Memorandum

To: David Knowlton, City Engineer
City of Salem, Massachusetts

Date: September 16, 2019

Project #: 13150.07

From: Amy Silbovitz, PE
Matthew Duranleau, EIT

Re: Potential Pope Street / Proctor Street Reversal
Boston Street 25% Redesign
Salem, Massachusetts

VHB has analyzed the potential impacts of reversing the one-way directionality of Pope Street and Proctor Street in Salem, Massachusetts. As part of 25% design of the reconstruction of Boston Street, a road safety audit (RSA) was conducted at the intersections of Boston Street at Bridge Street / Goodhue Street / Proctor Street and Boston Street at Pope Street in April 2019. While the high-crash location cluster was initially limited to the intersection of Boston Street at Bridge Street / Goodhue Street / Proctor Street, upon further inspection it was determined that the cluster also includes the intersection of Boston Street and Pope Street.

As highlighted in the RSA, a total of 28 crashes occurred at the intersection of Boston Street at Bridge Street / Goodhue Street / Proctor Street between 2016 and 2018 and a total of 14 crashes occurred at the intersection of Boston Street at Pope Street during the same time period. Of the 14 crashes that occurred at the intersection of Boston and Pope Street during the three-year period, eight were angle crashes between through vehicles traveling eastbound on Boston Street and vehicles turning left from Pope Street onto Boston Street and four were angle crashes between vehicles traveling westbound on Boston Street and vehicles turning left from Pope Street onto Boston Street.

One of the potential safety enhancements suggested during the RSA to reduce angle crashes at the Boston Street intersection with Pope Street was to consider reversing the directionality of Pope Street and Proctor Street between Mansell Parkway and Boston Street, with Pope Street becoming one-way southbound and Proctor Street becoming one-way northbound. This memorandum presents the feasibility of reversing the directionality of Pope Street and Proctor Street.

Existing Roadway Geometry

Under existing conditions, Pope Street and Proctor Street between the intersections of Mansell Parkway and Boston Street are both one-way roadways that are currently operating as a couplet. Traffic on Pope Street travel in the northbound direction and traffic on Proctor Street travel in the southbound direction. The one-way segments of Pope Street and Proctor Street are both approximately 1,000 feet in length and run in a general north-south direction. At the northern end, Pope Street intersects Boston Street at a three-way unsignalized intersection and Proctor Street intersects Boston Street at a five-way signalized intersection with Bridge Street and Goodhue Street. The two intersections on Boston Street are approximately 250 feet apart. At the southern end, Pope Street and Proctor Street intersect at a four-way unsignalized intersection with Mansell Parkway. The Proctor Street northbound and southbound approaches and the Mansell Parkway eastbound approach are under stop control while Pope Street is one-way away from this intersection. Proctor Street continues south of this intersection as a two-way roadway and connects with Highland Avenue.

As noted above, 12 angle crashes occurred at the intersection of Boston Street and Pope Street between 2016 and 2018 due to vehicles turning left from Pope Street onto Boston Street. Reversing the direction of traffic on Pope Street

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and Proctor Street would shift all northbound traffic to Proctor Street and would have all traffic turning onto Boston Street occur at the existing signalized intersection. This would reduce the potential for angle crashes.

Traffic Operation Analyses

Intersection capacity analyses were conducted for the 2026 Future year conditions under current roadway geometry and under the proposed directionality reversals at the following three intersections:

- Boston Street at Proctor Street / Bridge Street / Goodhue Street
- Boston Street at Pope Street
- Proctor Street at Pope Street / Mansell Parkway

Intersection capacity analyses were conducted for the 2026 Future year conditions without improvements and the 2026 Future year conditions with Pope Street and Proctor Street reversed. It is assumed that along with reversing the direction of traffic on Pope Street and Proctor Street, improvements would also be made along Boston Street at the intersections with Pope Street and Proctor Street. In addition, a third scenario was analyzed, which included the 2026 Future conditions Alternative 2C. This Alternative included the proposed improvements that were approved in the the Project Information Form for the Boston Street improvements project that was approved for construction by MassDOT and includes roadway improvements such as signalizing the intersection of Boston Street at Pope Street and improving the intersection of Boston Street and Bridge Street/Proctor Street/Goodhue Street. Traffic counts were conducted in September 2016 on Boston Street for the two intersections and supplemental traffic counts for this analysis were conducted in June 2019 for the intersection of Proctor Street at Pope Street / Mansell Parkway.

Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them. Roadway operating conditions are classified by calculated levels-of-service. Level–of-service (LOS) is the term used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure that considers a number of factors including roadway geometry, speed, travel delay, freedom to maneuver, and safety. Level-of-service provides an index to operational qualities of a roadway segment or an intersection. Level-of-service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing congested operating conditions.

Level-of-service (LOS) designation is reported differently for signalized intersections and unsignalized intersections. For signalized intersections, the analysis considers the operation of each lane or lane group entering the intersection and assigns a LOS designation to each. Overall intersection data is then calculated in order to represent the overall conditions at the intersection. The evaluation criteria used to analyze the signalized study area intersections is based on the percentile-delay method (Synchro results). For unsignalized intersections, the analysis assumes that traffic on the mainline is not affected by traffic on the side streets. The LOS is determined primarily for left-turns from the main street and all movements from the minor street. The evaluation criteria used to analyze the unsignalized study area intersections is based on the Highway Capacity Manual (HCM)[1].

Signalized Intersection Capacity Analysis

Levels-of-service analyses were conducted for the 2026 Future without Improvements condition, 2026 Future Alternative 2C condition, and 2026 Future with Pope Street and Proctor Street reversed condition for the signalized

[1] Transportation Research Board, Highway Capacity Manual, 6th Edition, Washington, D.C., 2018.

study area intersections. Table 1 summarizes the capacity analyses for the signalized intersections and the capacity analyses worksheets are included in the Attachments to this memorandum.

