APPENDIX D:
SYNCHRO OUTPUT FILES

2011 EXISTING CONDITION

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Act Effct Green (s)	44.0	32.0	44.0	32.0	48.4	36.0	66.0	55.4
Actuated g/C Ratio	0.40	0.29	0.40	0.29	0.44	0.33	0.60	0.50
v/c Ratio	0.71	0.89	0.50	0.62	0.16	0.89	1.11	0.56
Control Delay	38.2	49.0	29.1	34.3	11.5	54.8	105.1	22.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	49.0	29.1	34.3	11.5	54.8	105.1	22.0
LOS	D	D	C	C	B	D	F	C
Approach Delay		47.1		33.5		49.6		65.7
Approach LOS		D		C		D		E

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.11	
Intersection Signal Delay: 50.4	Intersection LOS: D
Intersection Capacity Utilization 105.2%	ICU Level of Service G
Analysis Period (min) 15	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)	37.3	60.1	20.3	60.1	14.7	60.1
Actuated g/C Ratio	0.62	1.00	0.34	1.00	0.24	1.00
v/c Ratio	0.32	0.46	0.58	0.15	0.09	0.02
Control Delay	6.6	0.4	19.3	0.2	18.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.6	0.4	19.3	0.2	18.8	0.0
LOS	A	A	B	A	B	A
Approach Delay		1.0	14.6		9.5	
Approach LOS		A	B		A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 60.1	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 5.8	Intersection LOS: A
Intersection Capacity Utilization 57.3%	ICU Level of Service B
Analysis Period (min) 15	

Lane Group	EBT	WBT	NBL	NBT	SBT	SBR
Act Effct Green (s)	41.0	21.0	18.2	18.2	18.2	16.2
Actuated g/C Ratio	0.46	0.24	0.20	0.20	0.20	0.18
v/c Ratio	0.98	0.95	0.66	0.83	0.41	0.39
Control Delay	42.7	55.6	46.7	50.9	37.3	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.7	55.6	46.7	50.9	37.3	8.5
LOS	D	E	D	D	D	A
Approach Delay	42.7	55.6		49.5	18.9	
Approach LOS	D	E		D	B	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 89.3	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 45.1	Intersection LOS: D
Intersection Capacity Utilization 96.9%	ICU Level of Service F
Analysis Period (min) 15	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1234	3	23	775	1	98
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1299	3	24	816	1	103
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				4.0		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				847		
pX, platoon unblocked					0.88	
vC, conflicting volume			1302		1757	652
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1302		1585	652
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		99	75
cM capacity (veh/h)			528		85	410

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	866	436	296	544	104
Volume Left	0	0	24	0	1
Volume Right	0	3	0	0	103
cSH	1700	1700	528	1700	395
Volume to Capacity	0.51	0.26	0.05	0.32	0.26
Queue Length 95th (ft)	0	0	4	0	26
Control Delay (s)	0.0	0.0	1.6	0.0	17.4
Lane LOS			A		C
Approach Delay (s)	0.0		0.6		17.4
Approach LOS					C

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Act Effct Green (s)	47.0	20.7	112.2	37.5	22.7	29.5	15.7	15.7
Actuated g/C Ratio	0.42	0.18	1.00	0.33	0.20	0.26	0.14	0.14
v/c Ratio	0.98	0.88	0.03	0.90	0.53	0.35	0.85	0.26
Control Delay	51.4	61.2	0.0	61.3	41.8	30.2	77.2	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.4	61.2	0.0	61.3	41.8	30.2	77.2	12.6
LOS	D	E	A	E	D	C	E	B
Approach Delay	51.4	55.9			50.7		52.1	
Approach LOS	D	E			D		D	

Intersection Summary	
Cycle Length: 113	
Actuated Cycle Length: 112.2	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 52.3	Intersection LOS: D
Intersection Capacity Utilization 93.1%	ICU Level of Service F
Analysis Period (min) 15	

Lane Group	EBT	WBT	SBL	SBR
Act Effct Green (s)	85.3	85.3	9.0	9.0
Actuated g/C Ratio	0.96	0.96	0.10	0.10
v/c Ratio	0.38	0.18	0.01	0.03
Control Delay	1.0	0.6	38.0	24.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	1.0	0.6	38.0	24.6
LOS	A	A	D	C
Approach Delay	1.0	0.6	26.8	
Approach LOS	A	A	C	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 88.4	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.38	
Intersection Signal Delay: 1.0	Intersection LOS: A
Intersection Capacity Utilization 58.0%	ICU Level of Service B
Analysis Period (min) 15	

Lane Group	EBL	EBT	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	58.0	56.0	10.2	22.9	22.9	17.1	32.1	110.0
Actuated g/C Ratio	0.53	0.51	0.09	0.21	0.21	0.16	0.29	1.00
v/c Ratio	0.36	0.99	0.27	0.24	0.09	0.75	0.32	0.38
Control Delay	16.5	55.5	49.8	37.7	36.8	61.6	32.8	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.5	55.5	49.8	37.7	36.8	61.6	32.8	0.7
LOS	B	E	D	D	D	E	C	A
Approach Delay		45.3		39.8			21.0	
Approach LOS		D		D			C	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 34.2 Intersection LOS: C
Intersection Capacity Utilization 76.5% ICU Level of Service D
Analysis Period (min) 15

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	12	12	12	12	12	13	12
Storage Length (ft)	200		0	200		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	30		150	95		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			No
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		511			579			467			663	
Travel Time (s)		11.6			13.2			9.1			12.9	
Act Effct Green (s)	45.0	32.0		45.0	32.0		54.7	41.0		55.0	41.3	
Actuated g/C Ratio	0.45	0.32		0.45	0.32		0.55	0.41		0.55	0.41	
v/c Ratio	0.56	0.41		0.45	1.00		0.49	0.83		0.76	0.71	
Control Delay	25.5	26.9		20.8	60.3		16.2	37.0		34.2	31.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.5	26.9		20.8	60.3		16.2	37.0		34.2	31.0	
LOS	C	C		C	E		B	D		C	C	
Approach Delay		26.5			54.5			32.2			32.0	
Approach LOS		C			D			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 39.3 Intersection LOS: D
Intersection Capacity Utilization 95.8% ICU Level of Service F
Analysis Period (min) 15

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	15	15
Storage Length (ft)	285			300	0	250
Storage Lanes	1			1	1	1
Taper Length (ft)	100			100	25	100
Right Turn on Red				Yes		Yes
Link Speed (mph)		25	30		30	
Link Distance (ft)		1343	418		932	
Travel Time (s)		36.6	9.5		21.2	
Act Effct Green (s)	44.7	65.3	31.7	65.3	12.4	65.3
Actuated g/C Ratio	0.68	1.00	0.49	1.00	0.19	1.00
v/c Ratio	0.18	0.21	0.65	0.04	0.51	0.11
Control Delay	4.7	0.1	16.1	0.0	30.8	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.7	0.1	16.1	0.0	30.8	0.1
LOS	A	A	B	A	C	A
Approach Delay		0.5	15.3		15.2	
Approach LOS		A	B		B	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 65.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 10.2 Intersection LOS: B
Intersection Capacity Utilization 57.8% ICU Level of Service B
Analysis Period (min) 15

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	0		400
Storage Lanes	0		0	0		0	1		1	0		1
Taper Length (ft)	25		25	25		25	100		100	25		200
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			30			25			25	
Link Distance (ft)		1239			1760			1420			1263	
Travel Time (s)		18.8			40.0			38.7			34.4	
Act Effct Green (s)		29.0			31.1		17.5	17.5			17.5	15.5
Actuated g/C Ratio		0.33			0.36		0.20	0.20			0.20	0.18
v/c Ratio		0.87			0.91		0.48	0.47			0.70	0.48
Control Delay		36.7			38.9		43.4	30.0			44.9	8.4
Queue Delay		0.0			0.0		0.0	0.0			0.0	0.0
Total Delay		36.7			38.9		43.4	30.0			44.9	8.4
LOS		D			D		D	C			D	A
Approach Delay		36.7			38.9			33.7			26.4	
Approach LOS		D			D			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 86.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 35.7 Intersection LOS: D
Intersection Capacity Utilization 89.8% ICU Level of Service E
Analysis Period (min) 15

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	50			45	30	
Link Distance (ft)	1760			847	588	
Travel Time (s)	24.0			12.8	13.4	
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 65.3% ICU Level of Service C
Analysis Period (min) 15

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	681	4	85	1082	2	63
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	709	4	89	1127	2	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				847		
pX, platoon unblocked					0.77	
vC, conflicting volume			714		1452	357
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			714		985	357
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			90		99	90
cM capacity (veh/h)			882		172	640

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	473	241	464	751	68
Volume Left	0	0	89	0	2
Volume Right	0	4	0	0	66
cSH	1700	1700	882	1700	590
Volume to Capacity	0.28	0.14	0.10	0.44	0.11
Queue Length 95th (ft)	0	0	8	0	10
Control Delay (s)	0.0	0.0	2.8	0.0	11.9
Lane LOS			A		B
Approach Delay (s)	0.0		1.1		11.9
Approach LOS					B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	13	12	12	15	10	11	11	11	11	11
Storage Length (ft)	0		0	0		230	100		0	250		0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (ft)	25		25	25		25	180		25	75		25
Right Turn on Red			No			Yes			Yes			Yes
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		847			742			331			588	
Travel Time (s)		23.1			20.2			6.4			11.5	
Act Effct Green (s)		28.7			36.0	107.9	35.8	19.0		33.3	17.1	17.1
Actuated g/C Ratio		0.27			0.33	1.00	0.33	0.18		0.31	0.16	0.16
v/c Ratio		0.87			0.83	0.06	0.79	0.82		0.59	1.00	0.43
Control Delay		49.9			40.6	0.1	49.1	55.1		36.4	101.0	10.6
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		49.9			40.6	0.1	49.1	55.1		36.4	101.0	10.6
LOS		D			D	A	D	E		D	F	B
Approach Delay		49.9			36.5			53.1			59.2	
Approach LOS		D			D			D			E	

Intersection Summary

Area Type: Other
Cycle Length: 113
Actuated Cycle Length: 107.9
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 47.9 Intersection LOS: D
Intersection Capacity Utilization 87.7% ICU Level of Service E
Analysis Period (min) 15

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	11	12	12
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	25		25	
Link Distance (ft)		1998	1034		194	
Travel Time (s)		30.3	28.2		5.3	
Act Effct Green (s)		27.8	27.8		9.4	9.4
Actuated g/C Ratio		0.68	0.68		0.23	0.23
v/c Ratio		0.38	0.47		0.12	0.19
Control Delay		5.1	5.4		14.0	5.6
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		5.1	5.4		14.0	5.6
LOS		A	A		B	A
Approach Delay		5.1	5.4		8.7	
Approach LOS		A	A		A	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 41
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.47
Intersection Signal Delay: 5.5 Intersection LOS: A
Intersection Capacity Utilization 66.4% ICU Level of Service C
Analysis Period (min) 15

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	230		180	120		0
Storage Lanes	1		0	0		0	1		1	1		1
Taper Length (ft)	25		25	25		25	100		50	75		200
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		45			30			45			45	
Link Distance (ft)		923			748			1034			725	
Travel Time (s)		14.0			17.0			15.7			11.0	
Act Effct Green (s)	40.3	40.3					19.1	46.0	46.0	15.7	42.6	120.0
Actuated g/C Ratio	0.34	0.34					0.16	0.38	0.38	0.13	0.36	1.00
v/c Ratio	0.35	0.88					0.72	0.19	0.05	0.66	0.22	0.56
Control Delay	30.7	52.7					62.0	27.5	28.6	62.7	30.3	1.5
Queue Delay	0.0	0.0					0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	52.7					62.0	27.5	28.6	62.7	30.3	1.5
LOS	C	D					E	C	C	E	C	A
Approach Delay		46.6						42.0			14.7	
Approach LOS		D						D			B	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 29.2 Intersection LOS: C
Intersection Capacity Utilization 61.5% ICU Level of Service B
Analysis Period (min) 15

2015 NO BUILD CONDITION

Intersection: 1: East Hanover Ave & US 202

Movement	EB	EB	EB	B29	WB	WB	WB	NB	NB	B30	SB	SB
Directions Served	L	T	TR	T	L	T	TR	L	TR	T	L	TR
Maximum Queue (ft)	250	525	526	3183	250	525	488	134	486	1341	668	659
Average Queue (ft)	231	505	443	3116	160	329	270	58	462	1186	638	350
95th Queue (ft)	300	547	641	3528	286	499	449	114	473	1588	715	639
Link Distance (ft)		452	452	3149		512	512	389	389	1300	587	587
Upstream Blk Time (%)		49	20	47		0	0		69	45	50	2
Queuing Penalty (veh)		0	0	0		2	0		0	0	0	0
Storage Bay Dist (ft)	200				200							
Storage Blk Time (%)	67	37			13	32						
Queuing Penalty (veh)	371	79			34	42						

Intersection: 1: East Hanover Ave & US 202

Movement	B31
Directions Served	T
Maximum Queue (ft)	2035
Average Queue (ft)	1301
95th Queue (ft)	2824
Link Distance (ft)	2267
Upstream Blk Time (%)	21
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: East Hanover Ave & The American Rd

Movement	EB	WB	WB	SB
Directions Served	L	T	T	L
Maximum Queue (ft)	108	148	144	79
Average Queue (ft)	50	54	63	36
95th Queue (ft)	94	114	122	65
Link Distance (ft)		388	388	841
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	285			
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: East Hanover Ave & Horse Hill Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	LT	R
Maximum Queue (ft)	200	288	262	196	269	266	150	792	262	122
Average Queue (ft)	95	142	158	39	143	165	123	480	91	48
95th Queue (ft)	172	247	260	99	253	271	183	910	198	94
Link Distance (ft)		256	256		246	246		1045	956	
Upstream Blk Time (%)	0	1	1	0	1	2		0		
Queuing Penalty (veh)	0	9	6	0	3	9		0		
Storage Bay Dist (ft)	200			200			100			400
Storage Blk Time (%)	1	1			3		28	52		
Queuing Penalty (veh)	9	4			2		94	89		

Intersection: 4: East Hanover Ave & Monroe St

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (ft)	82	79	147	154	152
Average Queue (ft)	15	14	29	16	58
95th Queue (ft)	69	62	96	74	113
Link Distance (ft)	95	95	379	379	548
Upstream Blk Time (%)	1	1			
Queuing Penalty (veh)	7	8			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: East Hanover Ave & Ridgedale Ave

Movement	EB	EB	WB	WB	WB	B17	B17	NB	NB	NB	B20	B20
Directions Served	LT	TR	LT	T	R	T	T	L	T	TR	T	T
Maximum Queue (ft)	432	438	685	681	280	413	432	150	354	351	599	557
Average Queue (ft)	402	405	572	577	77	182	188	149	327	186	300	75
95th Queue (ft)	481	474	845	845	282	571	588	152	388	324	631	354
Link Distance (ft)	347	347	659	659		1933	1933		262	262	572	572
Upstream Blk Time (%)	38	43	32	33					72	4	6	1
Queuing Penalty (veh)	283	321	120	120					0	0	0	0
Storage Bay Dist (ft)					230			100				
Storage Blk Time (%)				71				79	9			
Queuing Penalty (veh)				40				122	30			

Intersection: 5: East Hanover Ave & Ridgedale Ave

Movement	SB	SB	SB	B19	B19
Directions Served	L	T	R	T	T
Maximum Queue (ft)	300	593	563	389	300
Average Queue (ft)	162	461	98	114	34
95th Queue (ft)	345	737	380	350	162
Link Distance (ft)		507	507	522	522
Upstream Blk Time (%)		41	2	0	
Queuing Penalty (veh)		0	0	0	
Storage Bay Dist (ft)	250				
Storage Blk Time (%)		61			
Queuing Penalty (veh)		82			

Intersection: 6: East Hanover Ave & Library

Movement	EB	EB	WB	WB	SB	SB
Directions Served	LT	T	T	TR	L	R
Maximum Queue (ft)	1564	1592	38	66	10	30
Average Queue (ft)	773	786	4	9	0	7
95th Queue (ft)	1713	1739	22	39	5	27
Link Distance (ft)	1933	1933	962	962	151	151
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: East Hanover Ave & Whippany Rd

Movement	EB	EB	B25	B25	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	T	T	L	T	T	R	L	T	T
Maximum Queue (ft)	379	876	1058	1013	96	111	140	69	169	295	241
Average Queue (ft)	119	860	788	847	26	42	61	22	132	117	93
95th Queue (ft)	280	886	1506	1309	71	87	112	55	195	263	168
Link Distance (ft)	793	793	962	962		956	956			588	588
Upstream Blk Time (%)		53	36	39							
Queuing Penalty (veh)		396	267	293							
Storage Bay Dist (ft)					230			180	120		
Storage Blk Time (%)							0		26	1	
Queuing Penalty (veh)							0		46	2	

Intersection: 8: East Hanover Ave & Shoprite Driveway1

Movement	EB	WB	SB
Directions Served	L	TR	LR
Maximum Queue (ft)	36	7	39
Average Queue (ft)	7	0	11
95th Queue (ft)	28	4	35
Link Distance (ft)		381	264
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	150		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: East Hanover Ave & Shoprite Driveway2

Movement	EB	EB	EB	WB	SB
Directions Served	L	T	T	TR	LR
Maximum Queue (ft)	31	61	88	7	38
Average Queue (ft)	3	4	6	0	8
95th Queue (ft)	16	48	40	4	31
Link Distance (ft)		381	381	256	302
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	150				
Storage Blk Time (%)		0			
Queuing Penalty (veh)		0			

Intersection: 10: East Hanover Ave & Driveway

Movement	WB	WB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	21	53	30
Average Queue (ft)	1	4	3
95th Queue (ft)	10	26	16
Link Distance (ft)	1214	1214	141
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: East Hanover Ave & Driveway

Movement	EB	EB	SB
Directions Served	T	T	R
Maximum Queue (ft)	412	425	37
Average Queue (ft)	220	223	8
95th Queue (ft)	476	479	30
Link Distance (ft)	379	379	224
Upstream Blk Time (%)	5	6	
Queuing Penalty (veh)	37	43	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 44: East Hanover Ave & Remediated Driveway

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 46: East Hanover Ave & Big Box Driveway

Movement	EB	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (ft)	44	179	195	97	105	45	30
Average Queue (ft)	11	32	39	29	37	14	7
95th Queue (ft)	34	116	133	86	100	41	28
Link Distance (ft)		1214	1214	95	95	204	204
Upstream Blk Time (%)				1	1		
Queuing Penalty (veh)				4	6		
Storage Bay Dist (ft)	200						
Storage Blk Time (%)		0					
Queuing Penalty (veh)		0					

Network Summary

Network wide Queuing Penalty: 2977

Intersection: 1: East Hanover Ave & US 202

Movement	EB	EB	EB	WB	WB	WB	B23	B23	NB	NB	B30	SB
Directions Served	L	T	TR	L	T	TR	T	T	L	TR	T	L
Maximum Queue (ft)	244	292	223	250	599	611	1319	1417	334	462	723	674
Average Queue (ft)	133	131	140	177	584	585	1155	1228	133	405	284	641
95th Queue (ft)	231	233	215	309	591	600	1609	1727	240	551	783	692
Link Distance (ft)		447	447		512	512	1266	1266	389	389	1112	587
Upstream Blk Time (%)					53	61	37	63		32		75
Queuing Penalty (veh)					396	454	274	467		0		0
Storage Bay Dist (ft)	200			200								
Storage Blk Time (%)	8	0		5	66							
Queuing Penalty (veh)	19	1		23	141							

Intersection: 1: East Hanover Ave & US 202

Movement	SB	B31
Directions Served	TR	T
Maximum Queue (ft)	660	1349
Average Queue (ft)	418	1185
95th Queue (ft)	722	1788
Link Distance (ft)	587	1303
Upstream Blk Time (%)	6	54
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: East Hanover Ave & The American Rd

Movement	EB	EB	WB	WB	WB	B12	B12	SB	SB	B13
Directions Served	L	T	T	T	R	T	T	L	R	T
Maximum Queue (ft)	91	47	473	476	350	775	768	909	300	471
Average Queue (ft)	32	3	339	333	54	306	315	643	214	248
95th Queue (ft)	75	21	572	577	261	896	908	1180	433	620
Link Distance (ft)		1266	388	388		829	829	841		456
Upstream Blk Time (%)			34	30		10	12	54		48
Queuing Penalty (veh)			230	198		69	78	0		0
Storage Bay Dist (ft)	285				300				250	
Storage Blk Time (%)				34				6	62	
Queuing Penalty (veh)				27				14	136	

Intersection: 3: East Hanover Ave & Horse Hill Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	B21
Directions Served	L	T	TR	L	T	TR	L	TR	LT	R	T
Maximum Queue (ft)	239	230	247	235	299	278	138	221	1244	450	467
Average Queue (ft)	114	113	133	102	230	236	49	88	795	295	72
95th Queue (ft)	201	202	227	231	314	298	111	164	1500	597	311
Link Distance (ft)		257	257		242	242		1337	1166		853
Upstream Blk Time (%)	0	0	0	1	15	23			14		
Queuing Penalty (veh)	0	0	1	0	111	165			0		
Storage Bay Dist (ft)	200			200			100			400	
Storage Blk Time (%)	2	0		2	22		1	6	43	8	
Queuing Penalty (veh)	6	0		10	33		3	5	103	29	

Intersection: 4: East Hanover Ave & Monroe St

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (ft)	162	130	406	447	566
Average Queue (ft)	100	97	256	247	303
95th Queue (ft)	141	130	460	468	637
Link Distance (ft)	88	88	392	392	548
Upstream Blk Time (%)	54	56	7	4	26
Queuing Penalty (veh)	240	248	52	28	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: East Hanover Ave & Ridgedale Ave

Movement	EB	EB	WB	WB	WB	B17	B17	NB	NB	NB	B20	B20
Directions Served	LT	TR	LT	T	R	T	T	L	T	TR	T	T
Maximum Queue (ft)	426	431	730	755	280	1950	1952	150	354	364	622	606
Average Queue (ft)	406	407	729	730	83	1187	1202	148	335	321	498	436
95th Queue (ft)	424	420	731	744	291	2138	2148	162	355	386	770	775
Link Distance (ft)	335	335	659	659		1933	1933		262	262	572	572
Upstream Blk Time (%)	64	74	62	59		5	6		82	60	51	11
Queuing Penalty (veh)	303	351	417	400		33	39		0	0	0	0
Storage Bay Dist (ft)					230			100				
Storage Blk Time (%)				63				79	29			
Queuing Penalty (veh)				75				165	88			

Intersection: 5: East Hanover Ave & Ridgedale Ave

Movement	SB	SB	SB	B19	B19
Directions Served	L	T	R	T	T
Maximum Queue (ft)	300	592	570	686	672
Average Queue (ft)	197	569	313	626	537
95th Queue (ft)	371	578	691	796	840
Link Distance (ft)		496	496	645	645
Upstream Blk Time (%)		78	8	70	11
Queuing Penalty (veh)		0	0	0	0
Storage Bay Dist (ft)	250				
Storage Blk Time (%)	1	81			
Queuing Penalty (veh)	4	162			

Intersection: 6: East Hanover Ave & Library

Movement	EB	EB	WB	WB	B25	B25	SB	SB
Directions Served	LT	T	T	TR	T	T	L	R
Maximum Queue (ft)	219	214	540	564	230	347	71	89
Average Queue (ft)	98	80	226	247	55	78	29	35
95th Queue (ft)	181	159	720	729	337	492	59	71
Link Distance (ft)	1933	1933	962	962	793	793	151	151
Upstream Blk Time (%)			7	7		2		0
Queuing Penalty (veh)			43	45		14		0
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 7: East Hanover Ave & Whippany Rd

