APPENDIX A

Participants of Study Advisory Meetings
April 13–September 12, 2017

Study Advisory Meeting

Route 1A Subregional Corridor Study in Wrentham

April 13 and September 12, 2017

Name	Affiliation	Email
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APPENDIX B

Pedestrian Report Card Assessment

Route 1A from Plainville town line to Route 140 in Wrentham

Performance Measure Scores

Performance Measure	Features	Goal	Weight	Unweighted Score	Weighted Score
Sidewalk Presence	Sidewalks are present on Less than 50% of the corridor (one side of the stree and in a short section in Wrentham Center (on both sides).	Capacity Management and Mobility	3	1	3
Crossing Opportunities	Total 8 crosswalks in 3.1 miles = 2.6 crosswalks per mile	Capacity Management and Mobility	2	1	2
Walkway Width	Very few sidewalks are at least 5 feet wide on either side of the street	Capacity Management and Mobility	1	1	1
Pedestrian Volumes	Estimated 60 or more pedestrians in Downtown Wrentham	Economic Vitality	1	3	3
Adjacent Bicycle Accommodations	None	Economic Vitality	1	1	1
Pedestrian Crashes	No HSIP pedestrian clusters	Safety	3	3	9
Average Vehicle Travel Speeds	40 MPH (miles per hour)	Safety	1	1	1
Vehicle-Pedestrian Buffer	3' buffers	Safety	1	1	1
Sidewalk Condition	Sidewalks are not in fair condition on one side of the street and not present on other side.	System Preservation	1	1	1
Transportation Equity Factor	Two out of four factors (schools nearby, high presence of senior citizens)	N/A	N/A		

The weighted scores of all the performance measures within the same category are averaged and given a grade of poor, fair, or good based on the average weighted category score. The average weighted scores are classified as follows:

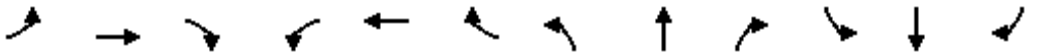
- Good – Score is 2.3 or more (maximum 3.0).
- Fair – Score is between 1.7 and 2.3.
- Poor – Score is 1.7 or less (maximum 0).

Pedestrian Report Card Assessment

Goal	weight points	weighted score	Final score	Rating
Capacity Management and Mobility	6	6	1.0	Poor
Economic Vitality	2	4	2.0	Fair
Safety	5	11	2.2	Fair
System Preservation	1	1	1.0	Poor

APPENDIX C

Intersection Capacity Analyses
Weekday AM/PM Peak Hour
2017 Existing Conditions



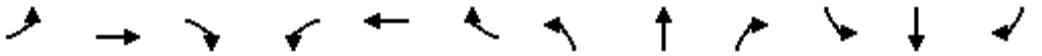
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	224	455	5	30	153	37	21	359	75	89	389	240
Future Volume (vph)	224	455	5	30	153	37	21	359	75	89	389	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	0		0	0		50	0		160
Storage Lanes	1		0	0		0	0		0	0		1
Taper Length (ft)	100			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		462			799			154			1055	
Travel Time (s)		10.5			18.2			3.5			24.0	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.80	0.80	0.80	0.94	0.94	0.94
Heavy Vehicles (%)	7%	7%	7%	18%	18%	18%	3%	3%	3%	5%	5%	5%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	270	554	0	0	265	0	0	569	0	0	509	255
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		1			1			3			3	
Permitted Phases	1			1			3			3		3
Detector Phase	1	1		1	1		3	3		3	3	3
Switch Phase												
Minimum Initial (s)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	12.0
Minimum Split (s)	17.0	17.0		17.0	17.0		17.0	17.0		17.0	17.0	17.0
Total Split (s)	33.0	33.0		33.0	33.0		32.0	32.0		32.0	32.0	32.0
Total Split (%)	38.8%	38.8%		38.8%	38.8%		37.6%	37.6%		37.6%	37.6%	37.6%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	5.0	5.0			5.0			5.0			5.0	5.0
Lead/Lag	Lead	Lead		Lead	Lead							
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min		None	None		None	None	None
Act Effct Green (s)	27.7	27.7			27.7			27.0			27.0	27.0
Actuated g/C Ratio	0.43	0.43			0.43			0.42			0.42	0.42
v/c Ratio	0.61	0.73			0.47			0.77			0.88	0.33
Control Delay	21.3	22.4			15.9			25.2			37.0	4.0
Queue Delay	0.0	0.0			0.0			0.0			0.0	0.0
Total Delay	21.3	22.4			15.9			25.2			37.0	4.0
LOS	C	C			B			C			D	A
Approach Delay		22.1			15.9			25.2			26.0	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	78	173			67			183			179	6
Queue Length 95th (ft)	135	248			113			248			#354	44
Internal Link Dist (ft)		382			719			74			975	
Turn Bay Length (ft)	100											160
Base Capacity (vph)	451	767			573			735			581	776
Starvation Cap Reductn	0	0			0			0			0	0
Spillback Cap Reductn	0	0			0			0			0	0
Storage Cap Reductn	0	0			0			0			0	0
Reduced v/c Ratio	0.60	0.72			0.46			0.77			0.88	0.33

Lane Group	Ø2
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	20.0
Total Split (s)	20.0
Total Split (%)	24%
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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		
Area Type:	Other	
Cycle Length: 85		
Actuated Cycle Length: 64.7		
Natural Cycle: 120		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 0.88		
Intersection Signal Delay: 23.4		Intersection LOS: C
Intersection Capacity Utilization 102.9%		ICU Level of Service G
Analysis Period (min) 15		

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

Splits and Phases: Route 140 & Route 1A



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	218	10	75	412	83	115	412	54	56	383	251
Future Volume (vph)	168	218	10	75	412	83	115	412	54	56	383	251
Confl. Peds. (#/hr)	6					6	2					2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.92	0.92	0.92	0.84	0.84	0.84
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	198	268	0	0	671	0	0	632	0	0	523	299
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		1			1			3			3	
Permitted Phases	1			1			3			3		3
Detector Phase	1	1		1	1		3	3		3	3	3
Switch Phase												
Minimum Initial (s)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	12.0
Minimum Split (s)	17.0	17.0		17.0	17.0		17.0	17.0		17.0	17.0	17.0
Total Split (s)	33.0	33.0		33.0	33.0		32.0	32.0		32.0	32.0	32.0
Total Split (%)	38.8%	38.8%		38.8%	38.8%		37.6%	37.6%		37.6%	37.6%	37.6%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	5.0	5.0			5.0			5.0			5.0	5.0
Lead/Lag	Lead	Lead		Lead	Lead							
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min		None	None		None	None	None
Act Effct Green (s)	28.3	28.3			28.3			27.3			27.3	27.3
Actuated g/C Ratio	0.41	0.41			0.41			0.40			0.40	0.40
v/c Ratio	0.88	0.35			0.97			1.85			0.85	0.39
Control Delay	60.9	17.1			52.0			414.9			36.4	5.4
Queue Delay	0.0	0.0			0.0			0.0			0.0	0.0
Total Delay	60.9	17.1			52.0			414.9			36.4	5.4
LOS	E	B			D			F			D	A
Approach Delay		35.7			52.0			414.9			25.1	
Approach LOS		D			D			F			C	
Queue Length 50th (ft)	67	67			238			~390			175	8
Queue Length 95th (ft)	#233	166			#597			#770			#448	57
Internal Link Dist (ft)		392			719			77			975	
Turn Bay Length (ft)	100											160
Base Capacity (vph)	225	761			689			341			615	771
Starvation Cap Reductn	0	0			0			0			0	0
Spillback Cap Reductn	0	0			0			0			0	0
Storage Cap Reductn	0	0			0			0			0	0
Reduced v/c Ratio	0.88	0.35			0.97			1.85			0.85	0.39

Intersection Summary
Cycle Length: 85
Actuated Cycle Length: 69
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.85

Lane Group	Ø2
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	20.0
Total Split (s)	20.0
Total Split (%)	24%
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

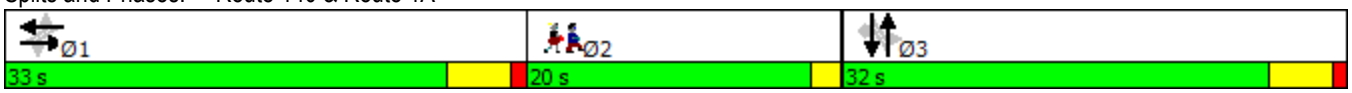
Intersection Summary

Intersection Signal Delay: 129.1	Intersection LOS: F
Intersection Capacity Utilization 114.3%	ICU Level of Service H
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: Route 140 & Route 1A



Unsignalized Intersection Capacity Analysis
Common St & Route 1A & Kendrick St

09/26/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2
Lane Configurations											
Traffic Volume (veh/h)	56	642	241	29	382	5	0	0	71	7	29
Future Volume (Veh/h)	56	642	241	29	382	5	0	0	71	7	29
Sign Control		Free			Free		Stop		Stop		
Grade		0%			0%		0%		0%		
Peak Hour Factor	0.89	0.89	0.89	0.83	0.83	0.83	0.92	0.92	0.65	0.65	0.65
Hourly flow rate (vph)	63	721	271	35	460	6	0	0	109	11	45
Pedestrians		7			7		7		7		
Lane Width (ft)		12.0			12.0		0.0		12.0		
Walking Speed (ft/s)		3.5			3.5		3.5		3.5		
Percent Blockage		1			1		0		1		
Right turn flare (veh)											
Median type		None			None						
Median storage veh)											
Upstream signal (ft)					462						
pX, platoon unblocked											
vC, conflicting volume	473			999			1665	477	1530	1532	870
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	473			999			1665	477	1530	1532	870
tC, single (s)	4.1			4.2			6.5	6.2	7.2	6.6	6.3
tC, 2 stage (s)											
tF (s)	2.2			2.3			4.0	3.3	3.6	4.1	3.4
p0 queue free %	94			95			100	100	0	89	87
cM capacity (veh/h)	1073			658			86	584	84	101	340

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	1055	501	165
Volume Left	63	35	109
Volume Right	271	6	45
cSH	1073	658	108
Volume to Capacity	0.06	0.05	1.53
Queue Length 95th (ft)	5	4	306
Control Delay (s)	1.6	1.5	352.0
Lane LOS	A	A	F
Approach Delay (s)	1.6	1.5	352.0
Approach LOS			F

Intersection Summary			
Average Delay	35.2		
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
Common St & Route 1A & Kendrick St

09/26/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2
Lane Configurations											
Traffic Volume (veh/h)	15	400	214	15	762	13	0	0	215	3	9
Future Volume (Veh/h)	15	400	214	15	762	13	0	0	215	3	9
Sign Control		Free			Free		Stop		Stop		
Grade		0%			0%		0%		0%		
Peak Hour Factor	0.93	0.93	0.93	0.91	0.91	0.91	0.92	0.92	0.89	0.89	0.89
Hourly flow rate (vph)	16	430	230	16	837	14	0	0	242	3	10
Pedestrians		4					23		10		
Lane Width (ft)		12.0					0.0		12.0		
Walking Speed (ft/s)		3.5					3.5		3.5		
Percent Blockage		0					0		1		
Right turn flare (veh)										2	2
Median type		None			None						
Median storage veh)											
Upstream signal (ft)					472						
pX, platoon unblocked	0.71						0.71	0.71	0.71	0.71	
vC, conflicting volume	874			670			1601	871	1467	1493	555
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	617			670			1643	612	1453	1490	555
tC, single (s)	4.1			4.1			6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)											
tF (s)	2.2			2.2			4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			98			100	100	0	96	98
cM capacity (veh/h)	686			916			67	348	73	84	528

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	676	867	255
Volume Left	16	16	242
Volume Right	230	14	10
cSH	686	916	76
Volume to Capacity	0.02	0.02	3.36
Queue Length 95th (ft)	2	1	Err
Control Delay (s)	0.6	0.5	Err
Lane LOS	A	A	F
Approach Delay (s)	0.6	0.5	Err
Approach LOS			F

Intersection Summary			
Average Delay	1418.6		
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

Unsignalized Intersection Capacity Analysis
Taunton St & Common St

09/25/2017

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	53	179	73	0	176	2	6	180	125	79	70	0
Future Volume (Veh/h)	53	179	73	0	176	2	6	180	125	79	70	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.84	0.84	0.84	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	60	203	83	0	210	2	7	222	154	98	86	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	702	595	299	780	672	86	86			376		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	702	595	299	780	672	86	86			376		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.3		
p0 queue free %	63	46	89	100	37	100	100			92		
cM capacity (veh/h)	163	379	738	145	332	946	1492			1156		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1
Volume Total	346	212	383	184
Volume Left	60	0	7	98
Volume Right	83	2	154	0
cSH	340	334	1492	1156
Volume to Capacity	1.02	0.63	0.00	0.08
Queue Length 95th (ft)	294	103	0	7
Control Delay (s)	88.9	32.7	0.2	4.8
Lane LOS	F	D	A	A
Approach Delay (s)	88.9	32.7	0.2	4.8
Approach LOS	F	D		

Intersection Summary				
Average Delay	34.3			
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
Taunton St/David Brown's Way & Common St

09/26/2017

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	35	151	53	1	216	2	9	188	72	66	187	2
Future Volume (Veh/h)	35	151	53	1	216	2	9	188	72	66	187	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.90	0.90	0.90	0.91	0.91	0.91	0.87	0.87	0.87
Hourly flow rate (vph)	39	170	60	1	240	2	10	207	79	76	215	2
Pedestrians		1										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		3.5										
Percent Blockage		0										
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	758	636	248	780	675	216	217			287		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	758	636	248	780	675	216	217			287		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	72	54	92	99	31	100	99			94		
cM capacity (veh/h)	138	369	790	176	350	824	1359			1274		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1
Volume Total	269	243	296	293
Volume Left	39	1	10	76
Volume Right	60	2	79	2
cSH	328	350	1359	1274
Volume to Capacity	0.82	0.69	0.01	0.06
Queue Length 95th (ft)	175	124	1	5
Control Delay (s)	51.0	35.5	0.3	2.5
Lane LOS	F	E	A	A
Approach Delay (s)	51.0	35.5	0.3	2.5
Approach LOS	F	E		

Intersection Summary				
Average Delay	21.0			
Intersection Capacity Utilization	66.4%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	149	270	246	0	0	253
Future Volume (Veh/h)	149	270	246	0	0	253
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	180	325	296	0	0	305
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			796			
pX, platoon unblocked						
vC, conflicting volume	296				981	296
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	296				981	296
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	85				100	58
cM capacity (veh/h)	1232				230	729

Direction, Lane #	NB 1	SB 1	SE 1
Volume Total	505	296	305
Volume Left	180	0	0
Volume Right	0	0	305
cSH	1232	1700	729
Volume to Capacity	0.15	0.17	0.42
Queue Length 95th (ft)	13	0	52
Control Delay (s)	4.0	0.0	13.4
Lane LOS	A		B
Approach Delay (s)	4.0	0.0	13.4
Approach LOS			B

Intersection Summary			
Average Delay		5.5	
Intersection Capacity Utilization		42.1%	ICU Level of Service A
Analysis Period (min)		15	

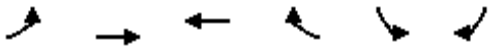
Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	255	419	249	0	0	242
Future Volume (Veh/h)	255	419	249	0	0	242
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	277	455	271	0	0	263
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			806			
pX, platoon unblocked						
vC, conflicting volume	271				1280	271
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	271				1280	271
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	79				100	66
cM capacity (veh/h)	1292				144	768

Direction, Lane #	NB 1	SB 1	SE 1
Volume Total	732	271	263
Volume Left	277	0	0
Volume Right	0	0	263
cSH	1292	1700	768
Volume to Capacity	0.21	0.16	0.34
Queue Length 95th (ft)	20	0	38
Control Delay (s)	4.8	0.0	12.1
Lane LOS	A		B
Approach Delay (s)	4.8	0.0	12.1
Approach LOS			B

Intersection Summary			
Average Delay		5.3	
Intersection Capacity Utilization		55.9%	ICU Level of Service B
Analysis Period (min)		15	

Unsignalized Intersection Capacity Analysis
Route 1A & Creek Street

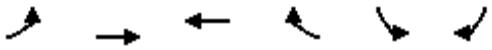
09/25/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	179	849	335	35	133	66
Future Volume (Veh/h)	179	849	335	35	133	66
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.86	0.86	0.76	0.76	0.86	0.86
Hourly flow rate (vph)	208	987	441	46	155	77
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	487				1867	464
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	487				1867	464
tC, single (s)	4.1				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.4
p0 queue free %	80				0	87
cM capacity (veh/h)	1066				61	584

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1195	487	232
Volume Left	208	0	155
Volume Right	0	46	77
cSH	1066	1700	87
Volume to Capacity	0.20	0.29	2.65
Queue Length 95th (ft)	18	0	550
Control Delay (s)	5.1	0.0	850.8
Lane LOS	A		F
Approach Delay (s)	5.1	0.0	850.8
Approach LOS			F

Intersection Summary			
Average Delay	106.3		
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	204	498	765	77	45	236
Future Volume (Veh/h)	204	498	765	77	45	236
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.87	0.87	0.85	0.85
Hourly flow rate (vph)	222	541	879	89	53	278
Pedestrians					3	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	971				1912	926
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	971				1912	926
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	69				0	15
cM capacity (veh/h)	712				52	326

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	763	968	331
Volume Left	222	0	53
Volume Right	0	89	278
cSH	712	1700	176
Volume to Capacity	0.31	0.57	1.88
Queue Length 95th (ft)	33	0	611
Control Delay (s)	7.6	0.0	460.9
Lane LOS	A		F
Approach Delay (s)	7.6	0.0	460.9
Approach LOS			F

Intersection Summary			
Average Delay	76.8		
Intersection Capacity Utilization	109.5%	ICU Level of Service	H
Analysis Period (min)	15		

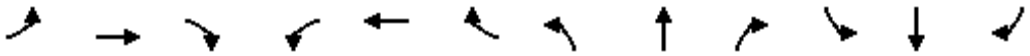
Unsignalized Intersection Capacity Analysis
Route 1A & Beach Street

09/25/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	915	33	41	429	3	22	0	38	9	1	1
Future Volume (Veh/h)	4	915	33	41	429	3	22	0	38	9	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.79	0.79	0.79	0.55	0.55	0.55
Hourly flow rate (vph)	5	1064	38	48	499	3	28	0	48	16	2	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	502			1102			1692	1691	1083	1738	1708	500
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	502			1102			1692	1691	1083	1738	1708	500
tC, single (s)	4.1			4.2			7.2	6.6	6.3	7.2	6.6	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.1	3.4	3.6	4.1	3.4
p0 queue free %	100			92			56	100	81	68	98	100
cM capacity (veh/h)	1047			601			63	80	251	50	80	557

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1107	550	76	20
Volume Left	5	48	28	16
Volume Right	38	3	48	2
cSH	1047	601	120	57
Volume to Capacity	0.00	0.08	0.63	0.35
Queue Length 95th (ft)	0	6	81	32
Control Delay (s)	0.2	2.2	76.5	98.8
Lane LOS	A	A	F	F
Approach Delay (s)	0.2	2.2	76.5	98.8
Approach LOS			F	F

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	604	48	69	876	4	45	0	77	5	0	2
Future Volume (Veh/h)	1	604	48	69	876	4	45	0	77	5	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.88	0.88	0.88	0.76	0.76	0.76	0.58	0.58	0.58
Hourly flow rate (vph)	1	623	49	78	995	5	59	0	101	9	0	3
Pedestrians		1			1			1				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		3.5			3.5			3.5				
Percent Blockage		0			0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1000			673			1808	1806	650	1905	1828	998
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1000			673			1808	1806	650	1905	1828	998
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			92			0	100	79	77	100	99
cM capacity (veh/h)	692			922			57	73	472	39	71	298

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	673	1078	160	12
Volume Left	1	78	59	9
Volume Right	49	5	101	3
cSH	692	922	128	49
Volume to Capacity	0.00	0.08	1.25	0.24
Queue Length 95th (ft)	0	7	250	20
Control Delay (s)	0.0	2.4	226.9	99.7
Lane LOS	A	A	F	F
Approach Delay (s)	0.0	2.4	226.9	99.7
Approach LOS			F	F

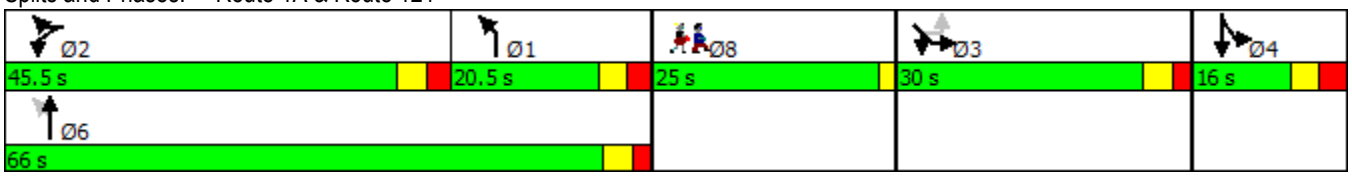
Intersection Summary			
Average Delay	20.9		
Intersection Capacity Utilization	102.4%	ICU Level of Service	G
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER	Ø8
Lane Configurations											
Traffic Volume (vph)	289	173	60	0	419	0	0	7	526	200	
Future Volume (vph)	289	173	60	0	419	0	0	7	526	200	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0	0	150		0	0		0	0	200	
Storage Lanes	1	1	1		0	0		0	1	1	
Taper Length (ft)	25		25			25			25		
Right Turn on Red					Yes			Yes		Yes	
Link Speed (mph)	30			30			30		30		
Link Distance (ft)	228			938			493		596		
Travel Time (s)	5.2			21.3			11.2		13.5		
Peak Hour Factor	0.91	0.91	0.87	0.87	0.87	0.92	0.92	0.35	0.86	0.86	
Heavy Vehicles (%)	12%	12%	8%	8%	8%	2%	2%	14%	2%	2%	
Shared Lane Traffic (%)											
Lane Group Flow (vph)	318	190	69	482	0	0	20	0	612	233	
Turn Type	Prot	Prot	pm+pt	NA			NA		Prot	Prot	
Protected Phases	2!	2!	1	6!		4	4		3	3	8
Permitted Phases			6!								
Detector Phase	2	2	1	6		4	4		3	3	
Switch Phase											
Minimum Initial (s)	15.0	15.0	8.0	15.0		6.0	6.0		8.0	8.0	5.0
Minimum Split (s)	21.0	21.0	14.0	20.0		12.0	12.0		13.0	13.0	25.0
Total Split (s)	45.5	45.5	20.5	66.0		16.0	16.0		30.0	30.0	25.0
Total Split (%)	33.2%	33.2%	15.0%	48.2%		11.7%	11.7%		21.9%	21.9%	18%
Yellow Time (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	2.5	2.5	2.5	2.0		3.0	3.0		2.0	2.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.0			6.0		5.0	5.0	
Lead/Lag	Lead	Lead	Lag								
Lead-Lag Optimize?	Yes	Yes	Yes								
Recall Mode	Min	Min	None	Min		None	None		None	None	None
Act Effct Green (s)	21.7	21.7	34.3	32.5			6.3		26.2	26.2	
Actuated g/C Ratio	0.30	0.30	0.47	0.44			0.09		0.36	0.36	
v/c Ratio	0.67	0.44	0.25	0.48			0.02		0.97	0.36	
Control Delay	31.6	26.3	21.8	1.8			0.0		57.9	13.1	
Queue Delay	0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Total Delay	31.6	26.3	21.8	1.8			0.0		57.9	13.1	
LOS	C	C	C	A			A		E	B	
Approach Delay	29.6			4.3					45.5		
Approach LOS	C			A					D		
Queue Length 50th (ft)	118	65	15	0			0		261	32	
Queue Length 95th (ft)	240	144	42	0			0		#624	106	
Internal Link Dist (ft)	148			858			413		516		
Turn Bay Length (ft)			150							200	
Base Capacity (vph)	924	827	448	1349			864		634	648	
Starvation Cap Reductn	0	0	0	0			0		0	0	
Spillback Cap Reductn	0	0	0	0			0		0	0	
Storage Cap Reductn	0	0	0	0			0		0	0	
Reduced v/c Ratio	0.34	0.23	0.15	0.36			0.02		0.97	0.36	

Intersection Summary		
Area Type:	Other	
Cycle Length: 137		
Actuated Cycle Length: 73.1		
Natural Cycle: 125		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 0.97		
Intersection Signal Delay: 29.0		Intersection LOS: C
Intersection Capacity Utilization 84.0%		ICU Level of Service E
Analysis Period (min) 15		

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

Splits and Phases: Route 1A & Route 121



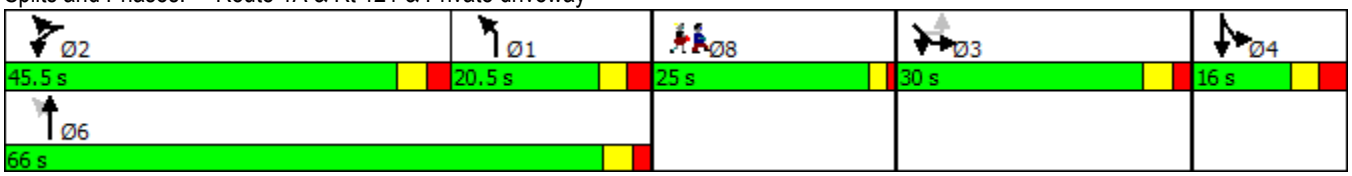
Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER	Ø8
Lane Configurations												
Traffic Volume (vph)	440	472	6	201	0	386	3	2	0	255	145	
Future Volume (vph)	440	472	6	201	0	386	3	2	0	255	145	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0	0		150		0	0		0	0	200	
Storage Lanes	1	1		1		0	0		0	1	1	
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes		Yes	
Link Speed (mph)	30				30			30		30		
Link Distance (ft)	223				1040			190		596		
Travel Time (s)	5.1				23.6			4.3		13.5		
Confl. Peds. (#/hr)			1	8		2	2		8			
Peak Hour Factor	0.84	0.84	0.84	0.90	0.90	0.90	0.62	0.62	0.62	0.69	0.69	
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	17%	17%	17%	2%	2%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	524	569	0	223	429	0	0	8	0	370	210	
Turn Type	Prot	Prot		pm+pt	NA		Split	NA		Prot	Prot	
Protected Phases	2!	2!		1	6!		4	4		3	3	8
Permitted Phases				6!								
Detector Phase	2	2		1	6		4	4		3	3	
Switch Phase												
Minimum Initial (s)	15.0	15.0		8.0	15.0		6.0	6.0		8.0	8.0	5.0
Minimum Split (s)	21.0	21.0		14.0	20.5		12.0	12.0		13.0	13.0	25.0
Total Split (s)	45.5	45.5		20.5	66.0		16.0	16.0		30.0	30.0	25.0
Total Split (%)	33.2%	33.2%		15.0%	48.2%		11.7%	11.7%		21.9%	21.9%	18%
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	2.5	2.5		2.5	2.0		3.0	3.0		2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.0			6.0		5.0	5.0	
Lead/Lag	Lead	Lead		Lag								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	Min	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	40.8	40.8		54.6	55.1			6.2		25.5	25.5	
Actuated g/C Ratio	0.42	0.42		0.57	0.57			0.06		0.26	0.26	
v/c Ratio	0.69	0.76		0.32	0.37			0.08		0.79	0.39	
Control Delay	31.2	27.6		16.0	0.9			50.4		48.4	11.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	31.2	27.6		16.0	0.9			50.4		48.4	11.8	
LOS	C	C		B	A			D		D	B	
Approach Delay	29.3				6.1			50.4		35.2		
Approach LOS	C				A			D		D		
Queue Length 50th (ft)	221	195		52	0			4		188	19	
Queue Length 95th (ft)	#557	#530		181	0			16		#336	48	
Internal Link Dist (ft)	143				960			110		516		
Turn Bay Length (ft)				150							200	
Base Capacity (vph)	755	751		837	1230			166		467	538	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	

Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER	Ø8
Reduced v/c Ratio	0.69	0.76		0.27	0.35			0.05		0.79	0.39	

Intersection Summary			
Area Type:	Other		
Cycle Length: 137			
Actuated Cycle Length: 96.5			
Natural Cycle: 115			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 24.3		Intersection LOS: C	
Intersection Capacity Utilization 75.5%		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.
! Phase conflict between lane groups.

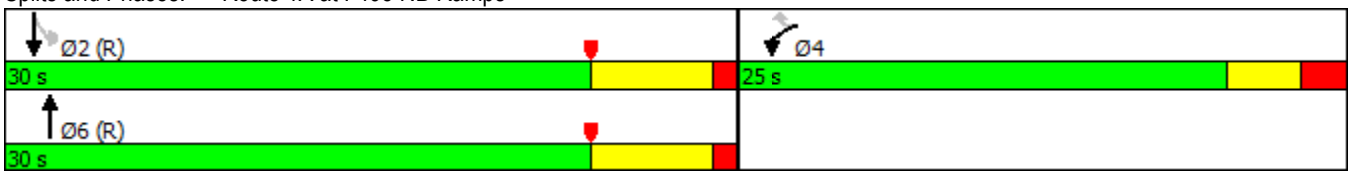
Splits and Phases: Route 1A & Rt 121 & Private driveway



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	118	109	374	516	107	383
Future Volume (vph)	118	109	374	516	107	383
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200	300		0	0	
Storage Lanes	1	1		0	0	
Taper Length (ft)	25				0	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	627		1275			363
Travel Time (s)	14.3		29.0			8.3
Peak Hour Factor	0.95	0.95	0.91	0.91	0.86	0.86
Heavy Vehicles (%)	16%	16%	6%	6%	9%	9%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	124	115	978	0	0	569
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases		4			2	
Detector Phase	4	4	6		2	2
Switch Phase						
Minimum Initial (s)	18.0	18.0	21.0		21.0	21.0
Minimum Split (s)	23.0	23.0	27.0		27.0	27.0
Total Split (s)	25.0	25.0	30.0		30.0	30.0
Total Split (%)	45.5%	45.5%	54.5%		54.5%	54.5%
Yellow Time (s)	3.0	3.0	5.0		5.0	5.0
All-Red Time (s)	2.0	2.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0			0.0
Total Lost Time (s)	5.0	5.0	6.0			6.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max		C-Max	C-Max
Act Effct Green (s)	18.0	18.0	31.8			31.8
Actuated g/C Ratio	0.33	0.33	0.58			0.58
v/c Ratio	0.13	0.22	0.48			0.48
Control Delay	13.4	4.6	7.4			11.5
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	13.4	4.6	7.4			11.5
LOS	B	A	A			B
Approach Delay	9.2		7.4			11.5
Approach LOS	A		A			B
Queue Length 50th (ft)	14	0	174			66
Queue Length 95th (ft)	29	28	280			102
Internal Link Dist (ft)	547		1195			283
Turn Bay Length (ft)	200	300				
Base Capacity (vph)	1097	579	2036			1177
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0
Reduced v/c Ratio	0.11	0.20	0.48			0.48

Intersection Summary		
Area Type:	Other	
Cycle Length: 55		
Actuated Cycle Length: 55		
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Yellow, Master Intersection		
Natural Cycle: 50		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.48		
Intersection Signal Delay: 9.0		Intersection LOS: A
Intersection Capacity Utilization 73.6%		ICU Level of Service D
Analysis Period (min) 15		

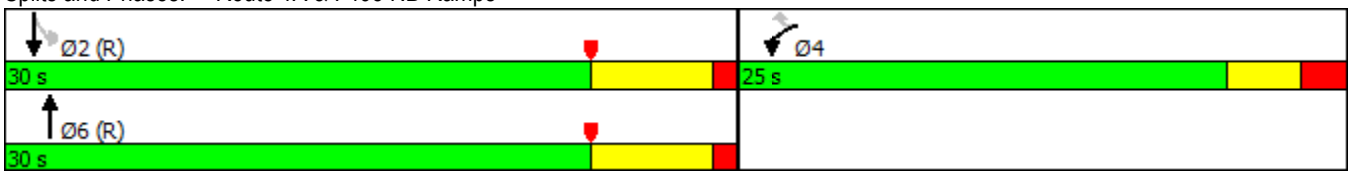
Splits and Phases: Route 1A at I-495 NB Ramps

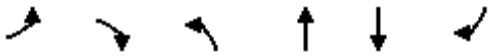


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	303	271	332	291	119	412
Future Volume (vph)	303	271	332	291	119	412
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200	300		0	0	
Storage Lanes	1	1		0	0	
Taper Length (ft)	25				0	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	627		1275			363
Travel Time (s)	14.3		29.0			8.3
Peak Hour Factor	0.98	0.98	0.83	0.83	0.81	0.81
Heavy Vehicles (%)	3%	3%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	309	277	751	0	0	656
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases		4			2	
Detector Phase	4	4	6		2	2
Switch Phase						
Minimum Initial (s)	18.0	18.0	21.0		21.0	21.0
Minimum Split (s)	23.0	23.0	27.0		27.0	27.0
Total Split (s)	25.0	25.0	30.0		30.0	30.0
Total Split (%)	45.5%	45.5%	54.5%		54.5%	54.5%
Yellow Time (s)	3.0	3.0	5.0		5.0	5.0
All-Red Time (s)	2.0	2.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0			0.0
Total Lost Time (s)	5.0	5.0	6.0			6.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max		C-Max	C-Max
Act Effct Green (s)	18.0	18.0	26.0			26.0
Actuated g/C Ratio	0.33	0.33	0.47			0.47
v/c Ratio	0.28	0.40	0.43			0.61
Control Delay	14.5	4.1	9.4			13.8
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	14.5	4.1	9.4			13.8
LOS	B	A	A			B
Approach Delay	9.6		9.4			13.8
Approach LOS	A		A			B
Queue Length 50th (ft)	37	0	76			77
Queue Length 95th (ft)	63	42	85			105
Internal Link Dist (ft)	547		1195			283
Turn Bay Length (ft)	200	300				
Base Capacity (vph)	1236	746	1740			1074
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0
Reduced v/c Ratio	0.25	0.37	0.43			0.61

Intersection Summary		
Area Type:	Other	
Cycle Length: 55		
Actuated Cycle Length: 55		
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Yellow, Master Intersection		
Natural Cycle: 50		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.61		
Intersection Signal Delay: 10.9	Intersection LOS: B	
Intersection Capacity Utilization 65.2%	ICU Level of Service C	
Analysis Period (min) 15		

Splits and Phases: Route 1A & I-495 NB Ramps

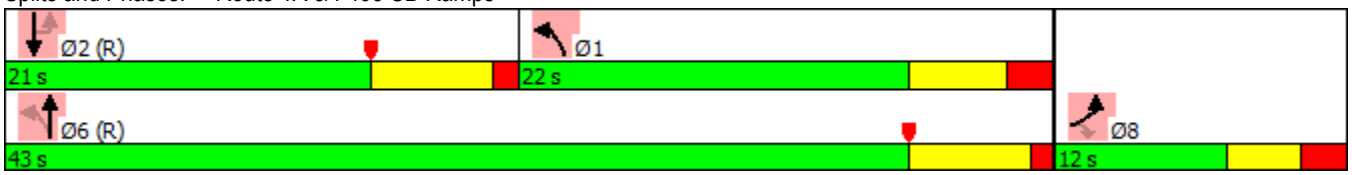


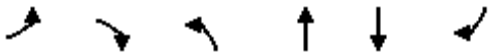


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	86	162	197	801	250	261
Future Volume (vph)	86	162	197	801	250	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	280	0			0
Storage Lanes	1	1	1			0
Taper Length (ft)	0		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			40	40	
Link Distance (ft)	604			409	1275	
Travel Time (s)	13.7			7.0	21.7	
Peak Hour Factor	0.78	0.78	0.86	0.86	0.85	0.85
Heavy Vehicles (%)	14%	14%	7%	7%	11%	11%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	110	208	229	931	601	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	8		1	6	2	
Permitted Phases		8	6			
Detector Phase	8	8	1	6	2	
Switch Phase						
Minimum Initial (s)	5.0	5.0	6.0	10.0	10.0	
Minimum Split (s)	10.0	10.0	12.0	16.0	16.0	
Total Split (s)	12.0	12.0	22.0	43.0	21.0	
Total Split (%)	21.8%	21.8%	40.0%	78.2%	38.2%	
Yellow Time (s)	3.0	3.0	4.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	6.0	6.0	6.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	6.7	6.7	37.3	37.3	15.3	
Actuated g/C Ratio	0.12	0.12	0.68	0.68	0.28	
v/c Ratio	0.57	0.59	0.31	0.41	0.57	
Control Delay	36.0	11.7	9.5	7.2	15.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	36.0	11.7	9.5	7.2	15.6	
LOS	D	B	A	A	B	
Approach Delay	20.1			7.7	15.6	
Approach LOS	C			A	B	
Queue Length 50th (ft)	35	0	68	169	41	
Queue Length 95th (ft)	65	33	94	211	90	
Internal Link Dist (ft)	524			329	1195	
Turn Bay Length (ft)		280				
Base Capacity (vph)	201	361	748	2286	1056	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.55	0.58	0.31	0.41	0.57	

Intersection Summary		
Area Type:	Other	
Cycle Length: 55		
Actuated Cycle Length: 55		
Offset: 0 (0%), Referenced to phase 2:SBTU and 6:NBTL, Start of Yellow		
Natural Cycle: 40		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.59		
Intersection Signal Delay: 11.8		Intersection LOS: B
Intersection Capacity Utilization 56.4%		ICU Level of Service B
Analysis Period (min) 15		

Splits and Phases: Route 1A & I-495 SB Ramps

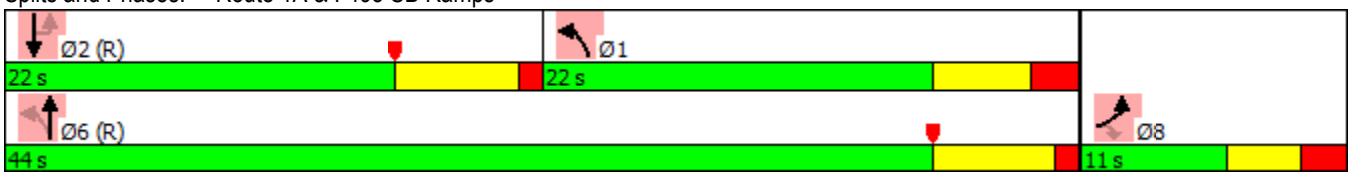


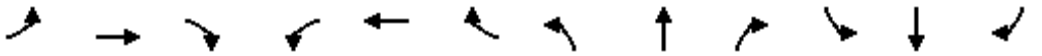


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	123	470	250	501	587	118
Future Volume (vph)	123	470	250	501	587	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	280	0			0
Storage Lanes	1	1	1			0
Taper Length (ft)	0		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	30	
Link Distance (ft)	604			409	1275	
Travel Time (s)	13.7			9.3	29.0	
Peak Hour Factor	0.86	0.86	0.89	0.89	0.88	0.88
Heavy Vehicles (%)	2%	2%	1%	1%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	143	547	281	563	801	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	8		1	6	2	
Permitted Phases		8	6			
Detector Phase	8	8	1	6	2	
Switch Phase						
Minimum Initial (s)	5.0	5.0	6.0	10.0	10.0	
Minimum Split (s)	10.0	10.0	12.0	16.0	16.0	
Total Split (s)	11.0	11.0	22.0	44.0	22.0	
Total Split (%)	20.0%	20.0%	40.0%	80.0%	40.0%	
Yellow Time (s)	3.0	3.0	4.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	6.0	6.0	6.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	6.0	6.0	38.0	38.0	16.0	
Actuated g/C Ratio	0.11	0.11	0.69	0.69	0.29	
v/c Ratio	0.74	0.83	0.40	0.23	0.77	
Control Delay	50.2	16.2	8.1	2.1	27.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	50.2	16.2	8.1	2.1	27.5	
LOS	D	B	A	A	C	
Approach Delay	23.3			4.1	27.5	
Approach LOS	C			A	C	
Queue Length 50th (ft)	47	0	48	13	96	
Queue Length 95th (ft)	#116	#105	62	10	#126	
Internal Link Dist (ft)	524			329	1195	
Turn Bay Length (ft)		280				
Base Capacity (vph)	193	660	711	2469	1034	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.74	0.83	0.40	0.23	0.77	

Intersection Summary		
Area Type:	Other	
Cycle Length: 55		
Actuated Cycle Length: 55		
Offset: 0 (0%), Referenced to phase 2:SBTU and 6:NBTL, Start of Yellow		
Natural Cycle: 60		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.83		
Intersection Signal Delay: 17.8	Intersection LOS: B	
Intersection Capacity Utilization 58.3%	ICU Level of Service B	
Analysis Period (min) 15		
# 95th percentile volume exceeds capacity, queue may be longer.		
Queue shown is maximum after two cycles.		

