	390	580	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	44	44	95	95	96	96
Heavy Vehicles, %	79	79	4	4	6	6
Mvmt Flow	23	0	0	411	604	10

**Major/Minor** Minor2 Major1 Major2

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1020	609	614	0	-	0
Stage 1	609	-	-	-	-	-
Stage 2	411	-	-	-	-	-
Critical Hdwy	7.19	6.99	4.14	-	-	-
Critical Hdwy Stg 1	6.19	-	-	-	-	-
Critical Hdwy Stg 2	6.19	-	-	-	-	-
Follow-up Hdwy	4.211	4.011	2.236	-	-	-
Pot Cap-1 Maneuver	191	379	956	-	-	-
Stage 1	419	-	-	-	-	-
Stage 2	531	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	191	379	956	-	-	-
Mov Cap-2 Maneuver	191	-	-	-	-	-
Stage 1	419	-	-	-	-	-
Stage 2	531	-	-	-	-	-

**Approach** EB NB SB

HCM Control Delay, s 26.4 0 0  
HCM LOS D

**Minor Lane/Major Mvmt** NBL NBT EBLn1 SBT SBR













Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	956	-	191	-	-
HCM Lane V/C Ratio	-	-	0.119	-	-
HCM Control Delay (s)	0	-	26.4	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

## Zone 3

2040 Alt F AM Peak

## 10: Franklin St/Franklin St Ext &amp; N High St/Folsom Rd

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		+			+			+			+	
Traffic Volume (vph)	40	350	10	30	510	10	10	5	70	10	30	10
Future Volume (vph)	40	350	10	30	510	10	10	5	70	10	30	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		150	100		150	0		0	150		150
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.998			0.889			0.973	
Flt Protected		0.995			0.997			0.994			0.990	
Satd. Flow (prot)	0	1762	0	0	1800	0	0	1646	0	0	1830	0
Flt Permitted		0.995			0.997			0.994			0.990	
Satd. Flow (perm)	0	1762	0	0	1800	0	0	1646	0	0	1830	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		327			240			246			251	
Travel Time (s)		7.4			5.5			5.6			5.7	
Peak Hour Factor	0.89	0.89	0.89	0.96	0.96	0.96	0.65	0.65	0.65	0.67	0.67	0.67
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	2%	2%	2%	0%	0%	0%
Adj. Flow (vph)	45	393	11	31	531	10	15	8	108	15	45	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	449	0	0	572	0	0	131	0	0	75	0
Sign Control		Free			Free			Stop			Stop	

## Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 46.6%

ICU Level of Service A

Analysis Period (min) 15



**Intersection**

Int Delay, s/veh 3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		+			+			+			+	
Traffic Vol, veh/h	40	350	10	30	510	10	10	5	70	10	30	10
Future Vol, veh/h	40	350	10	30	510	10	10	5	70	10	30	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	96	96	96	65	65	65	67	67	67
Heavy Vehicles, %	7	7	7	5	5	5	2	2	2	0	0	0
Mvmt Flow	45	393	11	31	531	10	15	8	108	15	45	15

Major/Minor	Major1	Major2	Minor2	Minor1
Conflicting Flow All	541	0	0	404
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	4.17	-	4.15	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.263	-	2.245	-
Pot Cap-1 Maneuver	1003	-	1139	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	1003	-	1139	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	0.9	0.5	11.8	31.7
HCM LOS			B	D

Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SELn1
Capacity (veh/h)	208	1003	-	-	1139	-	-	662
HCM Lane V/C Ratio	0.359	0.045	-	-	0.027	-	-	0.198
HCM Control Delay (s)	31.7	8.8	0	-	8.2	0	-	11.8
HCM Lane LOS	D	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.5	0.1	-	-	0.1	-	-	0.7



Zone 4  
11: Folsom Rd/Tsienneto Rd & Crystal Av/NH 28

2040 Alt F AM Peak  
HCM Signalized Intersection Capacity Analysis

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	20	120	180	240	100	0	90	260	20	145	430	345
Future Volume (vph)	20	120	180	240	100	0	90	260	20	145	430	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	4.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1736	3471	1553	3335	3438		1752	1845	1568	1752	1845	1568
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1736	3471	1553	3335	3438		1752	1845	1568	1752	1845	1568
Peak-hour factor, PHF	0.84	0.84	0.84	0.79	0.79	0.79	0.86	0.86	0.86	0.99	0.99	0.99
Adj. Flow (vph)	24	143	214	304	127	0	105	302	23	146	434	348
RTOR Reduction (vph)	0	0	166	0	0	0	0	0	0	0	0	176
Lane Group Flow (vph)	24	143	48	304	127	0	105	302	23	146	434	172
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Free	Prot	NA	pt+ov
Protected Phases	5	2		1	6		7	4		3	8	8 1
Permitted Phases		2	2		6			4	Free		8	
Actuated Green, G (s)	11.9	20.2	20.2	11.5	19.8		7.2	22.9	90.0	11.4	27.1	44.6
Effective Green, g (s)	11.9	20.2	20.2	11.5	19.8		7.2	22.9	90.0	11.4	27.1	44.6
Actuated g/C Ratio	0.13	0.22	0.22	0.13	0.22		0.08	0.25	1.00	0.13	0.30	0.50
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	229	779	348	426	756		140	469	1568	221	555	777
v/s Ratio Prot	0.01	c0.04		c0.09	0.04		0.06	0.16		c0.08	c0.24	0.11
v/s Ratio Perm			0.03						c0.01			
v/c Ratio	0.10	0.18	0.14	0.71	0.17		0.75	0.64	0.01	0.66	0.78	0.22
Uniform Delay, d1	34.4	28.2	27.9	37.7	28.4		40.5	29.9	0.0	37.5	28.7	12.9
Progression Factor	1.00	1.00	1.00	1.04	0.86		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.5	0.8	5.5	0.5		20.0	3.0	0.0	7.2	7.1	0.1
Delay (s)	35.3	28.7	28.8	44.5	24.8		60.5	32.9	0.0	44.7	35.8	13.0
Level of Service	D	C	C	D	C		E	C	A	D	D	B
Approach Delay (s)		29.2			38.7			37.9			28.7	
Approach LOS		C			D			D			C	

Intersection Summary

HCM 2000 Control Delay	32.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Zone 4  
12: Tsienneto Rd & Pinkerton St

2040 Alt F AM Peak  
Lanes, Volumes, Timings

Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	80	60	460	220	70	840
Future Volume (vph)	80	60	460	220	70	840
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	180	0		0	180	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Fr <sub>t</sub>		0.850		0.850		
Flt Protected	0.950					0.996
Satd. Flow (prot)	1770	1583	1845	1568	0	3525
Flt Permitted	0.950					0.996
Satd. Flow (perm)	1770	1583	1845	1568	0	3525
Link Speed (mph)	30		30			30
Link Distance (ft)	408		387			233
Travel Time (s)	9.3		8.8			5.3
Peak Hour Factor	0.83	0.83	0.86	0.86	0.81	0.81
Heavy Vehicles (%)	2%	2%	3%	3%	2%	2%
Adj. Flow (vph)	96	72	535	256	86	1037
Shared Lane Traffic (%)						
Lane Group Flow (vph)	96	72	535	256	0	1123
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 63.9% ICU Level of Service B  
 Analysis Period (min) 15

**Intersection**

Int Delay, s/veh 4.2

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations	↘	↗	↑	↖		↗↘
Traffic Vol, veh/h	80	60	460	220	70	840
Future Vol, veh/h	80	60	460	220	70	840
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	180	0	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	83	83	86	86	81	81
Heavy Vehicles, %	2	2	3	3	2	2
Mvmt Flow	96	72	535	256	86	1037

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1226	535	0
Stage 1	535	-	-
Stage 2	691	-	-
Critical Hdwy	6.63	6.23	-
Critical Hdwy Stg 1	5.43	-	-
Critical Hdwy Stg 2	5.83	-	-
Follow-up Hdwy	3.519	3.319	-
Pot Cap-1 Maneuver	184	544	-
Stage 1	586	-	-
Stage 2	460	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	148	544	-
Mov Cap-2 Maneuver	148	-	-
Stage 1	471	-	-
Stage 2	460	-	-

Approach	NW	NE	SW
HCM Control Delay, s	43.2	0	1.3
HCM LOS	E		

Minor Lane/Major Mvmt	NET	NER	NWLn1	NWLn2	SWL	SWT
Capacity (veh/h)	-	-	148	544	1031	-
HCM Lane V/C Ratio	-	-	0.651	0.133	0.084	-
HCM Control Delay (s)	-	-	66.1	12.6	8.8	0.7
HCM Lane LOS	-	-	F	B	A	A
HCM 95th %tile Q(veh)	-	-	3.6	0.5	0.3	-



Zone 4  
13: Applebees/Linlew Dr & NH 28

2040 Alt F AM Peak  
HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	40	580	0	0	470	20	5	0	5	20	0	130
Future Volume (vph)	40	580	0	0	470	20	5	0	5	20	0	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0			6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	0.95			0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00			0.99			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00			1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1687	3374			3517			1805	1615		1787	1599
Flt Permitted	0.95	1.00			1.00			0.74	1.00		0.75	1.00
Satd. Flow (perm)	1687	3374			3517			1412	1615		1413	1599
Peak-hour factor, PHF	0.83	0.83	0.83	0.92	0.92	0.92	0.50	0.50	0.50	0.90	0.90	0.90
Adj. Flow (vph)	48	699	0	0	511	22	10	0	10	22	0	144
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	9	0	0	132
Lane Group Flow (vph)	48	699	0	0	531	0	0	10	1	0	22	12
Heavy Vehicles (%)	7%	7%	7%	2%	2%	2%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases					6		8	8	8	4		4
Actuated Green, G (s)	5.6	70.5			58.9			7.5	7.5		7.5	7.5
Effective Green, g (s)	5.6	70.5			58.9			7.5	7.5		7.5	7.5
Actuated g/C Ratio	0.06	0.78			0.65			0.08	0.08		0.08	0.08
Clearance Time (s)	6.0	6.0			6.0			6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	104	2642			2301			117	134		117	133
v/s Ratio Prot	c0.03	c0.21			0.15							
v/s Ratio Perm								0.01	0.00		c0.02	0.01
v/c Ratio	0.46	0.26			0.23			0.09	0.01		0.19	0.09
Uniform Delay, d1	40.7	2.7			6.3			38.1	37.8		38.4	38.1
Progression Factor	0.89	1.66			1.25			1.00	1.00		1.00	1.00
Incremental Delay, d2	3.1	0.2			0.0			0.3	0.0		0.8	0.3
Delay (s)	39.2	4.7			8.0			38.4	37.9		39.2	38.4
Level of Service	D	A			A			D	D		D	D
Approach Delay (s)		6.9			8.0			38.1			38.5	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Zone 4  
14: VIP Dr/Ashleigh Dr & NH 28

2040 Alt F AM Peak  
HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	470	5	5	450	160	10	5	5	180	5	100
Future Volume (vph)	70	470	5	5	450	160	10	5	5	180	5	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		0.95	0.95	1.00
Frt	1.00	1.00		1.00	0.96		1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	1.00
Satd. Flow (prot)	3303	3400		1736	3335		1805	1758		1665	1674	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.96	1.00
Satd. Flow (perm)	3303	3400		1736	3335		1805	1758		1665	1674	1568
Peak-hour factor, PHF	0.83	0.83	0.83	0.97	0.97	0.97	0.67	0.67	0.67	0.90	0.90	0.90
Adj. Flow (vph)	84	566	6	5	464	165	15	7	7	200	6	111
RTOR Reduction (vph)	0	1	0	0	41	0	0	7	0	0	0	80
Lane Group Flow (vph)	84	571	0	5	588	0	15	7	0	102	104	31
Heavy Vehicles (%)	6%	6%	6%	4%	4%	4%	0%	0%	0%	3%	3%	3%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	pt+ov
Protected Phases	5	2		1	6		3	3		4	4	4.5
Permitted Phases								3				
Actuated Green, G (s)	7.7	49.1		1.3	42.7		4.1	4.1		11.5	11.5	25.2
Effective Green, g (s)	7.7	49.1		1.3	42.7		4.1	4.1		11.5	11.5	25.2
Actuated g/C Ratio	0.09	0.55		0.01	0.47		0.05	0.05		0.13	0.13	0.28
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	282	1854		25	1582		82	80		212	213	439
v/s Ratio Prot	c0.03	c0.17		0.00	c0.18		c0.01	0.00		0.06	c0.06	0.02
v/s Ratio Perm												
v/c Ratio	0.30	0.31		0.20	0.37		0.18	0.09		0.48	0.49	0.07
Uniform Delay, d1	38.6	11.2		43.8	15.1		41.3	41.2		36.5	36.5	23.8
Progression Factor	1.00	1.00		1.58	0.57		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1		3.9	0.7		1.1	0.5		1.7	1.8	0.1
Delay (s)	39.2	11.3		73.0	9.3		42.4	41.7		38.2	38.3	23.9
Level of Service	D	B		E	A		D	D		D	D	C
Approach Delay (s)		14.8			9.8			42.1			33.2	
Approach LOS		B			A			D			C	











Intersection Summary

HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Zone 4  
15: NH 28 & Scobie Pond Rd

2040 Alt F AM Peak  
Lanes, Volumes, Timings

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	590	470	20	40	20
Future Volume (vph)	10	590	470	20	40	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	140			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.995		0.955	
Flt Protected	0.950				0.968	
Satd. Flow (prot)	1687	1776	1818	0	1657	0
Flt Permitted	0.950				0.968	
Satd. Flow (perm)	1687	1776	1818	0	1657	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		535	210		522	
Travel Time (s)		12.2	4.8		11.9	
Peak Hour Factor	0.84	0.84	0.89	0.89	0.83	0.83
Heavy Vehicles (%)	7%	7%	4%	4%	6%	6%
Adj. Flow (vph)	12	702	528	22	48	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	12	702	550	0	72	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 41.2% ICU Level of Service A  
 Analysis Period (min) 15

Intersection

Int Delay, s/veh 1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑	↘		↘	
Traffic Vol, veh/h	10	590	470	20	40	20
Future Vol, veh/h	10	590	470	20	40	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	140	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	89	89	83	83
Heavy Vehicles, %	7	7	4	4	6	6
Mvmt Flow	12	702	528	22	48	24

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	550	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.17	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.263	-	-
Pot Cap-1 Maneuver	995	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	995	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	27.4
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	995	-	-	-	232
HCM Lane V/C Ratio	0.012	-	-	-	0.312
HCM Control Delay (s)	8.7	-	-	-	27.4
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	1.3



## Zone 5

2040 Alt F AM Peak

16: NH 102 W/NH 102 E &amp; Bypass 28 S/Bypass 28 N &amp; E Derry Rd

Lanes, Volumes, Timings

Lane Group	WBL2	WBL	WBR	WBR2	NBL	NBT	NBR	NBR2	SBL2	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	340	210	20	90	90	40	5	10	100	110	40
Future Volume (vph)	10	340	210	20	90	90	40	5	10	100	110	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	150		0		150		0		0	0
Storage Lanes		1	0		0		0		0		0	0
Taper Length (ft)		25			25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.946				0.973					0.979	
Flt Protected		0.971				0.980					0.979	
Satd. Flow (prot)	0	1694	0	0	0	1759	0	0	0	0	1702	0
Flt Permitted		0.971				0.980					0.979	
Satd. Flow (perm)	0	1694	0	0	0	1759	0	0	0	0	1702	0
Link Speed (mph)		30				30					30	
Link Distance (ft)		465				456					371	
Travel Time (s)		10.6				10.4					8.4	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.86	0.86	0.86	0.86	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	7%	7%	7%	7%
Adj. Flow (vph)	11	374	231	22	105	105	47	6	13	125	138	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	638	0	0	0	263	0	0	0	0	326	0
Sign Control		Yield				Yield					Yield	

## Intersection Summary









Area Type: Other

Control Type: Roundabout

Intersection Capacity Utilization 97.3%

ICU Level of Service F

Analysis Period (min) 15














								
Lane Group	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations		+					+	
Traffic Volume (vph)	70	130	120	140	5	40	220	10
Future Volume (vph)	70	130	120	140	5	40	220	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		150			150		0
Storage Lanes	0		0			0		0
Taper Length (ft)	25					25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.924					0.995	
Flt Protected		0.992					0.992	
Satd. Flow (prot)	0	1613	0	0	0	0	1753	0
Flt Permitted		0.992					0.992	
Satd. Flow (perm)	0	1613	0	0	0	0	1753	0
Link Speed (mph)							30	
Link Distance (ft)		400					530	
Travel Time (s)		9.1					12.0	
Peak Hour Factor	0.60	0.60	0.60	0.60	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	8%	8%	8%	8%	7%	7%	7%	7%
Adj. Flow (vph)	117	217	200	233	6	48	265	12
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	767	0	0	0	0	331	0
Sign Control		Yield					Yield	
<b>Intersection Summary</b>								



Intersection						
Intersection Delay, s/veh 28.2						
Intersection LOS D						
Approach	WB	NB	SB	NE	SW	
Entry Lanes	1	1	1	1	1	
Conflicting Circle Lanes	1	1	1	1	1	
Adj Approach Flow, veh/h	638	263	326	767	331	
Demand Flow Rate, veh/h	657	270	350	828	354	
Vehicles Circulating, veh/h	638	730	845	364	976	
Vehicles Exiting, veh/h	362	462	485	831	319	
Ped Vol Crossing Leg. #/h	0	0	0	0	0	
Ped Cap Adj	1.000	1.000	1.000	1.000	1.000	
Approach Delay, s/veh	40.1	11.6	19.1	28.7	26.4	
Approach LOS	E	B	C	D	D	
Lane	Left	Left	Left	Left	Left	
Designated Moves	LR	LTR	LTR	LTR	LTR	
Assumed Moves	LR	LTR	LTR	LTR	LTR	
RT Channelized						
Lane Util	1.000	1.000	1.000	1.000	1.000	
Follow-Up Headway, s	2.609	2.609	2.609	2.609	2.609	
Critical Headway, s	4.976	4.976	4.976	4.976	4.976	
Entry Flow, veh/h	657	270	350	828	354	
Cap Entry Lane, veh/h	720	655	583	952	510	
Entry HV Adj Factor	0.971	0.974	0.933	0.926	0.935	
Flow Entry, veh/h	638	263	326	767	331	
Cap Entry, veh/h	699	638	544	881	477	
V/C Ratio	0.913	0.412	0.600	0.870	0.694	
Control Delay, s/veh	40.1	11.6	19.1	28.7	26.4	
LOS	E	B	C	D	D	
95th %tile Queue, veh	12	2	4	11	5	

Zone 5  
17: Pinkerton St/Nesmith Rd & NH 28 Bypass

2040 Alt F AM Peak  
Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	10	145	5	40	50	200	170	10	10	110	20
Future Volume (vph)	10	10	145	5	40	50	200	170	10	10	110	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		50	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.929			0.997			0.981	
Flt Protected		0.976			0.997			0.974			0.996	
Satd. Flow (prot)	0	1717	1495	0	1676	0	0	1791	0	0	1785	0
Flt Permitted		0.976			0.997			0.974			0.996	
Satd. Flow (perm)	0	1717	1495	0	1676	0	0	1791	0	0	1785	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		144			453			475			436	
Travel Time (s)		3.3			10.3			10.8			9.9	
Peak Hour Factor	0.82	0.82	0.82	0.70	0.70	0.70	0.75	0.75	0.75	0.71	0.71	0.71
Heavy Vehicles (%)	8%	8%	8%	5%	5%	5%	3%	3%	3%	4%	4%	4%
Adj. Flow (vph)	12	12	177	7	57	71	267	227	13	14	155	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	24	177	0	135	0	0	507	0	0	197	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 47.8% ICU Level of Service A  
 Analysis Period (min) 15



Intersection												
Int Delay, s/veh	8.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↕		↕	↕		↕	↕		↕	↕
Traffic Vol, veh/h	10	10	145	5	40	50	200	170	10	10	110	20
Future Vol, veh/h	10	10	145	5	40	50	200	170	10	10	110	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	50	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	70	70	70	75	75	75	71	71	71
Heavy Vehicles, %	8	8	8	5	5	5	3	3	3	4	4	4
Mvmt Flow	12	12	177	7	57	71	267	227	13	14	155	28