Movement	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB	B28
Directions Served	L	TR	L	T	T	R	L	T	T	R	T
Maximum Queue (ft)	242	662	272	114	141	80	169	310	141	221	94
Average Queue (ft)	109	393	140	42	69	18	124	92	80	29	4
95th Queue (ft)	199	617	233	86	121	54	189	217	134	247	53
Link Distance (ft)	793	793		953	953			588	588	588	396
Upstream Blk Time (%)										1	
Queuing Penalty (veh)										0	
Storage Bay Dist (ft)			230			180	120				
Storage Blk Time (%)			1				16	0			
Queuing Penalty (veh)			2				26	1			

Intersection: 46: East Hanover Ave & Big Box Driveway

Movement	EB	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (ft)	249	881	879	114	114	122	44
Average Queue (ft)	41	433	441	65	75	34	18
95th Queue (ft)	146	944	942	128	134	94	42
Link Distance (ft)		1229	1229	88	88	267	267
Upstream Blk Time (%)				6	10		
Queuing Penalty (veh)				45	74		
Storage Bay Dist (ft)	200						
Storage Blk Time (%)		43					
Queuing Penalty (veh)		13					

Zone Summary

Zone wide Queuing Penalty: 5860

2015 ALTERNATIVE 1

Timings
1: East Hanover Ave & US 202

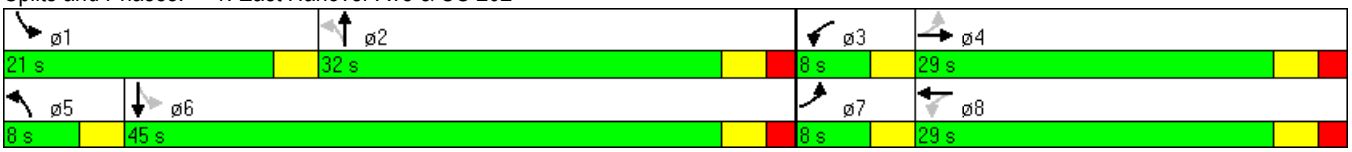
5/23/2012

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	215	1111	130	518	76	352	460	426
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt	
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	7.0	5.0	7.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	29.0	8.0	29.0	8.0	32.0	8.0	32.0
Total Split (s)	8.0	29.0	8.0	29.0	8.0	32.0	21.0	45.0
Total Split (%)	8.9%	32.2%	8.9%	32.2%	8.9%	35.6%	23.3%	50.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Total Lost Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	None	Min	None	Max	None	None
Act Effct Green (s)	37.0	27.0	37.0	27.0	40.0	30.0	53.0	44.6
Actuated g/C Ratio	0.41	0.30	0.41	0.30	0.44	0.33	0.59	0.50
v/c Ratio	0.85	1.04	0.55	0.69	0.20	0.99	0.95	0.61
Control Delay	49.1	71.5	25.7	29.6	10.3	67.8	53.9	19.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.1	71.5	25.7	29.6	10.3	67.8	53.9	19.8
LOS	D	E	C	C	B	E	D	B
Approach Delay		68.0		29.0		61.0		35.3
Approach LOS		E		C		E		D

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 49.8 — Intersection LOS: D
Intersection Capacity Utilization 109.7% — ICU Level of Service H
Analysis Period (min) 15

Splits and Phases: 1: East Hanover Ave & US 202

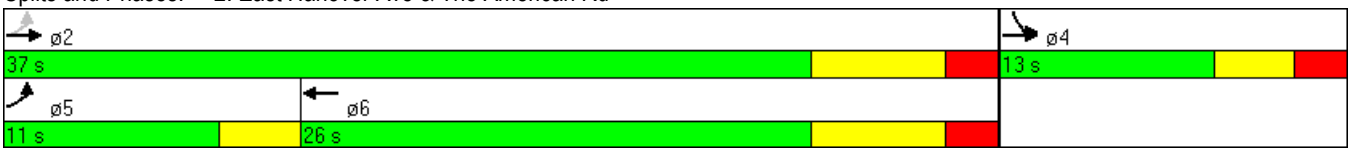


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	202	1586	756	260	61	55	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	11.0	50.0	26.0	0.0	13.0	0.0	37.0
Total Split (%)	22.0%	100.0%	52.0%	0.0%	26.0%	0.0%	74%
Yellow Time (s)	3.0		5.0		3.0		5.0
All-Red Time (s)	0.0		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)	3.0	7.0	7.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		Min		None		None
Act Effct Green (s)	32.1	48.1	19.4	48.1	8.0	48.1	
Actuated g/C Ratio	0.67	1.00	0.40	1.00	0.17	1.00	
v/c Ratio	0.40	0.48	0.56	0.18	0.20	0.03	
Control Delay	5.3	0.5	13.8	0.3	19.7	0.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	5.3	0.5	13.8	0.3	19.7	0.0	
LOS	A	A	B	A	B	A	
Approach Delay		1.0	10.3		10.4		
Approach LOS		A	B		B		

Intersection Summary

Cycle Length: 50
Actuated Cycle Length: 48.1
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 4.6 Intersection LOS: A
Intersection Capacity Utilization 59.7% ICU Level of Service B
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd

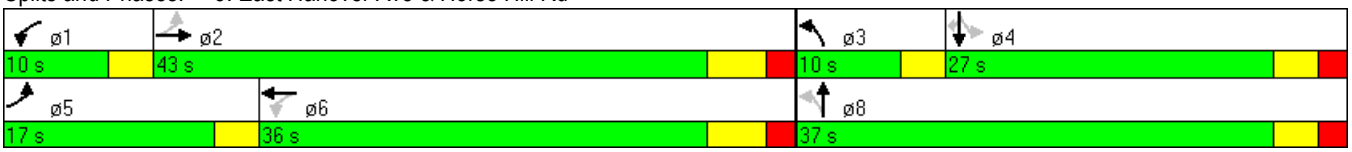


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	299	1207	73	785	171	218	62	72	176
Turn Type	pm+pt		pm+pt		pm+pt		Perm		Perm
Protected Phases	5	2	1	6	3	8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	4	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	32.0	10.0	32.0	10.0	27.0	27.0	27.0	27.0
Total Split (s)	17.0	43.0	10.0	36.0	10.0	37.0	27.0	27.0	27.0
Total Split (%)	18.9%	47.8%	11.1%	40.0%	11.1%	41.1%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	4.0	1.0	4.0	1.0	3.0	3.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead		Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	59.1	47.9	52.4	40.2	28.9	26.9		16.7	14.7
Actuated g/C Ratio	0.66	0.53	0.58	0.45	0.32	0.30		0.19	0.16
v/c Ratio	0.65	0.75	0.28	0.56	0.48	0.65		0.60	0.45
Control Delay	15.4	21.6	18.2	13.9	26.8	29.9		43.4	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	15.4	21.6	18.2	13.9	26.8	29.9		43.4	8.5
LOS	B	C	B	B	C	C		D	A
Approach Delay		20.5		14.2		28.8		23.6	
Approach LOS		C		B		C		C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 67 (74%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 20.3 Intersection LOS: C
Intersection Capacity Utilization 82.7% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1365	3	25	914	1	115
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1437	3	26	962	1	121
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				4.0		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	161			847		
pX, platoon unblocked			0.87		0.93	0.87
vC, conflicting volume			1440		1972	721
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1204		1284	376
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		99	78
cM capacity (veh/h)			500		141	539

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	958	482	347	641	122
Volume Left	0	0	26	0	1
Volume Right	0	3	0	0	121
cSH	1700	1700	500	1700	527
Volume to Capacity	0.56	0.28	0.05	0.38	0.23
Queue Length 95th (ft)	0	0	4	0	22
Control Delay (s)	0.0	0.0	1.7	0.0	13.9
Lane LOS			A		B
Approach Delay (s)	0.0		0.6		13.9
Approach LOS					B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	1218	545	57	338	310	133	232	77
Turn Type			Free	pm+pt		pm+pt		Perm
Protected Phases	2	6		3	8	7	4	
Permitted Phases			Free	8		4		4
Detector Phase	2	6		3	8	7	4	4
Switch Phase								
Minimum Initial (s)	7.0	7.0		5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	13.0	13.0		8.0	31.0	8.0	27.0	27.0
Total Split (s)	34.0	17.0	0.0	12.0	31.0	8.0	27.0	27.0
Total Split (%)	37.8%	18.9%	0.0%	13.3%	34.4%	8.9%	30.0%	30.0%
Yellow Time (s)	4.0	4.0		3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	1.0	4.0	1.0	4.0	4.0
Lead/Lag				Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	Max		None	Min	None	Min	Min
Act Effct Green (s)	34.9	13.0	90.0	33.1	22.1	28.1	18.1	18.1
Actuated g/C Ratio	0.39	0.14	1.00	0.37	0.25	0.31	0.20	0.20
v/c Ratio	1.22	1.36	0.03	1.05	0.48	0.41	0.67	0.22
Control Delay	127.9	206.4	0.0	89.2	28.2	22.6	42.2	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	127.9	206.4	0.0	89.2	28.2	22.6	42.2	8.1
LOS	F	F	A	F	C	C	D	A
Approach Delay	127.9	190.0			57.0		30.4	
Approach LOS	F	F			E		C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.36
Intersection Signal Delay: 113.5 Intersection LOS: F
Intersection Capacity Utilization 106.4% ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	17	1492	732	1	5
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	29.0	29.0	29.0	30.0	30.0
Total Split (s)	60.0	60.0	60.0	30.0	30.0
Total Split (%)	66.7%	66.7%	66.7%	33.3%	33.3%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		86.7	86.7	7.7	7.7
Actuated g/C Ratio		0.96	0.96	0.09	0.09
v/c Ratio		0.47	0.22	0.01	0.04
Control Delay		2.0	0.6	37.0	23.8
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		2.0	0.6	37.0	23.8
LOS		A	A	D	C
Approach Delay		2.0	0.6	26.0	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 78 (87%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.47
Intersection Signal Delay: 1.6 Intersection LOS: A
Intersection Capacity Utilization 64.9% ICU Level of Service C
Analysis Period (min) 15

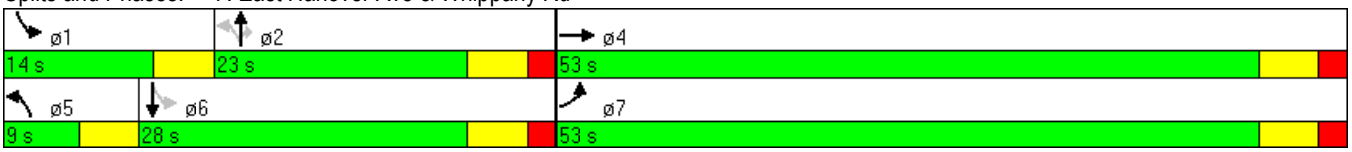
Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBL	EBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	487	869	59	243	29	220	345	688
Turn Type	Prot		pm+pt		Perm	pm+pt		Free
Protected Phases	7	4	5	2		1	6	
Permitted Phases			2		2	6		Free
Detector Phase	7	4	5	2	2	1	6	
Switch Phase								
Minimum Initial (s)	7.0	7.0	5.0	7.0	7.0	5.0	7.0	
Minimum Split (s)	23.0	13.0	9.0	13.0	13.0	9.0	28.0	
Total Split (s)	53.0	53.0	9.0	23.0	23.0	14.0	28.0	0.0
Total Split (%)	58.9%	58.9%	10.0%	25.6%	25.6%	15.6%	31.1%	0.0%
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	0.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	6.0	2.0	4.0	4.0	2.0	4.0	2.0
Lead/Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	Max	Max	None	Min	
Act Effct Green (s)	49.0	47.0	28.2	19.2	19.2	35.0	25.8	90.0
Actuated g/C Ratio	0.54	0.52	0.31	0.21	0.21	0.39	0.29	1.00
v/c Ratio	0.53	1.09	0.16	0.34	0.09	0.48	0.35	0.45
Control Delay	6.9	69.3	18.9	31.7	29.5	23.2	27.4	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.9	69.3	18.9	31.7	29.5	23.2	27.4	0.9
LOS	A	E	B	C	C	C	C	A
Approach Delay		48.9		29.2			12.1	
Approach LOS		D		C			B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 75 (83%), Referenced to phase 4:EBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.09
Intersection Signal Delay: 31.8 Intersection LOS: C
Intersection Capacity Utilization 84.6% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 7: East Hanover Ave & Whippany Rd

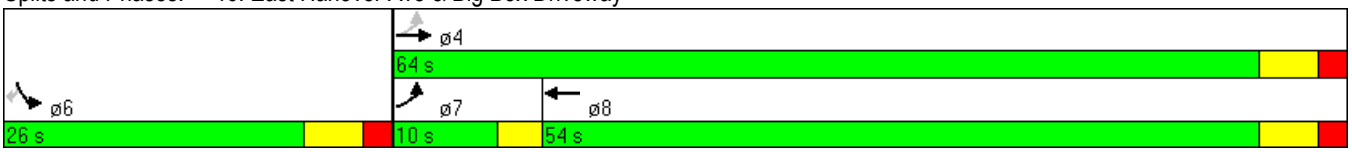


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	36	1353	904	15	9
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	22.0	22.0	26.0	26.0
Total Split (s)	10.0	64.0	54.0	26.0	26.0
Total Split (%)	11.1%	71.1%	60.0%	28.9%	28.9%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	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)	3.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	None	None
Act Effct Green (s)	80.6	81.2	74.0	10.0	10.0
Actuated g/C Ratio	0.90	0.90	0.82	0.11	0.11
v/c Ratio	0.07	0.46	0.35	0.08	0.05
Control Delay	2.5	3.6	0.9	37.1	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	2.5	3.6	0.9	37.1	20.2
LOS	A	A	A	D	C
Approach Delay		3.5	0.9	30.6	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 78 (87%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 2.8 Intersection LOS: A
Intersection Capacity Utilization 55.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway



Timings
1: East Hanover Ave & US 202

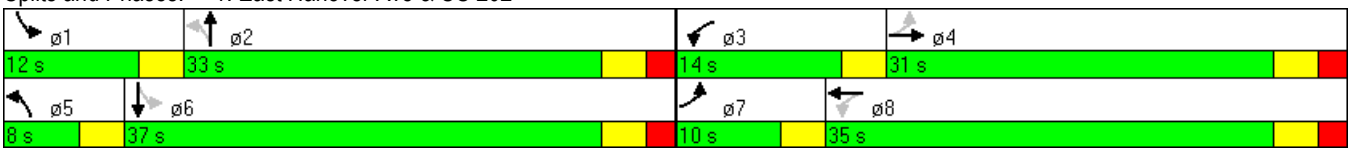
5/23/2012

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	155	485	214	1016	191	493	269	354
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt	
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	7.0	5.0	7.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	29.0	8.0	29.0	8.0	32.0	8.0	32.0
Total Split (s)	10.0	31.0	14.0	35.0	8.0	33.0	12.0	37.0
Total Split (%)	11.1%	34.4%	15.6%	38.9%	8.9%	36.7%	13.3%	41.1%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Total Lost Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	None	Min	None	Max	None	Max
Act Effct Green (s)	41.7	29.7	45.0	33.0	41.0	31.0	45.0	35.0
Actuated g/C Ratio	0.46	0.33	0.50	0.37	0.46	0.34	0.50	0.39
v/c Ratio	0.58	0.48	0.50	1.05	0.76	0.97	0.88	0.82
Control Delay	23.0	25.0	17.0	69.4	34.0	60.3	48.7	36.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	25.0	17.0	69.4	34.0	60.3	48.7	36.0
LOS	C	C	B	E	C	E	D	D
Approach Delay		24.6		61.8		53.9		40.2
Approach LOS		C		E		D		D

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 48.6 — Intersection LOS: D
Intersection Capacity Utilization 105.0% — ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 1: East Hanover Ave & US 202

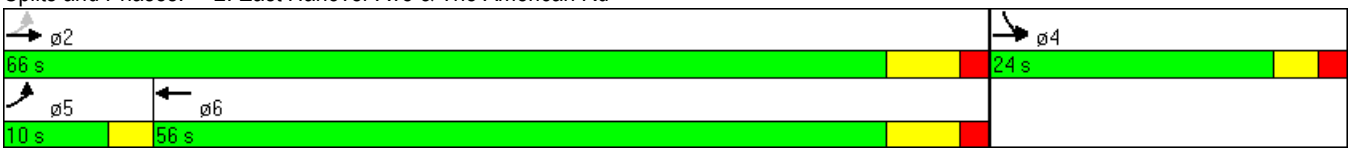


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	85	770	1259	79	219	222	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	10.0	90.0	56.0	0.0	24.0	0.0	66.0
Total Split (%)	11.1%	100.0%	62.2%	0.0%	26.7%	0.0%	73%
Yellow Time (s)	3.0		5.0		3.0		5.0
All-Red Time (s)	0.0		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)	3.0	7.0	7.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		Min		None		None
Act Effct Green (s)	49.5	73.4	37.9	73.4	15.5	73.4	
Actuated g/C Ratio	0.67	1.00	0.52	1.00	0.21	1.00	
v/c Ratio	0.32	0.24	0.74	0.06	0.57	0.14	
Control Delay	7.2	0.2	17.7	0.1	34.5	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	7.2	0.2	17.7	0.1	34.5	0.2	
LOS	A	A	B	A	C	A	
Approach Delay		0.9	16.7		17.2		
Approach LOS		A	B		B		

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 73.4
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 11.6 Intersection LOS: B
Intersection Capacity Utilization 66.2% ICU Level of Service C
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd

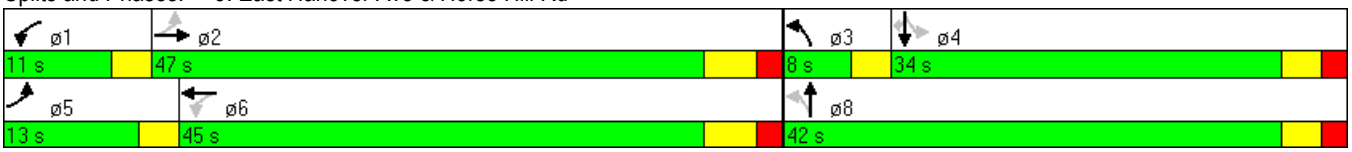


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	238	667	150	1229	79	126	160	202	236
Turn Type	pm+pt		pm+pt		pm+pt		Perm		Perm
Protected Phases	5	2	1	6	3	8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	4	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	32.0	10.0	32.0	8.0	27.0	27.0	27.0	27.0
Total Split (s)	13.0	47.0	11.0	45.0	8.0	42.0	34.0	34.0	34.0
Total Split (%)	13.0%	47.0%	11.0%	45.0%	8.0%	42.0%	34.0%	34.0%	34.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	4.0	1.0	4.0	1.0	3.0	3.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead		Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	59.4	45.6	56.2	43.4	38.6	36.6		30.2	28.2
Actuated g/C Ratio	0.59	0.46	0.56	0.43	0.39	0.37		0.30	0.28
v/c Ratio	0.88	0.56	0.43	0.91	0.33	0.31		0.92	0.42
Control Delay	52.8	21.5	11.2	21.4	22.3	19.7		62.3	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	52.8	21.5	11.2	21.4	22.3	19.7		62.3	7.4
LOS	D	C	B	C	C	B		E	A
Approach Delay		28.5		20.4		20.5		40.6	
Approach LOS		C		C		C		D	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 85 (85%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 26.5 Intersection LOS: C
Intersection Capacity Utilization 92.6% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	879	4	95	1417	2	68
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	916	4	99	1476	2	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	153			847		
pX, platoon unblocked			0.94		0.74	0.94
vC, conflicting volume			920		1854	460
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			778		1065	287
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		99	89
cM capacity (veh/h)			781		143	665

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	610	309	591	984	73
Volume Left	0	0	99	0	2
Volume Right	0	4	0	0	71
cSH	1700	1700	781	1700	602
Volume to Capacity	0.36	0.18	0.13	0.58	0.12
Queue Length 95th (ft)	0	0	11	0	10
Control Delay (s)	0.0	0.0	3.2	0.0	11.8
Lane LOS			A		B
Approach Delay (s)	0.0		1.2		11.8
Approach LOS					B

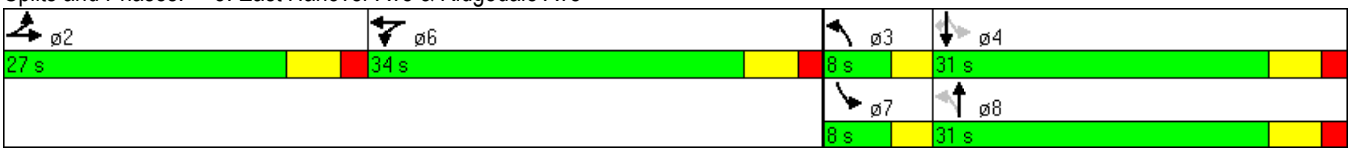
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	619	1062	119	301	417	200	324	170
Turn Type			Free	pm+pt		pm+pt		Perm
Protected Phases	2	6		3	8	7	4	
Permitted Phases			Free	8		4		4
Detector Phase	2	6		3	8	7	4	4
Switch Phase								
Minimum Initial (s)	7.0	7.0		5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	13.0	13.0		8.0	31.0	8.0	31.0	31.0
Total Split (s)	27.0	34.0	0.0	8.0	31.0	8.0	31.0	31.0
Total Split (%)	27.0%	34.0%	0.0%	8.0%	31.0%	8.0%	31.0%	31.0%
Yellow Time (s)	4.0	4.0		3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0	3.0	4.0	1.0	4.0	1.0	4.0	4.0
Lead/Lag				Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	Max		None	Min	None	Min	Min
Act Effct Green (s)	27.3	31.0	100.0	33.7	23.7	33.7	23.7	23.7
Actuated g/C Ratio	0.27	0.31	1.00	0.34	0.24	0.34	0.24	0.24
v/c Ratio	1.08	1.17	0.07	1.47	0.68	0.86	0.80	0.36
Control Delay	83.2	119.6	0.1	258.5	37.2	58.5	50.2	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.2	119.6	0.1	258.5	37.2	58.5	50.2	6.7
LOS	F	F	A	F	D	E	D	A
Approach Delay	83.2	109.0			119.0		41.9	
Approach LOS	F	F			F		D	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.47
Intersection Signal Delay: 92.5 Intersection LOS: F
Intersection Capacity Utilization 108.6% ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	50	866	1263	49	82
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	29.0	29.0	29.0	28.0	28.0
Total Split (s)	71.0	71.0	71.0	29.0	29.0
Total Split (%)	71.0%	71.0%	71.0%	29.0%	29.0%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		84.7	84.7	10.7	10.7
Actuated g/C Ratio		0.85	0.85	0.11	0.11
v/c Ratio		0.42	0.47	0.28	0.38
Control Delay		0.9	2.9	44.3	18.8
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		0.9	2.9	44.3	18.8
LOS		A	A	D	B
Approach Delay		0.9	2.9	28.4	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 50 (50%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.47
Intersection Signal Delay: 3.5 Intersection LOS: A
Intersection Capacity Utilization 74.6% ICU Level of Service D
Analysis Period (min) 15

