APPENDIX T

2007 Existing Route 9 Ramp Modification Levels of Service

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	140	2416	230	140	1398	451	3	0	29	25	139	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.987				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.950		0.950	0.999	
Satd. Flow (prot)	1770	5019	0	1770	5085	1583	0	1770	1583	1681	1768	1583
Flt Permitted	0.950			0.950				0.950		0.950	0.999	
Satd. Flow (perm)	1770	5019	0	1770	5085	1583	0	1770	1583	1681	1768	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17				471			32			24
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		324			359			181			248	
Travel Time (s)		7.4			8.2			4.1			5.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	2626	250	152	1520	490	3	0	32	27	151	24
Shared Lane Traffic (%)										10%		
Lane Group Flow (vph)	152	2876	0	152	1520	490	0	3	32	24	154	24
Turn Type	Prot			Prot		Perm	Split		custom	Split		custom
Protected Phases	1	6		5	2		8	8		4	4	
Permitted Phases						2			5 8			1 4
Detector Phase	1	6		5	2	2	8	8	5 8	4	4	1 4
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	10.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	14.0	23.0		12.0	23.0	23.0	10.0	10.0		10.0	10.0	
Total Split (s)	22.0	58.0	0.0	14.0	50.0	50.0	10.0	10.0	24.0	12.0	12.0	34.0
Total Split (%)	18.3%	48.3%	0.0%	11.7%	41.7%	41.7%	8.3%	8.3%	20.0%	10.0%	10.0%	28.3%
Maximum Green (s)	16.0	51.0		8.0	43.0	43.0	5.0	5.0		7.0	7.0	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-3.0	0.0	-2.0	-3.0	-3.0	-1.0	-1.0	-2.0	-1.0	-1.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	16.5	70.8		18.0	72.3	72.3		6.0	23.2	8.0	8.0	26.1
Actuated g/C Ratio	0.14	0.59		0.15	0.60	0.60		0.05	0.19	0.07	0.07	0.22
v/c Ratio	0.63	0.97		0.57	0.50	0.43		0.03	0.10	0.21	1.31	0.07
Control Delay	60.3	35.4		56.2	17.2	4.3		55.3	10.2	57.9	229.3	8.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	60.3	35.4		56.2	17.2	4.3		55.3	10.2	57.9	229.3	8.2
LOS	E	D		E	B	A		E	B	E	F	A
Approach Delay		36.6			17.0			14.1			182.7	
Approach LOS		D			B			B			F	
90th %ile Green (s)	16.0	51.0		8.0	43.0	43.0	5.0	5.0		7.0	7.0	

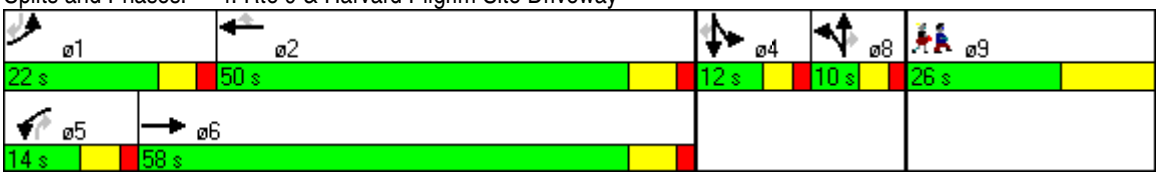
Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	16.0
Yellow Time (s)	10.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	1
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	16.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Term Code	Max	Coord		Max	Coord	Coord	Max	Max		Max	Max	
70th %ile Green (s)	17.8	65.8		19.2	67.2	67.2	5.0	5.0		7.0	7.0	
70th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Max	Max		Max	Max	
50th %ile Green (s)	15.5	66.7		18.3	69.5	69.5	5.0	5.0		7.0	7.0	
50th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Max	Max		Max	Max	
30th %ile Green (s)	13.2	77.3		17.7	81.8	81.8	0.0	0.0		7.0	7.0	
30th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Skip	Skip		Max	Max	
10th %ile Green (s)	9.8	78.3		16.7	85.2	85.2	0.0	0.0		7.0	7.0	
10th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Skip	Skip		Max	Max	
Queue Length 50th (ft)	111	754		108	230	28		2	0	18	~161	0
Queue Length 95th (ft)	182	#1120		#269	451	70		13	21	49	#305	13
Internal Link Dist (ft)		244			279			101			168	
Turn Bay Length (ft)												
Base Capacity (vph)	271	2969		265	3065	1141		89	332	112	118	387
Starvation Cap Reductn	0	0		0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.56	0.97		0.57	0.50	0.43		0.03	0.10	0.21	1.31	0.06