Splits and Phases: Route 1A & I-495 SB Ramps



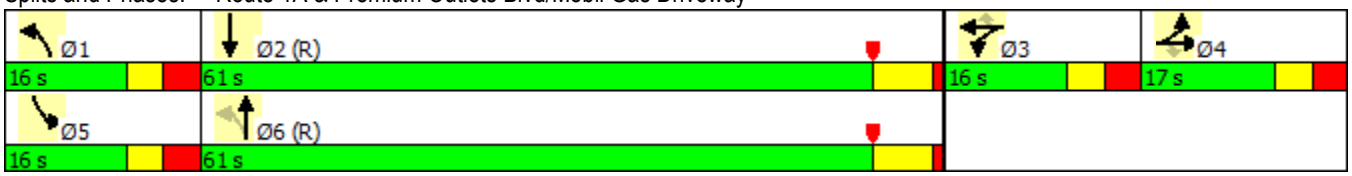


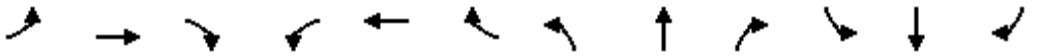
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	3	32	16	5	78	82	791	47	47	258	103
Future Volume (vph)	92	3	32	16	5	78	82	791	47	47	258	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	0		0	230		0	0		0
Storage Lanes	1		1	0		1	1		0	1		1
Taper Length (ft)	0			0			25			0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		721			236			646			291	
Travel Time (s)		16.4			5.4			11.0			5.0	
Peak Hour Factor	0.69	0.69	0.69	0.65	0.65	0.65	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	9%	9%	9%	15%	15%	15%	8%	8%	8%	17%	17%	17%
Shared Lane Traffic (%)	49%											
Lane Group Flow (vph)	68	69	46	0	33	120	90	921	0	52	284	113
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		Prot	NA	Free
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases			4			3	6					Free
Detector Phase	4	4	4	3	3	3	1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	12.0	12.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	
Total Split (s)	17.0	17.0	17.0	16.0	16.0	16.0	16.0	61.0		16.0	61.0	
Total Split (%)	15.5%	15.5%	15.5%	14.5%	14.5%	14.5%	14.5%	55.5%		14.5%	55.5%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	9.5	9.5	9.5		7.7	7.7	71.5	65.0		8.5	66.0	110.0
Actuated g/C Ratio	0.09	0.09	0.09		0.07	0.07	0.65	0.59		0.08	0.60	1.00
v/c Ratio	0.50	0.51	0.17		0.30	0.51	0.13	0.47		0.44	0.15	0.08
Control Delay	60.6	60.8	1.4		54.8	11.9	7.2	16.0		60.8	14.7	0.1
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	60.6	60.8	1.4		54.8	11.9	7.2	16.0		60.8	14.7	0.1
LOS	E	E	A		D	B	A	B		E	B	A
Approach Delay		45.8			21.2			15.2			16.3	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	48	49	0		23	0	20	207		37	52	0
Queue Length 95th (ft)	73	73	0		39	0	41	287		m63	82	0
Internal Link Dist (ft)		641			156			566			211	
Turn Bay Length (ft)			250				230					
Base Capacity (vph)	159	160	284		144	263	734	1964		141	1851	1380
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	0.43	0.43	0.16		0.23	0.46	0.12	0.47		0.37	0.15	0.08

Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 3 (3%), Referenced to phase 2:SBT and 6:NBTL, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 19.1	Intersection LOS: B
Intersection Capacity Utilization 51.8%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: Route 1A & Premium Outlets Blvd/Mobil Gas Driveway



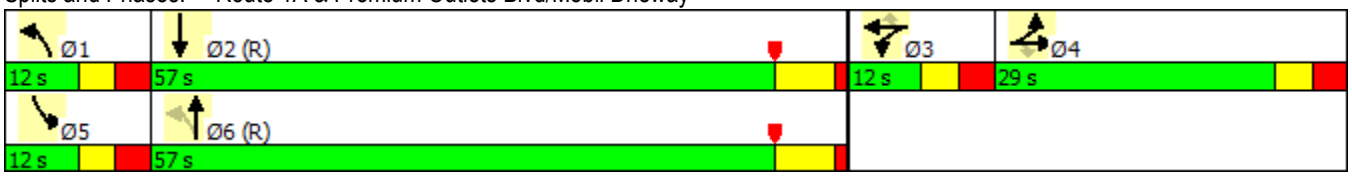


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	381	27	136	22	11	54	97	332	26	34	655	340
Future Volume (vph)	381	27	136	22	11	54	97	332	26	34	655	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	0		0	230		0	0		0
Storage Lanes	1		1	0		1	1		0	1		1
Taper Length (ft)	0			0			25			0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		659			195			646			291	
Travel Time (s)		15.0			4.4			11.0			5.0	
Peak Hour Factor	0.88	0.88	0.88	0.70	0.70	0.70	0.94	0.94	0.94	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	4%	4%	4%	3%	3%	3%
Shared Lane Traffic (%)	47%											
Lane Group Flow (vph)	229	235	155	0	47	77	103	381	0	39	753	391
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		Prot	NA	Free
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases			4			3	6					Free
Detector Phase	4	4	4	3	3	3	1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	12.0	12.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	
Total Split (s)	29.0	29.0	29.0	12.0	12.0	12.0	12.0	57.0		12.0	57.0	
Total Split (%)	26.4%	26.4%	26.4%	10.9%	10.9%	10.9%	10.9%	51.8%		10.9%	51.8%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	19.6	19.6	19.6		5.9	5.9	65.2	61.2		6.4	56.1	110.0
Actuated g/C Ratio	0.18	0.18	0.18		0.05	0.05	0.59	0.56		0.06	0.51	1.00
v/c Ratio	0.75	0.76	0.37		0.49	0.34	0.27	0.20		0.39	0.42	0.25
Control Delay	58.0	59.0	8.6		67.8	4.1	11.0	13.9		60.9	18.9	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	58.0	59.0	8.6		67.8	4.1	11.0	13.9		60.9	18.9	0.2
LOS	E	E	A		E	A	B	B		E	B	A
Approach Delay		46.0			28.2			13.3			14.1	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	161	165	0		33	0	30	80		25	205	0
Queue Length 95th (ft)	238	245	50		56	0	57	113		m34	253	m0
Internal Link Dist (ft)		579			115			566			211	
Turn Bay Length (ft)			250				230					
Base Capacity (vph)	358	361	460		98	227	385	1915		103	1788	1568
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	0.64	0.65	0.34		0.48	0.34	0.27	0.20		0.38	0.42	0.25

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 9 (8%), Referenced to phase 2:SBT and 6:NBTL, Start of Yellow		
Natural Cycle: 60		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.76		
Intersection Signal Delay: 22.9	Intersection LOS: C	
Intersection Capacity Utilization 56.4%	ICU Level of Service B	
Analysis Period (min) 15		

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

Splits and Phases: Route 1A & Premium Outlets Blvd/Mobil Drieway

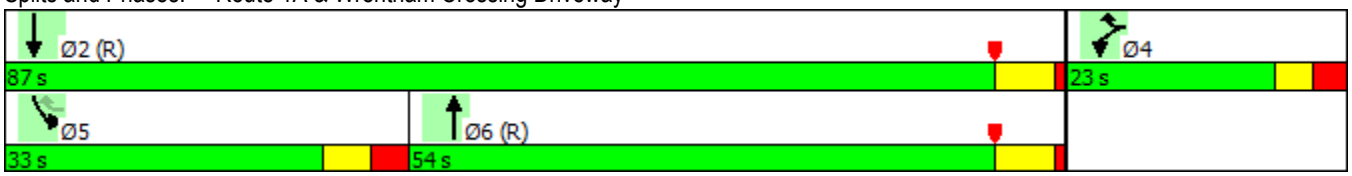


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	924	0	1	308
Future Volume (vph)	0	0	924	0	1	308
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	250	
Storage Lanes	1	1		0	1	
Taper Length (ft)	0				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	466		1292			646
Travel Time (s)	10.6		29.4			14.7
Peak Hour Factor	0.92	0.92	0.91	0.91	0.90	0.90
Heavy Vehicles (%)	2%	2%	7%	7%	17%	17%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1015	0	1	342
Turn Type	Prot	custom	NA		Prot	NA
Protected Phases	4	4	6		5	2
Permitted Phases		5				
Detector Phase	4	4	6		5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	10.0		8.0	10.0
Minimum Split (s)	14.0	14.0	16.0		15.0	16.0
Total Split (s)	23.0	23.0	54.0		33.0	87.0
Total Split (%)	20.9%	20.9%	49.1%		30.0%	79.1%
Yellow Time (s)	3.0	3.0	5.0		4.0	5.0
All-Red Time (s)	3.0	3.0	1.0		3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		7.0	6.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max		None	C-Max
Act Effct Green (s)			105.8		8.0	110.0
Actuated g/C Ratio			0.96		0.07	1.00
v/c Ratio			0.31		0.01	0.11
Control Delay			1.0		40.0	0.1
Queue Delay			0.0		0.0	0.0
Total Delay			1.0		40.0	0.1
LOS			A		D	A
Approach Delay			1.0			0.2
Approach LOS			A			A
Queue Length 50th (ft)			0		1	0
Queue Length 95th (ft)			100		m3	0
Internal Link Dist (ft)	386		1212			566
Turn Bay Length (ft)					250	
Base Capacity (vph)			3245		364	3085
Starvation Cap Reductn			0		0	0
Spillback Cap Reductn			0		0	0
Storage Cap Reductn			0		0	0
Reduced v/c Ratio			0.31		0.00	0.11

Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 66 (60%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.31	
Intersection Signal Delay: 0.8	Intersection LOS: A
Intersection Capacity Utilization 30.5%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: Route 1A & Wrentham Crossing Driveway

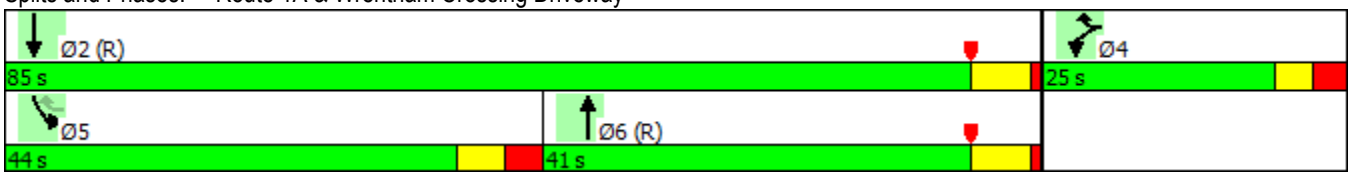


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	442	0	5	808
Future Volume (vph)	0	0	442	0	5	808
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	250	
Storage Lanes	1	1		0	1	
Taper Length (ft)	0				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	456		1293			646
Travel Time (s)	10.4		29.4			14.7
Peak Hour Factor	0.92	0.92	0.94	0.94	0.95	0.95
Heavy Vehicles (%)	2%	2%	4%	4%	3%	3%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	470	0	5	851
Turn Type	Prot	custom	NA		Prot	NA
Protected Phases	4	4	6		5	2
Permitted Phases		5				
Detector Phase	4	4	6		5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	10.0		8.0	10.0
Minimum Split (s)	14.0	14.0	16.0		15.0	16.0
Total Split (s)	25.0	25.0	41.0		44.0	85.0
Total Split (%)	22.7%	22.7%	37.3%		40.0%	77.3%
Yellow Time (s)	3.0	3.0	5.0		4.0	5.0
All-Red Time (s)	3.0	3.0	1.0		3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		7.0	6.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max		None	C-Max
Act Effct Green (s)			105.8		8.0	110.0
Actuated g/C Ratio			0.96		0.07	1.00
v/c Ratio			0.14		0.04	0.24
Control Delay			0.7		39.6	0.2
Queue Delay			0.0		0.0	0.0
Total Delay			0.7		39.6	0.2
LOS			A		D	A
Approach Delay			0.7			0.4
Approach LOS			A			A
Queue Length 50th (ft)			0		4	0
Queue Length 95th (ft)			40		m8	0
Internal Link Dist (ft)	376		1213			566
Turn Bay Length (ft)					250	
Base Capacity (vph)			3338		589	3505
Starvation Cap Reductn			0		0	0
Spillback Cap Reductn			0		0	0
Storage Cap Reductn			0		0	0
Reduced v/c Ratio			0.14		0.01	0.24

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow		
Natural Cycle: 45		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.24		
Intersection Signal Delay: 0.5		Intersection LOS: A
Intersection Capacity Utilization 27.3%		ICU Level of Service A
Analysis Period (min) 15		

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

Splits and Phases: Route 1A & Wrentham Crossing Driveway



APPENDIX D

Preliminary Traffic-Signal and Multiway-Stop Warrants Analyses

Route 1A at Common Street
Route 1A at Creek Street
Route 1A at Beach Street
Common Street at Taunton Street (Multiway-Stop Analysis)

Table D-1
Summary of Hourly Volumes and Warrant Analyses
Route 1A (South Street) at Common Street, Wrentham

Hourly period starting	Route 1A (main street)		Common St (minor street)	Sum of main street	Maximum of minor street	Volumes above the required minimum on main/minor street		
	SB[1]	NB[2]	WB[3]			Warrant 1	Warrant 2	Warrant 7
6:00	145	704	75	849	75	√		In the recent 12-month period, 4 crashes are considered correctable by a traffic signal.
7:00	361	901	142	1262	142	√	√	
8:00	338	775	140	1112	140	√	√	
9:00	301	449	112	749	112			
10:00	357	400	117	757	117	√		
11:00	365	432	120	796	120	√		
12:00	421	464	129	884	129	√	√	
13:00	394	472	124	866	124	√		
14:00	579	541	173	1120	173	√	√	
15:00	686	504	172	1190	172	√	√	
16:00	704	491	180	1195	180	√	√	
17:00	717	467	200	1184	200	√	√	
18:00	474	385	168	859	168	√	√	
19:00	277	243	104	519	104			
						MET	**MET**	

[1] Used average of S16-043-350-01 SB recorded between 11/30/16 and 12/1/16 (South St)

[2] Used average of S16-043-350-01 NB recorded between 11/30/16 and 12/1/16 (South St) scaled by 84.3% based on TMCs to reflect higher SB volumes south of the intersection than north of it

[3] Used average of S16-043-350-04 NB recorded between 11/30/16 and 12/1/16 (East St) with all hours scaled to give equivalent volumes from 7-9am and 4-6pm on both approaches

Warrants 1, 2, and 7 in MUTCD Chapter 4C were applied to this intersection.

Warrant 1 (8-Hour Volume) is fulfilled. It requires that the traffic conditions (observed vehicular volumes higher than the specified minimum volumes) exist for each of any 8 hours of an average day. The interruption of continuous traffic (Condition B) was applied in this case. The volume threshold for a major street (assuming one lane) is 750 vehicles per hour (vph) and for a minor street of one lane is 75 vph.

Warrant 2 (4-Hour Volume) is fulfilled. It requires that the traffic conditions (main street combined/minor street maximum volume falling above an applicable curve) exist for each of any 4 hours of an average day. The lower threshold volume for a minor street of one lane is 80 vph.

Warrant 7 (Crash Experience) is not fulfilled. 5 crashes were observed between April 2016 and March 2017, the most recent 12 months for which data is available. However, one was a rear-to-rear collision as a vehicle backed out of an adjacent parking space, which is not likely to be corrected by signalization.

Table D-2
Summary of Hourly Volumes and Warrant Analyses
Route 1A (South Street) at Creek Street, Wrentham

Hourly period starting	Route 1A (main street)		Creek St (minor street)	Sum of main street	Maximum of minor street	Volumes above the required minimum on main/minor street		
	SB[1]	NB[2]	EB[3]			Warrant 1[4]	Warrant 2[4]	Warrant 7
6:00	160	720	127	880	127	√		In the recent 12-month period, 4 crashes are considered correctable by a traffic signal.
7:00	366	900	212	1266	212	√	√	
8:00	380	711	195	1091	195	√	√	
9:00	305	420	162	725	162	√		
10:00	347	379	145	726	145			
11:00	378	396	170	774	170	√	√	
12:00	408	410	173	818	173	√	√	
13:00	498	428	156	926	156	√	√	
14:00	623	520	173	1143	173	√	√	
15:00	759	516	222	1275	222	√	√	
16:00	802	500	231	1302	231	√	√	
17:00	823	536	236	1359	236	√	√	
18:00	648	460	185	1108	185	√	√	
19:00	495	327	139	822	139	√		
						MET	**MET**	

[1] Used S17-018-350-07 SB recorded 5/18/17 (South St)

[2] Used S17-018-350-07 NB recorded 5/18/17 (South St). Analysis of TMC suggested that NB volumes were equivalent north and south of the intersection.

[3] Used average of 2 days from 6374 EB recorded 4/28/2015 and 4/29/2015 (Creek St) with all hours scaled to give equivalent volumes from 7-9am and 4-6pm on both approaches

[4] Used 100% columns for Warrant 1 and 2. The 85th-percentile speed is 37.8mph, which is lower than the 40mph threshold.

Warrants 1, 2, and 7 in MUTCD Chapter 4C were applied to this intersection.

Warrant 1 (8-Hour Volume) is fulfilled. It requires that the traffic conditions (observed vehicular volumes higher than the specified minimum volumes) exist for each of any 8 hours of an average day. The interruption of continuous traffic (Condition B) was applied in this case. The volume threshold for a major street (assuming one lane) is 750 vehicles per hour (vph) and for a minor street of one lane is 75 vph.

Warrant 2 (4-Hour Volume) is fulfilled. It requires that the traffic conditions (main street combined/minor street maximum volume falling above an applicable curve) exist for each of any 4 hours of an average day. The lower threshold volume for a minor street of one lane is 80 vph.

Warrant 7 (Crash Experience) is not fulfilled. 5 crashes were observed between April 2016 and March 2017, the most recent 12 months for which data is available. However, one was a rear-end due to congested traffic conditions, which is not likely to be corrected with signalization.

Table D-3
Summary of Hourly Volumes and Warrant Analyses
Route 1A (South Street) at Beach Street, Wrentham

Hourly period starting	Route 1A (main street)		Beach St (minor street)	Sum of main street	Maximum of minor street	Volumes above the required minimum on main/minor street		
	SB[1]	NB[2]	WB[3]			Warrant 1[4]	Warrant 2[4]	Warrant 7
6:00	219	727	69	946	69			In the recent 12-month period,3 crashes are considered correctable by a traffic signal.
7:00	471	928	98	1399	98	√	√	
8:00	426	706	97	1132	97	√	√	
9:00	374	454	71	828	71			
10:00	422	420	66	842	66			
11:00	428	407	80	835	80	√		
12:00	442	489	73	931	73			
13:00	509	482	82	991	82	√		
14:00	678	624	121	1302	121	√	√	
15:00	821	585	126	1406	126	√	√	
16:00	890	579	96	1469	96	√	√	
17:00	938	675	98	1613	98	√	√	
18:00	793	530	79	1323	79	√		
19:00	516	392	72	908	72			
						MET	**MET**	

[1] Used S17-018-350-06 SB recorded 5/18/17 (South St)

[2] Used S17-018-350-06 NB recorded 5/18/17 (South St) scaled by 97.4% based on TMCs to reflect higher NB volumes north of the intersection than south of it

[3] Used S17-018-350-08 NB recorded 5/18/17 (Taunton St) with all hours scaled to give equivalent volumes from 7-9am and 4-6pm on both approaches

[4] Used 100% columns for Warrant 1 and 2 even though speeds from count S17-018-350-08 for 5/18/17 showed 85th-percentile speeds of 40.5mph (exceeding the threshold of 40mph and therefore justifying use of the 70% column if necessary)

Warrants 1, 2, and 7 in MUTCD Chapter 4C were applied to this intersection.

Warrant 1 (8-Hour Volume) is fulfilled. It requires that the traffic conditions (observed vehicular volumes higher than the specified minimum volumes) exist for each of any 8 hours of an average day. The interruption of continuous traffic (Condition B) was applied in this case. The volume threshold for a major street (assuming one lane) is 750 vehicles per hour (vph) and for a minor street of one lane is 75 vph.

Warrant 2 (4-Hour Volume) is fulfilled. It requires that the traffic conditions (main street combined/minor street maximum volume falling above an applicable curve) exist for each of any 4 hours of an average day. The lower threshold volume for a minor street of one lane is 80 vph.

Warrant 7 (Crash Experience) is not fulfilled. Only 3 correctable crashes were observed between April 2016 and March 2017, the most recent 12 months for which data is available

Table D-4
Summary of Hourly Volumes and All-Way Stop Warrant Analyses
Common Street at Taunton Street, Wrentham

Hourly period starting	Common Street (main street)		Taunton Street / David Brown Way (minor street)		Sum of main street	Sum of minor street	MUTCD* Criteria 2B.07 C
	EB[1]	WB[1]	NB[2]	SB[3]			
6:00	184	75	200	34	259	235	
7:00	299	142	285	130	441	415	√
8:00	280	140	279	199	420	478	√
9:00	194	113	175	102	307	277	√
10:00	168	118	167	111	285	278	
11:00	194	120	199	117	313	316	√
12:00	200	129	193	120	329	313	√
13:00	194	125	205	104	318	309	√
14:00	241	173	339	188	415	527	√
15:00	271	173	301	193	444	494	√
16:00	234	180	277	180	414	457	√
17:00	224	200	270	196	424	466	√
18:00	165	168	190	146	333	336	√
19:00	112	104	187	112	216	299	
							MET

[1] Used average of S16-043-350-04 NB recorded between 11/30/16 and 12/1/16 (East St) with all hours scaled to give equivalent volumes from 7-9am and 4-6pm on both approaches

[2] Used S17-018-350-08 NB recorded 5/18/17 (Taunton St)

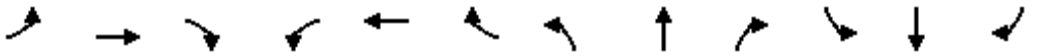
[3] Used S17-018-350-08 SB recorded 5/18/17 (Taunton St) with all hours scaled to give equivalent volumes from 7-9am and 4-6pm on both approaches

* Manual on Uniform Traffic Control Devices (MUTCD) All-Way Stop Traffic Volume Criteria 2B.07 C requires that

1) The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and
2) The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same eight hours, with an Average delay to to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but
3) If the 85th-percentile approach speed of the minor-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1) and 2).

APPENDIX E

Intersection Capacity Analyses
Saturday Midday Peak Hour
2017 Existing Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	183	205	8	77	221	66	65	320	70	69	336	301
Future Volume (vph)	183	205	8	77	221	66	65	320	70	69	336	301
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	0		0	0		60	0		160
Storage Lanes	1		0	0		0	0		0	0		1
Taper Length (ft)	100			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		462			799			154			1055	
Travel Time (s)		10.5			18.2			3.5			24.0	
Confl. Peds. (#/hr)	3					3			1	1		
Peak Hour Factor	0.88	0.88	0.88	0.77	0.77	0.77	0.84	0.84	0.84	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	208	242	0	0	473	0	0	541	0	0	456	338
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		1			1			3			3	
Permitted Phases	1			1			3			3		3
Detector Phase	1	1		1	1		3	3		3	3	3
Switch Phase												
Minimum Initial (s)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	12.0
Minimum Split (s)	17.0	17.0		17.0	17.0		17.0	17.0		17.0	17.0	17.0
Total Split (s)	33.0	33.0		33.0	33.0		32.0	32.0		32.0	32.0	32.0
Total Split (%)	38.8%	38.8%		38.8%	38.8%		37.6%	37.6%		37.6%	37.6%	37.6%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	5.0	5.0			5.0			5.0			5.0	5.0
Lead/Lag	Lead	Lead		Lead	Lead							
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min		None	None		None	None	None
Act Effct Green (s)	28.3	28.3			28.3			27.3			27.3	27.3
Actuated g/C Ratio	0.41	0.41			0.41			0.40			0.40	0.40
v/c Ratio	0.65	0.32			0.73			1.07			0.77	0.40
Control Delay	31.2	16.7			26.9			83.1			30.7	4.0
Queue Delay	0.0	0.0			0.0			0.0			0.0	0.0
Total Delay	31.2	16.7			26.9			83.1			30.7	4.0
LOS	C	B			C			F			C	A
Approach Delay		23.4			26.9			83.1			19.3	
Approach LOS		C			C			F			B	
Queue Length 50th (ft)	61	59			141			~212			145	0
Queue Length 95th (ft)	#215	157			#313			#519			#417	55
Internal Link Dist (ft)		382			719			74			975	
Turn Bay Length (ft)	100											160
Base Capacity (vph)	318	761			649			507			596	836
Starvation Cap Reductn	0	0			0			0			0	0
Spillback Cap Reductn	0	0			0			0			0	0
Storage Cap Reductn	0	0			0			0			0	0

Lane Group	Ø2
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	20.0
Total Split (s)	20.0
Total Split (%)	24%
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Reduced v/c Ratio	0.65	0.32			0.73			1.07			0.77	0.40

Intersection Summary			
Area Type:	Other		
Cycle Length: 85			
Actuated Cycle Length: 69			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.07			
Intersection Signal Delay: 37.0		Intersection LOS: D	
Intersection Capacity Utilization 94.1%		ICU Level of Service F	
Analysis Period (min) 15			

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

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

Splits and Phases: Route 140 & Route 1A

HCM Unsignalized Intersection Capacity Analysis
Common St & Route 1A & Kendrick St

09/26/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2
Lane Configurations											
Traffic Volume (veh/h)	32	394	246	24	560	12	0	0	125	1	13
Future Volume (Veh/h)	32	394	246	24	560	12	0	0	125	1	13
Sign Control		Free			Free		Stop		Stop		
Grade		0%			0%		0%		0%		
Peak Hour Factor	0.91	0.91	0.91	0.83	0.83	0.83	1.00	1.00	0.91	0.91	0.91
Hourly flow rate (vph)	35	433	270	29	675	14	0	0	137	1	14
Pedestrians		6			7		47		2		
Lane Width (ft)		12.0			12.0		0.0		12.0		
Walking Speed (ft/s)		3.5			3.5		3.5		3.5		
Percent Blockage		1			1		0		0		
Right turn flare (veh)											
Median type		None			None						
Median storage veh)											
Upstream signal (ft)					462						
pX, platoon unblocked	0.91						0.91	0.91	0.91	0.91	
vC, conflicting volume	736			705			1562	735	1386	1434	577
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	659			705			1568	658	1375	1427	577
tC, single (s)	4.1			4.1			6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)											
tF (s)	2.2			2.2			4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			97			100	100	0	99	97
cM capacity (veh/h)	840			887			93	418	104	113	510

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	738	718	152
Volume Left	35	29	137
Volume Right	270	14	14
cSH	840	887	112
Volume to Capacity	0.04	0.03	1.36
Queue Length 95th (ft)	3	3	261
Control Delay (s)	1.1	0.9	278.5
Lane LOS	A	A	F
Approach Delay (s)	1.1	0.9	278.5
Approach LOS			F

Intersection Summary			
Average Delay		27.2	
Intersection Capacity Utilization		64.2%	ICU Level of Service C
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
Taunton St/David Brown's Way & Common St

09/26/2017

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	35	168	64	0	185	2	8	197	105	74	121	1
Future Volume (Veh/h)	35	168	64	0	185	2	8	197	105	74	121	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.87	0.87	0.87	0.86	0.86	0.86	0.84	0.84	0.84
Hourly flow rate (vph)	39	189	72	0	213	2	9	229	122	88	144	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	737	629	290	795	690	144	145			351		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	737	629	290	795	690	144	145			351		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	75	49	90	100	37	100	99			93		
cM capacity (veh/h)	157	368	749	155	339	903	1443			1208		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1
Volume Total	300	215	360	233
Volume Left	39	0	9	88
Volume Right	72	2	122	1
cSH	350	341	1443	1208
Volume to Capacity	0.86	0.63	0.01	0.07
Queue Length 95th (ft)	199	101	0	6
Control Delay (s)	54.0	31.9	0.2	3.5
Lane LOS	F	D	A	A
Approach Delay (s)	54.0	31.9	0.2	3.5
Approach LOS	F	D		

Intersection Summary				
Average Delay	21.6			
Intersection Capacity Utilization	65.6%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	196	278	244	0	0	261
Future Volume (Veh/h)	196	278	244	0	0	261
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	225	320	280	0	0	300
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			877			
pX, platoon unblocked						
vC, conflicting volume	280				1050	280
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	280				1050	280
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	82				100	60
cM capacity (veh/h)	1277				206	756

Direction, Lane #	NB 1	SB 1	SE 1
Volume Total	545	280	300
Volume Left	225	0	0
Volume Right	0	0	300
cSH	1277	1700	756
Volume to Capacity	0.18	0.16	0.40
Queue Length 95th (ft)	16	0	48
Control Delay (s)	4.6	0.0	12.9
Lane LOS	A		B
Approach Delay (s)	4.6	0.0	12.9
Approach LOS			B

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

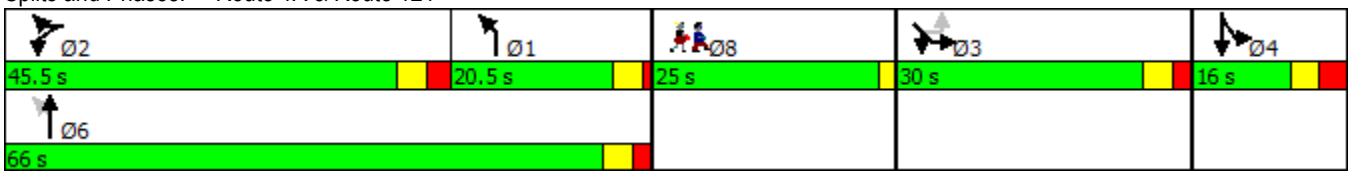
Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER	Ø8
Lane Configurations												
Traffic Volume (vph)	367	262	1	92	1	347	0	1	0	221	113	
Future Volume (vph)	367	262	1	92	1	347	0	1	0	221	113	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0	0		150		0	0		0	0	200	
Storage Lanes	1	1		1		0	0		0	1	1	
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes		Yes	
Link Speed (mph)	30				30			30		30		
Link Distance (ft)	248				928			183		596		
Travel Time (s)	5.6				21.1			4.2		13.5		
Confl. Peds. (#/hr)			3									
Peak Hour Factor	0.91	0.91	0.91	0.94	0.94	0.94	0.25	0.25	0.25	0.84	0.84	
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	403	289	0	98	370	0	0	4	0	263	135	
Turn Type	Prot	Prot		pm+pt	NA			NA		Prot	Prot	
Protected Phases	2!	2!		1	6!		4	4		3	3	8
Permitted Phases				6!								
Detector Phase	2	2		1	6		4	4		3	3	
Switch Phase												
Minimum Initial (s)	15.0	15.0		8.0	15.0		6.0	6.0		8.0	8.0	5.0
Minimum Split (s)	21.0	21.0		14.0	20.5		12.0	12.0		13.0	13.0	25.0
Total Split (s)	45.5	45.5		20.5	66.0		16.0	16.0		30.0	30.0	25.0
Total Split (%)	33.2%	33.2%		15.0%	48.2%		11.7%	11.7%		21.9%	21.9%	18%
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	2.5	2.5		1.0	2.0		3.0	3.0		2.0	2.0	0.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		4.0	5.0			6.0		5.0	5.0	
Lead/Lag	Lead	Lead		Lag								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	Min	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	25.5	25.5		40.5	36.2			7.1		18.4	18.4	
Actuated g/C Ratio	0.36	0.36		0.58	0.51			0.10		0.26	0.26	
v/c Ratio	0.63	0.44		0.28	0.37			0.02		0.57	0.26	
Control Delay	28.1	15.7		24.0	3.1			45.0		34.3	8.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	28.1	15.7		24.0	3.1			45.0		34.3	8.3	
LOS	C	B		C	A			D		C	A	
Approach Delay	23.0				7.5			45.0		25.4		
Approach LOS	C				A			D		C		
Queue Length 50th (ft)	121	44		14	0			1		84	0	
Queue Length 95th (ft)	424	204		83	56			4		286	45	
Internal Link Dist (ft)	168				848			103		516		
Turn Bay Length (ft)				150							200	
Base Capacity (vph)	1152	1071		593	1420			319		743	743	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	

Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER	Ø8
Reduced v/c Ratio	0.35	0.27		0.17	0.26			0.01		0.35	0.18	

Intersection Summary			
Area Type:	Other		
Cycle Length: 137			
Actuated Cycle Length: 70.4			
Natural Cycle: 95			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 19.0		Intersection LOS: B	
Intersection Capacity Utilization 67.0%		ICU Level of Service C	
Analysis Period (min) 15			

! Phase conflict between lane groups.

Splits and Phases: Route 1A & Route 121

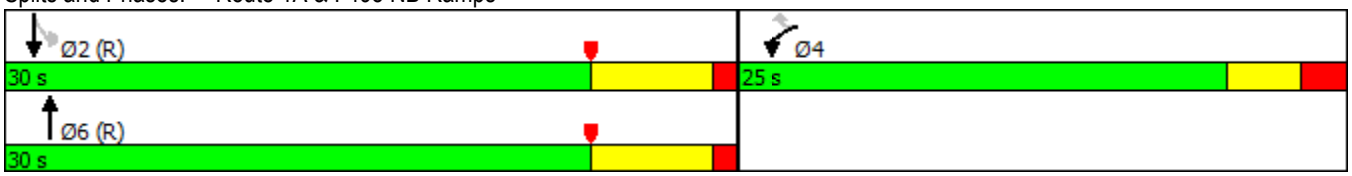


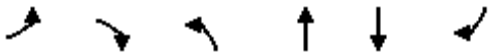
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	720	145	320	348	93	380
Future Volume (vph)	720	145	320	348	93	380
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200	300		0	0	
Storage Lanes	1	1		0	0	
Taper Length (ft)	25				0	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		40			40
Link Distance (ft)	627		1275			363
Travel Time (s)	14.3		21.7			6.2
Peak Hour Factor	0.99	0.99	0.96	0.96	0.90	0.90
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	727	146	696	0	0	525
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases		4			2	
Detector Phase	4	4	6		2	2
Switch Phase						
Minimum Initial (s)	18.0	18.0	21.0		21.0	21.0
Minimum Split (s)	23.0	23.0	27.0		27.0	27.0
Total Split (s)	25.0	25.0	30.0		30.0	30.0
Total Split (%)	45.5%	45.5%	54.5%		54.5%	54.5%
Yellow Time (s)	3.0	3.0	5.0		5.0	5.0
All-Red Time (s)	2.0	2.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0			0.0
Total Lost Time (s)	5.0	5.0	6.0			6.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max		C-Max	C-Max
Act Effct Green (s)	18.8	18.8	25.2			25.2
Actuated g/C Ratio	0.34	0.34	0.46			0.46
v/c Ratio	0.63	0.23	0.42			0.45
Control Delay	17.9	3.8	9.3			12.0
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	17.9	3.8	9.3			12.0
LOS	B	A	A			B
Approach Delay	15.5		9.3			12.0
Approach LOS	B		A			B
Queue Length 50th (ft)	102	0	107			55
Queue Length 95th (ft)	142	29	m132			96
Internal Link Dist (ft)	547		1195			283
Turn Bay Length (ft)	200	300				
Base Capacity (vph)	1236	663	1677			1155
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0
Reduced v/c Ratio	0.59	0.22	0.42			0.45

Intersection Summary		
Area Type:	Other	
Cycle Length: 55		
Actuated Cycle Length: 55		
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Yellow, Master Intersection		
Natural Cycle: 50		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.63		
Intersection Signal Delay: 12.6		Intersection LOS: B
Intersection Capacity Utilization 72.2%		ICU Level of Service C
Analysis Period (min) 15		

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

Splits and Phases: Route 1A & I-495 NB Ramps





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	92	459	489	587	961	127
Future Volume (vph)	92	459	489	587	961	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	280	0			0
Storage Lanes	1	1	1			0
Taper Length (ft)	0		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			40	40	
Link Distance (ft)	604			409	1275	
Travel Time (s)	13.7			7.0	21.7	
Peak Hour Factor	0.95	0.95	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	3%	3%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	97	483	532	638	1183	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	8		1	6	2	
Permitted Phases		8	6			
Detector Phase	8	8	1	6	2	
Switch Phase						
Minimum Initial (s)	5.0	5.0	6.0	10.0	10.0	
Minimum Split (s)	10.0	10.0	12.0	16.0	16.0	
Total Split (s)	11.0	11.0	52.0	99.0	47.0	
Total Split (%)	10.0%	10.0%	47.3%	90.0%	42.7%	
Yellow Time (s)	3.0	3.0	4.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	6.0	6.0	6.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	6.0	6.0	93.0	93.0	41.0	
Actuated g/C Ratio	0.05	0.05	0.85	0.85	0.37	
v/c Ratio	1.01	0.89	0.67	0.22	0.91	
Control Delay	147.6	24.5	28.8	0.9	41.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	147.6	24.5	28.8	0.9	41.5	
LOS	F	C	C	A	D	
Approach Delay	45.1			13.6	41.5	
Approach LOS	D			B	D	
Queue Length 50th (ft)	~70	0	225	7	415	
Queue Length 95th (ft)	#181	#168	m285	m8	#542	
Internal Link Dist (ft)	524			329	1195	
Turn Bay Length (ft)		280				
Base Capacity (vph)	96	543	799	2963	1306	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	1.01	0.89	0.67	0.22	0.91	

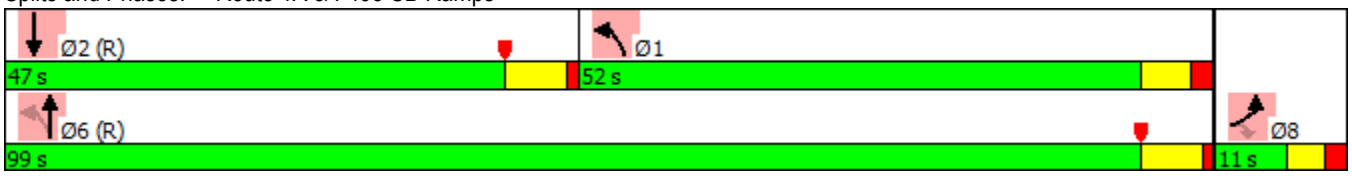
Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 12 (11%), Referenced to phase 2:SBT and 6:NBTL, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 31.1	Intersection LOS: C
Intersection Capacity Utilization 77.0%	ICU Level of Service D
Analysis Period (min) 15	

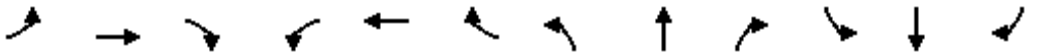
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Splits and Phases: Route 1A & I-495 SB Ramps