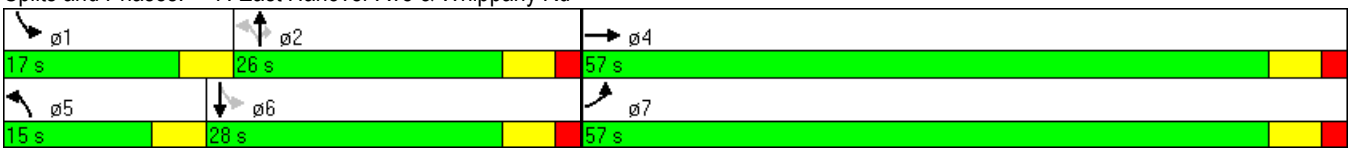
Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBL	EBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	260	464	246	281	32	244	321	1058
Turn Type	Prot		pm+pt		Perm	pm+pt		Free
Protected Phases	7	4	5	2		1	6	
Permitted Phases			2		2	6		Free
Detector Phase	7	4	5	2	2	1	6	
Switch Phase								
Minimum Initial (s)	7.0	7.0	5.0	7.0	7.0	5.0	7.0	
Minimum Split (s)	23.0	13.0	9.0	13.0	13.0	9.0	28.0	
Total Split (s)	57.0	57.0	15.0	26.0	26.0	17.0	28.0	0.0
Total Split (%)	57.0%	57.0%	15.0%	26.0%	26.0%	17.0%	28.0%	0.0%
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	0.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	6.0	2.0	4.0	4.0	2.0	4.0	2.0
Lead/Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	Max	Max	None	Min	
Act Effct Green (s)	53.0	51.0	37.4	22.6	22.6	40.6	24.2	100.0
Actuated g/C Ratio	0.53	0.51	0.37	0.23	0.23	0.41	0.24	1.00
v/c Ratio	0.29	0.71	0.57	0.37	0.09	0.53	0.39	0.70
Control Delay	6.5	12.4	26.3	34.6	32.1	24.8	33.4	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	12.4	26.3	34.6	32.1	24.8	33.4	2.6
LOS	A	B	C	C	C	C	C	A
Approach Delay		10.7		30.8			12.0	
Approach LOS		B		C			B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 90 (90%), Referenced to phase 4:EBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 15.0 Intersection LOS: B
Intersection Capacity Utilization 68.9% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 7: East Hanover Ave & Whippany Rd

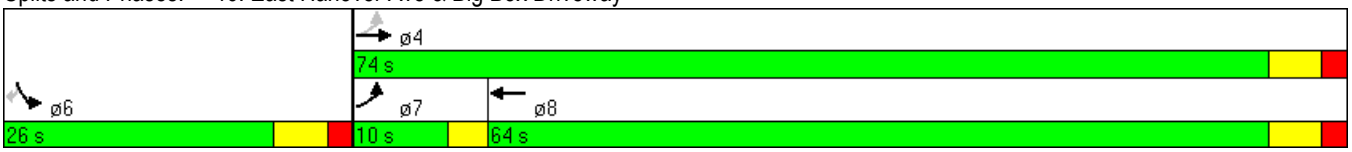


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	31	861	1400	22	29
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	22.0	22.0	26.0	26.0
Total Split (s)	10.0	74.0	64.0	26.0	26.0
Total Split (%)	10.0%	74.0%	64.0%	26.0%	26.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	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)	3.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	None	None
Act Effct Green (s)	87.4	86.8	81.4	10.0	10.0
Actuated g/C Ratio	0.87	0.87	0.81	0.10	0.10
v/c Ratio	0.11	0.30	0.54	0.13	0.17
Control Delay	2.4	2.9	1.8	43.1	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	2.4	2.9	1.8	43.1	16.9
LOS	A	A	A	D	B
Approach Delay		2.8	1.8	28.1	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 87 (87%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 2.8 Intersection LOS: A
Intersection Capacity Utilization 57.6% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway



2015 ALTERNATIVE 2

Timings
1: East Hanover Ave & US 202

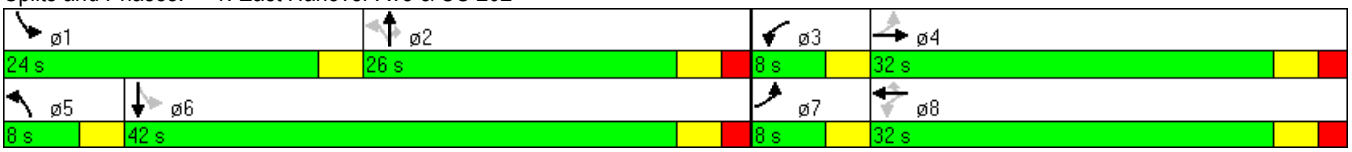
5/23/2012

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Volume (vph)	215	1111	130	518	180	76	352	218	460	426
Turn Type	pm+pt		pm+pt		Perm	pm+pt		Perm	pm+pt	
Protected Phases	7	4	3	8		5	2		1	6
Permitted Phases	4		8		8	2		2	6	
Detector Phase	7	4	3	8	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	29.0	8.0	29.0	29.0	8.0	26.0	26.0	8.0	32.0
Total Split (s)	8.0	32.0	8.0	32.0	32.0	8.0	26.0	26.0	24.0	42.0
Total Split (%)	8.9%	35.6%	8.9%	35.6%	35.6%	8.9%	28.9%	28.9%	26.7%	46.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	0.0	-1.0	-4.0	0.0	-1.0	-4.0
Total Lost Time (s)	0.0	2.0	0.0	2.0	5.0	2.0	1.0	5.0	2.0	1.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	Min	Min	None	Min
Act Effct Green (s)	41.9	31.3	41.6	31.0	28.0	28.4	23.4	19.4	46.1	40.7
Actuated g/C Ratio	0.47	0.35	0.46	0.34	0.31	0.32	0.26	0.22	0.51	0.45
v/c Ratio	0.56	0.90	0.52	0.44	0.31	0.28	0.73	0.49	0.92	0.68
Control Delay	21.9	39.7	18.8	10.3	4.8	15.4	39.5	13.0	47.2	24.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	39.7	18.8	10.3	4.8	15.4	39.5	13.0	47.2	24.6
LOS	C	D	B	B	A	B	D	B	D	C
Approach Delay		36.9		10.4			27.7			34.9
Approach LOS		D		B			C			C

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 85 (94%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 29.1 — Intersection LOS: C
Intersection Capacity Utilization 96.2% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 1: East Hanover Ave & US 202

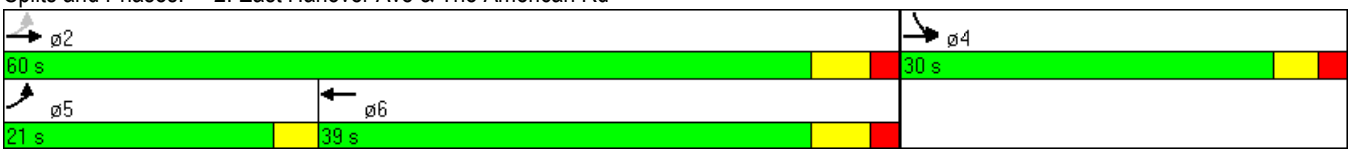


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	202	1586	756	260	61	55	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	21.0	90.0	39.0	0.0	30.0	0.0	60.0
Total Split (%)	23.3%	100.0%	43.3%	0.0%	33.3%	0.0%	67%
Yellow Time (s)	3.0		4.0		3.0		4.0
All-Red Time (s)	0.0		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)	3.0	6.0	6.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		C-Min		None		C-Max
Act Effct Green (s)	62.1	90.0	46.4	90.0	19.9	90.0	
Actuated g/C Ratio	0.69	1.00	0.52	1.00	0.22	1.00	
v/c Ratio	0.44	0.48	0.44	0.18	0.15	0.03	
Control Delay	3.9	0.5	15.8	0.3	27.3	0.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	3.9	0.5	15.8	0.3	27.3	0.0	
LOS	A	A	B	A	C	A	
Approach Delay		0.9	11.8		14.3		
Approach LOS		A	B		B		

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 56 (62%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 5.2 Intersection LOS: A
Intersection Capacity Utilization 58.8% ICU Level of Service B
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd

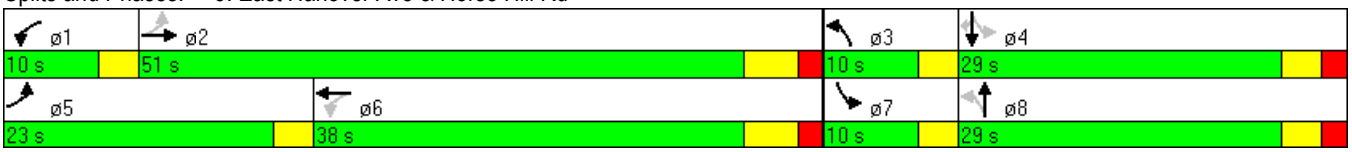


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	299	1207	73	785	171	218	62	72	176
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt		Perm
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	7	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.0	32.0	10.0	32.0	10.0	27.0	10.0	27.0	27.0
Total Split (s)	23.0	51.0	10.0	38.0	10.0	29.0	10.0	29.0	29.0
Total Split (%)	23.0%	51.0%	10.0%	38.0%	10.0%	29.0%	10.0%	29.0%	29.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	4.0	1.0	4.0	1.0	3.0	1.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	64.0	53.0	54.8	42.8	33.2	24.0	32.7	22.0	20.0
Actuated g/C Ratio	0.64	0.53	0.55	0.43	0.33	0.24	0.33	0.22	0.20
v/c Ratio	0.67	0.75	0.31	0.58	0.41	0.80	0.27	0.19	0.40
Control Delay	18.2	23.7	14.5	22.5	26.2	47.6	23.4	30.6	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.2	23.7	14.5	22.5	26.2	47.6	23.4	30.6	7.6
LOS	B	C	B	C	C	D	C	C	A
Approach Delay		22.7		21.8		40.4		16.1	
Approach LOS		C		C		D		B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 61 (61%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 24.5 Intersection LOS: C
Intersection Capacity Utilization 79.2% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1365	3	25	914	1	115
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1437	3	26	962	1	121
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				4.0		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	162			847		
pX, platoon unblocked			0.88		0.93	0.88
vC, conflicting volume			1440		1972	721
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1230		1465	415
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		99	77
cM capacity (veh/h)			496		106	517

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	958	482	347	641	122
Volume Left	0	0	26	0	1
Volume Right	0	3	0	0	121
cSH	1700	1700	496	1700	500
Volume to Capacity	0.56	0.28	0.05	0.38	0.24
Queue Length 95th (ft)	0	0	4	0	24
Control Delay (s)	0.0	0.0	1.7	0.0	14.5
Lane LOS			A		B
Approach Delay (s)	0.0		0.6		14.5
Approach LOS					B

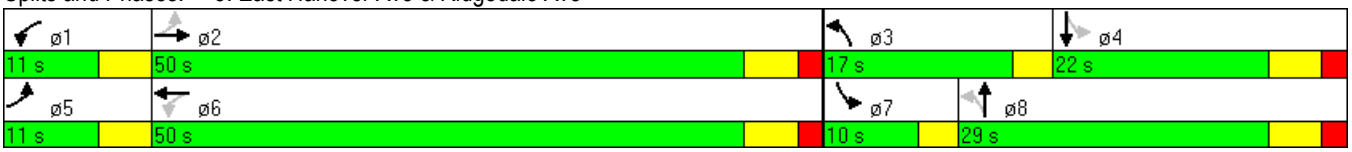
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	88	1218	115	545	338	310	133	232
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt	
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	11.0	13.0	11.0	13.0	10.0	28.0	8.0	22.0
Total Split (s)	11.0	50.0	11.0	50.0	17.0	29.0	10.0	22.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	17.0%	29.0%	10.0%	22.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	1.0	4.0	1.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	C-Max	Max	C-Max	None	None	None	None
Act Effct Green (s)	56.2	46.0	56.2	46.0	34.8	21.9	26.7	14.8
Actuated g/C Ratio	0.56	0.46	0.56	0.46	0.35	0.22	0.27	0.15
v/c Ratio	0.20	0.97	0.47	0.39	0.97	0.54	0.43	0.62
Control Delay	4.2	30.9	18.2	17.7	70.2	34.9	27.5	40.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.2	30.9	18.2	17.7	70.2	34.9	27.5	40.0
LOS	A	C	B	B	E	C	C	D
Approach Delay		29.4		17.8		51.6		36.3
Approach LOS		C		B		D		D

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 32.5 Intersection LOS: C
Intersection Capacity Utilization 88.5% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	17	1492	732	1	5
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	29.0	29.0	29.0	28.0	28.0
Total Split (s)	72.0	72.0	72.0	28.0	28.0
Total Split (%)	72.0%	72.0%	72.0%	28.0%	28.0%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		96.6	96.6	9.0	9.0
Actuated g/C Ratio		0.97	0.97	0.09	0.09
v/c Ratio		0.47	0.22	0.01	0.03
Control Delay		0.5	0.7	42.0	26.2
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		0.5	0.7	42.0	26.2
LOS		A	A	D	C
Approach Delay		0.5	0.7	28.8	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 60 (60%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.47
Intersection Signal Delay: 0.6 Intersection LOS: A
Intersection Capacity Utilization 66.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBL	EBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	487	869	59	243	29	220	345	688
Turn Type	Prot		pm+pt		Perm	pm+pt		Free
Protected Phases	7	4	5	2		1	6	
Permitted Phases			2		2	6		Free
Detector Phase	7	4	5	2	2	1	6	
Switch Phase								
Minimum Initial (s)	7.0	7.0	5.0	7.0	7.0	5.0	7.0	
Minimum Split (s)	23.0	13.0	9.0	13.0	13.0	9.0	23.0	
Total Split (s)	78.0	78.0	9.0	19.0	19.0	13.0	23.0	0.0
Total Split (%)	70.9%	70.9%	8.2%	17.3%	17.3%	11.8%	20.9%	0.0%
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	0.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	6.0	2.0	4.0	4.0	2.0	4.0	2.0
Lead/Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	Min	Min	None	Min	
Act Effct Green (s)	74.9	72.9	23.1	14.1	14.1	29.1	19.9	110.0
Actuated g/C Ratio	0.68	0.66	0.21	0.13	0.13	0.26	0.18	1.00
v/c Ratio	0.42	0.86	0.25	0.57	0.15	0.76	0.56	0.45
Control Delay	9.4	24.0	33.3	50.3	44.1	51.7	45.4	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	24.0	33.3	50.3	44.1	51.7	45.4	0.9
LOS	A	C	C	D	D	D	D	A
Approach Delay		19.3		46.8			22.1	
Approach LOS		B		D			C	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 4:EBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 23.4 Intersection LOS: C
Intersection Capacity Utilization 84.6% ICU Level of Service E
Analysis Period (min) 15

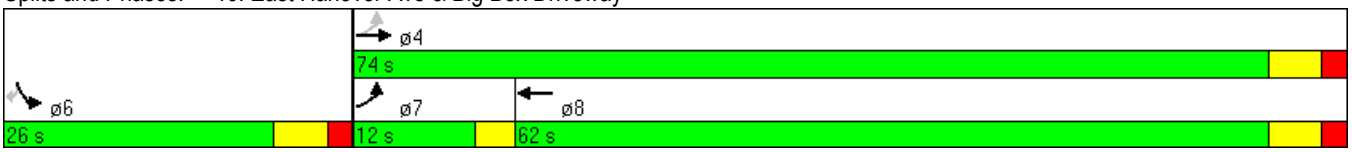
Splits and Phases: 7: East Hanover Ave & Whippany Rd

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	36	1353	904	15	9
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	21.0	21.0	26.0	26.0
Total Split (s)	12.0	74.0	62.0	26.0	26.0
Total Split (%)	12.0%	74.0%	62.0%	26.0%	26.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	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)	3.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	None	None
Act Effct Green (s)	90.6	91.2	84.0	10.0	10.0
Actuated g/C Ratio	0.91	0.91	0.84	0.10	0.10
v/c Ratio	0.07	0.46	0.34	0.09	0.06
Control Delay	0.7	0.8	2.3	42.3	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.7	0.8	2.3	42.3	22.4
LOS	A	A	A	D	C
Approach Delay		0.8	2.3	34.6	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 88 (88%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 1.7 Intersection LOS: A
Intersection Capacity Utilization 55.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway

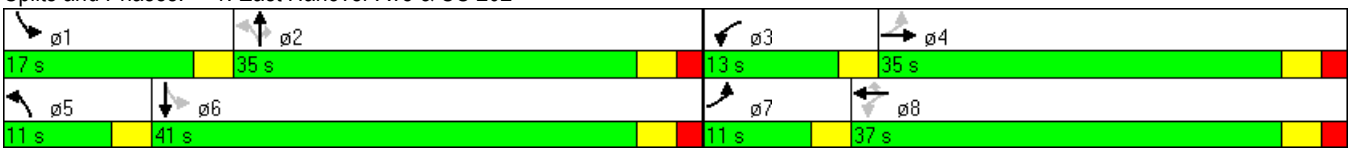


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Volume (vph)	155	485	214	1016	246	191	493	100	269	354
Turn Type	pm+pt		pm+pt		Perm	pm+pt		Perm	pm+pt	
Protected Phases	7	4	3	8		5	2		1	6
Permitted Phases	4		8		8	2		2	6	
Detector Phase	7	4	3	8	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	29.0	8.0	29.0	29.0	8.0	32.0	32.0	8.0	32.0
Total Split (s)	11.0	35.0	13.0	37.0	37.0	11.0	35.0	35.0	17.0	41.0
Total Split (%)	11.0%	35.0%	13.0%	37.0%	37.0%	11.0%	35.0%	35.0%	17.0%	41.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	0.0	-1.0	-4.0	0.0	-3.0	-3.0
Total Lost Time (s)	0.0	2.0	0.0	2.0	5.0	2.0	1.0	5.0	0.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	C-Max	None	Min	Min	None	Min
Act Effct Green (s)	48.0	35.0	49.9	36.8	33.8	40.6	32.6	28.6	50.1	37.1
Actuated g/C Ratio	0.48	0.35	0.50	0.37	0.34	0.41	0.33	0.29	0.50	0.37
v/c Ratio	0.60	0.45	0.51	0.83	0.42	0.86	0.84	0.22	0.77	0.85
Control Delay	26.9	26.4	8.9	20.6	4.1	53.6	44.5	11.3	35.7	42.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.9	26.4	8.9	20.6	4.1	53.6	44.5	11.3	35.7	42.6
LOS	C	C	A	C	A	D	D	B	D	D
Approach Delay		26.5		16.2			42.5			40.4
Approach LOS		C		B			D			D

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 79 (79%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 28.8 Intersection LOS: C
Intersection Capacity Utilization 91.0% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 1: East Hanover Ave & US 202

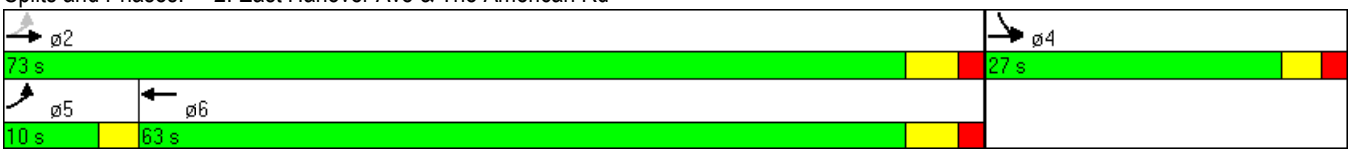


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	85	770	1259	79	219	222	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	10.0	100.0	63.0	0.0	27.0	0.0	73.0
Total Split (%)	10.0%	100.0%	63.0%	0.0%	27.0%	0.0%	73%
Yellow Time (s)	3.0		4.0		3.0		4.0
All-Red Time (s)	0.0		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)	3.0	6.0	6.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		C-Min		None		C-Max
Act Effct Green (s)	73.5	100.0	62.5	100.0	18.5	100.0	
Actuated g/C Ratio	0.74	1.00	0.62	1.00	0.18	1.00	
v/c Ratio	0.32	0.24	0.61	0.06	0.65	0.14	
Control Delay	4.9	0.1	4.2	0.1	46.1	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	4.9	0.1	4.2	0.1	46.1	0.2	
LOS	A	A	A	A	D	A	
Approach Delay		0.6	4.0		22.9		
Approach LOS		A	A		C		

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 59 (59%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 6.1 Intersection LOS: A
Intersection Capacity Utilization 65.3% ICU Level of Service C
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	238	667	150	1229	79	126	160	202	236
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt		Perm
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	7	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.0	32.0	10.0	32.0	8.0	26.0	10.0	26.0	26.0
Total Split (s)	13.0	51.0	13.0	51.0	10.0	26.0	10.0	26.0	26.0
Total Split (%)	13.0%	51.0%	13.0%	51.0%	10.0%	26.0%	10.0%	26.0%	26.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	4.0	1.0	4.0	1.0	3.0	1.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	67.3	52.8	63.6	49.9	29.3	18.5	29.7	20.5	18.5
Actuated g/C Ratio	0.67	0.53	0.64	0.50	0.29	0.18	0.30	0.20	0.18
v/c Ratio	0.81	0.49	0.36	0.79	0.28	0.60	0.59	0.57	0.51
Control Delay	38.1	13.9	6.2	13.5	26.5	39.6	34.8	42.0	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	13.9	6.2	13.5	26.5	39.6	34.8	42.0	8.4
LOS	D	B	A	B	C	D	C	D	A
Approach Delay		19.4		12.7		35.8		26.8	
Approach LOS		B		B		D		C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 93 (93%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 19.2 Intersection LOS: B
Intersection Capacity Utilization 82.0% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	879	4	95	1417	2	68
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	916	4	99	1476	2	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	161			847		
pX, platoon unblocked			0.94		0.73	0.94
vC, conflicting volume			920		1854	460
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			778		1028	287
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		99	89
cM capacity (veh/h)			781		148	664

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	610	309	591	984	73
Volume Left	0	0	99	0	2
Volume Right	0	4	0	0	71
cSH	1700	1700	781	1700	604
Volume to Capacity	0.36	0.18	0.13	0.58	0.12
Queue Length 95th (ft)	0	0	11	0	10
Control Delay (s)	0.0	0.0	3.2	0.0	11.8
Lane LOS			A		B
Approach Delay (s)	0.0		1.2		11.8
Approach LOS					B

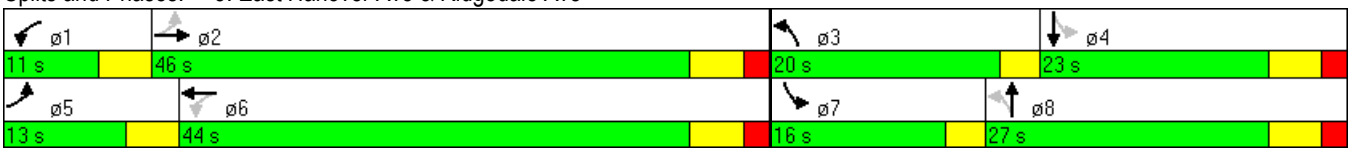
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	145	619	164	1062	301	417	200	324
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt	
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	11.0	13.0	11.0	13.0	8.0	27.0	8.0	23.0
Total Split (s)	13.0	46.0	11.0	44.0	20.0	27.0	16.0	23.0
Total Split (%)	13.0%	46.0%	11.0%	44.0%	20.0%	27.0%	16.0%	23.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	1.0	4.0	1.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	C-Max	Max	C-Max	None	None	None	None
Act Effct Green (s)	52.6	42.0	48.6	40.0	40.4	22.9	34.4	17.9
Actuated g/C Ratio	0.53	0.42	0.49	0.40	0.40	0.23	0.34	0.18
v/c Ratio	0.58	0.59	0.55	0.88	0.85	0.71	0.60	0.80
Control Delay	27.1	22.0	15.2	30.2	44.5	39.4	27.7	43.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.1	22.0	15.2	30.2	44.5	39.4	27.7	43.2
LOS	C	C	B	C	D	D	C	D
Approach Delay		22.8		28.3		41.3		38.7
Approach LOS		C		C		D		D

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 54 (54%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 31.6 Intersection LOS: C
Intersection Capacity Utilization 85.7% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	50	866	1263	49	82
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	29.0	29.0	29.0	28.0	28.0
Total Split (s)	71.0	71.0	71.0	29.0	29.0
Total Split (%)	71.0%	71.0%	71.0%	29.0%	29.0%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		84.7	84.7	10.7	10.7
Actuated g/C Ratio		0.85	0.85	0.11	0.11
v/c Ratio		0.42	0.47	0.28	0.38
Control Delay		1.5	2.4	44.3	18.8
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		1.5	2.4	44.3	18.8
LOS		A	A	D	B
Approach Delay		1.5	2.4	28.4	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 35 (35%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.47
Intersection Signal Delay: 3.5 Intersection LOS: A
Intersection Capacity Utilization 74.6% ICU Level of Service D
Analysis Period (min) 15