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1029	971	169	1060	979	234	183	0	0	240	0	0
Stage 1	197	197	-	768	768	-	-	-	-	-	-	-
Stage 2	832	774	-	292	211	-	-	-	-	-	-	-
Critical Hdwy	7.18	6.58	6.28	7.15	6.55	6.25	4.13	-	-	4.14	-	-
Critical Hdwy Stg 1	6.18	5.58	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.18	5.58	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.572	4.072	3.372	3.545	4.045	3.345	2.227	-	-	2.236	-	-
Pot Cap-1 Maneuver	207	247	860	199	247	798	1386	-	-	1315	-	-
Stage 1	791	727	-	390	407	-	-	-	-	-	-	-
Stage 2	355	400	-	710	722	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	120	190	860	124	190	798	1386	-	-	1315	-	-
Mov Cap-2 Maneuver	120	190	-	124	190	-	-	-	-	-	-	-
Stage 1	615	718	-	303	316	-	-	-	-	-	-	-
Stage 2	206	311	-	548	713	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.2	26.2	4.3	0.6
HCM LOS	B	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1386	-	-	147	860	303	1315	-	-
HCM Lane V/C Ratio	0.192	-	-	0.166	0.206	0.448	0.011	-	-
HCM Control Delay (s)	8.2	0	-	34.3	10.3	26.2	7.8	0	-
HCM Lane LOS	A	A	-	D	B	D	A	A	-
HCM 95th %tile Q(veh)	0.7	-	-	0.6	0.8	2.2	0	-	-


























## Zone 5

2040 Alt F AM Peak

## 18: Tsienneto Rd &amp; NH 28 Byp S/NH 28 Byp N

HCM Signalized Intersection Capacity Analysis

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	30	50	20	20	50	160	80	240	80	80	520	50
Future Volume (vph)	30	50	20	20	50	160	80	240	80	80	520	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1767		1736	1827	1553	1770	1793		1787	1856	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1752	1767		1736	1827	1553	1770	1793		1787	1856	
Peak-hour factor, PHF	0.82	0.82	0.82	0.81	0.81	0.81	0.68	0.68	0.68	0.78	0.78	0.78
Adj. Flow (vph)	37	61	24	25	62	198	118	353	118	103	667	64
RTOR Reduction (vph)	0	17	0	0	0	139	0	14	0	0	4	0
Lane Group Flow (vph)	37	68	0	25	62	59	118	457	0	103	727	0
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	2%	2%	2%	1%	1%	1%
Turn Type	Prot	NA		Prot	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	1	6		5	2	2 3	3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	4.4	10.7		3.0	9.3	23.4	8.1	35.0		6.2	33.1	
Effective Green, g (s)	4.4	10.7		3.0	9.3	23.4	8.1	35.0		6.2	33.1	
Actuated g/C Ratio	0.06	0.14		0.04	0.12	0.30	0.10	0.44		0.08	0.42	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	97	239		66	215	460	181	795		140	778	
v/s Ratio Prot	c0.02	c0.04		0.01	0.03	0.04	c0.07	0.25		0.06	c0.39	
v/s Ratio Perm												
v/c Ratio	0.38	0.28		0.38	0.29	0.13	0.65	0.57		0.74	0.93	
Uniform Delay, d1	35.9	30.7		37.0	31.8	20.3	34.0	16.4		35.5	21.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.5	0.7		3.6	3.4	0.1	8.1	1.0		18.1	18.1	
Delay (s)	38.4	31.3		40.7	35.1	20.4	42.2	17.4		53.6	40.0	
Level of Service	D	C		D	D	C	D	B		D	D	
Approach Delay (s)		33.5			25.4			22.4			41.7	
Approach LOS		C			C			C			D	










## Intersection Summary

HCM 2000 Control Delay	32.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	78.9	Sum of lost time (s)	24.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Zone 5  
19: NH 102 EB/NH 102 WB & Tsienneto Rd

2040 Alt F AM Peak  
Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	170	0	10	140	250	470
Future Volume (vph)	170	0	10	140	250	470
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.912	
Flt Protected	0.950			0.997		
Satd. Flow (prot)	1770	0	0	1707	1699	0
Flt Permitted	0.950			0.997		
Satd. Flow (perm)	1770	0	0	1707	1699	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	348			739	425	
Travel Time (s)	7.9			16.8	9.7	
Peak Hour Factor	0.94	0.94	0.91	0.91	0.82	0.82
Heavy Vehicles (%)	2%	2%	11%	11%	2%	2%
Adj. Flow (vph)	181	0	11	154	305	573
Shared Lane Traffic (%)						
Lane Group Flow (vph)	181	0	0	165	878	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 58.1% ICU Level of Service B  
 Analysis Period (min) 15

**Intersection**

Int Delay, s/veh 3.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			4	4	
Traffic Vol, veh/h	170	0	10	140	250	470
Future Vol, veh/h	170	0	10	140	250	470
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	91	91	82	82
Heavy Vehicles, %	2	2	11	11	2	2
Mvmt Flow	181	0	11	154	305	573

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	768	592	878	0	-	0
Stage 1	592	-	-	-	-	-
Stage 2	176	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.21	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.299	-	-	-
Pot Cap-1 Maneuver	370	506	733	-	-	-
Stage 1	553	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	364	506	733	-	-	-
Mov Cap-2 Maneuver	364	-	-	-	-	-
Stage 1	544	-	-	-	-	-
Stage 2	855	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	24.3	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	733	-	364	-	-
HCM Lane V/C Ratio	0.015	-	0.497	-	-
HCM Control Delay (s)	10	0	24.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	2.7	-	-



**APPENDIX S-2: 2040 ALTERNATIVE F INTERSECTION CAPACITY  
ANALYSES – HCS PRINTOUTS – PM PEAK HOUR**

# HCM Signalized Intersection Capacity Analysis

NH 102 & Exit 4 SB Off

01/04/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↘	↗
Traffic Volume (vph)	0	1310	1330	0	1005	1135
Future Volume (vph)	0	1310	1330	0	1005	1135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	16	12
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	0.88
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3471	3406		1930	2682
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		3471	3406		1930	2682
Peak-hour factor, PHF	0.93	0.93	0.88	0.88	0.89	0.89
Adj. Flow (vph)	0	1409	1511	0	1129	1275
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	1409	1511	0	1129	1275
Heavy Vehicles (%)	4%	4%	6%	6%	6%	6%
Turn Type		NA	NA		Prot	Prot
Protected Phases		2	6		4	4
Permitted Phases						
Actuated Green, G (s)		48.0	48.0		60.0	60.0
Effective Green, g (s)		48.0	48.0		60.0	60.0
Actuated g/C Ratio		0.40	0.40		0.50	0.50
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1388	1362		965	1341
v/s Ratio Prot		0.41	c0.44		c0.59	0.48
v/s Ratio Perm						
v/c Ratio		1.02	1.11		1.17	0.95
Uniform Delay, d1		36.0	36.0		30.0	28.6
Progression Factor		0.59	0.05		1.00	1.00
Incremental Delay, d2		21.8	50.4		87.7	14.4
Delay (s)		43.0	52.2		117.7	43.0
Level of Service		D	D		F	D
Approach Delay (s)		43.0	52.2		78.1	
Approach LOS		D	D		E	
<b>Intersection Summary</b>						
HCM 2000 Control Delay			61.5		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			1.14			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			104.4%		ICU Level of Service	G
Analysis Period (min)			15			


















c Critical Lane Group



# HCM Signalized Intersection Capacity Analysis

2. NH 102 & Exit 4 NB Off

01/04/2018

											
Movement	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	1250	0	1105	0	0	985	1330	0	0	570	795
Future Volume (vph)	1250	0	1105	0	0	985	1330	0	0	570	795
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0			6.0	6.0			6.0	4.0
Lane Util. Factor	0.97		0.88			0.97	0.95			0.95	1.00
Frt	1.00		0.85			1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00			0.95	1.00			1.00	1.00
Satd. Flow (prot)	3242		2632			3335	3438			3505	1568
Flt Permitted	0.95		1.00			0.95	1.00			1.00	1.00
Satd. Flow (perm)	3242		2632			3335	3438			3505	1568
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	1420	0	1256	0	0	1048	1415	0	0	620	864
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1420	0	1256	0	0	1048	1415	0	0	620	864
Heavy Vehicles (%)	8%	8%	8%	2%	2%	5%	5%	5%	3%	3%	3%
Turn Type	Prot		Prot			Prot	NA			NA	Free
Protected Phases	8		8			5	2			6	
Permitted Phases											Free
Actuated Green, G (s)	44.0		44.0			32.0	64.0			26.0	120.0
Effective Green, g (s)	44.0		44.0			32.0	64.0			26.0	120.0
Actuated g/C Ratio	0.37		0.37			0.27	0.53			0.22	1.00
Clearance Time (s)	6.0		6.0			6.0	6.0			6.0	
Vehicle Extension (s)	3.0		3.0			3.0	3.0			3.0	
Lane Grp Cap (vph)	1188		965			889	1833			759	1568
w/s Ratio Prot	0.44		c0.48			c0.31	c0.41			0.18	
w/s Ratio Perm											0.55
w/c Ratio	1.20		1.30			1.18	0.77			0.82	0.55
Uniform Delay, d1	38.0		38.0			44.0	22.2			44.7	0.0
Progression Factor	1.00		1.00			0.87	0.91			1.00	1.00
Incremental Delay, d2	96.3		143.3			81.7	0.3			9.5	1.4
Delay (s)	134.3		181.3			120.1	20.5			54.2	1.4
Level of Service	F		F			F	C			D	A
Approach Delay (s)		156.4		0.0			62.9			23.5	
Approach LOS		F		A			E			C	
<b>Intersection Summary</b>											
HCM 2000 Control Delay			91.8			HCM 2000 Level of Service				F	
HCM 2000 Volume to Capacity ratio			1.15								
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				18.0	
Intersection Capacity Utilization			95.5%			ICU Level of Service				F	
Analysis Period (min)			15								
c Critical Lane Group											



# HCM Signalized Intersection Capacity Analysis

3 X Exit 5 SB On/Exit 5 SB Off & NH 28

12/28/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑					↑↑		↑
Traffic Volume (vph)	0	925	385	240	525	0	0	0	0	740	0	480
Future Volume (vph)	0	925	385	240	525	0	0	0	0	740	0	480
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	4.0	6.0	6.0					6.0		6.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.97		1.00
Frt		1.00	0.85	1.00	1.00					1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (prot)		3471	1553	1719	3438					3367		1553
Flt Permitted		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (perm)		3471	1553	1719	3438					3367		1553
Peak-hour factor, PHF	0.87	0.87	0.87	0.86	0.86	0.86	0.92	0.92	0.92	0.91	0.91	0.91
Adj. Flow (vph)	0	1063	443	279	610	0	0	0	0	813	0	527
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	218
Lane Group Flow (vph)	0	1063	443	279	610	0	0	0	0	813	0	309
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	4%	4%	4%
Turn Type		NA	Free	Prot	NA					Prot		Prot
Protected Phases		2		1	6					4		4
Permitted Phases			Free									
Actuated Green, G (s)		36.6	100.0	18.4	61.0					27.0		27.0
Effective Green, g (s)		36.6	100.0	18.4	61.0					27.0		27.0
Actuated g/C Ratio		0.37	1.00	0.18	0.61					0.27		0.27
Clearance Time (s)		6.0		6.0	6.0					6.0		6.0
Vehicle Extension (s)		5.0		3.0	5.0					3.0		3.0
Lane Grp Cap (vph)		1270	1553	316	2097					909		419
v/s Ratio Prot		c0.31		c0.16	0.18					c0.24		0.20
v/s Ratio Perm			0.29									
v/c Ratio		0.84	0.29	0.88	0.29					0.89		0.74
Uniform Delay, d1		29.0	0.0	39.8	9.2					35.1		33.3
Progression Factor		1.00	1.00	0.20	0.00					1.00		1.00
Incremental Delay, d2		6.7	0.5	16.3	0.2					11.2		6.7
Delay (s)		35.6	0.5	24.2	0.2					46.3		40.0
Level of Service		D	A	C	A					D		D
Approach Delay (s)		25.3			7.7			0.0			43.8	
Approach LOS		C			A			A			D	

## Intersection Summary

HCM 2000 Control Delay	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



# HCM Signalized Intersection Capacity Analysis

4 X: Exit 5 NB Off & NH 28

12/28/2017





















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	580	1085	0	0	470	560	295	0	360	0	0	0
Future Volume (vph)	580	1085	0	0	470	560	295	0	360	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	4.0	6.0		6.0			
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00		1.00			
Frt	1.00	1.00			1.00	0.85	1.00		0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (prot)	1752	3505			3505	1568	1703		1524			
Flt Permitted	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	1752	3505			3505	1568	1703		1524			
Peak-hour factor, PHF	0.92	0.92	0.92	0.91	0.91	0.91	0.67	0.67	0.67	0.92	0.92	0.92
Adj. Flow (vph)	630	1179	0	0	516	615	440	0	537	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	71	0	0	0
Lane Group Flow (vph)	630	1179	0	0	516	615	440	0	466	0	0	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	6%	6%	6%	2%	2%	2%
Turn Type	Prot	NA			NA	Free	Prot		Prot			
Protected Phases	5	2			6		8		8			
Permitted Phases		2			6	Free						
Actuated Green, G (s)	35.0	60.0			19.0	100.0	28.0		28.0			
Effective Green, g (s)	35.0	60.0			19.0	100.0	28.0		28.0			
Actuated g/C Ratio	0.35	0.60			0.19	1.00	0.28		0.28			
Clearance Time (s)	6.0	6.0			6.0		6.0		6.0			
Vehicle Extension (s)	5.0	5.0			5.0		3.0		3.0			
Lane Grp Cap (vph)	613	2103			665	1568	476		426			
v/s Ratio Prot	c0.36	0.34			c0.15		0.26		c0.31			
v/s Ratio Perm						0.39						
w/c Ratio	1.03	0.56			0.78	0.39	0.92		1.09			
Uniform Delay, d1	32.5	12.1			38.5	0.0	35.0		36.0			
Progression Factor	0.20	0.22			1.00	1.00	1.00		1.00			
Incremental Delay, d2	33.7	0.5			8.6	0.7	23.7		71.7			
Delay (s)	40.2	3.2			47.1	0.7	58.7		107.7			
Level of Service	D	A			D	A	E		F			
Approach Delay (s)		16.1			21.9			85.7				0.0
Approach LOS		B			C			F				A
<b>Intersection Summary</b>												
HCM 2000 Control Delay		35.1					HCM 2000 Level of Service		D			
HCM 2000 Volume to Capacity ratio		0.99										
Actuated Cycle Length (s)		100.0					Sum of lost time (s)		18.0			
Intersection Capacity Utilization		76.8%					ICU Level of Service		D			
Analysis Period (min)		15										
c Critical Lane Group												



# HCM Signalized Intersection Capacity Analysis

5 8: NH 102 & St. Charles Street/Londonderry Road

01/04/2018

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	5	160	10	0	10	650	1440	120	10	1020	50
Future Volume (vph)	10	5	160	10	0	10	650	1440	120	10	1020	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Fr <sub>t</sub>		1.00	0.85		0.93		1.00	0.99		1.00	0.99	
Fl <sub>t</sub> Protected		0.97	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1801	1583		1729		1770	3498		1770	3515	
Fl <sub>t</sub> Permitted		0.74	1.00		0.83		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1378	1583		1477		1770	3498		1770	3515	
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	5	174	40	0	40	707	1565	130	11	1109	54
RTOR Reduction (vph)	0	0	106	0	76	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	16	68	0	4	0	707	1692	0	11	1161	0
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	custom	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		6	4								
Actuated Green, G (s)		5.7	48.0		5.7		51.1	98.1		1.0	48.0	
Effective Green, g (s)		5.7	48.0		5.7		51.1	98.1		1.0	48.0	
Actuated g/C Ratio		0.05	0.39		0.05		0.42	0.80		0.01	0.39	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		63	618		68		736	2794		14	1373	
v/s Ratio Prot							c0.40	0.48		0.01	c0.33	
v/s Ratio Perm		c0.01	0.04		0.00							
v/c Ratio		0.25	0.11		0.05		0.96	0.61		0.79	0.85	
Uniform Delay, d1		56.5	23.8		56.0		34.9	4.8		60.8	34.0	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.1	0.1		0.3		23.8	0.4		130.6	5.0	
Delay (s)		58.6	23.9		56.3		58.7	5.2		191.4	39.0	
Level of Service		E	C		E		E	A		F	D	
Approach Delay (s)		26.8			56.3			20.9			40.4	
Approach LOS		C			E			C			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			27.9				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			122.8				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			92.4%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												



# HCM Signalized Intersection Capacity Analysis

10: NH 102 & Fordway/Madden Hill Road

01/04/2018

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↖		↗		↕	↗		↖	
Traffic Volume (vph)	10	30	5	260	0	50	0	1020	220	15	555	0
Future Volume (vph)	10	30	5	260	0	50	0	1020	220	15	555	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0		4.5		6.0	6.0		6.0	
Lane Util. Factor		1.00		1.00		1.00		1.00	1.00		1.00	
Frt		0.99		1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.99		0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1815		1752		1568		1759	1495		1807	
Flt Permitted		0.99		0.80		1.00		1.00	1.00		0.72	
Satd. Flow (perm)		1815		1469		1568		1759	1495		1295	
Peak-hour factor, PHF	0.60	0.60	0.60	0.96	0.96	0.96	0.89	0.89	0.89	0.86	0.86	0.86
Adj. Flow (vph)	17	50	8	271	0	52	0	1146	247	17	645	0
RTOR Reduction (vph)	0	5	0	0	0	38	0	0	43	0	0	0
Lane Group Flow (vph)	0	70	0	271	0	14	0	1146	204	0	662	0
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	8%	8%	8%	5%	5%	5%
Turn Type	Perm	NA		D.Pm		Perm		NA	Perm	Perm	NA	
Protected Phases		4						2			2	
Permitted Phases	4			4		8			2	2		
Actuated Green, G (s)		17.9		17.9		19.4		60.1	60.1		60.1	
Effective Green, g (s)		17.9		17.9		19.4		60.1	60.1		60.1	
Actuated g/C Ratio		0.20		0.20		0.22		0.67	0.67		0.67	
Clearance Time (s)		6.0		6.0		4.5		6.0	6.0		6.0	
Vehicle Extension (s)		3.0		3.0		3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		360		292		337		1174	998		864	
v/s Ratio Prot								0.65				
v/s Ratio Perm		0.04		0.18		0.01			0.14		0.51	
v/c Ratio		0.19		0.93		0.04		0.98	0.20		0.77	
Uniform Delay, d1		30.0		35.4		27.9		14.3	5.8		10.2	
Progression Factor		1.00		1.00		1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.3		33.9		0.0		20.5	0.1		4.1	
Delay (s)		30.3		69.3		28.0		34.8	5.9		14.3	
Level of Service		C		E		C		C	A		B	
Approach Delay (s)		30.3			62.7			29.7			14.3	
Approach LOS		C			E			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			29.9									
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			90.0						12.0			
Intersection Capacity Utilization			86.1%									
Analysis Period (min)			15									
c Critical Lane Group												



Zone 3  
7: NH 102 (E Broadway) & Birch St/Crystal Av












2040 Alt F PM Peak  
HCM Signalized Intersection Capacity Analysis

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	230	110	30	180	150	180	170	540	130	70	330	180
Future Volume (vph)	230	110	30	180	150	180	170	540	130	70	330	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3400	1785		1752	1845	1568	1787	1881	1599	1787	3385	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3400	1785		1752	1845	1568	1787	1881	1599	1787	3385	
Peak-hour factor, PHF	0.91	0.91	0.91	0.93	0.93	0.93	0.95	0.95	0.95	0.94	0.94	0.94
Adj. Flow (vph)	253	121	33	194	161	194	179	568	137	74	351	191
RTOR Reduction (vph)	0	13	0	0	0	106	0	0	71	0	84	0
Lane Group Flow (vph)	253	141	0	194	161	88	179	568	66	74	458	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	1%	1%	1%	1%	1%	1%
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4	5	5	2	3	1	6	
Permitted Phases						4			2			
Actuated Green, G (s)	10.0	12.0		10.8	12.8	22.7	9.9	27.3	37.3	3.8	21.2	
Effective Green, g (s)	10.0	12.0		10.8	12.8	22.7	9.9	27.3	37.3	3.8	21.2	
Actuated g/C Ratio	0.13	0.15		0.14	0.16	0.29	0.13	0.35	0.48	0.05	0.27	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	436	274		242	303	577	227	659	888	87	921	
v/s Ratio Prot	0.07	0.08		c0.11	c0.09	0.02	c0.10	c0.30	0.01	0.04	0.14	
v/s Ratio Perm						0.04			0.03			
v/c Ratio	0.58	0.52		0.80	0.53	0.15	0.79	0.86	0.07	0.85	0.50	
Uniform Delay, d1	32.0	30.3		32.5	29.8	20.5	33.0	23.5	11.0	36.8	23.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.0	1.6		17.1	1.8	0.1	16.4	13.9	0.0	50.9	0.4	
Delay (s)	33.9	31.9		49.7	31.6	20.6	49.4	37.5	11.0	87.7	24.3	
Level of Service	C	C		D	C	C	D	D	B	F	C	
Approach Delay (s)		33.2			34.1			35.8			31.9	
Approach LOS		C			C			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			34.0									
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			77.9						24.0			
Intersection Capacity Utilization			87.0%									
Analysis Period (min)			15									
c Critical Lane Group												