Intersection Summary

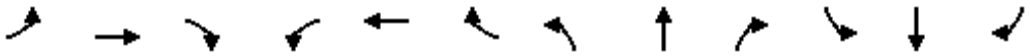
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.31
Intersection Signal Delay: 34.1 Intersection LOS: C
Intersection Capacity Utilization 80.6% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Rte 9 & Harvard Pilgrim Site Driveway



Lane Group	ø9
90th %ile Term Code	Ped
70th %ile Green (s)	0.0
70th %ile Term Code	Skip
50th %ile Green (s)	0.0
50th %ile Term Code	Skip
30th %ile Green (s)	0.0
30th %ile Term Code	Skip
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

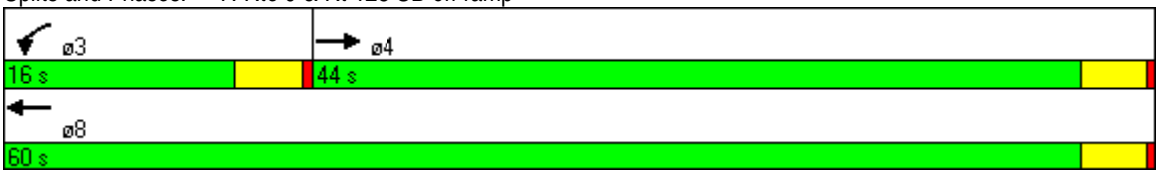


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1810	0	469	1286	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	250		0	0		0	0		0
Storage Lanes	0		0	2		0	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected				0.950								
Satd. Flow (prot)	0	3539	0	3433	3539	0	0	0	0	0	0	0
Flt Permitted				0.950								
Satd. Flow (perm)	0	3539	0	3433	3539	0	0	0	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		270			300			519			578	
Travel Time (s)		6.1			6.8			11.8			13.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1967	0	510	1398	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1967	0	510	1398	0	0	0	0	0	0	0
Turn Type				Prot								
Protected Phases		4		3	8							
Permitted Phases												
Detector Phase		4		3	8							
Switch Phase												
Minimum Initial (s)		4.0		4.0	4.0							
Minimum Split (s)		20.0		8.0	20.0							
Total Split (s)	0.0	44.0	0.0	16.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Split (%)	0.0%	73.3%	0.0%	26.7%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)		40.0		12.0	56.0							
Yellow Time (s)		3.5		3.5	3.5							
All-Red Time (s)		0.5		0.5	0.5							
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)		3.0		3.0	3.0							
Recall Mode		None		None	None							
Walk Time (s)		5.0			5.0							
Flash Dont Walk (s)		11.0			11.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)		40.3		11.7	60.0							
Actuated g/C Ratio		0.67		0.20	1.00							
v/c Ratio		0.83		0.76	0.40							
Control Delay		23.3		28.6	0.3							
Queue Delay		0.0		0.0	0.0							
Total Delay		23.3		28.6	0.3							
LOS		C		C	A							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		23.3			7.9							
Approach LOS		C			A							
90th %ile Green (s)		40.0		12.0	56.0							
90th %ile Term Code		Coord		Max	Coord							
70th %ile Green (s)		40.0		12.0	56.0							
70th %ile Term Code		Coord		Max	Coord							
50th %ile Green (s)		40.0		12.0	56.0							
50th %ile Term Code		Coord		Max	Coord							
30th %ile Green (s)		40.0		12.0	56.0							
30th %ile Term Code		Coord		Max	Coord							
10th %ile Green (s)		41.6		10.4	56.0							
10th %ile Term Code		Coord		Gap	Coord							
Queue Length 50th (ft)		811		90	0							
Queue Length 95th (ft)		m880		#151	0							
Internal Link Dist (ft)		190			220			439			498	
Turn Bay Length (ft)				250								
Base Capacity (vph)		2378		687	3539							
Starvation Cap Reductn		0		0	0							
Spillback Cap Reductn		0		0	0							
Storage Cap Reductn		0		0	0							
Reduced v/c Ratio		0.83		0.74	0.40							

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2: and 6:, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 15.7		Intersection LOS: B	
Intersection Capacity Utilization 70.1%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 7: Rte 9 & Rt 128 SB off ramp