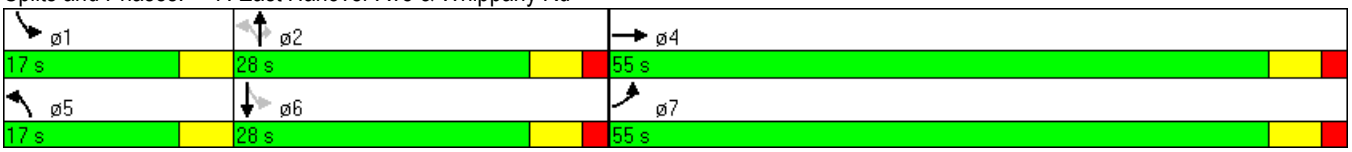
Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBL	EBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	260	464	246	281	32	244	321	1058
Turn Type	Prot		pm+pt		Perm	pm+pt		Free
Protected Phases	7	4	5	2		1	6	
Permitted Phases			2		2	6		Free
Detector Phase	7	4	5	2	2	1	6	
Switch Phase								
Minimum Initial (s)	7.0	7.0	5.0	7.0	7.0	5.0	7.0	
Minimum Split (s)	23.0	13.0	9.0	13.0	13.0	9.0	28.0	
Total Split (s)	55.0	55.0	17.0	28.0	28.0	17.0	28.0	0.0
Total Split (%)	55.0%	55.0%	17.0%	28.0%	28.0%	17.0%	28.0%	0.0%
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	0.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	6.0	2.0	4.0	4.0	2.0	4.0	2.0
Lead/Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	Min	Min	None	Min	
Act Effct Green (s)	58.7	56.7	33.4	16.7	16.7	33.3	16.7	100.0
Actuated g/C Ratio	0.59	0.57	0.33	0.17	0.17	0.33	0.17	1.00
v/c Ratio	0.26	0.64	0.65	0.51	0.13	0.61	0.57	0.70
Control Delay	6.2	12.4	32.3	40.6	35.2	30.6	41.8	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.2	12.4	32.3	40.6	35.2	30.6	41.8	2.6
LOS	A	B	C	D	D	C	D	A
Approach Delay		10.6		36.6			14.5	
Approach LOS		B		D			B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 40 (40%), Referenced to phase 4:EBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 17.4 Intersection LOS: B
Intersection Capacity Utilization 68.9% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 7: East Hanover Ave & Whippany Rd

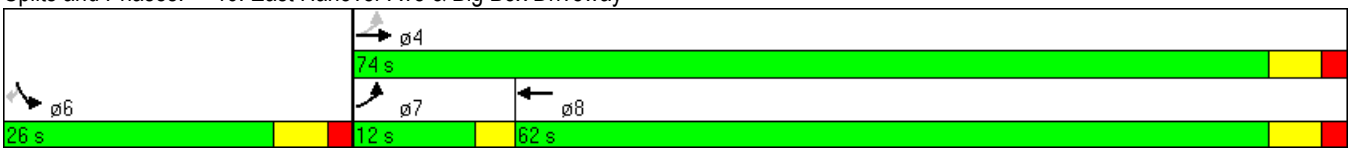


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	31	861	1400	22	29
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	21.0	22.0	26.0	26.0
Total Split (s)	12.0	74.0	62.0	26.0	26.0
Total Split (%)	12.0%	74.0%	62.0%	26.0%	26.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	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)	3.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	None	None
Act Effct Green (s)	87.4	86.8	80.8	10.0	10.0
Actuated g/C Ratio	0.87	0.87	0.81	0.10	0.10
v/c Ratio	0.11	0.30	0.55	0.13	0.17
Control Delay	2.1	2.2	3.3	43.1	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	2.1	2.2	3.3	43.1	16.9
LOS	A	A	A	D	B
Approach Delay		2.2	3.3	28.1	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 93 (93%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 3.4 Intersection LOS: A
Intersection Capacity Utilization 57.6% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway



2015 ALTERNATIVE 3

Timings
1: East Hanover Ave & US 202

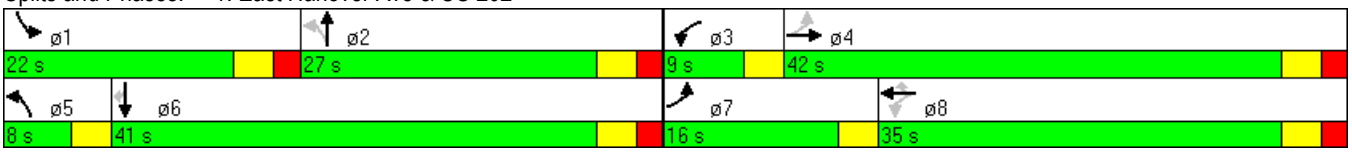
5/23/2012

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	215	1111	130	518	180	76	352	460	426	126
Turn Type	pm+pt		pm+pt		Perm	pm+pt		Prot		Perm
Protected Phases	7	4	3	8		5	2	1	6	
Permitted Phases	4		8		8	2				6
Detector Phase	7	4	3	8	8	5	2	1	6	6
Switch Phase										
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	29.0	8.0	29.0	29.0	8.0	26.0	10.0	32.0	32.0
Total Split (s)	16.0	42.0	9.0	35.0	35.0	8.0	27.0	22.0	41.0	41.0
Total Split (%)	16.0%	42.0%	9.0%	35.0%	35.0%	8.0%	27.0%	22.0%	41.0%	41.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-3.0	-2.0	-3.0	0.0	-1.0	-4.0	-2.0	-3.0	0.0
Total Lost Time (s)	1.0	2.0	1.0	2.0	5.0	2.0	1.0	3.0	2.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	Max	None	Max	Max
Act Effct Green (s)	48.5	38.5	41.8	32.8	29.8	33.5	28.1	18.4	41.8	38.8
Actuated g/C Ratio	0.48	0.38	0.42	0.33	0.30	0.34	0.28	0.18	0.42	0.39
v/c Ratio	0.51	0.81	0.60	0.46	0.32	0.23	0.57	0.75	0.55	0.21
Control Delay	19.3	32.7	27.6	16.3	5.4	17.8	26.6	46.8	26.3	23.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.3	32.7	27.6	16.3	5.4	17.8	26.6	46.8	26.3	23.1
LOS	B	C	C	B	A	B	C	D	C	C
Approach Delay		30.6		15.7			25.6		35.2	
Approach LOS		C		B			C		D	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 60 (60%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 27.8 — Intersection LOS: C
Intersection Capacity Utilization 82.8% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 1: East Hanover Ave & US 202

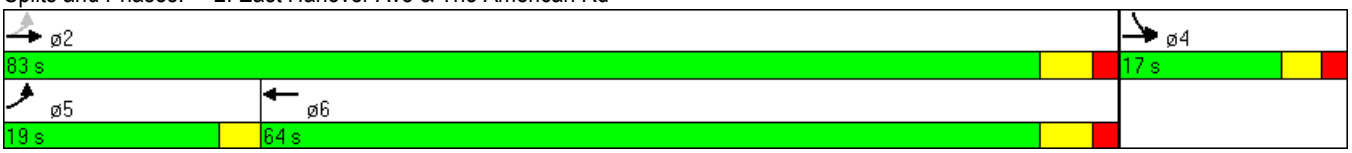


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	202	1586	756	260	61	55	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	19.0	100.0	64.0	0.0	17.0	0.0	83.0
Total Split (%)	19.0%	100.0%	64.0%	0.0%	17.0%	0.0%	83%
Yellow Time (s)	3.0		4.0		3.0		4.0
All-Red Time (s)	0.0		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)	3.0	6.0	6.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		C-Min		None		C-Max
Act Effct Green (s)	80.0	100.0	65.7	100.0	12.0	100.0	
Actuated g/C Ratio	0.80	1.00	0.66	1.00	0.12	1.00	
v/c Ratio	0.38	0.48	0.34	0.18	0.27	0.03	
Control Delay	3.4	0.3	4.4	0.2	43.5	0.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	3.4	0.3	4.4	0.2	43.5	0.0	
LOS	A	A	A	A	D	A	
Approach Delay		0.7	3.3		22.8		
Approach LOS		A	A		C		

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 46 (46%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 2.5 Intersection LOS: A
Intersection Capacity Utilization 58.8% ICU Level of Service B
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	299	1207	73	785	171	218	62	72	176
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt		Perm
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	7	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.0	31.0	10.0	31.0	8.0	30.0	8.0	30.0	30.0
Total Split (s)	23.0	52.0	10.0	39.0	8.0	30.0	8.0	30.0	30.0
Total Split (%)	23.0%	52.0%	10.0%	39.0%	8.0%	30.0%	8.0%	30.0%	30.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	1.0	0.0	1.0	0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	65.5	55.4	57.7	46.6	31.7	24.1	31.5	22.5	20.5
Actuated g/C Ratio	0.66	0.55	0.58	0.47	0.32	0.24	0.32	0.22	0.20
v/c Ratio	0.63	0.72	0.30	0.37	0.43	0.80	0.31	0.18	0.40
Control Delay	12.1	12.4	13.5	12.8	28.0	46.8	25.3	30.0	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1	12.4	13.5	12.8	28.0	46.8	25.3	30.0	7.3
LOS	B	B	B	B	C	D	C	C	A
Approach Delay		12.3		12.9		40.5		16.2	
Approach LOS		B		B		D		B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 64 (64%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 17.1 Intersection LOS: B
Intersection Capacity Utilization 79.2% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1365	3	25	914	1	115
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1437	3	26	962	1	121
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				4.0		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			TWLTL		
Median storage veh)				2		
Upstream signal (ft)	176			847		
pX, platoon unblocked			0.88		0.92	0.88
vC, conflicting volume			1440		1972	721
vC1, stage 1 conf vol					1438	
vC2, stage 2 conf vol					534	
vCu, unblocked vol			1231		1474	416
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			95		99	77
cM capacity (veh/h)			495		206	516

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	958	482	347	641	122
Volume Left	0	0	26	0	1
Volume Right	0	3	0	0	121
cSH	1700	1700	495	1700	509
Volume to Capacity	0.56	0.28	0.05	0.38	0.24
Queue Length 95th (ft)	0	0	4	0	23
Control Delay (s)	0.0	0.0	1.7	0.0	14.3
Lane LOS			A		B
Approach Delay (s)	0.0		0.6		14.3
Approach LOS					B

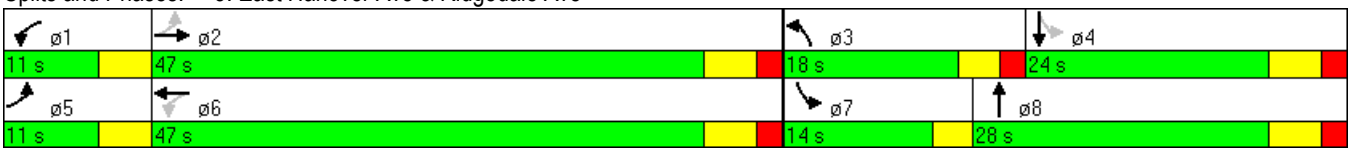
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	88	1218	115	545	338	310	133	232	77
Turn Type	pm+pt		pm+pt		Prot		pm+pt		Free
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6				4		Free
Detector Phase	5	2	1	6	3	8	7	4	
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0	
Minimum Split (s)	11.0	13.0	11.0	13.0	10.0	28.0	8.0	24.0	
Total Split (s)	11.0	47.0	11.0	47.0	18.0	28.0	14.0	24.0	0.0
Total Split (%)	11.0%	47.0%	11.0%	47.0%	18.0%	28.0%	14.0%	24.0%	0.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	1.0	4.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	C-Max	None	Min	None	Min	
Act Effct Green (s)	56.1	48.6	57.5	51.1	14.7	19.1	28.4	13.9	100.0
Actuated g/C Ratio	0.56	0.49	0.58	0.51	0.15	0.19	0.28	0.14	1.00
v/c Ratio	0.20	0.91	0.57	0.35	0.78	0.62	0.41	0.51	0.05
Control Delay	5.2	23.1	25.3	14.6	53.9	39.0	26.4	43.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.2	23.1	25.3	14.6	53.9	39.0	26.4	43.2	0.1
LOS	A	C	C	B	D	D	C	D	A
Approach Delay		22.1		16.3		46.1		30.6	
Approach LOS		C		B		D		C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 27.0 Intersection LOS: C
Intersection Capacity Utilization 79.5% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	17	1492	732	1	5
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	29.0	29.0	29.0	28.0	28.0
Total Split (s)	72.0	72.0	72.0	28.0	28.0
Total Split (%)	72.0%	72.0%	72.0%	28.0%	28.0%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		96.6	96.6	9.0	9.0
Actuated g/C Ratio		0.97	0.97	0.09	0.09
v/c Ratio		0.47	0.22	0.01	0.03
Control Delay		0.8	0.6	42.0	26.2
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		0.8	0.6	42.0	26.2
LOS		A	A	D	C
Approach Delay		0.8	0.6	28.8	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 59 (59%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.47
Intersection Signal Delay: 0.8 Intersection LOS: A
Intersection Capacity Utilization 66.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBT	NBL	NBT	NBR	SBL	SBT	SBR	ø7
Lane Configurations								
Volume (vph)	869	59	243	29	220	345	688	
Turn Type		pm+pt		Perm	pm+pt		Free	
Protected Phases	4	5	2		1	6		7
Permitted Phases		2		2	6		Free	
Detector Phase	4	5	2	2	1	6		
Switch Phase								
Minimum Initial (s)	7.0	5.0	7.0	7.0	5.0	7.0		7.0
Minimum Split (s)	13.0	9.0	13.0	13.0	9.0	28.0		13.0
Total Split (s)	63.0	9.0	20.0	20.0	17.0	28.0	0.0	63.0
Total Split (%)	63.0%	9.0%	20.0%	20.0%	17.0%	28.0%	0.0%	63%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0
All-Red Time (s)	2.0	0.0	2.0	2.0	0.0	2.0		2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	6.0	2.0	4.0	4.0	2.0	4.0	2.0	
Lead/Lag		Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	Yes		
Recall Mode	C-Max	None	Min	Min	None	Min		None
Act Effct Green (s)	59.4	23.1	14.1	14.1	32.6	23.4	100.0	
Actuated g/C Ratio	0.59	0.23	0.14	0.14	0.33	0.23	1.00	
v/c Ratio	0.76	0.21	0.52	0.14	0.57	0.43	0.45	
Control Delay	6.1	25.0	43.4	38.2	31.5	34.6	0.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	6.1	25.0	43.4	38.2	31.5	34.6	0.9	
LOS	A	C	D	D	C	C	A	
Approach Delay	6.1		39.7			15.6		
Approach LOS	A		D			B		

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 83 (83%), Referenced to phase 4:EBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 13.6 Intersection LOS: B
Intersection Capacity Utilization 73.1% ICU Level of Service D
Analysis Period (min) 15

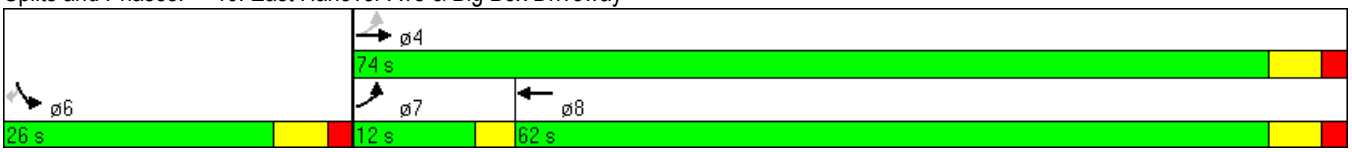
Splits and Phases: 7: East Hanover Ave & Whippany Rd

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	36	1353	904	15	9
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	21.0	22.0	26.0	26.0
Total Split (s)	12.0	74.0	62.0	26.0	26.0
Total Split (%)	12.0%	74.0%	62.0%	26.0%	26.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	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)	3.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	None	None
Act Effct Green (s)	90.6	91.2	84.0	10.0	10.0
Actuated g/C Ratio	0.91	0.91	0.84	0.10	0.10
v/c Ratio	0.07	0.46	0.34	0.09	0.06
Control Delay	0.7	0.9	3.6	42.3	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.7	0.9	3.6	42.3	22.4
LOS	A	A	A	D	C
Approach Delay		0.9	3.6	34.6	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 91 (91%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 2.3 Intersection LOS: A
Intersection Capacity Utilization 55.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway



Timings
1: East Hanover Ave & US 202

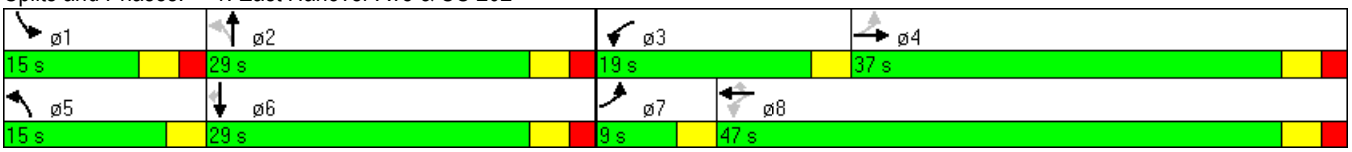
5/23/2012

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	155	485	214	1016	246	191	493	269	354	188
Turn Type	pm+pt		pm+pt		Perm	pm+pt		Prot		Perm
Protected Phases	7	4	3	8		5	2	1	6	
Permitted Phases	4		8		8	2				6
Detector Phase	7	4	3	8	8	5	2	1	6	6
Switch Phase										
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	29.0	8.0	29.0	29.0	8.0	29.0	10.0	29.0	29.0
Total Split (s)	9.0	37.0	19.0	47.0	47.0	15.0	29.0	15.0	29.0	29.0
Total Split (%)	9.0%	37.0%	19.0%	47.0%	47.0%	15.0%	29.0%	15.0%	29.0%	29.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-3.0	-2.0	-3.0	0.0	-1.0	-3.0	-2.0	-3.0	0.0
Total Lost Time (s)	1.0	2.0	1.0	2.0	5.0	2.0	2.0	3.0	2.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	C-Max	None	Min	None	Min	Min
Act Effct Green (s)	50.8	41.0	57.0	46.2	43.2	37.3	25.0	12.0	25.7	22.7
Actuated g/C Ratio	0.51	0.41	0.57	0.46	0.43	0.37	0.25	0.12	0.26	0.23
v/c Ratio	0.60	0.39	0.44	0.66	0.34	0.69	0.70	0.70	0.76	0.57
Control Delay	23.8	22.1	6.6	9.4	1.4	33.0	37.3	52.1	45.4	41.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	22.1	6.6	9.4	1.4	33.0	37.3	52.1	45.4	41.0
LOS	C	C	A	A	A	C	D	D	D	D
Approach Delay		22.4		7.7			36.2		46.6	
Approach LOS		C		A			D		D	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 35 (35%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 24.7 — Intersection LOS: C
Intersection Capacity Utilization 79.2% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: East Hanover Ave & US 202

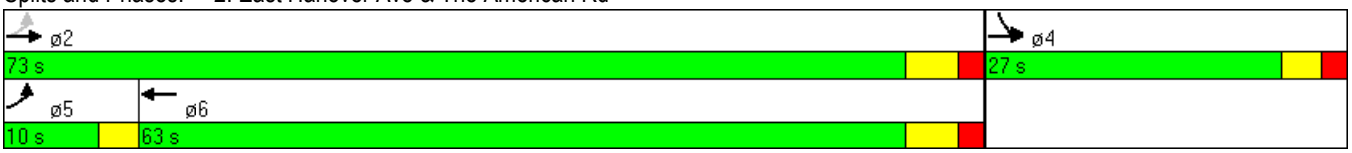


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	85	770	1259	79	219	222	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	10.0	100.0	63.0	0.0	27.0	0.0	73.0
Total Split (%)	10.0%	100.0%	63.0%	0.0%	27.0%	0.0%	73%
Yellow Time (s)	3.0		4.0		3.0		4.0
All-Red Time (s)	0.0		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)	3.0	6.0	6.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		C-Min		None		C-Max
Act Effct Green (s)	73.5	100.0	62.5	100.0	18.5	100.0	
Actuated g/C Ratio	0.74	1.00	0.62	1.00	0.18	1.00	
v/c Ratio	0.32	0.24	0.61	0.06	0.65	0.14	
Control Delay	8.3	0.2	5.5	0.1	46.1	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	8.3	0.2	5.5	0.1	46.1	0.2	
LOS	A	A	A	A	D	A	
Approach Delay		1.0	5.2		22.9		
Approach LOS		A	A		C		

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 20 (20%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 6.8 Intersection LOS: A
Intersection Capacity Utilization 65.3% ICU Level of Service C
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	238	667	150	1229	79	126	160	202	236
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt		Perm
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	7	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.0	31.0	10.0	31.0	8.0	27.0	8.0	27.0	27.0
Total Split (s)	20.0	52.0	10.0	42.0	8.0	27.0	11.0	30.0	30.0
Total Split (%)	20.0%	52.0%	10.0%	42.0%	8.0%	27.0%	11.0%	30.0%	30.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	1.0	0.0	1.0	0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	67.2	54.2	61.1	49.0	26.7	17.7	30.7	22.3	20.3
Actuated g/C Ratio	0.67	0.54	0.61	0.49	0.27	0.18	0.31	0.22	0.20
v/c Ratio	0.68	0.47	0.37	0.56	0.29	0.62	0.56	0.52	0.49
Control Delay	19.9	13.1	6.9	8.3	26.5	40.9	33.2	38.7	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	13.1	6.9	8.3	26.5	40.9	33.2	38.7	7.5
LOS	B	B	A	A	C	D	C	D	A
Approach Delay		14.6		8.2		36.7		24.9	
Approach LOS		B		A		D		C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 53 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 15.5 Intersection LOS: B
Intersection Capacity Utilization 71.2% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	879	4	95	1417	2	68
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	916	4	99	1476	2	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			TWLTL		
Median storage veh)				2		
Upstream signal (ft)	161			847		
pX, platoon unblocked			0.94		0.74	0.94
vC, conflicting volume			920		1854	460
vC1, stage 1 conf vol					918	
vC2, stage 2 conf vol					936	
vCu, unblocked vol			778		1071	286
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			87		99	89
cM capacity (veh/h)			781		340	665

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	610	309	591	984	73
Volume Left	0	0	99	0	2
Volume Right	0	4	0	0	71
cSH	1700	1700	781	1700	647
Volume to Capacity	0.36	0.18	0.13	0.58	0.11
Queue Length 95th (ft)	0	0	11	0	9
Control Delay (s)	0.0	0.0	3.2	0.0	11.3
Lane LOS			A		B
Approach Delay (s)	0.0		1.2		11.3
Approach LOS					B