Zone 3  
8: N.High St/N. High St & Ash St Ext

2040 Alt F PM Peak  
Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	810	10	5	100	125	470
Future Volume (vph)	810	10	5	100	125	470
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	120	0			220
Storage Lanes	1	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950			0.998		
Satd. Flow (prot)	1787	1599	0	1859	1881	1599
Flt Permitted	0.950			0.998		
Satd. Flow (perm)	1787	1599	0	1859	1881	1599
Link Speed (mph)	30			30	30	
Link Distance (ft)	322			309	354	
Travel Time (s)	7.3			7.0	8.0	
Peak Hour Factor	0.90	0.90	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	1%	1%	2%	2%	1%	1%
Adj. Flow (vph)	900	11	6	115	144	540
Shared Lane Traffic (%)						
Lane Group Flow (vph)	900	11	0	121	144	540
Sign Control	Stop			Stop	Stop	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 63.6% ICU Level of Service B  
 Analysis Period (min) 15

Intersection

Intersection Delay, s/veh 225.6  
Intersection LOS F

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗		↔	↑	↗
Traffic Vol, veh/h	810	10	5	100	125	470
Future Vol, veh/h	810	10	5	100	125	470
Peak Hour Factor	0.90	0.90	0.87	0.87	0.87	0.87
Heavy Vehicles, %	1	1	2	2	1	1
Mvmt Flow	900	11	6	115	144	540
Number of Lanes	1	1	0	1	1	1










Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	2
HCM Control Delay	392	15.5	40.9
HCM LOS	F	C	E

Lane	NBLn1	EBLn1	EBLn2	SBLn1	SBLn2
Vol Left, %	5%	100%	0%	0%	0%
Vol Thru, %	95%	0%	0%	100%	0%
Vol Right, %	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	105	810	10	125	470
LT Vol	5	810	0	0	0
Through Vol	100	0	0	125	0
RT Vol	0	0	10	0	470
Lane Flow Rate	121	900	11	144	540
Geometry Grp	4	7	7	7	7
Degree of Util (X)	0.244	1.825	0.019	0.266	0.896
Departure Headway (Hd)	9.45	7.298	6.08	8.544	7.82
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	383	504	592	424	470
Service Time	7.45	4.998	3.78	6.244	5.52
HCM Lane V/C Ratio	0.316	1.786	0.019	0.34	1.149
HCM Control Delay	15.5	396.7	8.9	14.3	48
HCM Lane LOS	C	F	A	B	E
HCM 95th-tile Q	0.9	56.8	0.1	1.1	9.8



Zone 3  
9: N High St & Madden Rd

2040 Alt F PM Peak  
Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	0	0	910	595	10
Future Volume (vph)	10	0	0	910	595	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.998	
Flt Protected	0.950					
Satd. Flow (prot)	1703	0	0	1881	1877	0
Flt Permitted	0.950					
Satd. Flow (perm)	1703	0	0	1881	1877	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	160			224	319	
Travel Time (s)	3.6			5.1	7.3	
Peak Hour Factor	0.50	0.50	0.93	0.93	0.86	0.86
Heavy Vehicles (%)	6%	6%	1%	1%	1%	1%
Adj. Flow (vph)	20	0	0	978	692	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	20	0	0	978	704	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 64.3% ICU Level of Service C  
 Analysis Period (min) 15

**Intersection**

Int Delay, s/veh 0.6

**Movement** EBL EBR NBL NBT SBT SBR

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			4	4	
Traffic Vol, veh/h	10	0	0	910	595	10
Future Vol, veh/h	10	0	0	910	595	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	50	93	93	86	86
Heavy Vehicles, %	6	6	1	1	1	1
Mvmt Flow	20	0	0	978	692	12

**Major/Minor** Minor2 Major1 Major2

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1676	698	704	0	-	0
Stage 1	698	-	-	-	-	-
Stage 2	978	-	-	-	-	-
Critical Hdwy	6.46	6.26	4.11	-	-	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	2.209	-	-	-
Pot Cap-1 Maneuver	102	434	898	-	-	-
Stage 1	486	-	-	-	-	-
Stage 2	358	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	102	434	898	-	-	-
Mov Cap-2 Maneuver	102	-	-	-	-	-
Stage 1	486	-	-	-	-	-
Stage 2	358	-	-	-	-	-

**Approach** EB NB SB

HCM Control Delay, s 48.7 0 0  
HCM LOS E

**Minor Lane/Major Mvmt** NBL NBT EBLn1 SBT SBR

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	898	-	102	-	-
HCM Lane V/C Ratio	-	-	0.196	-	-
HCM Control Delay (s)	0	-	48.7	-	-
HCM Lane LOS	A	-	E	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-















## Zone 3

2040 Alt F PM Peak

## 10: Franklin St/Franklin St Ext &amp; N High St/Folsom Rd

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		+			+			+			+	
Traffic Volume (vph)	50	860	10	40	460	20	40	10	140	5	40	10
Future Volume (vph)	50	860	10	40	460	20	40	10	140	5	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		150	100		150	0		0	150		150
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.995			0.901			0.976	
Flt Protected		0.997			0.996			0.990			0.996	
Satd. Flow (prot)	0	1872	0	0	1846	0	0	1695	0	0	1847	0
Flt Permitted		0.997			0.996			0.990			0.996	
Satd. Flow (perm)	0	1872	0	0	1846	0	0	1695	0	0	1847	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		327			240			246			251	
Travel Time (s)		7.4			5.5			5.6			5.7	
Peak Hour Factor	0.94	0.94	0.94	0.88	0.88	0.88	0.67	0.67	0.67	0.82	0.82	0.82
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	53	915	11	45	523	23	60	15	209	6	49	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	979	0	0	591	0	0	284	0	0	67	0
Sign Control		Free			Free			Stop			Stop	

## Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 86.5%

ICU Level of Service E

Analysis Period (min) 15

Zone 3  
10: Franklin St/Franklin St Ext & N High St/Folsom Rd

2040 Alt F PM Peak  
HCM 2010 TWSC

Intersection												
Int Delay, s/veh	104.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations	+			+			+			+		
Traffic Vol, veh/h	50	860	10	40	460	20	40	10	140	5	40	10
Future Vol, veh/h	50	860	10	40	460	20	40	10	140	5	40	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	88	88	88	67	67	67	82	82	82
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	0	0	0
Mvmt Flow	53	915	11	45	523	23	60	15	209	6	49	12

Major/Minor	Major1	Major2	Minor2	Minor1								
Conflicting Flow All	546	0	0	926	0	0	1682	1657	535	1659	1663	921
Stage 1	-	-	-	-	-	-	625	625	-	1027	1027	-
Stage 2	-	-	-	-	-	-	1057	1032	-	632	636	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1028	-	-	738	-	-	76	99	549	79	98	331
Stage 1	-	-	-	-	-	-	476	480	-	285	314	-
Stage 2	-	-	-	-	-	-	275	313	-	472	475	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1028	-	-	738	-	-	~33	81	549	36	80	331
Mov Cap-2 Maneuver	-	-	-	-	-	-	~33	81	-	36	80	-
Stage 1	-	-	-	-	-	-	426	438	-	255	281	-
Stage 2	-	-	-	-	-	-	196	280	-	258	433	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	0.5	0.8	\$ 669.6	141.5
HCM LOS			F	F

Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SELn1
Capacity (veh/h)	82	1028	-	-	738	-	-	123
HCM Lane V/C Ratio	0.818	0.052	-	-	0.062	-	-	2.306
HCM Control Delay (s)	141.5	8.7	0	-	10.2	0	-	\$ 669.6
HCM Lane LOS	F	A	A	-	B	A	-	F
HCM 95th %tile Q(veh)	4.2	0.2	-	-	0.2	-	-	24.4

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon


























## Zone 4

## 2040 Alt F PM Peak

## 11: Folsom Rd/Tsienneto Rd &amp; NH 28 S/NH 28

## HCM Signalized Intersection Capacity Analysis

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	60	180	240	390	280	0	150	470	100	190	370	370
Future Volume (vph)	60	180	240	390	280	0	150	470	100	190	370	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	3433	3539		1770	1863	1583	1787	1881	1599
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	3433	3539		1770	1863	1583	1787	1881	1599
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.96	0.96	0.96	0.95	0.95	0.95
Adj. Flow (vph)	65	196	261	415	298	0	156	490	104	200	389	389
RTOR Reduction (vph)	0	0	212	0	0	0	0	0	72	0	0	129
Lane Group Flow (vph)	65	196	49	415	298	0	156	490	32	200	389	260
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2		1	6		7	4		3	8	1
Permitted Phases			2						4			8
Actuated Green, G (s)	6.7	20.7	20.7	16.4	30.4		14.2	33.8	33.8	15.1	34.7	51.1
Effective Green, g (s)	6.7	20.7	20.7	16.4	30.4		14.2	33.8	33.8	15.1	34.7	51.1
Actuated g/C Ratio	0.06	0.19	0.19	0.15	0.28		0.13	0.31	0.31	0.14	0.32	0.46
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	107	665	297	511	978		228	572	486	245	593	830
v/s Ratio Prot	0.04	0.06		c0.12	c0.08		0.09	c0.26		c0.11	0.21	0.05
v/s Ratio Perm			0.03						0.02			0.12
v/c Ratio	0.61	0.29	0.17	0.81	0.30		0.68	0.86	0.07	0.82	0.66	0.31
Uniform Delay, d1	50.4	38.4	37.4	45.3	31.4		45.8	35.8	26.9	46.1	32.5	18.5
Progression Factor	1.00	1.00	1.00	1.23	0.97		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.4	1.1	1.2	9.2	0.2		8.2	12.0	0.1	18.6	2.6	0.2
Delay (s)	59.8	39.5	38.6	65.2	30.7		54.0	47.9	27.0	64.7	35.1	18.7
Level of Service	E	D	D	E	C		D	D	C	E	D	B
Approach Delay (s)		41.6			50.8			46.2			34.6	
Approach LOS		D			D			D			C	

## Intersection Summary

HCM 2000 Control Delay	42.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Zone 4  
12: Tsienneto Rd & Pinkerton St

2040 Alt F PM Peak  
Lanes, Volumes, Timings

Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	60	80	760	370	90	870
Future Volume (vph)	60	80	760	370	90	870
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	180	0		0	180	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850		0.850		
Flt Protected	0.950					0.995
Satd. Flow (prot)	1787	1599	1881	1599	0	3556
Flt Permitted	0.950					0.995
Satd. Flow (perm)	1787	1599	1881	1599	0	3556
Link Speed (mph)	30		30			30
Link Distance (ft)	403		387			233
Travel Time (s)	9.2		8.8			5.3
Confl. Peds. (#/hr)				370		
Peak Hour Factor	0.86	0.86	0.96	0.96	0.85	0.85
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	70	93	792	385	106	1024
Shared Lane Traffic (%)						
Lane Group Flow (vph)	70	93	792	385	0	1130
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 80.0% ICU Level of Service D  
 Analysis Period (min) 15



Zone 4  
12: Tsienneto Rd & Pinkerton St

2040 Alt F PM Peak  
HCM 2010 TWSC

Intersection

Int Delay, s/veh 57.2

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations	↖	↗	↑	↗		↖
Traffic Vol, veh/h	60	80	760	370	90	870
Future Vol, veh/h	60	80	760	370	90	870
Conflicting Peds, #/hr	0	0	0	370	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	180	0	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	96	96	85	85
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	70	93	792	385	106	1024

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1886	1162	0
Stage 1	1162	-	-
Stage 2	724	-	-
Critical Hdwy	6.615	6.215	-
Critical Hdwy Stg 1	5.415	-	-
Critical Hdwy Stg 2	5.815	-	-
Follow-up Hdwy	3.5095	3.3095	-
Pot Cap-1 Maneuver	70	238	-
Stage 1	299	-	-
Stage 2	444	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	~ 17	154	-
Mov Cap-2 Maneuver	~ 17	-	-
Stage 1	72	-	-
Stage 2	444	-	-

Approach	NW	NE	SW
HCM Control Delay, s	827.6	0	5.8
HCM LOS	F		

Minor Lane/Major Mvmt	NET	NER	NWLn1	NWLn2	SWL	SWT
Capacity (veh/h)	-	-	17	154	391	-
HCM Lane V/C Ratio	-	-	4.104	0.604	0.271	-
HCM Control Delay (s)	-	-	\$ 1852.6	58.8	17.6	4.6
HCM Lane LOS	-	-	F	F	C	A
HCM 95th %tile Q(veh)	-	-	9.4	3.2	1.1	-

Notes  
 -: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



## Zone 4

## 13: Applebee's/Linlew Dr &amp; NH 28

2040 Alt F PM Peak

HCM Signalized Intersection Capacity Analysis

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↖	↗		↖	↗			↖	↗		↖	↗
Traffic Volume (vph)	130	895	5	10	620	60	15	10	15	20	10	110
Future Volume (vph)	130	895	5	10	620	60	15	10	15	20	10	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3571		1787	3527			1844	1615		1821	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.79	1.00		0.78	1.00
Satd. Flow (perm)	1787	3571		1787	3527			1505	1615		1476	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.95	0.95	0.95	0.90	0.90	0.90	0.80	0.80	0.80
Adj. Flow (vph)	134	923	5	11	653	63	17	11	17	25	12	138
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	16	0	0	128
Lane Group Flow (vph)	134	928	0	11	712	0	0	28	1	0	38	10
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8		8	4	4	4
Actuated Green, G (s)	13.5	82.3		1.5	70.3			8.2	8.2		8.2	8.2
Effective Green, g (s)	13.5	82.3		1.5	70.3			8.2	8.2		8.2	8.2
Actuated g/C Ratio	0.12	0.75		0.01	0.64			0.07	0.07		0.07	0.07
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	219	2671		24	2254			112	120		110	119
v/s Ratio Prot	c0.07	c0.26		0.01	0.20							
v/s Ratio Perm								0.02	0.00		c0.03	0.01
v/c Ratio	0.61	0.35		0.46	0.32			0.25	0.01		0.35	0.09
Uniform Delay, d1	45.8	4.7		53.8	9.0			48.0	47.1		48.4	47.4
Progression Factor	1.27	0.68		0.87	1.41			1.00	1.00		1.00	1.00
Incremental Delay, d2	4.5	0.3		12.3	0.3			1.2	0.0		1.9	0.3
Delay (s)	62.5	3.5		59.0	13.0			49.2	47.2		50.2	47.7
Level of Service	E	A		E	B			D	D		D	D
Approach Delay (s)		11.0			13.7			48.4			48.3	
Approach LOS		B			B			D			D	

## Intersection Summary

HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Zone 4  
14: VIP Dr/Ashleigh Dr & NH 28

2040 Alt F PM Peak  
HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	770	5	5	580	190	40	10	10	350	10	140
Future Volume (vph)	80	770	5	5	580	190	40	10	10	350	10	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	6.0
Lane Util. Factor	0.97	0.95		1.00	0.95		1.00	1.00		0.95	0.95	1.00
Frt	1.00	1.00		1.00	0.96		1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.95	1.00
Satd. Flow (prot)	3467	3571		1770	3408		1805	1758		1715	1724	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.95	1.00
Satd. Flow (perm)	3467	3571		1770	3408		1805	1758		1715	1724	1615
Peak-hour factor, PHF	0.84	0.84	0.84	0.90	0.90	0.90	0.78	0.78	0.78	0.86	0.86	0.86
Adj. Flow (vph)	95	917	6	6	644	211	51	13	13	407	12	163
RTOR Reduction (vph)	0	0	0	0	23	0	0	12	0	0	0	113
Lane Group Flow (vph)	95	923	0	6	832	0	51	14	0	208	211	50
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	pt+ov
Protected Phases	5	2		1	6		3	3		4	4	4.5
Permitted Phases		2			6							
Actuated Green, G (s)	8.4	57.6		1.4	50.6		7.4	7.4		19.6	19.6	34.0
Effective Green, g (s)	8.4	57.6		1.4	50.6		7.4	7.4		19.6	19.6	34.0
Actuated g/C Ratio	0.08	0.52		0.01	0.46		0.07	0.07		0.18	0.18	0.31
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	264	1869		22	1567		121	118		305	307	499
v/s Ratio Prot	c0.03	c0.26		0.00	c0.24		c0.03	0.01		0.12	c0.12	0.03
v/s Ratio Perm												
v/c Ratio	0.36	0.49		0.27	0.53		0.42	0.12		0.68	0.69	0.10
Uniform Delay, d1	48.2	16.8		53.8	21.2		49.2	48.2		42.3	42.3	27.1
Progression Factor	1.00	1.00		1.19	0.89		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	0.9		6.4	0.3		2.4	0.4		6.2	6.3	0.1
Delay (s)	49.1	17.8		70.3	19.1		51.6	48.7		48.4	48.6	27.2
Level of Service	D	B		E	B		D	D		D	D	C
Approach Delay (s)		20.7			19.5			50.6			42.5	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Zone 4  
15: NH 28 & Scobie Pond Rd

2040 Alt F PM Peak  
Lanes, Volumes, Timings

	↖	→	←	↗	↘	↙
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↗		↘	
Traffic Volume (vph)	30	900	550	60	30	20
Future Volume (vph)	30	900	550	60	30	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	140			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.987		0.946	
Flt Protected	0.950				0.971	
Satd. Flow (prot)	1770	1863	1839	0	1694	0
Flt Permitted	0.950				0.971	
Satd. Flow (perm)	1770	1863	1839	0	1694	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		535	210		522	
Travel Time (s)		12.2	4.8		11.9	
Peak Hour Factor	0.91	0.91	0.90	0.90	0.75	0.75
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	33	989	611	67	40	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	33	989	678	0	67	0
Sign Control		Free	Free		Stop	

**Intersection Summary**

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 57.4% ICU Level of Service B  
 Analysis Period (min) 15



Intersection

Int Delay, s/veh 2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑	↗		↙	
Traffic Vol, veh/h	30	900	550	60	30	20
Future Vol, veh/h	30	900	550	60	30	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	140	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	90	90	75	75
Heavy Vehicles, %	2	2	2	2	3	3
Mvmt Flow	33	989	611	67	40	27

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	678	0	0 1700 645
Stage 1	-	-	- 645 -
Stage 2	-	-	- 1055 -
Critical Hdwy	4.12	-	- 6.43 6.23
Critical Hdwy Stg 1	-	-	- 5.43 -
Critical Hdwy Stg 2	-	-	- 5.43 -
Follow-up Hdwy	2.218	-	- 3.527 3.327
Pct Cap-1 Maneuver	914	-	- 101 470
Stage 1	-	-	- 520 -
Stage 2	-	-	- 333 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	914	-	- 97 470
Mov Cap-2 Maneuver	-	-	- 97 -
Stage 1	-	-	- 501 -
Stage 2	-	-	- 333 -

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	51
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	914	-	-	-	142
HCM Lane V/C Ratio	0.036	-	-	-	0.469
HCM Control Delay (s)	9.1	-	-	-	51
HCM Lane LOS	A	-	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	2.2



## Zone 5

2040 Alt F PM Peak

16: NH 102 W/NH 102 E &amp; Bypass 28 S/Bypass 28 N &amp; E Derry Rd

Lanes, Volumes, Timings

Lane Group	WBL2	WBL	WBR	WBR2	NBL	NBT	NBR	NBR2	SBL2	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	410	280	30	40	140	120	5	10	280	150	25
Future Volume (vph)	10	410	280	30	40	140	120	5	10	280	150	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.943				0.945					0.993	
Flt Protected		0.972				0.993					0.970	
Satd. Flow (prot)	0	1724	0	0	0	1748	0	0	0	0	1812	0
Flt Permitted		0.972				0.993					0.970	
Satd. Flow (perm)	0	1724	0	0	0	1748	0	0	0	0	1812	0
Link Speed (mph)		30				30					30	
Link Distance (ft)		449				456					370	
Travel Time (s)		10.2				10.4					8.4	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.87	0.87	0.87	0.87	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%	2%	2%	1%	1%	1%	1%
Adj. Flow (vph)	11	451	308	33	46	161	138	6	11	304	163	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	803	0	0	0	351	0	0	0	0	505	0
Sign Control		Yield				Yield					Yield	