Table 1 Future Signalized Intersection Capacity Analysis

	2026 Future Conditions (without Improvements)					2026 Future Conditions – Alternative 2C [f]					2026 Future Conditions – Pope Street and Proctor Street Reversed [f]				
Movement	**v/c [a]**	**Del [b]**	**LOS [c]**	**50 Q [d]**	**95 Q [e]**	**v/c**	**Del**	**LOS**	**50 Q**	**95 Q**	**v/c**	**Del**	**LOS**	**50 Q**	**95 Q**
Proctor Street/Bridge Street and Goodhue Street at Boston Street															
Weekday Morning															
EB HL/L	0.59	14	B	71	133	0.68	21	C	64	#268	0.75	30	C	88	#309
EB T/R	0.72	16	B	244	381	0.69	20	B	222	#677	0.86	33	C	297	#761
WB L/T	0.82	40	D	207	#361	0.51	25	C	133	#401	0.57	30	C	127	284
WB R/HR	0.97	64	E	218	#401	0.61	28	C	160	#448	0.68	35	D	134	#344
NB L/BL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.01	111	F	86	#271
NB T/R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.76	67	E	60	#193
SB L/T	0.75	35	D	187	#320	0.96	69	E	235	#415	1.03	86	F	202	#522
SB R/HR	0.43	26	C	82	143	0.55	36	D	103	174	0.57	37	D	88	#220
Overall		**32**	**C**				**31**	**C**				**48**	**D**		
Weekday Evening															
EB HL/L	0.63	19	B	75	161	0.80	31	C	82	#323	0.90	52	D	91	#354
EB T/R	0.63	14	B	199	306	0.64	44	D	233	#628	0.78	29	C	246	#625
WB L/T	0.91	51	D	238	#420	0.61	39	D	186	m#499	0.62	32	C	143	#337
WB R/HR	>1.20	>120	F	~352	#543	0.81	69	E	213	m#665	0.89	50	D	194	#499
NB L/BL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.01	111	F	86	#271
NB T/R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.60	55	D	46	#146
SB L/T	0.97	60	E	268	#466	1.02	81	F	~361	#577	1.13	112	F	~299	#666
SB R/HR	0.70	34	C	150	#245	0.74	43	D	197	#312	0.79	44	D	149	#391
Overall		**56**	**E**				**53**	**D**				**58**	**E**		

a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.
d. 50th percentile queue, in feet.
e. 95th percentile queue, in feet.
f. Analyzed with number of pedestrians counted during 2019 counts and concurrent pedestrian phase for the northbound crosswalk.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.

Table 1 Future Signalized Intersection Capacity Analysis (Cont.)

	2026 Future Conditions (without Improvements)					2026 Future Conditions – Alternative 2C [f]					2026 Future Conditions – Pope Street and Proctor Street Reversed [f]				
Movement	**v/c [a]**	**Del [b]**	**LOS [c]**	**50 Q [d]**	**95 Q [e]**	**v/c**	**Del**	**LOS**	**50 Q**	**95 Q**	**v/c**	**Del**	**LOS**	**50 Q**	**95 Q**
Pope Street at Boston Street															
Weekday Morning															
EB T	*Intersection under stop control for 2026 Future Conditions without Improvements*					0.66	19	B	128	m#664	*Intersection under stop control for 2026 Future Conditions with Pope Street and Proctor Street Reversed*				
WB T						0.61	19	B	149	#575					
NB L						0.73	50	D	128	201					
NB R						0.18	9	A	0	31					
SB R						0.02	0	A	0	0					
Overall							**23**	**C**							
Weekday Evening															
EB T	*Intersection under stop control for 2026 Future Conditions without Improvements*					0.56	18	B	349	m473	*Intersection under stop control for 2026 Future Conditions with Pope Street and Proctor Street Reversed*				
WB T						0.79	29	C	509	#867					
NB L						0.70	>120	F	132	196					
NB R						0.15	9	A	0	26					
SB R						0.01	0	A	0	0					
Overall							**36**	**D**							

a. Volume to capacity ratio.
b. Average total delay, in seconds per vehicle.
c. Level-of-service.
d. 50th percentile queue, in feet.
e. 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.

As shown in Table 1, under the 2026 Future conditions without improvements the intersection of Boston Street at Bridge Street/Goodhue Street/Proctor Street will operate at overall LOS C during the weekday morning peak hour and LOS E during the weekday evening peak hour. With the proposed improvements under Alternative 2C, the intersection will operate at overall LOS C and D during the weekday morning and weekday evening peak hours, respectively. With the addition of another phase at the signal to accommodate northbound traffic on Proctor Street due to the reversal of Pope Street and Proctor Street, the intersection will operate at LOS D and E during the weekday morning and weekday evening peak hours, respectively.

For the eastbound through movements on Boston Street, the 95th-percentile queues will increase from approximately 305-380 feet under the 2026 Future conditions without improvements to approximately 630-675 feet under the 2026 Future conditions under Alternative 2C and to approximately 625-760 feet under the 2026 Future conditions with Pope Street and Proctor Street reversed. For the westbound through movements on Boston Street, the 95th-percentile queues will range from approximately 360-420 feet under the 2026 Future conditions without improvements to approximately 400-500 feet under the 2026 Future conditions under Alternative 2C and will decrease to approximately 280-335 feet under the 2026 Future conditions with Pope Street and Proctor Street reversed.

Under Alternative 2C, the proposed signal at the intersection of Boston Street and Pope Street will operate at overall LOS C and D during the weekday morning and weekday evening peak hours, respectively, with queues on Boston Street ranging from 475-665 feet eastbound to 575-865 feet westbound.

It should be noted that under the 2026 Future conditions without improvements, there are no pedestrian or bicycle accommodations at the intersection of Boston Street at Bridge Street/Goodhue Street/Proctor Street. Under both the 2026 Future conditions under Alternative 2C and the 2026 Future conditions with Pope Street and Proctor Street reversed, it is assumed that pedestrian phases and bicycle infrastructure enhancements will be included at the intersection and therefore some of the increase in vehicular delay is due to these improvements.

Unsignalized Intersection Capacity Analysis

Table 2 summarizes the capacity analyses for the unsignalized intersections, and the capacity analyses worksheets are included in the Attachments to this memorandum.