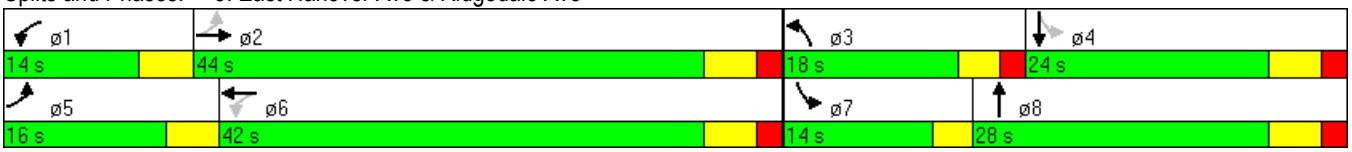
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	145	619	164	1062	301	417	200	324	170
Turn Type	pm+pt		pm+pt		Prot		pm+pt		Free
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6				4		Free
Detector Phase	5	2	1	6	3	8	7	4	
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0	
Minimum Split (s)	11.0	13.0	11.0	13.0	10.0	28.0	8.0	24.0	
Total Split (s)	16.0	44.0	14.0	42.0	18.0	28.0	14.0	24.0	0.0
Total Split (%)	16.0%	44.0%	14.0%	42.0%	18.0%	28.0%	14.0%	24.0%	0.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	1.0	4.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	
Act Effct Green (s)	53.5	44.3	52.7	43.9	14.4	21.3	33.1	17.5	100.0
Actuated g/C Ratio	0.54	0.44	0.53	0.44	0.14	0.21	0.33	0.18	1.00
v/c Ratio	0.64	0.56	0.51	0.80	0.71	0.76	0.66	0.57	0.12
Control Delay	32.7	17.9	13.3	24.7	50.2	42.1	32.3	41.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.7	17.9	13.3	24.7	50.2	42.1	32.3	41.4	0.2
LOS	C	B	B	C	D	D	C	D	A
Approach Delay		20.2		23.3		45.1		28.6	
Approach LOS		C		C		D		C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 28.2 Intersection LOS: C
Intersection Capacity Utilization 80.4% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	50	866	1263	49	82
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	29.0	29.0	29.0	28.0	28.0
Total Split (s)	71.0	71.0	71.0	29.0	29.0
Total Split (%)	71.0%	71.0%	71.0%	29.0%	29.0%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		84.7	84.7	10.7	10.7
Actuated g/C Ratio		0.85	0.85	0.11	0.11
v/c Ratio		0.42	0.47	0.28	0.38
Control Delay		1.7	2.4	44.3	18.8
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		1.7	2.4	44.3	18.8
LOS		A	A	D	B
Approach Delay		1.7	2.4	28.4	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 83 (83%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.47
Intersection Signal Delay: 3.5 Intersection LOS: A
Intersection Capacity Utilization 74.6% ICU Level of Service D
Analysis Period (min) 15

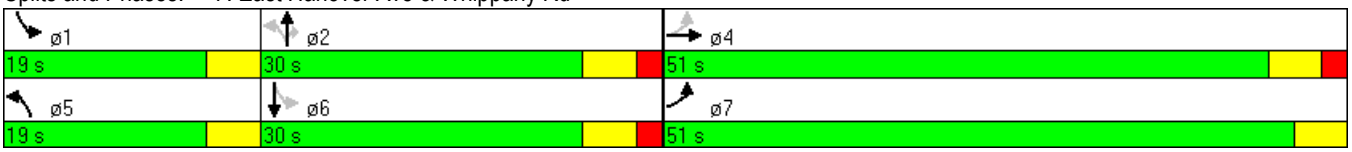
Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBT	NBL	NBT	NBR	SBL	SBT	SBR	ø7
Lane Configurations								
Volume (vph)	464	246	281	32	244	321	1058	
Turn Type		pm+pt		Perm	pm+pt		Free	
Protected Phases	4	5	2		1	6		7
Permitted Phases		2		2	6		Free	
Detector Phase	4	5	2	2	1	6		
Switch Phase								
Minimum Initial (s)	7.0	5.0	7.0	7.0	5.0	7.0		7.0
Minimum Split (s)	13.0	9.0	13.0	13.0	9.0	28.0		11.0
Total Split (s)	51.0	19.0	30.0	30.0	19.0	30.0	0.0	51.0
Total Split (%)	51.0%	19.0%	30.0%	30.0%	19.0%	30.0%	0.0%	51%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0
All-Red Time (s)	2.0	0.0	2.0	2.0	0.0	2.0		0.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	6.0	2.0	4.0	4.0	2.0	4.0	2.0	
Lead/Lag		Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	Yes		
Recall Mode	C-Max	None	None	None	None	None		None
Act Effct Green (s)	55.2	34.8	16.7	16.7	34.8	16.7	100.0	
Actuated g/C Ratio	0.55	0.35	0.17	0.17	0.35	0.17	1.00	
v/c Ratio	0.49	0.61	0.51	0.13	0.57	0.57	0.70	
Control Delay	8.6	29.4	40.6	35.2	28.1	41.8	2.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	8.6	29.4	40.6	35.2	28.1	41.8	2.6	
LOS	A	C	D	D	C	D	A	
Approach Delay	8.6		35.4			14.2		
Approach LOS	A		D			B		

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 86 (86%), Referenced to phase 4:EBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 16.4 Intersection LOS: B
Intersection Capacity Utilization 60.0% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 7: East Hanover Ave & Whippany Rd

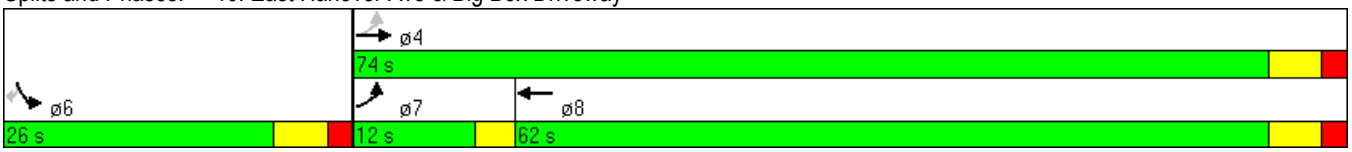


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	31	861	1400	22	29
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	22.0	22.0	26.0	26.0
Total Split (s)	12.0	74.0	62.0	26.0	26.0
Total Split (%)	12.0%	74.0%	62.0%	26.0%	26.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	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)	3.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	None	None
Act Effct Green (s)	87.4	86.8	80.8	10.0	10.0
Actuated g/C Ratio	0.87	0.87	0.81	0.10	0.10
v/c Ratio	0.11	0.30	0.55	0.13	0.17
Control Delay	3.4	4.3	1.4	43.1	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	3.4	4.3	1.4	43.1	16.9
LOS	A	A	A	D	B
Approach Delay		4.2	1.4	28.1	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 41 (41%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 3.0 Intersection LOS: A
Intersection Capacity Utilization 57.6% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway



2035 NO BUILD CONDITION

Intersection: 1: East Hanover Ave & US 202

Movement	EB	EB	EB	B29	WB	WB	WB	B23	B23	NB	NB	B30
Directions Served	L	T	TR	T	L	T	TR	T	T	L	TR	T
Maximum Queue (ft)	250	531	527	3188	250	570	525	103	60	136	476	1328
Average Queue (ft)	240	507	425	3165	180	417	338	21	10	50	460	1292
95th Queue (ft)	294	542	621	3174	314	611	528	101	63	108	471	1469
Link Distance (ft)		452	452	3149		512	512	1266	1266	389	389	1300
Upstream Blk Time (%)		60	13	54		11	0				69	65
Queuing Penalty (veh)		0	0	0		51	2				0	0
Storage Bay Dist (ft)	200				200							
Storage Blk Time (%)	85	30			18	48						
Queuing Penalty (veh)	526	71			53	70						

Intersection: 1: East Hanover Ave & US 202

Movement	SB	SB	B31
Directions Served	L	TR	T
Maximum Queue (ft)	679	659	2309
Average Queue (ft)	652	341	2207
95th Queue (ft)	677	606	2662
Link Distance (ft)	587	587	2267
Upstream Blk Time (%)	60	1	48
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: East Hanover Ave & The American Rd

Movement	EB	EB	WB	WB	SB
Directions Served	L	T	T	T	L
Maximum Queue (ft)	110	11	133	162	91
Average Queue (ft)	47	0	58	67	35
95th Queue (ft)	88	6	125	130	74
Link Distance (ft)		1266	388	388	841
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	285				
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: East Hanover Ave & Horse Hill Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	LT	R
Maximum Queue (ft)	198	284	256	139	258	258	149	729	198	108
Average Queue (ft)	92	124	134	39	138	163	122	377	89	48
95th Queue (ft)	176	219	229	90	239	264	185	715	169	85
Link Distance (ft)		256	256		246	246		1045	956	
Upstream Blk Time (%)		0	0		0	2				
Queuing Penalty (veh)		2	3		2	8				
Storage Bay Dist (ft)	200			200			100			400
Storage Blk Time (%)	1	1			2		19	39		
Queuing Penalty (veh)	5	2			2		71	76		

Intersection: 4: East Hanover Ave & Monroe St

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (ft)	98	88	172	176	327
Average Queue (ft)	42	43	38	33	173
95th Queue (ft)	126	124	119	125	500
Link Distance (ft)	94	94	379	379	548
Upstream Blk Time (%)	9	10			17
Queuing Penalty (veh)	65	76			0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: East Hanover Ave & Ridgedale Ave

Movement	EB	EB	WB	WB	WB	B17	B17	NB	NB	NB	B20	B20
Directions Served	LT	TR	LT	T	R	T	T	L	T	TR	T	T
Maximum Queue (ft)	425	446	760	746	280	1542	1556	150	365	356	620	604
Average Queue (ft)	404	408	728	725	98	802	815	149	338	308	538	396
95th Queue (ft)	473	474	762	752	316	1643	1660	149	353	399	744	772
Link Distance (ft)	347	347	659	659		1933	1933		262	262	572	572
Upstream Blk Time (%)	43	47	75	72					83	38	62	5
Queuing Penalty (veh)	352	389	303	290					0	0	0	0
Storage Bay Dist (ft)					230			100				
Storage Blk Time (%)				80				81	17			
Queuing Penalty (veh)				50				138	66			

Intersection: 5: East Hanover Ave & Ridgedale Ave

Movement	SB	SB	SB	B19	B19
Directions Served	L	T	R	T	T
Maximum Queue (ft)	300	595	559	505	467
Average Queue (ft)	170	481	192	220	144
95th Queue (ft)	356	721	565	595	483
Link Distance (ft)		507	507	522	522
Upstream Blk Time (%)		46	4	21	3
Queuing Penalty (veh)		0	0	0	0
Storage Bay Dist (ft)	250				
Storage Blk Time (%)	1	64			
Queuing Penalty (veh)	2	93			

Intersection: 6: East Hanover Ave & Library

Movement	EB	EB	B17	B17	WB	WB	SB	SB
Directions Served	LT	T	T	T	T	TR	L	R
Maximum Queue (ft)	1827	1815	137	140	74	80	10	30
Average Queue (ft)	802	824	12	11	5	7	1	5
95th Queue (ft)	1926	1948	85	85	34	40	7	23
Link Distance (ft)	1933	1933	659	659	962	962	151	151
Upstream Blk Time (%)	4	3						
Queuing Penalty (veh)	31	28						
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 7: East Hanover Ave & Whippany Rd

Movement	EB	EB	B25	B25	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	T	T	L	T	T	R	L	T	T
Maximum Queue (ft)	297	866	1056	1007	117	113	125	85	169	403	291
Average Queue (ft)	108	858	745	868	28	48	69	28	148	198	118
95th Queue (ft)	237	901	1477	1250	75	100	113	69	206	390	227
Link Distance (ft)	793	793	962	962		956	956			588	588
Upstream Blk Time (%)		54	33	35						0	
Queuing Penalty (veh)		449	269	287						0	
Storage Bay Dist (ft)					230			180	120		
Storage Blk Time (%)									40	3	
Queuing Penalty (veh)									77	8	

Intersection: 46: East Hanover Ave & Big Box Driveway

Movement	EB	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (ft)	118	289	275	104	108	45	38
Average Queue (ft)	16	93	104	36	48	16	9
95th Queue (ft)	79	258	261	101	116	43	32
Link Distance (ft)		1215	1215	94	94	304	304
Upstream Blk Time (%)				2	3		
Queuing Penalty (veh)				8	15		
Storage Bay Dist (ft)	200						
Storage Blk Time (%)		2					
Queuing Penalty (veh)		1					

Zone Summary

Zone wide Queuing Penalty: 3940

Intersection: 1: US 202 & East Hanover Ave

Movement	EB	EB	EB	B29	WB	WB	WB	B23	B23	NB	NB	B30
Directions Served	L	T	TR	T	L	T	TR	T	T	L	TR	T
Maximum Queue (ft)	250	520	519	1336	250	604	597	1305	1409	268	475	1127
Average Queue (ft)	248	480	394	1007	149	583	584	1227	1295	134	459	1061
95th Queue (ft)	262	589	637	1779	280	596	590	1469	1583	237	471	1353
Link Distance (ft)		447	447	1295		512	512	1266	1266	389	389	1112
Upstream Blk Time (%)		57	10	33		58	64	46	71		57	43
Queuing Penalty (veh)		0	0	0		517	576	409	638		0	0
Storage Bay Dist (ft)	200				200							
Storage Blk Time (%)	90	8			1	68						
Queuing Penalty (veh)	268	14			7	175						

Intersection: 1: US 202 & East Hanover Ave

Movement	SB	SB	B31
Directions Served	L	TR	T
Maximum Queue (ft)	686	659	1342
Average Queue (ft)	627	400	1218
95th Queue (ft)	734	752	1731
Link Distance (ft)	587	587	1303
Upstream Blk Time (%)	65	8	56
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: East Hanover Ave & The American Rd

Movement	EB	EB	WB	WB	WB	B12	B12	SB	SB	B13
Directions Served	L	T	T	T	R	T	T	L	R	T
Maximum Queue (ft)	83	24	475	478	350	876	862	916	300	471
Average Queue (ft)	20	2	408	409	73	589	595	770	262	291
95th Queue (ft)	58	15	608	608	308	1140	1138	1184	415	637
Link Distance (ft)		1266	388	388		829	829	841		456
Upstream Blk Time (%)			56	49		23	24	66		56
Queuing Penalty (veh)			462	404		189	197	0		0
Storage Bay Dist (ft)	285				300				250	
Storage Blk Time (%)				55				17	69	
Queuing Penalty (veh)				49				42	183	

Intersection: 3: Martin Luther King Ave/Horse Hill Rd & East Hanover Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	B21
Directions Served	L	T	TR	L	T	TR	L	TR	LT	R	T
Maximum Queue (ft)	200	229	252	234	299	274	147	211	1263	450	891
Average Queue (ft)	89	116	145	97	229	234	56	89	1192	410	699
95th Queue (ft)	167	205	248	235	338	328	116	167	1459	588	1223
Link Distance (ft)		257	257		242	242		1337	1166		853
Upstream Blk Time (%)		0	0	0	22	31			53		45
Queuing Penalty (veh)		0	2	0	185	264			0		0
Storage Bay Dist (ft)	200			200			100			400	
Storage Blk Time (%)	0	0		0	30		3	6	66	12	
Queuing Penalty (veh)	2	1		2	50		6	6	193	47	

Intersection: 4: Monroe St & East Hanover Ave

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (ft)	168	139	409	434	563
Average Queue (ft)	103	92	265	255	403
95th Queue (ft)	166	141	481	481	720
Link Distance (ft)	96	96	392	392	548
Upstream Blk Time (%)	54	57	15	12	46
Queuing Penalty (veh)	283	297	134	106	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Ridgedale Ave & East Hanover Ave

Movement	EB	EB	WB	WB	WB	B17	B17	NB	NB	NB	B20	B20
Directions Served	LT	TR	LT	T	R	T	T	L	T	TR	T	T
Maximum Queue (ft)	417	432	754	749	280	1960	1968	150	366	347	614	595
Average Queue (ft)	407	407	730	729	68	1773	1778	149	335	301	571	446
95th Queue (ft)	413	425	740	738	265	2371	2374	151	351	421	679	810
Link Distance (ft)	335	335	659	659		1933	1933		262	262	572	572
Upstream Blk Time (%)	62	70	66	63		28	29		85	50	69	12
Queuing Penalty (veh)	348	392	518	491		217	227		0	0	0	0
Storage Bay Dist (ft)					230			100				
Storage Blk Time (%)				66				83	27			
Queuing Penalty (veh)				86				191	96			

Intersection: 5: Ridgedale Ave & East Hanover Ave

Movement	SB	SB	SB	B19	B19
Directions Served	L	T	R	T	T
Maximum Queue (ft)	300	576	575	674	686
Average Queue (ft)	204	568	323	653	609
95th Queue (ft)	374	575	682	713	798
Link Distance (ft)		496	496	645	645
Upstream Blk Time (%)		76	7	75	18
Queuing Penalty (veh)		0	0	0	0
Storage Bay Dist (ft)	250				
Storage Blk Time (%)	1	81			
Queuing Penalty (veh)	4	177			

Intersection: 6: East Hanover Ave & Library

Movement	EB	EB	WB	WB	B25	B25	SB	SB
Directions Served	LT	T	T	TR	T	T	L	R
Maximum Queue (ft)	1016	1023	1059	1042	848	1018	74	140
Average Queue (ft)	539	556	749	761	405	557	29	51
95th Queue (ft)	1089	1088	1398	1389	979	1352	59	106
Link Distance (ft)	1933	1933	962	962	793	793	151	151
Upstream Blk Time (%)			41	43	5	24		2
Queuing Penalty (veh)			310	323	40	185		0
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 7: Whippany Rd & East Hanover Ave

Movement	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB	B28	B28
Directions Served	L	TR	L	T	T	R	L	T	T	R	T	T
Maximum Queue (ft)	652	690	279	369	129	67	169	366	226	676	385	427
Average Queue (ft)	240	407	183	77	68	17	113	97	76	338	40	200
95th Queue (ft)	545	616	291	235	124	50	205	265	162	884	236	537
Link Distance (ft)	793	793		953	953			588	588	588	396	396
Upstream Blk Time (%)		0								27	1	27
Queuing Penalty (veh)		0								0	0	0
Storage Bay Dist (ft)			230			180	120					
Storage Blk Time (%)			8				17	1				
Queuing Penalty (veh)			12				30	3				

Intersection: 44: East Hanover Ave & Remediated Driveway

Movement	EB	EB	WB	WB	B36	B36	SB
Directions Served	LT	T	T	TR	T	T	LR
Maximum Queue (ft)	309	285	886	931	157	151	290
Average Queue (ft)	101	48	304	318	62	62	268
95th Queue (ft)	226	180	989	1002	311	310	287
Link Distance (ft)	829	829	1000	1000	432	432	259
Upstream Blk Time (%)			8	9	4	4	98
Queuing Penalty (veh)			75	82	37	40	0
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 46: East Hanover Ave & Big Box Driveway

Movement	EB	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (ft)	249	1098	1103	126	126	102	54
Average Queue (ft)	28	619	628	57	73	39	23
95th Queue (ft)	121	1247	1258	127	138	92	50
Link Distance (ft)		1221	1221	96	96	268	268
Upstream Blk Time (%)		6	6	4	6		
Queuing Penalty (veh)		30	33	35	53		
Storage Bay Dist (ft)	200						
Storage Blk Time (%)		57					
Queuing Penalty (veh)		18					

Zone Summary

Zone wide Queuing Penalty: 9761

2035 ALTERNATIVE 1

Timings
1: East Hanover Ave & US 202

5/23/2012

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	238	1243	145	580	84	389	523	471
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt	
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	7.0	5.0	7.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	29.0	8.0	29.0	8.0	32.0	8.0	32.0
Total Split (s)	12.0	33.0	8.0	29.0	8.0	37.0	22.0	51.0
Total Split (%)	12.0%	33.0%	8.0%	29.0%	8.0%	37.0%	22.0%	51.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-1.0	-4.0	-1.0	-3.0
Total Lost Time (s)	0.0	2.0	0.0	2.0	2.0	1.0	2.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	None	Min	None	Max	None	Max
Act Effct Green (s)	41.0	31.0	37.0	27.0	41.0	36.0	57.0	50.6
Actuated g/C Ratio	0.41	0.31	0.37	0.27	0.41	0.36	0.57	0.51
v/c Ratio	0.84	1.13	0.68	0.85	0.29	1.03	1.25	0.66
Control Delay	47.9	103.2	36.5	42.9	13.9	75.9	158.1	22.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	103.2	36.5	42.9	13.9	75.9	158.1	22.5
LOS	D	F	D	D	B	E	F	C
Approach Delay		94.5		41.9		68.6		85.1
Approach LOS		F		D		E		F

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Natural Cycle: 110
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.25
Intersection Signal Delay: 76.3 — Intersection LOS: E
Intersection Capacity Utilization 121.4% — ICU Level of Service H
Analysis Period (min) 15

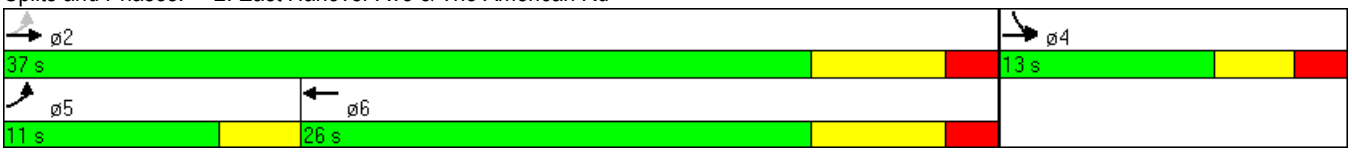
Splits and Phases: 1: East Hanover Ave & US 202

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	221	1790	848	291	68	59	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	11.0	50.0	26.0	0.0	13.0	0.0	37.0
Total Split (%)	22.0%	100.0%	52.0%	0.0%	26.0%	0.0%	74%
Yellow Time (s)	3.0		5.0		3.0		5.0
All-Red Time (s)	0.0		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)	3.0	7.0	7.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		Min		None		None
Act Effct Green (s)	34.9	51.0	20.0	51.0	8.0	51.0	
Actuated g/C Ratio	0.68	1.00	0.39	1.00	0.16	1.00	
v/c Ratio	0.48	0.54	0.64	0.20	0.23	0.04	
Control Delay	6.4	0.6	15.3	0.3	20.4	0.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	6.4	0.6	15.3	0.3	20.4	0.0	
LOS	A	A	B	A	C	A	
Approach Delay		1.2	11.5		11.0		
Approach LOS		A	B		B		

Intersection Summary

Cycle Length: 50
Actuated Cycle Length: 51
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 5.2 Intersection LOS: A
Intersection Capacity Utilization 65.3% ICU Level of Service C
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd

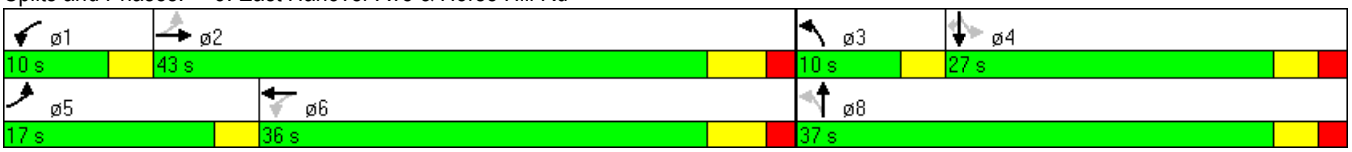


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	336	1346	81	884	194	241	66	79	199
Turn Type	pm+pt		pm+pt		pm+pt		Perm		Perm
Protected Phases	5	2	1	6	3	8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	4	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	32.0	10.0	32.0	10.0	27.0	27.0	27.0	27.0
Total Split (s)	17.0	43.0	10.0	36.0	10.0	37.0	27.0	27.0	27.0
Total Split (%)	18.9%	47.8%	11.1%	40.0%	11.1%	41.1%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	4.0	1.0	4.0	1.0	3.0	3.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead		Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	58.4	47.2	49.0	36.8	29.6	27.6		17.6	15.6
Actuated g/C Ratio	0.65	0.52	0.54	0.41	0.33	0.31		0.20	0.17
v/c Ratio	0.76	0.85	0.31	0.69	0.55	0.70		0.70	0.47
Control Delay	27.5	26.6	19.4	21.2	27.9	31.4		50.2	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	27.5	26.6	19.4	21.2	27.9	31.4		50.2	8.1
LOS	C	C	B	C	C	C		D	A
Approach Delay		26.7		21.0		30.2		25.8	
Approach LOS		C		C		C		C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 61 (68%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 25.6 Intersection LOS: C
Intersection Capacity Utilization 89.5% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1518	4	28	1025	3	126
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1598	4	29	1079	3	133
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				4.0		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	147			847		
pX, platoon unblocked			0.86		0.91	0.86
vC, conflicting volume			1602		2198	802
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1371		1411	438
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		97	73
cM capacity (veh/h)			426		111	485