## Intersection Summary

Area Type: Other

Control Type: Roundabout

Intersection Capacity Utilization 146.2%

ICU Level of Service H

Analysis Period (min) 15

Lane Group	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations								
Traffic Volume (vph)	65	240	350	90	10	30	120	25
Future Volume (vph)	65	240	350	90	10	30	120	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.920					0.982	
Flt Protected		0.996					0.989	
Satd. Flow (prot)	0	1724	0	0	0	0	1809	0
Flt Permitted		0.996					0.989	
Satd. Flow (perm)	0	1724	0	0	0	0	1809	0
Link Speed (mph)		30					30	
Link Distance (ft)		390					523	
Travel Time (s)		8.9					11.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%	2%	2%
Adj. Flow (vph)	72	267	389	100	11	33	132	27
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	828	0	0	0	0	203	0
Sign Control		Yield					Yield	

## Intersection Summary

01/09/2018

MSM

Synchro 9 Report

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## Intersection

Intersection Delay, s/veh 69.6

Intersection LOS F

Approach	WB	NB	SB	NE	SW
Entry Lanes	1	1	1	1	1
Conflicting Circle Lanes	1	1	1	1	1
Adj Approach Flow, veh/h	803	351	505	828	203
Demand Flow Rate, veh/h	811	358	510	837	208
Vehicles Circulating, veh/h	706	1065	694	539	1062
Vehicles Exiting, veh/h	717	311	576	665	455
Ped Vol Crossing Leg. #/h	0	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000	1.000
Approach Delay, s/veh	128.7	33.4	23.3	68.9	16.3
Approach LOS	F	D	C	F	C



















Lane	Left	Left	Left	Left	Left
Designated Moves	LR	LTR	LTR	LTR	LTR
Assumed Moves	LR	LTR	LTR	LTR	LTR
RT Channelized					
Lane Util	1.000	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976	4.976
Entry Flow, veh/h	811	358	510	837	208
Cap Entry Lane, veh/h	672	466	680	796	467
Entry HV Adj Factor	0.990	0.980	0.991	0.990	0.977
Flow Entry, veh/h	803	351	505	828	203
Cap Entry, veh/h	665	456	674	788	456
V/C Ratio	1.208	0.769	0.750	1.051	0.445
Control Delay, s/veh	128.7	33.4	23.3	68.9	16.3
LOS	F	D	C	F	C
95th %tile Queue, veh	28	7	7	20	2

## Zone 5

2040 Alt F PM Peak

## 17: NH Byp 28 NB/NH Byp 28 SB &amp; Pinkerton St/Nesmith Rd

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	30	330	5	30	20	310	330	10	10	130	10
Future Volume (vph)	10	30	330	5	30	20	310	330	10	10	130	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		50	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.952			0.998			0.991	
Flt Protected		0.988			0.996			0.977			0.997	
Satd. Flow (prot)	0	1840	1583	0	1802	0	0	1834	0	0	1859	0
Flt Permitted		0.988			0.996			0.977			0.997	
Satd. Flow (perm)	0	1840	1583	0	1802	0	0	1834	0	0	1859	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		168			453			475			436	
Travel Time (s)		3.8			10.3			10.8			9.9	
Peak Hour Factor	0.88	0.88	0.88	0.82	0.82	0.82	0.93	0.93	0.93	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	11	34	375	6	37	24	333	355	11	11	143	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	375	0	67	0	0	699	0	0	165	0
Sign Control		Stop			Stop			Free			Free	

## Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 60.3% ICU Level of Service B

Analysis Period (min) 15



Intersection												
Int Delay, s/veh	9.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔	↔		↔	↔
Traffic Vol, veh/h	10	30	330	5	30	20	310	330	10	10	130	10
Future Vol, veh/h	10	30	330	5	30	20	310	330	10	10	130	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	50	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	82	82	82	93	93	93	91	91	91
Heavy Vehicles, %	2	2	2	0	0	0	1	1	1	1	1	1
Mvmt Flow	11	34	375	6	37	24	333	355	11	11	143	11

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1228	1203	149	1402	1203	361	154	0	0	366	0	0
Stage 1	171	171	-	1027	1027	-	-	-	-	-	-	-
Stage 2	1057	1032	-	375	176	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.1	6.5	6.2	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.5	4	3.3	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	155	184	898	119	186	688	1433	-	-	1198	-	-
Stage 1	831	757	-	285	314	-	-	-	-	-	-	-
Stage 2	272	310	-	650	757	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	91	129	898	43	130	688	1433	-	-	1198	-	-
Mov Cap-2 Maneuver	91	129	-	43	130	-	-	-	-	-	-	-
Stage 1	588	749	-	202	222	-	-	-	-	-	-	-
Stage 2	155	219	-	358	749	-	-	-	-	-	-	-























Approach	EB	WB	NB	SB
HCM Control Delay, s	16.5	49.1	3.9	0.5
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1433	-	-	117	898	146	1198	-	-
HCM Lane V/C Ratio	0.233	-	-	0.389	0.418	0.459	0.009	-	-
HCM Control Delay (s)	8.3	0	-	54.1	11.9	49.1	8	0	-
HCM Lane LOS	A	A	-	F	B	E	A	A	-
HCM 95th %tile Q(veh)	0.9	-	-	1.6	2.1	2.1	0	-	-



Zone 5  
18: Tsienneto Rd & NH 28 Byp NB/NH 28 Byp SB

2040 Alt F PM Peak  
HCM Signalized Intersection Capacity Analysis

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	30	80	40	40	50	130	190	680	70	20	340	40
Future Volume (vph)	30	80	40	40	50	130	190	680	70	20	340	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1770		1787	1881	1599	1805	1873		1805	1870	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1770		1787	1881	1599	1805	1873		1805	1870	
Peak-hour factor, PHF	0.99	0.99	0.99	0.95	0.95	0.95	0.89	0.89	0.89	0.93	0.93	0.93
Adj. Flow (vph)	30	81	40	42	53	137	213	764	79	22	366	43
RTOR Reduction (vph)	0	22	0	0	0	85	0	4	0	0	5	0
Lane Group Flow (vph)	30	99	0	42	53	52	213	839	0	22	404	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	1	6		5	2	2,3	3	8		7	4	
Permitted Phases		6			2							
Actuated Green, G (s)	2.7	9.4		4.2	10.9	28.6	11.7	34.7		2.7	25.7	
Effective Green, g (s)	2.7	9.4		4.2	10.9	28.6	11.7	34.7		2.7	25.7	
Actuated g/C Ratio	0.04	0.13		0.08	0.15	0.38	0.16	0.46		0.04	0.34	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	63	221		100	273	609	281	866		64	640	
v/s Ratio Prot	0.02	c0.06		c0.02	0.03	0.03	c0.12	c0.45		0.01	0.22	
v/s Ratio Perm												
w/c Ratio	0.48	0.45		0.42	0.19	0.09	0.76	0.97		0.34	0.63	
Uniform Delay, d1	35.5	30.4		34.2	28.2	14.8	30.3	19.6		35.3	20.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.6	1.4		2.8	1.6	0.1	11.1	22.9		3.2	2.0	
Delay (s)	41.0	31.8		37.1	29.8	14.9	41.4	42.5		38.5	22.7	
Level of Service	D	C		D	C	B	D	D		D	C	
Approach Delay (s)		33.7			22.3			42.3			23.5	
Approach LOS		C			C			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay	34.8		HCM 2000 Level of Service		C							
HCM 2000 Volume to Capacity ratio	0.87											
Actuated Cycle Length (s)	75.0		Sum of lost time (s)		24.0							
Intersection Capacity Utilization	70.6%		ICU Level of Service		C							
Analysis Period (min)	15											
c Critical Lane Group												



Zone 5  
19: NH 102 EB/NH 102 WB & Tsienneto Rd

2040 Alt F PM Peak  
Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	480	5	10	310	190	310
Future Volume (vph)	480	5	10	310	190	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.998				0.916	
Flt Protected	0.953			0.999		
Satd. Flow (prot)	1789	0	0	1861	1690	0
Flt Permitted	0.953			0.999		
Satd. Flow (perm)	1789	0	0	1861	1690	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	348			709	425	
Travel Time (s)	7.9			16.1	9.7	
Peak Hour Factor	0.90	0.90	0.87	0.87	0.89	0.89
Heavy Vehicles (%)	1%	1%	2%	2%	3%	3%
Adj. Flow (vph)	533	6	11	356	213	348
Shared Lane Traffic (%)						
Lane Group Flow (vph)	539	0	0	367	561	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	62.6%
ICU Level of Service	B
Analysis Period (min)	15

**Intersection**

Int Delay, s/veh	90.9					
<b>Movement</b>	<b>EBL</b>	<b>EBR</b>	<b>NBL</b>	<b>NBT</b>	<b>SBT</b>	<b>SBR</b>
Lane Configurations	↘		↙		↔	
Traffic Vol, veh/h	480	5	10	310	190	310
Future Vol, veh/h	480	5	10	310	190	310
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	87	87	89	89
Heavy Vehicles, %	1	1	2	2	3	3
Mvmt Flow	533	6	11	356	213	348

<b>Major/Minor</b>	<b>Minor2</b>	<b>Major1</b>		<b>Major2</b>	
Conflicting Flow All	765	387	561	0	0
Stage 1	387	-	-	-	-
Stage 2	378	-	-	-	-
Critical Hdwy	6.41	6.21	4.12	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.218	-	-
Pot Cap-1 Maneuver	~ 373	663	1010	-	-
Stage 1	688	-	-	-	-
Stage 2	695	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	~ 368	663	1010	-	-
Mov Cap-2 Maneuver	~ 368	-	-	-	-
Stage 1	678	-	-	-	-
Stage 2	695	-	-	-	-

<b>Approach</b>	<b>EB</b>	<b>NB</b>	<b>SB</b>
HCM Control Delay, s	247.5	0.3	0
HCM LOS	F		

<b>Minor Lane/Major Mvmt</b>	<b>NBL</b>	<b>NBT</b>	<b>EBLn1</b>	<b>SBT</b>	<b>SBR</b>
Capacity (veh/h)	1010	-	370	-	-
HCM Lane V/C Ratio	0.011	-	1.456	-	-
HCM Control Delay (s)	8.6	0	247.5	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0	-	28.3	-	-

**Notes**

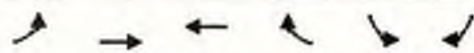
~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



**APPENDIX S-3: 2040 ALTERNATIVE F INTERSECTION CAPACITY  
ANALYSES – SYNCHRO PRINTOUTS – AM PEAK HOUR**

Lanes, Volumes, Timings  
 X NH 102 & Exit 4 SB Off

01/23/2018



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↘	↘↘
Traffic Volume (vph)	0	1355	685	0	855	805
Future Volume (vph)	0	1355	685	0	855	805
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3471	3406	0	1930	2682
Flt Permitted					0.950	
Satd. Flow (perm)	0	3471	3406	0	1930	2682
Right Turn on Red				Yes		No
Satd. Flow (RTOR)						
Link Speed (mph)		30	30		25	
Link Distance (ft)		712	388		212	
Travel Time (s)		16.2	8.8		5.8	
Peak Hour Factor	0.93	0.93	0.88	0.88	0.89	0.89
Heavy Vehicles (%)	4%	4%	6%	6%	6%	6%
Adj. Flow (vph)	0	1457	778	0	961	904
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1457	778	0	961	904
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		24	24		16	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	0.85	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors		3	3		3	3
Detector Template		Thru	Thru		Left	
Leading Detector (ft)		256	256		256	256
Trailing Detector (ft)		-5	-5		-5	-5
Detector 1 Position(ft)		-5	-5		-5	-5
Detector 1 Size(ft)		50	50		50	50
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)		0.0	0.0		0.0	0.0
Detector 1 Queue (s)		0.0	0.0		0.0	0.0
Detector 1 Delay (s)		0.0	0.0		0.0	0.0
Detector 2 Position(ft)		125	125		125	125
Detector 2 Size(ft)		6	6		6	6
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0		0.0	0.0
Detector 3 Position(ft)		250	250		250	250
Detector 3 Size(ft)		6	6		6	6
Detector 3 Type		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 3 Channel						



## Lanes, Volumes, Timings

X: NH 102 &amp; Exit 4 SB Off

01/23/2018



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector 3 Extend (s)		0.0	0.0		0.0	0.0
Turn Type		NA	NA		Prot	Prot
Protected Phases		2	6		4	4
Permitted Phases						
Detector Phase		2	6		4	4
Switch Phase						
Minimum Initial (s)		8.0	8.0		5.0	5.0
Minimum Split (s)		14.0	21.0		27.0	27.0
Total Split (s)		35.0	35.0		40.0	40.0
Total Split (%)		46.7%	46.7%		53.3%	53.3%
Maximum Green (s)		29.0	29.0		34.0	34.0
Yellow Time (s)		2.0	2.0		2.0	2.0
All-Red Time (s)		4.0	4.0		4.0	4.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Min	C-Min		None	None
Walk Time (s)			7.0		7.0	7.0
Flash Dont Walk (s)			8.0		14.0	14.0
Pedestrian Calls (#/hr)			0		0	0
Act Effct Green (s)		29.0	29.0		34.0	34.0
Actuated g/C Ratio		0.39	0.39		0.45	0.45
w/c Ratio		1.09	0.59		1.10	0.74
Control Delay		69.3	17.5		84.4	21.6
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		69.3	17.5		84.4	21.6
LOS		E	B		F	C
Approach Delay		69.3	17.5		53.9	
Approach LOS		E	B		D	
Queue Length 50th (ft)		~485	388		~517	188
Queue Length 95th (ft)		m#586	m366		#722	261
Internal Link Dist (ft)		632	308		132	
Turn Bay Length (ft)						
Base Capacity (vph)		1342	1316		874	1215
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced w/c Ratio		1.09	0.59		1.10	0.74

## Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum w/c Ratio: 1.10

Lanes, Volumes, Timings

X: NH 102 & Exit 4 SB Off

01/23/2018

Intersection Signal Delay: 52.5

Intersection LOS: D

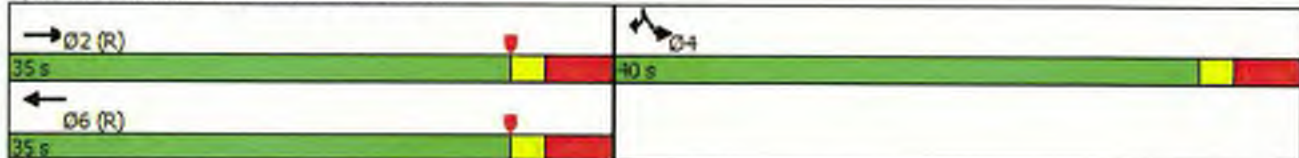
Intersection Capacity Utilization 96.8%

ICU Level of Service F

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: NH 102 & Exit 4 SB Off






















## Lanes, Volumes, Timings

## 2 NH 102 &amp; Exit 4 NB Off

01/23/2018

											
Lane Group	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	455	0	365	0	0	1165	1045	0	0	1295	1155
Future Volume (vph)	455	0	365	0	0	1165	1045	0	0	1295	1155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	0	0	0	550		0	0		0
Storage Lanes		2	2	0	0	2		0	0		1
Taper Length (ft)		25		25		25		25			
Lane Util. Factor	0.97	1.00	0.88	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Fr			0.850								0.850
Flt Protected	0.950					0.950					
Satd. Flow (prot)	3242	0	2632	0	0	3335	3438	0	0	3505	1568
Flt Permitted	0.950					0.950					
Satd. Flow (perm)	3242	0	2632	0	0	3335	3438	0	0	3505	1568
Right Turn on Red			No					Yes			Yes
Satd. Flow (RTOR)											447
Link Speed (mph)		25		30			30			30	
Link Distance (ft)		856		390			760			857	
Travel Time (s)		23.3		8.9			17.3			19.5	
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Heavy Vehicles (%)	8%	8%	8%	2%	2%	5%	5%	5%	3%	3%	3%
Adj. Flow (vph)	517	0	415	0	0	1239	1112	0	0	1408	1255
Shared Lane Traffic (%)											
Lane Group Flow (vph)	517	0	415	0	0	1239	1112	0	0	1408	1255
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Right	Right
Median Width(ft)		24		0			24			24	
Link Offset(ft)		12		0			0			0	
Crosswalk Width(ft)		16		16			16			16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15	25	15	9	15		9	15		25
Number of Detectors	3		3			3	3			3	0
Detector Template											
Leading Detector (ft)	256		256			256	256			256	0
Trailing Detector (ft)	-5		-5			-5	-5			-5	0
Detector 1 Position(ft)	-5		-5			-5	-5			-5	-5
Detector 1 Size(ft)	55		55			55	55			55	50
Detector 1 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0		0.0			0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0		0.0			0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0		0.0			0.0	0.0			0.0	0.0
Detector 2 Position(ft)	125		125			125	125			125	
Detector 2 Size(ft)	6		6			6	6			6	
Detector 2 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex	
Detector 2 Channel											
Detector 2 Extend (s)	0.0		0.0			0.0	0.0			0.0	
Detector 3 Position(ft)	250		250			250	250			250	
Detector 3 Size(ft)	6		6			6	6			6	



## Lanes, Volumes, Timings

Z 8: NH 102 &amp; Exit 4 NB Off

01/23/2018



Lane Group	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Detector 3 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex	
Detector 3 Channel											
Detector 3 Extend (s)	0.0		0.0			0.0	0.0			0.0	
Turn Type	Prot		Prot			Prot	NA			NA	Free
Protected Phases	8		8			5	2			6	
Permitted Phases											Free
Detector Phase	8		2			5	2			6	
Switch Phase											
Minimum Initial (s)	10.0		10.0			5.0	8.0			8.0	
Minimum Split (s)	16.0		16.0			11.0	42.0			31.0	
Total Split (s)	28.0		28.0			58.0	122.0			64.0	
Total Split (%)	18.7%		18.7%			38.7%	81.3%			42.7%	
Maximum Green (s)	22.0		22.0			52.0	116.0			58.0	
Yellow Time (s)	2.0		2.0			2.0	2.0			2.0	
All-Red Time (s)	4.0		4.0			4.0	4.0			4.0	
Lost Time Adjust (s)	0.0		0.0			0.0	0.0			0.0	
Total Lost Time (s)	6.0		6.0			6.0	6.0			6.0	
Lead/Lag						Lead				Lag	
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0		3.0			3.0	3.0			3.0	
Recall Mode	None		None			None	C-Min			C-Min	
Walk Time (s)							7.0			7.0	
Flash Dont Walk (s)							29.0			17.0	
Pedestrian Calls (#/hr)							0			0	
Act Effct Green (s)	22.0		22.0			52.0	116.0			58.0	150.0
Actuated g/C Ratio	0.15		0.15			0.35	0.77			0.39	1.00
v/c Ratio	1.09		1.08			1.07	0.42			1.04	0.80
Control Delay	125.3		125.9			73.9	5.6			79.7	4.4
Queue Delay	0.0		0.0			0.0	0.0			0.0	0.0
Total Delay	125.3		125.9			73.9	5.6			79.7	4.4
LOS	F		F			E	A			E	A
Approach Delay		125.6					41.6			44.2	
Approach LOS		F					D			D	
Queue Length 50th (ft)	~291		~255			~682	152			~780	0
Queue Length 95th (ft)	#395		#365			m518	m135			#919	0
Internal Link Dist (ft)		776		310			680			777	
Turn Bay Length (ft)						550					
Base Capacity (vph)	475		386			1156	2658			1355	1568
Starvation Cap Reductn	0		0			0	0			0	0
Spillback Cap Reductn	0		0			0	0			0	0
Storage Cap Reductn	0		0			0	0			0	0
Reduced v/c Ratio	1.09		1.08			1.07	0.42			1.04	0.80

## Intersection Summary

Area Type: Other  
 Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 15 (10%), Referenced to phase 2:NET and 6:SWT, Start of Yellow  
 Natural Cycle: 140



## 2. Lanes, Volumes, Timings 8: NH 102 & Exit 4 NB Off

01/23/2018

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.09

Intersection Signal Delay: 55.9

Intersection LOS: E

Intersection Capacity Utilization 98.0%

ICU Level of Service F

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.