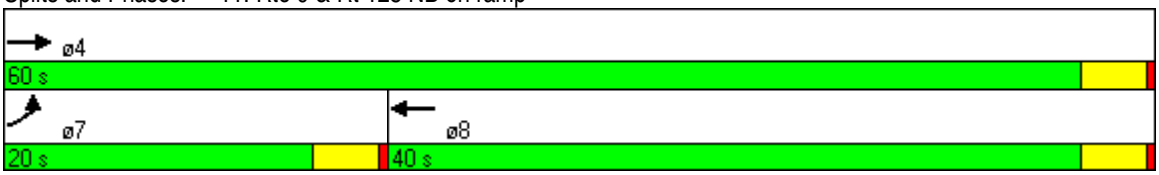
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	475	2192	0	0	819	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		100	0		0	0		0
Storage Lanes	2		0	0		0	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected	0.950											
Satd. Flow (prot)	3433	3539	0	0	3539	0	0	0	0	0	0	0
Flt Permitted	0.950											
Satd. Flow (perm)	3433	3539	0	0	3539	0	0	0	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		393			254			613			694	
Travel Time (s)		8.9			5.8			13.9			15.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	2383	0	0	890	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	516	2383	0	0	890	0	0	0	0	0	0	0
Turn Type	Prot											
Protected Phases	7	4			8							
Permitted Phases												
Minimum Split (s)	8.0	20.0			20.0							
Total Split (s)	20.0	60.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Split (%)	33.3%	100.0%	0.0%	0.0%	66.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)	16.0	56.0			36.0							
Yellow Time (s)	3.5	3.5			3.5							
All-Red Time (s)	0.5	0.5			0.5							
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Walk Time (s)		5.0			5.0							
Flash Dont Walk (s)		11.0			11.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)	16.0	60.0			36.0							
Actuated g/C Ratio	0.27	1.00			0.60							
v/c Ratio	0.56	0.67			0.42							
Control Delay	16.8	1.5			7.2							
Queue Delay	0.0	0.0			0.0							
Total Delay	16.8	1.5			7.2							
LOS	B	A			A							
Approach Delay		4.2			7.2							
Approach LOS		A			A							
Queue Length 50th (ft)	81	8			78							
Queue Length 95th (ft)	m92	0			111							
Internal Link Dist (ft)		313			174			533			614	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	250											
Base Capacity (vph)	915	3539			2123							
Starvation Cap Reductn	0	0			0							
Spillback Cap Reductn	0	0			0							
Storage Cap Reductn	0	0			0							
Reduced v/c Ratio	0.56	0.67			0.42							

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2: and 6:, Start of Green			
Natural Cycle: 40			
Control Type: Pretimed			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 4.9		Intersection LOS: A	
Intersection Capacity Utilization 70.1%		ICU Level of Service C	
Analysis Period (min) 15			