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	1065	537	389	719	136
Volume Left	0	0	29	0	3
Volume Right	0	4	0	0	133
cSH	1700	1700	426	1700	450
Volume to Capacity	0.63	0.32	0.07	0.42	0.30
Queue Length 95th (ft)	0	0	6	0	31
Control Delay (s)	0.0	0.0	2.2	0.0	16.4
Lane LOS			A		C
Approach Delay (s)	0.0		0.8		16.4
Approach LOS					C

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	1349	608	63	379	341	145	255	87
Turn Type			Free	pm+pt		pm+pt		Perm
Protected Phases	2	6		3	8	7	4	
Permitted Phases			Free	8		4		4
Detector Phase	2	6		3	8	7	4	4
Switch Phase								
Minimum Initial (s)	7.0	7.0		5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	13.0	13.0		8.0	31.0	8.0	20.0	20.0
Total Split (s)	30.0	21.0	0.0	19.0	31.0	8.0	20.0	20.0
Total Split (%)	33.3%	23.3%	0.0%	21.1%	34.4%	8.9%	22.2%	22.2%
Yellow Time (s)	4.0	4.0		3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	0.0	-2.0	-3.0	-2.0	-3.0	-3.0
Total Lost Time (s)	3.0	3.0	4.0	1.0	3.0	1.0	3.0	3.0
Lead/Lag				Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	Max		None	Min	None	Min	Min
Act Effct Green (s)	27.4	18.0	90.0	37.6	27.6	25.6	16.6	16.6
Actuated g/C Ratio	0.30	0.20	1.00	0.42	0.31	0.28	0.18	0.18
v/c Ratio	1.72	1.09	0.04	0.98	0.53	0.51	0.81	0.26
Control Delay	350.7	96.7	0.0	62.7	22.1	24.8	55.3	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	350.7	96.7	0.0	62.7	22.1	24.8	55.3	9.1
LOS	F	F	A	E	C	C	E	A
Approach Delay	350.7	89.1			39.1		37.9	
Approach LOS	F	F			D		D	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.72
Intersection Signal Delay: 185.9 Intersection LOS: F
Intersection Capacity Utilization 116.8% ICU Level of Service H
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	19	1651	805	1	6
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	29.0	29.0	29.0	28.0	28.0
Total Split (s)	60.0	60.0	60.0	30.0	30.0
Total Split (%)	66.7%	66.7%	66.7%	33.3%	33.3%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		86.6	86.6	9.0	9.0
Actuated g/C Ratio		0.96	0.96	0.10	0.10
v/c Ratio		0.53	0.24	0.01	0.04
Control Delay		4.5	0.7	37.0	22.8
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		4.5	0.7	37.0	22.8
LOS		A	A	D	C
Approach Delay		4.5	0.7	24.9	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 83 (92%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.53
Intersection Signal Delay: 3.3 Intersection LOS: A
Intersection Capacity Utilization 72.4% ICU Level of Service C
Analysis Period (min) 15

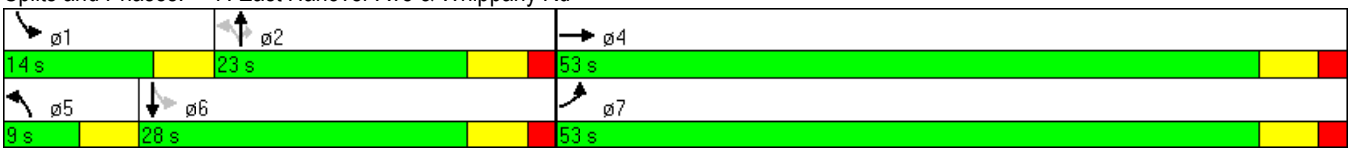
Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBL	EBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	529	971	68	261	32	243	381	764
Turn Type	Prot		pm+pt		Perm	pm+pt		Free
Protected Phases	7	4	5	2		1	6	
Permitted Phases			2		2	6		Free
Detector Phase	7	4	5	2	2	1	6	
Switch Phase								
Minimum Initial (s)	7.0	7.0	5.0	7.0	7.0	5.0	7.0	
Minimum Split (s)	23.0	13.0	9.0	13.0	13.0	9.0	20.0	
Total Split (s)	53.0	53.0	9.0	23.0	23.0	14.0	28.0	0.0
Total Split (%)	58.9%	58.9%	10.0%	25.6%	25.6%	15.6%	31.1%	0.0%
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	0.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	6.0	2.0	4.0	4.0	2.0	4.0	2.0
Lead/Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	Max	Max	None	Min	
Act Effct Green (s)	49.0	47.0	28.1	19.1	19.1	35.0	25.8	90.0
Actuated g/C Ratio	0.54	0.52	0.31	0.21	0.21	0.39	0.29	1.00
v/c Ratio	0.58	1.22	0.20	0.37	0.10	0.54	0.39	0.50
Control Delay	9.6	124.6	19.3	32.1	29.7	24.6	27.9	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.6	124.6	19.3	32.1	29.7	24.6	27.9	1.1
LOS	A	F	B	C	C	C	C	A
Approach Delay		87.8		29.5			12.6	
Approach LOS		F		C			B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 78 (87%), Referenced to phase 4:EBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.22
Intersection Signal Delay: 50.9 Intersection LOS: D
Intersection Capacity Utilization 92.7% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 7: East Hanover Ave & Whippany Rd

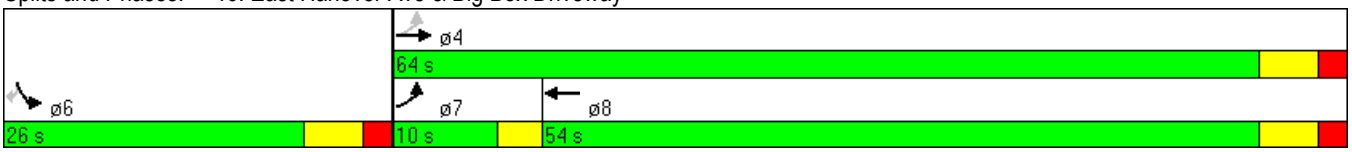


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	31	1507	1015	15	9
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	22.0	22.0	26.0	26.0
Total Split (s)	10.0	64.0	54.0	26.0	26.0
Total Split (%)	11.1%	71.1%	60.0%	28.9%	28.9%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	1.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	None	None
Act Effct Green (s)	82.6	82.0	75.2	12.0	12.0
Actuated g/C Ratio	0.92	0.91	0.84	0.13	0.13
v/c Ratio	0.06	0.51	0.38	0.07	0.05
Control Delay	1.5	3.1	0.6	35.0	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	1.5	3.1	0.6	35.0	19.0
LOS	A	A	A	C	B
Approach Delay		3.1	0.6	28.8	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 77 (86%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 2.3 Intersection LOS: A
Intersection Capacity Utilization 56.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway

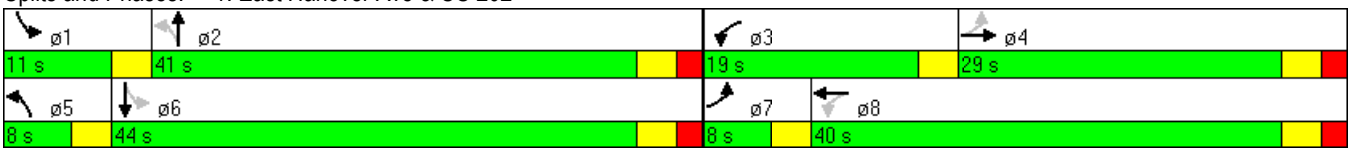


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	171	595	258	1230	210	544	319	391
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt	
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	7.0	5.0	7.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	29.0	8.0	29.0	8.0	32.0	8.0	32.0
Total Split (s)	8.0	29.0	19.0	40.0	8.0	41.0	11.0	44.0
Total Split (%)	8.0%	29.0%	19.0%	40.0%	8.0%	41.0%	11.0%	44.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-1.0	-4.0	-1.0	-3.0
Total Lost Time (s)	0.0	2.0	0.0	2.0	2.0	1.0	2.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	None	Min	None	Max	None	Max
Act Effct Green (s)	39.0	29.0	48.0	38.0	45.0	40.0	50.0	42.0
Actuated g/C Ratio	0.39	0.29	0.48	0.38	0.45	0.40	0.50	0.42
v/c Ratio	0.82	0.66	0.67	1.24	1.15	0.96	1.42	0.83
Control Delay	50.3	34.6	25.9	141.9	133.4	55.3	236.5	37.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.3	34.6	25.9	141.9	133.4	55.3	236.5	37.5
LOS	D	C	C	F	F	E	F	D
Approach Delay		37.8		125.1		73.9		106.7
Approach LOS		D		F		E		F

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Natural Cycle: 100
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.42
Intersection Signal Delay: 94.5 Intersection LOS: F
Intersection Capacity Utilization 120.8% ICU Level of Service H
Analysis Period (min) 15

Splits and Phases: 1: East Hanover Ave & US 202

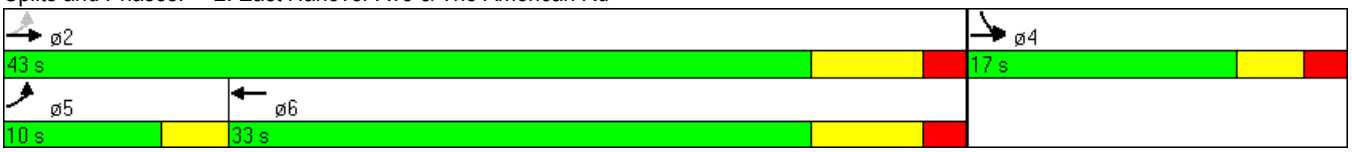


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	92	954	1549	89	265	243	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	10.0	60.0	33.0	0.0	17.0	0.0	43.0
Total Split (%)	16.7%	100.0%	55.0%	0.0%	28.3%	0.0%	72%
Yellow Time (s)	3.0		5.0		3.0		5.0
All-Red Time (s)	0.0		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)	3.0	7.0	7.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		Min		None		None
Act Effct Green (s)	39.6	59.2	27.7	59.2	11.6	59.2	
Actuated g/C Ratio	0.67	1.00	0.47	1.00	0.20	1.00	
v/c Ratio	0.29	0.30	1.01	0.06	0.75	0.15	
Control Delay	5.8	0.2	43.8	0.1	37.1	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	5.8	0.2	43.8	0.1	37.1	0.2	
LOS	A	A	D	A	D	A	
Approach Delay		0.7	41.4		19.4		
Approach LOS		A	D		B		

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 59.2
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 24.6 Intersection LOS: C
Intersection Capacity Utilization 76.7% ICU Level of Service D
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd

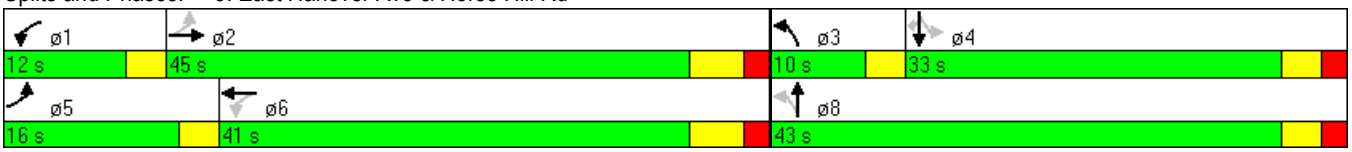


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	293	824	165	1474	95	138	165	220	291
Turn Type	pm+pt		pm+pt		pm+pt		Perm		Perm
Protected Phases	5	2	1	6	3	8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	4	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	32.0	10.0	32.0	8.0	27.0	27.0	27.0	27.0
Total Split (s)	16.0	45.0	12.0	41.0	10.0	43.0	33.0	33.0	33.0
Total Split (%)	16.0%	45.0%	12.0%	41.0%	10.0%	43.0%	33.0%	33.0%	33.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	4.0	1.0	4.0	1.0	3.0	3.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead		Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
Act Effct Green (s)	57.0	42.4	51.6	38.0	41.0	39.0		31.0	29.0
Actuated g/C Ratio	0.57	0.42	0.52	0.38	0.41	0.39		0.31	0.29
v/c Ratio	0.91	0.75	0.61	1.24	0.37	0.33		0.96	0.48
Control Delay	56.0	27.8	31.1	135.7	22.1	19.3		69.7	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	56.0	27.8	31.1	135.7	22.1	19.3		69.7	8.0
LOS	E	C	C	F	C	B		E	A
Approach Delay		34.1		125.5		20.1		43.2	
Approach LOS		C		F		C		D	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 75 (75%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.24
Intersection Signal Delay: 73.5 Intersection LOS: E
Intersection Capacity Utilization 104.9% ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1046	5	105	1680	5	75
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	1090	5	109	1750	5	78
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	167			847		
pX, platoon unblocked			0.93		0.77	0.93
vC, conflicting volume			1095		2186	547
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			942		1508	351
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			84		93	87
cM capacity (veh/h)			670		73	597

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	726	368	693	1167	83
Volume Left	0	0	109	0	5
Volume Right	0	5	0	0	78
cSH	1700	1700	670	1700	413
Volume to Capacity	0.43	0.22	0.16	0.69	0.20
Queue Length 95th (ft)	0	0	15	0	19
Control Delay (s)	0.0	0.0	4.2	0.0	15.9
Lane LOS			A		C
Approach Delay (s)	0.0		1.6		15.9
Approach LOS					C

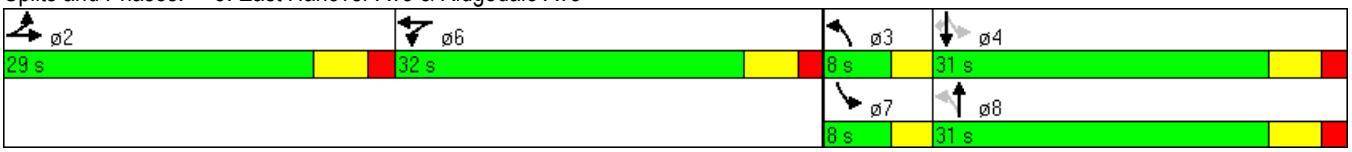
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		

Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	732	1247	131	353	459	219	355	205
Turn Type			Free	pm+pt		pm+pt		Perm
Protected Phases	2	6		3	8	7	4	
Permitted Phases			Free	8		4		4
Detector Phase	2	6		3	8	7	4	4
Switch Phase								
Minimum Initial (s)	7.0	7.0		5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	13.0	13.0		8.0	17.0	8.0	18.0	18.0
Total Split (s)	29.0	32.0	0.0	8.0	31.0	8.0	31.0	31.0
Total Split (%)	29.0%	32.0%	0.0%	8.0%	31.0%	8.0%	31.0%	31.0%
Yellow Time (s)	4.0	4.0		3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	1.0	4.0	1.0	4.0	4.0
Lead/Lag				Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	Max		None	Min	None	Min	Min
Act Effct Green (s)	27.1	28.0	100.0	34.9	24.9	34.9	24.9	24.9
Actuated g/C Ratio	0.27	0.28	1.00	0.35	0.25	0.35	0.25	0.25
v/c Ratio	1.29	1.51	0.08	1.81	0.72	0.99	0.83	0.40
Control Delay	163.1	265.1	0.1	404.0	37.7	84.3	52.4	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	163.1	265.1	0.1	404.0	37.7	84.3	52.4	6.5
LOS	F	F	A	F	D	F	D	A
Approach Delay	163.1	242.8			178.5		49.3	
Approach LOS	F	F			F		D	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Yellow, Master Intersection
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.81
Intersection Signal Delay: 174.4 Intersection LOS: F
Intersection Capacity Utilization 123.6% ICU Level of Service H
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	55	1003	1468	54	91
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	29.0	29.0	29.0	12.0	12.0
Total Split (s)	65.0	65.0	65.0	28.0	28.0
Total Split (%)	69.9%	69.9%	69.9%	30.1%	30.1%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		77.0	77.0	11.4	11.4
Actuated g/C Ratio		0.83	0.83	0.12	0.12
v/c Ratio		0.51	0.55	0.26	0.42
Control Delay		4.5	4.5	39.0	28.7
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		4.5	4.5	39.0	28.7
LOS		A	A	D	C
Approach Delay		4.5	4.5	32.6	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 93
Actuated Cycle Length: 93
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 6.0 Intersection LOS: A
Intersection Capacity Utilization 82.0% ICU Level of Service E
Analysis Period (min) 15

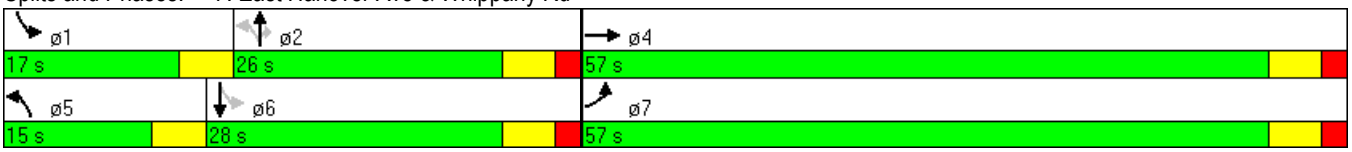
Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBL	EBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	300	540	281	308	36	261	351	1232
Turn Type	Prot		pm+pt		Perm	pm+pt		Free
Protected Phases	7	4	5	2		1	6	
Permitted Phases			2		2	6		Free
Detector Phase	7	4	5	2	2	1	6	
Switch Phase								
Minimum Initial (s)	7.0	7.0	5.0	7.0	7.0	5.0	7.0	
Minimum Split (s)	23.0	13.0	9.0	13.0	13.0	9.0	15.0	
Total Split (s)	57.0	57.0	15.0	26.0	26.0	17.0	28.0	0.0
Total Split (%)	57.0%	57.0%	15.0%	26.0%	26.0%	17.0%	28.0%	0.0%
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	0.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	6.0	2.0	4.0	4.0	2.0	4.0	2.0
Lead/Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	Max	Max	None	Min	
Act Effct Green (s)	53.0	51.0	37.5	22.5	22.5	40.5	24.0	100.0
Actuated g/C Ratio	0.53	0.51	0.38	0.22	0.22	0.40	0.24	1.00
v/c Ratio	0.34	0.83	0.67	0.41	0.11	0.58	0.43	0.81
Control Delay	14.7	29.4	30.4	35.2	32.3	26.1	34.1	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	29.4	30.4	35.2	32.3	26.1	34.1	4.6
LOS	B	C	C	D	C	C	C	A
Approach Delay		25.1		32.9			13.3	
Approach LOS		C		C			B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 20.3 Intersection LOS: C
Intersection Capacity Utilization 77.2% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 7: East Hanover Ave & Whippany Rd

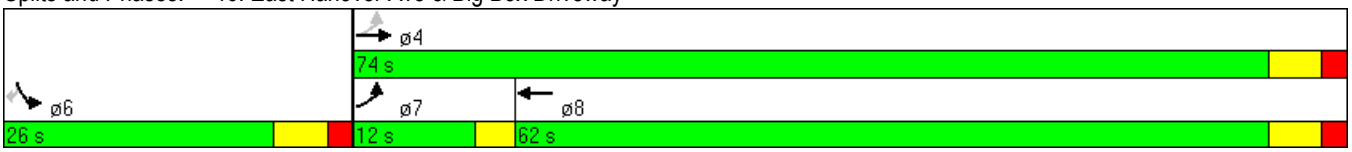


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	31	1029	1663	22	29
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	21.0	22.0	26.0	26.0
Total Split (s)	12.0	74.0	62.0	26.0	26.0
Total Split (%)	12.0%	74.0%	62.0%	26.0%	26.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	1.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	None	None
Act Effct Green (s)	89.4	88.0	82.0	12.0	12.0
Actuated g/C Ratio	0.89	0.88	0.82	0.12	0.12
v/c Ratio	0.12	0.36	0.64	0.11	0.15
Control Delay	2.0	2.3	4.3	40.8	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	2.3	4.3	40.8	15.7
LOS	A	A	A	D	B
Approach Delay		2.3	4.3	26.4	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 85 (85%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 4.0 Intersection LOS: A
Intersection Capacity Utilization 61.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway



2035 ALTERNATIVE 2

Timings
1: East Hanover Ave & US 202

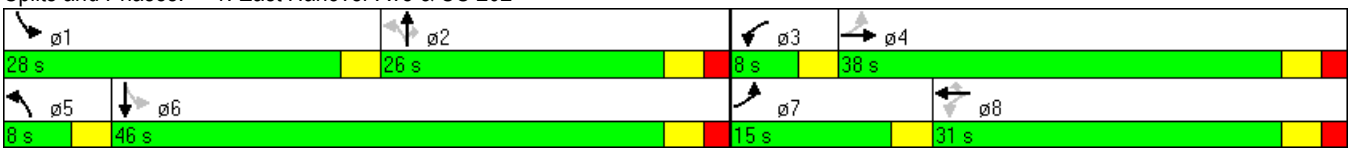
5/23/2012

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Volume (vph)	238	1243	145	580	201	84	389	245	523	471
Turn Type	pm+pt		pm+pt		Perm	pm+pt		Perm	pm+pt	
Protected Phases	7	4	3	8		5	2		1	6
Permitted Phases	4		8		8	2		2	6	
Detector Phase	7	4	3	8	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	29.0	8.0	29.0	29.0	8.0	26.0	26.0	8.0	32.0
Total Split (s)	15.0	38.0	8.0	31.0	31.0	8.0	26.0	26.0	28.0	46.0
Total Split (%)	15.0%	38.0%	8.0%	31.0%	31.0%	8.0%	26.0%	26.0%	28.0%	46.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	0.0	-1.0	-3.0	0.0	-2.0	-3.0
Total Lost Time (s)	0.0	2.0	0.0	2.0	5.0	2.0	2.0	5.0	1.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	Max	Max	None	Max
Act Effct Green (s)	46.0	36.0	39.5	29.5	26.5	30.0	24.0	21.0	53.0	45.6
Actuated g/C Ratio	0.46	0.36	0.40	0.30	0.26	0.30	0.24	0.21	0.53	0.46
v/c Ratio	0.62	0.97	0.67	0.57	0.37	0.35	0.87	0.58	0.97	0.74
Control Delay	24.5	51.4	40.5	18.2	3.9	19.3	57.5	20.9	58.2	29.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	51.4	40.5	18.2	3.9	19.3	57.5	20.9	58.2	29.7
LOS	C	D	D	B	A	B	E	C	E	C
Approach Delay		47.2		18.6			40.5			42.9
Approach LOS		D		B			D			D

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 46 (46%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 38.8 — Intersection LOS: D
Intersection Capacity Utilization 106.2% — ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 1: East Hanover Ave & US 202

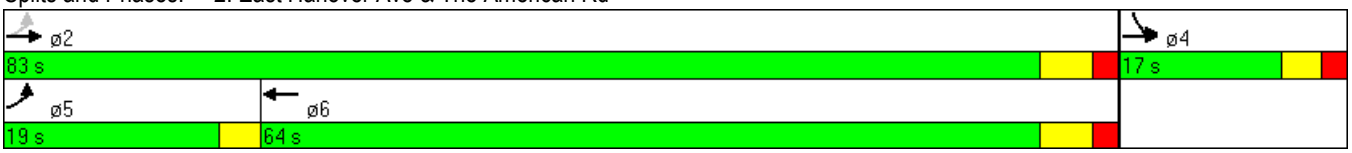


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	221	1790	848	291	68	59	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	19.0	100.0	64.0	0.0	17.0	0.0	83.0
Total Split (%)	19.0%	100.0%	64.0%	0.0%	17.0%	0.0%	83%
Yellow Time (s)	3.0		4.0		3.0		4.0
All-Red Time (s)	0.0		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)	3.0	6.0	6.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		C-Min		None		C-Max
Act Effct Green (s)	80.0	100.0	65.4	100.0	12.0	100.0	
Actuated g/C Ratio	0.80	1.00	0.65	1.00	0.12	1.00	
v/c Ratio	0.45	0.54	0.39	0.20	0.31	0.04	
Control Delay	4.1	0.7	3.3	0.2	44.2	0.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	4.1	0.7	3.3	0.2	44.2	0.0	
LOS	A	A	A	A	D	A	
Approach Delay		1.0	2.5		23.8		
Approach LOS		A	A		C		