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	605	32	153	13	20	73	263	365	28	42	338	1077
Future Volume (vph)	605	32	153	13	20	73	263	365	28	42	338	1077
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	0		0	180		0	0		0
Storage Lanes	1		1	0		1	1		0	1		1
Taper Length (ft)	0			0			25			0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		710			187			646			291	
Travel Time (s)		16.1			4.3			11.0			5.0	
Peak Hour Factor	0.90	0.90	0.90	0.85	0.85	0.85	0.94	0.94	0.94	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	5%	5%	5%	5%	5%	5%	2%	2%	2%
Shared Lane Traffic (%)	30%											
Lane Group Flow (vph)	470	238	170	0	39	86	280	418	0	42	341	1088
Turn Type	Split	NA	Perm	Split	NA	pm+ov	pm+pt	NA		Prot	NA	Free
Protected Phases	4	4		3	3	5	1	6		5	2	
Permitted Phases			4			3	6					Free
Detector Phase	4	4	4	3	3	5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	12.0	12.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	
Total Split (s)	36.0	36.0	36.0	12.0	12.0	18.0	18.0	44.0		18.0	44.0	
Total Split (%)	32.7%	32.7%	32.7%	10.9%	10.9%	16.4%	16.4%	40.0%		16.4%	40.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	32.7	32.7	32.7		5.9	11.7	56.1	46.3		8.1	40.2	110.0
Actuated g/C Ratio	0.30	0.30	0.30		0.05	0.11	0.51	0.42		0.07	0.37	1.00
v/c Ratio	0.92	0.46	0.28		0.41	0.36	0.54	0.29		0.33	0.26	0.69
Control Delay	63.8	35.9	6.1		63.7	8.4	20.1	22.9		54.5	16.5	10.9
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	63.8	35.9	6.1		63.7	8.4	20.1	22.9		54.5	16.5	10.9
LOS	E	D	A		E	A	C	C		D	B	B
Approach Delay		45.0			25.7			21.8			13.4	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	~352	149	0		27	0	112	105		24	97	608
Queue Length 95th (ft)	#578	232	51		59	19	170	153		m26	m105	m687
Internal Link Dist (ft)		630			107			566			211	
Turn Bay Length (ft)			250				180					
Base Capacity (vph)	510	515	600		96	294	521	1436		193	1293	1583
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	0.92	0.46	0.28		0.41	0.29	0.54	0.29		0.22	0.26	0.69

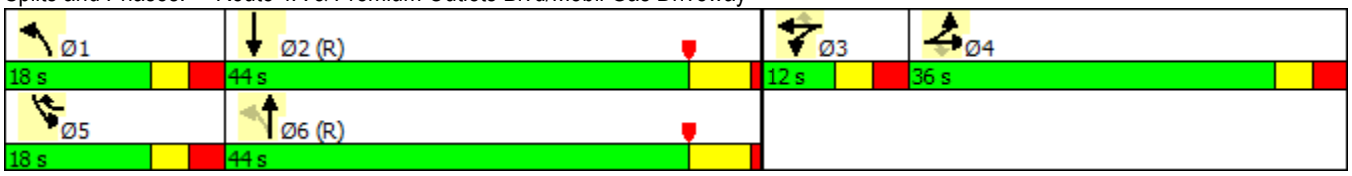
Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 53 (48%), Referenced to phase 2:SBT and 6:NBTL, Start of Yellow		
Natural Cycle: 70		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.92		
Intersection Signal Delay: 24.5		Intersection LOS: C
Intersection Capacity Utilization 63.2%		ICU Level of Service B
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: Route 1A & Premium Outlets Blvd/Mobil Gas Driveway

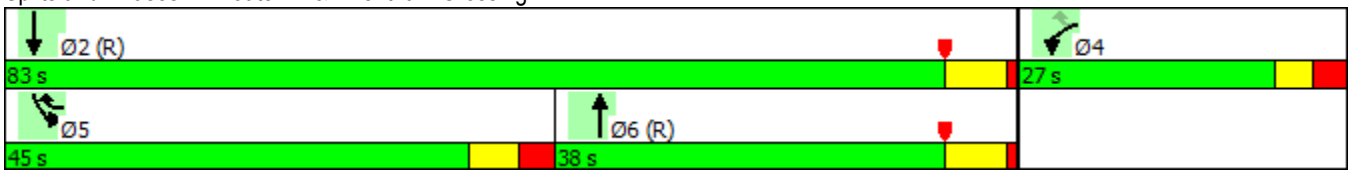


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	656	0	0	504
Future Volume (vph)	0	0	656	0	0	504
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	250	
Storage Lanes	1	1		0	1	
Taper Length (ft)	0				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		40			40
Link Distance (ft)	454		212			646
Travel Time (s)	10.3		3.6			11.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	713	0	0	548
Turn Type	Prot	pm+ov	NA		Prot	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4				
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	10.0		8.0	10.0
Minimum Split (s)	14.0	15.0	16.0		15.0	16.0
Total Split (s)	27.0	45.0	38.0		45.0	83.0
Total Split (%)	24.5%	40.9%	34.5%		40.9%	75.5%
Yellow Time (s)	3.0	4.0	5.0		4.0	5.0
All-Red Time (s)	3.0	3.0	1.0		3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	7.0	6.0		7.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max		None	C-Max
Act Effct Green (s)			110.0			110.0
Actuated g/C Ratio			1.00			1.00
v/c Ratio			0.20			0.15
Control Delay			0.1			0.2
Queue Delay			0.0			0.0
Total Delay			0.1			0.2
LOS			A			A
Approach Delay			0.1			0.2
Approach LOS			A			A
Queue Length 50th (ft)			0			0
Queue Length 95th (ft)			0			0
Internal Link Dist (ft)	374		132			566
Turn Bay Length (ft)						
Base Capacity (vph)			3539			3539
Starvation Cap Reductn			0			0
Spillback Cap Reductn			0			0
Storage Cap Reductn			0			0
Reduced v/c Ratio			0.20			0.15

Intersection Summary

Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 32 (29%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow		
Natural Cycle: 45		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.20		
Intersection Signal Delay: 0.2		Intersection LOS: A
Intersection Capacity Utilization 23.1%		ICU Level of Service A
Analysis Period (min) 15		

Splits and Phases: Route 1A & Wrentham Crossing



APPENDIX F

Corridor and Segment Crash-Rate Worksheets

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/15-21/2017

DISTRICT : 5

~ SEGMENT DATA ~

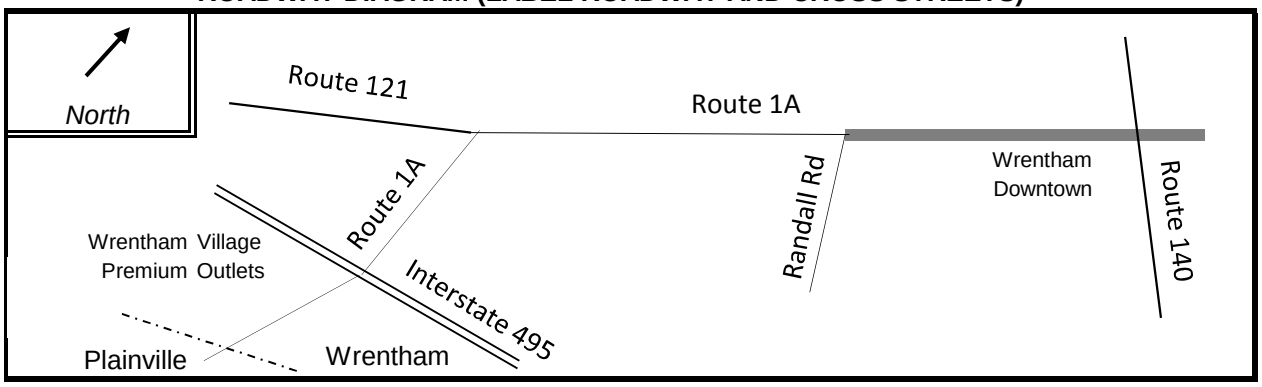
ROADWAY NAME: Route 1A Corridor Segment 1

START POINT: East of Route 140 (Frankin Street/East Street)

END POINT: West od Randall Road

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Principal Arterial - Other

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.35**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	16,000

TOTAL # OF CRASHES:	49	# OF YEARS :	3.25	AVERAGE # OF CRASHES PER YEAR (**A**) :	**15.08**

CRASH RATE CALCULATION : **7.38**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments : 2014 State Average for Urban Minor Arterial = 3.70

Project Title & Date: Route 1A Corridor Study in Wrentham

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/15-21/2017

DISTRICT : 5

~ SEGMENT DATA ~

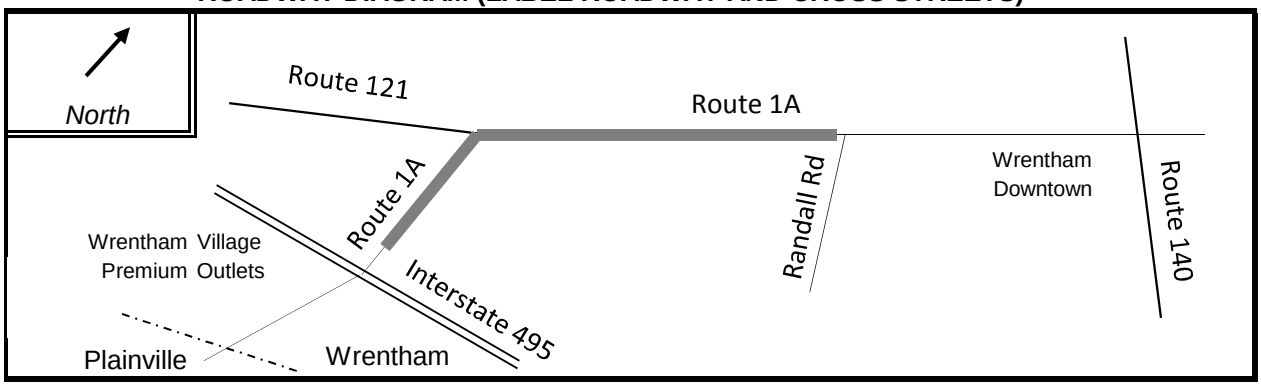
ROADWAY NAME: Route 1A Corridor Segment 2

START POINT: West od Randall Road

END POINT: North of I-95 Northbound Ramps

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban MinorArterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**1.72**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	15,850

TOTAL # OF CRASHES:	75	# OF YEARS :	3.25	AVERAGE # OF CRASHES PER YEAR (**A**) :	**23.08**

CRASH RATE CALCULATION : **2.32**

$$RATE = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments : 2014 State Average for Urban Minor Arterial = 3.70

Project Title & Date: Route 1A Corridor Study in Wrentham

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/15-21/2017

DISTRICT : 5

~ SEGMENT DATA ~

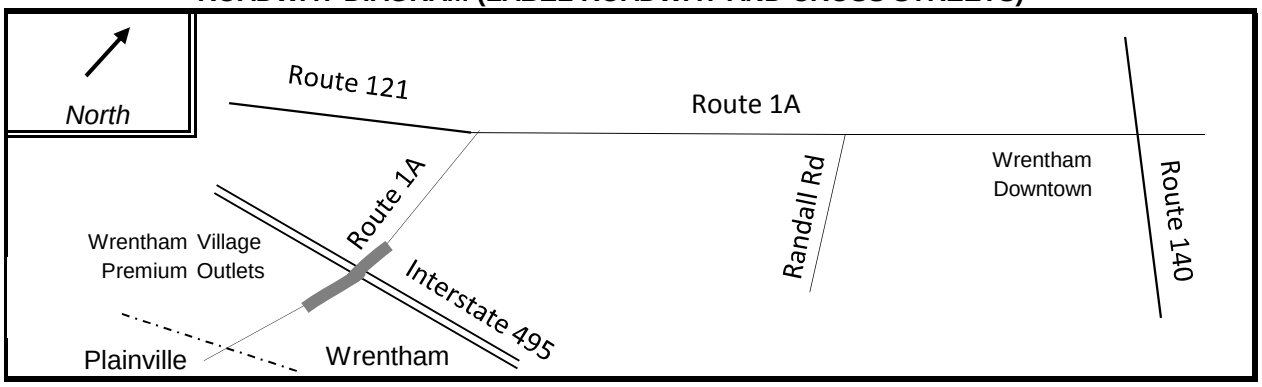
ROADWAY NAME: Route 1A Corridor Segment 3

START POINT: North of I-95 Northbound Ramps

END POINT: South of Premium Outlets Boulevard

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.53**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	18,750

TOTAL # OF CRASHES:	110	# OF YEARS :	3.25	AVERAGE # OF CRASHES PER YEAR (**A**) :	**33.85**

CRASH RATE CALCULATION : **9.33**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments : 2014 State Average for Urban Minor Arterial = 3.70

Project Title & Date: Route 1A Corridor Study in Wrentham

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/15-21/2017

DISTRICT : 5

~ SEGMENT DATA ~

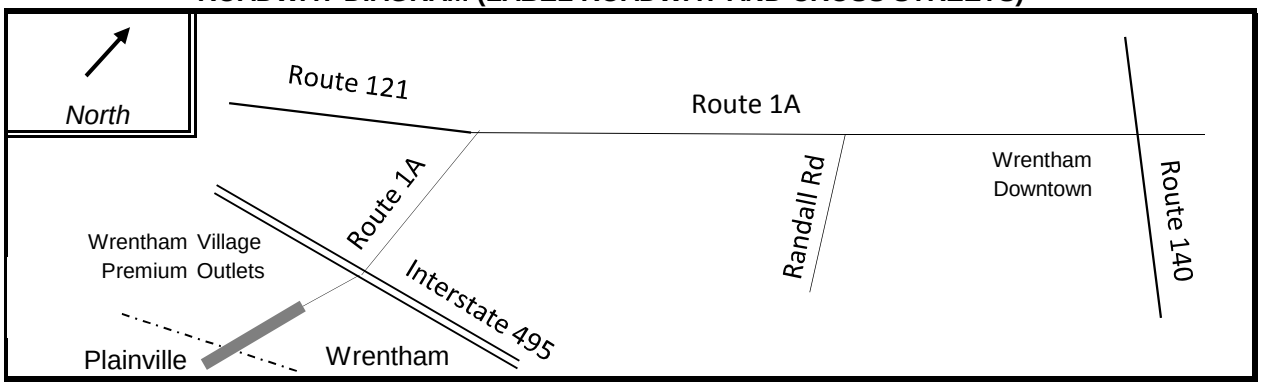
ROADWAY NAME: Route 1A Corridor Segment 4

START POINT: South of Premium Outlets Boulevard

END POINT: Plianville Town Line

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.5**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	14,400

TOTAL # OF CRASHES:	16	# OF YEARS :	3.25	AVERAGE # OF CRASHES PER YEAR (**A**) :	**4.92**

CRASH RATE CALCULATION : **1.87**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments : 2014 State Average for Urban Minor Arterial = 3.70

Project Title & Date: Route 1A Corridor Study in Wrentham

APPENDIX G

Intersection Crash-Rate Worksheets

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/18/2017

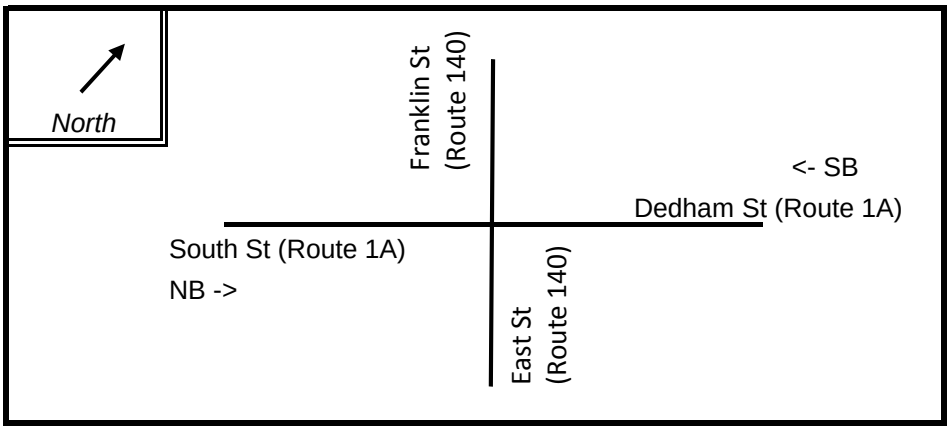
DISTRICT : 5 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Route 1A (South Street/Dedham Street)

MINOR STREET(S) : Route 140 (Franklin Street/East Street)

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	NB	WB		
PEAK HOURLY VOLUMES (PM) :	710	860	387	427		**2,384**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **26,489**

TOTAL # OF CRASHES : 22 # OF YEARS : 3 AVERAGE # OF CRASHES PER YEAR (**A**) : **7.33**

CRASH RATE CALCULATION : **0.87** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2015 Average Crash Rate for MassDOT District 5 Signalized Intersections = 0.76

Project Title & Date: Route 1A Corridor Study in Wrentham

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/18/2017

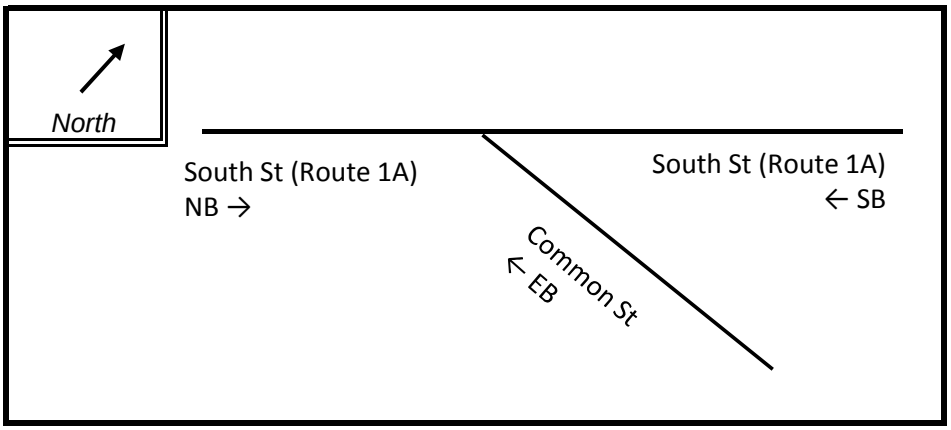
DISTRICT : 5 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Route 1A (South Street)

MINOR STREET(S) : Common Street

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	NB	WB		
PEAK HOURLY VOLUMES (PM) :	790	227	629			**1,646**

" K " FACTOR :	**0.090**	INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME :			**18,289**
TOTAL # OF CRASHES :	17	# OF YEARS :	3	AVERAGE # OF CRASHES PER YEAR (**A**) :	**5.67**

CRASH RATE CALCULATION : **0.98** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2015 Average Crash Rate for MassDOT District 5 Unsignalized Intersections = 0.58

Project Title & Date: Route 1A Corridor Study in Wrentham

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/18/2017

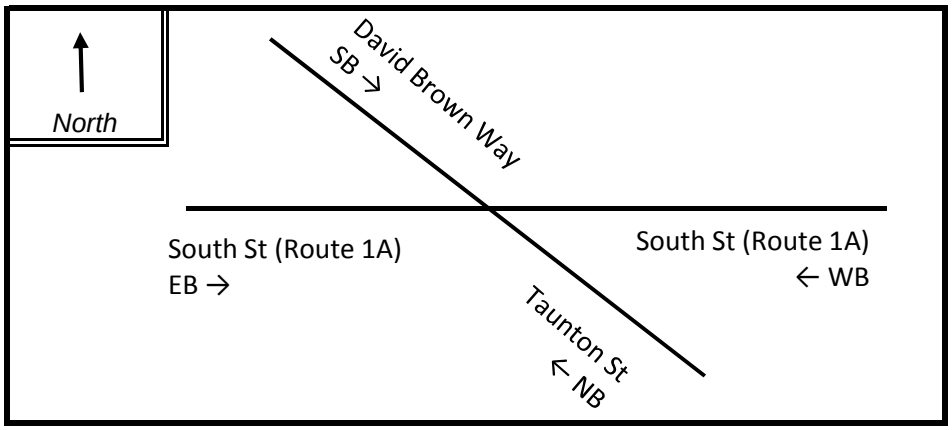
DISTRICT : 5 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Common Street

MINOR STREET(S) : Taunton Street / David Brown Way

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	NB	WB		
PEAK HOURLY VOLUMES (PM) :	219	269	239	251		**978**

" K " FACTOR :	**0.090**	INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME :	**10,867**

TOTAL # OF CRASHES :	10	# OF YEARS :	3	AVERAGE # OF CRASHES PER YEAR (**A**) :	**3.33**

CRASH RATE CALCULATION : **0.97** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2015 Average Crash Rate for MassDOT District 5 Unsignalized Intersections = 0.58

Project Title & Date: Route 1A Corridor Study in Wrentham

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/18/2017

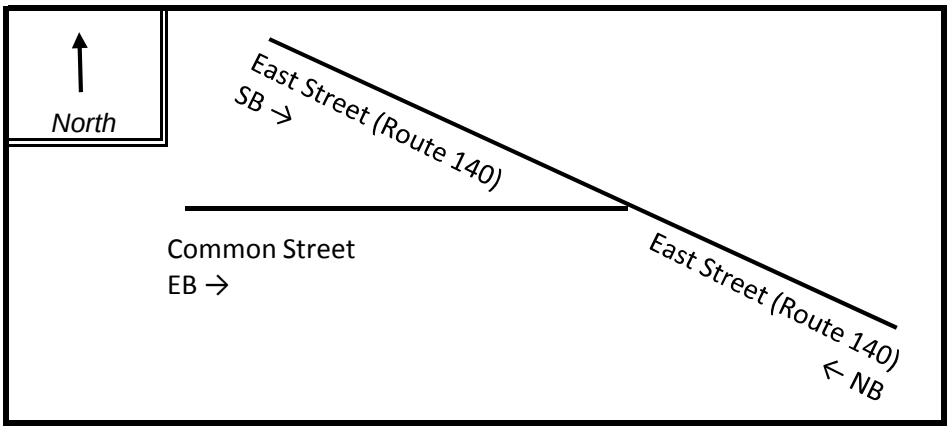
DISTRICT : 5 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : East Street (Route 140)

MINOR STREET(S) : Common Street

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	NB	WB		
PEAK HOURLY VOLUMES (PM) :	249	242	674			**1,165**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **12,944**

TOTAL # OF CRASHES : 9 # OF YEARS : 3.25 AVERAGE # OF CRASHES PER YEAR (**A**) : **2.77**

CRASH RATE CALCULATION : **0.67** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2015 Average Crash Rate for MassDOT District 5 Unsignalized Intersections = 0.58

Project Title & Date: Route 1A Corridor Study in Wrentham

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/18/2017

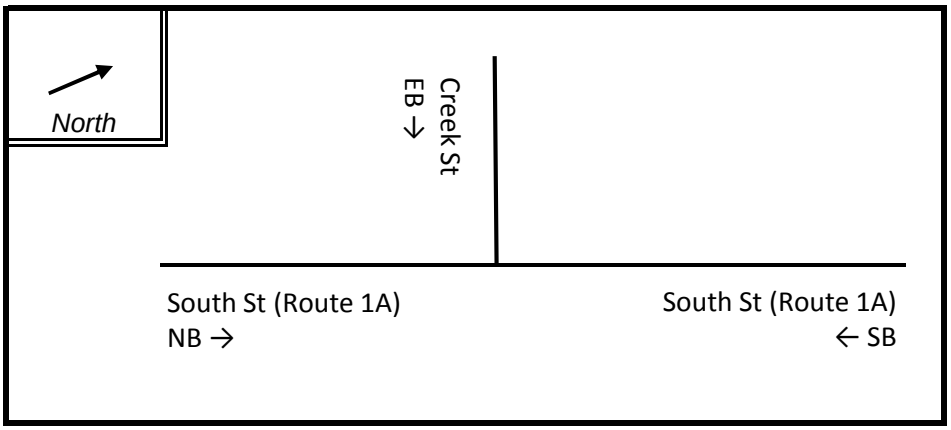
DISTRICT : 5 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : South Street (Route 1A)

MINOR STREET(S) : Creek Street

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	NB	WB		
PEAK HOURLY VOLUMES (PM) :	842	281	702			**1,825**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **20,278**

TOTAL # OF CRASHES : 11 # OF YEARS : 3 AVERAGE # OF CRASHES PER YEAR (**A**) : **3.67**

CRASH RATE CALCULATION : **0.57** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2015 Average Crash Rate for MassDOT District 5 Unsignalized Intersections = 0.58

Project Title & Date: Route 1A Corridor Study in Wrentham

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/18/2017

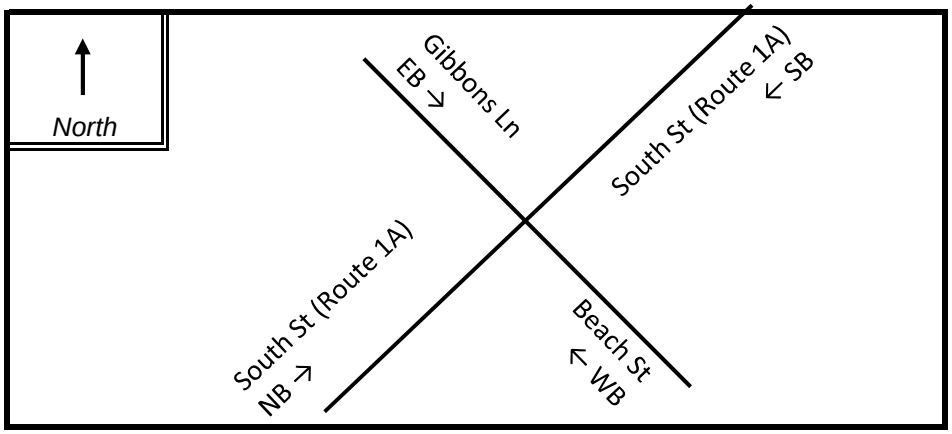
DISTRICT : 5 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : South Street (Route 1A)

MINOR STREET(S) : Beach Street/Gibbons Lane

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	NB	WB		
PEAK HOURLY VOLUMES (PM) :	949	7	653	122		**1,731**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **19,233**

TOTAL # OF CRASHES : 9 # OF YEARS : 3 AVERAGE # OF CRASHES PER YEAR (**A**) : **3.00**

CRASH RATE CALCULATION : **0.49** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2015 Average Crash Rate for MassDOT District 5 Unsignalized Intersections = 0.58

Project Title & Date: Route 1A Corridor Study in Wrentham

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/18/2017

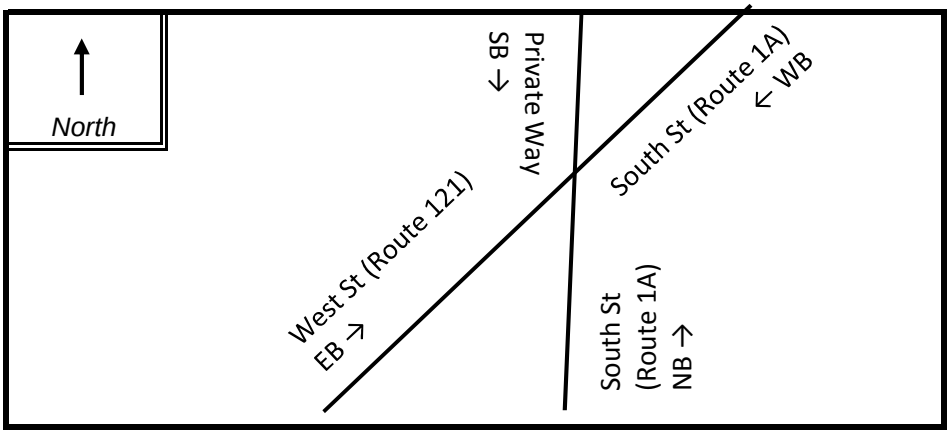
DISTRICT : 5 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : South Street (Route 1A)

MINOR STREET(S) : West St (Route 121)

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	NB	WB		
PEAK HOURLY VOLUMES (PM) :	5	400	587	918		**1,910**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **21,222**

TOTAL # OF CRASHES : 17 # OF YEARS : 3.25 AVERAGE # OF CRASHES PER YEAR (**A**) : **5.23**

CRASH RATE CALCULATION : **0.78** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2015 Average Crash Rate for MassDOT District 5 Signalized Intersections = 0.76

Project Title & Date: Route 1A Corridor Study in Wrentham

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/18/2017

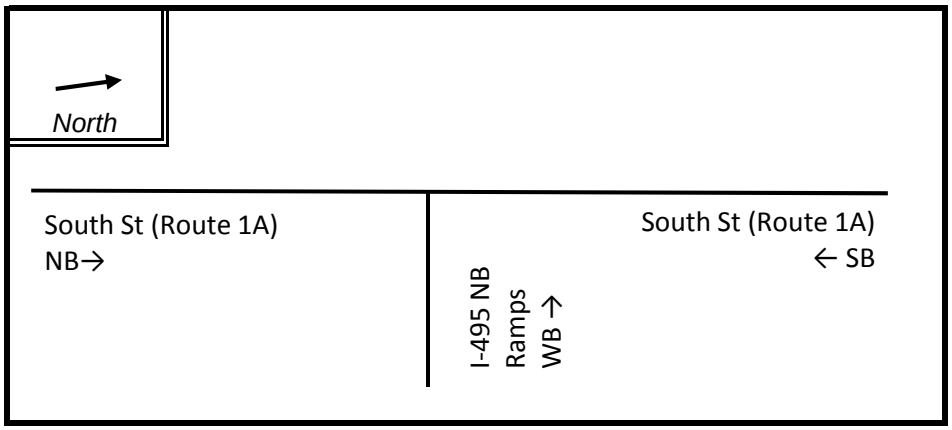
DISTRICT : 5 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : South Street (Route 1A)

MINOR STREET(S) : I--495 Northbound Ramps

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	NB	WB		
PEAK HOURLY VOLUMES (PM) :	531		623	574		**1,728**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **19,200**

TOTAL # OF CRASHES : 18 # OF YEARS : 3.25 AVERAGE # OF CRASHES PER YEAR (**A**) : **5.54**

CRASH RATE CALCULATION : **0.91** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2015 Average Crash Rate for MassDOT District 5 Signalized Intersections = 0.76

Project Title & Date: Route 1A Corridor Study in Wrentham

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/18/2017

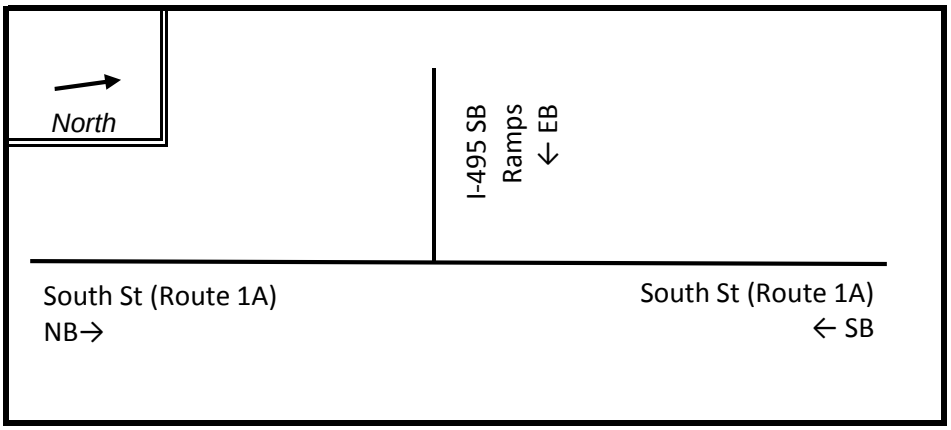
DISTRICT : 5 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : South Street (Route 1A)

MINOR STREET(S) : I--495 Southbound Ramps

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	NB	WB		
PEAK HOURLY VOLUMES (PM) :	705	593	751			**2,049**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **22,767**

TOTAL # OF CRASHES : 46 # OF YEARS : 3.25 AVERAGE # OF CRASHES PER YEAR (**A**) : **14.15**

CRASH RATE CALCULATION : **1.96** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2015 Average Crash Rate for MassDOT District 5 Signalized Intersections = 0.76

Project Title & Date: Route 1A Corridor Study in Wrentham

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Wrentham COUNT DATE : 5/18/2017

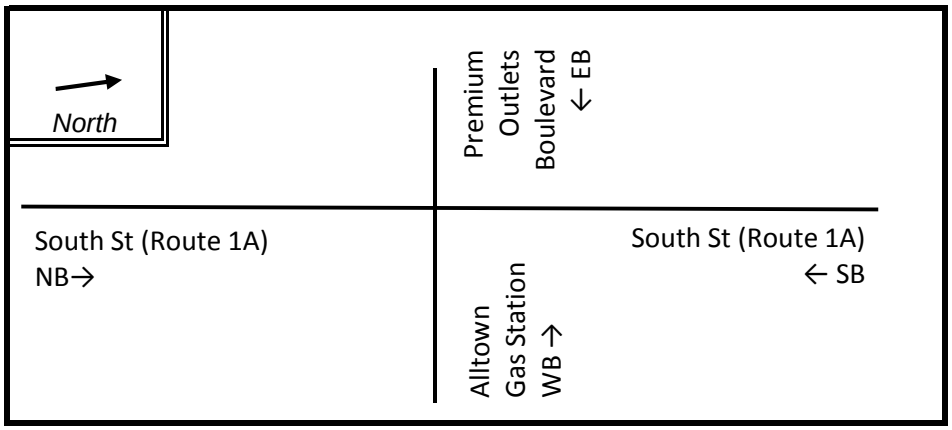
DISTRICT : 5 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : South Street (Route 1A)

MINOR STREET(S) : Premium Outlets Boulevard

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	NB	WB		
PEAK HOURLY VOLUMES (PM) :	1,029	544	455	87		**2,115**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **23,500**

TOTAL # OF CRASHES : 36 # OF YEARS : 3.25 AVERAGE # OF CRASHES PER YEAR (**A**) : **11.08**

CRASH RATE CALCULATION : **1.48** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2015 Average Crash Rate for MassDOT District 5 Signalized Intersections = 0.76

Project Title & Date: Route 1A Corridor Study in Wrentham

APPENDIX H

Collision Diagrams and Crash Statistics
Major Intersections and Segments in the Corridor

Figure H-1
Collision Diagram: Route 1A at Route 140 (Franklin Street/East Street)
Wrentham Police Reports: January 2014 – March 2017

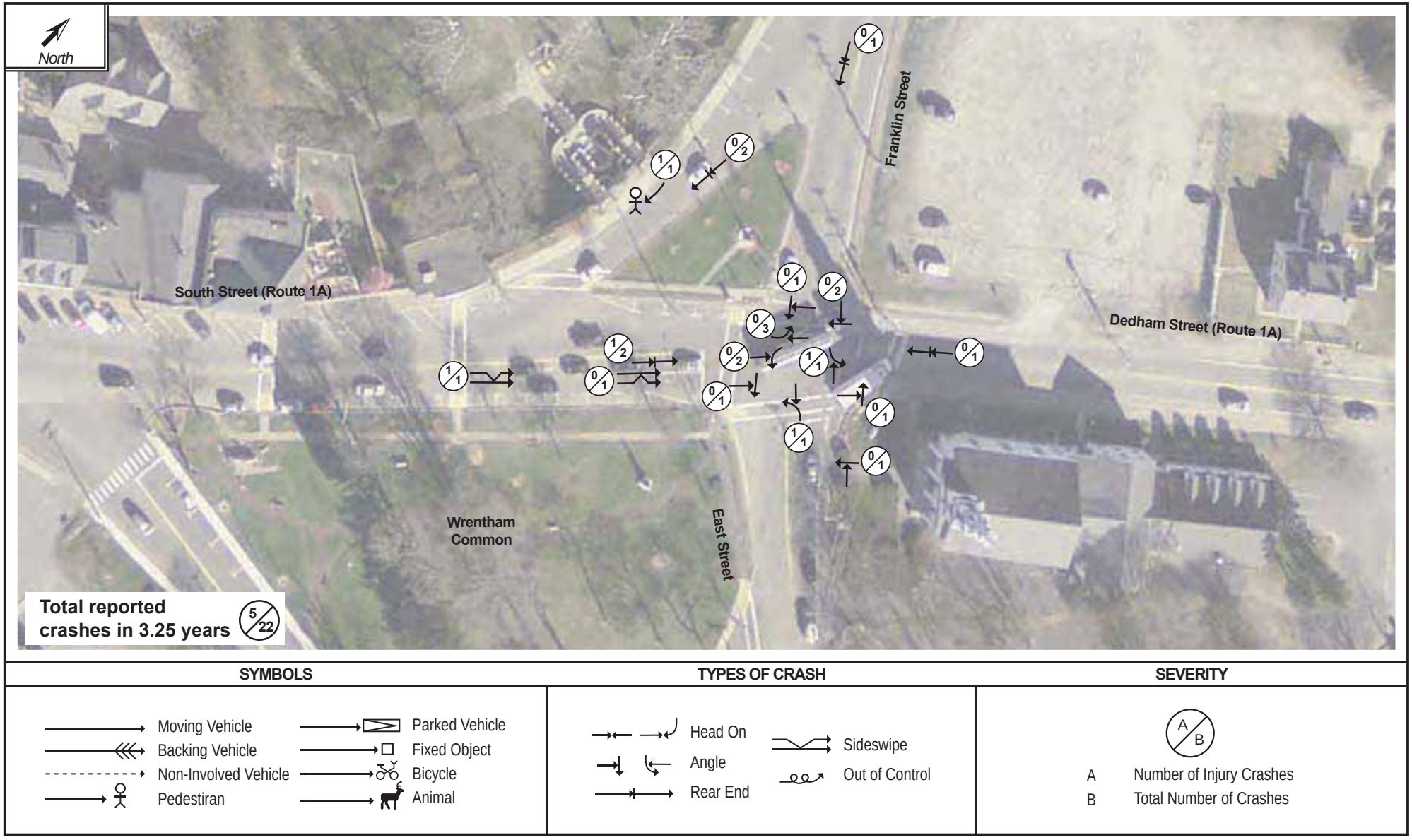
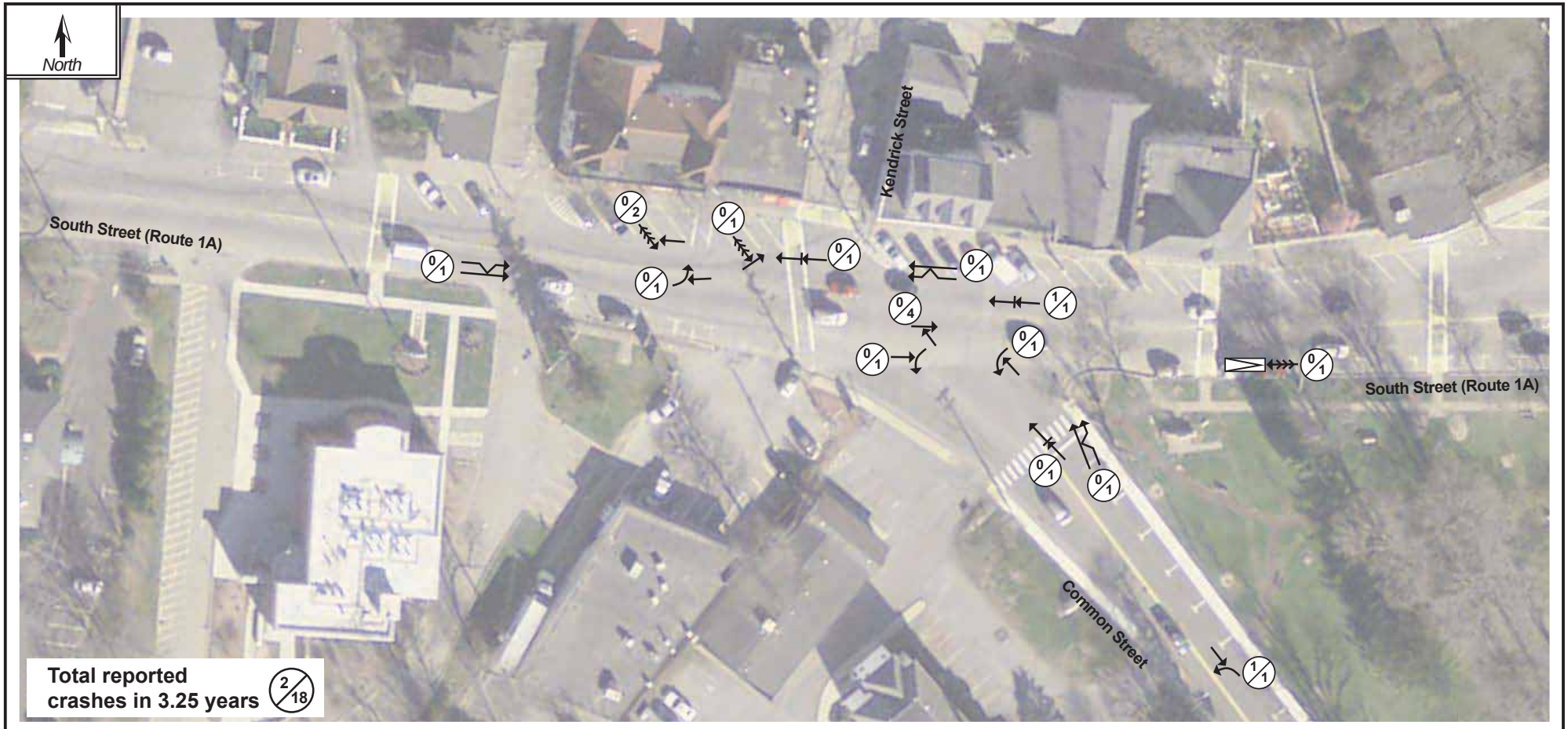