Table 2 Future Unsignalized Intersection Capacity Analysis

	2026 Future Conditions (without Improvements)					2026 Future Conditions – Alternative 2C					2026 Future Conditions – Pope Street and Proctor Street Reversed				
Movement	**D [a]**	**v/c [b]**	**Del [c]**	**LOS [d]**	**95 Q [e]**	**D**	**v/c**	**Del**	**LOS**	**95 Q**	**D**	**v/c**	**Del**	**LOS**	**95 Q**
Pope Street at Boston Street															
Weekday Morning															
WB L	n/a	n/a	n/a	n/a	n/a	*Intersection under Signal Control for 2026 Future Conditions – Alternative 2C*					10	0.02	12	B	3
NB L	220	>1.20	>120	F	428						n/a	n/a	n/a	n/a	n/a
NB R	55	0.15	16	C	13						n/a	n/a	n/a	n/a	n/a
Weekday Evening															
WB L	n/a	n/a	n/a	n/a	n/a	*Intersection under Signal Control for 2026 Future Conditions – Alternative 2C*					20	0.04	12	B	3
NB L	200	>1.20	>120	F	383						n/a	n/a	n/a	n/a	n/a
NB R	50	0.11	13	B	10						n/a	n/a	n/a	n/a	n/a
Proctor Street at Pope Street / Mansell Parkway (All-Way Stop)															
Weekday Morning															
EB T/R	110	0.17	9	A	15	110	0.17	9	A	15	110	0.17	9	A	15
WB L/T	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	420	0.58	14	B	93
NB L/R	115	0.15	8	A	13	115	0.15	8	A	13	115	0.18	10	A	18
SB L/T/R	420	0.54	12	B	83	420	0.54	12	B	83	n/a	n/a	n/a	n/a	n/a
Overall			**11**	**B**				**11**	**B**				**12**	**B**	
Weekday Evening															
EB T/R	70	0.12	9	A	10	70	0.12	9	A	10	70	0.11	9	A	10
WB L/T	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	520	0.72	19	C	158
NB L/R	150	0.19	8	A	18	150	0.19	8	A	18	150	0.25	10	B	25
SB L/T/R	520	0.65	15	B	125	520	0.65	15	B	125	n/a	n/a	n/a	n/a	n/a
Overall			**13**	**B**				**13**	**B**				**16**	**C**	

a. Demand of critical movement.
b. Volume to capacity ratio.
c. Average total delay, in seconds per vehicle.
d. Level-of-service.
e. 95th percentile queue, in feet.

As shown in Table 2, the Pope Street northbound approach operates under LOS F with queues greater than 380 feet during the 2026 Future conditions without improvements. Under the 2026 Future conditions with Pope and Proctor Street reversed, the westbound left movement onto Pope Street will operate at LOS B with minimal queues. The intersection of Proctor Street at Pope Street/Mansell Parkway will operate under similar conditions under all three

scenarios, with the overall LOS degrading from B to C during the weekday evening peak hour with the proposed reversal of Pope Street and Proctor Street.

Considerations

In addition to examining the intersection capacity analyses for the reversal of Pope Street and Proctor Street, VHB preliminarily looked at the geometric feasibility and practicality of reversing the directionality of the two roadways. From a geometric standpoint, it should be feasible to reverse the directionality of the two roadways. Pope Street and Proctor Street both carry one travel lane under existing conditions and would carry one travel lane under future conditions. Currently, the Pope Street northbound approach to Boston Street has two lanes, one left-turn lane and one right-turn lane. If Proctor Street become one-way northbound instead of Pope Street, the right-of-way is available on Proctor Street for two lanes approaching Boston Street if on-street parking was prohibited approaching Boston Street.

At the intersection of Proctor Street at Pope Street/Mansell Parkway, the reversal of directionality on the two roadways would not have a major impact. The intersection operates as an all-way stop under existing and proposed conditions, and therefore all vehicles will need to stop regardless of which approach they are coming from or turning onto. All approaches to the intersection consist of one general-travel lane, which can still be accommodated with the reversal of directionality on the two roadways.

In addition, reversing the directionality of Pope Street and Proctor Street will result in a traffic signal no longer being required at the intersection of Boston Street and Pope Street. Under Alternative 2C, a signal is proposed at the intersection of Boston Street and Pope Street to accommodate the northbound vehicles on Pope Street turning onto Boston Street. A signal is warranted at this location based on the Manual on Uniform Traffic Control Devises[2]. Reversing the directions of Pope Street and Proctor Street will no longer require a second signal along Boston Street at Pope Street, as all northbound vehicles turning onto Boston Street will use the existing signalized intersection at Proctor Street. This will improve the through mobility on Boston Street and reduce the number of conflict points along the corridor.

In order to implement the reversal of flow on Pope Street and Proctor Street, no changes to the curb-lines would be required. The change in directionality of the streets could be accomplished by updating the pavement markings along each roadway and updating the signage to properly inform drivers of the change in operations. The signal at the intersection of Boston Street at Proctor Street / Goodhue Street / Bridge Street would need to be updated to include the Proctor Street northbound approach, but the traffic signal is proposed to be upgraded regardless as part of the Boston Street improvements.

A final consideration of changing the directionality of the roadways would be informing the abutters along the two streets and getting approval from the City of Salem. Pope Street and Proctor Street both have numerous residential driveways connecting to the roadways, and a driveway for the Salem Heights housing development connects to Pope Street. Changing the directionality of these two roadways would directly affect the residents. In addition, the Walgreens on Boston Street has rear driveways onto both Proctor Street and Pope Street, so changing the directionality of the two roadways may involve altering the internal flow of the Walgreens parking lot as well.

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[2] Manual on Uniform Traffic Control Devises (MUTCD), 2009 Edition; U.S. Department of Transportation Federal Highway Administration; Washington D.C.

Conclusion

VHB prepared this memorandum to analyze the vehicular impacts of changing the directionality of Pope Street and Proctor Street. Based on the results of the analyses, overall the intersection of Boston Street at Bridge Street/Goodhue Street/Proctor Street will operate slightly worse with slightly longer queues and delays on some approaches with Pope and Proctor Street reversed as compared to the previously preferred Alternative 2C. The slight degradation in operations is due to the addition of another phase at the intersection, as Proctor Street will carry northbound traffic into the intersection instead of carrying southbound traffic away from the intersection.