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 38 (38%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 2.4 Intersection LOS: A
Intersection Capacity Utilization 64.5% ICU Level of Service C
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd

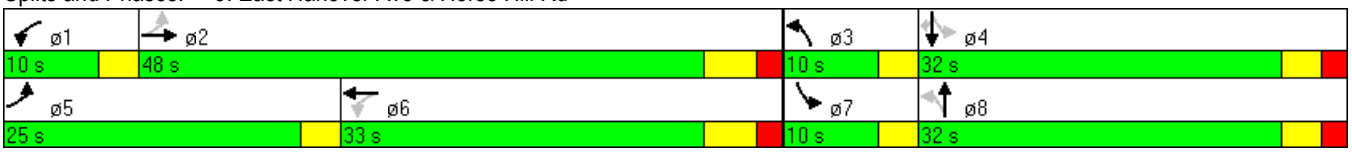


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	336	1346	81	884	194	241	66	79	199
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt		Perm
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	7	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.0	32.0	10.0	32.0	10.0	27.0	10.0	27.0	27.0
Total Split (s)	25.0	48.0	10.0	33.0	10.0	32.0	10.0	32.0	32.0
Total Split (%)	25.0%	48.0%	10.0%	33.0%	10.0%	32.0%	10.0%	32.0%	32.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	4.0	1.0	4.0	1.0	3.0	1.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	61.8	50.7	50.5	38.4	35.4	26.2	34.9	24.2	22.2
Actuated g/C Ratio	0.62	0.51	0.50	0.38	0.35	0.26	0.35	0.24	0.22
v/c Ratio	0.81	0.88	0.35	0.73	0.44	0.82	0.29	0.18	0.41
Control Delay	30.8	26.2	16.9	30.0	25.2	46.5	22.0	28.7	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	26.2	16.9	30.0	25.2	46.5	22.0	28.7	6.8
LOS	C	C	B	C	C	D	C	C	A
Approach Delay		27.0		29.0		39.2		14.7	
Approach LOS		C		C		D		B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 60 (60%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 28.3 Intersection LOS: C
Intersection Capacity Utilization 85.5% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1518	4	28	1025	3	126
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1598	4	29	1079	3	133
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				4.0		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	176			847		
pX, platoon unblocked			0.87		0.92	0.87
vC, conflicting volume			1602		2198	802
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1395		1624	477
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		96	71
cM capacity (veh/h)			423		82	465

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	1065	537	389	719	136
Volume Left	0	0	29	0	3
Volume Right	0	4	0	0	133
cSH	1700	1700	423	1700	419
Volume to Capacity	0.63	0.32	0.07	0.42	0.32
Queue Length 95th (ft)	0	0	6	0	35
Control Delay (s)	0.0	0.0	2.2	0.0	17.6
Lane LOS			A		C
Approach Delay (s)	0.0		0.8		17.6
Approach LOS					C

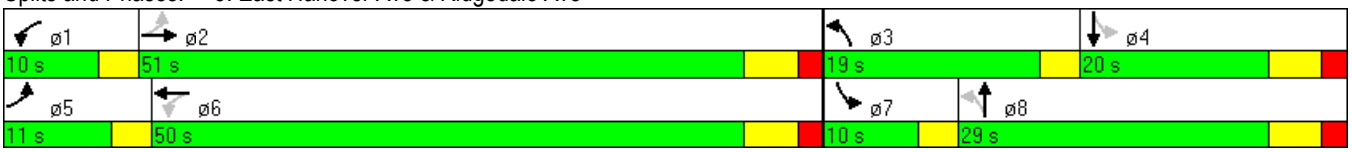
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	99	1349	126	608	379	341	145	255
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt	
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	10.0	13.0	10.0	13.0	10.0	28.0	8.0	20.0
Total Split (s)	11.0	51.0	10.0	50.0	19.0	29.0	10.0	20.0
Total Split (%)	11.0%	51.0%	10.0%	50.0%	19.0%	29.0%	10.0%	20.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
Lost Time Adjust (s)	-1.0	-3.0	-1.0	-3.0	-2.0	-3.0	-2.0	-3.0
Total Lost Time (s)	2.0	3.0	2.0	3.0	1.0	3.0	1.0	3.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	C-Max	Max	C-Max	None	None	None	None
Act Effct Green (s)	59.2	48.0	57.2	47.0	36.8	24.8	26.8	15.8
Actuated g/C Ratio	0.59	0.48	0.57	0.47	0.37	0.25	0.27	0.16
v/c Ratio	0.24	1.03	0.55	0.42	1.07	0.65	0.56	0.65
Control Delay	4.6	44.4	22.4	16.9	94.1	31.2	31.0	40.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	44.4	22.4	16.9	94.1	31.2	31.0	40.6
LOS	A	D	C	B	F	C	C	D
Approach Delay		42.1		17.8		57.6		37.7
Approach LOS		D		B		E		D

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 40.2 Intersection LOS: D
Intersection Capacity Utilization 96.8% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	19	1651	805	1	6
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	29.0	29.0	29.0	28.0	28.0
Total Split (s)	72.0	72.0	72.0	28.0	28.0
Total Split (%)	72.0%	72.0%	72.0%	28.0%	28.0%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		96.6	96.6	9.0	9.0
Actuated g/C Ratio		0.97	0.97	0.09	0.09
v/c Ratio		0.52	0.24	0.01	0.04
Control Delay		0.3	0.6	42.0	25.5
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		0.3	0.6	42.0	25.5
LOS		A	A	D	C
Approach Delay		0.3	0.6	27.9	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 76 (76%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 0.5 Intersection LOS: A
Intersection Capacity Utilization 72.4% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBL	EBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	529	971	68	261	32	243	381	764
Turn Type	Prot		pm+pt		Perm	pm+pt		Free
Protected Phases	7	4	5	2		1	6	
Permitted Phases			2		2	6		Free
Detector Phase	7	4	5	2	2	1	6	
Switch Phase								
Minimum Initial (s)	7.0	7.0	5.0	7.0	7.0	5.0	7.0	
Minimum Split (s)	23.0	13.0	9.0	13.0	13.0	9.0	26.0	
Total Split (s)	65.0	65.0	9.0	19.0	19.0	16.0	26.0	0.0
Total Split (%)	65.0%	65.0%	9.0%	19.0%	19.0%	16.0%	26.0%	0.0%
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	0.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	6.0	2.0	4.0	4.0	2.0	4.0	2.0
Lead/Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	Min	Min	None	Min	
Act Effct Green (s)	62.2	60.2	23.0	14.0	14.0	31.8	22.6	100.0
Actuated g/C Ratio	0.62	0.60	0.23	0.14	0.14	0.32	0.23	1.00
v/c Ratio	0.51	1.06	0.26	0.56	0.15	0.66	0.50	0.50
Control Delay	6.3	53.9	26.6	44.7	39.0	36.2	36.5	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.3	53.9	26.6	44.7	39.0	36.2	36.5	1.1
LOS	A	D	C	D	D	D	D	A
Approach Delay		38.7		40.8			17.0	
Approach LOS		D		D			B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 74 (74%), Referenced to phase 4:EBT, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 30.0 Intersection LOS: C
Intersection Capacity Utilization 92.7% ICU Level of Service F
Analysis Period (min) 15

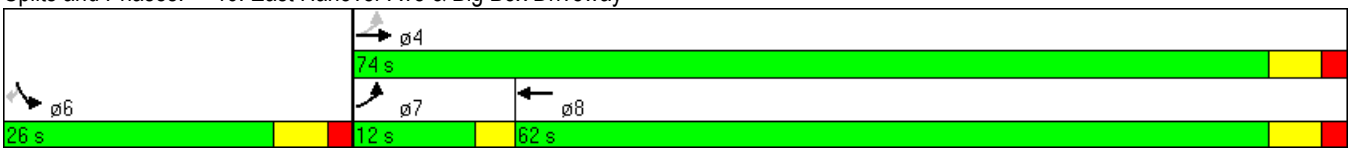
Splits and Phases: 7: East Hanover Ave & Whippany Rd

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	31	1507	1015	15	9
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	22.0	22.0	26.0	26.0
Total Split (s)	12.0	74.0	62.0	26.0	26.0
Total Split (%)	12.0%	74.0%	62.0%	26.0%	26.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	1.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	None	None
Act Effct Green (s)	92.6	92.0	85.2	12.0	12.0
Actuated g/C Ratio	0.93	0.92	0.85	0.12	0.12
v/c Ratio	0.06	0.50	0.37	0.07	0.05
Control Delay	0.4	1.0	2.1	40.1	21.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.4	1.0	2.1	40.1	21.3
LOS	A	A	A	D	C
Approach Delay		1.0	2.1	32.9	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 89 (89%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 1.7 Intersection LOS: A
Intersection Capacity Utilization 56.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway



Timings
1: East Hanover Ave & US 202

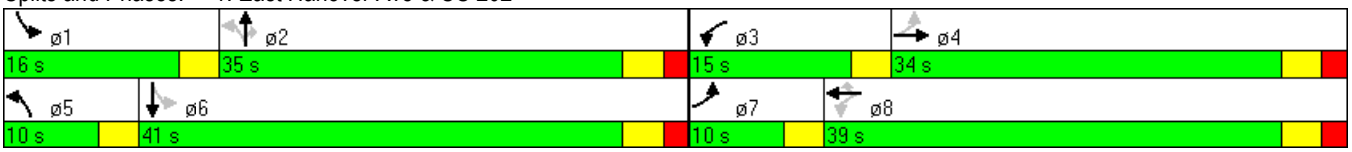
5/23/2012

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Volume (vph)	171	595	258	1230	298	210	544	131	319	391
Turn Type	pm+pt		pm+pt		Perm	pm+pt		Perm	pm+pt	
Protected Phases	7	4	3	8		5	2		1	6
Permitted Phases	4		8		8	2		2	6	
Detector Phase	7	4	3	8	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	29.0	8.0	29.0	29.0	8.0	32.0	32.0	8.0	32.0
Total Split (s)	10.0	34.0	15.0	39.0	39.0	10.0	35.0	35.0	16.0	41.0
Total Split (%)	10.0%	34.0%	15.0%	39.0%	39.0%	10.0%	35.0%	35.0%	16.0%	41.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	0.0	-1.0	-4.0	0.0	-2.0	-3.0
Total Lost Time (s)	0.0	2.0	0.0	2.0	5.0	2.0	1.0	5.0	1.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	Max	Max	None	Max
Act Effct Green (s)	44.4	32.4	49.0	37.0	34.0	41.0	34.0	30.0	50.0	39.0
Actuated g/C Ratio	0.44	0.32	0.49	0.37	0.34	0.41	0.34	0.30	0.50	0.39
v/c Ratio	0.71	0.59	0.69	1.00	0.50	1.02	0.89	0.27	0.99	0.90
Control Delay	35.2	30.2	19.2	35.2	4.5	92.1	48.8	12.5	72.2	46.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.2	30.2	19.2	35.2	4.5	92.1	48.8	12.5	72.2	46.6
LOS	D	C	B	D	A	F	D	B	E	D
Approach Delay		31.2		27.8			53.7			55.5
Approach LOS		C		C			D			E

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 53 (53%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 39.4 — Intersection LOS: D
Intersection Capacity Utilization 103.1% — ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 1: East Hanover Ave & US 202

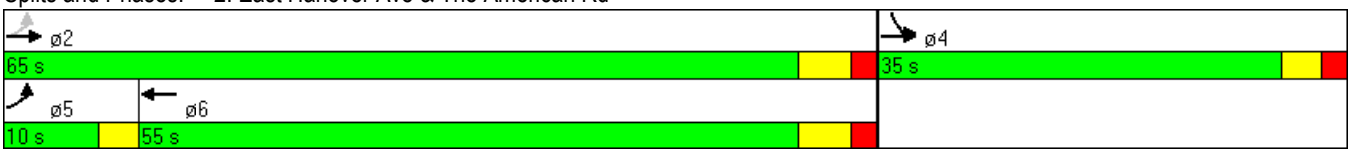


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	92	954	1549	89	265	243	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	10.0	100.0	55.0	0.0	35.0	0.0	65.0
Total Split (%)	10.0%	100.0%	55.0%	0.0%	35.0%	0.0%	65%
Yellow Time (s)	3.0		4.0		3.0		4.0
All-Red Time (s)	0.0		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)	3.0	6.0	6.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		C-Min		None		C-Max
Act Effct Green (s)	68.9	100.0	57.6	100.0	23.1	100.0	
Actuated g/C Ratio	0.69	1.00	0.58	1.00	0.23	1.00	
v/c Ratio	0.49	0.30	0.82	0.06	0.63	0.15	
Control Delay	18.4	0.2	11.1	0.0	40.3	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.4	0.2	11.1	0.0	40.3	0.2	
LOS	B	A	B	A	D	A	
Approach Delay		1.8	10.5		21.1		
Approach LOS		A	B		C		

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 23 (23%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 9.3 Intersection LOS: A
Intersection Capacity Utilization 75.8% ICU Level of Service D
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	293	824	165	1474	95	138	165	220	291
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt		Perm
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	7	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.0	32.0	10.0	32.0	8.0	26.0	10.0	26.0	26.0
Total Split (s)	15.0	51.0	13.0	49.0	10.0	26.0	10.0	26.0	26.0
Total Split (%)	15.0%	51.0%	13.0%	49.0%	10.0%	26.0%	10.0%	26.0%	26.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	4.0	1.0	4.0	1.0	3.0	1.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	66.5	51.6	60.3	46.4	30.4	19.5	30.7	21.5	19.5
Actuated g/C Ratio	0.66	0.52	0.60	0.46	0.30	0.20	0.31	0.22	0.20
v/c Ratio	0.87	0.62	0.48	1.01	0.34	0.63	0.61	0.59	0.62
Control Delay	49.3	17.2	12.8	39.6	27.1	40.2	35.3	42.1	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.3	17.2	12.8	39.6	27.1	40.2	35.3	42.1	14.1
LOS	D	B	B	D	C	D	D	D	B
Approach Delay		24.4		37.0		36.2		28.4	
Approach LOS		C		D		D		C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 66 (66%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 31.4 Intersection LOS: C
Intersection Capacity Utilization 93.3% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1046	5	105	1680	5	75
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	1090	5	109	1750	5	78
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	161			847		
pX, platoon unblocked			0.93		0.66	0.93
vC, conflicting volume			1095		2186	547
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			942		1259	351
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			84		94	87
cM capacity (veh/h)			670		91	597

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	726	368	693	1167	83
Volume Left	0	0	109	0	5
Volume Right	0	5	0	0	78
cSH	1700	1700	670	1700	444
Volume to Capacity	0.43	0.22	0.16	0.69	0.19
Queue Length 95th (ft)	0	0	15	0	17
Control Delay (s)	0.0	0.0	4.2	0.0	15.0
Lane LOS			A		B
Approach Delay (s)	0.0		1.6		15.0
Approach LOS					B

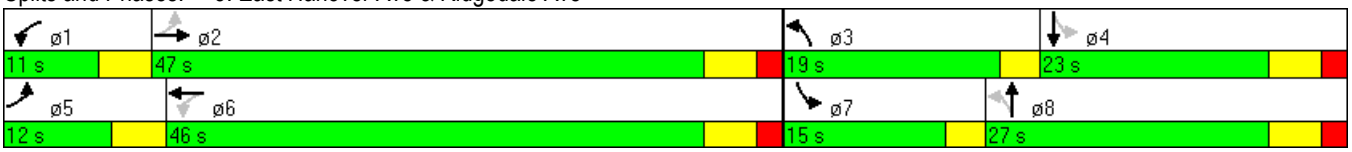
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	174	732	180	1247	353	459	219	355
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt	
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	11.0	13.0	11.0	13.0	8.0	27.0	8.0	23.0
Total Split (s)	12.0	47.0	11.0	46.0	19.0	27.0	15.0	23.0
Total Split (%)	12.0%	47.0%	11.0%	46.0%	19.0%	27.0%	15.0%	23.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	1.0	4.0	1.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	C-Max	Max	C-Max	None	None	None	None
Act Effct Green (s)	51.5	43.0	49.5	42.0	40.5	23.2	34.8	18.5
Actuated g/C Ratio	0.52	0.43	0.50	0.42	0.40	0.23	0.35	0.18
v/c Ratio	0.81	0.68	0.75	0.98	1.02	0.77	0.70	0.87
Control Delay	51.2	20.3	29.7	40.4	78.0	41.9	33.1	47.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.2	20.3	29.7	40.4	78.0	41.9	33.1	47.4
LOS	D	C	C	D	E	D	C	D
Approach Delay		25.1		39.2		55.7		43.4
Approach LOS		C		D		E		D

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 26 (26%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 39.8 Intersection LOS: D
Intersection Capacity Utilization 97.6% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	55	1003	1468	54	91
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	29.0	29.0	29.0	28.0	28.0
Total Split (s)	72.0	72.0	72.0	28.0	28.0
Total Split (%)	72.0%	72.0%	72.0%	28.0%	28.0%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		84.0	84.0	11.4	11.4
Actuated g/C Ratio		0.84	0.84	0.11	0.11
v/c Ratio		0.99	0.55	0.28	0.44
Control Delay		33.8	3.0	43.1	29.3
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		33.8	3.0	43.1	29.3
LOS		C	A	D	C
Approach Delay		33.8	3.0	34.4	
Approach LOS		C	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 16.7 Intersection LOS: B
Intersection Capacity Utilization 82.0% ICU Level of Service E
Analysis Period (min) 15

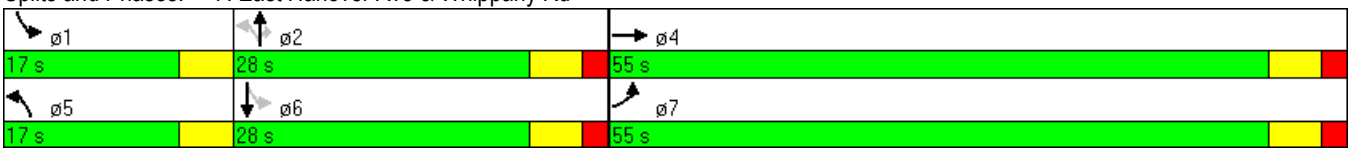
Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBL	EBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								
Volume (vph)	300	540	281	308	36	261	351	1232
Turn Type	Prot		pm+pt		Perm	pm+pt		Free
Protected Phases	7	4	5	2		1	6	
Permitted Phases			2		2	6		Free
Detector Phase	7	4	5	2	2	1	6	
Switch Phase								
Minimum Initial (s)	7.0	7.0	5.0	7.0	7.0	5.0	7.0	
Minimum Split (s)	23.0	13.0	9.0	13.0	13.0	9.0	28.0	
Total Split (s)	55.0	55.0	17.0	28.0	28.0	17.0	28.0	0.0
Total Split (%)	55.0%	55.0%	17.0%	28.0%	28.0%	17.0%	28.0%	0.0%
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	0.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	6.0	2.0	4.0	4.0	2.0	4.0	2.0
Lead/Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	Min	Min	None	Min	
Act Effct Green (s)	57.6	55.6	34.6	17.7	17.7	34.3	17.6	100.0
Actuated g/C Ratio	0.58	0.56	0.35	0.18	0.18	0.34	0.18	1.00
v/c Ratio	0.31	0.76	0.75	0.52	0.14	0.65	0.59	0.81
Control Delay	6.6	13.2	36.7	40.1	34.7	31.4	41.6	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.6	13.2	36.7	40.1	34.7	31.4	41.6	4.6
LOS	A	B	D	D	C	C	D	A
Approach Delay		11.3		38.2			15.4	
Approach LOS		B		D			B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 30 (30%), Referenced to phase 4:EBT, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 18.3 Intersection LOS: B
Intersection Capacity Utilization 77.2% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 7: East Hanover Ave & Whippany Rd

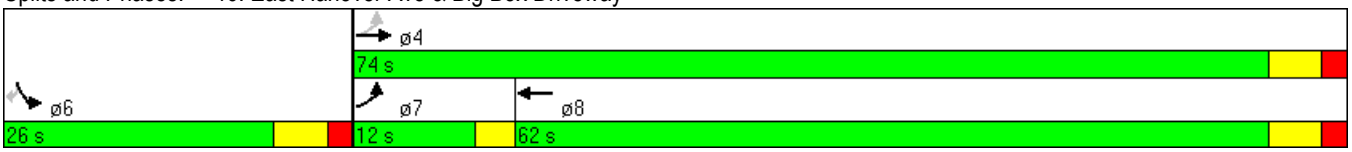


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	31	1029	1663	22	29
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	12.0	22.0	22.0	26.0	26.0
Total Split (s)	12.0	74.0	62.0	26.0	26.0
Total Split (%)	12.0%	74.0%	62.0%	26.0%	26.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	1.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	None	None
Act Effct Green (s)	89.4	88.0	82.0	12.0	12.0
Actuated g/C Ratio	0.89	0.88	0.82	0.12	0.12
v/c Ratio	0.12	0.36	0.64	0.11	0.15
Control Delay	3.2	4.6	3.8	40.8	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	3.2	4.6	3.8	40.8	15.7
LOS	A	A	A	D	B
Approach Delay		4.6	3.8	26.4	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 57 (57%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 4.5 Intersection LOS: A
Intersection Capacity Utilization 61.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway



2035 ALTERNATIVE 3

Timings
1: East Hanover Ave & US 202

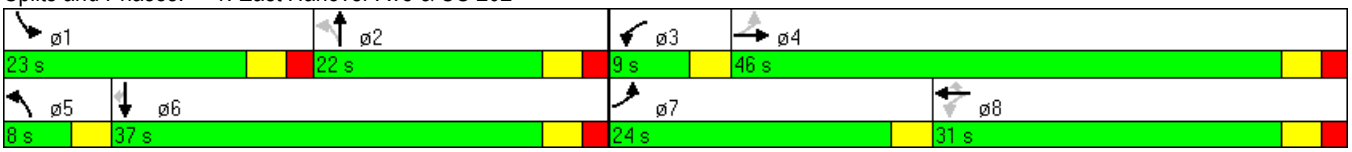
5/23/2012

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	238	1243	145	580	201	84	389	523	471	139
Turn Type	pm+pt		pm+pt		Perm	pm+pt		Prot		Perm
Protected Phases	7	4	3	8		5	2	1	6	
Permitted Phases	4		8		8	2				6
Detector Phase	7	4	3	8	8	5	2	1	6	6
Switch Phase										
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	29.0	8.0	29.0	29.0	8.0	22.0	10.0	32.0	32.0
Total Split (s)	24.0	46.0	9.0	31.0	31.0	8.0	22.0	23.0	37.0	37.0
Total Split (%)	24.0%	46.0%	9.0%	31.0%	31.0%	8.0%	22.0%	23.0%	37.0%	37.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-3.0	-2.0	-3.0	0.0	-1.0	-4.0	-2.0	-3.0	0.0
Total Lost Time (s)	1.0	2.0	1.0	2.0	5.0	2.0	1.0	3.0	2.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	Max	None	Max	Max
Act Effct Green (s)	52.6	42.6	44.4	35.4	32.4	28.1	22.7	19.7	37.7	34.7
Actuated g/C Ratio	0.53	0.43	0.44	0.35	0.32	0.28	0.23	0.20	0.38	0.35
v/c Ratio	0.54	0.82	0.68	0.48	0.33	0.34	0.76	0.80	0.67	0.26
Control Delay	17.4	30.4	42.8	15.2	4.3	22.4	36.3	48.1	32.6	26.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.4	30.4	42.8	15.2	4.3	22.4	36.3	48.1	32.6	26.6
LOS	B	C	D	B	A	C	D	D	C	C
Approach Delay		28.4		17.1			34.7		39.0	
Approach LOS		C		B			C		D	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 62 (62%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 29.8 — Intersection LOS: C
Intersection Capacity Utilization 90.5% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 1: East Hanover Ave & US 202