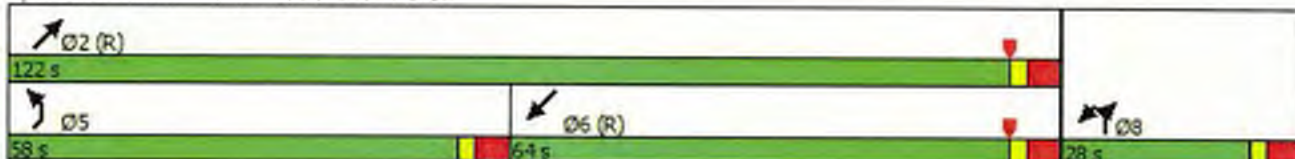
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: NH 102 & Exit 4 NB Off



## Lanes, Volumes, Timings

3 Exit 5 SB On/Exit 5 SB Off &amp; NH 28

01/23/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑					↑↑		↑
Traffic Volume (vph)	0	795	360	390	615	0	0	0	0	495	0	500
Future Volume (vph)	0	795	360	390	615	0	0	0	0	495	0	500
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		350	0		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frnt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3167	1417	1687	3374	0	0	0	0	3303	0	1524
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3167	1417	1687	3374	0	0	0	0	3303	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			357									177
Link Speed (mph)		30			30			30				35
Link Distance (ft)		851			693			486				581
Travel Time (s)		19.3			15.8			11.0				11.3
Peak Hour Factor	0.92	0.92	0.92	0.73	0.73	0.73	0.92	0.92	0.92	0.74	0.74	0.74
Heavy Vehicles (%)	14%	14%	14%	7%	7%	7%	2%	2%	2%	6%	6%	6%
Adj. Flow (vph)	0	864	391	534	842	0	0	0	0	669	0	676
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	864	391	534	842	0	0	0	0	669	0	676
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Right
Median Width(ft)		36			36			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		25	15		9	15		9	15		9
Number of Detectors		3	2	3	3					3		2
Detector Template		Thru	Right	Left	Thru					Left		
Leading Detector (ft)		256	131	256	256					256		206
Trailing Detector (ft)		-5	-5	-5	-5					-5		-5
Detector 1 Position(ft)		-5	-5	-5	-5					-5		-5
Detector 1 Size(ft)		50	50	50	50					50		50
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 2 Position(ft)		125	125	125	125					125		200
Detector 2 Size(ft)		6	6	6	6					6		6
Detector 2 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 3 Position(ft)		250		250	250					250		
Detector 3 Size(ft)		6		6	6					6		



## Lanes, Volumes, Timings

3 2: Exit 5 SB On/Exit 5 SB Off &amp; NH 28

01/23/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type		CI+Ex		CI+Ex	CI+Ex					CI+Ex		
Detector 3 Channel												
Detector 3 Extend (s)		0.0		0.0	0.0					0.0		
Turn Type		NA	Free	Prot	NA					Prot		Prot
Protected Phases		2		1	6					4		4
Permitted Phases			Free									
Detector Phase		2		1	6					4		4
Switch Phase												
Minimum Initial (s)		9.0		4.0	9.0					4.0		4.0
Minimum Split (s)		21.0		10.0	21.0					10.0		10.0
Total Split (s)		41.0		44.0	85.0					45.0		45.0
Total Split (%)		31.5%		33.8%	65.4%					34.6%		34.6%
Maximum Green (s)		35.0		38.0	79.0					39.0		39.0
Yellow Time (s)		4.0		4.0	4.0					4.0		4.0
All-Red Time (s)		2.0		2.0	2.0					2.0		2.0
Lost Time Adjust (s)		0.0		0.0	0.0					0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0					6.0		6.0
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0		3.0	5.0					3.0		3.0
Recall Mode		C-Min		None	C-Min					None		None
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		8.0			8.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)		35.0	130.0	38.0	79.0					39.0		39.0
Actuated g/C Ratio		0.27	1.00	0.29	0.61					0.30		0.30
v/c Ratio		1.01	0.28	1.08	0.41					0.68		1.16
Control Delay		81.3	0.5	74.9	1.3					44.0		121.9
Queue Delay		0.0	0.0	0.0	0.0					0.0		0.0
Total Delay		81.3	0.5	74.9	1.3					44.0		121.9
LOS		F	A	E	A					D		F
Approach Delay		56.1			29.9						83.2	
Approach LOS		E			C						F	
Queue Length 50th (ft)		~393	0	76	13					255		~566
Queue Length 95th (ft)		#534	0	m61	m11					251		#550
Internal Link Dist (ft)		771			613			406			501	
Turn Bay Length (ft)			350									
Base Capacity (vph)		852	1417	493	2050					990		581
Starvation Cap Reductn		0	0	0	0					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		1.01	0.28	1.08	0.41					0.68		1.16

## Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 130  
 Offset: 67 (52%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 130

### 3 Lanes, Volumes, Timings

#### 2: Exit 5 SB On/Exit 5 SB Off & NH 28

01/23/2018

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.16

Intersection Signal Delay: 56.2

Intersection LOS: E

Intersection Capacity Utilization 85.2%

ICU Level of Service E

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Exit 5 SB On/Exit 5 SB Off & NH 28





## Lanes, Volumes, Timings

4 Exit 5 NB Off &amp; NH 28

01/23/2018

	↖	→	↘	↙	←	↖	↙	↑	↘	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖			↖↖	↖	↖		↖			
Traffic Volume (vph)	605	685	0	0	625	790	380	0	160	0	0	0
Future Volume (vph)	605	685	0	0	625	790	380	0	160	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1641	3282	0	0	3438	1538	1656	0	1482	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1641	3282	0	0	3438	1538	1656	0	1482	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						642			175			
Link Speed (mph)		30			30			35			30	
Link Distance (ft)		693			542			867			392	
Travel Time (s)		15.8			12.3			16.9			8.9	
Peak Hour Factor	0.87	0.87	0.87	0.90	0.90	0.90	0.78	0.78	0.78	0.92	0.92	0.92
Heavy Vehicles (%)	10%	10%	10%	5%	5%	5%	9%	9%	9%	2%	2%	2%
Adj. Flow (vph)	695	787	0	0	694	878	487	0	205	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	695	787	0	0	694	878	487	0	205	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Right	Right	Left	Right	Left	Left	Right
Median Width(ft)		36			42			12			12	
Link Offset(ft)		0			0			0			36	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		25	15		9	15		9
Number of Detectors	3	3			3	2	3		0			
Detector Template	Left	Thru			Thru	Right	Left					
Leading Detector (ft)	256	256			256	131	256		0			
Trailing Detector (ft)	-5	-5			-5	-5	-5		0			
Detector 1 Position(ft)	-5	-5			-5	-5	-5		-5			
Detector 1 Size(ft)	50	50			50	50	50		50			
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 2 Position(ft)	125	125			125	125	125					
Detector 2 Size(ft)	6	6			6	6	6					
Detector 2 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex					
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 3 Position(ft)	250	250			250		250					
Detector 3 Size(ft)	6	6			6		6					
Detector 3 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0			0.0		0.0					



4 Lanes, Volumes, Timings  
 8: Exit 5 NB Off & NH 28

01/23/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA			NA	Free	Prot		Prot			
Protected Phases	5	2			6		8		8			
Permitted Phases		2			6	Free						
Detector Phase	5	2			6		8		8			
Switch Phase												
Minimum Initial (s)	4.0	16.0			16.0		4.0		4.0			
Minimum Split (s)	10.0	23.0			23.0		10.0		10.0			
Total Split (s)	57.0	89.0			32.0		41.0		41.0			
Total Split (%)	43.8%	68.5%			24.6%		31.5%		31.5%			
Maximum Green (s)	51.0	83.0			26.0		35.0		35.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0			5.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		10.0			10.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)	51.0	83.0			26.0	130.0	35.0		35.0			
Actuated g/C Ratio	0.39	0.64			0.20	1.00	0.27		0.27			
w/c Ratio	1.08	0.38			1.01	0.57	1.09		0.39			
Control Delay	56.7	0.3			88.3	1.5	115.0		10.5			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	56.7	0.3			88.3	1.5	115.0		10.5			
LOS	E	A			F	A	F		B			
Approach Delay		26.8			39.8			84.0				
Approach LOS		C			D			F				
Queue Length 50th (ft)	~238	0			~315	0	~462		19			
Queue Length 95th (ft)	m#195	m0			#447	0	#536		54			
Internal Link Dist (ft)		613			462			787			312	
Turn Bay Length (ft)												
Base Capacity (vph)	643	2095			687	1538	445		526			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced w/c Ratio	1.08	0.38			1.01	0.57	1.09		0.39			

Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 130  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 130  
 Control Type: Actuated-Coordinated  
 Maximum w/c Ratio: 1.09  
 Intersection Signal Delay: 42.8  
 Intersection LOS: D



4 ~~8~~: Lanes, Volumes, Timings  
Exit 5 NB Off & NH 28

01/23/2018

Intersection Capacity Utilization 85.2% ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.





















Splits and Phases: 3: Exit 5 NB Off & NH 28



## Lanes, Volumes, Timings

## 6. NH 102 &amp; St. Charles Street/Londonderry Road

01/23/2018

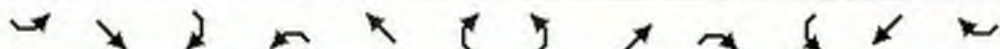
												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	0	120	0	1	0	160	780	5	10	1550	40
Future Volume (vph)	10	0	120	0	1	0	160	780	5	10	1550	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		180	0		0	360		0	65		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850					0.999			0.996	
Flt Protected		0.950					0.950			0.950		
Satd. Flow (prot)	0	1770	1583	0	1900	0	1770	3536	0	1770	3525	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1863	1583	0	1900	0	1770	3536	0	1770	3525	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			164					1			3	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		593			447			750			186	
Travel Time (s)		13.5			10.2			17.0			4.2	
Peak Hour Factor	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	11	0	130	0	4	0	174	848	5	11	1685	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	11	130	0	4	0	174	853	0	11	1728	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	3	1	3	1		3	3		3	3	
Detector Template	Left	Thru	Right	Left			Left	Thru		Left	Thru	
Leading Detector (ft)	256	256	45	256	45		256	256		256	256	
Trailing Detector (ft)	-5	-5	-5	-5	-5		-5	-5		-5	-5	
Detector 1 Position(ft)	-5	-5	-5	-5	-5		-5	-5		-5	-5	
Detector 1 Size(ft)	50	50	50	50	50		50	50		50	50	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)	125	125		125			125	125		125	125	
Detector 2 Size(ft)	6	6		6			6	6		6	6	
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0			0.0	0.0		0.0	0.0	
Detector 3 Position(ft)	250	250		250			250	250		250	250	
Detector 3 Size(ft)	6	6		6			6	6		6	6	



## Lanes, Volumes, Timings

NH 102 &amp; St. Charles Street/Londonderry Road

01/23/2018



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 3 Type	Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0		0.0			0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	custom		NA		Prot	NA		Prot	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		6	4								
Detector Phase	8	8	6	4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	8.0	5.0	5.0		5.0	8.0		5.0	8.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		24.0	24.0		11.0	24.0	
Total Split (s)	24.0	24.0	52.0	24.0	24.0		24.0	65.0		11.0	52.0	
Total Split (%)	24.0%	24.0%	52.0%	24.0%	24.0%		24.0%	65.0%		11.0%	52.0%	
Maximum Green (s)	18.0	18.0	46.0	18.0	18.0		18.0	59.0		5.0	46.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag			Lag				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	Min	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0			0	
Act Effct Green (s)		6.4	49.2		6.1		12.6	71.1		5.1	49.2	
Actuated g/C Ratio		0.08	0.64		0.08		0.17	0.93		0.07	0.64	
v/c Ratio		0.07	0.12		0.03		0.59	0.26		0.09	0.76	
Control Delay		35.2	1.3		35.0		38.1	2.1		37.9	14.5	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		35.2	1.3		35.0		38.1	2.1		37.9	14.5	
LOS		D	A		C		D	A		D	B	
Approach Delay		4.0			35.0			8.2			14.7	
Approach LOS		A			C			A			B	
Queue Length 50th (ft)		4	0		2		70	0		5	224	
Queue Length 95th (ft)		22	16		3		152	133		23	#655	
Internal Link Dist (ft)		513			367			670			106	
Turn Bay Length (ft)			180				360			65		
Base Capacity (vph)		444	1078		453		422	3293		117	2273	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.02	0.12		0.01		0.41	0.26		0.09	0.76	

## Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 76.3

Natural Cycle: 100

Control Type: Actuated-Uncoordinated

Lanes, Volumes, Timings

5 NH 102 & St. Charles Street/Londonderry Road

01/23/2018

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 11.9

Intersection LOS: B

Intersection Capacity Utilization 77.9%

ICU Level of Service D

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 9: NH 102 & St. Charles Street/Londonderry Road





## Lanes, Volumes, Timings

10: NH 102 &amp; Fordway/Madden Hill Road

01/23/2018

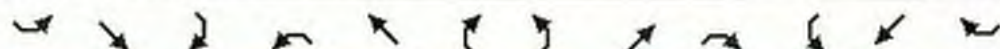
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	5	10	5	360	0	30	0	540	180	5	810	0
Future Volume (vph)	5	10	5	360	0	30	0	540	180	5	810	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		100	0		100	0		0
Storage Lanes	0		0	1		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967				0.850			0.850			
Flt Protected		0.988		0.950								
Satd. Flow (prot)	0	1780	0	1752	0	1568	0	1759	1495	0	1810	0
Flt Permitted		0.988		0.736							0.997	
Satd. Flow (perm)	0	1780	0	1358	0	1568	0	1759	1495	0	1804	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				36			158			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		356			493			234			339	
Travel Time (s)		8.1			11.2			5.3			7.7	
Peak Hour Factor	0.60	0.60	0.60	0.96	0.96	0.96	0.89	0.89	0.89	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	8%	8%	8%	5%	5%	5%
Adj. Flow (vph)	8	17	8	375	0	31	0	607	202	6	942	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	33	0	375	0	31	0	607	202	0	948	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		-22			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	1		3		1		2	1	3	2	
Detector Template	Left			Left		Right			Right	Left		
Leading Detector (ft)	256	45		256		45		131	45	256	131	
Trailing Detector (ft)	-5	-5		-5		-5		-5	-5	-5	-5	
Detector 1 Position(ft)	-5	-5		-5		-5		-5	-5	-5	-5	
Detector 1 Size(ft)	50	50		50		50		50	50	50	50	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0		0.0		0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0		0.0		0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0		0.0		0.0	0.0	0.0	0.0	
Detector 2 Position(ft)	125			125				125		125	125	
Detector 2 Size(ft)	6			6				6		6	6	
Detector 2 Type	Cl+Ex			Cl+Ex				Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0				0.0		0.0	0.0	
Detector 3 Position(ft)	250			250						250		
Detector 3 Size(ft)	6			6						6		



## Lanes, Volumes, Timings

10: NH 102 &amp; Fordway/Madden Hill Road

01/23/2018



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 3 Type	Cl+Ex			Cl+Ex						Cl+Ex		
Detector 3 Channel												
Detector 3 Extend (s)	0.0			0.0						0.0		
Turn Type	Perm	NA		D.Pm			Perm	NA	Perm	Perm	NA	
Protected Phases	4							2		2		
Permitted Phases	4			4			8		2	2		
Detector Phase	4	4		4			8	2	2	2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0			5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0			22.5	24.0	24.0	24.0	24.0	
Total Split (s)	32.0	32.0		32.0			32.0	58.0	58.0	58.0	58.0	
Total Split (%)	35.6%	35.6%		35.6%			35.6%	64.4%	64.4%	64.4%	64.4%	
Maximum Green (s)	26.0	26.0		26.0			27.5	52.0	52.0	52.0	52.0	
Yellow Time (s)	4.0	4.0		4.0			3.5	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0			1.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0		0.0			0.0	0.0	0.0		0.0	
Total Lost Time (s)		6.0		6.0			4.5	6.0	6.0		6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0			3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None			None	Min	Min	Min	Min	
Walk Time (s)	7.0	7.0		7.0			7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0			11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	
Act Effct Green (s)		25.6		25.6			27.1	50.6	50.6		50.6	
Actuated g/C Ratio		0.29		0.29			0.31	0.57	0.57		0.57	
v/c Ratio		0.06		0.95			0.06	0.60	0.22		0.92	
Control Delay		19.5		67.9			7.2	15.4	3.1		32.4	
Queue Delay		0.0		0.0			0.0	0.0	0.0		0.0	
Total Delay		19.5		67.9			7.2	15.4	3.1		32.4	
LOS		B		E			A	B	A		C	
Approach Delay		19.5					63.3	12.3			32.4	
Approach LOS		B					E	B			C	
Queue Length 50th (ft)		10		209			0	206	10		444	
Queue Length 95th (ft)		20		#385			18	303	38		#380	
Internal Link Dist (ft)		276					413	154			259	
Turn Bay Length (ft)							100		100			
Base Capacity (vph)		530		400			514	1038	947		1065	
Starvation Cap Reductn		0		0			0	0	0		0	
Spillback Cap Reductn		0		0			0	0	0		0	
Storage Cap Reductn		0		0			0	0	0		0	
Reduced v/c Ratio		0.06		0.94			0.06	0.58	0.21		0.89	

## Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 88.2

Natural Cycle: 90

Control Type: Actuated-Uncoordinated



# Lanes, Volumes, Timings

## 10: NH 102 & Fordway/Madden Hill Road

01/23/2018

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 30.5

Intersection LOS: C

Intersection Capacity Utilization 83.9%

ICU Level of Service E

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 10: NH 102 & Fordway/Madden Hill Road

 Ø2 58 s	 Ø4 32 s
	 Ø8 32 s

## Zone 3

2040 Alt F AM Peak

## 7: Birch St/Crystal Ave &amp; NH 102 (E Broadway)

Lanes, Volumes, Timings

	↖	→	↘	↙	←	↖	↙	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↑↑		↖↗	↗		↖	↑	↗
Traffic Volume (vph)	130	270	130	30	500	200	200	100	40	100	100	120
Future Volume (vph)	130	270	130	30	500	200	200	100	40	100	100	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	390		0	110		0	70		0	245		245
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Fr <sub>t</sub>			0.850		0.957			0.957				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1743	1333	1703	3259	0	3335	1732	0	1703	1792	1524
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1656	1743	1333	1703	3259	0	3335	1732	0	1703	1792	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			135		74			20				128
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		505			530			361			411	
Travel Time (s)		11.5			12.0			8.2			9.3	
Peak Hour Factor	0.96	0.96	0.96	0.94	0.94	0.94	0.85	0.85	0.85	0.91	0.91	0.91
Heavy Vehicles (%)	9%	9%	9%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Parking (#/hr)			0									
Adj. Flow (vph)	135	281	135	32	532	213	235	118	47	110	110	132
Shared Lane Traffic (%)												
Lane Group Flow (vph)	135	281	135	32	745	0	235	165	0	110	110	132
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2	3	1	6		3	8		7	4	5
Permitted Phases			2									4
Detector Phase	5	2	3	1	6		3	8		7	4	5
Switch Phase												
Minimum Initial (s)	4.0	5.0	4.0	4.0	10.0		4.0	10.0		4.0	9.0	4.0
Minimum Split (s)	10.0	30.0	10.0	10.0	30.0		10.0	25.0		10.0	25.0	10.0
Total Split (s)	14.0	40.0	13.0	12.0	38.0		13.0	25.0		13.0	25.0	14.0
Total Split (%)	15.6%	44.4%	14.4%	13.3%	42.2%		14.4%	27.8%		14.4%	27.8%	15.6%
Maximum Green (s)	8.0	34.0	7.0	6.0	32.0		7.0	19.0		7.0	19.0	8.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min	Min	None	Min		Min	None		Min	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		10			10			0			10	
Act Effct Green (s)	8.1	32.3	50.6	6.0	22.4		10.8	12.5		7.1	12.3	23.0
Actuated g/C Ratio	0.11	0.43	0.68	0.08	0.30		0.15	0.17		0.10	0.17	0.31
v/c Ratio	0.75	0.37	0.14	0.24	0.72		0.49	0.54		0.68	0.37	0.24
Control Delay	62.3	18.0	2.5	40.3	25.2		38.9	32.8		58.7	32.7	5.3



Zone 3  
7: Birch St/Crystal Ave & NH 102 (E Broadway)

2040 Alt F AM Peak  
Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	62.3	18.0	2.5	40.3	25.2		38.9	32.8		58.7	32.7	5.3
LOS	E	B	A	D	C		D	C		E	C	A
Approach Delay		25.0			25.8			36.4			30.6	
Approach LOS		C			C			D			C	
Queue Length 50th (ft)	60	71	0	14	139		53	60		49	45	1
Queue Length 95th (ft)	#185	183	26	46	220		#124	123		#155	101	38
Internal Link Dist (ft)		425			450			281			331	
Turn Bay Length (ft)	390			110			70			245		245
Base Capacity (vph)	180	815	949	139	1461		484	463		162	463	559
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.75	0.34	0.14	0.23	0.51		0.49	0.36		0.68	0.24	0.24