However, while the intersection of Boston Street at Bridge Street/Goodhue Street/Proctor Street will degrade slightly, under the reversal of Pope Street and Proctor Street a second signal at the intersection of Boston Street and Pope Street is no longer required. Not installing a traffic signal at the intersection of Boston Street and Pope Street improves the through mobility on Boston Street. In addition, at the intersection of Proctor Street at Pope Street/Mansell Parkway, the reversal of directionality on the two roadways will not have a major impact.

Attachments

Capacity Analysis Worksheets

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	SBL	SBT	SBR	SBR2
Lane Configurations												
Traffic Volume (vph)	25	265	575	125	10	405	185	225	125	260	180	10
Future Volume (vph)	25	265	575	125	10	405	185	225	125	260	180	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		75		0	0		125		0		0	
Storage Lanes		1		0	0		1		0		1	
Taper Length (ft)		25			25				25			
Satd. Flow (prot)	0	1752	1786	0	0	1843	1568	0	0	1815	1568	0
Flt Permitted		0.235				0.976				0.984		
Satd. Flow (perm)	0	432	1786	0	0	1800	1510	0	0	1811	1568	0
Right Turn on Red				No				No				No
Satd. Flow (RTOR)												
Link Speed (mph)			30			30				30		
Link Distance (ft)			804			292				416		
Travel Time (s)			18.3			6.6				9.5		
Confl. Peds. (#/hr)		9		7	7			9	4			
Confl. Bikes (#/hr)				1			1	1				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	315	761	0	0	451	446	0	0	419	207	0
Turn Type	D.P+P	D.P+P	NA		Perm	NA	Perm		Split	NA	Prot	
Protected Phases	2	2	2 3			3			1	1	1	
Permitted Phases	3	3			3		3					
Minimum Split (s)	14.5	14.5			16.5	16.5	16.5		16.5	16.5	16.5	
Total Split (s)	20.0	20.0			30.0	30.0	30.0		30.0	30.0	30.0	
Total Split (%)	25.0%	25.0%			37.5%	37.5%	37.5%		37.5%	37.5%	37.5%	
Yellow Time (s)	2.5	2.5			3.5	3.5	3.5		3.5	3.5	3.5	
All-Red Time (s)	0.0	0.0			2.0	2.0	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)		0.0				0.0	0.0			0.0	0.0	
Total Lost Time (s)		2.5				5.5	5.5			5.5	5.5	
Lead/Lag	Lag	Lag							Lead	Lead	Lead	
Lead-Lag Optimize?												
Act Effct Green (s)		45.0	47.5			24.5	24.5			24.5	24.5	
Actuated g/C Ratio		0.56	0.59			0.31	0.31			0.31	0.31	
v/c Ratio		0.59	0.72			0.82	0.97			0.75	0.43	
Control Delay		14.4	16.4			39.9	64.1			35.4	25.6	
Queue Delay		0.0	0.0			0.0	0.0			0.0	0.0	
Total Delay		14.4	16.4			39.9	64.1			35.4	25.6	
LOS		B	B			D	E			D	C	
Approach Delay			15.8			51.9				32.2		
Approach LOS			B			D				C		
Queue Length 50th (ft)		71	244			207	218			187	82	
Queue Length 95th (ft)		133	381			#361	#401			#320	143	
Internal Link Dist (ft)			724			212				336		
Turn Bay Length (ft)		75					125					
Base Capacity (vph)		531	1060			551	462			555	480	
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		0.59	0.72			0.82	0.97			0.75	0.43	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 65
Control Type: Pretimed
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 32.2 — Intersection LOS: C
Intersection Capacity Utilization 108.4% — 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: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street

Intersection	
Int Delay, s/veh	52.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↖	↗
Traffic Vol, veh/h	705	0	0	630	220	55
Future Vol, veh/h	705	0	0	630	220	55
Conflicting Peds, #/hr	0	14	14	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	4	4	2	2
Mvmt Flow	766	0	0	685	239	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	1452	766
Stage 1	-	-	-	-	766	-
Stage 2	-	-	-	-	686	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	-	0	0	-	~ 144	403
Stage 1	-	0	0	-	459	-
Stage 2	-	0	0	-	500	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	~ 144	403
Mov Cap-2 Maneuver	-	-	-	-	~ 144	-
Stage 1	-	-	-	-	459	-
Stage 2	-	-	-	-	500	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	$ 307.6
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	WBT
Capacity (veh/h)	144	403	-	-
HCM Lane V/C Ratio	1.661	0.148	-	-
HCM Control Delay (s)	$ 380.6	15.5	-	-
HCM Lane LOS	F	C	-	-
HCM 95th %tile Q(veh)	17.1	0.5	-	-

Notes

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

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	105	5	0	0	0	5	0	110	15	310	95
Future Vol, veh/h	0	105	5	0	0	0	5	0	110	15	310	95
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	114	5	0	0	0	5	0	120	16	337	103
Number of Lanes	0	1	0	0	0	0	0	1	0	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.3	7.9	12.2
HCM LOS	A	A	B

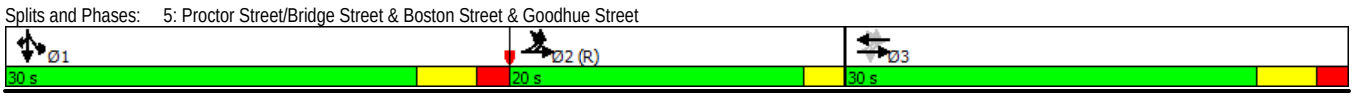
Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	4%	0%	4%
Vol Thru, %	0%	95%	74%
Vol Right, %	96%	5%	23%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	115	110	420
LT Vol	5	0	15
Through Vol	0	105	310
RT Vol	110	5	95
Lane Flow Rate	125	120	457
Geometry Grp	1	1	1
Degree of Util (X)	0.144	0.171	0.539
Departure Headway (Hd)	4.154	5.142	4.247
Convergence, Y/N	Yes	Yes	Yes
Cap	861	696	849
Service Time	2.19	3.188	2.273
HCM Lane V/C Ratio	0.145	0.172	0.538
HCM Control Delay	7.9	9.3	12.2
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.5	0.6	3.3