Figure H-2
Collision Diagram: Route 1A at Common Street
Wrentham Police Reports: January 2014 – March 2017

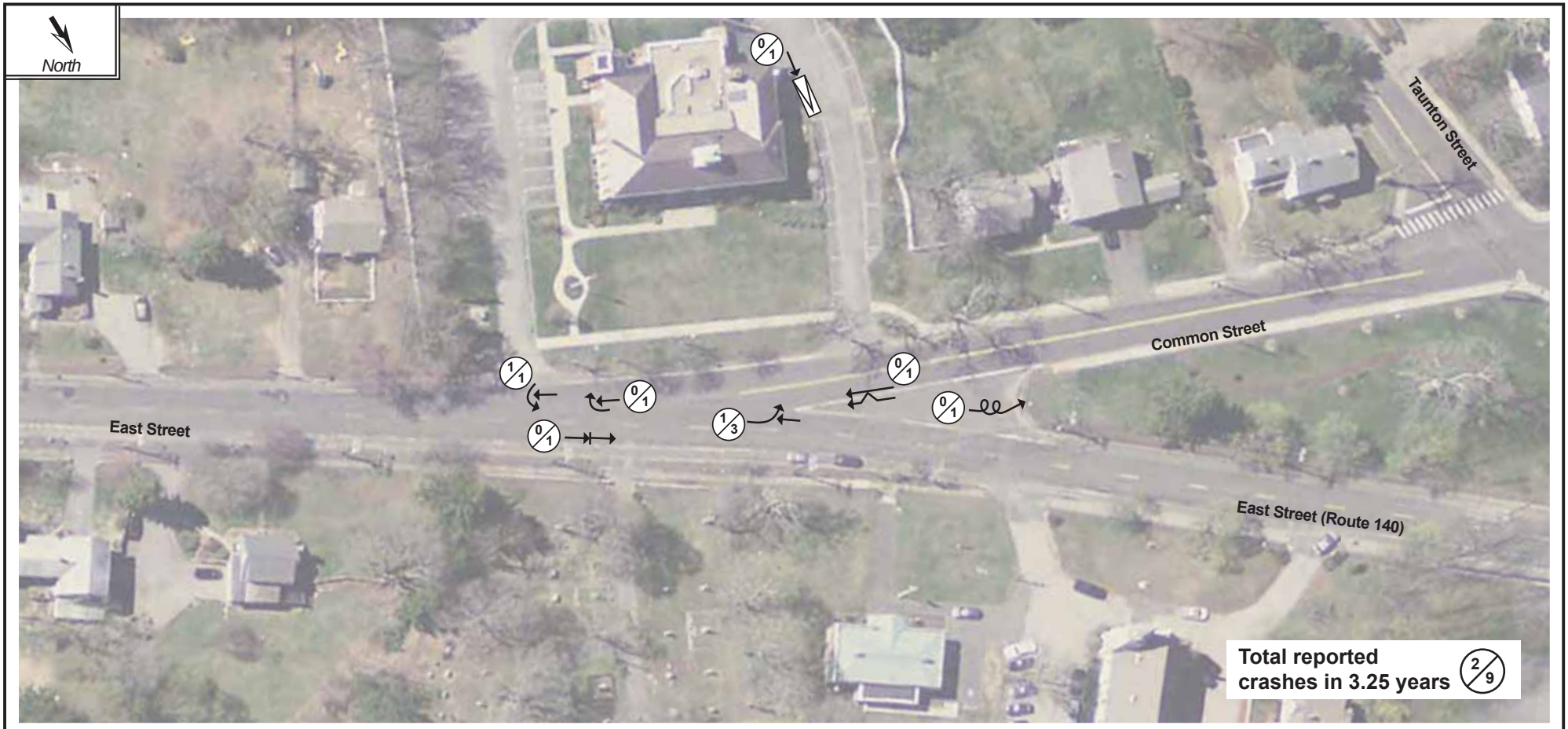


SYMBOLS		TYPES OF CRASH		SEVERITY	
Moving Vehicle	Parked Vehicle	Head On	Sideswipe	A/B	
Backing Vehicle	Fixed Object	Angle	Out of Control	A	Number of Injury Crashes
Non-Involved Vehicle	Bicycle	Rear End		B	Total Number of Crashes
Pedestiran	Animal				

Figure H-3
Collision Diagram: Common Street at Taunton Street
Wrentham Police Reports: January 2014 – March 2017

SYMBOLS	TYPES OF CRASH	SEVERITY
Moving Vehicle Backing Vehicle Non-Involved Vehicle Pedestiran Parked Vehicle Fixed Object Bicycle Animal	Head On Angle Rear End Sideswipe Out of Control	A/B A Number of Injury Crashes B Total Number of Crashes

Figure H-4
Collision Diagram: Common Street at East Street (Route 140)
Wrentham Police Reports: January 2014 – March 2017



SYMBOLS

- Moving Vehicle
- Backing Vehicle
- Non-Involved Vehicle
- Pedestiran
- Parked Vehicle
- Fixed Object
- Bicycle
- Animal

TYPES OF CRASH

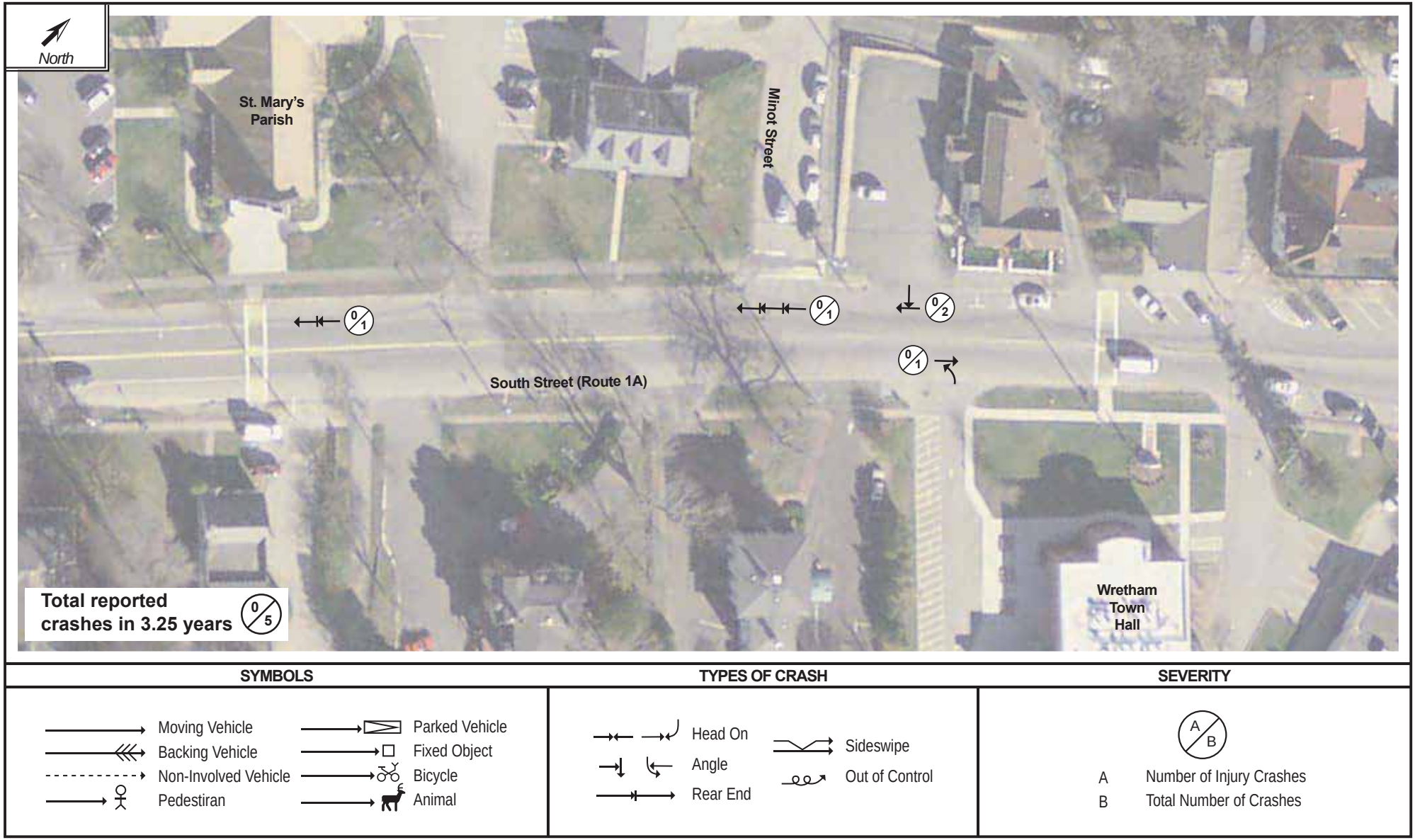
- Head On
- Angle
- Rear End
- Sideswipe
- Out of Control

SEVERITY

A/B

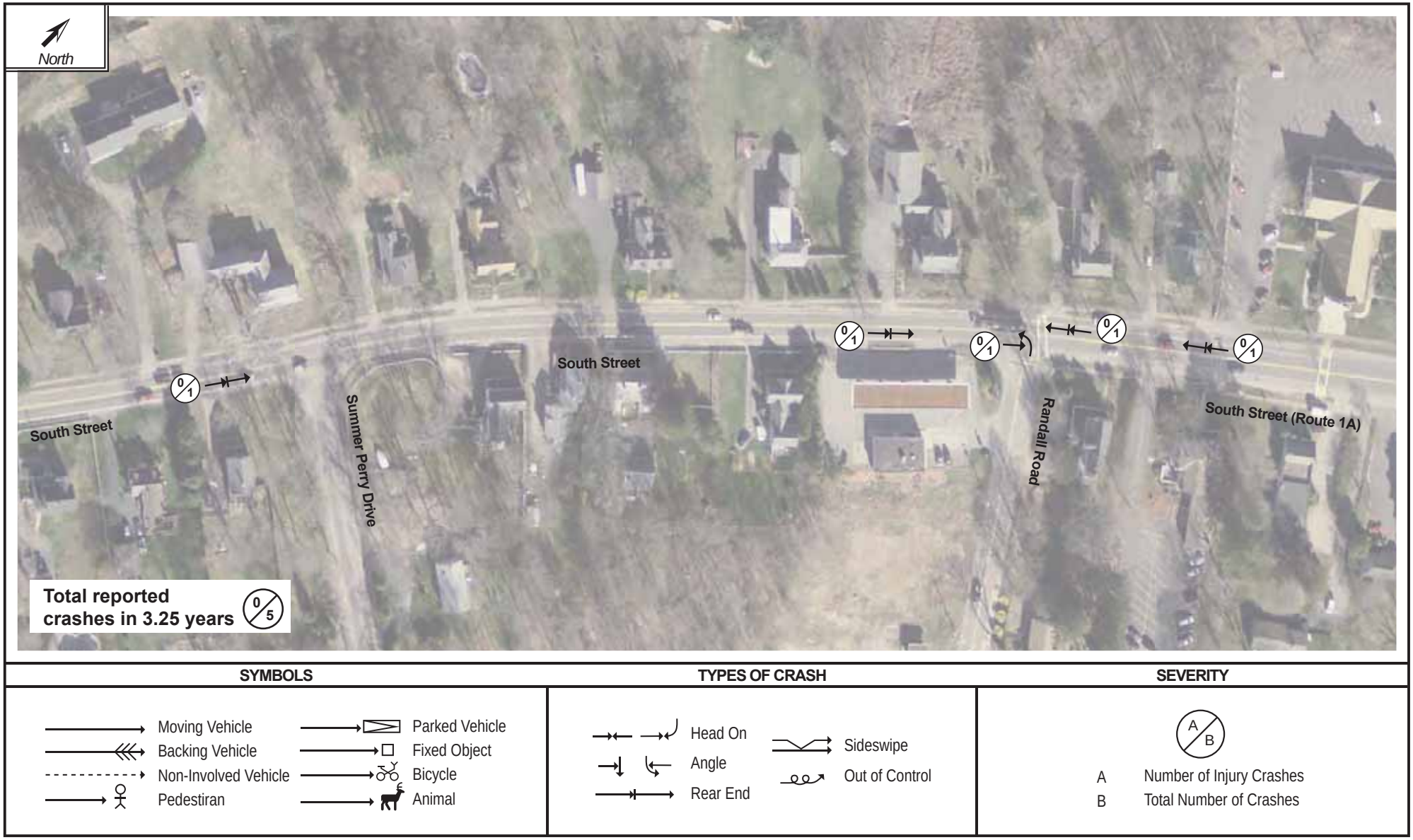
A Number of Injury Crashes
B Total Number of Crashes

Figure H-5
Collision Diagram: Route 1A in the Vicinity of Wrentham Town Hall
Wrentham Police Reports: January 2014 – March 2017



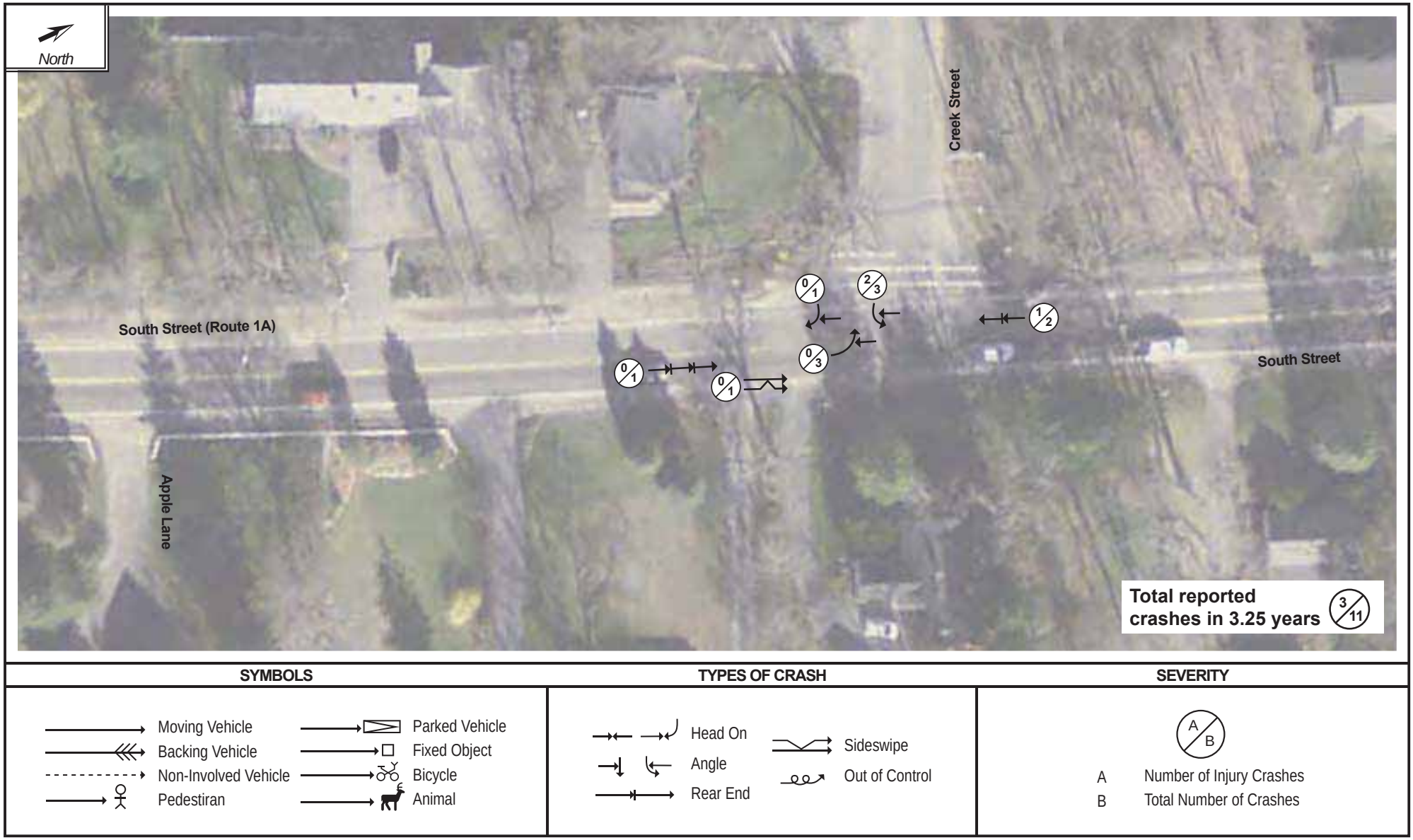
SYMBOLS	TYPES OF CRASH	SEVERITY
Moving Vehicle Backing Vehicle Non-Involved Vehicle Pedestiran Parked Vehicle Fixed Object Bicycle Animal	Head On Angle Rear End Sideswipe Out of Control	A/B A Number of Injury Crashes B Total Number of Crashes

Figure H-6
Collision Diagram: Route 1A at Randall Road and at Summer Perry Drive
Wrentham Police Reports: January 2014 – March 2017



SYMBOLS	TYPES OF CRASH	SEVERITY
Moving Vehicle Backing Vehicle Non-Involved Vehicle Pedestiran Parked Vehicle Fixed Object Bicycle Animal	Head On Angle Rear End Sideswipe Out of Control	A/B A Number of Injury Crashes B Total Number of Crashes

Figure H-7
Collision Diagram: Route 1A at Creek Street
Wrentham Police Reports: January 2014 – March 2017



SYMBOLS

- Moving Vehicle
- Backing Vehicle
- Non-Involved Vehicle
- Pedestiran
- Parked Vehicle
- Fixed Object
- Bicycle
- Animal

TYPES OF CRASH

- Head On
- Angle
- Rear End
- Sideswipe
- Out of Control

SEVERITY

A/B

A Number of Injury Crashes
B Total Number of Crashes

Figure H-8
Collision Diagram: Route 1A between Creek Street and Beach Street
Wrentham Police Reports: January 2014 – March 2017

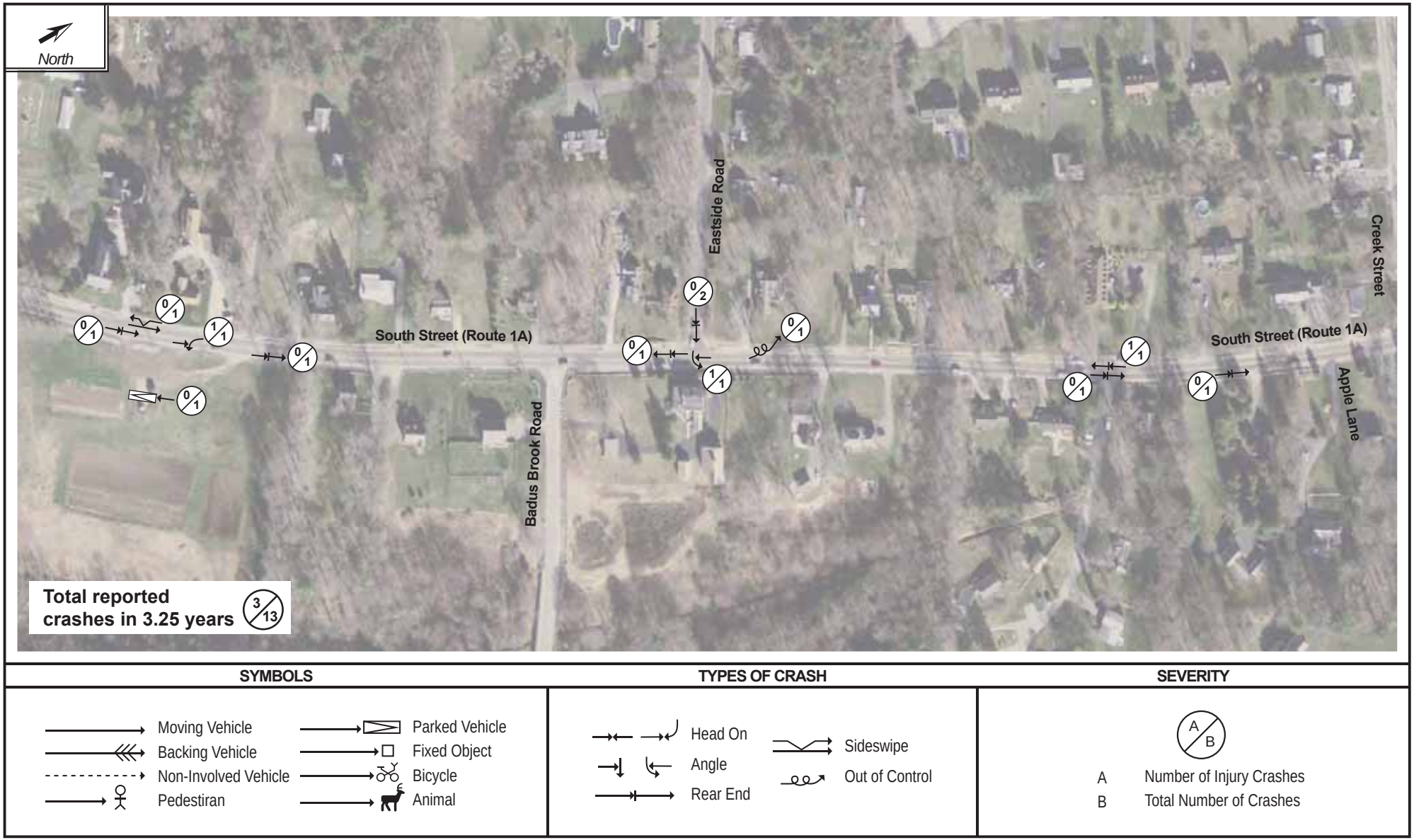
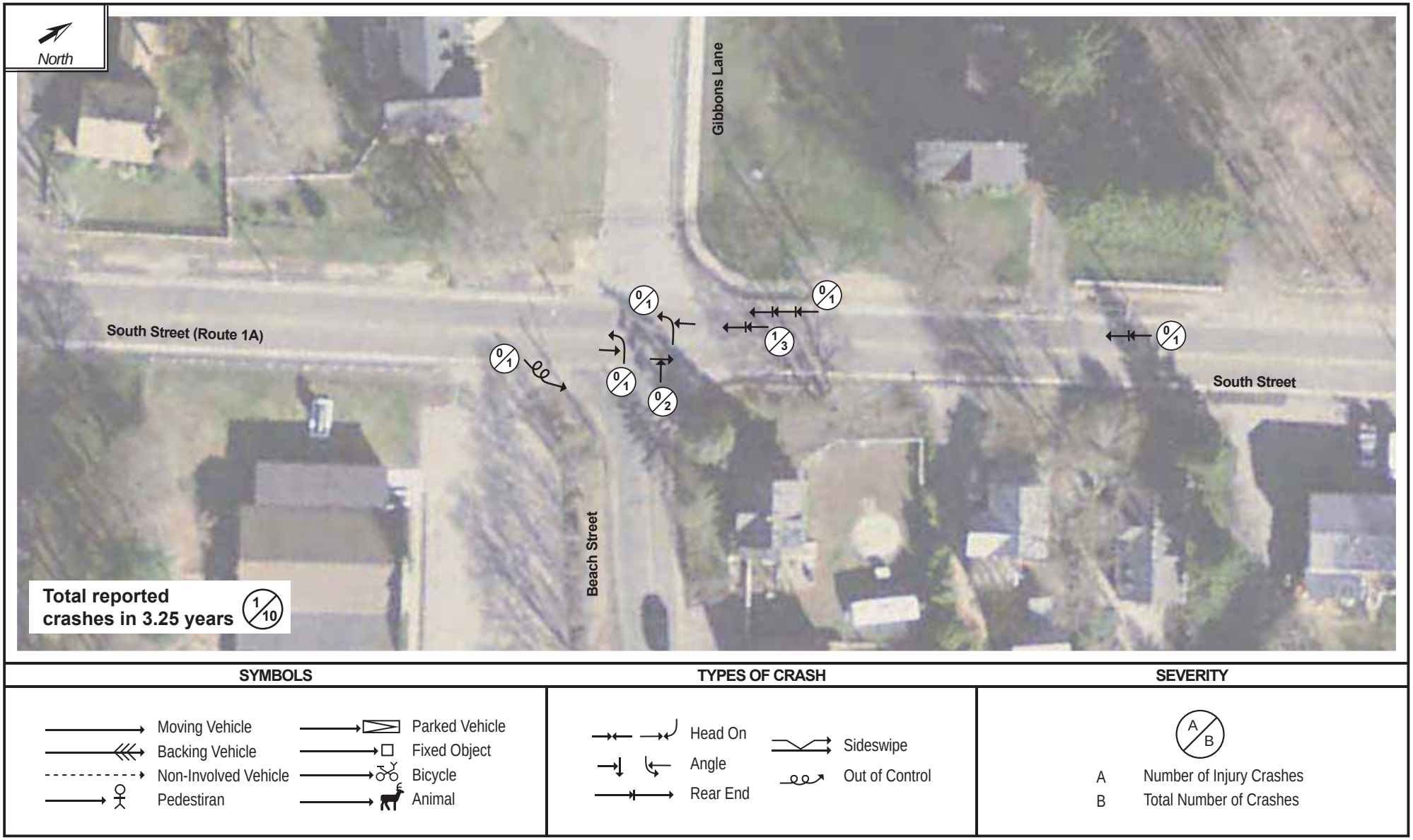


Figure H-9
Collision Diagram: Route 1A at Beach Street
Wrentham Police Reports: January 2014 – March 2017



SYMBOLS	TYPES OF CRASH	SEVERITY
Moving Vehicle Backing Vehicle Non-Involved Vehicle Pedestiran Parked Vehicle Fixed Object Bicycle Animal	Head On Angle Rear End Sideswipe Out of Control	A/B A Number of Injury Crashes B Total Number of Crashes

Figure H-10
Collision Diagram: Route 1A between Beach Street and West Street (Route 121)
Wrentham Police Reports: January 2014 – March 2017

SYMBOLS

- Moving Vehicle
- Backing Vehicle
- Non-Involved Vehicle
- Pedestiran
- Parked Vehicle
- Fixed Object
- Bicycle
- Animal

TYPES OF CRASH

- Head On
- Angle
- Rear End
- Sideswipe
- Out of Control

SEVERITY

A/B

A Number of Injury Crashes
B Total Number of Crashes

Figure H-11
Collision Diagram: Route 1A at Route 121 (West Street)
Wrentham Police Reports: January 2014 – March 2017

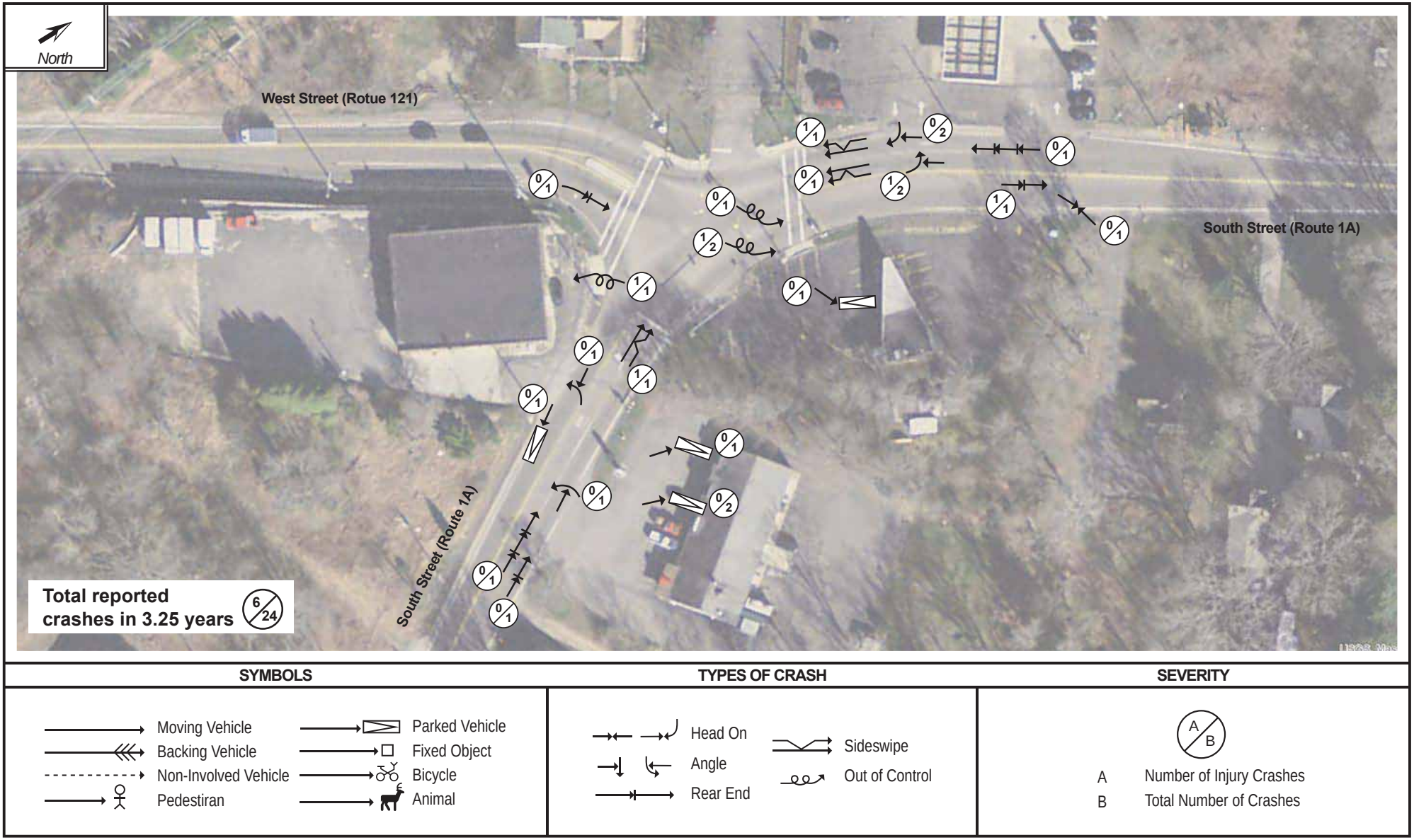


Figure H-12
Collision Diagram: Route 1A between Route 121 and I-495
Wrentham Police Reports: January 2014 – March 2017

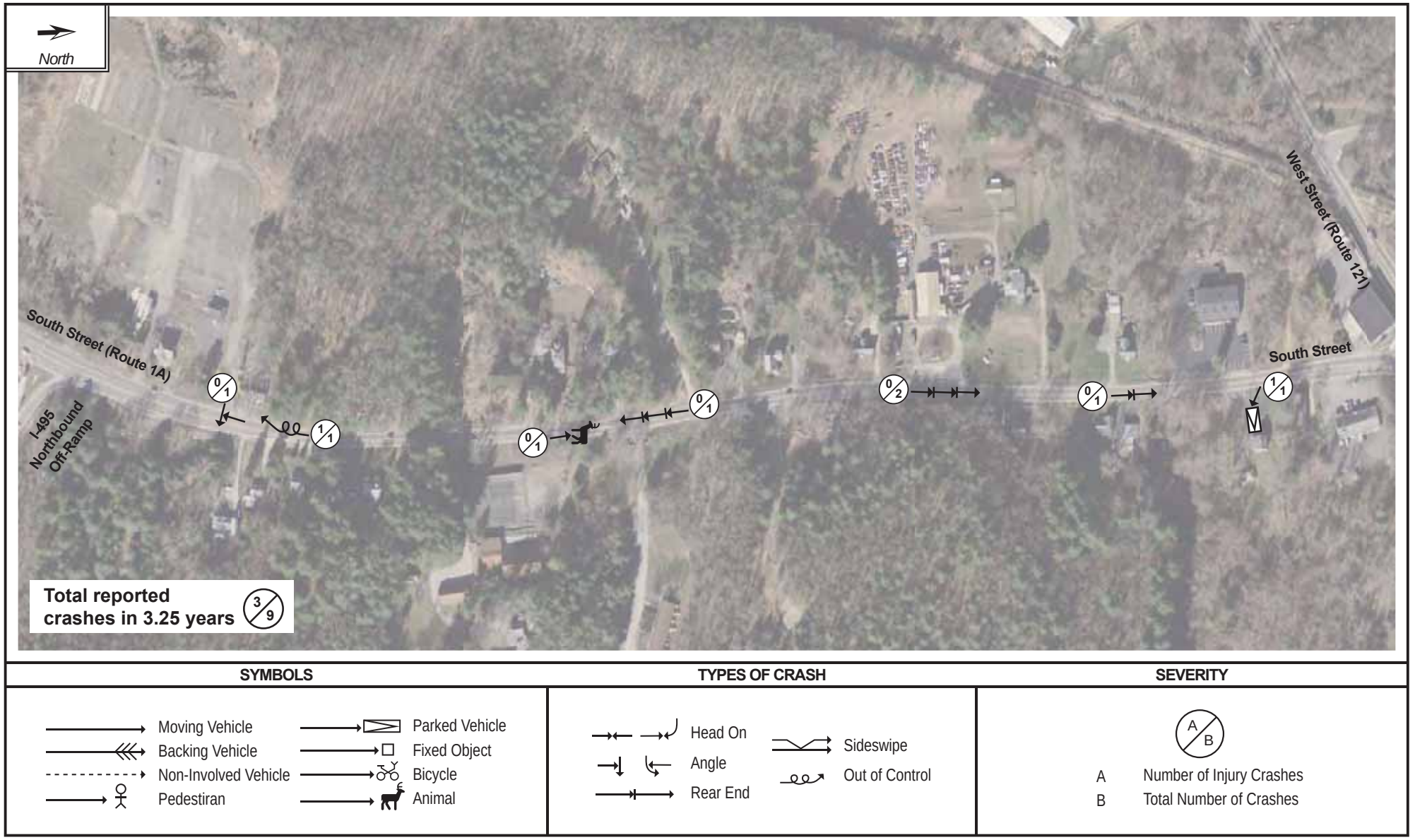
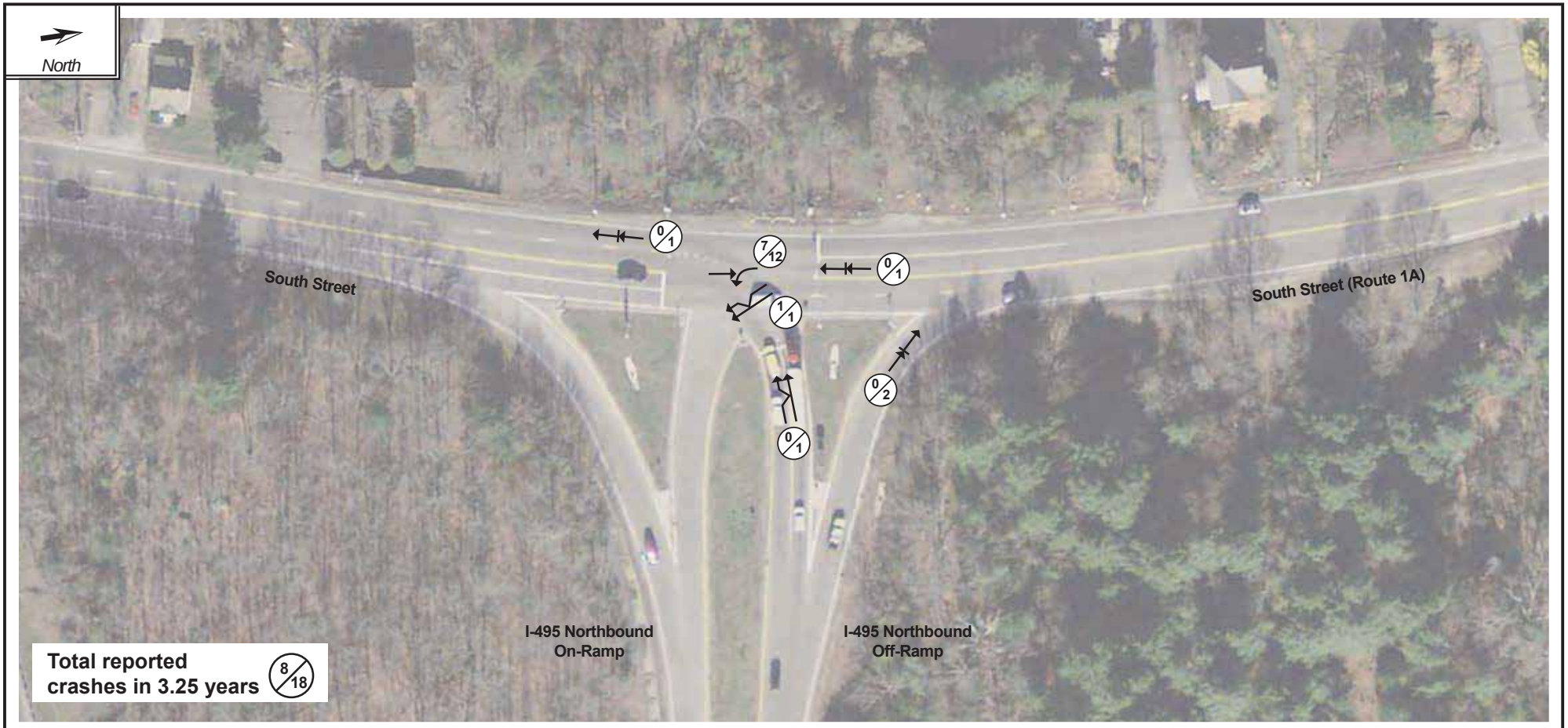
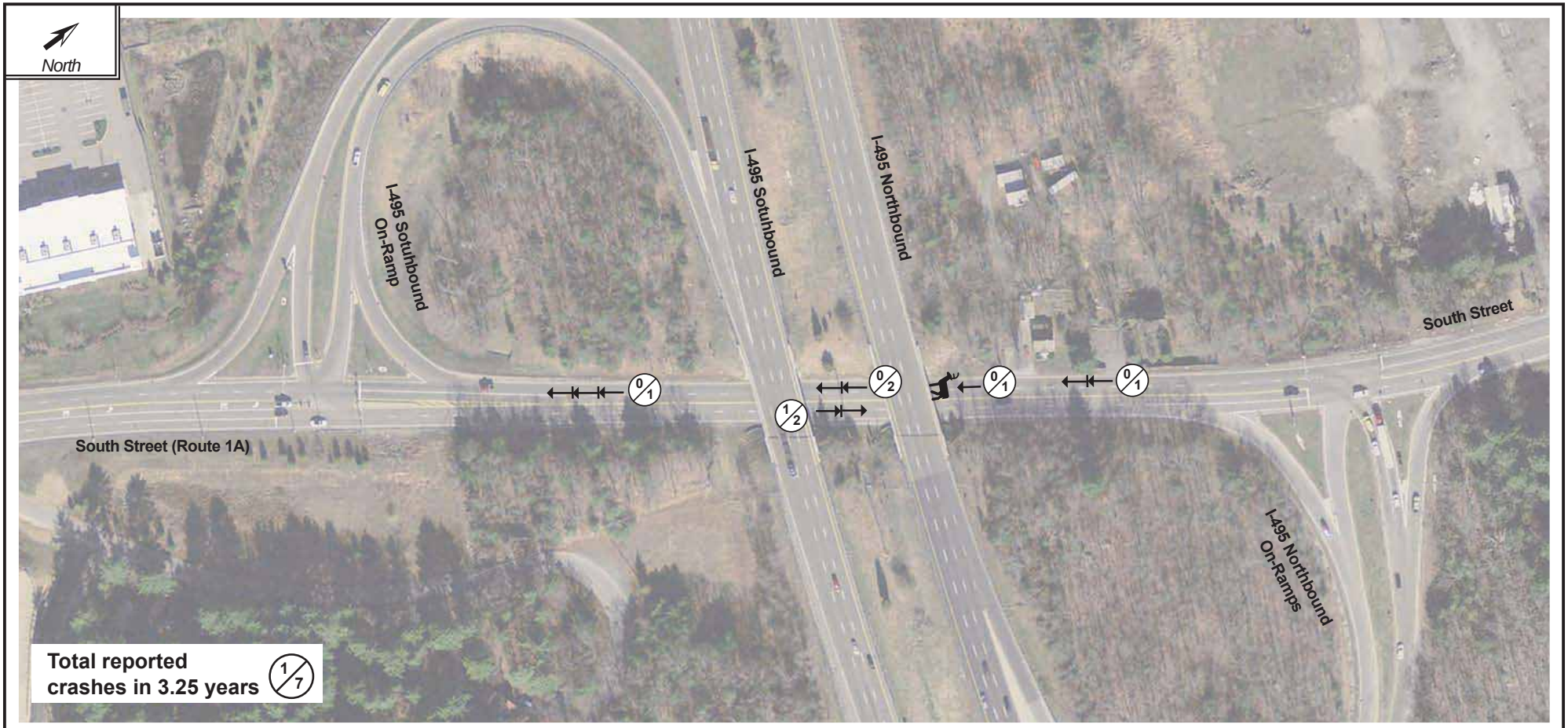