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

Splits and Phases: 11: Rte 9 & Rt 128 NB on ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	1606	4	17	2203	69	197	0	240	271	21	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt						0.850			0.850			0.850
Flt Protected	0.950			0.950				0.950		0.950	0.959	
Satd. Flow (prot)	1770	5085	0	1770	5085	1583	0	1770	1583	1681	1697	1583
Flt Permitted	0.950			0.950				0.950		0.950	0.959	
Satd. Flow (perm)	1770	5085	0	1770	5085	1583	0	1770	1583	1681	1697	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						50			261			140
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		324			359			181			248	
Travel Time (s)		7.4			8.2			4.1			5.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	1746	4	18	2395	75	214	0	261	295	23	140
Shared Lane Traffic (%)										46%		
Lane Group Flow (vph)	40	1750	0	18	2395	75	0	214	261	159	159	140
Turn Type	Prot			Prot		Perm	Split		custom	Split		custom
Protected Phases	1	6		5	2		8	8		4	4	
Permitted Phases						2			5 8			1 4
Detector Phase	1	6		5	2	2	8	8	5 8	4	4	1 4
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	10.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	14.0	23.0		12.0	23.0	23.0	10.0	10.0		10.0	10.0	
Total Split (s)	10.0	36.0	0.0	10.0	36.0	36.0	14.0	14.0	24.0	14.0	14.0	24.0
Total Split (%)	10.0%	36.0%	0.0%	10.0%	36.0%	36.0%	14.0%	14.0%	24.0%	14.0%	14.0%	24.0%
Maximum Green (s)	4.0	29.0		4.0	29.0	29.0	9.0	9.0		9.0	9.0	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-3.0	0.0	-2.0	-3.0	-3.0	-1.0	-1.0	-2.0	-1.0	-1.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	8.6	50.9		7.9	50.2	50.2		10.0	21.1	10.0	10.0	18.6
Actuated g/C Ratio	0.09	0.51		0.08	0.50	0.50		0.10	0.21	0.10	0.10	0.19
v/c Ratio	0.26	0.68		0.13	0.94	0.09		1.21	0.48	0.95	0.94	0.34
Control Delay	47.9	22.1		52.9	24.1	3.5		175.2	6.3	103.3	100.4	5.8
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	22.1		52.9	24.1	3.5		175.2	6.3	103.3	100.4	5.8
LOS	D	C		D	C	A		F	A	F	F	A
Approach Delay		22.7			23.7			82.4			72.5	
Approach LOS		C			C			F			E	
90th %ile Green (s)	4.0	29.0		4.0	29.0	29.0	9.0	9.0		9.0	9.0	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	26%
Maximum Green (s)	16.0
Yellow Time (s)	10.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	1
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	16.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Term Code	Max	Coord		Max	Coord	Coord	Max	Max		Max	Max	
70th %ile Green (s)	8.7	51.9		7.1	50.3	50.3	9.0	9.0		9.0	9.0	
70th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Max	Max		Max	Max	
50th %ile Green (s)	7.6	52.6		6.4	51.4	51.4	9.0	9.0		9.0	9.0	
50th %ile Term Code	Gap	Coord		Gap	Coord	Coord	Max	Max		Max	Max	
30th %ile Green (s)	6.5	53.0		6.0	52.5	52.5	9.0	9.0		9.0	9.0	
30th %ile Term Code	Gap	Coord		Min	Coord	Coord	Max	Max		Max	Max	
10th %ile Green (s)	6.0	53.0		6.0	53.0	53.0	9.0	9.0		9.0	9.0	
10th %ile Term Code	Min	Coord		Min	Coord	Coord	Max	Max		Max	Max	
Queue Length 50th (ft)	24	260		12	338	1		~167	0	108	107	0
Queue Length 95th (ft)	59	#553		m20	#868	m22		#312	42	#240	#238	26
Internal Link Dist (ft)		244			279			101			168	
Turn Bay Length (ft)												
Base Capacity (vph)	151	2588		140	2555	820		177	540	168	170	408
Starvation Cap Reductn	0	0		0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.26	0.68		0.13	0.94	0.09		1.21	0.48	0.95	0.94	0.34

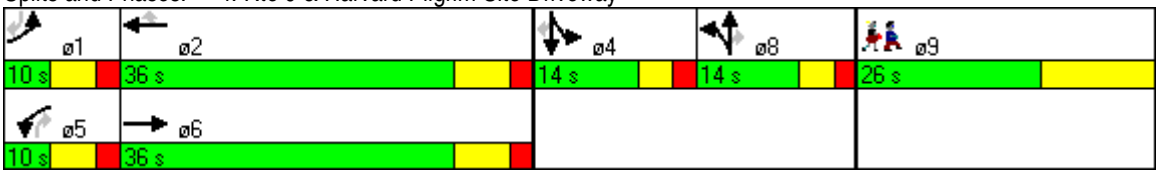
Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 145			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.21			
Intersection Signal Delay: 33.0		Intersection LOS: C	
Intersection Capacity Utilization 71.5%		ICU Level of Service C	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

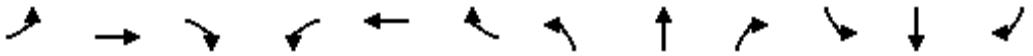
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Rte 9 & Harvard Pilgrim Site Driveway



Lane Group	ø9
90th %ile Term Code	Ped
70th %ile Green (s)	0.0
70th %ile Term Code	Skip
50th %ile Green (s)	0.0
50th %ile Term Code	Skip
30th %ile Green (s)	0.0
30th %ile Term Code	Skip
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