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	SBL	SBT	SBR	SBR2
Lane Configurations												
Traffic Volume (vph)	45	245	475	145	20	440	315	210	155	350	275	40
Future Volume (vph)	45	245	475	145	20	440	315	210	155	350	275	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		75		0	0		125		0		0	
Storage Lanes		1		0	0		1		0		1	
Taper Length (ft)		25			25				25			
Satd. Flow (prot)	0	1787	1800	0	0	1877	1599	0	0	1853	1599	0
Flt Permitted		0.170				0.954				0.985		
Satd. Flow (perm)	0	319	1800	0	0	1794	1544	0	0	1846	1599	0
Right Turn on Red				No				No				No
Satd. Flow (RTOR)												
Link Speed (mph)			30			30				30		
Link Distance (ft)			804			292				416		
Travel Time (s)			18.3			6.6				9.5		
Confl. Peds. (#/hr)		3		17	17			3	8		5	
Confl. Bikes (#/hr)				1			4	4				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	315	674	0	0	500	570	0	0	548	342	0
Turn Type	D.P+P	D.P+P	NA		Perm	NA	Perm		Split	NA	Prot	
Protected Phases	2	2	2 3			3			1	1	1	
Permitted Phases	3	3			3		3					
Minimum Split (s)	14.5	14.5			16.5	16.5	16.5		16.5	16.5	16.5	
Total Split (s)	20.0	20.0			30.0	30.0	30.0		30.0	30.0	30.0	
Total Split (%)	25.0%	25.0%			37.5%	37.5%	37.5%		37.5%	37.5%	37.5%	
Yellow Time (s)	2.5	2.5			3.5	3.5	3.5		3.5	3.5	3.5	
All-Red Time (s)	0.0	0.0			2.0	2.0	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)		0.0				0.0	0.0			0.0	0.0	
Total Lost Time (s)		2.5				5.5	5.5			5.5	5.5	
Lead/Lag	Lag	Lag							Lead	Lead	Lead	
Lead-Lag Optimize?												
Act Effct Green (s)		45.0	47.5			24.5	24.5			24.5	24.5	
Actuated g/C Ratio		0.56	0.59			0.31	0.31			0.31	0.31	
v/c Ratio		0.63	0.63			0.91	1.21			0.97	0.70	
Control Delay		18.5	13.9			50.5	140.2			60.0	33.6	
Queue Delay		0.0	0.0			0.0	0.0			0.0	0.0	
Total Delay		18.5	13.9			50.5	140.2			60.0	33.6	
LOS		B	B			D	F			E	C	
Approach Delay			15.4			98.3				49.9		
Approach LOS			B			F				D		
Queue Length 50th (ft)		75	199			238	~352			268	150	
Queue Length 95th (ft)		161	306			#420	#543			#466	#245	
Internal Link Dist (ft)			724			212				336		
Turn Bay Length (ft)		75					125					
Base Capacity (vph)		500	1068			549	472			567	489	
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		0.63	0.63			0.91	1.21			0.97	0.70	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 30 (38%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 1.21
Intersection Signal Delay: 55.9 Intersection LOS: E
Intersection Capacity Utilization 115.6% 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: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street



Intersection	
Int Delay, s/veh	43.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↖	↗
Traffic Vol, veh/h	575	0	0	790	200	50
Future Vol, veh/h	575	0	0	790	200	50
Conflicting Peds, #/hr	0	17	17	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	1	1
Mvmt Flow	625	0	0	859	217	54

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	1485	625
Stage 1	-	-	-	-	625	-
Stage 2	-	-	-	-	860	-
Critical Hdwy	-	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	-	0	0	-	~ 138	487
Stage 1	-	0	0	-	536	-
Stage 2	-	0	0	-	416	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	~ 138	487
Mov Cap-2 Maneuver	-	-	-	-	~ 138	-
Stage 1	-	-	-	-	536	-
Stage 2	-	-	-	-	416	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	281.3
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	WBT
Capacity (veh/h)	138	487	-	-
HCM Lane V/C Ratio	1.575	0.112	-	-
HCM Control Delay (s)	$ 348.3	13.3	-	-
HCM Lane LOS	F	B	-	-
HCM 95th %tile Q(veh)	15.3	0.4	-	-

Notes

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

Intersection	
Intersection Delay, s/veh	12.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	70	1	0	0	0	2	0	150	25	370	125
Future Vol, veh/h	0	70	1	0	0	0	2	0	150	25	370	125
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	76	1	0	0	0	2	0	163	27	402	136
Number of Lanes	0	1	0	0	0	0	0	1	0	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.2	8.1	14.8
HCM LOS	A	A	B

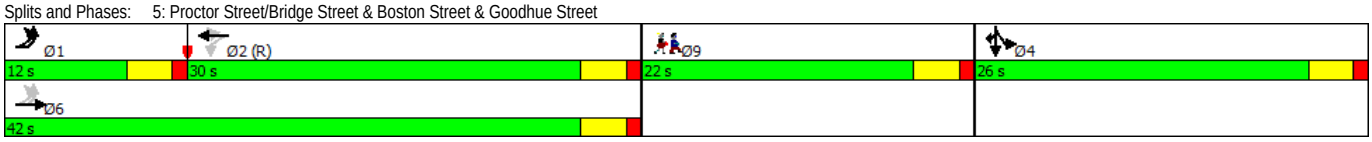
Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	1%	0%	5%
Vol Thru, %	0%	99%	71%
Vol Right, %	99%	1%	24%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	152	71	520
LT Vol	2	0	25
Through Vol	0	70	370
RT Vol	150	1	125
Lane Flow Rate	165	77	565
Geometry Grp	1	1	1
Degree of Util (X)	0.189	0.117	0.655
Departure Headway (Hd)	4.118	5.443	4.173
Convergence, Y/N	Yes	Yes	Yes
Cap	871	657	865
Service Time	2.149	3.49	2.196
HCM Lane V/C Ratio	0.189	0.117	0.653
HCM Control Delay	8.1	9.2	14.8
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.7	0.4	5