Figure H-13
Collision Diagram: Route 1A at I-495 Northbound Ramps
Wrentham Police Reports: January 2014 – March 2017



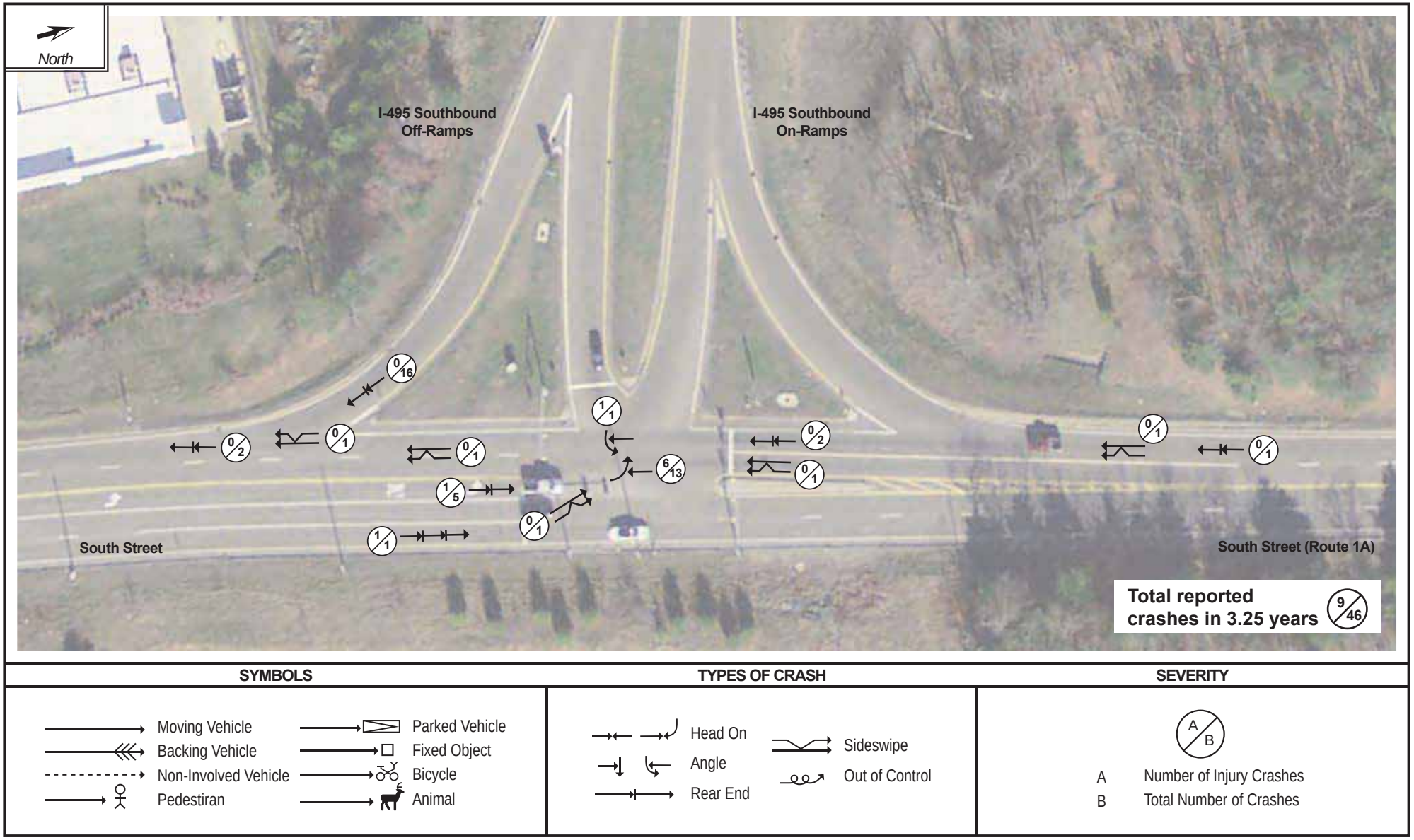
SYMBOLS	TYPES OF CRASH	SEVERITY
Moving Vehicle Backing Vehicle Non-Involved Vehicle Pedestiran Parked Vehicle Fixed Object Bicycle Animal	Head On Angle Rear End Sideswipe Out of Control	A/B A Number of Injury Crashes B Total Number of Crashes

Figure H-14
Collision Diagram: Route 1A between I-495 Northbound and Southbound Ramps
Wrentham Police Reports: January 2014 – March 2017



SYMBOLS	TYPES OF CRASH	SEVERITY
Moving Vehicle Backing Vehicle Non-Involved Vehicle Pedestiran Parked Vehicle Fixed Object Bicycle Animal	Head On Angle Rear End Sideswipe Out of Control	A/B A Number of Injury Crashes B Total Number of Crashes

Figure H-15
Collision Diagram: Route 1A at I-495 Southbound Ramps
Wrentham Police Reports: January 2014 – March 2017

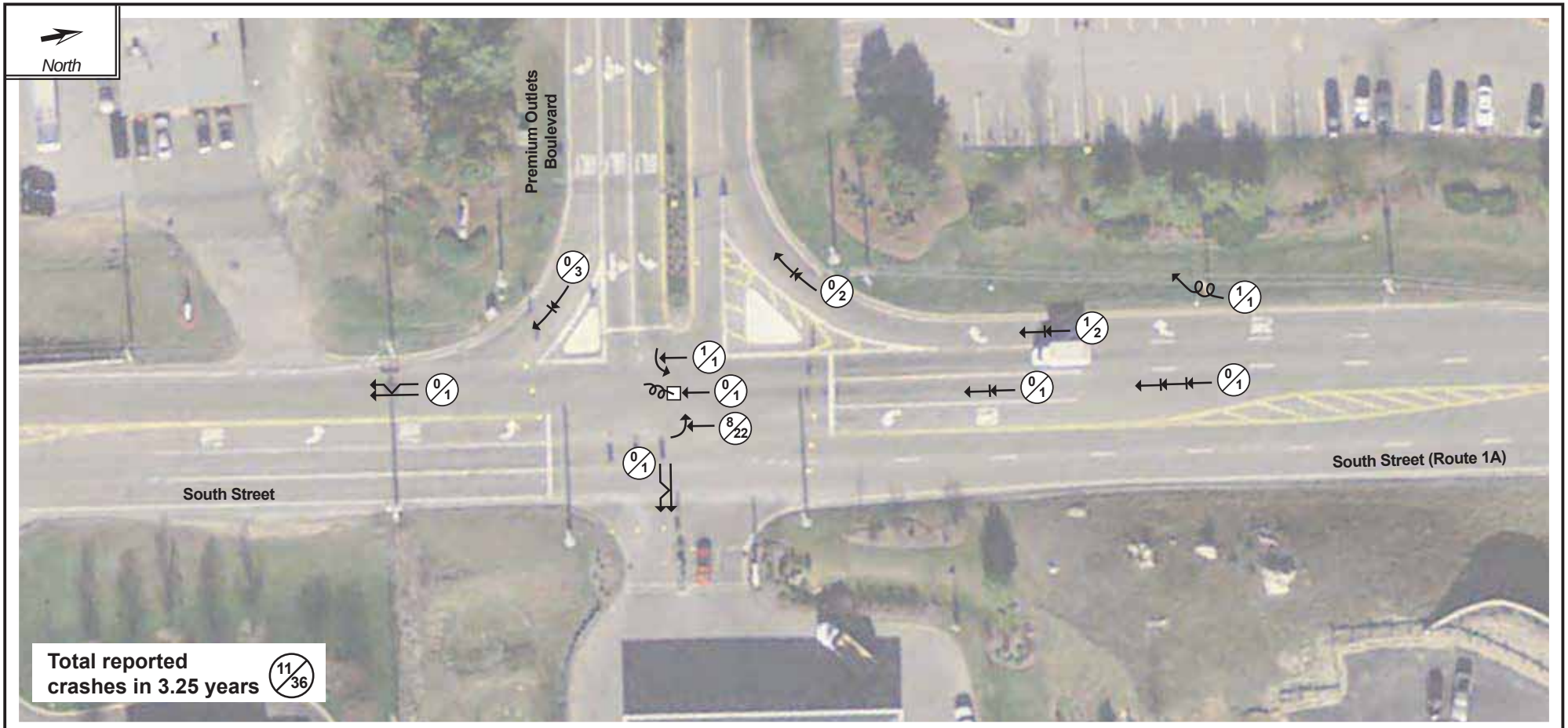


SYMBOLS	TYPES OF CRASH	SEVERITY
Moving Vehicle	Head On	A/B
Backing Vehicle	Angle	A Number of Injury Crashes
Non-Involved Vehicle	Rear End	B Total Number of Crashes
Pedestiran	Sideswipe	
Parked Vehicle	Out of Control	
Fixed Object		
Bicycle		
Animal		

Figure H-16
Collision Diagram: Route 1A at Nickerson Lane
Wrentham Police Reports: January 2014 – March 2017

SYMBOLS	TYPES OF CRASH	SEVERITY
Moving Vehicle Backing Vehicle Non-Involved Vehicle Pedestiran Parked Vehicle Fixed Object Bicycle Animal	Head On Angle Rear End Sideswipe Out of Control	A/B A Number of Injury Crashes B Total Number of Crashes

Figure H-17
Collision Diagram: Route 1A at Premium Outlets Boulevard
Wrentham Police Reports: January 2014 – March 2017



SYMBOLS

- Moving Vehicle
- Backing Vehicle
- Non-Involved Vehicle
- Pedestiran
- Parked Vehicle
- Fixed Object
- Bicycle
- Animal

TYPES OF CRASH

- Head On
- Angle
- Rear End
- Sideswipe
- Out of Control

SEVERITY

A/B

A Number of Injury Crashes
B Total Number of Crashes

Figure H-18
Collision Diagram: Route 1A between Premium Outlets Boulevard and High Street
Wrentham Police Reports: January 2014 – March 2017

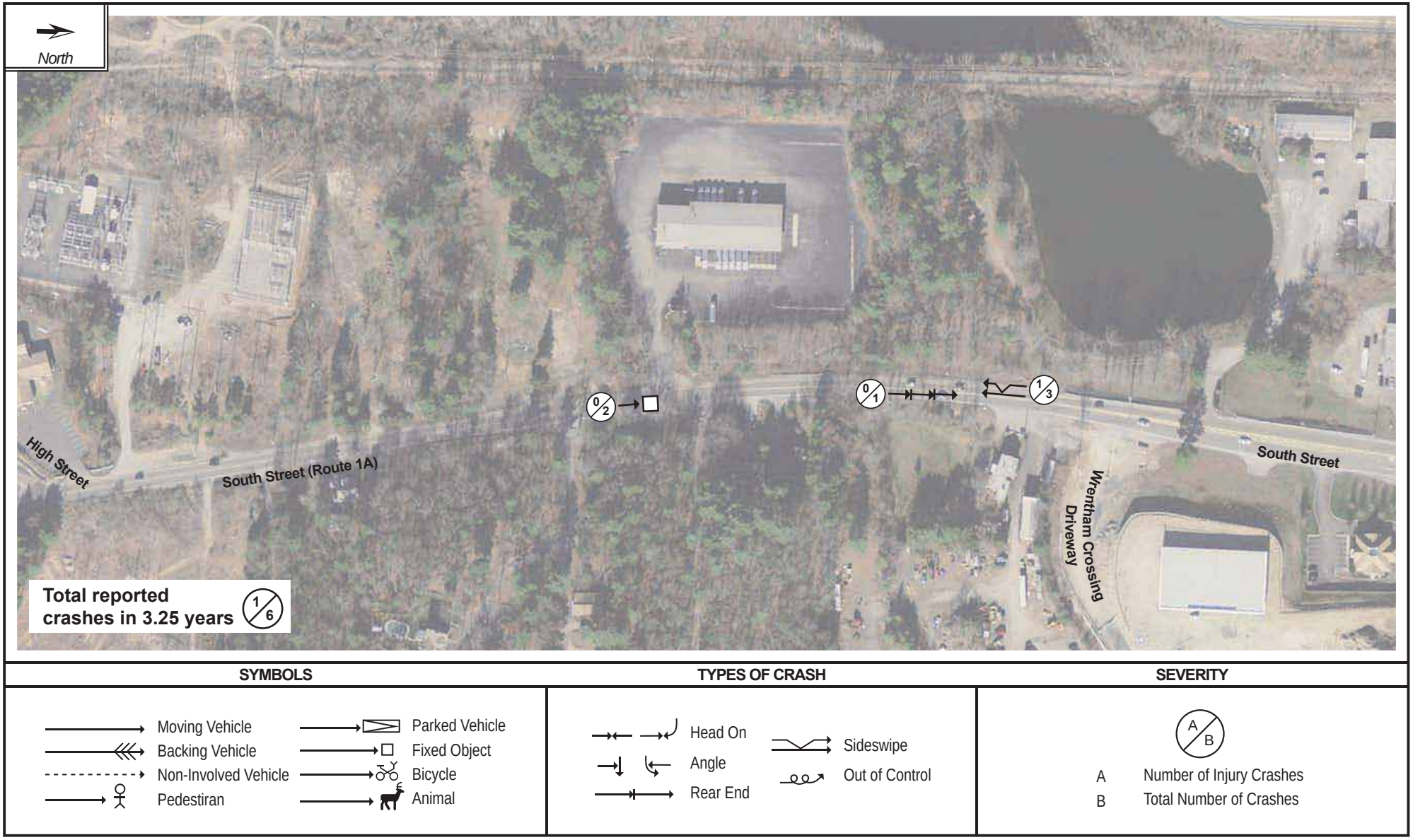
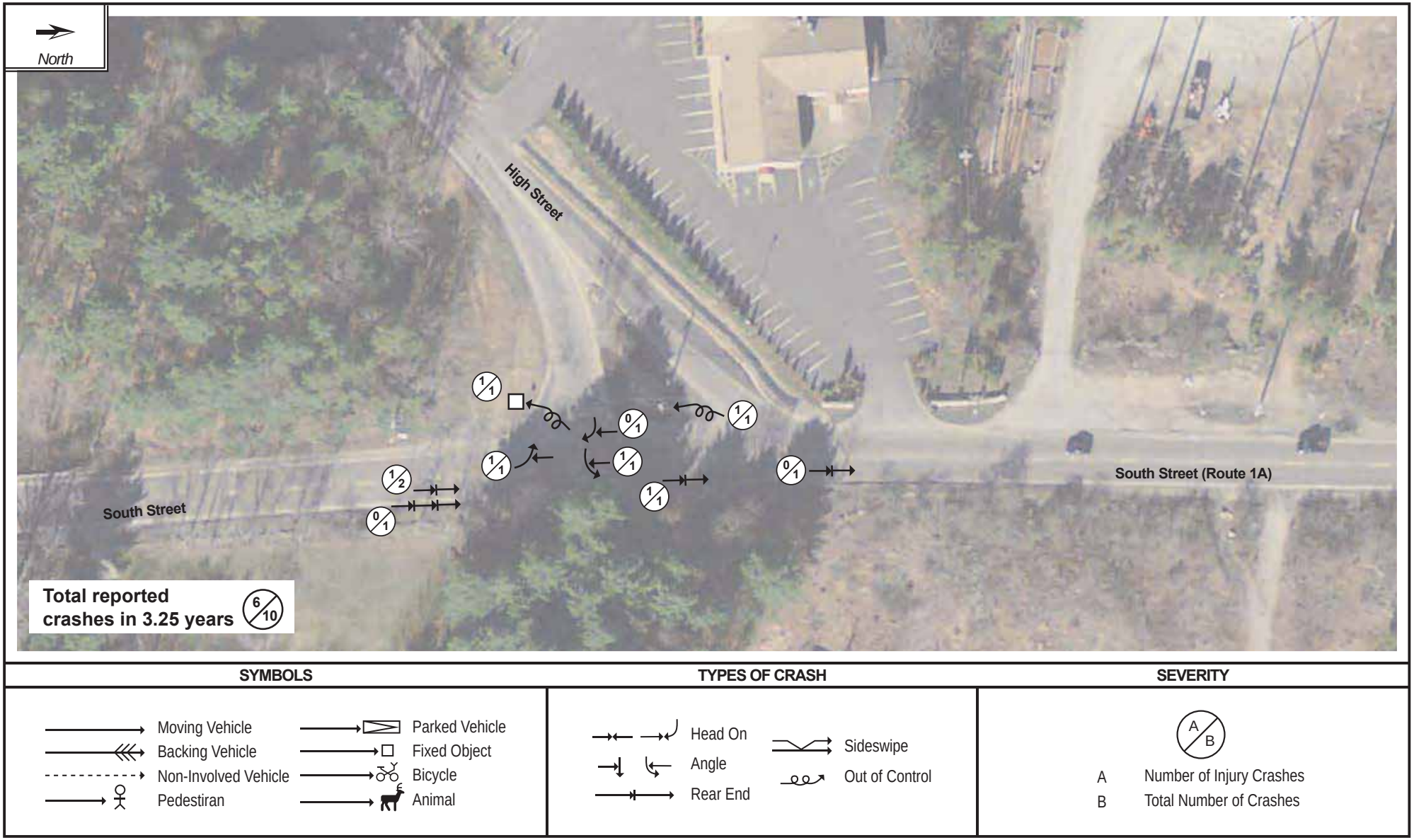


Figure H-19
Collision Diagram: Route 1A at High Street
Wrentham Police Reports: January 2014 – March 2017



SYMBOLS	TYPES OF CRASH	SEVERITY
Moving Vehicle Backing Vehicle Non-Involved Vehicle Pedestiran Parked Vehicle Fixed Object Bicycle Animal	Head On Angle Rear End Sideswipe Out of Control	A/B A Number of Injury Crashes B Total Number of Crashes

Table H-1
Crash Statistics: Route 1A at Route 140 (Franklin Street/East Street)
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		7	8	7	0	22	6.8
Severity	Property damage only	3	6	5	0	14	4.3
	Non-fatal injury	2	2	1	0	5	1.5
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	2	0	1	0	3	0.9
Collision type	Single vehicle	0	1	0	0	1	0.3
	Rear-end	1	3	1	0	5	1.5
	Angle	5	1	6	0	12	3.7
	Sideswipe, same direction	0	2	0	0	2	0.6
	Sideswipe, opposite direction	0	1	0	0	1	0.3
	Head-on	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	1	0	0	0	1	0.3
Involved pedestrian(s)		0	1	0	0	1	0.3
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		2	1	2	0	5	1.5
Wet or icy pavement conditions		5	0	1	0	6	1.8
Dark conditions (lit or unlit)		1	1	2	0	4	1.2

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-2
Crash Statistics: Route 1A at Common Street
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		5	7	5	1	18	5.5
Severity	Property damage only	2	5	5	1	13	4.0
	Non-fatal injury	1	1	0	0	2	0.6
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	2	1	0	0	3	0.9
Collision type	Single vehicle	0	0	0	0	0	0.0
	Rear-end	3	1	0	0	4	1.2
	Angle	1	4	2	1	8	2.5
	Sideswipe, same direction	0	1	2	0	3	0.9
	Sideswipe, opposite direction	1	0	0	0	1	0.3
	Head-on	0	1	0	0	1	0.3
	Rear-to-rear	0	0	1	0	1	0.3
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		1	3	2	0	6	1.8
Wet or icy pavement conditions		2	3	0	0	5	1.5
Dark conditions (lit or unlit)		2	2	0	1	5	1.5

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-3
Crash Statistics: Common Street at Taunton Street
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		4	5	1	0	10	3.1
Severity	Property damage only	2	2	0	0	4	1.2
	Non-fatal injury	1	2	1	0	4	1.2
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	1	1	0	0	2	0.6
Collision type	Single vehicle	0	1	0	0	1	0.3
	Rear-end	1	2	0	0	3	0.9
	Angle	3	2	1	0	6	1.8
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0.0
	Head-on	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		1	2	1	0	4	1.2
Wet or icy pavement conditions		0	0	0	0	0	0.0
Dark conditions (lit or unlit)		0	2	0	0	2	0.6

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-4
Crash Statistics: Common Street at East Street (Route 140)
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		2	0	5	2	9	2.8
Severity	Property damage only	2	0	3	1	6	1.8
	Non-fatal injury	0	0	1	1	2	0.6
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	0	0	1	0	1	0.3
Collision type	Single vehicle	0	0	1	0	1	0.3
	Rear-end	1	0	1	0	2	0.6
	Angle	1	0	1	1	3	0.9
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	1	0	1	0.3
	Head-on	0	0	1	1	2	0.6
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		0	0	1	0	1	0.3
Wet or icy pavement conditions		0	0	1	1	2	0.6
Dark conditions (lit or unlit)		0	0	0	1	1	0.3

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-5
Crash Statistics: Route 1A in the Vicinity of Wrentham Town Hall
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		2	1	1	1	5	1.5
Severity	Property damage only	1	1	1	0	3	0.9
	Non-fatal injury	0	0	0	0	0	0.0
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	1	0	0	1	2	0.6
Collision type	Single vehicle	0	0	0	0	0	0.0
	Rear-end	1	1	0	0	2	0.6
	Angle	1	0	1	1	3	0.9
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0.0
	Head-on	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		0	1	0	0	1	0.3
Wet or icy pavement conditions		1	0	0	1	2	0.6
Dark conditions (lit or unlit)		0	0	1	0	1	0.3

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-6
Crash Statistics: Route 1A at Randall Road and at Summer Perry Drive
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		4	1	0	0	5	1.5
Severity	Property damage only	3	1	0	0	4	1.2
	Non-fatal injury	0	0	0	0	0	0.0
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	1	0	0	0	1	0.3
Collision type	Single vehicle	0	0	0	0	0	0.0
	Rear-end	3	1	0	0	4	1.2
	Angle	1	0	0	0	1	0.3
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0.0
	Head-on	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		4	1	0	0	5	1.5
Wet or icy pavement conditions		2	0	0	0	2	0.6
Dark conditions (lit or unlit)		0	0	0	0	0	0.0

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-7
Crash Statistics: Route 1A at Creek Street
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		2	3	6	0	11	3.4
Severity	Property damage only	1	2	3	0	6	1.8
	Non-fatal injury	1	0	3	0	4	1.2
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	0	1	0	0	1	0.3
Collision type	Single vehicle	0	0	0	0	0	0.0
	Rear-end	1	1	1	0	3	0.9
	Angle	1	2	4	0	7	2.2
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0.0
	Head-on	0	0	1	0	1	0.3
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		0	2	2	0	4	1.2
Wet or icy pavement conditions		1	2	0	0	3	0.9
Dark conditions (lit or unlit)		0	2	0	0	2	0.6

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-8
Crash Statistics: Route 1A between Creek Street and Beach Street
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		4	5	4	0	13	4.0
Severity	Property damage only	1	4	3	0	8	2.5
	Non-fatal injury	3	1	1	0	5	1.5
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Collision type	Single vehicle	1	0	0	0	1	0.3
	Rear-end	1	5	2	0	8	2.5
	Angle	0	0	1	0	1	0.3
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	1	0	1	0.3
	Head-on	1	0	0	0	1	0.3
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	1	0	0	0	1	0.3
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		1	0	1	0	2	0.6
Wet or icy pavement conditions		1	0	1	0	2	0.6
Dark conditions (lit or unlit)		2	0	2	0	4	1.2

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-9
Crash Statistics: Route 1A at Beach Street
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		3	3	4	0	10	3.1
Severity	Property damage only	2	3	3	0	8	2.5
	Non-fatal injury	0	0	1	0	1	0.3
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	1	0	0	0	1	0.3
Collision type	Single vehicle	0	0	1	0	1	0.3
	Rear-end	2	1	2	0	5	1.5
	Angle	0	2	1	0	3	0.9
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0.0
	Head-on	1	0	0	0	1	0.3
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		0	2	0	0	2	0.6
Wet or icy pavement conditions		1	1	3	0	5	1.5
Dark conditions (lit or unlit)		0	1	1	0	2	0.6

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-10
Crash Statistics: Route 1A between Beach Street and West Street (Route 121)
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		3	2	2	0	7	2.2
Severity	Property damage only	1	1	1	0	3	0.9
	Non-fatal injury	0	1	0	0	1	0.3
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	2	0	1	0	3	0.9
Collision type	Single vehicle	0	1	0	0	1	0.3
	Rear-end	3	0	2	0	5	1.5
	Angle	0	1	0	0	1	0.3
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0.0
	Head-on	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		0	0	1	0	1	0.3
Wet or icy pavement conditions		0	0	0	0	0	0.0
Dark conditions (lit or unlit)		0	1	1	0	2	0.6

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-11
Crash Statistics: Route 1A at Route 121 (West Street)
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		8	5	7	3	23	7.1
Severity	Property damage only	4	4	5	3	16	4.9
	Non-fatal injury	3	1	2	0	6	1.8
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	1	0	0	0	1	0.3
Collision type	Single vehicle	1	0	1	0	2	0.6
	Rear-end	4	3	2	0	9	2.8
	Angle	3	1	3	2	9	2.8
	Sideswipe, same direction	0	1	0	0	1	0.3
	Sideswipe, opposite direction	0	0	0	1	1	0.3
	Head-on	0	0	1	0	1	0.3
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		1	2	3	0	6	1.8
Wet or icy pavement conditions		0	3	2	0	5	1.5
Dark conditions (lit or unlit)		0	1	2	1	4	1.2

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-12
Crash Statistics: Route 1A between Route 121 and I-495
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		2	1	5	1	9	2.8
Severity	Property damage only	1	0	3	0	4	1.2
	Non-fatal injury	0	1	1	1	3	0.9
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	1	0	1	0	2	0.6
Collision type	Single vehicle	1	1	1	0	3	0.9
	Rear-end	0	0	4	1	5	1.5
	Angle	1	0	0	0	1	0.3
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0.0
	Head-on	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		1	0	2	1	4	1.2
Wet or icy pavement conditions		1	1	1	1	4	1.2
Dark conditions (lit or unlit)		1	0	1	0	2	0.6

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-13
Crash Statistics: Route 1A at I-495 Northbound Ramps
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		11	3	4	0	18	5.5
Severity	Property damage only	6	1	1	0	8	2.5
	Non-fatal injury	5	1	2	0	8	2.5
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	0	1	1	0	2	0.6
Collision type	Single vehicle	0	0	0	0	0	0.0
	Rear-end	3	1	0	0	4	1.2
	Angle	5	2	4	0	11	3.4
	Sideswipe, same direction	1	0	0	0	1	0.3
	Sideswipe, opposite direction	0	0	0	0	0	0.0
	Head-on	2	0	0	0	2	0.6
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		2	1	1	0	4	1.2
Wet or icy pavement conditions		1	2	2	0	5	1.5
Dark conditions (lit or unlit)		3	2	1	0	6	1.8

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-14
Crash Statistics: Route 1A between I-495 Northbound and Southbound Ramps
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		4	2	0	1	7	2.2
Severity	Property damage only	3	1	0	1	5	1.5
	Non-fatal injury	1	0	0	0	1	0.3
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	0	1	0	0	1	0.3
Collision type	Single vehicle	0	1	0	0	1	0.3
	Rear-end	4	1	0	1	6	1.8
	Angle	0	0	0	0	0	0.0
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0.0
	Head-on	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		0	0	0	0	0	0.0
Wet or icy pavement conditions		1	0	0	0	1	0.3
Dark conditions (lit or unlit)		2	1	0	0	3	0.9

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-15
Crash Statistics: Route 1A at I-495 Southbound Ramps
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		12	11	16	7	46	14.2
Severity	Property damage only	8	5	12	5	30	9.2
	Non-fatal injury	2	2	3	2	9	2.8
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	2	4	1	0	7	2.2
Collision type	Single vehicle	0	0	1	0	1	0.3
	Rear-end	7	7	10	2	26	8.0
	Angle	4	3	5	5	17	5.2
	Sideswipe, same direction	1	0	0	0	1	0.3
	Sideswipe, opposite direction	0	1	0	0	1	0.3
	Head-on	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		3	4	1	0	8	2.5
Wet or icy pavement conditions		2	3	4	1	10	3.1
Dark conditions (lit or unlit)		2	0	5	2	9	2.8

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-16
Crash Statistics: Route 1A at Nickerson Lane
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		1	1	1	0	3	0.9
Severity	Property damage only	1	0	1	0	2	0.6
	Non-fatal injury	0	0	0	0	0	0.0
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	0	1	0	0	1	0.3
Collision type	Single vehicle	0	0	0	0	0	0.0
	Rear-end	1	0	1	0	2	0.6
	Angle	0	1	0	0	1	0.3
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0.0
	Head-on	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		1	0	0	0	1	0.3
Wet or icy pavement conditions		0	0	0	0	0	0.0
Dark conditions (lit or unlit)		1	0	0	0	1	0.3

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-17
Crash Statistics: Route 1A at Premium Outlets Boulevard
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		10	10	12	4	36	11.1
Severity	Property damage only	2	5	6	3	16	4.9
	Non-fatal injury	8	2	1	1	12	3.7
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	0	3	5	0	8	2.5
Collision type	Single vehicle	1	1	1	1	4	1.2
	Rear-end	1	4	2	1	8	2.5
	Angle	6	5	7	1	19	5.8
	Sideswipe, same direction	0	0	2	0	2	0.6
	Sideswipe, opposite direction	0	0	0	1	1	0.3
	Head-on	2	0	0	0	2	0.6
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		3	2	4	0	9	2.8
Wet or icy pavement conditions		4	0	0	2	6	1.8
Dark conditions (lit or unlit)		3	1	2	0	6	1.8

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-18
Crash Statistics: Route 1A between Premium Outlets Boulevard and High Street
Wrentham Police Crash Data 2014-2017

Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		0	3	3	0	6	1.8
Severity	Property damage only	0	1	2	0	3	0.9
	Non-fatal injury	0	1	0	0	1	0.3
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	0	1	1	0	2	0.6
Collision type	Single vehicle	0	1	1	0	2	0.6
	Rear-end	0	0	2	0	2	0.6
	Angle	0	1	0	0	1	0.3
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	1	0	0	1	0.3
	Head-on	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0.0
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		0	1	1	0	2	0.6
Wet or icy pavement conditions		0	2	0	0	2	0.6
Dark conditions (lit or unlit)		0	1	1	0	2	0.6

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

Table H-19
Crash Statistics: Route 1A at High Street
Wrentham Police Crash Data 2014-2017

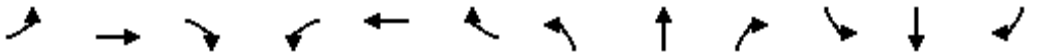
Statistics Period		2014	2015	2016	2017 *	Total	Annual Avg.
Total number of crashes		3	1	5	1	10	3.1
Severity	Property damage only	0	0	2	0	2	0.6
	Non-fatal injury	1	1	3	0	5	1.5
	Fatality	0	0	0	0	0	0.0
	Not reported/unknown	2	0	0	1	3	0.9
Collision type	Single vehicle	0	1	1	0	2	0.6
	Rear-end	1	0	3	0	4	1.2
	Angle	2	0	0	0	2	0.6
	Sideswipe, same direction	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0.0
	Head-on	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	1	1	0.3
	Not reported/unknown	0	0	1	0	1	0.3
Involved pedestrian(s)		0	0	0	0	0	0.0
Involved cyclist(s)		0	0	0	0	0	0.0
Occurred during weekday peak periods **		1	0	0	1	2	0.6
Wet or icy pavement conditions		0	0	2	1	3	0.9
Dark conditions (lit or unlit)		0	1	2	1	4	1.2

* 2017 data available for first 3 month only.

** Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

APPENDIX I

Intersection Capacity Analyses, 2040 Weekday AM/PM Peak Hour
Wrentham Common Improvement Plan A



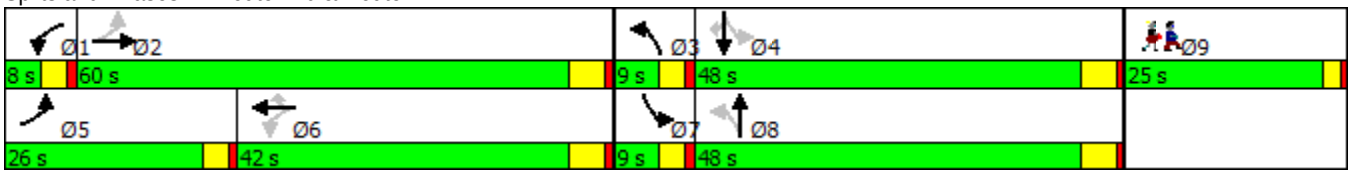
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	224	455	5	30	153	37	21	359	75	89	389	240
Future Volume (vph)	224	455	5	30	153	37	21	359	75	89	389	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	100		75	200		0	100		200
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	100			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		463			568			368			1055	
Travel Time (s)		10.5			12.9			8.4			24.0	
Confl. Peds. (#/hr)	7		9	10		12	4		6	1		3
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.80	0.80	0.80	0.94	0.94	0.94
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	7%	7%	7%	18%	18%	18%	3%	3%	3%	5%	5%	5%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	621	0	40	206	50	29	608	0	106	463	286
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8			4		4
Detector Phase	5	2		1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		4.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	9.0	15.0		8.0	15.0	15.0	9.0	15.0		9.0	17.0	17.0
Total Split (s)	26.0	60.0		8.0	42.0	42.0	9.0	48.0		9.0	48.0	48.0
Total Split (%)	17.3%	40.0%		5.3%	28.0%	28.0%	6.0%	32.0%		6.0%	32.0%	32.0%
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0		4.0	5.0	5.0	4.0	5.0		4.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes			Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None		None	Min	Min	None	None		None	None	None
Act Effct Green (s)	56.5	49.3		37.5	32.4	32.4	49.8	43.7		51.6	47.8	47.8
Actuated g/C Ratio	0.46	0.40		0.31	0.27	0.27	0.41	0.36		0.42	0.39	0.39
v/c Ratio	0.60	0.87		0.32	0.48	0.11	0.11	0.94		0.82	0.65	0.41
Control Delay	27.6	47.9		28.5	42.9	0.5	25.7	63.8		72.1	40.0	13.9
Queue Delay	1.7	19.3		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	29.3	67.2		28.5	42.9	0.5	25.7	63.8		72.1	40.0	13.9
LOS	C	E		C	D	A	C	E		E	D	B
Approach Delay		54.8			33.8			62.0			35.3	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)	141	425		16	130	0	13	466		50	318	54
Queue Length 95th (ft)	249	#693		42	230	0	36	#751		#190	#609	166
Internal Link Dist (ft)		383			488			288			975	
Turn Bay Length (ft)	200			100		75	200			100		200
Base Capacity (vph)	527	811		126	499	491	259	644		129	709	700
Starvation Cap Reductn	103	194		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	25.0
Total Split (s)	25.0
Total Split (%)	17%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.71	1.01		0.32	0.41	0.10	0.11	0.94		0.82	0.65	0.41

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 122			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 48.0		Intersection LOS: D	
Intersection Capacity Utilization 77.4%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: Route 140 & Route 1A



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	218	10	75	412	83	115	412	54	56	383	251
Future Volume (vph)	168	218	10	75	412	83	115	412	54	56	383	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	100		75	200		0	100		200
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	100			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		463			568			368			1055	
Travel Time (s)		10.5			12.9			8.4			24.0	
Confl. Peds. (#/hr)	6					6	2					2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.92	0.92	0.92	0.84	0.84	0.84
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	221	300	0	99	543	109	140	568	0	75	511	335
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8			4		4
Detector Phase	5	2		1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	9.0	15.0		9.0	15.0	15.0	9.0	15.0		9.0	15.0	15.0
Total Split (s)	17.0	57.0		10.0	50.0	50.0	10.0	49.0		9.0	48.0	48.0
Total Split (%)	11.3%	38.0%		6.7%	33.3%	33.3%	6.7%	32.7%		6.0%	32.0%	32.0%
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0		4.0	5.0	5.0	4.0	5.0		4.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes			Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None		None	Min	Min	None	None		None	None	None
Act Effct Green (s)	61.3	50.3		50.3	43.2	43.2	51.3	44.2		49.3	43.2	43.2
Actuated g/C Ratio	0.48	0.40		0.40	0.34	0.34	0.40	0.35		0.39	0.34	0.34
v/c Ratio	0.86	0.41		0.23	0.86	0.18	0.76	0.88		0.55	0.81	0.51
Control Delay	57.4	30.7		22.1	54.3	4.8	53.7	56.1		42.1	50.7	17.1
Queue Delay	0.0	1.2		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	57.4	31.9		22.1	54.3	4.8	53.7	56.1		42.1	50.7	17.1
LOS	E	C		C	D	A	D	E		D	D	B
Approach Delay		42.7			42.9			55.6			37.8	
Approach LOS		D			D			E			D	
Queue Length 50th (ft)	108	166		41	394	0	69	424		35	372	81
Queue Length 95th (ft)	#286	286		90	#663	28	#201	#804		#84	#613	179
Internal Link Dist (ft)		383			488			288			975	
Turn Bay Length (ft)	200			100		75	200			100		200
Base Capacity (vph)	256	760		425	661	625	184	645		136	632	656
Starvation Cap Reductn	0	263		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0

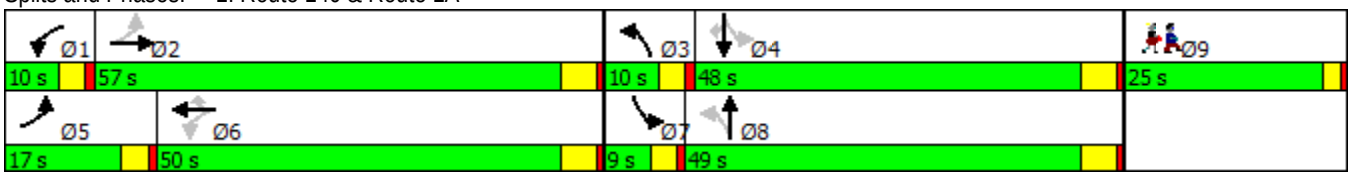
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	25.0
Total Split (s)	25.0
Total Split (%)	17%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.86	0.60		0.23	0.82	0.17	0.76	0.88		0.55	0.81	0.51

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 127.3			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 44.3		Intersection LOS: D	
Intersection Capacity Utilization 81.8%		ICU Level of Service D	
Analysis Period (min) 15			