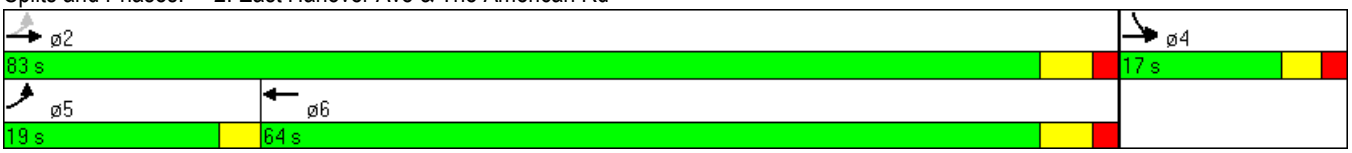


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	221	1790	848	291	68	59	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	19.0	100.0	64.0	0.0	17.0	0.0	83.0
Total Split (%)	19.0%	100.0%	64.0%	0.0%	17.0%	0.0%	83%
Yellow Time (s)	3.0		4.0		3.0		4.0
All-Red Time (s)	0.0		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)	3.0	6.0	6.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		C-Min		None		C-Max
Act Effct Green (s)	80.0	100.0	65.4	100.0	12.0	100.0	
Actuated g/C Ratio	0.80	1.00	0.65	1.00	0.12	1.00	
v/c Ratio	0.45	0.54	0.39	0.20	0.31	0.04	
Control Delay	3.9	0.4	3.2	0.3	44.2	0.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	3.9	0.4	3.2	0.3	44.2	0.0	
LOS	A	A	A	A	D	A	
Approach Delay		0.8	2.4		23.8		
Approach LOS		A	A		C		

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 45 (45%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 2.2 Intersection LOS: A
Intersection Capacity Utilization 64.5% ICU Level of Service C
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	336	1346	81	884	194	241	66	79	199
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt		Perm
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	7	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.0	31.0	10.0	31.0	8.0	30.0	8.0	30.0	30.0
Total Split (s)	23.0	51.0	10.0	38.0	10.0	29.0	10.0	29.0	29.0
Total Split (%)	23.0%	51.0%	10.0%	38.0%	10.0%	29.0%	10.0%	29.0%	29.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	1.0	0.0	1.0	0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	63.2	53.2	53.3	42.3	34.0	24.8	33.6	22.8	20.8
Actuated g/C Ratio	0.63	0.53	0.53	0.42	0.34	0.25	0.34	0.23	0.21
v/c Ratio	0.74	0.84	0.35	0.46	0.46	0.86	0.30	0.20	0.43
Control Delay	20.3	19.6	20.9	19.4	27.0	53.0	23.9	30.6	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.3	19.6	20.9	19.4	27.0	53.0	23.9	30.6	7.4
LOS	C	B	C	B	C	D	C	C	A
Approach Delay		19.8		19.5		44.1		15.9	
Approach LOS		B		B		D		B	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 67 (67%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 23.0 Intersection LOS: C
Intersection Capacity Utilization 85.5% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1518	4	28	1025	3	126
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1598	4	29	1079	3	133
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				4.0		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			TWLTL		
Median storage veh)				2		
Upstream signal (ft)	161			847		
pX, platoon unblocked			0.73		0.78	0.73
vC, conflicting volume			1602		2198	802
vC1, stage 1 conf vol					1600	
vC2, stage 2 conf vol					598	
vCu, unblocked vol			1076		1377	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			94		98	83
cM capacity (veh/h)			468		204	787

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	1065	537	389	719	136
Volume Left	0	0	29	0	3
Volume Right	0	4	0	0	133
cSH	1700	1700	468	1700	738
Volume to Capacity	0.63	0.32	0.06	0.42	0.18
Queue Length 95th (ft)	0	0	5	0	17
Control Delay (s)	0.0	0.0	2.0	0.0	11.0
Lane LOS			A		B
Approach Delay (s)	0.0		0.7		11.0
Approach LOS					B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	99	1349	126	608	379	341	145	255	87
Turn Type	pm+pt		pm+pt		Prot		pm+pt		Free
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6				4		Free
Detector Phase	5	2	1	6	3	8	7	4	
Switch Phase									
Minimum Initial (s)	7.0	7.0	5.0	7.0	5.0	7.0	5.0	7.0	
Minimum Split (s)	11.0	13.0	9.0	13.0	10.0	28.0	8.0	24.0	
Total Split (s)	11.0	53.0	9.0	51.0	18.0	28.0	10.0	20.0	0.0
Total Split (%)	11.0%	53.0%	9.0%	51.0%	18.0%	28.0%	10.0%	20.0%	0.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	1.0	4.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	C-Max	None	Min	None	Min	
Act Effct Green (s)	57.0	49.9	56.4	51.3	15.0	21.8	25.7	13.8	100.0
Actuated g/C Ratio	0.57	0.50	0.56	0.51	0.15	0.22	0.26	0.14	1.00
v/c Ratio	0.25	0.99	0.71	0.39	0.85	0.73	0.59	0.57	0.06
Control Delay	3.3	28.6	39.0	14.9	60.1	35.8	33.6	45.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.3	28.6	39.0	14.9	60.1	35.8	33.6	45.0	0.1
LOS	A	C	D	B	E	D	C	D	A
Approach Delay		27.2		18.8		45.9		33.6	
Approach LOS		C		B		D		C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 30.6 Intersection LOS: C
Intersection Capacity Utilization 89.6% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	19	1651	805	1	6
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	29.0	29.0	29.0	28.0	28.0
Total Split (s)	72.0	72.0	72.0	28.0	28.0
Total Split (%)	72.0%	72.0%	72.0%	28.0%	28.0%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		96.6	96.6	9.0	9.0
Actuated g/C Ratio		0.97	0.97	0.09	0.09
v/c Ratio		0.52	0.24	0.01	0.04
Control Delay		0.3	0.6	42.0	25.5
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		0.3	0.6	42.0	25.5
LOS		A	A	D	C
Approach Delay		0.3	0.6	27.9	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 74 (74%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 0.5 Intersection LOS: A
Intersection Capacity Utilization 72.4% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBT	NBL	NBT	NBR	SBL	SBT	SBR	ø7
Lane Configurations								
Volume (vph)	971	68	261	32	243	381	764	
Turn Type		pm+pt		Perm	pm+pt		Free	
Protected Phases	4	5	2		1	6		7
Permitted Phases		2		2	6		Free	
Detector Phase	4	5	2	2	1	6		
Switch Phase								
Minimum Initial (s)	7.0	5.0	7.0	7.0	5.0	7.0		7.0
Minimum Split (s)	13.0	9.0	13.0	13.0	9.0	28.0		13.0
Total Split (s)	63.0	9.0	20.0	20.0	17.0	28.0	0.0	63.0
Total Split (%)	63.0%	9.0%	20.0%	20.0%	17.0%	28.0%	0.0%	63%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0
All-Red Time (s)	2.0	0.0	2.0	2.0	0.0	2.0		2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	6.0	2.0	4.0	4.0	2.0	4.0	2.0	
Lead/Lag		Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	Yes		
Recall Mode	C-Max	None	Min	Min	None	Min		None
Act Effct Green (s)	58.9	23.4	14.4	14.4	33.1	23.9	100.0	
Actuated g/C Ratio	0.59	0.23	0.14	0.14	0.33	0.24	1.00	
v/c Ratio	0.85	0.25	0.54	0.15	0.63	0.47	0.50	
Control Delay	10.4	25.5	43.8	38.3	33.4	34.9	1.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	10.4	25.5	43.8	38.3	33.4	34.9	1.1	
LOS	B	C	D	D	C	C	A	
Approach Delay	10.4		39.8			16.1		
Approach LOS	B		D			B		

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 73 (73%), Referenced to phase 4:EBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 15.8 Intersection LOS: B
Intersection Capacity Utilization 79.4% ICU Level of Service D
Analysis Period (min) 15

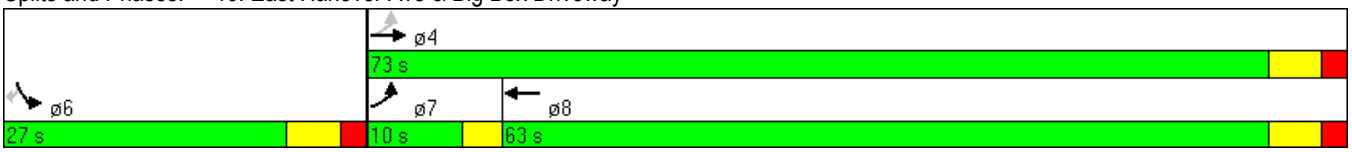
Splits and Phases: 7: East Hanover Ave & Whippany Rd

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	31	1507	1015	15	9
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	22.0	22.0	26.0	26.0
Total Split (s)	10.0	73.0	63.0	27.0	27.0
Total Split (%)	10.0%	73.0%	63.0%	27.0%	27.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	1.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	Max	Max
Act Effct Green (s)	72.0	69.0	63.4	23.0	23.0
Actuated g/C Ratio	0.72	0.69	0.63	0.23	0.23
v/c Ratio	0.09	0.67	0.50	0.04	0.03
Control Delay	2.4	4.9	9.4	30.4	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	2.4	4.9	9.4	30.4	16.1
LOS	A	A	A	C	B
Approach Delay		4.9	9.4	24.9	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 85 (85%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 6.9 Intersection LOS: A
Intersection Capacity Utilization 52.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway



Timings
1: East Hanover Ave & US 202

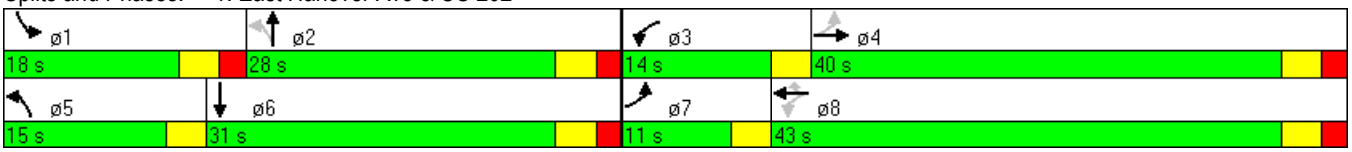
5/23/2012

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	171	595	258	1230	298	210	544	319	391	208
Turn Type	pm+pt		pm+pt		Perm	pm+pt		Prot		Free
Protected Phases	7	4	3	8		5	2	1	6	
Permitted Phases	4		8		8	2				Free
Detector Phase	7	4	3	8	8	5	2	1	6	
Switch Phase										
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	8.0	29.0	8.0	29.0	29.0	8.0	29.0	10.0	32.0	
Total Split (s)	11.0	40.0	14.0	43.0	43.0	15.0	28.0	18.0	31.0	0.0
Total Split (%)	11.0%	40.0%	14.0%	43.0%	43.0%	15.0%	28.0%	18.0%	31.0%	0.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-3.0	-2.0	-4.0	0.0	-2.0	-3.0	-3.0	-3.0	0.0
Total Lost Time (s)	1.0	2.0	1.0	1.0	5.0	1.0	2.0	2.0	2.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	C-Max	C-Max	None	Min	None	Min	
Act Effct Green (s)	50.6	39.5	54.3	43.2	39.2	39.5	25.1	15.6	28.3	100.0
Actuated g/C Ratio	0.51	0.40	0.54	0.43	0.39	0.40	0.25	0.16	0.28	1.00
v/c Ratio	0.71	0.49	0.65	0.85	0.44	0.70	0.80	0.63	0.76	0.14
Control Delay	34.5	23.9	17.3	13.2	2.7	32.2	41.2	45.4	43.3	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.5	23.9	17.3	13.2	2.7	32.2	41.2	45.4	43.3	0.2
LOS	C	C	B	B	A	C	D	D	D	A
Approach Delay		26.1		12.1			39.0		34.3	
Approach LOS		C		B			D		C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 41 (41%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 24.7 — Intersection LOS: C
Intersection Capacity Utilization 89.6% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 1: East Hanover Ave & US 202

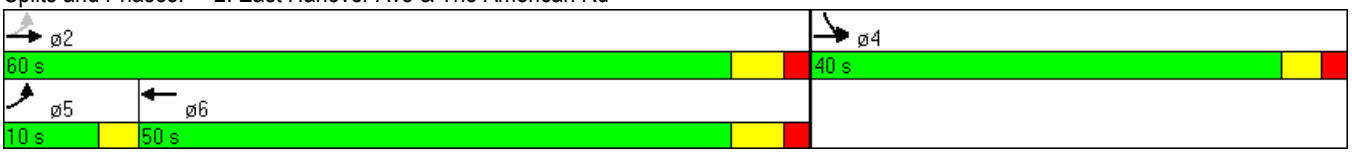


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	ø2
Lane Configurations							
Volume (vph)	92	954	1549	89	265	243	
Turn Type	custom			Free		Free	
Protected Phases	5	2 4!	6		4!		2
Permitted Phases	2			Free		Free	
Detector Phase	5	2 4	6		4		
Switch Phase							
Minimum Initial (s)	7.0		7.0		7.0		5.0
Minimum Split (s)	10.0		26.0		12.0		12.0
Total Split (s)	10.0	100.0	50.0	0.0	40.0	0.0	60.0
Total Split (%)	10.0%	100.0%	50.0%	0.0%	40.0%	0.0%	60%
Yellow Time (s)	3.0		4.0		3.0		4.0
All-Red Time (s)	0.0		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)	3.0	6.0	6.0	4.0	5.0	4.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None		C-Min		None		C-Max
Act Effct Green (s)	68.3	100.0	56.5	100.0	23.7	100.0	
Actuated g/C Ratio	0.68	1.00	0.56	1.00	0.24	1.00	
v/c Ratio	0.47	0.30	0.83	0.06	0.62	0.15	
Control Delay	15.4	0.2	14.2	0.1	39.0	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	15.4	0.2	14.2	0.1	39.0	0.2	
LOS	B	A	B	A	D	A	
Approach Delay		1.5	13.4		20.5		
Approach LOS		A	B		C		

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 10 (10%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 10.6 Intersection LOS: B
Intersection Capacity Utilization 75.8% ICU Level of Service D
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: East Hanover Ave & The American Rd



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	293	824	165	1474	95	138	165	220	291
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt		Perm
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	3	8	7	4	4
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0	7.0
Minimum Split (s)	10.0	31.0	10.0	31.0	8.0	27.0	8.0	27.0	27.0
Total Split (s)	17.0	49.0	13.0	45.0	10.0	28.0	10.0	27.0	27.0
Total Split (%)	17.0%	49.0%	13.0%	45.0%	10.0%	28.0%	10.0%	27.0%	27.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0	1.0	0.0	1.0	0.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	65.9	51.9	59.0	46.0	31.0	20.1	31.3	22.1	20.1
Actuated g/C Ratio	0.66	0.52	0.59	0.46	0.31	0.20	0.31	0.22	0.20
v/c Ratio	0.84	0.61	0.49	0.71	0.33	0.61	0.60	0.58	0.58
Control Delay	39.5	18.5	13.9	11.4	26.2	38.7	33.8	40.7	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.5	18.5	13.9	11.4	26.2	38.7	33.8	40.7	10.8
LOS	D	B	B	B	C	D	C	D	B
Approach Delay		23.2		11.7		34.9		26.1	
Approach LOS		C		B		C		C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 53 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 19.7 Intersection LOS: B
Intersection Capacity Utilization 80.4% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: East Hanover Ave & Horse Hill Rd

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1046	5	105	1680	5	75
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	1090	5	109	1750	5	78
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			TWLTL		
Median storage veh)				2		
Upstream signal (ft)	175			847		
pX, platoon unblocked			0.93		0.65	0.93
vC, conflicting volume			1095		2186	547
vC1, stage 1 conf vol					1092	
vC2, stage 2 conf vol					1094	
vCu, unblocked vol			942		1236	351
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			84		98	87
cM capacity (veh/h)			670		279	597

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	726	368	693	1167	83
Volume Left	0	0	109	0	5
Volume Right	0	5	0	0	78
cSH	1700	1700	670	1700	558
Volume to Capacity	0.43	0.22	0.16	0.69	0.15
Queue Length 95th (ft)	0	0	15	0	13
Control Delay (s)	0.0	0.0	4.2	0.0	12.6
Lane LOS			A		B
Approach Delay (s)	0.0		1.6		12.6
Approach LOS					B

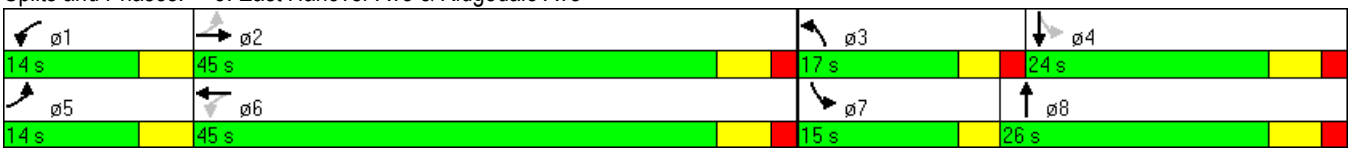
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Volume (vph)	174	732	180	1247	353	459	219	355	205
Turn Type	pm+pt		pm+pt		Prot		pm+pt		Free
Protected Phases	5	2	1	6	3	8	7	4	
Permitted Phases	2		6				4		Free
Detector Phase	5	2	1	6	3	8	7	4	
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0	
Minimum Split (s)	11.0	13.0	11.0	13.0	10.0	24.0	8.0	24.0	
Total Split (s)	14.0	45.0	14.0	45.0	17.0	26.0	15.0	24.0	0.0
Total Split (%)	14.0%	45.0%	14.0%	45.0%	17.0%	26.0%	15.0%	24.0%	0.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	1.0	4.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	
Act Effct Green (s)	52.3	43.1	52.2	43.1	14.0	21.2	35.2	18.7	100.0
Actuated g/C Ratio	0.52	0.43	0.52	0.43	0.14	0.21	0.35	0.19	1.00
v/c Ratio	0.77	0.68	0.66	0.95	0.85	0.84	0.73	0.58	0.14
Control Delay	45.0	17.9	22.1	36.2	61.5	47.5	36.0	40.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	17.9	22.1	36.2	61.5	47.5	36.0	40.8	0.2
LOS	D	B	C	D	E	D	D	D	A
Approach Delay		22.1		34.6		52.9		28.8	
Approach LOS		C		C		D		C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 34.2 Intersection LOS: C
Intersection Capacity Utilization 89.9% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 5: East Hanover Ave & Ridgedale Ave



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	55	1003	1468	54	91
Turn Type	Perm				Perm
Protected Phases		2	6	4	
Permitted Phases	2				4
Detector Phase	2	2	6	4	4
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	29.0	29.0	29.0	28.0	28.0
Total Split (s)	72.0	72.0	72.0	28.0	28.0
Total Split (%)	72.0%	72.0%	72.0%	28.0%	28.0%
Yellow Time (s)	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	7.0	5.0	5.0	3.0	3.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)		84.0	84.0	11.4	11.4
Actuated g/C Ratio		0.84	0.84	0.11	0.11
v/c Ratio		0.51	0.55	0.28	0.44
Control Delay		1.5	3.1	43.1	29.3
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		1.5	3.1	43.1	29.3
LOS		A	A	D	C
Approach Delay		1.5	3.1	34.4	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 73 (73%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 4.2 Intersection LOS: A
Intersection Capacity Utilization 82.0% ICU Level of Service E
Analysis Period (min) 15

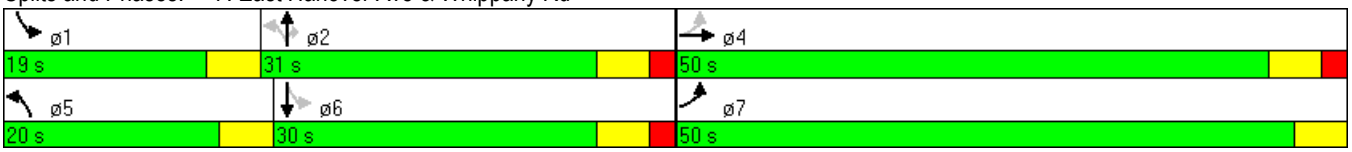
Splits and Phases: 6: East Hanover Ave & Library

Lane Group	EBT	NBL	NBT	NBR	SBL	SBT	SBR	ø7
Lane Configurations								
Volume (vph)	540	281	308	36	261	351	1232	
Turn Type		pm+pt		Perm	pm+pt		Free	
Protected Phases	4	5	2		1	6		7
Permitted Phases		2		2	6		Free	
Detector Phase	4	5	2	2	1	6		
Switch Phase								
Minimum Initial (s)	7.0	5.0	7.0	7.0	5.0	7.0		7.0
Minimum Split (s)	13.0	9.0	13.0	13.0	9.0	28.0		11.0
Total Split (s)	50.0	20.0	31.0	31.0	19.0	30.0	0.0	50.0
Total Split (%)	50.0%	20.0%	31.0%	31.0%	19.0%	30.0%	0.0%	50%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0
All-Red Time (s)	2.0	0.0	2.0	2.0	0.0	2.0		0.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	6.0	2.0	4.0	4.0	2.0	4.0	2.0	
Lead/Lag		Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	Yes		
Recall Mode	C-Max	None	None	None	None	None		None
Act Effct Green (s)	53.2	37.7	18.5	18.5	35.8	17.6	100.0	
Actuated g/C Ratio	0.53	0.38	0.18	0.18	0.36	0.18	1.00	
v/c Ratio	0.59	0.68	0.50	0.13	0.60	0.59	0.81	
Control Delay	16.0	30.2	38.9	33.8	27.4	41.5	4.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	16.0	30.2	38.9	33.8	27.4	41.5	4.6	
LOS	B	C	D	C	C	D	A	
Approach Delay	16.0		34.7			14.9		
Approach LOS	B		C			B		

Intersection Summary

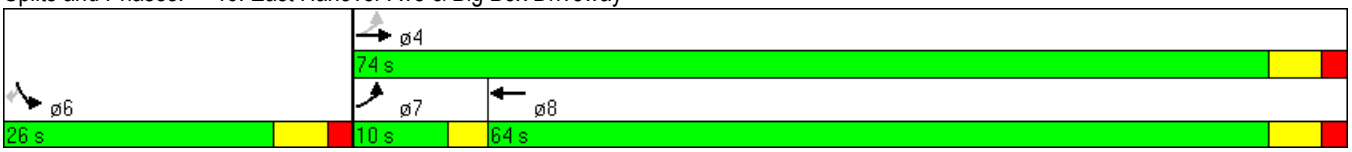
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 4 (4%), Referenced to phase 4:EBTL, Start of Yellow
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 18.8 Intersection LOS: B
Intersection Capacity Utilization 66.8% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 7: East Hanover Ave & Whippany Rd



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Volume (vph)	31	1029	1663	22	29
Turn Type	pm+pt				Perm
Protected Phases	7	4	8	6	
Permitted Phases	4				6
Detector Phase	7	4	8	6	6
Switch Phase					
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	21.0	22.0	26.0	26.0
Total Split (s)	10.0	74.0	64.0	26.0	26.0
Total Split (%)	10.0%	74.0%	64.0%	26.0%	26.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	1.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?	Yes		Yes		
Recall Mode	None	C-Max	C-Max	None	None
Act Effct Green (s)	89.4	88.0	82.6	12.0	12.0
Actuated g/C Ratio	0.89	0.88	0.83	0.12	0.12
v/c Ratio	0.12	0.36	0.63	0.11	0.15
Control Delay	3.4	5.4	1.5	40.8	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	3.4	5.4	1.5	40.8	15.7
LOS	A	A	A	D	B
Approach Delay		5.3	1.5	26.4	
Approach LOS		A	A	C	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 41 (41%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 3.4 Intersection LOS: A
Intersection Capacity Utilization 61.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 46: East Hanover Ave & Big Box Driveway