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 74.4  
 Natural Cycle: 80  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.75  
 Intersection Signal Delay: 28.5  
 Intersection LOS: C  
 Intersection Capacity Utilization 61.3%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 7: Birch St/Crystal Ave & NH 102 (E Broadway)

↙ Ø1 12 s	→ Ø2 40 s	↘ Ø3 13 s	↓ Ø4 25 s
↙ Ø5 14 s	← Ø6 38 s	↘ Ø7 13 s	↑ Ø8 25 s


























## Zone 4

2040 Alt F AM Peak

## 11: Folsom Rd/Tsienneto Rd &amp; Crystal Av/NH 28

Lanes, Volumes, Timings

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	20	120	180	240	100	0	90	260	20	145	430	345
Future Volume (vph)	20	120	180	240	100	0	90	260	20	145	430	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	110		90	360		0	190		180	0		210
Storage Lanes	1		1	2		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr			0.850						0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3471	1553	3335	3438	0	1752	1845	1568	1752	1845	1568
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1736	3471	1553	3335	3438	0	1752	1845	1568	1752	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			214						255			348
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		639			476			532			387	
Travel Time (s)		14.5			10.8			12.1			8.8	
Peak Hour Factor	0.84	0.84	0.84	0.79	0.79	0.79	0.86	0.86	0.86	0.99	0.99	0.99
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	24	143	214	304	127	0	105	302	23	146	434	348
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	143	214	304	127	0	105	302	23	146	434	348
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Free	Prot	NA	pt+ov
Protected Phases	5	2		1	6		7	4		3	8	8 1
Permitted Phases		2	2		6			4	Free		8	
Detector Phase	5	2	2	1	6		7	4		3	8	8 1
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		6.0	8.0		7.0	8.0	
Minimum Split (s)	14.0	21.0	21.0	14.0	21.0		12.0	21.0		13.0	21.0	
Total Split (s)	14.0	23.0	23.0	18.0	27.0		15.0	30.0		19.0	34.0	
Total Split (%)	15.6%	25.6%	25.6%	20.0%	30.0%		16.7%	33.3%		21.1%	37.8%	
Maximum Green (s)	8.0	17.0	17.0	12.0	21.0		9.0	24.0		13.0	28.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	C-Max	C-Max	None	Max		None	None		None	None	
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	
Flash Dont Walk (s)		10.0	10.0		10.0			10.0			10.0	
Pedestrian Calls (#/hr)		0	0		0			0			0	
Act Effect Green (s)	11.9	21.3	21.3	11.5	21.0		8.5	21.7	90.0	11.4	27.1	44.7
Actuated g/C Ratio	0.13	0.24	0.24	0.13	0.23		0.09	0.24	1.00	0.13	0.30	0.50
v/c Ratio	0.11	0.17	0.40	0.71	0.16		0.63	0.68	0.01	0.66	0.78	0.37
Control Delay	39.1	30.4	7.3	48.8	24.1		56.9	38.8	0.0	51.5	39.9	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0



Zone 4  
11: Folsom Rd/Tsienneto Rd & Crystal Av/NH 28

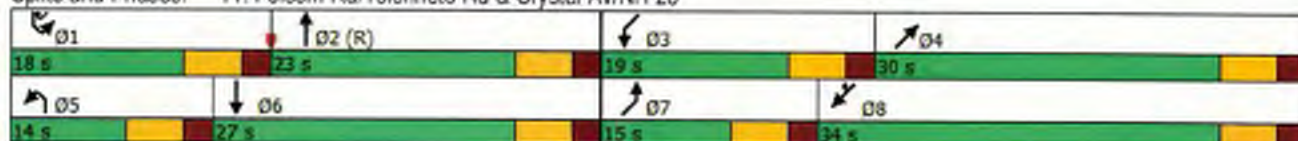
2040 Alt F AM Peak  
Lanes, Volumes, Timings

	↶	↑	↗	↘	↓	↙	↖	↗	↘	↙	↖	↗
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Total Delay	39.1	30.4	7.3	48.8	24.1		56.9	38.8	0.0	51.5	39.9	2.6
LOS	D	C	A	D	C		E	D	A	D	D	A
Approach Delay		18.0			41.5			41.2			27.7	
Approach LOS		B			D			D			C	
Queue Length 50th (ft)	13	36	0	97	23		58	150	0	79	221	0
Queue Length 95th (ft)	35	58	46	91	48		#113	223	0	140	#345	41
Internal Link Dist (ft)		559			396			452			307	
Turn Bay Length (ft)	110		90	360			190		180			210
Base Capacity (vph)	228	822	531	444	802		175	493	1568	253	574	939
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	0.11	0.17	0.40	0.68	0.16		0.60	0.61	0.01	0.58	0.76	0.37

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:NBT, Start of Green  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 31.4  
 Intersection LOS: C  
 Intersection Capacity Utilization 56.1%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 11: Folsom Rd/Tsienneto Rd & Crystal Av/NH 28





Zone 4  
13: Applebees/Linlew Dr & NH 28

2040 Alt F AM Peak  
Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↖	↗		↖	↗			↖	↗		↖	↗
Traffic Volume (vph)	40	580	0	0	470	20	5	0	5	20	0	130
Future Volume (vph)	40	580	0	0	470	20	5	0	5	20	0	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	110		0	115		150	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		1
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.994				0.850			0.850
Flt Protected	0.950							0.950			0.950	
Satd. Flow (prot)	1687	3374	0	1863	3518	0	0	1805	1615	0	1787	1599
Flt Permitted	0.950							0.743			0.751	
Satd. Flow (perm)	1687	3374	0	1863	3518	0	0	1412	1615	0	1413	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					6				109			144
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		277			671			218			433	
Travel Time (s)		6.3			15.3			5.0			9.8	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.50	0.50	0.50	0.90	0.90	0.90
Heavy Vehicles (%)	7%	7%	7%	2%	2%	2%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	48	699	0	0	511	22	10	0	10	22	0	144
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	699	0	0	533	0	0	10	10	0	22	144
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases					6		8	8	8	4		4
Detector Phase	5	2		1	6		8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	14.0	46.0		11.0	43.0		33.0	33.0	33.0	33.0	33.0	33.0
Total Split (s)	14.0	46.0		11.0	43.0		33.0	33.0	33.0	33.0	33.0	33.0
Total Split (%)	15.6%	51.1%		12.2%	47.8%		36.7%	36.7%	36.7%	36.7%	36.7%	36.7%
Maximum Green (s)	8.0	40.0		5.0	37.0		27.0	27.0	27.0	27.0	27.0	27.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max		None	None		None	None	None	None	None	None
Act Effct Green (s)	8.8	70.5			61.4			7.5	7.5		7.5	7.5
Actuated g/C Ratio	0.10	0.78			0.68			0.08	0.08		0.08	0.08
v/c Ratio	0.29	0.26			0.22			0.09	0.04		0.19	0.55
Control Delay	37.7	5.0			8.8			38.0	0.4		41.0	15.0
Queue Delay	0.0	0.0			0.0			0.0	0.0		0.0	0.0
Total Delay	37.7	5.0			8.8			38.0	0.4		41.0	15.0
LOS	D	A			A			D	A		D	B
Approach Delay		7.1			8.8			19.2			18.4	



Zone 4  
13: Applebees/Linlew Dr & NH 28

2040 Alt F AM Peak  
Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Approach LOS		A			A			B			B	
Queue Length 50th (ft)	27	28			78			5	0		12	0
Queue Length 95th (ft)	56	182			144			11	0		34	53
Internal Link Dist (ft)		197			591			138			353	
Turn Bay Length (ft)	110											
Base Capacity (vph)	164	2644			2400			423	560		423	580
Starvation Cap Reductn	0	0			0			0	0		0	0
Spillback Cap Reductn	0	0			0			0	0		0	0
Storage Cap Reductn	0	0			0			0	0		0	0
Reduced v/c Ratio	0.29	0.26			0.22			0.02	0.02		0.05	0.25

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 63 (70%), Referenced to phase 2:EBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.55  
 Intersection Signal Delay: 9.2  
 Intersection Capacity Utilization 43.1%  
 Analysis Period (min) 15























Intersection LOS: A  
 ICU Level of Service A

Splits and Phases: 13: Applebees/Linlew Dr & NH 28



Zone 4  
14: VIP Dr/Ashleigh Dr & NH 28

2040 Alt F AM Peak  
Lanes, Volumes, Timings

													
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	70	470	5	5	450	160	10	5	5	180	5	100	
Future Volume (vph)	70	470	5	5	450	160	10	5	5	180	5	100	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	280		150	205		150	0		0	325		150	
Storage Lanes	2		0	1		0	1		0	1		1	
Taper Length (ft)	200			25			25			25			
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00	
Ft		0.998			0.961			0.925				0.850	
Flt Protected	0.950			0.950			0.950			0.950	0.955		
Satd. Flow (prot)	3303	3399	0	1736	3336	0	1805	1758	0	1665	1674	1568	
Flt Permitted	0.950			0.950			0.950			0.950	0.955		
Satd. Flow (perm)	3303	3399	0	1736	3336	0	1805	1758	0	1665	1674	1568	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		2			78			7				111	
Link Speed (mph)		30			30			30				30	
Link Distance (ft)		412			486			151				446	
Travel Time (s)		9.4			11.0			3.4				10.1	
Peak Hour Factor	0.83	0.83	0.83	0.97	0.97	0.97	0.67	0.67	0.67	0.90	0.90	0.90	
Heavy Vehicles (%)	6%	6%	6%	4%	4%	4%	0%	0%	0%	3%	3%	3%	
Adj. Flow (vph)	84	566	6	5	464	165	15	7	7	200	6	111	
Shared Lane Traffic (%)										49%			
Lane Group Flow (vph)	84	572	0	5	629	0	15	14	0	102	104	111	
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	pt+ov	
Protected Phases	5	2		1	6		3	3		4	4	4 5	
Permitted Phases								3					
Detector Phase	5	2		1	6		3	3		4	4	4 5	
Switch Phase													
Minimum Initial (s)	5.0	8.0		5.0	8.0		5.0	5.0		8.0	8.0		
Minimum Split (s)	14.0	53.0		11.0	50.0		11.0	11.0		15.0	15.0		
Total Split (s)	14.0	53.0		11.0	50.0		11.0	11.0		15.0	15.0		
Total Split (%)	15.6%	58.9%		12.2%	55.6%		12.2%	12.2%		16.7%	16.7%		
Maximum Green (s)	8.0	47.0		5.0	44.0		5.0	5.0		9.0	9.0		
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0		
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Recall Mode	None	Min		None	C-Min		None	None		None	None		
Walk Time (s)		5.0			5.0		5.0	5.0		5.0	5.0		
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0		
Pedestrian Calls (#/hr)		0			0		0	0		0	0		
Act Effct Green (s)	7.7	56.3		5.9	45.1		6.3	6.3		11.5	11.5	25.1	
Actuated g/C Ratio	0.09	0.63		0.07	0.50		0.07	0.07		0.13	0.13	0.28	
w/c Ratio	0.30	0.27		0.04	0.37		0.12	0.11		0.48	0.49	0.21	
Control Delay	40.9	10.6		62.6	8.7		40.8	30.0		43.5	43.7	5.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0	



Zone 4  
14: VIP Dr/Ashleigh Dr & NH 28

2040 Alt F AM Peak  
Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	40.9	10.6		62.6	8.7		40.8	30.0		43.5	43.7	5.4
LOS	D	B		E	A		D	C		D	D	A
Approach Delay		14.5			9.1			35.6			30.2	
Approach LOS		B			A			D			C	
Queue Length 50th (ft)	23	73		3	34		8	4		57	58	0
Queue Length 95th (ft)	41	149		m13	210		20	16		104	106	34
Internal Link Dist (ft)		332			406			71			366	
Turn Bay Length (ft)	280			205						325		150
Base Capacity (vph)	308	2210		113	1858		127	130		215	216	513
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	0.27	0.26		0.04	0.34		0.12	0.11		0.47	0.48	0.22

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 6:WBT, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.49
Intersection Signal Delay:	15.8
Intersection LOS:	B
Intersection Capacity Utilization:	48.5%
ICU Level of Service:	A
Analysis Period (min):	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 14: VIP Dr/Ashleigh Dr & NH 28

11 s	53 s	11 s	15 s
14 s	50 s		

## Zone 5

## 2040 Alt F AM Peak

## 18: Tsienneto Rd &amp; NH 28 Byp S/NH 28 Byp N

Lanes, Volumes, Timings

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	30	50	20	20	50	160	80	240	80	80	520	50
Future Volume (vph)	30	50	20	20	50	160	80	240	80	80	520	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		150	190		190	135		0	120		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.958				0.850		0.962			0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1767	0	1736	1827	1553	1770	1792	0	1787	1857	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1752	1767	0	1736	1827	1553	1770	1792	0	1787	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20				198		25			7	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		481			347			479			371	
Travel Time (s)		10.9			7.9			10.9			8.4	
Peak Hour Factor	0.82	0.82	0.82	0.81	0.81	0.81	0.68	0.68	0.68	0.78	0.78	0.78
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	2%	2%	2%	1%	1%	1%
Adj. Flow (vph)	37	61	24	25	62	198	118	353	118	103	667	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	85	0	25	62	198	118	471	0	103	731	0
Turn Type	Prot	NA		Prot	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	1	6		5	2	2 3	3	8		7	4	
Permitted Phases												
Detector Phase	1	6		5	2	2 3	3	8		7	4	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Total Split (s)	14.0	14.0		14.0	14.0		14.0	38.0		14.0	38.0	
Total Split (%)	17.5%	17.5%		17.5%	17.5%		17.5%	47.5%		17.5%	47.5%	
Maximum Green (s)	8.0	8.0		8.0	8.0		8.0	32.0		8.0	32.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	Max		None	None		None	None	
Act Effct Green (s)	8.1	10.7		8.1	8.1	22.2	8.1	35.0		8.1	31.8	
Actuated g/C Ratio	0.11	0.14		0.11	0.11	0.30	0.11	0.47		0.11	0.43	
v/c Ratio	0.19	0.31		0.13	0.31	0.33	0.61	0.55		0.53	0.91	
Control Delay	35.4	28.5		34.5	37.5	5.4	49.0	18.9		44.5	39.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	35.4	28.5		34.5	37.5	5.4	49.0	18.9		44.5	39.6	
LOS	D	C		C	D	A	D	B		D	D	
Approach Delay		30.6			15.0			25.0			40.2	



## 18: Tsienneto Rd &amp; NH 28 Byp S/NH 28 Byp N

Lanes, Volumes, Timings

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Approach LOS		C			B			C			D	
Queue Length 50th (ft)	17	24		12	29	0	58	175		50	348	
Queue Length 95th (ft)	41	66		31	60	34	82	181		85	#453	
Internal Link Dist (ft)		401			267			399			291	
Turn Bay Length (ft)	200			190		190	135			120		
Base Capacity (vph)	191	272		189	199	605	193	862		195	816	
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	0.19	0.31		0.13	0.31	0.33	0.61	0.55		0.53	0.90	

## Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 73.9

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 30.7

Intersection LOS: C

Intersection Capacity Utilization 62.0%

ICU Level of Service B

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

## Splits and Phases: 18: Tsienneto Rd &amp; NH 28 Byp S/NH 28 Byp N

Ø1	Ø2	Ø3	Ø4
14 s	14 s	14 s	38 s
Ø5	Ø6	Ø7	Ø8
14 s	14 s	14 s	38 s

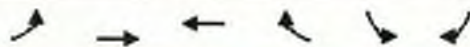
**APPENDIX S-4: 2040 ALTERNATIVE F INTERSECTION CAPACITY ANALYSES – SYNCHRO PRINTOUTS – PM PEAK HOUR**



Lanes, Volumes, Timings

X: NH 102 & Exit 4 SB Off

01/23/2018

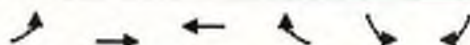


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↘	↙
Traffic Volume (vph)	0	1310	1330	0	1005	1135
Future Volume (vph)	0	1310	1330	0	1005	1135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	0.88
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	3471	3406	0	1930	2682
Flt Permitted					0.950	
Satd. Flow (perm)	0	3471	3406	0	1930	2682
Right Turn on Red				Yes		No
Satd. Flow (RTOR)						
Link Speed (mph)		30	30		25	
Link Distance (ft)		712	388		212	
Travel Time (s)		16.2	8.8		5.8	
Peak Hour Factor	0.93	0.93	0.88	0.88	0.89	0.89
Heavy Vehicles (%)	4%	4%	6%	6%	6%	6%
Adj. Flow (vph)	0	1409	1511	0	1129	1275
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1409	1511	0	1129	1275
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		24	24		16	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	0.85	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors		3	3		3	3
Detector Template		Thru	Thru		Left	
Leading Detector (ft)		256	256		256	256
Trailing Detector (ft)		-5	-5		-5	-5
Detector 1 Position(ft)		-5	-5		-5	-5
Detector 1 Size(ft)		50	50		50	50
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)		0.0	0.0		0.0	0.0
Detector 1 Queue (s)		0.0	0.0		0.0	0.0
Detector 1 Delay (s)		0.0	0.0		0.0	0.0
Detector 2 Position(ft)		125	125		125	125
Detector 2 Size(ft)		6	6		6	6
Detector 2 Type		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0		0.0	0.0
Detector 3 Position(ft)		250	250		250	250
Detector 3 Size(ft)		6	6		6	6
Detector 3 Type		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 3 Channel						

## Lanes, Volumes, Timings

NH 102 &amp; Exit 4 SB Off

01/23/2018



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector 3 Extend (s)		0.0	0.0		0.0	0.0
Turn Type		NA	NA		Prot	Prot
Protected Phases		2	6		4	4
Permitted Phases						
Detector Phase		2	6		4	4
Switch Phase						
Minimum Initial (s)		8.0	8.0		5.0	5.0
Minimum Split (s)		14.0	21.0		27.0	27.0
Total Split (s)		54.0	54.0		66.0	66.0
Total Split (%)		45.0%	45.0%		55.0%	55.0%
Maximum Green (s)		48.0	48.0		60.0	60.0
Yellow Time (s)		2.0	2.0		2.0	2.0
All-Red Time (s)		4.0	4.0		4.0	4.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Recall Mode		C-Min	C-Min		None	None
Walk Time (s)			7.0		7.0	7.0
Flash Dont Walk (s)			8.0		14.0	14.0
Pedestrian Calls (#/hr)			0		0	0
Act Effct Green (s)		48.0	48.0		60.0	60.0
Actuated g/C Ratio		0.40	0.40		0.50	0.50
v/c Ratio		1.02	1.11		1.17	0.95
Control Delay		44.5	58.9		117.1	44.5
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		44.5	58.9		117.1	44.5
LOS		D	E		F	D
Approach Delay		44.5	58.9		78.6	
Approach LOS		D	E		E	
Queue Length 50th (ft)		~553	~704		~1042	518
Queue Length 95th (ft)		m#702	m50		#1276	#687
Internal Link Dist (ft)		632	308		132	
Turn Bay Length (ft)						
Base Capacity (vph)		1388	1362		965	1341
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.02	1.11		1.17	0.95

## Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.17



# Lanes, Volumes, Timings

7: NH 102 & Exit 4 SB Off

01/23/2018

Intersection Signal Delay: 64.0

Intersection LOS: E

Intersection Capacity Utilization 104.4%

ICU Level of Service G

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.



