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

Splits and Phases: 1: Route 140 & Route 1A



Intersection Capacity Analysis
Common St & Route 1A & Kendrick St

09/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2	Ø9
Lane Configurations												
Traffic Volume (vph)	56	642	241	29	382	5	0	0	71	7	29	
Future Volume (vph)	56	642	241	29	382	5	0	0	71	7	29	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		100	50		0	0	0	0	50		
Storage Lanes	1		0	1		0	0	0	1	1		
Taper Length (ft)	0			25			0		0			
Right Turn on Red			Yes			Yes		Yes			Yes	
Link Speed (mph)		30			30		30		30			
Link Distance (ft)		338			463		659		592			
Travel Time (s)		7.7			10.5		15.0		13.5			
Confl. Peds. (#/hr)			1	1		7			5			
Peak Hour Factor	0.89	0.89	0.89	0.83	0.83	0.83	0.25	0.25	0.92	0.92	0.92	
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	
Heavy Vehicles (%)	5%	5%	5%	10%	10%	10%	0%	0%	2%	2%	2%	
Shared Lane Traffic (%)											10%	
Lane Group Flow (vph)	70	1111	0	39	522	0	0	0	99	0	31	
Turn Type	Perm	NA		Perm	NA				Prot		Perm	
Protected Phases		2			6				3			9
Permitted Phases	2			6							2	
Detector Phase	2	2		6	6				3		2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0				5.0		5.0	5.0
Minimum Split (s)	10.0	10.0		10.0	10.0				10.0		10.0	25.0
Total Split (s)	65.0	65.0		65.0	65.0				10.0		65.0	25.0
Total Split (%)	65.0%	65.0%		65.0%	65.0%				10.0%		65.0%	25%
Yellow Time (s)	4.0	4.0		4.0	4.0				4.0		4.0	2.0
All-Red Time (s)	1.0	1.0		1.0	1.0				1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0				0.0		0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0				5.0		5.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		None	None				Min		Min	None
Act Effct Green (s)	60.6	60.6		60.6	60.6				5.0		60.6	
Actuated g/C Ratio	0.77	0.77		0.77	0.77				0.06		0.77	
v/c Ratio	0.11	0.84		0.21	0.40				0.61		0.03	
Control Delay	4.6	15.8		8.1	5.5				37.6		0.9	
Queue Delay	0.0	0.0		0.0	0.5				0.0		0.0	
Total Delay	4.6	15.8		8.1	6.0				37.6		0.9	
LOS	A	B		A	A				D		A	
Approach Delay		15.2			6.2				28.9			
Approach LOS		B			A				C			
Queue Length 50th (ft)	5	186		3	47				20		0	
Queue Length 95th (ft)	35	#946		27	204				#104		5	
Internal Link Dist (ft)		258			383		579		512			
Turn Bay Length (ft)				50							50	
Base Capacity (vph)	613	1327		187	1318				162		1163	
Starvation Cap Reductn	0	0		0	408				0		0	
Spillback Cap Reductn	0	0		0	0				0		0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2	Ø9
Storage Cap Reductn	0	0		0	0				0		0	
Reduced v/c Ratio	0.11	0.84		0.21	0.57				0.61		0.03	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 79.2			
Natural Cycle: 100			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 13.4		Intersection LOS: B	
Intersection Capacity Utilization 68.2%		ICU Level of Service C	
Analysis Period (min) 15			

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

Splits and Phases: 2: Common St & Route 1A & Kendrick St

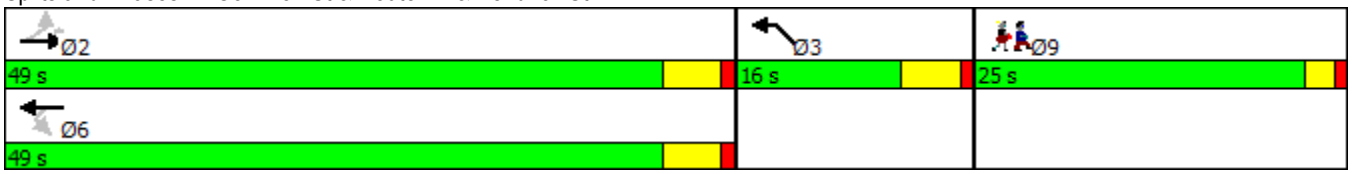
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2	Ø9
Lane Configurations												
Traffic Volume (vph)	15	400	214	15	762	13	0	0	215	3	9	
Future Volume (vph)	15	400	214	15	762	13	0	0	215	3	9	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		100	50		0	0	0	0	50		
Storage Lanes	1		0	1		0	0	0	1	1		
Taper Length (ft)	25			25			25		25			
Right Turn on Red			Yes			Yes		Yes			Yes	
Link Speed (mph)		30			30		30		30			
Link Distance (ft)		338			463		659		592			
Travel Time (s)		7.7			10.5		15.0		13.5			
Confl. Peds. (#/hr)	23		10	10		23			4			
Peak Hour Factor	0.93	0.93	0.93	0.91	0.91	0.91	0.92	0.92	0.89	0.89	0.89	
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	1%	1%	1%	
Shared Lane Traffic (%)											10%	
Lane Group Flow (vph)	18	740	0	18	954	0	0	0	276	0	10	
Turn Type	Perm	NA		Perm	NA				Prot		Perm	
Protected Phases		2			6				3			9
Permitted Phases	2			6							2	
Detector Phase	2	2		6	6				3		2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0				5.0		5.0	5.0
Minimum Split (s)	10.0	10.0		10.0	10.0				10.0		10.0	25.0
Total Split (s)	49.0	49.0		49.0	49.0				16.0		49.0	25.0
Total Split (%)	54.4%	54.4%		54.4%	54.4%				17.8%		54.4%	28%
Yellow Time (s)	4.0	4.0		4.0	4.0				4.0		4.0	2.0
All-Red Time (s)	1.0	1.0		1.0	1.0				1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0				0.0		0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0				5.0		5.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		None	None				Min		Min	None
Act Effct Green (s)	44.6	44.6		44.6	44.6				11.1		44.6	
Actuated g/C Ratio	0.64	0.64		0.64	0.64				0.16		0.64	
v/c Ratio	0.11	0.64		0.06	0.79				0.81		0.01	
Control Delay	9.7	12.4		7.8	17.8				44.2		0.0	
Queue Delay	0.0	0.0		0.0	4.3				0.0		0.0	
Total Delay	9.7	12.4		7.8	22.1				44.2		0.0	
LOS	A	B		A	C				D		A	
Approach Delay		12.3			21.8				42.7			
Approach LOS		B			C				D			
Queue Length 50th (ft)	2	123		2	203				82		0	
Queue Length 95th (ft)	18	#468		16	#775				#270		0	
Internal Link Dist (ft)		258			383		579		512			
Turn Bay Length (ft)				50							50	
Base Capacity (vph)	163	1151		320	1206				339		999	
Starvation Cap Reductn	0	0		0	182				0		0	
Spillback Cap Reductn	0	0		0	0				0		0	

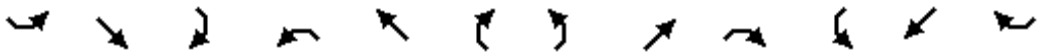
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2	Ø9
Storage Cap Reductn	0	0		0	0				0		0	
Reduced v/c Ratio	0.11	0.64		0.06	0.93				0.81		0.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 69.2			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 21.2		Intersection LOS: C	
Intersection Capacity Utilization 67.9%		ICU Level of Service C	
Analysis Period (min) 15			

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

Splits and Phases: Common St & Route 1A & Kendrick St

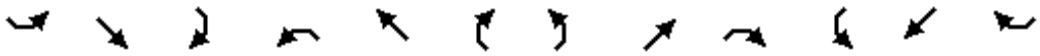




Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	180	125	79	70	0	53	179	73	0	176	1
Future Volume (vph)	6	180	125	79	70	0	53	179	73	0	176	1
Peak Hour Factor	0.81	0.81	0.81	0.80	0.80	0.80	0.88	0.88	0.88	0.84	0.84	0.84
Hourly flow rate (vph)	8	249	173	111	98	0	67	228	93	0	235	1

Direction, Lane #	SE 1	NW 1	NE 1	SW 1
Volume Total (vph)	430	209	388	236
Volume Left (vph)	8	111	67	0
Volume Right (vph)	173	0	93	1
Hadj (s)	-0.15	0.16	-0.06	0.20
Departure Headway (s)	6.6	7.5	6.8	7.5
Degree Utilization, x	0.79	0.44	0.73	0.49
Capacity (veh/h)	430	411	496	422
Control Delay (s)	30.0	16.2	26.2	17.5
Approach Delay (s)	30.0	16.2	26.2	17.5
Approach LOS	D	C	D	C

Intersection Summary				
Delay		24.2		
Level of Service		C		
Intersection Capacity Utilization		71.1%	ICU Level of Service	C
Analysis Period (min)		15		



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	188	72	66	187	2	35	151	53	1	216	2
Future Volume (vph)	9	188	72	66	187	2	35	151	53	1	216	2
Peak Hour Factor	0.91	0.91	0.91	0.87	0.87	0.87	0.89	0.89	0.89	0.90	0.90	0.90
Hourly flow rate (vph)	11	231	89	85	241	3	44	190	67	1	269	2

Direction, Lane #	SE 1	NW 1	NE 1	SW 1
Volume Total (vph)	331	329	301	272
Volume Left (vph)	11	85	44	1
Volume Right (vph)	89	3	67	2
Hadj (s)	-0.14	0.08	-0.07	0.03
Departure Headway (s)	6.7	6.9	6.9	7.1
Degree Utilization, x	0.62	0.63	0.58	0.54
Capacity (veh/h)	490	473	470	453
Control Delay (s)	19.9	21.0	18.9	18.0
Approach Delay (s)	19.9	21.0	18.9	18.0
Approach LOS	C	C	C	C

Intersection Summary				
Delay	19.6			
Level of Service	C			
Intersection Capacity Utilization	72.8%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	149	270	247	0	0	253
Future Volume (Veh/h)	149	270	247	0	0	253
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.80	0.80	0.94	0.25	0.25	0.81
Hourly flow rate (vph)	209	378	294	0	0	350
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			809			
pX, platoon unblocked						
vC, conflicting volume	294				1090	294
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	294				1090	294
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				100	53
cM capacity (veh/h)	1262				200	738

Direction, Lane #	NB 1	NB 2	SB 1	SE 1
Volume Total	209	378	294	350
Volume Left	209	0	0	0
Volume Right	0	0	0	350
cSH	1262	1700	1700	738
Volume to Capacity	0.17	0.22	0.17	0.47
Queue Length 95th (ft)	15	0	0	64
Control Delay (s)	8.4	0.0	0.0	14.2
Lane LOS	A			B
Approach Delay (s)	3.0		0.0	14.2
Approach LOS				B

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	255	419	249	0	0	242
Future Volume (Veh/h)	255	419	249	0	0	242
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	310	510	303	0	0	295
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			809			
pX, platoon unblocked						
vC, conflicting volume	303				1433	303
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	303				1433	303
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	75				100	60
cM capacity (veh/h)	1258				111	737

Direction, Lane #	NB 1	NB 2	SB 1	SE 1
Volume Total	310	510	303	295
Volume Left	310	0	0	0
Volume Right	0	0	0	295
cSH	1258	1700	1700	737
Volume to Capacity	0.25	0.30	0.18	0.40
Queue Length 95th (ft)	24	0	0	48
Control Delay (s)	8.8	0.0	0.0	13.1
Lane LOS	A			B
Approach Delay (s)	3.3		0.0	13.1
Approach LOS				B

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	270	247	177	185	10
Future Volume (Veh/h)	0	270	247	177	185	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.80	0.94	0.84	0.88	0.25
Hourly flow rate (vph)	0	378	294	236	235	45
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			368			
pX, platoon unblocked	0.78				0.78	0.78
vC, conflicting volume	530				790	412
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	261				593	111
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				36	94
cM capacity (veh/h)	1030				365	743

Direction, Lane #	NB 1	SB 1	NE 1
Volume Total	378	530	280
Volume Left	0	0	235
Volume Right	0	236	45
cSH	1700	1700	398
Volume to Capacity	0.22	0.31	0.70
Queue Length 95th (ft)	0	0	131
Control Delay (s)	0.0	0.0	32.9
Lane LOS			D
Approach Delay (s)	0.0	0.0	32.9
Approach LOS			D

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis

David Brown's Way & Route 140

09/26/2017

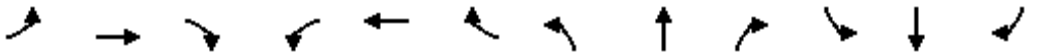
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	419	249	219	162	5
Future Volume (Veh/h)	0	419	249	219	162	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	533	317	279	206	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			368			
pX, platoon unblocked	0.72				0.72	0.72
vC, conflicting volume	596				990	456
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	240				789	46
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				20	99
cM capacity (veh/h)	956				259	737

Direction, Lane #	NB 1	SB 1	NE 1
Volume Total	533	596	212
Volume Left	0	0	206
Volume Right	0	279	6
cSH	1700	1700	264
Volume to Capacity	0.31	0.35	0.80
Queue Length 95th (ft)	0	0	156
Control Delay (s)	0.0	0.0	57.4
Lane LOS			F
Approach Delay (s)	0.0	0.0	57.4
Approach LOS			F

Intersection Summary			
Average Delay	9.1		
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX J

Intersection Capacity Analyses, 2040 Weekday AM/PM Peak Hour
Wrentham Common Improvement Plan B



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	224	455	5	30	153	37	21	359	75	89	389	240
Future Volume (vph)	224	455	5	30	153	37	21	359	75	89	389	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	100		75	250		0	100		200
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	100			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		463			568			303			1055	
Travel Time (s)		10.5			12.9			6.9			24.0	
Confl. Peds. (#/hr)	7		9	10		12	4		6	1		3
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.80	0.80	0.80	0.94	0.94	0.94
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	7%	7%	7%	18%	18%	18%	3%	3%	3%	5%	5%	5%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	621	0	40	206	50	29	608	0	106	463	286
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8			4		4
Detector Phase	5	2		1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		3.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	9.0	15.0		7.0	15.0	15.0	9.0	15.0		9.0	15.0	15.0
Total Split (s)	20.0	60.0		7.0	47.0	47.0	9.0	49.0		9.0	49.0	49.0
Total Split (%)	13.3%	40.0%		4.7%	31.3%	31.3%	6.0%	32.7%		6.0%	32.7%	32.7%
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0		4.0	5.0	5.0	4.0	5.0		4.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes			Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None		None	Min	Min	None	None		None	None	None
Act Effct Green (s)	55.8	49.4		38.8	34.8	34.8	50.8	44.7		52.6	48.8	48.8
Actuated g/C Ratio	0.46	0.40		0.32	0.28	0.28	0.42	0.37		0.43	0.40	0.40
v/c Ratio	0.63	0.87		0.35	0.45	0.11	0.11	0.93		0.79	0.64	0.40
Control Delay	29.6	48.0		31.9	39.7	0.5	25.0	60.0		64.6	39.0	13.4
Queue Delay	3.5	20.1		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	33.1	68.2		31.9	39.7	0.5	25.0	60.0		64.6	39.0	13.4
LOS	C	E		C	D	A	C	E		E	D	B
Approach Delay		56.7			32.0			58.4			33.6	
Approach LOS		E			C			E			C	
Queue Length 50th (ft)	143	425		16	126	0	13	460		49	314	52
Queue Length 95th (ft)	253	#693		43	219	0	36	#738		#179	#596	162
Internal Link Dist (ft)		383			488			223			975	
Turn Bay Length (ft)	200			100		75	250			100		200
Base Capacity (vph)	485	809		113	561	538	268	657		135	721	711
Starvation Cap Reductn	106	194		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0

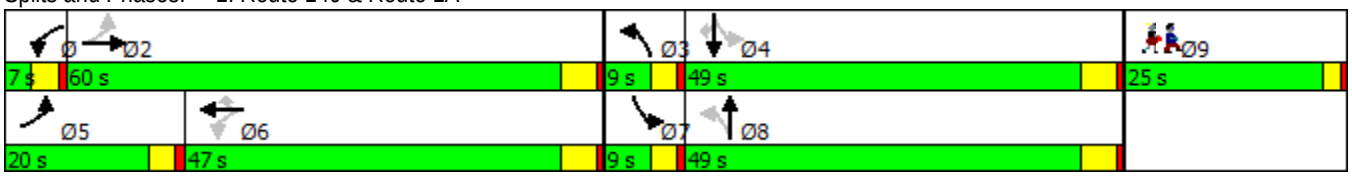
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	25.0
Total Split (s)	25.0
Total Split (%)	17%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

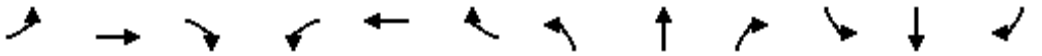
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.80	1.01		0.35	0.37	0.09	0.11	0.93		0.79	0.64	0.40

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 122.3			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 47.1		Intersection LOS: D	
Intersection Capacity Utilization 77.4%		ICU Level of Service D	
Analysis Period (min) 15			

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

Splits and Phases: 1: Route 140 & Route 1A





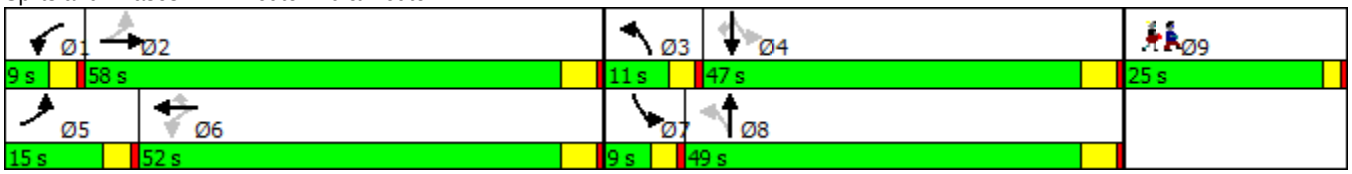
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	218	10	75	412	83	115	412	54	56	383	251
Future Volume (vph)	168	218	10	75	412	83	115	412	54	56	383	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	100		75	250		0	100		200
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	100			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		463			568			274			1055	
Travel Time (s)		10.5			12.9			6.2			24.0	
Confl. Peds. (#/hr)	6					6	2					2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.92	0.92	0.92	0.84	0.84	0.84
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	221	300	0	99	543	109	140	568	0	75	511	335
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6	8			4		4
Detector Phase	5	2		1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	9.0	15.0		9.0	15.0	15.0	9.0	15.0		9.0	15.0	15.0
Total Split (s)	15.0	58.0		9.0	52.0	52.0	11.0	49.0		9.0	47.0	47.0
Total Split (%)	10.0%	38.7%		6.0%	34.7%	34.7%	7.3%	32.7%		6.0%	31.3%	31.3%
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0		4.0	5.0	5.0	4.0	5.0		4.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes			Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None		None	Min	Min	None	None		None	None	None
Act Effct Green (s)	58.1	48.0		48.0	41.9	41.9	52.5	44.4		48.4	42.4	42.4
Actuated g/C Ratio	0.47	0.39		0.39	0.34	0.34	0.42	0.36		0.39	0.34	0.34
v/c Ratio	0.96	0.42		0.25	0.86	0.18	0.69	0.86		0.50	0.80	0.51
Control Delay	77.2	30.5		22.8	53.8	4.6	44.2	52.1		37.5	49.9	17.4
Queue Delay	0.0	0.9		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	77.2	31.4		22.8	53.8	4.6	44.2	52.1		37.5	49.9	17.4
LOS	E	C		C	D	A	D	D		D	D	B
Approach Delay		50.8			42.6			50.6			37.0	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)	109	163		41	383	0	67	415		34	368	82
Queue Length 95th (ft)	#308	283		90	#638	27	#189	#804		79	#626	183
Internal Link Dist (ft)		383			488			194			975	
Turn Bay Length (ft)	200			100		75	250			100		200
Base Capacity (vph)	231	797		403	711	663	203	663		151	635	657
Starvation Cap Reductn	0	263		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	25.0
Total Split (s)	25.0
Total Split (%)	17%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.96	0.56		0.25	0.76	0.16	0.69	0.86		0.50	0.80	0.51

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 124.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 44.3		Intersection LOS: D	
Intersection Capacity Utilization 81.8%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: Route 140 & Route 1A



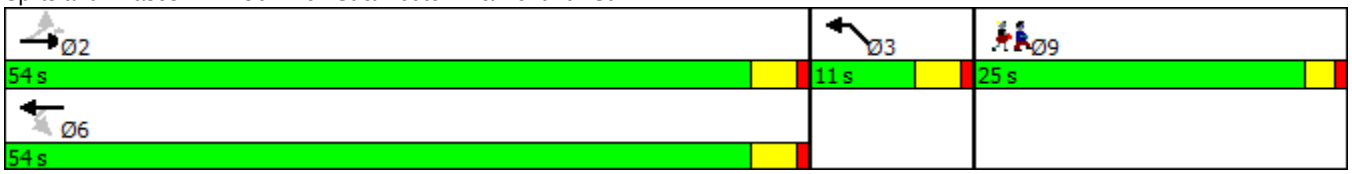
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2	Ø9
Lane Configurations												
Traffic Volume (vph)	56	642	241	29	382	5	0	0	71	7	29	
Future Volume (vph)	56	642	241	29	382	5	0	0	71	7	29	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	50		0	50		0	0	0	0	50		
Storage Lanes	1		0	1		0	0	0	1	1		
Taper Length (ft)	0			25			0		0			
Right Turn on Red			Yes			Yes		Yes			Yes	
Link Speed (mph)		30			30		30		30			
Link Distance (ft)		338			463		659		562			
Travel Time (s)		7.7			10.5		15.0		12.8			
Confl. Peds. (#/hr)			1			7			5			
Peak Hour Factor	0.89	0.89	0.89	0.83	0.83	0.83	0.25	0.25	0.92	0.92	0.92	
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	
Heavy Vehicles (%)	5%	5%	5%	10%	10%	10%	0%	0%	2%	2%	2%	
Shared Lane Traffic (%)											10%	
Lane Group Flow (vph)	70	1111	0	39	522	0	0	0	99	0	31	
Turn Type	Perm	NA		Perm	NA				Prot		Perm	
Protected Phases		2			6				3			9
Permitted Phases	2			6							2	
Detector Phase	2	2		6	6				3		2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0				5.0		5.0	5.0
Minimum Split (s)	9.0	9.0		9.0	9.0				9.0		9.0	25.0
Total Split (s)	54.0	54.0		54.0	54.0				11.0		54.0	25.0
Total Split (%)	60.0%	60.0%		60.0%	60.0%				12.2%		60.0%	28%
Yellow Time (s)	3.0	3.0		3.0	3.0				3.0		3.0	2.0
All-Red Time (s)	1.0	1.0		1.0	1.0				1.0		1.0	1.0
Lost Time Adjust (s)	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	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		None	None				Min		Min	None
Act Effct Green (s)	50.7	50.7		50.7	50.7				6.6		50.7	
Actuated g/C Ratio	0.74	0.74		0.74	0.74				0.10		0.74	
v/c Ratio	0.12	0.87		0.27	0.41				0.47		0.03	
Control Delay	5.2	18.6		11.7	6.2				26.9		1.4	
Queue Delay	0.0	0.0		0.0	0.4				0.0		0.0	
Total Delay	5.2	18.6		11.7	6.6				26.9		1.4	
LOS	A	B		B	A				C		A	
Approach Delay		17.8			6.9				20.8			
Approach LOS		B			A				C			
Queue Length 50th (ft)	5	186		3	47				19		0	
Queue Length 95th (ft)	36	#907		32	209				76		7	
Internal Link Dist (ft)		258			383		579		482			
Turn Bay Length (ft)	50			50							50	
Base Capacity (vph)	573	1281		147	1270				223		1121	
Starvation Cap Reductn	0	0		0	303				0		0	
Spillback Cap Reductn	0	0		0	0				0		0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2	Ø9
Storage Cap Reductn	0	0		0	0				0		0	
Reduced v/c Ratio	0.12	0.87		0.27	0.54				0.44		0.03	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 68.7			
Natural Cycle: 100			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 14.7		Intersection LOS: B	
Intersection Capacity Utilization 66.5%		ICU Level of Service C	
Analysis Period (min) 15			

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

Splits and Phases: 2: Common St & Route 1A & Kendrick St



Intersection Capacity Analysis
Common St & Route 1A & Kendrick St

09/26/2017

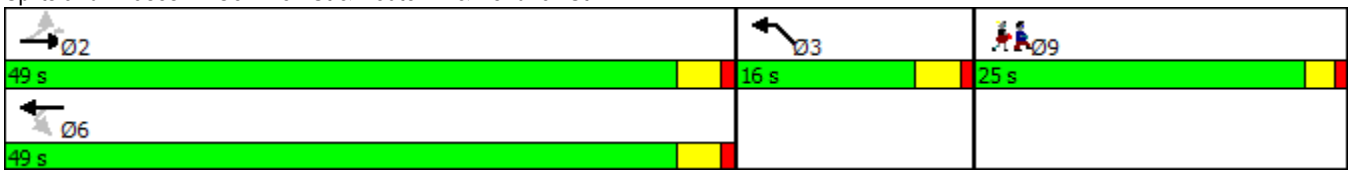
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2	Ø9
Lane Configurations												
Traffic Volume (vph)	15	400	214	15	762	13	0	0	215	3	9	
Future Volume (vph)	15	400	214	15	762	13	0	0	215	3	9	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	50		0	50		0	0	0	0	50		
Storage Lanes	1		0	1		0	0	0	1	1		
Taper Length (ft)	25			25			25		25			
Right Turn on Red			Yes			Yes		Yes			Yes	
Link Speed (mph)		30			30		30		30			
Link Distance (ft)		338			463		659		563			
Travel Time (s)		7.7			10.5		15.0		12.8			
Confl. Peds. (#/hr)	23		10	10		23			4			
Peak Hour Factor	0.93	0.93	0.93	0.91	0.91	0.91	0.92	0.92	0.89	0.89	0.89	
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	1%	1%	1%	
Shared Lane Traffic (%)											10%	
Lane Group Flow (vph)	18	740	0	18	954	0	0	0	276	0	10	
Turn Type	Perm	NA		Perm	NA				Prot		Perm	
Protected Phases		2			6				3			9
Permitted Phases	2			6							2	
Detector Phase	2	2		6	6				3		2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0				5.0		5.0	5.0
Minimum Split (s)	9.0	9.0		9.0	9.0				9.0		9.0	25.0
Total Split (s)	49.0	49.0		49.0	49.0				16.0		49.0	25.0
Total Split (%)	54.4%	54.4%		54.4%	54.4%				17.8%		54.4%	28%
Yellow Time (s)	3.0	3.0		3.0	3.0				3.0		3.0	2.0
All-Red Time (s)	1.0	1.0		1.0	1.0				1.0		1.0	1.0
Lost Time Adjust (s)	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	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		None	None				Min		Min	None
Act Effct Green (s)	45.6	45.6		45.6	45.6				12.2		45.6	
Actuated g/C Ratio	0.66	0.66		0.66	0.66				0.18		0.66	
v/c Ratio	0.11	0.63		0.06	0.77				0.78		0.01	
Control Delay	9.1	11.4		7.4	16.4				41.5		0.0	
Queue Delay	0.0	0.0		0.0	3.6				0.0		0.0	
Total Delay	9.1	11.4		7.4	20.0				41.5		0.0	
LOS	A	B		A	C				D		A	
Approach Delay		11.4			19.8				40.1			
Approach LOS		B			B				D			
Queue Length 50th (ft)	2	114		2	190				86		0	
Queue Length 95th (ft)	18	449		16	#762				#272		0	
Internal Link Dist (ft)		258			383		579		483			
Turn Bay Length (ft)	50			50							50	
Base Capacity (vph)	171	1177		326	1234				353		1016	
Starvation Cap Reductn	0	0		0	194				0		0	
Spillback Cap Reductn	0	0		0	0				0		0	

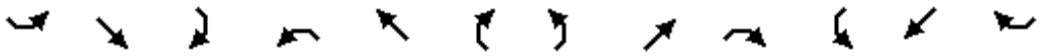
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2	Ø9
Storage Cap Reductn	0	0		0	0				0		0	
Reduced v/c Ratio	0.11	0.63		0.06	0.92				0.78		0.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 69.2			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 19.5		Intersection LOS: B	
Intersection Capacity Utilization 66.3%		ICU Level of Service C	
Analysis Period (min) 15			

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

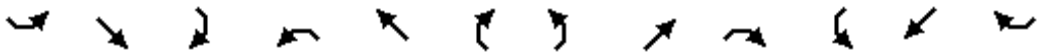
Splits and Phases: Common St & Route 1A & Kendrick St





Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	186	125	79	72	0	53	0	252	0	176	0
Future Volume (vph)	0	186	125	79	72	0	53	0	252	0	176	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		562			397			216			203	
Travel Time (s)		12.8			9.0			4.9			4.6	
Peak Hour Factor	0.92	0.81	0.81	0.80	0.80	0.92	0.88	0.92	0.88	0.92	0.92	0.92
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	2%	5%	5%	3%	3%	2%	3%	2%	3%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	430	0	0	212	0	0	388	0	0	214	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 73.1%		ICU Level of Service D	
Analysis Period (min) 15			



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	188	72	66	189	0	35	0	204	1	216	2
Future Volume (vph)	0	188	72	66	189	0	35	0	204	1	216	2
Peak Hour Factor	0.92	0.91	0.91	0.87	0.87	0.92	0.89	0.92	0.89	0.92	0.92	0.92
Hourly flow rate (vph)	0	231	89	85	243	0	44	0	257	1	263	2

Direction, Lane #	SE 1	NW 1	NE 1	SW 1
Volume Total (vph)	320	328	301	266
Volume Left (vph)	0	85	44	1
Volume Right (vph)	89	0	257	2
Hadj (s)	-0.15	0.09	-0.45	0.03
Departure Headway (s)	6.5	6.7	6.3	6.8
Degree Utilization, x	0.58	0.61	0.53	0.51
Capacity (veh/h)	502	493	503	464
Control Delay (s)	17.9	19.4	16.2	16.6
Approach Delay (s)	17.9	19.4	16.2	16.6
Approach LOS	C	C	C	C

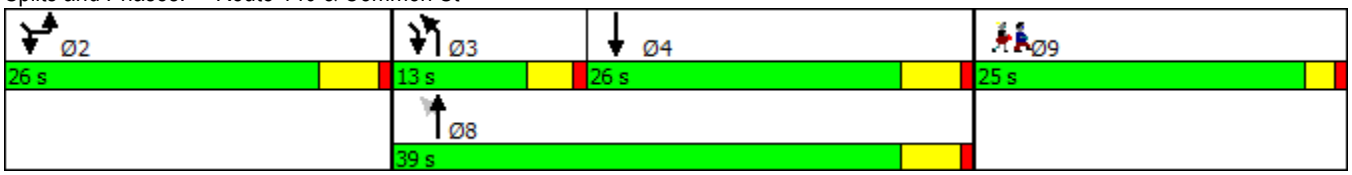
Intersection Summary				
Delay	17.6			
Level of Service	C			
Intersection Capacity Utilization	73.8%	ICU Level of Service	D	
Analysis Period (min)	15			

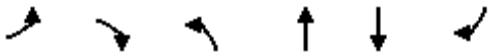
Lane Group	NBL	NBT	SBT	SBR	SEL	SER	Ø9
Lane Configurations							
Traffic Volume (vph)	149	270	246	0	186	252	
Future Volume (vph)	149	270	246	0	186	252	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	200			100	0	100	
Storage Lanes	1			0	1	1	
Taper Length (ft)	25				0		
Right Turn on Red				Yes		Yes	
Link Speed (mph)		30	30		30		
Link Distance (ft)		494	456		397		
Travel Time (s)		11.2	10.4		9.0		
Confl. Peds. (#/hr)				219	162		
Peak Hour Factor	0.80	0.80	0.94	0.94	0.81	0.81	
Growth Factor	112%	112%	112%	112%	112%	112%	
Heavy Vehicles (%)	3%	3%	5%	5%	5%	5%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	209	378	293	0	257	348	
Turn Type	pm+pt	NA	NA		Prot	pt+ov	
Protected Phases	3	8	4		2	2 3	9
Permitted Phases	8						
Detector Phase	3	8	4		2	2 3	
Switch Phase							
Minimum Initial (s)	4.0	4.0	4.0		4.0		5.0
Minimum Split (s)	8.0	9.0	9.0		9.0		25.0
Total Split (s)	13.0	39.0	26.0		26.0		25.0
Total Split (%)	14.4%	43.3%	28.9%		28.9%		28%
Yellow Time (s)	3.0	4.0	4.0		4.0		2.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		
Total Lost Time (s)	4.0	5.0	5.0		5.0		
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None	Min	None		Min		None
Act Effct Green (s)	28.4	27.3	14.5		14.1	26.9	
Actuated g/C Ratio	0.52	0.50	0.26		0.26	0.49	
v/c Ratio	0.41	0.41	0.61		0.58	0.37	
Control Delay	12.8	12.9	26.5		26.4	3.2	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	12.8	12.9	26.5		26.4	3.2	
LOS	B	B	C		C	A	
Approach Delay		12.9	26.5		13.0		
Approach LOS		B	C		B		
Queue Length 50th (ft)	27	57	73		64	0	
Queue Length 95th (ft)	109	200	230		178	32	
Internal Link Dist (ft)		414	376		317		
Turn Bay Length (ft)	200					100	
Base Capacity (vph)	537	1235	748		710	954	
Starvation Cap Reductn	0	0	0		0	0	
Spillback Cap Reductn	0	0	0		0	0	

Lane Group	NBL	NBT	SBT	SBR	SEL	SER	Ø9
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.39	0.31	0.39		0.36	0.36	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 54.9			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 15.6		Intersection LOS: B	
Intersection Capacity Utilization 47.0%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: Route 140 & Common St





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	171	242	255	419	250	0	
Future Volume (vph)	171	242	255	419	250	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0	100	200			100	
Storage Lanes	1	1	1			0	
Taper Length (ft)	25		25				
Right Turn on Red		Yes				Yes	
Link Speed (mph)	30			30	30		
Link Distance (ft)	366			494	442		
Travel Time (s)	8.3			11.2	10.0		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	112%	112%	112%	112%	112%	112%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	218	308	325	533	318	0	
Turn Type	Prot	pt+ov	pm+pt	NA	NA		
Protected Phases	2	2 3	3	8	4		9
Permitted Phases			8				
Detector Phase	2	2 3	3	8	4		
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0		5.0
Minimum Split (s)	9.0		8.0	9.0	9.0		25.0
Total Split (s)	18.0		15.0	47.0	32.0		25.0
Total Split (%)	20.0%		16.7%	52.2%	35.6%		28%
Yellow Time (s)	4.0		3.0	4.0	4.0		2.0
All-Red Time (s)	1.0		1.0	1.0	1.0		1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		4.0	5.0	5.0		
Lead/Lag			Lead		Lag		
Lead-Lag Optimize?			Yes		Yes		
Recall Mode	Min		None	Min	None		None
Act Effct Green (s)	12.6	27.3	30.8	29.8	15.0		
Actuated g/C Ratio	0.23	0.49	0.55	0.54	0.27		
v/c Ratio	0.55	0.33	0.58	0.54	0.63		
Control Delay	29.9	3.4	13.9	12.3	25.6		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	29.9	3.4	13.9	12.3	25.6		
LOS	C	A	B	B	C		
Approach Delay	14.4			12.9	25.6		
Approach LOS	B			B	C		
Queue Length 50th (ft)	57	0	44	88	85		
Queue Length 95th (ft)	#219	49	#160	287	217		
Internal Link Dist (ft)	286			414	362		
Turn Bay Length (ft)		100	200				
Base Capacity (vph)	438	929	581	1481	958		
Starvation Cap Reductn	0	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.50	0.33	0.56	0.36	0.33		

Intersection Summary		
Area Type:	Other	
Cycle Length: 90		
Actuated Cycle Length: 55.7		
Natural Cycle: 80		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 0.63		
Intersection Signal Delay: 15.7		Intersection LOS: B
Intersection Capacity Utilization 52.8%		ICU Level of Service A
Analysis Period (min) 15		

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

Splits and Phases: Route 140 & Common St

APPENDIX K

Intersection Capacity Analyses, 2040 Weekday AM/PM Peak Hour
Wrentham Common Improvement Plan C

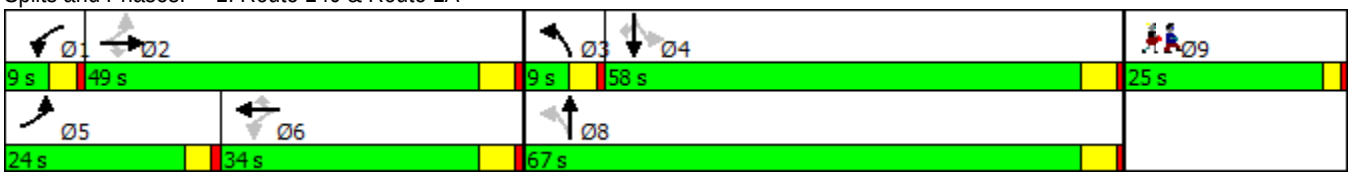
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	224	455	185	30	153	37	91	359	75	89	389	240
Future Volume (vph)	224	455	185	30	153	37	91	359	75	89	389	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		75	100		75	200		0	0		200
Storage Lanes	1		1	1		1	1		0	0		1
Taper Length (ft)	100			25			25			0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		444			799			317			1055	
Travel Time (s)		10.1			18.2			7.2			24.0	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.80	0.80	0.80	0.94	0.94	0.94
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	7%	7%	7%	18%	18%	18%	3%	3%	3%	5%	5%	5%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	614	250	40	206	50	127	608	0	0	569	286
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	3	8		4	4	4
Switch Phase												
Minimum Initial (s)	4.0	1.0	1.0	4.0	12.0	12.0	4.0	12.0		12.0	12.0	12.0
Minimum Split (s)	8.0	20.0	20.0	8.0	17.0	17.0	8.0	17.0		17.0	17.0	17.0
Total Split (s)	24.0	49.0	49.0	9.0	34.0	34.0	9.0	67.0		58.0	58.0	58.0
Total Split (%)	16.0%	32.7%	32.7%	6.0%	22.7%	22.7%	6.0%	44.7%		38.7%	38.7%	38.7%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0			5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes						Yes			Yes	Yes	Yes
Recall Mode	None	None	None	Min	Min	Min	None	None		None	None	None
Act Effct Green (s)	54.8	44.7	44.7	37.4	31.3	31.3	52.6	51.5			42.4	42.4
Actuated g/C Ratio	0.46	0.38	0.38	0.31	0.26	0.26	0.44	0.43			0.36	0.36
v/c Ratio	0.60	0.92	0.40	0.32	0.49	0.11	0.43	0.78			0.82	0.39
Control Delay	30.5	57.7	21.1	31.5	45.9	0.5	26.3	36.8			46.4	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	6.5	16.0			0.0	0.0
Total Delay	30.5	57.7	21.1	31.5	45.9	0.5	32.8	52.9			46.4	4.8
LOS	C	E	C	C	D	A	C	D			D	A
Approach Delay		42.8			36.3			49.4			32.5	
Approach LOS		D			D			D			C	
Queue Length 50th (ft)	142	426	80	16	132	0	53	358			194	0
Queue Length 95th (ft)	282	#808	180	48	248	0	104	540			339	62
Internal Link Dist (ft)		364			719			237			975	
Turn Bay Length (ft)	150		75	100		75	200					200
Base Capacity (vph)	514	667	626	125	423	451	295	955			875	852
Starvation Cap Reductn	0	0	0	0	0	0	121	339			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

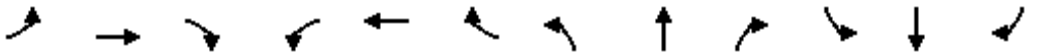
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	25.0
Total Split (s)	25.0
Total Split (%)	17%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Reduced v/c Ratio	0.59	0.92	0.40	0.32	0.49	0.11	0.73	0.99			0.65	0.34

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 118.9			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 40.9		Intersection LOS: D	
Intersection Capacity Utilization 87.2%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: Route 140 & Route 1A





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	218	198	75	412	83	290	422	54	56	383	251
Future Volume (vph)	168	218	198	75	412	83	290	422	54	56	383	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		75	100		75	200		0	0		200
Storage Lanes	1		1	1		1	1		0	0		1
Taper Length (ft)	100			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		444			799			317			1055	
Travel Time (s)		10.1			18.2			7.2			24.0	
Confl. Peds. (#/hr)	6					6	2					2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.92	0.92	0.92	0.84	0.84	0.84
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	221	287	261	99	543	109	353	580	0	0	586	335
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	3	8		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.0	15.0	15.0	9.0	15.0	15.0	9.0	15.0		15.0	15.0	15.0
Total Split (s)	17.0	49.0	49.0	12.0	44.0	44.0	23.0	64.0		41.0	41.0	41.0
Total Split (%)	11.3%	32.7%	32.7%	8.0%	29.3%	29.3%	15.3%	42.7%		27.3%	27.3%	27.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0			5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes						Yes			Yes	Yes	Yes
Recall Mode	None	None	None	Min	Min	Min	None	None		None	None	None
Act Effct Green (s)	57.2	44.4	44.4	48.0	39.2	39.2	60.2	59.2			36.1	36.1
Actuated g/C Ratio	0.44	0.34	0.34	0.37	0.30	0.30	0.47	0.46			0.28	0.28
v/c Ratio	0.93	0.45	0.42	0.25	0.96	0.20	0.88	0.68			0.82	0.51
Control Delay	75.8	36.9	19.7	25.1	74.3	5.4	49.3	33.6			54.4	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	6.5	54.0			0.0	0.0
Total Delay	75.8	36.9	19.7	25.1	74.3	5.4	55.7	87.6			54.4	9.0
LOS	E	D	B	C	E	A	E	F			D	A
Approach Delay		42.3			57.8			75.6			37.8	
Approach LOS		D			E			E			D	
Queue Length 50th (ft)	126	177	79	45	426	0	180	349			230	15
Queue Length 95th (ft)	#317	299	171	97	#738	30	#430	628			#355	79
Internal Link Dist (ft)		364			719			237			975	
Turn Bay Length (ft)	150		75	100		75	200					200
Base Capacity (vph)	237	640	625	394	564	550	400	850			718	654
Starvation Cap Reductn	0	0	0	0	0	0	26	386			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0