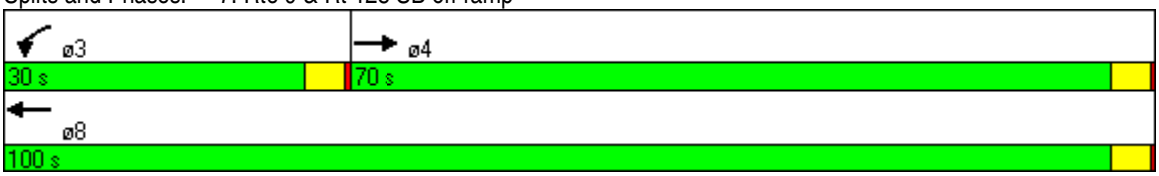


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1233	0	570	2006	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	250		0	0		0	0		0
Storage Lanes	0		0	2		0	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected				0.950								
Satd. Flow (prot)	0	3539	0	3433	3539	0	0	0	0	0	0	0
Flt Permitted				0.950								
Satd. Flow (perm)	0	3539	0	3433	3539	0	0	0	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		270			300			519			578	
Travel Time (s)		6.1			6.8			11.8			13.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1340	0	620	2180	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1340	0	620	2180	0	0	0	0	0	0	0
Turn Type				Prot								
Protected Phases		4		3	8							
Permitted Phases												
Detector Phase		4		3	8							
Switch Phase												
Minimum Initial (s)		4.0		4.0	4.0							
Minimum Split (s)		20.0		8.0	20.0							
Total Split (s)	0.0	70.0	0.0	30.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Split (%)	0.0%	70.0%	0.0%	30.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)		66.0		26.0	96.0							
Yellow Time (s)		3.5		3.5	3.5							
All-Red Time (s)		0.5		0.5	0.5							
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)		3.0		3.0	3.0							
Recall Mode		None		None	None							
Walk Time (s)		5.0			5.0							
Flash Dont Walk (s)		11.0			11.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)		68.8		23.2	100.0							
Actuated g/C Ratio		0.69		0.23	1.00							
v/c Ratio		0.55		0.78	0.62							
Control Delay		6.0		36.2	0.6							
Queue Delay		0.0		0.0	0.0							
Total Delay		6.0		36.2	0.6							
LOS		A		D	A							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		6.0			8.5							
Approach LOS		A			A							
90th %ile Green (s)		63.2		28.8	96.0							
90th %ile Term Code		Coord		Gap	Coord							
70th %ile Green (s)		66.8		25.2	96.0							
70th %ile Term Code		Coord		Gap	Coord							
50th %ile Green (s)		68.9		23.1	96.0							
50th %ile Term Code		Coord		Gap	Coord							
30th %ile Green (s)		71.0		21.0	96.0							
30th %ile Term Code		Coord		Gap	Coord							
10th %ile Green (s)		74.3		17.7	96.0							
10th %ile Term Code		Coord		Gap	Coord							
Queue Length 50th (ft)		14		170	0							
Queue Length 95th (ft)		m479		m187	0							
Internal Link Dist (ft)		190			220			439			498	
Turn Bay Length (ft)				250								
Base Capacity (vph)		2456		912	3539							
Starvation Cap Reductn		0		0	0							
Spillback Cap Reductn		0		0	0							
Storage Cap Reductn		0		0	0							
Reduced v/c Ratio		0.55		0.68	0.62							

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2: and 6:, Start of Green			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 7.7		Intersection LOS: A	
Intersection Capacity Utilization 79.7%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 7: Rte 9 & Rt 128 SB off ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	706	1295	0	0	1915	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	0		100	0		0	0		0
Storage Lanes	2		0	0		0	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected	0.950											
Satd. Flow (prot)	3433	3539	0	0	3539	0	0	0	0	0	0	0
Flt Permitted	0.950											
Satd. Flow (perm)	3433	3539	0	0	3539	0	0	0	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		393			254			613			694	
Travel Time (s)		8.9			5.8			13.9			15.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	767	1408	0	0	2082	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	767	1408	0	0	2082	0	0	0	0	0	0	0
Turn Type	Prot											
Protected Phases	7	4			8							
Permitted Phases												
Minimum Split (s)	8.0	20.0			20.0							
Total Split (s)	30.0	100.0	0.0	0.0	70.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Split (%)	30.0%	100.0%	0.0%	0.0%	70.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)	26.0	96.0			66.0							
Yellow Time (s)	3.5	3.5			3.5							
All-Red Time (s)	0.5	0.5			0.5							
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Walk Time (s)		5.0			5.0							
Flash Dont Walk (s)		11.0			11.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)	26.0	100.0			66.0							
Actuated g/C Ratio	0.26	1.00			0.66							
v/c Ratio	0.86	0.40			0.89							
Control Delay	52.9	0.3			20.4							
Queue Delay	0.0	0.0			0.0							
Total Delay	52.9	0.3			20.4							
LOS	D	A			C							
Approach Delay		18.8			20.4							
Approach LOS		B			C							
Queue Length 50th (ft)	239	0			517							
Queue Length 95th (ft)	#345	0			655							
Internal Link Dist (ft)		313			174			533			614	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	250											
Base Capacity (vph)	893	3539			2336							
Starvation Cap Reductn	0	0			0							
Spillback Cap Reductn	0	0			0							
Storage Cap Reductn	0	0			0							
Reduced v/c Ratio	0.86	0.40			0.89							

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2: and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Pretimed			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 19.6		Intersection LOS: B	
Intersection Capacity Utilization 79.7%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 11: Rte 9 & Rt 128 NB on ramp