Splits and Phases: 7: NH 102 & Exit 4 SB Off



## Lanes, Volumes, Timings

## 2. NH 102 &amp; Exit 4 NB Off

01/23/2018

												
Lane Group	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR	
Lane Configurations												
Traffic Volume (vph)	1250	0	1105	0	0	985	1330	0	0	570	795	
Future Volume (vph)	1250	0	1105	0	0	985	1330	0	0	570	795	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	0	0	0	550		0	0		0	
Storage Lanes		2	2	0	0	2		0	0		1	
Taper Length (ft)		25		25		25		25				
Lane Util. Factor	0.97	1.00	0.88	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00	
Frnt			0.850								0.850	
Flt Protected	0.950					0.950						
Satd. Flow (prot)	3242	0	2632	0	0	3335	3438	0	0	3505	1568	
Flt Permitted	0.950					0.950						
Satd. Flow (perm)	3242	0	2632	0	0	3335	3438	0	0	3505	1568	
Right Turn on Red			No					Yes			Yes	
Satd. Flow (RTOR)											750	
Link Speed (mph)		25		30			30			30		
Link Distance (ft)		856		390			760			857		
Travel Time (s)		23.3		8.9			17.3			19.5		
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92	
Heavy Vehicles (%)	8%	8%	8%	2%	2%	5%	5%	5%	3%	3%	3%	
Adj. Flow (vph)	1420	0	1256	0	0	1048	1415	0	0	620	864	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1420	0	1256	0	0	1048	1415	0	0	620	864	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Right	Right	
Median Width(ft)		24		0			24			24		
Link Offset(ft)		12		0			0			0		
Crosswalk Width(ft)		16		16			16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15	15	25	15	9	15		9	15		25	
Number of Detectors	3		3			3	3			3	0	
Detector Template												
Leading Detector (ft)	256		256			256	256			256	0	
Trailing Detector (ft)	-5		-5			-5	-5			-5	0	
Detector 1 Position(ft)	-5		-5			-5	-5			-5	-5	
Detector 1 Size(ft)	55		55			55	55			55	50	
Detector 1 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0			0.0	0.0			0.0	0.0	
Detector 1 Queue (s)	0.0		0.0			0.0	0.0			0.0	0.0	
Detector 1 Delay (s)	0.0		0.0			0.0	0.0			0.0	0.0	
Detector 2 Position(ft)	125		125			125	125			125		
Detector 2 Size(ft)	6		6			6	6			6		
Detector 2 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0			0.0	0.0			0.0		
Detector 3 Position(ft)	250		250			250	250			250		
Detector 3 Size(ft)	6		6			6	6			6		



## Lanes, Volumes, Timings

## 2. NH 102 &amp; Exit 4 NB Off

01/23/2018



Lane Group	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Detector 3 Type	CI+Ex		CI+Ex			CI+Ex	CI+Ex			CI+Ex	
Detector 3 Channel											
Detector 3 Extend (s)	0.0		0.0			0.0	0.0			0.0	
Turn Type	Prot		Prot			Prot	NA			NA	Free
Protected Phases	8		8			5	2			6	
Permitted Phases											Free
Detector Phase	8		2			5	2			6	
Switch Phase											
Minimum Initial (s)	10.0		10.0			5.0	8.0			8.0	
Minimum Split (s)	16.0		16.0			11.0	42.0			31.0	
Total Split (s)	50.0		50.0			38.0	70.0			32.0	
Total Split (%)	41.7%		41.7%			31.7%	58.3%			26.7%	
Maximum Green (s)	44.0		44.0			32.0	64.0			26.0	
Yellow Time (s)	2.0		2.0			2.0	2.0			2.0	
All-Red Time (s)	4.0		4.0			4.0	4.0			4.0	
Lost Time Adjust (s)	0.0		0.0			0.0	0.0			0.0	
Total Lost Time (s)	6.0		6.0			6.0	6.0			6.0	
Lead/Lag						Lead				Lag	
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0		3.0			3.0	3.0			3.0	
Recall Mode	None		None			None	C-Min			C-Min	
Walk Time (s)							7.0			7.0	
Flash Dont Walk (s)							29.0			17.0	
Pedestrian Calls (#/hr)							0			0	
Act Effct Green (s)	44.0		44.0			32.0	64.0			26.0	120.0
Actuated g/C Ratio	0.37		0.37			0.27	0.53			0.22	1.00
v/c Ratio	1.20		1.30			1.18	0.77			0.82	0.55
Control Delay	131.1		176.4			117.1	20.9			54.6	1.4
Queue Delay	0.0		0.0			0.0	0.0			0.0	0.0
Total Delay	131.1		176.4			117.1	20.9			54.6	1.4
LOS	F		F			F	C			D	A
Approach Delay		152.4					61.8			23.6	
Approach LOS		F					E			C	
Queue Length 50th (ft)	~686		~708			~497	447			242	0
Queue Length 95th (ft)	#793		#827			m#434	m379			#312	0
Internal Link Dist (ft)		776		310			680			777	
Turn Bay Length (ft)						550					
Base Capacity (vph)	1188		965			889	1833			759	1568
Starvation Cap Reductn	0		0			0	0			0	0
Spillback Cap Reductn	0		0			0	0			0	0
Storage Cap Reductn	0		0			0	0			0	0
Reduced v/c Ratio	1.20		1.30			1.18	0.77			0.82	0.55

## Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 44 (37%), Referenced to phase 2:NET and 6:SWT, Start of Yellow

Natural Cycle: 150

## Lanes, Volumes, Timings

### 2 NH 102 & Exit 4 NB Off

01/23/2018

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.30

Intersection Signal Delay: 89.9

Intersection LOS: F

Intersection Capacity Utilization 95.5%

ICU Level of Service F

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: NH 102 & Exit 4 NB Off





Lanes, Volumes, Timings

3 Exit 5 SB On/Exit 5 SB Off & NH 28

01/23/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↓	↑↑					↓↓		↑
Traffic Volume (vph)	0	925	385	240	525	0	0	0	0	740	0	480
Future Volume (vph)	0	925	385	240	525	0	0	0	0	740	0	480
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		350	0		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frnt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	3471	1553	1719	3438	0	0	0	0	3367	0	1553
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	3471	1553	1719	3438	0	0	0	0	3367	0	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			428									298
Link Speed (mph)		30			30			30				35
Link Distance (ft)		851			693			486				581
Travel Time (s)		19.3			15.8			11.0				11.3
Peak Hour Factor	0.87	0.87	0.87	0.86	0.86	0.86	0.92	0.92	0.92	0.91	0.91	0.91
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	4%	4%	4%
Adj. Flow (vph)	0	1063	443	279	610	0	0	0	0	813	0	527
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1063	443	279	610	0	0	0	0	813	0	527
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Right	Left	Right
Median Width(ft)		36			36			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		25	15		9	15		9	15		25
Number of Detectors		3	3	3	3					3		3
Detector Template		Thru	Right	Left	Thru					Left		Right
Leading Detector (ft)		256	256	256	256					256		256
Trailing Detector (ft)		-5	-5	-5	-5					-5		-5
Detector 1 Position(ft)		-5	-5	-5	-5					-5		-5
Detector 1 Size(ft)		50	50	50	50					50		50
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 2 Position(ft)		125	125	125	125					125		125
Detector 2 Size(ft)		6	6	6	6					6		6
Detector 2 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 3 Position(ft)		250	250	250	250					250		250
Detector 3 Size(ft)		6	6	6	6					6		6



## Lanes, Volumes, Timings

3 Exit 5 SB On/Exit 5 SB Off &amp; NH 28

01/23/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 3 Channel												
Detector 3 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Turn Type		NA	Free	Prot	NA					Prot		Prot
Protected Phases		2		1	6					4		4
Permitted Phases			Free									
Detector Phase		2		1	6					4		4
Switch Phase												
Minimum Initial (s)		9.0		4.0	9.0					4.0		4.0
Minimum Split (s)		21.0		10.0	21.0					10.0		10.0
Total Split (s)		42.0		25.0	67.0					33.0		33.0
Total Split (%)		42.0%		25.0%	67.0%					33.0%		33.0%
Maximum Green (s)		36.0		19.0	61.0					27.0		27.0
Yellow Time (s)		4.0		4.0	4.0					4.0		4.0
All-Red Time (s)		2.0		2.0	2.0					2.0		2.0
Lost Time Adjust (s)		0.0		0.0	0.0					0.0		0.0
Total Lost Time (s)		6.0		6.0	6.0					6.0		6.0
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		5.0		3.0	5.0					3.0		3.0
Recall Mode		C-Min		None	C-Min					None		None
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		8.0			8.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)		36.6	100.0	18.4	61.0					27.0		27.0
Actuated g/C Ratio		0.37	1.00	0.18	0.61					0.27		0.27
v/c Ratio		0.84	0.29	0.89	0.29					0.89		0.83
Control Delay		36.3	0.5	30.6	0.2					49.0		27.3
Queue Delay		0.0	0.0	0.0	0.0					0.0		0.0
Total Delay		36.3	0.5	30.6	0.2					49.0		27.3
LOS		D	A	C	A					D		C
Approach Delay		25.8			9.7						40.4	
Approach LOS		C			A						D	
Queue Length 50th (ft)		325	0	11	0					257		143
Queue Length 95th (ft)		391	0	m#57	m0					#364		#331
Internal Link Dist (ft)		771			613			406			501	
Turn Bay Length (ft)			350									
Base Capacity (vph)		1271	1553	326	2097					909		636
Starvation Cap Reductn		0	0	0	0					0		0
Spillback Cap Reductn		0	0	0	0					0		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.84	0.29	0.86	0.29					0.89		0.83

## Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 55 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90



### Lanes, Volumes, Timings

#### 3 2: Exit 5 SB On/Exit 5 SB Off & NH 28

01/23/2018

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 27.2

Intersection LOS: C

Intersection Capacity Utilization 76.8%

ICU Level of Service D

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Exit 5 SB On/Exit 5 SB Off & NH 28



Lanes, Volumes, Timings

4 Exit 5 NB Off & NH 28

01/23/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	580	1085	0	0	470	560	295	0	360	0	0	0
Future Volume (vph)	580	1085	0	0	470	560	295	0	360	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frts						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1752	3505	0	0	3505	1568	1703	0	1524	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1752	3505	0	0	3505	1568	1703	0	1524	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						615			98			
Link Speed (mph)		30			30			35			30	
Link Distance (ft)		693			542			867			392	
Travel Time (s)		15.8			12.3			16.9			8.9	
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.67	0.67	0.67	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	6%	6%	6%	2%	2%	2%
Adj. Flow (vph)	630	1179	0	0	516	615	440	0	537	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	630	1179	0	0	516	615	440	0	537	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Right	Left	Right	Left	Left	Right
Median Width(ft)		36			42			12			12	
Link Offset(ft)		0			0			0			36	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		25	15		25	15		9
Number of Detectors	3	3			3	3	3		0			
Detector Template	Left					Right	Left					
Leading Detector (ft)	256	256			256	256	256		0			
Trailing Detector (ft)	-5	-5			-5	-5	-5		0			
Detector 1 Position(ft)	-5	-5			-5	-5	-5		-5			
Detector 1 Size(ft)	50	50			50	50	50		50			
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 2 Position(ft)	125	125			125	125	125					
Detector 2 Size(ft)	6	6			6	6	6					
Detector 2 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex					
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0			0.0	0.0	0.0					
Detector 3 Position(ft)	250	250			250	250	250					
Detector 3 Size(ft)	6	6			6	6	6					
Detector 3 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0			0.0	0.0	0.0					



## Lanes, Volumes, Timings

4. Exit 5 NB Off &amp; NH 28

01/23/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA			NA	Free	Prot		Prot			
Protected Phases	5	2			6		8		8			
Permitted Phases		2			6	Free						
Detector Phase	5	2			6		8		8			
Switch Phase												
Minimum Initial (s)	4.0	16.0			16.0		4.0		4.0			
Minimum Split (s)	10.0	23.0			23.0		11.0		11.0			
Total Split (s)	41.0	66.0			25.0		34.0		34.0			
Total Split (%)	41.0%	66.0%			25.0%		34.0%		34.0%			
Maximum Green (s)	35.0	60.0			19.0		28.0		28.0			
Yellow Time (s)	4.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	2.0	2.0			2.0		2.0		2.0			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.0		6.0		6.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0			5.0		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		10.0			10.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)	35.0	60.0			19.0	100.0	28.0		28.0			
Actuated g/C Ratio	0.35	0.60			0.19	1.00	0.28		0.28			
v/c Ratio	1.03	0.56			0.78	0.39	0.92		1.08			
Control Delay	45.0	3.2			47.7	0.7	62.2		93.1			
Queue Delay	0.0	0.0			0.0	0.0	0.0		0.0			
Total Delay	45.0	3.2			47.7	0.7	62.2		93.1			
LOS	D	A			D	A	E		F			
Approach Delay		17.8			22.2			79.2				
Approach LOS		B			C			E				
Queue Length 50th (ft)	~446	11			165	0	272		~337			
Queue Length 95th (ft)	m#611	m64			#225	0	266		#304			
Internal Link Dist (ft)		613			462			787			312	
Turn Bay Length (ft)												
Base Capacity (vph)	613	2103			665	1568	477		498			
Starvation Cap Reductn	0	0			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.03	0.56			0.78	0.39	0.92		1.08			

## Intersection Summary

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.08  
 Intersection Signal Delay: 34.4  
 Intersection LOS: C

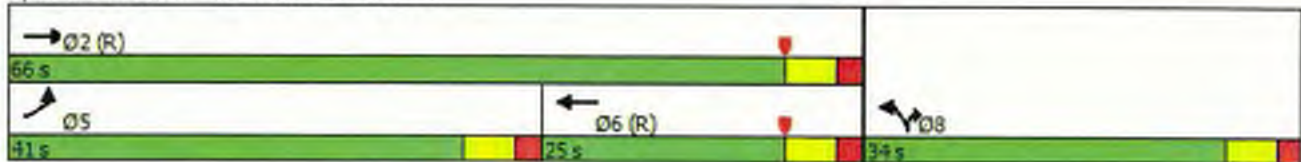
4 **Lanes, Volumes, Timings**  
**8: Exit 5 NB Off & NH 28**

01/23/2018

Intersection Capacity Utilization 76.8% ICU Level of Service D  
 Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Exit 5 NB Off & NH 28

























## Lanes, Volumes, Timings

## 5. NH 102 &amp; St. Charles Street/Londonderry Road

01/23/2018

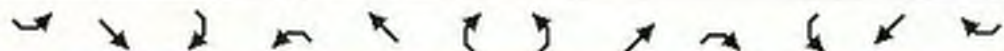
												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	5	160	10	0	10	650	1440	120	10	1020	50
Future Volume (vph)	10	5	160	10	0	10	650	1440	120	10	1020	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		180	0		0	360		0	65		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.932			0.988			0.993	
Flt Protected		0.967			0.976		0.950			0.950		
Satd. Flow (prot)	0	1801	1583	0	1728	0	1770	3497	0	1770	3514	0
Flt Permitted		0.740			0.834		0.950			0.950		
Satd. Flow (perm)	0	1378	1583	0	1477	0	1770	3497	0	1770	3514	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			174		126			15			4	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		593			447			750			186	
Travel Time (s)		13.5			10.2			17.0			4.2	
Peak Hour Factor	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	11	5	174	40	0	40	707	1565	130	11	1109	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	16	174	0	80	0	707	1695	0	11	1163	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	3	1	3	1		3	3		3	3	
Detector Template	Left	Thru	Right	Left			Left	Thru		Left	Thru	
Leading Detector (ft)	256	256	45	256	45		256	256		256	256	
Trailing Detector (ft)	-5	-5	-5	-5	-5		-5	-5		-5	-5	
Detector 1 Position(ft)	-5	-5	-5	-5	-5		-5	-5		-5	-5	
Detector 1 Size(ft)	50	50	50	50	50		50	50		50	50	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)	125	125		125			125	125		125	125	
Detector 2 Size(ft)	6	6		6			6	6		6	6	
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0			0.0	0.0		0.0	0.0	
Detector 3 Position(ft)	250	250		250			250	250		250	250	
Detector 3 Size(ft)	6	6		6			6	6		6	6	



## Lanes, Volumes, Timings

5. NH 102 &amp; St. Charles Street/Londonderry Road

01/23/2018



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 3 Type	CI+Ex	CI+Ex		CI+Ex			CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0		0.0			0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	custom	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		6	4								
Detector Phase	8	8	6	4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	8.0	5.0	5.0		5.0	8.0		5.0	8.0	
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		24.0	24.0		11.0	24.0	
Total Split (s)	24.0	24.0	49.0	24.0	24.0		57.0	95.0		11.0	49.0	
Total Split (%)	18.5%	18.5%	37.7%	18.5%	18.5%		43.8%	73.1%		8.5%	37.7%	
Maximum Green (s)	18.0	18.0	43.0	18.0	18.0		51.0	89.0		5.0	43.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag			Lag				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	Min	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0			0	
Act Effct Green (s)		6.9	43.1		6.9		51.1	99.4		5.0	43.1	
Actuated g/C Ratio		0.06	0.37		0.06		0.44	0.85		0.04	0.37	
w/c Ratio		0.20	0.25		0.39		0.91	0.57		0.14	0.89	
Control Delay		58.9	4.8		7.7		49.3	4.8		60.0	45.3	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		58.9	4.8		7.7		49.3	4.8		60.0	45.3	
LOS		E	A		A		D	A		E	D	
Approach Delay		9.4			7.7			17.9			45.4	
Approach LOS		A			A			B			D	
Queue Length 50th (ft)		12	0		0		505	152		8	441	
Queue Length 95th (ft)		36	47		0		#776	373		29	#594	
Internal Link Dist (ft)		513			367			670			106	
Turn Bay Length (ft)			180				360			65		
Base Capacity (vph)		213	694		335		775	2983		76	1300	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced w/c Ratio		0.06	0.25		0.24		0.91	0.57		0.14	0.89	

## Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 116.6  
 Natural Cycle: 130  
 Control Type: Actuated-Uncoordinated



Lanes, Volumes, Timings

5. 9: NH 102 & St. Charles Street/Londonderry Road

01/23/2018

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 25.7

Intersection LOS: C

Intersection Capacity Utilization 92.4%

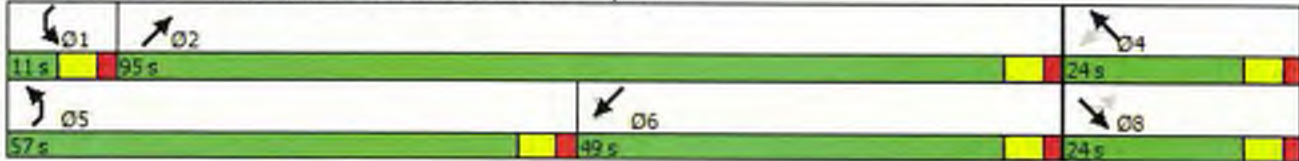
ICU Level of Service F

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.



