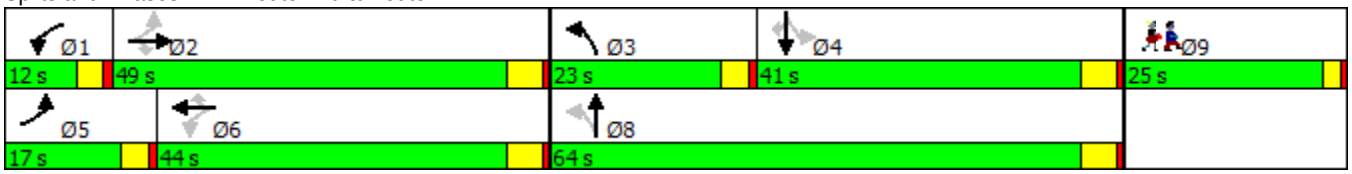
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	25.0
Total Split (s)	25.0
Total Split (%)	17%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.93	0.45	0.42	0.25	0.96	0.20	0.94	1.25			0.82	0.51

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 129.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 53.7		Intersection LOS: D	
Intersection Capacity Utilization 92.8%		ICU Level of Service F	
Analysis Period (min) 15			

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

Splits and Phases: 1: Route 140 & Route 1A



HCM Unsignalized Intersection Capacity Analysis
Common St & Route 1A & Kendrick St

09/26/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2
Lane Configurations											
Traffic Volume (veh/h)	56	822	61	29	382	5	0	0	20	7	29
Future Volume (Veh/h)	56	822	61	29	382	5	0	0	20	7	29
Sign Control		Free			Free		Stop		Stop		
Grade		0%			0%		0%		0%		
Peak Hour Factor	0.89	0.89	0.89	0.83	0.83	0.83	0.25	0.25	0.92	0.92	0.92
Hourly flow rate (vph)	70	1034	77	39	515	7	0	0	24	9	35
Pedestrians		5					7		1		
Lane Width (ft)		12.0					0.0		12.0		
Walking Speed (ft/s)		3.5					3.5		3.5		
Percent Blockage		0					0		0		
Right turn flare (veh)										2	2
Median type		None			TWLTL						
Median storage veh)					2						
Upstream signal (ft)					444						
pX, platoon unblocked	0.90						0.90	0.90	0.90	0.90	
vC, conflicting volume	529			1112			1856	530	1812	1820	1074
vC1, stage 1 conf vol							604		1214	1214	
vC2, stage 2 conf vol							1252		598	607	
vCu, unblocked vol	421			1112			1895	423	1846	1856	1074
tC, single (s)	4.1			4.2			6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							5.5		6.1	5.5	
tF (s)	2.2			2.3			4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			93			100	100	87	96	87
cM capacity (veh/h)	1010			599			175	569	182	202	267

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	70	1111	39	522	68
Volume Left	70	0	39	0	24
Volume Right	0	77	0	7	35
cSH	1010	1700	599	1700	386
Volume to Capacity	0.07	0.65	0.07	0.31	0.18
Queue Length 95th (ft)	6	0	5	0	16
Control Delay (s)	8.8	0.0	11.4	0.0	24.3
Lane LOS	A		B		C
Approach Delay (s)	0.5		0.8		24.3
Approach LOS					C

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
Common St & Route 1A & Kendrick St

09/26/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR	NWR2
Lane Configurations											
Traffic Volume (veh/h)	15	588	26	15	937	13	0	0	15	3	19
Future Volume (Veh/h)	15	588	26	15	937	13	0	0	15	3	19
Sign Control		Free			Free		Stop		Stop		
Grade		0%			0%		0%		0%		
Peak Hour Factor	0.93	0.93	0.93	0.91	0.91	0.91	0.92	0.92	0.89	0.89	0.89
Hourly flow rate (vph)	18	708	31	18	1153	16	0	0	19	4	24
Pedestrians		4					23		10		
Lane Width (ft)		12.0					0.0		12.0		
Walking Speed (ft/s)		3.5					3.5		3.5		
Percent Blockage		0					0		1		
Right turn flare (veh)										2	2
Median type		None			TWLTL						
Median storage veh)					2						
Upstream signal (ft)					444						
pX, platoon unblocked	0.58						0.58	0.58	0.58	0.58	
vC, conflicting volume	1192			749			2005	1188	1962	1998	734
vC1, stage 1 conf vol							1220		770	770	
vC2, stage 2 conf vol							785		1193	1228	
vCu, unblocked vol	973			749			2365	966	2292	2352	734
tC, single (s)	4.1			4.1			6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							5.5		6.1	5.5	
tF (s)	2.2			2.2			4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			98			100	100	86	97	94
cM capacity (veh/h)	416			856			155	180	138	143	418

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	18	739	18	1169	47
Volume Left	18	0	18	0	19
Volume Right	0	31	0	16	24
cSH	416	1700	856	1700	284
Volume to Capacity	0.04	0.43	0.02	0.69	0.17
Queue Length 95th (ft)	3	0	2	0	15
Control Delay (s)	14.0	0.0	9.3	0.0	24.8
Lane LOS	B		A		C
Approach Delay (s)	0.3		0.1		24.8
Approach LOS					C

Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	66.1%	ICU Level of Service		C
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
Taunton St/David Brown's Way & Common St

09/26/2017

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	2	1	1	6	0	125	53	252	0	0	255	2
Future Volume (Veh/h)	2	1	1	6	0	125	53	252	0	0	255	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.80	0.80	0.80	0.81	0.81	0.81	0.88	0.88	0.88	0.84	0.84	0.84
Hourly flow rate (vph)	3	1	1	8	0	173	67	321	0	0	340	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											192	
pX, platoon unblocked												
vC, conflicting volume	970	798	321	798	796	342	343			321		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	970	798	321	798	796	342	343			321		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	98	100	100	97	100	75	94			100		
cM capacity (veh/h)	167	300	718	287	299	694	1210			1185		

Direction, Lane #	NB 1	SB 1	NE 1	SW 1
Volume Total	5	181	388	343
Volume Left	3	8	67	0
Volume Right	1	173	0	3
cSH	220	653	1210	1185
Volume to Capacity	0.02	0.28	0.06	0.00
Queue Length 95th (ft)	2	28	4	0
Control Delay (s)	21.7	12.6	1.9	0.0
Lane LOS	C	B	A	
Approach Delay (s)	21.7	12.6	1.9	0.0
Approach LOS	C	B		

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	52.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
Taunton St/David Brown's Way & Common St

09/26/2017

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	2	2	2	9	2	72	35	204	1	1	286	2
Future Volume (Veh/h)	2	2	2	9	2	72	35	204	1	1	286	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.91	0.91	0.91	0.89	0.89	0.89	0.90	0.90	0.90
Hourly flow rate (vph)	3	3	3	11	2	89	44	257	1	1	356	2
Pedestrians								1				
Lane Width (ft)								12.0				
Walking Speed (ft/s)								3.5				
Percent Blockage								0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											192	
pX, platoon unblocked												
vC, conflicting volume	796	706	258	709	705	358	358			258		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	796	706	258	709	705	358	358			258		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	99	100	97	99	87	96			100		
cM capacity (veh/h)	257	347	781	337	349	688	1201			1307		

Direction, Lane #	NB 1	SB 1	NE 1	SW 1
Volume Total	9	102	302	359
Volume Left	3	11	44	1
Volume Right	3	89	1	2
cSH	372	608	1201	1307
Volume to Capacity	0.02	0.17	0.04	0.00
Queue Length 95th (ft)	2	15	3	0
Control Delay (s)	14.9	12.1	1.5	0.0
Lane LOS	B	B	A	A
Approach Delay (s)	14.9	12.1	1.5	0.0
Approach LOS	B	B		

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	47.7%	ICU Level of Service	A	
Analysis Period (min)	15			

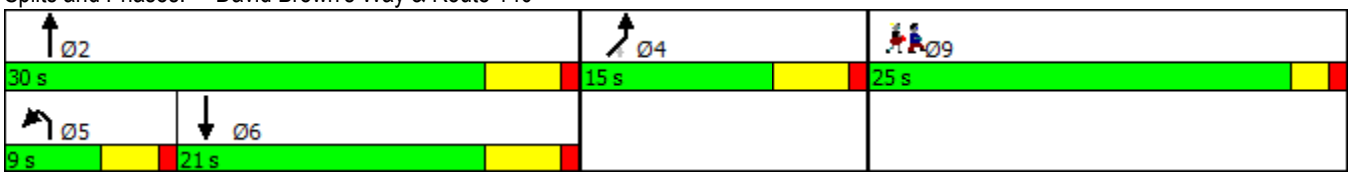
Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Lane Configurations							
Traffic Volume (vph)	79	340	426	178	185	73	
Future Volume (vph)	79	340	426	178	185	73	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	75			0	0	0	
Storage Lanes	1			0	1	1	
Taper Length (ft)	25				0		
Right Turn on Red				Yes		Yes	
Link Speed (mph)		30	30		30		
Link Distance (ft)		453	317		192		
Travel Time (s)		10.3	7.2		4.4		
Peak Hour Factor	0.80	0.80	0.94	0.84	0.88	0.88	
Growth Factor	112%	112%	112%	112%	112%	112%	
Heavy Vehicles (%)	3%	3%	5%	12%	3%	3%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	111	476	745	0	235	93	
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		9
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0	5.0
Minimum Split (s)	8.0	9.0	9.0		9.0	9.0	25.0
Total Split (s)	9.0	30.0	21.0		15.0	15.0	25.0
Total Split (%)	12.9%	42.9%	30.0%		21.4%	21.4%	36%
Yellow Time (s)	3.0	4.0	4.0		4.0	4.0	2.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None	Min	Min		None	None	None
Act Effct Green (s)	5.1	26.0	16.8		10.2	10.2	
Actuated g/C Ratio	0.10	0.52	0.34		0.21	0.21	
v/c Ratio	0.62	0.49	0.65		0.65	0.23	
Control Delay	42.6	11.9	17.5		31.8	7.7	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	42.6	11.9	17.5		31.8	7.7	
LOS	D	B	B		C	A	
Approach Delay		17.7	17.5		25.0		
Approach LOS		B	B		C		
Queue Length 50th (ft)	28	63	67		55	0	
Queue Length 95th (ft)	#107	213	#228		#205	34	
Internal Link Dist (ft)		373	237		112		
Turn Bay Length (ft)	75						
Base Capacity (vph)	180	966	1151		361	397	
Starvation Cap Reductn	0	0	0		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	

Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Reduced v/c Ratio	0.62	0.49	0.65		0.65	0.23	

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 49.6			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 19.0		Intersection LOS: B	
Intersection Capacity Utilization 47.6%		ICU Level of Service A	
Analysis Period (min) 15			

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

Splits and Phases: David Brown's Way & Route 140



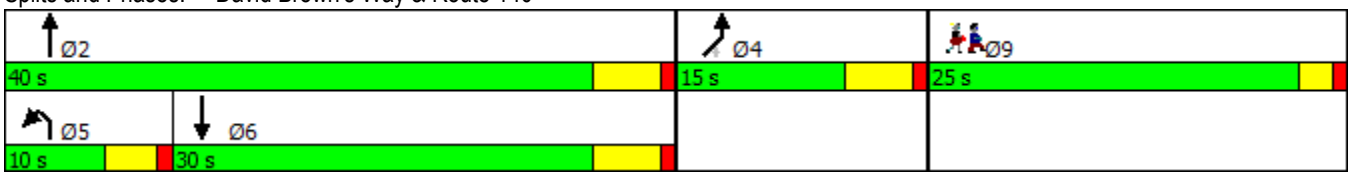
Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Lane Configurations							
Traffic Volume (vph)	70	604	437	219	162	53	
Future Volume (vph)	70	604	437	219	162	53	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	75			0	0	0	
Storage Lanes	1			0	1	1	
Taper Length (ft)	25				25		
Right Turn on Red				Yes		Yes	
Link Speed (mph)		30	30		30		
Link Distance (ft)		453	317		192		
Travel Time (s)		10.3	7.2		4.4		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	112%	112%	112%	112%	112%	112%	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	89	769	835	0	206	67	
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		9
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0	5.0
Minimum Split (s)	8.0	9.0	9.0		9.0	9.0	25.0
Total Split (s)	10.0	40.0	30.0		15.0	15.0	25.0
Total Split (%)	12.5%	50.0%	37.5%		18.8%	18.8%	31%
Yellow Time (s)	3.0	4.0	4.0		4.0	4.0	2.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None	Min	Min		None	None	None
Act Effct Green (s)	6.2	31.7	23.4		10.3	10.3	
Actuated g/C Ratio	0.11	0.57	0.42		0.19	0.19	
v/c Ratio	0.45	0.71	0.56		0.62	0.19	
Control Delay	34.9	16.0	13.9		34.0	9.4	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	34.9	16.0	13.9		34.0	9.4	
LOS	C	B	B		C	A	
Approach Delay		17.9	13.9		27.9		
Approach LOS		B	B		C		
Queue Length 50th (ft)	24	127	80		53	0	
Queue Length 95th (ft)	#102	#520	210		#207	32	
Internal Link Dist (ft)		373	237		112		
Turn Bay Length (ft)	75						
Base Capacity (vph)	200	1229	1766		332	352	
Starvation Cap Reductn	0	0	59		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	

Lane Group	NBL	NBT	SBT	SBR	NEL	NER	Ø9
Reduced v/c Ratio	0.45	0.63	0.49		0.62	0.19	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 55.4			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 17.6		Intersection LOS: B	
Intersection Capacity Utilization 54.0%		ICU Level of Service A	
Analysis Period (min) 15			

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

Splits and Phases: David Brown's Way & Route 140



APPENDIX L

Preliminary Analyses of Roundabout Option:
Route 1A at Route 140 and
Route 140 at Common Street

Draft Diagram (1)

0 160 320 ft

(Scale not correct)

Double-Lane Modern Roundabout Foot-Print (170' D Inscribe Circle)

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Wrentham Route 1A/Route 140

Intersection	
Intersection Delay, s/veh	144.4
Intersection LOS	F

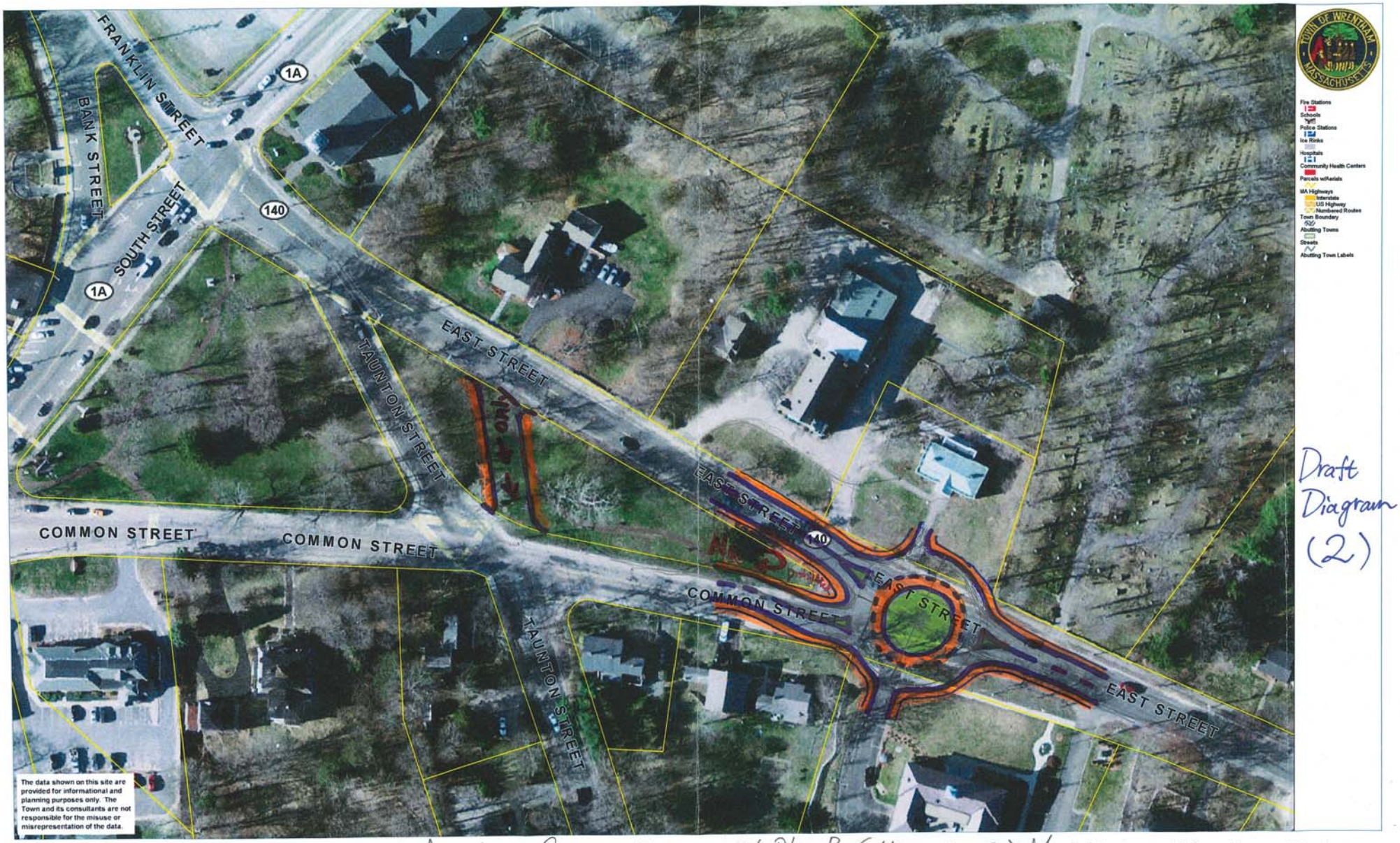
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	521	751	708	921
Demand Flow Rate, veh/h	531	766	715	939
Vehicles Circulating, veh/h	698	873	594	796
Vehicles Exiting, veh/h	1037	436	635	843
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	2	0	0	6
Ped Cap Adj	1.000	1.000	1.000	0.999
Approach Delay, s/veh	52.9	312.1	107.6	87.6
Approach LOS	F	F	F	F

Lane	Left	Left	Left	Left	Right
Designated Moves	LTR	LTR	LTR	LT	R
Assumed Moves	LTR	LTR	LTR	LT	R
RT Channelized					
Lane Util	1.000	1.000	1.000	0.636	0.364
Critical Headway, s	5.193	5.193	5.193	5.193	5.193
Entry Flow, veh/h	531	766	715	597	342
Cap Entry Lane, veh/h	562	472	624	510	510
Entry HV Adj Factor	0.982	0.981	0.990	0.981	0.980
Flow Entry, veh/h	521	751	708	586	335
Cap Entry, veh/h	552	463	618	500	499
V/C Ratio	0.945	1.623	1.146	1.173	0.672
Control Delay, s/veh	52.9	312.1	107.6	124.0	24.1
LOS	F	F	F	F	C
95th %tile Queue, veh	12	43	23	21	5

Intersection	
Intersection Delay, s/veh	39.1
Intersection LOS	E

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	521	751	708	921
Demand Flow Rate, veh/h	531	766	715	939
Vehicles Circulating, veh/h	698	873	594	796
Vehicles Exiting, veh/h	1037	436	635	843
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	2	0	0	6
Ped Cap Adj	0.999	1.000	1.000	0.999
Approach Delay, s/veh	10.9	76.8	19.9	39.2
Approach LOS	B	F	C	E

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	L	TR	L	TR	LT	R
Assumed Moves	L	TR	L	TR	L	TR	LT	R
RT Channelized								
Lane Util	0.424	0.576	0.132	0.868	0.197	0.803	0.636	0.364
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	225	306	101	665	141	574	597	342
Cap Entry Lane, veh/h	669	693	587	613	724	746	622	647
Entry HV Adj Factor	0.982	0.981	0.980	0.981	0.993	0.990	0.981	0.980
Flow Entry, veh/h	221	300	99	652	140	568	586	335
Cap Entry, veh/h	657	680	575	601	719	738	610	633
V/C Ratio	0.336	0.442	0.172	1.084	0.195	0.770	0.961	0.529
Control Delay, s/veh	9.9	11.6	8.4	87.2	7.2	23.1	53.2	14.5
LOS	A	B	A	F	A	C	F	B
95th %tile Queue, veh	1	2	1	19	1	7	13	3



Draft Diagram (2)

0 100 200 ft (Scale Not Correct)

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Wrentham Common Improvement Plan B (Alternative 2) Variation

Single-lane (130'D) Modern Roundabout at Route 140/Common Street (Not Recommended)

Wrentham Common

Intersection	
Intersection Delay, s/veh	29.1
Intersection LOS	D

Approach	EB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	526	858	318
Demand Flow Rate, veh/h	536	876	324
Vehicles Circulating, veh/h	324	222	331
Vehicles Exiting, veh/h	331	638	766
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	15.9	44.4	9.5
Approach LOS	C	E	A

Lane	Left	Left	Left
Designated Moves	LR	LT	T
Assumed Moves	LR	LT	T
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	536	876	324
Cap Entry Lane, veh/h	817	905	812
Entry HV Adj Factor	0.981	0.980	0.980
Flow Entry, veh/h	526	858	318
Cap Entry, veh/h	802	887	796
V/C Ratio	0.656	0.968	0.399
Control Delay, s/veh	15.9	44.4	9.5
LOS	C	E	A
95th %tile Queue, veh	5	16	2

APPENDIX M

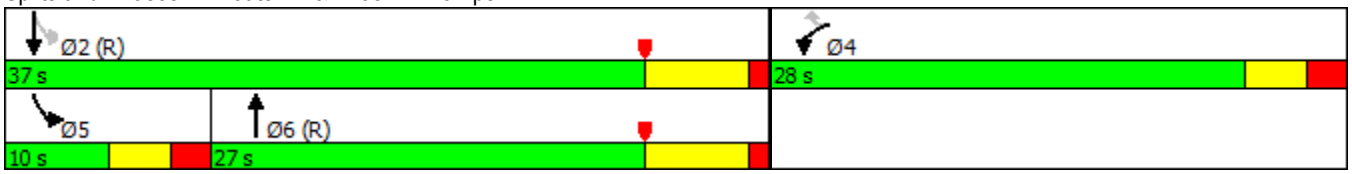
Intersection Capacity Analyses
2040 Weekend Midday Peak Hour
Route 1A from I-495 to Premium Outlets Boulevard
with Proposed Improvements

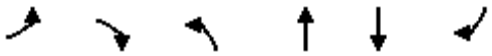
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	1023	193	515	560	124	658
Future Volume (vph)	1023	193	515	560	124	658
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200	300		0	0	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				0	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		40			40
Link Distance (ft)	627		1288			363
Travel Time (s)	14.3		22.0			6.2
Peak Hour Factor	0.99	0.99	0.96	0.96	0.90	0.90
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1033	195	1119	0	138	731
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	4		6		5	2
Permitted Phases		4			2	
Detector Phase	4	4	6		5	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	21.0		5.0	21.0
Minimum Split (s)	15.0	15.0	27.0		10.0	27.0
Total Split (s)	28.0	28.0	27.0		10.0	37.0
Total Split (%)	43.1%	43.1%	41.5%		15.4%	56.9%
Yellow Time (s)	3.0	3.0	5.0		3.0	5.0
All-Red Time (s)	2.0	2.0	1.0		2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0		5.0	6.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max		None	C-Max
Act Effct Green (s)	22.5	22.5	23.5		32.5	31.5
Actuated g/C Ratio	0.35	0.35	0.36		0.50	0.48
v/c Ratio	0.88	0.29	0.77		0.54	0.81
Control Delay	30.5	4.0	6.2		17.7	23.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	30.5	4.0	6.2		17.7	23.7
LOS	C	A	A		B	C
Approach Delay	26.3		6.2			22.8
Approach LOS	C		A			C
Queue Length 50th (ft)	191	0	54		28	234
Queue Length 95th (ft)	#297	37	65		#58	#434
Internal Link Dist (ft)	547		1208			283
Turn Bay Length (ft)	200	300				
Base Capacity (vph)	1203	680	1454		254	903
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.86	0.29	0.77		0.54	0.81

Intersection Summary	
Area Type:	Other
Cycle Length: 65	
Actuated Cycle Length: 65	
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Yellow, Master Intersection	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 18.4	Intersection LOS: B
Intersection Capacity Utilization 81.6%	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: Route 1A & I-495 NB Ramps





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	122	744	0	1688	1512	169
Future Volume (vph)	122	744	0	1688	1512	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			40	40	
Link Distance (ft)	398			412	1288	
Travel Time (s)	9.0			7.0	22.0	
Peak Hour Factor	0.95	0.95	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	3%	3%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	128	783	0	1835	1827	0
Turn Type	Prot	Free		NA	NA	
Protected Phases	8			6	2	
Permitted Phases		Free				
Detector Phase	8			6	2	
Switch Phase						
Minimum Initial (s)	18.0			10.0	10.0	
Minimum Split (s)	23.0			16.0	16.0	
Total Split (s)	23.0			42.0	42.0	
Total Split (%)	35.4%			64.6%	64.6%	
Yellow Time (s)	3.0			5.0	5.0	
All-Red Time (s)	2.0			1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	5.0			6.0	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None			C-Max	C-Max	
Act Effct Green (s)	18.0	65.0		41.8	41.8	
Actuated g/C Ratio	0.28	1.00		0.64	0.64	
v/c Ratio	0.13	0.49		0.81	0.81	
Control Delay	18.2	1.1		10.0	11.0	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	18.2	1.1		10.0	11.0	
LOS	B	A		B	B	
Approach Delay	3.5			10.0	11.0	
Approach LOS	A			B	B	
Queue Length 50th (ft)	19	0		116	188	
Queue Length 95th (ft)	38	0		m#181	#490	
Internal Link Dist (ft)	318			332	1208	
Turn Bay Length (ft)						
Base Capacity (vph)	950	1583		2254	2252	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.13	0.49		0.81	0.81	

Intersection Summary	
Area Type:	Other

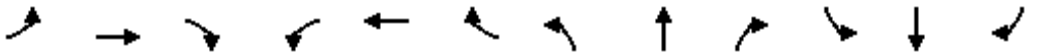
Cycle Length: 65	
Actuated Cycle Length: 65	
Offset: 47 (72%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 71.3%	ICU Level of Service C
Analysis Period (min) 15	

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

Splits and Phases: Route 1A & I-495 SB Ramps

Intersection Capacity Analysis
Route 1A & Premium Outlets Blvd/Mobil Gas Driveway

09/26/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	805	43	203	17	27	97	350	787	37	56	854	1332
Future Volume (vph)	805	43	203	17	27	97	350	787	37	56	854	1332
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	0		0	180		0	0		0
Storage Lanes	1		1	0		1	1		0	1		1
Taper Length (ft)	0			0			25			0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		508			187			626			311	
Travel Time (s)		11.5			4.3			10.7			5.3	
Peak Hour Factor	0.90	0.90	0.90	0.85	0.85	0.85	0.94	0.94	0.94	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	5%	5%	5%	5%	5%	5%	2%	2%	2%
Shared Lane Traffic (%)	30%											
Lane Group Flow (vph)	626	316	226	0	52	114	372	876	0	57	863	1345
Turn Type	Split	NA	Perm	Split	NA	pm+ov	pm+pt	NA		Prot	NA	Free
Protected Phases	4	4		3	3	5	1	6		5	2	
Permitted Phases			4			3	6					Free
Detector Phase	4	4	4	3	3	5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	12.0	12.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	
Total Split (s)	52.0	52.0	52.0	11.0	11.0	15.0	28.0	52.0		15.0	39.0	
Total Split (%)	40.0%	40.0%	40.0%	8.5%	8.5%	11.5%	21.5%	40.0%		11.5%	30.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	48.2	48.2	48.2		5.0	12.2	61.0	46.8		8.2	33.0	130.0
Actuated g/C Ratio	0.37	0.37	0.37		0.04	0.09	0.47	0.36		0.06	0.25	1.00
v/c Ratio	0.99	0.49	0.30		0.76	0.44	1.07	0.71		0.51	0.96	0.85
Control Delay	73.7	35.6	4.7		118.0	9.0	90.5	37.9		65.3	67.2	10.0
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	73.7	35.6	4.7		118.0	9.0	90.5	37.9		65.3	67.2	10.0
LOS	E	D	A		F	A	F	D		E	E	B
Approach Delay		50.1			43.2			53.6			33.2	
Approach LOS		D			D			D			C	
Queue Length 50th (ft)	~594	220	0		44	0	~303	387		44	351	370
Queue Length 95th (ft)	#840	318	54		#110	18	#506	451		m65	#505	263
Internal Link Dist (ft)		428			107			546			231	
Turn Bay Length (ft)			250				180					
Base Capacity (vph)	635	641	741		68	267	348	1231		122	898	1583
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	0.99	0.49	0.30		0.76	0.43	1.07	0.71		0.47	0.96	0.85

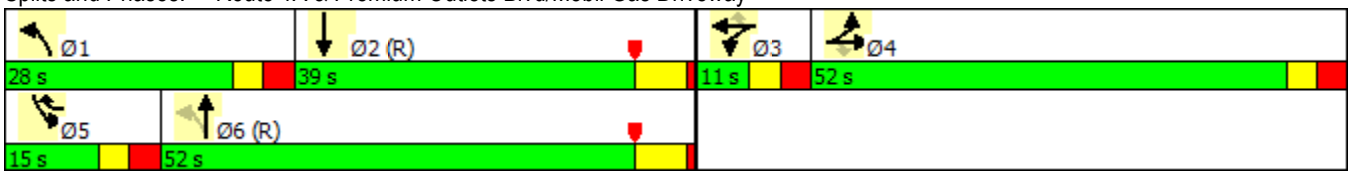
Intersection Summary		
Area Type:	Other	
Cycle Length: 130		
Actuated Cycle Length: 130		
Offset: 45 (35%), Referenced to phase 2:SBT and 6:NBTL, Start of Yellow		
Natural Cycle: 130		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.07		
Intersection Signal Delay: 42.9		Intersection LOS: D
Intersection Capacity Utilization 88.1%		ICU Level of Service E
Analysis Period (min) 15		

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

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

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

Splits and Phases: Route 1A & Premium Outlets Blvd/Mobil Gas Driveway



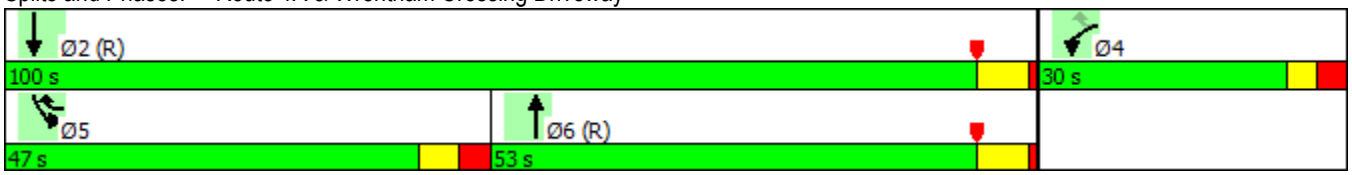
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	221	350	824	168	401	675
Future Volume (vph)	221	350	824	168	401	675
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	250	
Storage Lanes	1	1		0	1	
Taper Length (ft)	0				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		40			40
Link Distance (ft)	454		212			626
Travel Time (s)	10.3		3.6			10.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	240	380	1079	0	436	734
Turn Type	Prot	pm+ov	NA		Prot	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4				
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	10.0		8.0	10.0
Minimum Split (s)	14.0	15.0	16.0		15.0	16.0
Total Split (s)	30.0	47.0	53.0		47.0	100.0
Total Split (%)	23.1%	36.2%	40.8%		36.2%	76.9%
Yellow Time (s)	3.0	4.0	5.0		4.0	5.0
All-Red Time (s)	3.0	3.0	1.0		3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	7.0	6.0		7.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max		None	C-Max
Act Effct Green (s)	21.3	63.4	53.6		36.1	96.7
Actuated g/C Ratio	0.16	0.49	0.41		0.28	0.74
v/c Ratio	0.83	0.48	0.75		0.89	0.28
Control Delay	75.5	21.0	37.4		30.7	2.6
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	75.5	21.0	37.4		30.7	2.6
LOS	E	C	D		C	A
Approach Delay	42.1		37.4			13.1
Approach LOS	D		D			B
Queue Length 50th (ft)	195	174	417		250	20
Queue Length 95th (ft)	#304	246	526		m418	m34
Internal Link Dist (ft)	374		132			546
Turn Bay Length (ft)					250	
Base Capacity (vph)	326	838	1435		544	2632
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.74	0.45	0.75		0.80	0.28

Intersection Summary

Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 122 (94%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 28.5		Intersection LOS: C	
Intersection Capacity Utilization 77.6%		ICU Level of Service D	
Analysis Period (min) 15			

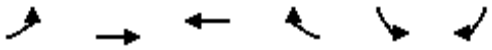
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: Route 1A & Wrentham Crossing Driveway

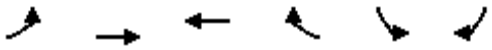


APPENDIX N

Intersection Capacity Analyses
Weekday AM/PM Peak Hour
Projected 2040 Traffic Conditions with Proposed Improvements



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	204	498	765	77	45	236	
Future Volume (vph)	204	498	765	77	45	236	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	75			0	0	75	
Storage Lanes	1			0	1	1	
Taper Length (ft)	0				0		
Right Turn on Red				Yes		Yes	
Link Speed (mph)		30	30		30		
Link Distance (ft)		762	621		1107		
Travel Time (s)		17.3	14.1		25.2		
Confl. Peds. (#/hr)	3			3			
Peak Hour Factor	0.92	0.92	0.87	0.87	0.85	0.85	
Growth Factor	112%	112%	112%	112%	112%	112%	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	248	606	1084	0	59	311	
Turn Type	pm+pt	NA	NA		Prot	pm+ov	
Protected Phases	7	4	8		6	7	9
Permitted Phases	4					6	
Detector Phase	7	4	8		6	7	
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0		10.0	10.0	21.0
Total Split (s)	13.0	67.0	54.0		12.0	13.0	21.0
Total Split (%)	13.0%	67.0%	54.0%		12.0%	13.0%	21%
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead		Lag			Lead	
Lead-Lag Optimize?	Yes		Yes			Yes	
Recall Mode	None	None	None		Min	None	None
Act Effct Green (s)	62.0	62.0	49.0		6.7	19.7	
Actuated g/C Ratio	0.79	0.79	0.62		0.09	0.25	
v/c Ratio	0.90	0.41	0.94		0.39	0.49	
Control Delay	53.4	3.6	30.4		42.0	6.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	53.4	3.6	30.4		42.0	6.1	
LOS	D	A	C		D	A	
Approach Delay		18.1	30.4		11.8		
Approach LOS		B	C		B		
Queue Length 50th (ft)	70	68	433		28	0	
Queue Length 95th (ft)	#204	105	#716		60	48	
Internal Link Dist (ft)		682	541		1027		
Turn Bay Length (ft)	75					75	
Base Capacity (vph)	276	1482	1158		159	633	
Starvation Cap Reductn	0	0	0		0	0	
Spillback Cap Reductn	0	0	0		0	0	

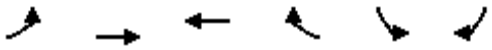


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.90	0.41	0.94		0.37	0.49	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 78.7			
Natural Cycle: 130			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 22.9		Intersection LOS: C	
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: 8: Route 1A & Creek Street



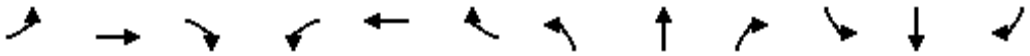
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	204	498	765	77	45	236	
Future Volume (vph)	204	498	765	77	45	236	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Right Turn on Red				Yes		Yes	
Link Speed (mph)		30	30		30		
Link Distance (ft)		762	621		1107		
Travel Time (s)		17.3	14.1		25.2		
Confl. Peds. (#/hr)	3			3			
Peak Hour Factor	0.92	0.92	0.87	0.87	0.85	0.85	
Growth Factor	112%	112%	112%	112%	112%	112%	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	248	606	1084	0	59	311	
Turn Type	pm+pt	NA	NA		Prot	Perm	
Protected Phases	7	4	8		6		9
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	5.0
Minimum Split (s)	10.0	10.0	10.0		10.0	10.0	21.0
Total Split (s)	17.0	85.0	68.0		14.0	14.0	21.0
Total Split (%)	14.2%	70.8%	56.7%		11.7%	11.7%	18%
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None	None	None		Max	Max	None
Act Effct Green (s)	80.4	80.4	63.3		9.0	9.0	
Actuated g/C Ratio	0.78	0.78	0.62		0.09	0.09	
v/c Ratio	0.88	0.41	0.95		0.38	0.73	
Control Delay	57.1	5.4	36.3		53.4	16.7	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	57.1	5.4	36.3		53.4	16.7	
LOS	E	A	D		D	B	
Approach Delay		20.4	36.3		22.6		
Approach LOS		C	D		C		
Queue Length 50th (ft)	101	81	541		36	0	
Queue Length 95th (ft)	#310	268	#1107		83	68	
Internal Link Dist (ft)		682	541		1027		
Turn Bay Length (ft)							
Base Capacity (vph)	283	1473	1146		157	424	
Starvation Cap Reductn	0	0	0		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.88	0.41	0.95		0.38	0.73	

Intersection Summary

Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 102.6			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 28.2		Intersection LOS: C	
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.