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	SBL	SBT	SBR	SBR2	Ø9
Lane Configurations													
Traffic Volume (vph)	25	265	575	125	10	405	185	225	125	260	180	10	
Future Volume (vph)	25	265	575	125	10	405	185	225	125	260	180	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		75		0	0		125		0		0		
Storage Lanes		1		0	0		1		0		1		
Taper Length (ft)		25			25				25				
Satd. Flow (prot)	0	1752	1783	0	0	1843	1568	0	0	1815	1568	0	
Flt Permitted		0.316				0.981				0.984			
Satd. Flow (perm)	0	583	1783	0	0	1810	1509	0	0	1810	1568	0	
Right Turn on Red				No				No				No	
Satd. Flow (RTOR)													
Link Speed (mph)			30			30				30			
Link Distance (ft)			804			292				416			
Travel Time (s)			18.3			6.6				9.5			
Confl. Peds. (#/hr)		9		7	7			9	4				
Confl. Bikes (#/hr)				1			1	1					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	315	761	0	0	451	446	0	0	419	207	0	
Turn Type	pm+pt	pm+pt	NA		Perm	NA	Perm		Split	NA	Prot		
Protected Phases	1	1	6			2			4	4	4		9
Permitted Phases	6	6			2		2						
Detector Phase	1	1	6		2	2	2		4	4	4		
Switch Phase													
Minimum Initial (s)	8.0	8.0	12.0		12.0	12.0	12.0		11.0	11.0	11.0		18.0
Minimum Split (s)	12.0	12.0	22.0		16.0	16.0	16.0		16.5	16.5	16.5		22.0
Total Split (s)	12.0	12.0	42.0		30.0	30.0	30.0		26.0	26.0	26.0		22.0
Total Split (%)	13.3%	13.3%	46.7%		33.3%	33.3%	33.3%		28.9%	28.9%	28.9%		24%
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0		3.0
All-Red Time (s)	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		
Total Lost Time (s)		4.0	4.0			4.0	4.0			4.0	4.0		
Lead/Lag	Lead	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?													
Recall Mode	None	None	None		C-Min	C-Min	C-Min		None	None	None		None
Act Effct Green (s)		55.8	55.8			43.8	43.8			21.8	21.8		
Actuated g/C Ratio		0.62	0.62			0.49	0.49			0.24	0.24		
v/c Ratio		0.68	0.69			0.51	0.61			0.96	0.55		
Control Delay		20.9	18.5			23.1	26.0			68.8	36.0		
Queue Delay		0.0	1.1			1.5	1.8			0.0	0.0		
Total Delay		20.9	19.7			24.6	27.8			68.8	36.0		
LOS		C	B			C	C			E	D		
Approach Delay			20.0			26.2				57.9			
Approach LOS			C			C				E			
Queue Length 50th (ft)		64	222			133	160			235	103		
Queue Length 95th (ft)		#268	#677			#401	#448			#415	174		
Internal Link Dist (ft)			724			212				336			
Turn Bay Length (ft)		75					125						
Base Capacity (vph)		465	1106			881	734			443	383		
Starvation Cap Reductn		0	0			254	151			0	0		
Spillback Cap Reductn		0	152			0	0			0	0		
Storage Cap Reductn		0	0			0	0			0	0		
Reduced v/c Ratio		0.68	0.80			0.72	0.77			0.95	0.54		

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 31.3 Intersection LOS: C
Intersection Capacity Utilization 105.9% 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: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street

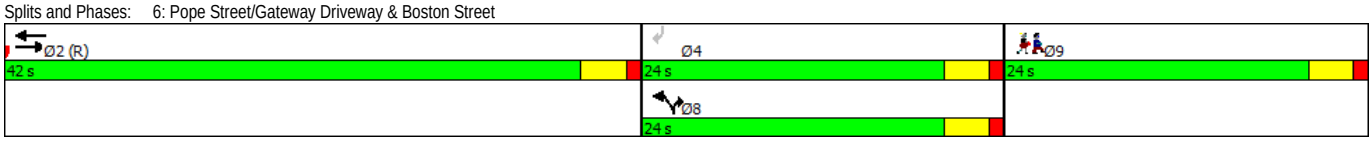


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	0	705	0	0	630	4	220	0	55	0	0	10	
Future Volume (vph)	0	705	0	0	630	4	220	0	55	0	0	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		0	0		50	0		0	
Storage Lanes	0		0	0		0	1		1	0		1	
Taper Length (ft)	25			25			25			25			
Satd. Flow (prot)	0	1863	0	0	1825	0	1770	0	1583	0	0	1611	
Flt Permitted							0.950						
Satd. Flow (perm)	0	1863	0	0	1825	0	1766	0	1583	0	0	1611	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)									61			460	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		292			117			232			72		
Travel Time (s)		6.6			2.7			5.3			1.6		
Confl. Peds. (#/hr)			14	14			1						
Confl. Bikes (#/hr)			1										
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	2%	2%	4%	4%	2%	2%	2%	2%	2%	2%	2%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	766	0	0	689	0	239	0	60	0	0	11	
Turn Type		NA			NA		Prot		Prot			Perm	
Protected Phases		2			2		8		8				9
Permitted Phases												4	
Detector Phase		2			2		8		8			4	
Switch Phase													
Minimum Initial (s)		10.0			10.0		6.0		6.0			6.0	5.0
Minimum Split (s)		14.0			14.0		10.0		10.0			10.0	24.0
Total Split (s)		42.0			42.0		24.0		24.0			24.0	24.0
Total Split (%)		46.7%			46.7%		26.7%		26.7%			26.7%	27%
Yellow Time (s)		3.0			3.0		3.0		3.0			3.0	3.0
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			4.0		4.0		4.0			4.0	
Lead/Lag													
Lead-Lag Optimize?													
Recall Mode		C-Min			C-Min		Min		Min			Min	None
Act Effct Green (s)		55.8			55.8		16.6		16.6			16.6	
Actuated g/C Ratio		0.62			0.62		0.18		0.18			0.18	
v/c Ratio		0.66			0.61		0.73		0.18			0.02	
Control Delay		16.3			18.6		47.9		9.2			0.0	
Queue Delay		2.4			0.4		1.8		0.0			0.0	
Total Delay		18.8			19.1		49.7		9.2			0.0	
LOS		B			B		D		A			A	
Approach Delay		18.8			19.1			41.6					
Approach LOS		B			B			D					
Queue Length 50th (ft)		128			149		128		0			0	
Queue Length 95th (ft)		m#664			#575		201		31			0	
Internal Link Dist (ft)		212			37			152			1		
Turn Bay Length (ft)									50				
Base Capacity (vph)		1155			1131		393		399			715	
Starvation Cap Reductn		258			0		0		0			0	
Spillback Cap Reductn		0			125		59		0			131	
Storage Cap Reductn		0			0		0		0			0	
Reduced v/c Ratio		0.85			0.68		0.72		0.15			0.02	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 22.6 Intersection LOS: C
Intersection Capacity Utilization 60.6% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Pope Street/Gateway Driveway & Boston Street



Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	SBL	SBT	SBR	SBR2	Ø9
Lane Configurations													
Traffic Volume (vph)	45	245	475	145	20	440	315	210	155	350	275	40	
Future Volume (vph)	45	245	475	145	20	440	315	210	155	350	275	40	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		75		0	0		125		0		0		
Storage Lanes		1		0	0		1		0		1		
Taper Length (ft)		25			25				25				
Satd. Flow (prot)	0	1787	1787	0	0	1877	1599	0	0	1853	1599	0	
Flt Permitted		0.251				0.960				0.985			
Satd. Flow (perm)	0	472	1787	0	0	1806	1542	0	0	1845	1599	0	
Right Turn on Red				No				No				No	
Satd. Flow (RTOR)													
Link Speed (mph)			30			30				30			
Link Distance (ft)			804			292				416			
Travel Time (s)			18.3			6.6				9.5			
Confl. Peds. (#/hr)		3		17	17			3	8		5		
Confl. Bikes (#/hr)				1			4	4					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	315	674	0	0	500	570	0	0	548	342	0	
Turn Type	pm+pt	pm+pt	NA		Perm	NA	Perm		Split	NA	Prot		
Protected Phases	1	1	6			2			4	4	4		9
Permitted Phases	6	6			2		2						
Detector Phase	1	1	6		2	2	2		4	4	4		
Switch Phase													
Minimum Initial (s)	8.0	8.0	12.0		12.0	12.0	12.0		11.0	11.0	11.0		18.0
Minimum Split (s)	13.0	13.0	23.0		17.0	17.0	17.0		16.5	16.5	16.5		22.0
Total Split (s)	13.0	13.0	45.0		32.0	32.0	32.0		33.0	33.0	33.0		22.0
Total Split (%)	13.0%	13.0%	45.0%		32.0%	32.0%	32.0%		33.0%	33.0%	33.0%		22%
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0		3.0
All-Red Time (s)	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		
Total Lost Time (s)		4.0	4.0			4.0	4.0			4.0	4.0		
Lead/Lag	Lead	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?													
Recall Mode	None	None	None		C-Min	C-Min	C-Min		None	None	None		None
Act Effct Green (s)		58.6	58.6			45.6	45.6			29.0	29.0		
Actuated g/C Ratio		0.59	0.59			0.46	0.46			0.29	0.29		
v/c Ratio		0.80	0.64			0.61	0.81			1.02	0.74		
Control Delay		31.4	19.9			28.3	35.0			80.6	43.2		
Queue Delay		0.0	23.8			10.4	33.8			0.0	0.0		
Total Delay		31.4	43.8			38.7	68.7			80.6	43.2		
LOS		C	D			D	E			F	D		
Approach Delay			39.8			54.7				66.2			
Approach LOS			D			D				E			
Queue Length 50th (ft)		82	233			186	213			~361	197		
Queue Length 95th (ft)		#323	#628			m#499	m#665			#577	#312		
Internal Link Dist (ft)			724			212				336			
Turn Bay Length (ft)		75					125						
Base Capacity (vph)		394	1046			823	703			537	463		
Starvation Cap Reductn		0	0			292	162			0	0		
Spillback Cap Reductn		0	386			0	0			0	0		
Storage Cap Reductn		0	0			0	0			0	0		
Reduced v/c Ratio		0.80	1.02			0.94	1.05			1.02	0.74		

Intersection Summary

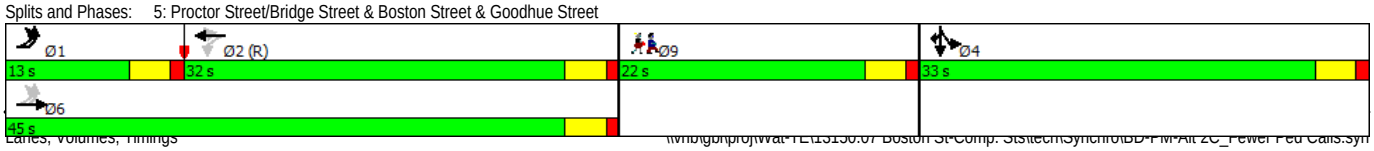
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 53.2 Intersection LOS: D
Intersection Capacity Utilization 113.1% ICU Level 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.