Splits and Phases: 9: NH 102 & St. Charles Street/Londonderry Road



## Lanes, Volumes, Timings

## 10: NH 102 &amp; Fordway/Madden Hill Road

01/23/2018

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	30	5	260	0	50	0	1020	220	15	555	0
Future Volume (vph)	10	30	5	260	0	50	0	1020	220	15	555	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		100	0		100	0		0
Storage Lanes	0		0	1		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.986				0.850			0.850			
Flt Protected		0.989		0.950							0.999	
Satd. Flow (prot)	0	1816	0	1752	0	1568	0	1759	1495	0	1808	0
Flt Permitted		0.989		0.797							0.716	
Satd. Flow (perm)	0	1816	0	1470	0	1568	0	1759	1495	0	1296	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				49			129			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		356			493			234			339	
Travel Time (s)		8.1			11.2			5.3			7.7	
Peak Hour Factor	0.60	0.60	0.60	0.96	0.96	0.96	0.89	0.89	0.89	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	8%	8%	8%	5%	5%	5%
Adj. Flow (vph)	17	50	8	271	0	52	0	1146	247	17	645	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	75	0	271	0	52	0	1146	247	0	662	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		-22			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	1		3		1		2	1	3	2	
Detector Template	Left			Left		Right			Right	Left		
Leading Detector (ft)	256	45		256		45		131	45	256	131	
Trailing Detector (ft)	-5	-5		-5		-5		-5	-5	-5	-5	
Detector 1 Position(ft)	-5	-5		-5		-5		-5	-5	-5	-5	
Detector 1 Size(ft)	50	50		50		50		50	50	50	50	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0		0.0		0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0		0.0		0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0		0.0		0.0	0.0	0.0	0.0	
Detector 2 Position(ft)	125			125				125		125	125	
Detector 2 Size(ft)	6			6				6		6	6	
Detector 2 Type	Cl+Ex			Cl+Ex				Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0				0.0		0.0	0.0	
Detector 3 Position(ft)	250			250						250		
Detector 3 Size(ft)	6			6						6		



## Lanes, Volumes, Timings

NH 102 &amp; Fordway/Madden Hill Road

01/23/2018

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 3 Type	CI+Ex			CI+Ex						CI+Ex		
Detector 3 Channel												
Detector 3 Extend (s)	0.0			0.0						0.0		
Turn Type	Perm	NA		D.Pm		Perm		NA	Perm	Perm	NA	
Protected Phases		4						2			2	
Permitted Phases	4			4		8			2	2		
Detector Phase	4	4		4		8		2	2	2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0		5.0		5.0	5.0	5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0		22.5		24.0	24.0	24.0	24.0	
Total Split (s)	24.0	24.0		24.0		24.0		66.0	66.0	66.0	66.0	
Total Split (%)	26.7%	26.7%		26.7%		26.7%		73.3%	73.3%	73.3%	73.3%	
Maximum Green (s)	18.0	18.0		18.0		19.5		60.0	60.0	60.0	60.0	
Yellow Time (s)	4.0	4.0		4.0		3.5		4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0		1.0		2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0		0.0		0.0		0.0	0.0		0.0	
Total Lost Time (s)		6.0		6.0		4.5		6.0	6.0		6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0		3.0		3.0	3.0	3.0	3.0	
Recall Mode	None	None		None		None		Min	Min	Min	Min	
Walk Time (s)	7.0	7.0		7.0		7.0		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0		11.0		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0		0		0	0	0	0	
Act Effct Green (s)		17.9		17.9		19.4		60.1	60.1		60.1	
Actuated g/C Ratio		0.20		0.20		0.22		0.67	0.67		0.67	
v/c Ratio		0.20		0.93		0.14		0.98	0.24		0.76	
Control Delay		29.4		74.6		10.5		37.2	3.3		17.7	
Queue Delay		0.0		0.0		0.0		0.0	0.0		0.0	
Total Delay		29.4		74.6		10.5		37.2	3.3		17.7	
LOS		C		E		B		D	A		B	
Approach Delay		29.4			64.3			31.2			17.7	
Approach LOS		C			E			C			B	
Queue Length 50th (ft)		33		152		1		549	21		226	
Queue Length 95th (ft)		45		#300		30		#892	47		349	
Internal Link Dist (ft)		276			413			154			259	
Turn Bay Length (ft)						100			100			
Base Capacity (vph)		368		294		378		1174	1041		866	
Starvation Cap Reductn		0		0		0		0	0		0	
Spillback Cap Reductn		0		0		0		0	0		0	
Storage Cap Reductn		0		0		0		0	0		0	
Reduced v/c Ratio		0.20		0.92		0.14		0.98	0.24		0.76	

## Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated

# Lanes, Volumes, Timings

6. 10: NH 102 & Fordway/Madden Hill Road

01/23/2018

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 31.9

Intersection LOS: C

Intersection Capacity Utilization 86.1%

ICU Level of Service E

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 10: NH 102 & Fordway/Madden Hill Road

 Ø2 65 s	 Ø4 24 s
	 Ø8 24 s


























## Zone 3

2040 Alt F PM Peak

## 7: NH 102 (E Broadway) &amp; Birch St/Crystal Av

Lanes, Volumes, Timings

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	230	110	30	180	150	180	170	540	130	70	330	180
Future Volume (vph)	230	110	30	180	150	180	170	540	130	70	330	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	70		0	245		245	390		0	110		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Friction		0.968				0.850			0.850		0.947	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	1786	0	1752	1845	1568	1787	1881	1599	1787	3385	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	1786	0	1752	1845	1568	1787	1881	1599	1787	3385	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15				150			137		116	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		361			411			477			530	
Travel Time (s)		8.2			9.3			10.8			12.0	
Peak Hour Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.95	0.95	0.95	0.94	0.94	0.94
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	253	121	33	194	161	194	179	568	137	74	351	191
Shared Lane Traffic (%)												
Lane Group Flow (vph)	253	154	0	194	161	194	179	568	137	74	542	0
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4	5	5	2	3	1	6	
Permitted Phases						4			2			
Detector Phase	3	8		7	4	5	5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	4.0	5.0		4.0	10.0	4.0	4.0	10.0	4.0	4.0	9.0	
Minimum Split (s)	17.0	24.0		11.0	24.0	16.0	16.0	24.0	17.0	11.0	24.0	
Total Split (s)	17.0	24.0		17.0	24.0	16.0	16.0	33.0	17.0	11.0	28.0	
Total Split (%)	20.0%	28.2%		20.0%	28.2%	18.8%	18.8%	38.8%	20.0%	12.9%	32.9%	
Maximum Green (s)	11.0	18.0		11.0	18.0	10.0	10.0	27.0	11.0	5.0	22.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max	None	None	None	
Act Effct Green (s)	10.0	12.0		10.8	12.8	28.7	9.9	27.3	43.4	5.1	19.7	
Actuated g/C Ratio	0.13	0.16		0.14	0.17	0.37	0.13	0.36	0.57	0.07	0.26	
v/c Ratio	0.57	0.53		0.79	0.53	0.28	0.78	0.85	0.14	0.63	0.57	
Control Delay	37.9	34.4		58.0	36.9	6.5	58.8	39.1	2.3	63.1	22.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	37.9	34.4		58.0	36.9	6.5	58.8	39.1	2.3	63.1	22.0	
LOS	D	C		E	D	A	E	D	A	E	C	
Approach Delay		36.6			33.6			37.4			26.9	



Zone 3  
7: NH 102 (E Broadway) & Birch St/Crystal Av

2040 Alt F PM Peak  
Lanes, Volumes, Timings

Lane Group	NBL	NBT	NBR	SBL	SBT	SSR	NEL	NET	NER	SWL	SWT	SWR
Approach LOS		D			C			D				C
Queue Length 50th (ft)	60	64		94	75	14	87	261	0	37	91	
Queue Length 95th (ft)	103	120		#218	132	56	#206	#491	25	#108	152	
Internal Link Dist (ft)		281			331			397			450	
Turn Bay Length (ft)	70			245		245	390			110		
Base Capacity (vph)	492	435		253	437	684	235	669	984	117	1063	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.51	0.35		0.77	0.37	0.28	0.76	0.85	0.14	0.63	0.51	

Intersection Summary

Area Type: Other  
 Cycle Length: 85  
 Actuated Cycle Length: 76.7  
 Natural Cycle: 85  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 33.8  
 Intersection LOS: C  
 Intersection Capacity Utilization 87.0%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 7: NH 102 (E Broadway) & Birch St/Crystal Av

01 11 s	02 33 s	03 17 s	04 24 s
05 16 s	06 28 s	07 17 s	08 24 s
























## Zone 4

## 2040 Alt F PM Peak

## 11: Folsom Rd/Tsienneto Rd &amp; NH 28 S/NH 28

Lanes, Volumes, Timings

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	60	180	240	390	280	0	150	470	100	190	370	370
Future Volume (vph)	60	180	240	390	280	0	150	470	100	190	370	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	110		90	360		0	190		180	0		210
Storage Lanes	1		1	2		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	0	1770	1863	1583	1787	1881	1599
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3539	0	1770	1863	1583	1787	1881	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			261						208			240
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		639			495			532			387	
Travel Time (s)		14.5			11.3			12.1			8.8	
Peak Hour Factor	0.92	0.92	0.92	0.94	0.94	0.94	0.96	0.96	0.96	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Adj. Flow (vph)	65	196	261	415	298	0	156	490	104	200	389	389
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	196	261	415	298	0	156	490	104	200	389	389
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2		1	6		7	4		3	8	1
Permitted Phases			2						4			8
Detector Phase	5	2	2	1	6		7	4	4	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	14.0	22.0	22.0	14.0	22.0		14.0	22.0	22.0	14.0	22.0	14.0
Total Split (s)	14.0	22.0	22.0	21.0	29.0		23.0	45.0	45.0	22.0	44.0	21.0
Total Split (%)	12.7%	20.0%	20.0%	19.1%	26.4%		20.9%	40.9%	40.9%	20.0%	40.0%	19.1%
Maximum Green (s)	8.0	16.0	16.0	15.0	23.0		17.0	39.0	39.0	16.0	38.0	15.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	None		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		11.0	11.0		11.0			11.0	11.0		11.0	
Pedestrian Calls (#/hr)		0	0		0			0	0		0	
Act Effct Green (s)	8.3	20.7	20.7	16.4	31.6		14.2	33.8	33.8	15.1	34.7	57.1
Actuated g/C Ratio	0.08	0.19	0.19	0.15	0.29		0.13	0.31	0.31	0.14	0.32	0.52
v/c Ratio	0.49	0.29	0.51	0.81	0.29		0.69	0.86	0.17	0.82	0.66	0.41
Control Delay	61.7	41.8	9.2	68.9	33.6		61.0	50.6	0.6	71.8	37.8	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0



Zone 4

2040 Alt F PM Peak

11: Folsom Rd/Tsienneto Rd & NH 28 S/NH 28

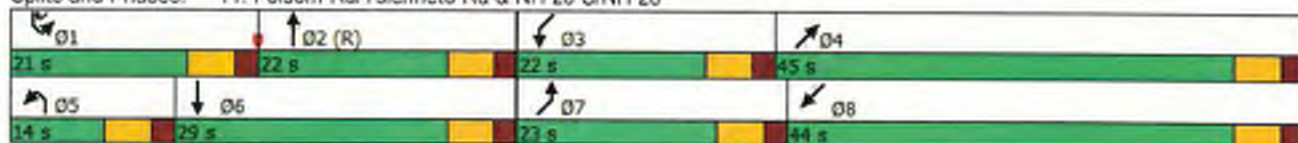
Lanes, Volumes, Timings

	↶	↑	↗	↘	↓	↙	↖	↗	↘	↙	↖	↗
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Total Delay	61.7	41.8	9.2	68.9	33.6		61.0	50.6	0.6	71.8	37.8	6.7
LOS	E	D	A	E	C		E	D	A	E	D	A
Approach Delay		28.0			54.2			45.8			32.4	
Approach LOS		C			D			D			C	
Queue Length 50th (ft)	44	66	0	148	85		106	319	0	138	232	49
Queue Length 95th (ft)	91	103	75	#245	104		173	428	0	#250	328	114
Internal Link Dist (ft)		559			415			452			307	
Turn Bay Length (ft)	110		90	360			190		180			210
Base Capacity (vph)	133	667	510	511	1015		273	660	695	259	649	945
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	0.49	0.29	0.51	0.81	0.29		0.57	0.74	0.15	0.77	0.60	0.41

Intersection Summary

Area Type: Other  
 Cycle Length: 110  
 Actuated Cycle Length: 110  
 Offset: 0 (0%), Referenced to phase 2:NBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.86  
 Intersection Signal Delay: 40.3  
 Intersection LOS: D  
 Intersection Capacity Utilization 73.1%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 11: Folsom Rd/Tsienneto Rd & NH 28 S/NH 28





## Zone 4

## 13: Applebee's/Linlew Dr &amp; NH 28

## 2040 Alt F PM Peak

Lanes, Volumes, Timings

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	130	895	5	10	620	60	15	10	15	20	10	110
Future Volume (vph)	130	895	5	10	620	60	15	10	15	20	10	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	115		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.987				0.850			0.850
Flt Protected	0.950			0.950				0.971			0.968	
Satd. Flow (prot)	1787	3571	0	1787	3528	0	0	1845	1615	0	1821	1599
Flt Permitted	0.950			0.950				0.792			0.785	
Satd. Flow (perm)	1787	3571	0	1787	3528	0	0	1505	1615	0	1477	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			12				149			149
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		277			652			230			387	
Travel Time (s)		6.3			14.8			5.2			8.8	
Peak Hour Factor	0.97	0.97	0.97	0.95	0.95	0.95	0.90	0.90	0.90	0.80	0.80	0.80
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	134	923	5	11	653	63	17	11	17	25	13	138
Shared Lane Traffic (%)												
Lane Group Flow (vph)	134	928	0	11	716	0	0	28	17	0	38	138
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8		8	4	4	4
Detector Phase	5	2		1	6		8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	8.0		5.0	8.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	26.0	63.0		11.0	48.0		21.0	21.0	21.0	21.0	21.0	21.0
Total Split (s)	30.0	74.0		11.0	55.0		25.0	25.0	25.0	25.0	25.0	25.0
Total Split (%)	27.3%	67.3%		10.0%	50.0%		22.7%	22.7%	22.7%	22.7%	22.7%	22.7%
Maximum Green (s)	24.0	68.0		5.0	49.0		19.0	19.0	19.0	19.0	19.0	19.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	None
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		11.0			11.0		8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0	0	0
Act Effct Green (s)	13.5	87.1		6.3	70.3			8.2	8.2		8.2	8.2
Actuated g/C Ratio	0.12	0.79		0.06	0.64			0.07	0.07		0.07	0.07
v/c Ratio	0.61	0.33		0.11	0.32			0.25	0.07		0.35	0.54
Control Delay	67.9	3.0		44.4	14.0			52.5	0.5		56.2	14.6
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0

Zone 4  
13: Applebee's/Linlew Dr & NH 28

2040 Alt F PM Peak  
Lanes, Volumes, Timings

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Total Delay	67.9	3.0		44.4	14.0			52.5	0.5		56.2	14.6
LOS	E	A		D	B			D	A		E	B
Approach Delay		11.2			14.4			32.8			23.6	
Approach LOS		B			B			C			C	
Queue Length 50th (ft)	102	34		8	128			19	0		26	0
Queue Length 95th (ft)	157	84		m19	187			47	0		52	33
Internal Link Dist (ft)		197			572			150			307	
Turn Bay Length (ft)	100			115								
Base Capacity (vph)	389	2827		101	2257			259	402		255	399
Starvation Cap Reductn	0	0		0	0			0	0		0	0
Spillback Cap Reductn	0	0		0	0			0	0		0	0
Storage Cap Reductn	0	0		0	0			0	0		0	0
Reduced v/c Ratio	0.34	0.33		0.11	0.32			0.11	0.04		0.15	0.35

Intersection Summary

Area Type: Other  
 Cycle Length: 110  
 Actuated Cycle Length: 110  
 Offset: 0 (0%), Referenced to phase 2:SET and 6:NWT, Start of Green  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.61  
 Intersection Signal Delay: 13.9  
 Intersection LOS: B  
 Intersection Capacity Utilization 52.4%  
 ICU Level of Service A  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 13: Applebee's/Linlew Dr & NH 28





Zone 4  
14: VIP Dr/Ashleigh Dr & NH 28

2040 Alt F PM Peak  
Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	770	5	5	580	190	40	10	10	350	10	140
Future Volume (vph)	80	770	5	5	580	190	40	10	10	350	10	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	280		150	205		150	0		0	325		150
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (ft)	150			25			25			25		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.999			0.963			0.925				0.850
Fit Protected	0.950			0.950			0.950			0.950	0.955	
Satd. Flow (prot)	3467	3571	0	1770	3408	0	1805	1758	0	1715	1724	1615
Fit Permitted	0.950			0.950			0.950			0.950	0.955	
Satd. Flow (perm)	3467	3571	0	1770	3408	0	1805	1758	0	1715	1724	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			43			13				163
Link Speed (mph)		30			30			30				30
Link Distance (ft)		877			314			151				476
Travel Time (s)		19.9			7.1			3.4				10.8
Peak Hour Factor	0.84	0.84	0.84	0.90	0.90	0.90	0.78	0.78	0.78	0.86	0.86	0.86
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	95	917	6	6	644	211	51	13	13	407	12	163
Shared Lane Traffic (%)										49%		
Lane Group Flow (vph)	95	923	0	6	855	0	51	26	0	208	211	163
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	pt+ov
Protected Phases	5	2		1	6		3	3		4	4	4 5
Permitted Phases		2			6							
Detector Phase	5	2		1	6		3	3		4	4	4 5
Switch Phase												
Minimum Initial (s)	5.0	8.0		5.0	8.0		5.0	5.0		8.0	8.0	
Minimum Split (s)	11.0	22.0		11.0	22.0		22.0	22.0		22.0	22.0	
Total Split (s)	14.0	45.0		11.0	42.0		22.0	22.0		32.0	32.0	
Total Split (%)	12.7%	40.9%		10.0%	38.2%		20.0%	20.0%		29.1%	29.1%	
Maximum Green (s)	8.0	39.0		5.0	36.0		16.0	16.0		26.0	26.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	None		None	None		None	None	
Walk Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	8.4	63.6		6.0	51.8		8.5	8.5		19.6	19.6	34.0
Actuated g/C Ratio	0.08	0.58		0.05	0.47		0.08	0.08		0.18	0.18	0.31
v/c Ratio	0.36	0.45		0.06	0.53		0.37	0.18		0.68	0.69	0.27
Control Delay	51.6	17.3		59.6	21.0		54.8	32.2		52.7	53.0	4.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0

Zone 4  
14: VIP Dr/Ashleigh Dr & NH 28

2040 Alt F PM Peak  
Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	51.6	17.3		59.6	21.0		54.8	32.2		52.7	53.0	4.6
LOS	D	B		E	C		D	C		D	D	A
Approach Delay		20.5			21.2			47.2			39.4	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	33	182		4	147		35	9		146	148	0
Queue Length 95th (ft)	55	332		m15	255		62	30		200	202	35
Internal Link Dist (ft)		797			234			71			396	
Turn Bay Length (ft)	280			205						325		150
Base Capacity (vph)	279	2064		96	1626		262	266		410	412	610
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	0.34	0.45		0.06	0.53		0.19	0.10		0.51	0.51	0.27

Intersection Summary

Area Type: Other  
 Cycle Length: 110  
 Actuated Cycle Length: 110  
 Offset: 0 (0%), Referenced to phase 2:EBT, Start of Green  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.69  
 Intersection Signal Delay: 25.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 57.9%  
 ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 14: VIP Dr/Ashleigh Dr & NH 28


























## Zone 5

2040 Alt F PM Peak

## 18: Tsienneto Rd &amp; NH 28 Byp NB/NH 28 Byp SB

Lanes, Volumes, Timings

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	30	80	40	40	50	130	190	680	70	20	340	40
Future Volume (vph)	30	80	40	40	50	130	190	680	70	20	340	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	190		190	135		0	120		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.950				0.850		0.986			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1770	0	1787	1881	1599	1805	1873	0	1805	1870	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1770	0	1787	1881	1599	1805	1873	0	1805	1870	0
Right Turn on Red			Yes			Yes		Yes			Yes	
Satd. Flow (RTOR)		25				137		8			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		481			347			479			371	
Travel Time (s)		10.9			7.9			10.9			8.4	
Peak Hour Factor	0.99	0.99	0.99	0.95	0.95	0.95	0.89	0.89	0.89	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	30	81	40	42	53	137	213	764	79	22	366	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	121	0	42	53	137	213	843	0	22	409	0
Turn Type	Prot	NA		Prot	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	1	6		5	2	2 3	3	8		7	4	
Permitted Phases		6			2							
Detector Phase	1	6		5	2	2 3	3	8		7	4	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		14.0	28.0		14.0	14.0	
Total Split (s)	14.0	14.0		14.0	14.0		19.0	38.0		14.0	33.0	
Total Split (%)	17.5%	17.5%		17.5%	17.5%		23.8%	47.5%		17.5%	41.3%	
Maximum Green (s)	8.0	8.0		8.0	8.0		13.0	32.0		8.0	27.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	Max		None	None		None	None	
Walk Time (s)								7.0				
Flash Dont Walk (s)								15.0				
Pedestrian Calls (#/hr)								0				
Act Effect Green (s)	8.3	8.3		8.3	10.9	28.8	11.6	34.7		8.3	21.5	
Actuated g/C Ratio	0.12	0.12		0.12	0.16	0.43	0.17	0.51		0.12	0.32	
v/c Ratio	0.14	0.50		0.19	0.17	0.18	0.68	0.87		0.10	0.68	
Control Delay	33.7	35.1		34.2	31.2	4.6	42.0	31.7		33.4	27.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	



## Zone 5

2040 Alt F PM Peak

## 18: Tsienneto Rd &amp; NH 28 Byp NB/NH 28 Byp SB

Lanes, Volumes, Timings

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Total Delay	33.7	35.1		34.2	31.2	4.6	42.0	31.7		33.4	27.5	
LOS	C	D		C	C	A	D	C		C	C	
Approach Delay		34.8			16.0			33.8			27.8	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	13	42		18	17	0	92	295		9	167	
Queue Length 95th (ft)	39	#113		50	59	36	#197	#700		32	263	
Internal Link Dist (ft)		401			267			399			291	
Turn Bay Length (ft)	200			190		190	135			120		
Base Capacity (vph)	218	240		219	303	800	361	966		222	782	
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	0.14	0.50		0.19	0.17	0.17	0.59	0.87		0.10	0.52	

## Intersection Summary

Area Type:	Other
Cycle Length:	80
Actuated Cycle Length:	67.5
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.87
Intersection Signal Delay:	30.3
Intersection LOS:	C
Intersection Capacity Utilization:	70.6%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

## Splits and Phases: 18: Tsienneto Rd &amp; NH 28 Byp NB/NH 28 Byp SB

01	02	03	04
14 s	14 s	19 s	33 s
05	06	07	08
14 s	14 s	14 s	38 s