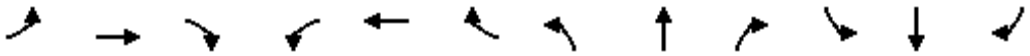
Splits and Phases: Route 1A & Creek Street



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	915	33	41	429	3	22	0	38	9	1	1
Future Volume (Veh/h)	4	915	33	41	429	3	22	0	38	9	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.79	0.79	0.79	0.55	0.55	0.55
Hourly flow rate (vph)	5	1192	43	53	559	4	31	0	54	18	2	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	563			1235			1892	1892	1214	1944	1912	561
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	563			1235			1892	1892	1214	1944	1912	561
tC, single (s)	4.1			4.2			7.2	6.6	6.3	7.2	6.6	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.1	3.4	3.6	4.1	3.4
p0 queue free %	99			90			30	100	74	44	97	100
cM capacity (veh/h)	994			534			45	59	210	32	58	514

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	1240	53	563	85	22
Volume Left	5	53	0	31	18
Volume Right	43	0	4	54	2
cSH	994	534	1700	89	37
Volume to Capacity	0.01	0.10	0.33	0.95	0.60
Queue Length 95th (ft)	0	8	0	135	53
Control Delay (s)	0.2	12.5	0.0	167.0	199.7
Lane LOS	A	B		F	F
Approach Delay (s)	0.2	1.1		167.0	199.7
Approach LOS				F	F

Intersection Summary				
Average Delay	9.9			
Intersection Capacity Utilization	70.2%	ICU Level of Service		C
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	604	48	69	876	4	45	0	77	5	0	2
Future Volume (Veh/h)	1	604	48	69	876	4	45	0	77	5	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.88	0.88	0.88	0.76	0.76	0.76	0.58	0.58	0.58
Hourly flow rate (vph)	1	697	55	88	1115	5	66	0	113	10	0	4
Pedestrians		1			1			1				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		3.5			3.5			3.5				
Percent Blockage		0			0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1120			753			2024	2024	726	2134	2048	1118
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1120			753			2024	2024	726	2134	2048	1118
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			90			0	100	74	59	100	98
cM capacity (veh/h)	624			861			39	52	427	25	51	254

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	753	88	1120	179	14
Volume Left	1	88	0	66	10
Volume Right	55	0	5	113	4
cSH	624	861	1700	92	33
Volume to Capacity	0.00	0.10	0.66	1.94	0.42
Queue Length 95th (ft)	0	9	0	382	35
Control Delay (s)	0.0	9.7	0.0	538.2	178.1
Lane LOS	A	A		F	F
Approach Delay (s)	0.0	0.7		538.2	178.1
Approach LOS				F	F

Intersection Summary			
Average Delay	46.3		
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

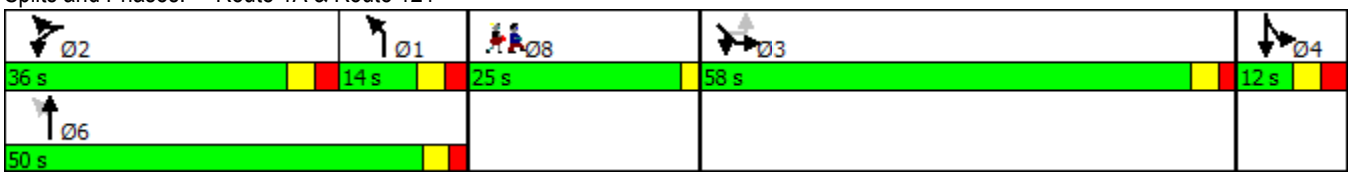
Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER	Ø8
Lane Configurations											
Traffic Volume (vph)	289	173	60	0	419	0	0	7	526	200	
Future Volume (vph)	289	173	60	0	419	0	0	7	526	200	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0	0	150		0	0		0	0	200	
Storage Lanes	1	1	1		0	0		0	1	1	
Taper Length (ft)	25		25			25			25		
Right Turn on Red					Yes			Yes		Yes	
Link Speed (mph)	30			30			30		30		
Link Distance (ft)	228			938			493		596		
Travel Time (s)	5.2			21.3			11.2		13.5		
Peak Hour Factor	0.91	0.91	0.87	0.87	0.87	0.92	0.92	0.35	0.86	0.86	
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	
Heavy Vehicles (%)	12%	12%	8%	8%	8%	2%	2%	14%	2%	2%	
Shared Lane Traffic (%)											
Lane Group Flow (vph)	356	213	77	539	0	0	22	0	685	260	
Turn Type	Prot	Prot	pm+pt	NA			NA		Prot	Prot	
Protected Phases	2!	2!	1	6!		4	4		3	3	8
Permitted Phases			6!								
Detector Phase	2	2	1	6		4	4		3	3	
Switch Phase											
Minimum Initial (s)	15.0	15.0	8.0	15.0		3.0	3.0		8.0	8.0	5.0
Minimum Split (s)	21.0	21.0	14.0	20.0		12.0	12.0		13.0	13.0	25.0
Total Split (s)	36.0	36.0	14.0	50.0		12.0	12.0		58.0	58.0	25.0
Total Split (%)	24.8%	24.8%	9.7%	34.5%		8.3%	8.3%		40.0%	40.0%	17%
Yellow Time (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	2.5	2.5	2.5	2.0		3.0	3.0		2.0	2.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.0			6.0		5.0	5.0	
Lead/Lag	Lead	Lead	Lag								
Lead-Lag Optimize?	Yes	Yes	Yes								
Recall Mode	Min	Min	None	Min		None	None		None	None	None
Act Effct Green (s)	30.7	30.7	43.1	41.8			4.5		53.4	53.4	
Actuated g/C Ratio	0.28	0.28	0.39	0.38			0.04		0.48	0.48	
v/c Ratio	0.80	0.54	0.42	0.64			0.03		0.81	0.31	
Control Delay	54.1	42.1	46.3	9.4			0.0		35.4	10.6	
Queue Delay	0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Total Delay	54.1	42.1	46.3	9.4			0.0		35.4	10.6	
LOS	D	D	D	A			A		D	B	
Approach Delay	49.6			14.0					28.6		
Approach LOS	D			B					C		
Queue Length 50th (ft)	259	141	38	48			0		458	56	
Queue Length 95th (ft)	#424	226	71	141			0		#596	107	
Internal Link Dist (ft)	148			858			413		516		
Turn Bay Length (ft)			150							200	
Base Capacity (vph)	445	398	189	872			848		850	830	
Starvation Cap Reductn	0	0	0	0			0		0	0	
Spillback Cap Reductn	0	0	0	0			0		0	0	
Storage Cap Reductn	0	0	0	0			0		0	0	

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER	Ø8
Reduced v/c Ratio	0.80	0.54	0.41	0.62			0.03		0.81	0.31	

Intersection Summary			
Area Type:	Other		
Cycle Length: 145			
Actuated Cycle Length: 111.2			
Natural Cycle: 145			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 29.7		Intersection LOS: C	
Intersection Capacity Utilization 92.5%		ICU Level of Service F	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

Splits and Phases: Route 1A & Route 121



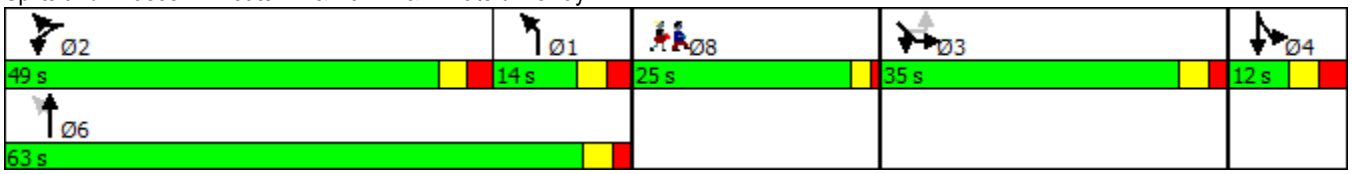
Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER	Ø8
Lane Configurations												
Traffic Volume (vph)	440	472	6	201	0	386	3	2	0	255	145	
Future Volume (vph)	440	472	6	201	0	386	3	2	0	255	145	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0	0		150		0	0		0	0	200	
Storage Lanes	1	1		1		0	0		0	1	1	
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes		Yes	
Link Speed (mph)	30				30			30		30		
Link Distance (ft)	223				1040			190		596		
Travel Time (s)	5.1				23.6			4.3		13.5		
Confl. Peds. (#/hr)			1	8		2	2		8			
Peak Hour Factor	0.84	0.84	0.84	0.90	0.90	0.90	0.62	0.62	0.62	0.69	0.69	
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	17%	17%	17%	2%	2%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	587	637	0	250	480	0	0	9	0	414	235	
Turn Type	Prot	Prot		pm+pt	NA		Split	NA		Prot	Prot	
Protected Phases	2!	2!		1	6!		4	4		3	3	8
Permitted Phases				6!								
Detector Phase	2	2		1	6		4	4		3	3	
Switch Phase												
Minimum Initial (s)	15.0	15.0		8.0	15.0		3.0	3.0		8.0	8.0	5.0
Minimum Split (s)	21.0	21.0		14.0	20.5		12.0	12.0		13.0	13.0	25.0
Total Split (s)	49.0	49.0		14.0	63.0		12.0	12.0		35.0	35.0	25.0
Total Split (%)	36.3%	36.3%		10.4%	46.7%		8.9%	8.9%		25.9%	25.9%	19%
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	2.5	2.5		2.5	2.0		3.0	3.0		2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.0			6.0		5.0	5.0	
Lead/Lag	Lead	Lead		Lag								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	Min	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	44.2	44.2		58.0	58.5			5.1		30.5	30.5	
Actuated g/C Ratio	0.42	0.42		0.55	0.56			0.05		0.29	0.29	
v/c Ratio	0.78	0.85		0.40	0.43			0.12		0.81	0.40	
Control Delay	36.6	35.0		19.5	1.9			56.5		49.3	12.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Delay	36.6	35.0		19.5	1.9			56.5		49.3	12.3	
LOS	D	C		B	A			E		D	B	
Approach Delay	35.7				7.9			56.5		35.9		
Approach LOS	D				A			E		D		
Queue Length 50th (ft)	292	270		70	0			5		231	27	
Queue Length 95th (ft)	#684	#667		214	20			19		#376	55	
Internal Link Dist (ft)	143				960			110		516		
Turn Bay Length (ft)				150							200	
Base Capacity (vph)	753	751		634	1122			92		514	584	
Starvation Cap Reductn	0	0		0	0			0		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	

Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER	Ø8
Storage Cap Reductn	0	0		0	0			0		0	0	
Reduced v/c Ratio	0.78	0.85		0.39	0.43			0.10		0.81	0.40	

Intersection Summary			
Area Type:	Other		
Cycle Length: 135			
Actuated Cycle Length: 104.9			
Natural Cycle: 135			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 28.1		Intersection LOS: C	
Intersection Capacity Utilization 83.0%		ICU Level of Service E	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

Splits and Phases: Route 1A & Rt 121 & Private driveway



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	183	145	482	668	142	571
Future Volume (vph)	183	145	482	668	142	571
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200	300		0	0	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				0	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	627		1275			363
Travel Time (s)	14.3		29.0			8.3
Peak Hour Factor	0.95	0.95	0.91	0.91	0.86	0.86
Heavy Vehicles (%)	16%	16%	6%	6%	9%	9%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	193	153	1264	0	165	664
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	4		6		5	2
Permitted Phases		4			2	
Detector Phase	4	4	6		5	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	21.0		5.0	21.0
Minimum Split (s)	15.0	15.0	27.0		9.5	27.0
Total Split (s)	15.0	15.0	28.0		12.0	40.0
Total Split (%)	27.3%	27.3%	50.9%		21.8%	72.7%
Yellow Time (s)	3.0	3.0	5.0		3.5	5.0
All-Red Time (s)	2.0	2.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0		4.5	6.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	C-Max		None	C-Max
Act Effct Green (s)	10.0	10.0	24.5		35.5	34.0
Actuated g/C Ratio	0.18	0.18	0.45		0.65	0.62
v/c Ratio	0.35	0.40	0.70		0.49	0.62
Control Delay	21.8	8.0	4.3		10.1	9.6
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	21.8	8.0	4.3		10.1	9.6
LOS	C	A	A		B	A
Approach Delay	15.7		4.3			9.7
Approach LOS	B		A			A
Queue Length 50th (ft)	28	0	47		17	112
Queue Length 95th (ft)	53	40	0		43	180
Internal Link Dist (ft)	547		1195			283
Turn Bay Length (ft)	200	300				
Base Capacity (vph)	548	378	1794		352	1077
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.35	0.40	0.70		0.47	0.62

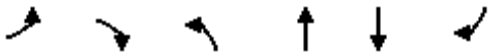
Intersection Summary		
Area Type:	Other	
Cycle Length: 55		
Actuated Cycle Length: 55		
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Yellow, Master Intersection		
Natural Cycle: 60		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.70		
Intersection Signal Delay: 7.7		Intersection LOS: A
Intersection Capacity Utilization 63.9%		ICU Level of Service B
Analysis Period (min) 15		

Splits and Phases: Route 1A & I-495 NB Ramps

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	472	360	532	466	158	642
Future Volume (vph)	472	360	532	466	158	642
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200	300		0	0	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				0	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	627		1275			363
Travel Time (s)	14.3		29.0			8.3
Peak Hour Factor	0.98	0.98	0.83	0.83	0.81	0.81
Heavy Vehicles (%)	3%	3%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	482	367	1202	0	195	793
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	4		6		5	2
Permitted Phases		4			2	
Detector Phase	4	4	6		5	2
Switch Phase						
Minimum Initial (s)	10.0	10.0	21.0		5.0	21.0
Minimum Split (s)	15.0	15.0	27.0		9.5	27.0
Total Split (s)	15.0	15.0	29.0		11.0	40.0
Total Split (%)	27.3%	27.3%	52.7%		20.0%	72.7%
Yellow Time (s)	3.0	3.0	5.0		3.5	5.0
All-Red Time (s)	2.0	2.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	6.0		4.5	6.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max		None	C-Max
Act Effct Green (s)	10.0	10.0	25.2		35.5	34.0
Actuated g/C Ratio	0.18	0.18	0.46		0.65	0.62
v/c Ratio	0.78	0.64	0.68		0.57	0.69
Control Delay	32.5	9.2	6.3		12.5	11.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	32.5	9.2	6.3		12.5	11.0
LOS	C	A	A		B	B
Approach Delay	22.4		6.3			11.3
Approach LOS	C		A			B
Queue Length 50th (ft)	78	4	110		21	144
Queue Length 95th (ft)	#141	65	50		48	201
Internal Link Dist (ft)	547		1195			283
Turn Bay Length (ft)	200	300				
Base Capacity (vph)	618	573	1775		345	1151
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.78	0.64	0.68		0.57	0.69

Intersection Summary		
Area Type:	Other	
Cycle Length: 55		
Actuated Cycle Length: 55		
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Yellow, Master Intersection		
Natural Cycle: 55		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.78		
Intersection Signal Delay: 12.4	Intersection LOS: B	
Intersection Capacity Utilization 64.8%	ICU Level of Service C	
Analysis Period (min) 15		
# 95th percentile volume exceeds capacity, queue may be longer.		
Queue shown is maximum after two cycles.		

Splits and Phases: 4: Route 1A & I-495 NB Ramps

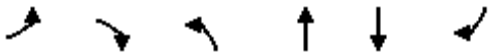


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	114	259	0	1290	408	347
Future Volume (vph)	114	259	0	1290	408	347
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			40	40	
Link Distance (ft)	604			409	1275	
Travel Time (s)	13.7			7.0	21.7	
Peak Hour Factor	0.78	0.78	0.86	0.86	0.85	0.85
Heavy Vehicles (%)	14%	14%	7%	7%	11%	11%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	146	332	0	1500	888	0
Turn Type	Prot	Perm		NA	NA	
Protected Phases	8			6	2	
Permitted Phases		8				
Detector Phase	8	8		6	2	
Switch Phase						
Minimum Initial (s)	5.0	5.0		10.0	10.0	
Minimum Split (s)	10.0	10.0		16.0	16.0	
Total Split (s)	17.0	17.0		38.0	38.0	
Total Split (%)	30.9%	30.9%		69.1%	69.1%	
Yellow Time (s)	3.0	3.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		6.0	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None		C-Max	C-Max	
Act Effct Green (s)	8.4	8.4		35.6	35.6	
Actuated g/C Ratio	0.15	0.15		0.65	0.65	
v/c Ratio	0.31	0.67		0.69	0.42	
Control Delay	21.7	10.2		6.1	2.7	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	21.7	10.2		6.1	2.7	
LOS	C	B		A	A	
Approach Delay	13.7			6.1	2.7	
Approach LOS	B			A	A	
Queue Length 50th (ft)	22	0		97	11	
Queue Length 95th (ft)	34	33		195	44	
Internal Link Dist (ft)	524			329	1195	
Turn Bay Length (ft)						
Base Capacity (vph)	670	568		2183	2103	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.22	0.58		0.69	0.42	

Intersection Summary	
Area Type:	Other

Cycle Length: 55	
Actuated Cycle Length: 55	
Offset: 31 (56%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 6.3	Intersection LOS: A
Intersection Capacity Utilization 49.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: Route 1A & I-495 SB Ramps

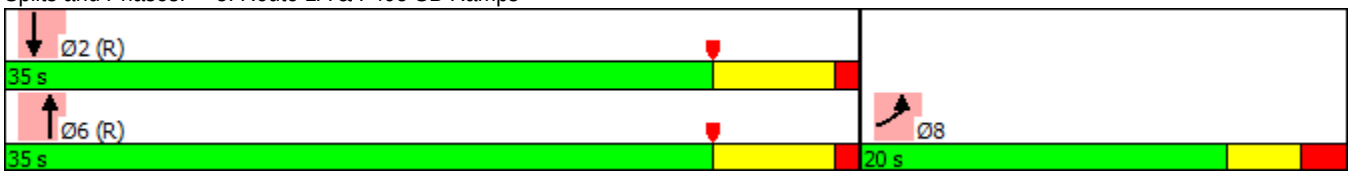


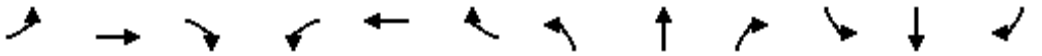
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	164	716	0	1248	957	157
Future Volume (vph)	164	716	0	1248	957	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	30	
Link Distance (ft)	579			399	1275	
Travel Time (s)	13.2			9.1	29.0	
Peak Hour Factor	0.86	0.86	0.89	0.89	0.88	0.88
Heavy Vehicles (%)	2%	2%	1%	1%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	191	833	0	1402	1266	0
Turn Type	Prot	Free		NA	NA	
Protected Phases	8			6	2	
Permitted Phases		Free				
Detector Phase	8			6	2	
Switch Phase						
Minimum Initial (s)	5.0			10.0	10.0	
Minimum Split (s)	20.0			20.0	20.0	
Total Split (s)	20.0			35.0	35.0	
Total Split (%)	36.4%			63.6%	63.6%	
Yellow Time (s)	3.0			5.0	5.0	
All-Red Time (s)	2.0			1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	5.0			6.0	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None			C-Max	C-Max	
Act Effct Green (s)	8.4	55.0		39.0	39.0	
Actuated g/C Ratio	0.15	1.00		0.71	0.71	
v/c Ratio	0.36	0.53		0.55	0.51	
Control Delay	22.5	1.3		2.5	5.5	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	22.5	1.3		2.5	5.5	
LOS	C	A		A	A	
Approach Delay	5.2			2.5	5.5	
Approach LOS	A			A	A	
Queue Length 50th (ft)	29	0		18	98	
Queue Length 95th (ft)	48	0		52	120	
Internal Link Dist (ft)	499			319	1195	
Turn Bay Length (ft)						
Base Capacity (vph)	936	1583		2536	2474	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.20	0.53		0.55	0.51	

Intersection Summary	
Area Type:	Other

Cycle Length: 55	
Actuated Cycle Length: 55	
Offset: 27 (49%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 4.3	Intersection LOS: A
Intersection Capacity Utilization 48.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Route 1A & I-495 SB Ramps



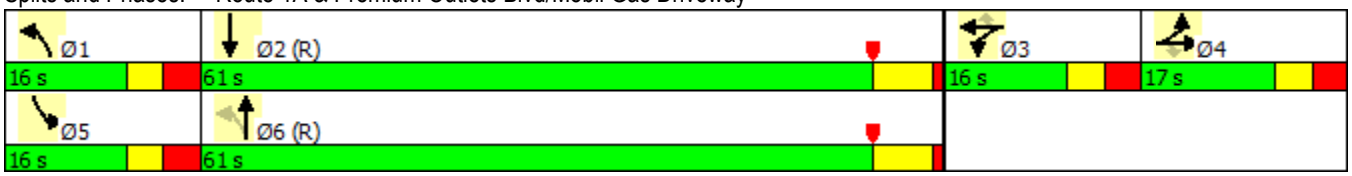


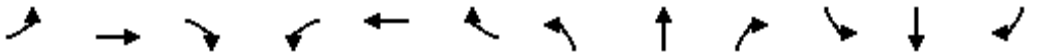
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	122	4	43	21	7	104	109	1052	63	63	482	137
Future Volume (vph)	122	4	43	21	7	104	109	1052	63	63	482	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	0		0	230		0	0		0
Storage Lanes	1		1	0		1	1		0	1		1
Taper Length (ft)	0			0			25			0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		721			236			646			291	
Travel Time (s)		16.4			5.4			11.0			5.0	
Peak Hour Factor	0.69	0.69	0.69	0.65	0.65	0.65	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	9%	9%	9%	15%	15%	15%	8%	8%	8%	17%	17%	17%
Shared Lane Traffic (%)	48%											
Lane Group Flow (vph)	92	91	62	0	43	160	120	1225	0	69	530	151
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		Prot	NA	Free
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases			4			3	6					Free
Detector Phase	4	4	4	3	3	3	1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	12.0	12.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	
Total Split (s)	17.0	17.0	17.0	16.0	16.0	16.0	16.0	61.0		16.0	61.0	
Total Split (%)	15.5%	15.5%	15.5%	14.5%	14.5%	14.5%	14.5%	55.5%		14.5%	55.5%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	10.2	10.2	10.2		8.1	8.1	68.2	61.2		8.9	59.4	110.0
Actuated g/C Ratio	0.09	0.09	0.09		0.07	0.07	0.62	0.56		0.08	0.54	1.00
v/c Ratio	0.63	0.62	0.23		0.37	0.64	0.23	0.66		0.55	0.32	0.11
Control Delay	67.5	66.7	2.0		56.8	19.7	3.8	11.1		60.0	14.2	0.1
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	67.5	66.7	2.0		56.8	19.7	3.8	11.1		60.0	14.2	0.1
LOS	E	E	A		E	B	A	B		E	B	A
Approach Delay		50.6			27.5			10.4			15.6	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	66	65	0		29	0	8	351		45	108	0
Queue Length 95th (ft)	93	92	0		46	14	15	217		m84	144	0
Internal Link Dist (ft)		641			156			566			211	
Turn Bay Length (ft)			250				230					
Base Capacity (vph)	160	161	284		144	273	555	1848		141	1667	1380
Starvation Cap Reductn	0	0	0		0	0	0	15		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	0.57	0.57	0.22		0.30	0.59	0.22	0.67		0.49	0.32	0.11

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 36 (33%), Referenced to phase 2:SBT and 6:NBTL, Start of Yellow		
Natural Cycle: 65		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.66		
Intersection Signal Delay: 17.2	Intersection LOS: B	
Intersection Capacity Utilization 60.4%	ICU Level of Service B	
Analysis Period (min) 15		

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

Splits and Phases: Route 1A & Premium Outlets Blvd/Mobil Gas Driveway



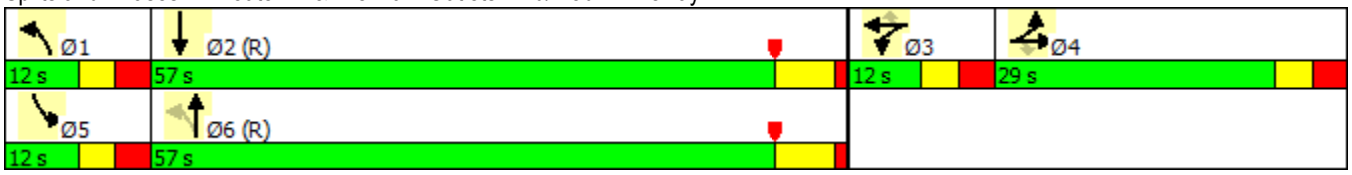


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	507	36	181	29	15	72	129	687	35	45	1172	452
Future Volume (vph)	507	36	181	29	15	72	129	687	35	45	1172	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	0		0	230		0	0		0
Storage Lanes	1		1	0		1	1		0	1		1
Taper Length (ft)	0			0			25			0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		659			195			646			246	
Travel Time (s)		15.0			4.4			11.0			4.2	
Peak Hour Factor	0.88	0.88	0.88	0.70	0.70	0.70	0.94	0.94	0.94	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	4%	4%	4%	3%	3%	3%
Shared Lane Traffic (%)	47%											
Lane Group Flow (vph)	305	312	206	0	62	103	137	768	0	52	1347	520
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		Prot	NA	Free
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases			4			3	6					Free
Detector Phase	4	4	4	3	3	3	1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	12.0	12.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	
Total Split (s)	29.0	29.0	29.0	12.0	12.0	12.0	12.0	57.0		12.0	57.0	
Total Split (%)	26.4%	26.4%	26.4%	10.9%	10.9%	10.9%	10.9%	51.8%		10.9%	51.8%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	22.1	22.1	22.1		6.0	6.0	59.1	54.3		5.9	51.4	110.0
Actuated g/C Ratio	0.20	0.20	0.20		0.05	0.05	0.54	0.49		0.05	0.47	1.00
v/c Ratio	0.89	0.90	0.46		0.63	0.45	0.82	0.45		0.55	0.82	0.33
Control Delay	70.0	71.8	13.8		79.1	9.1	55.7	31.6		69.2	27.7	0.5
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	70.0	71.8	13.8		79.1	9.1	55.7	31.6		69.2	27.7	0.5
LOS	E	E	B		E	A	E	C		E	C	A
Approach Delay		56.6			35.4			35.3			21.5	
Approach LOS		E			D			D			C	
Queue Length 50th (ft)	220	225	27		44	0	75	277		33	375	0
Queue Length 95th (ft)	#362	#372	88		68	0	#155	347		m#76	458	0
Internal Link Dist (ft)		579			115			566			166	
Turn Bay Length (ft)			250				230					
Base Capacity (vph)	358	361	464		98	227	168	1704		95	1638	1568
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	0.85	0.86	0.44		0.63	0.45	0.82	0.45		0.55	0.82	0.33

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 80 (73%), Referenced to phase 2:SBT and 6:NBTL, Start of Yellow		
Natural Cycle: 90		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.90		
Intersection Signal Delay: 32.9		Intersection LOS: C
Intersection Capacity Utilization 76.2%		ICU Level of Service D
Analysis Period (min) 15		

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

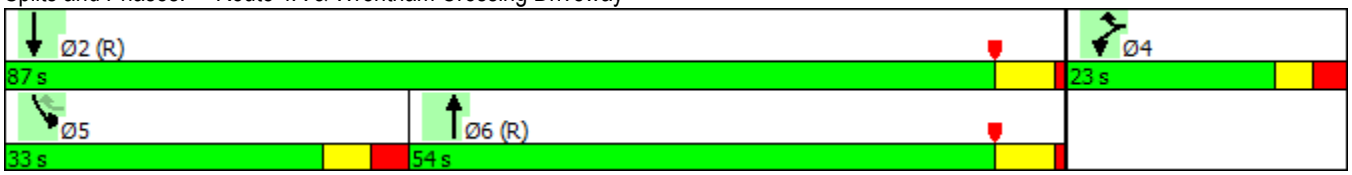
Splits and Phases: Route 1A & Premium Outlets Blvd/Mobil Driveway



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	54	94	964	45	136	410
Future Volume (vph)	54	94	964	45	136	410
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	250	
Storage Lanes	1	1		0	1	
Taper Length (ft)	0				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	466		1292			646
Travel Time (s)	10.6		29.4			14.7
Peak Hour Factor	0.92	0.92	0.91	0.91	0.90	0.90
Heavy Vehicles (%)	2%	2%	7%	7%	17%	17%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	59	102	1108	0	151	456
Turn Type	Prot	custom	NA		Prot	NA
Protected Phases	4	4	6		5	2
Permitted Phases		5				
Detector Phase	4	4	6		5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	10.0		8.0	10.0
Minimum Split (s)	14.0	14.0	16.0		15.0	16.0
Total Split (s)	23.0	23.0	54.0		33.0	87.0
Total Split (%)	20.9%	20.9%	49.1%		30.0%	79.1%
Yellow Time (s)	3.0	3.0	5.0		4.0	5.0
All-Red Time (s)	3.0	3.0	1.0		3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		7.0	6.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max		None	C-Max
Act Effct Green (s)	9.6	32.6	65.4		16.0	88.4
Actuated g/C Ratio	0.09	0.30	0.59		0.15	0.80
v/c Ratio	0.39	0.20	0.56		0.67	0.18
Control Delay	54.3	16.9	15.8		54.3	3.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	54.3	16.9	15.8		54.3	3.5
LOS	D	B	B		D	A
Approach Delay	30.6		15.8			16.1
Approach LOS	C		B			B
Queue Length 50th (ft)	40	31	228		108	39
Queue Length 95th (ft)	80	64	358		177	57
Internal Link Dist (ft)	386		1212			566
Turn Bay Length (ft)					250	
Base Capacity (vph)	273	494	1995		364	2480
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.22	0.21	0.56		0.41	0.18

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 25 (23%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow		
Natural Cycle: 60		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.67		
Intersection Signal Delay: 17.2		Intersection LOS: B
Intersection Capacity Utilization 58.1%		ICU Level of Service B
Analysis Period (min) 15		

Splits and Phases: Route 1A & Wrentham Crossing Driveway

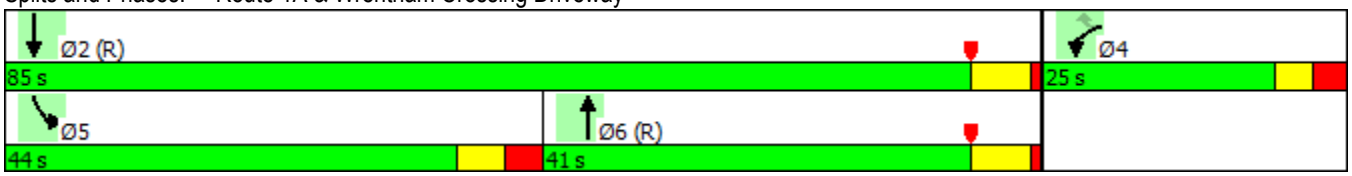


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	148	245	606	100	301	1082
Future Volume (vph)	148	245	606	100	301	1082
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	250	
Storage Lanes	1	1		0	1	
Taper Length (ft)	0				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	456		1293			646
Travel Time (s)	10.4		29.4			14.7
Peak Hour Factor	0.92	0.92	0.94	0.94	0.95	0.95
Heavy Vehicles (%)	2%	2%	4%	4%	3%	3%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	161	266	751	0	317	1139
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	4		6		5	2
Permitted Phases		4				
Detector Phase	4	4	6		5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	10.0		8.0	10.0
Minimum Split (s)	14.0	14.0	16.0		15.0	16.0
Total Split (s)	25.0	25.0	41.0		44.0	85.0
Total Split (%)	22.7%	22.7%	37.3%		40.0%	77.3%
Yellow Time (s)	3.0	3.0	5.0		4.0	5.0
All-Red Time (s)	3.0	3.0	1.0		3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		7.0	6.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max		None	C-Max
Act Effct Green (s)	14.8	14.8	50.8		25.3	83.2
Actuated g/C Ratio	0.13	0.13	0.46		0.23	0.76
v/c Ratio	0.68	0.60	0.48		0.79	0.43
Control Delay	59.1	11.1	23.0		35.8	3.1
Queue Delay	0.0	0.0	0.0		0.0	0.5
Total Delay	59.1	11.1	23.0		35.8	3.6
LOS	E	B	C		D	A
Approach Delay	29.2		23.0			10.6
Approach LOS	C		C			B
Queue Length 50th (ft)	109	0	184		152	56
Queue Length 95th (ft)	174	71	288		m168	162
Internal Link Dist (ft)	376		1213			566
Turn Bay Length (ft)					250	
Base Capacity (vph)	305	493	1580		589	2649
Starvation Cap Reductn	0	0	0		0	926
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.53	0.54	0.48		0.54	0.66

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 23 (21%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow		
Natural Cycle: 60		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.79		
Intersection Signal Delay: 17.1		Intersection LOS: B
Intersection Capacity Utilization 60.6%		ICU Level of Service B
Analysis Period (min) 15		

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

Splits and Phases: Route 1A & Wrentham Crossing Driveway



APPENDIX O

MassDOT Project Development Process

Overview of the Project Development Process

Transportation decision-making is complex and can be influenced by legislative mandates, environmental regulations, financial limitations, agency programmatic commitments, and partnering opportunities. Decision-makers and reviewing agencies, when consulted early and often throughout the project development process, can ensure that all participants understand the potential impact these factors can have on project implementation. Project development is the process that takes a transportation improvement from concept through construction.

The MassDOT Highway Division has developed a comprehensive project development process which is contained in Chapter 2 of the *MassDOT Highway Division's Project Development and Design Guide*. The eight-step process covers a range of activities extending from identification of a project need, through completion of a set of finished contract plans, to construction of the project. The sequence of decisions made through the project development process progressively narrows the project focus and, ultimately, leads to a project that addresses the identified needs. The descriptions provided below are focused on the process for a highway project, but the same basic process will need to be followed for non-highway projects as well.

1. Needs Identification

For each of the locations at which an improvement is to be implemented, MassDOT leads an effort to define the problem, establishes project goals and objectives, and defines the scope of the planning needed for implementation. To that end, it has to complete a Project Need Form (PNF), which states in general terms the deficiencies or needs related to the transportation facility or location. The PNF documents the problems and explains why corrective action is needed. For this study, the information defining the need for the project will be drawn primarily, perhaps exclusively, from the present report. Also, at this point in the process, MassDOT meets with potential participants, such as the Metropolitan Planning Organization (MPO) and community members, to allow for an informal review of the project.

The PNF is reviewed by the MassDOT Highway Division district office whose jurisdiction includes the location of the proposed project. MassDOT also sends the PNF to the MPO, for informational purposes. The outcome of this step determines whether the project requires further planning, whether it is already well supported by prior planning studies, and, therefore, whether it is ready to move forward into the design phase, or whether it should be dismissed from further consideration.

2. Planning

This phase will likely not be required for the implementation of the improvements proposed in this planning study, as this planning report should constitute the outcome of this step. However, in general, the purpose of this implementation step is for the project proponent to identify issues, impacts, and approvals that may need to be obtained, so that the subsequent design and permitting processes are understood.

The level of planning needed will vary widely, based on the complexity of the project. Typical tasks include: define the existing context, confirm project need, establish goals and objectives, initiate public outreach, define the project, collect data, develop and analyze alternatives, make

recommendations, and provide documentation. Likely outcomes include consensus on the project definition to enable it to move forward into environmental documentation (if needed) and design, or a recommendation to delay the project or dismiss it from further consideration.

3. Project Initiation

At this point in the process, the proponent, MassDOT Highway Division, fills out a Project Initiation Form (PIF) for each improvement, which is reviewed by its Project Review Committee (PRC) and the MPO. The PRC is composed of the Chief Engineer, each District Highway Director, and representatives of the Project Management, Environmental, Planning, Right-of-Way, Traffic, and Bridge departments, and the MassDOT Federal Aid Program Office (FAPO). The PIF documents the project type and description, summarizes the project planning process, identifies likely funding and project management responsibility, and defines a plan for interagency and public participation. First the PRC reviews and evaluates the proposed project based on the MassDOT's statewide priorities and criteria. If the result is positive, MassDOT Highway Division moves the project forward to the design phase, and to programming review by the MPO. The PRC may provide a Project Management Plan to define roles and responsibilities for subsequent steps. The MPO review includes project evaluation based on the MPO's regional priorities and criteria. The MPO may assign project evaluation criteria score, a Transportation Improvement Program (TIP) year, a tentative project category, and a tentative funding category.

4. Environmental Permitting, Design, and Right-of-Way Process

This step has four distinct but closely integrated elements: public outreach, environmental documentation and permitting (if required), design, and right-of-way acquisition (if required). The outcome of this step is a fully designed and permitted project ready for construction. However, a project does not have to be fully designed in order for the MPO to program it in the TIP. The sections below provide more detailed information on the four elements of this step of the project development process.

Public Outreach

Continued public outreach in the design and environmental process is essential to maintain public support for the project and to seek meaningful input on the design elements. The public outreach is often in the form of required public hearings, but can also include less formal dialogues with those interested in and affected by a proposed project.

Environmental Documentation and Permitting

The project proponent, in coordination with the Environmental Services section of the MassDOT Highway Division, will be responsible for identifying and complying with all applicable federal, state, and local environmental laws and requirements. This includes determining the appropriate project category for both the Massachusetts Environmental Protection Act (MEPA) and the National Environmental Protection Act (NEPA). Environmental documentation and permitting is often completed in conjunction with the **Preliminary Design** phase described below.

Design
There are three major phases of design. The first is **Preliminary Design**, which is also referred to as the 25-percent submission. The major components of this phase include full survey of the project area, preparation of base plans, development of basic geometric layout, development of preliminary cost estimates, and submission of a functional design report. Preliminary Design, although not required to, is often completed in conjunction with the Environmental Documentation and Permitting. The next phase is **Final Design**, which is also referred to as the 75-percent and 100-percent submission. The major components of this phase include preparation of a subsurface exploratory plan (if required), coordination of utility relocations, development of traffic management plans through construction zones, development of final cost estimates, and refinement and finalization of the construction plans. Once Final Design is complete, a full set of **Plans, Specifications, and Estimates (PS&E)** is developed for the project.

Right-of-Way Acquisition
A separate set of Right-of-Way plans are required for any project that requires land acquisition or easements. The plans must identify the existing and proposed layout lines, easements, property lines, names of property owners, and the dimensions and areas of estimated takings and easements.

5. Programming (Identification of Funding)
Programming, which typically begins during the design phase, can actually occur at any time during the process, from planning to design. In this step, which is distinct from project initiation, the proponent requests that the MPO place the project in the region's Transportation Improvement Program (TIP). The proponent requesting the project's listing on the TIP can be the community or it can be one of the MPO member agencies (the Regional Planning Agency, MassDOT, and the Regional Transit Authority). The MPO then considers the project in terms of state and regional needs, evaluation criteria, and compliance with the regional Transportation Plan and decides whether to place it in the draft TIP for public review and then in the final TIP.

6. Procurement
Following project design and programming of a highway project, the MassDOT Highway Division publishes a request for proposals. It then reviews the bids and awards the contract to the qualified bidder with the lowest bid.

7. Construction
After a construction contract is awarded, MassDOT Highway Division and the contractor develop a public participation plan and a management plan for the construction process.

8. Project Assessment
The purpose of this step is to receive constituents' comments on the project development process and the project's design elements. MassDOT Highway Division can apply what is learned in this process to future projects.

Project Development Schematic Timetable

Description	Schedule Influence	Typical Duration
Step I: Problem/Need/Opportunity Identification The proponent completes a Project Need Form (PNF). This form is then reviewed by the MassDOT Highway District office which provides guidance to the proponent on the subsequent steps of the process.	The Project Need Form has been developed so that it can be prepared quickly by the proponent, including any supporting data that is readily available. The District office shall return comments to the proponent within one month of PNF submission.	1 to 3 months
Step II: Planning Project planning can range from agreement that the problem should be addressed through a clear solution to a detailed analysis of alternatives and their impacts.	For some projects, no planning beyond preparation of the Project Need Form is required. Some projects require a planning study centered on specific project issues associated with the proposed solution or a narrow family of alternatives. More complex projects will likely require a detailed alternatives analysis.	Project Planning Report: 3 to 24+ months
Step III: Project Initiation The proponent prepares and submits a Project Initiation Form (PIF) and a Transportation Evaluation Criteria (TEC) form in this step. The PIF and TEC are informally reviewed by the Metropolitan Planning Organization (MPO) and MassDOT Highway District office, and formally reviewed by the PRC.	The PIF includes refinement of the preliminary information contained in the PNF. Additional information summarizing the results of the planning process, such as the Project Planning Report, are included with the PIF and TEC. The schedule is determined by PRC staff review (dependent on project complexity) and meeting schedule.	1 to 4 months
Step IV: Design, Environmental, and Right of Way The proponent completes the project design. Concurrently, the proponent completes necessary environmental permitting analyses and files applications for permits. Any right of way needed for the project is identified and the acquisition process begins.	The schedule for this step is dependent upon the size of the project and the complexity of the design, permitting, and right-of-way issues. Design review by the MassDOT Highway district and appropriate sections is completed in this step.	3 to 48+ months
Step V: Programming The MPO considers the project in terms of its regional priorities and determines whether or not to include the project in the draft Regional Transportation Improvement Program (TIP) which is then made available for public comment. The TIP includes a project description and funding source.	The schedule for this step is subject to each MPO's programming cycle and meeting schedule. It is also possible that the MPO will not include a project in its Draft TIP based on its review and approval procedures.	3 to 12+ months
Step VI: Procurement The project is advertised for construction and a contract awarded.	Administration of competing projects can influence the advertising schedule.	1 to 12 months
Step VII: Construction The construction process is initiated including public notification and any anticipated public involvement. Construction continues to project completion.	The duration for this step is entirely dependent upon project complexity and phasing.	3 to 60+ months
Step VIII: Project Assessment The construction period is complete and project elements and processes are evaluated on a voluntary basis.	The duration for this step is dependent upon the proponent's approach to this step and any follow-up required.	1 month

Source: MassDOT Highway Division Project Development and Design Guide