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

Splits and Phases: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street

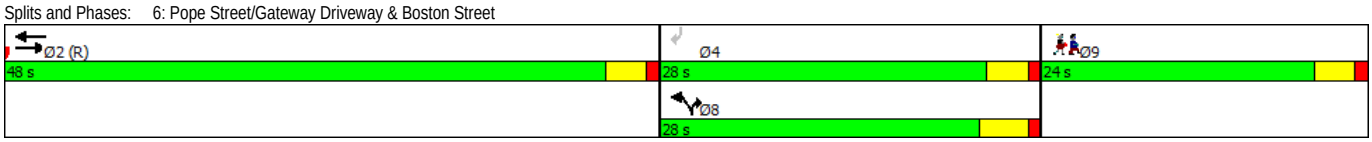


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	0	575	0	0	790	19	200	0	50	0	0	5	
Future Volume (vph)	0	575	0	0	790	19	200	0	50	0	0	5	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		0	50		0	0		0	
Storage Lanes	0		0	0		0	1		1	0		1	
Taper Length (ft)	25			25			25			25			
Satd. Flow (prot)	0	1881	0	0	1857	0	1787	0	1599	0	0	1611	
Flt Permitted							0.950						
Satd. Flow (perm)	0	1881	0	0	1857	0	1782	0	1599	0	0	1611	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)					2			104	55			397	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		292			117			232			87		
Travel Time (s)		6.6			2.7			5.3			2.0		
Confl. Peds. (#/hr)			17	17			1						
Confl. Bikes (#/hr)			2						3				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	1%	1%	2%	2%	2%	1%	2%	1%	2%	2%	2%	
Shared Lane Traffic (%)									10%				
Lane Group Flow (vph)	0	625	0	0	880	0	217	5	49	0	0	5	
Turn Type		NA			NA		Prot		Prot			Perm	
Protected Phases		2			2		8		8				9
Permitted Phases												4	
Detector Phase		2			2		8		8			4	
Switch Phase													
Minimum Initial (s)		10.0			10.0		5.0		5.0			6.0	5.0
Minimum Split (s)		14.0			14.0		22.5		22.5			10.0	24.0
Total Split (s)		48.0			48.0		28.0		28.0			28.0	24.0
Total Split (%)		48.0%			48.0%		28.0%		28.0%			28.0%	24%
Yellow Time (s)		3.0			3.0		3.5		3.5			3.0	3.0
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			4.0		4.5		4.5			4.0	
Lead/Lag													
Lead-Lag Optimize?													
Recall Mode		C-Min			C-Min		None		None			None	None
Act Effct Green (s)		59.8			59.8		17.3	0.0	17.3			17.8	
Actuated g/C Ratio		0.60			0.60		0.17	0.00	0.17			0.18	
v/c Ratio		0.56			0.79		0.70	0.05	0.15			0.01	
Control Delay		16.7			27.4		50.8	0.0	8.9			0.0	
Queue Delay		1.5			1.2		72.9	0.0	0.0			0.0	
Total Delay		18.2			28.5		123.7	0.0	8.9			0.0	
LOS		B			C		F	A	A			A	
Approach Delay		18.2			28.5			100.7					
Approach LOS		B			C			F					
Queue Length 50th (ft)		349			509		132	0	0			0	
Queue Length 95th (ft)		m473			#867		196	0	26			0	
Internal Link Dist (ft)		212			37			152			7		
Turn Bay Length (ft)							50						
Base Capacity (vph)		1124			1111		419	104	417			688	
Starvation Cap Reductn		305			0		0	0	0			0	
Spillback Cap Reductn		0			84		296	0	0			0	
Storage Cap Reductn		0			0		0	0	0			0	
Reduced v/c Ratio		0.76			0.86		1.76	0.05	0.12			0.01	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 35.8 Intersection LOS: D
Intersection Capacity Utilization 68.8% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Pope Street/Gateway Driveway & Boston Street

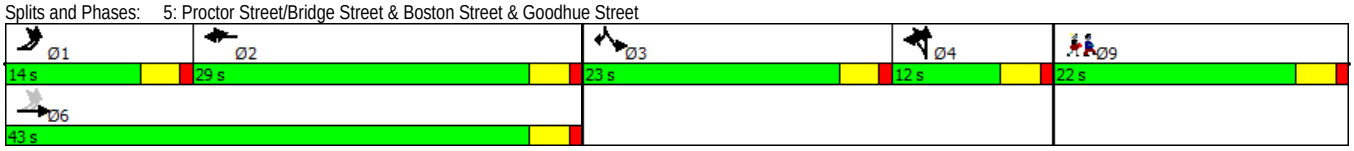


Lane Group	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	SBL	SBR	SBR2	Ø9
Lane Configurations														
Traffic Volume (vph)	25	265	700	295	135	165	110	50	60	55	385	180	10	
Future Volume (vph)	25	265	700	295	135	165	110	50	60	55	385	180	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		75			125			150		0	0	0		
Storage Lanes		1			1			1		0	1	1		
Taper Length (ft)		25						25			25			
Satd. Flow (prot)	0	1752	1845	1845	1568	0	0	1770	1692	0	1752	1568	0	
Flt Permitted		0.313						0.950			0.950			
Satd. Flow (perm)	0	572	1845	1845	1568	0	0	1770	1692	0	1737	1568	0	
Right Turn on Red						No				No			No	
Satd. Flow (RTOR)														
Link Speed (mph)			30	30					30					
Link Distance (ft)			804	292					745					
Travel Time (s)			18.3	6.6					16.9					
Confl. Peds. (#/hr)		9				9				4	4			
Confl. Bikes (#/hr)					1	1								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	2%	3%	3%	3%	
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	315	761	321	326	0	0	174	125	0	418	207	0	
Turn Type	pm+pt	pm+pt	NA	NA	Prot		Split	Split	NA		Prot	Prot		
Protected Phases	1	1	6	2	2		4	4	4		3	3		9
Permitted Phases	6	6												
Detector Phase	1	1	6	2	2		4	4	4		3	3		
Switch Phase														
Minimum Initial (s)	6.0	6.0	10.0	10.0	10.0		6.0	6.0	6.0		6.0	6.0		7.0
Minimum Split (s)	10.0	10.0	22.0	14.0	14.0		10.0	10.0	10.0		10.0	10.0		22.0
Total Split (s)	14.0	14.0	43.0	29.0	29.0		12.0	12.0	12.0		23.0	23.0		22.0
Total Split (%)	14.0%	14.0%	43.0%	29.0%	29.0%		12.0%	12.0%	12.0%		23.0%	23.0%		22%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0		3.0
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		
Total Lost Time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lag	Lag		Lead	Lead		
Lead-Lag Optimize?														
Recall Mode	None	None	Min	Min	Min		None	None	None		None	None		None
Act Effct Green (s)		39.4	39.4	25.2	25.2			8.1	8.1		19.2	19.2		
Actuated g/C Ratio		0.48	0.48	0.31	0.31			0.10	0.10		0.23	0.23		
v/c Ratio		0.75	0.86	0.57	0.68			1.01	0.76		1.03	0.57		
Control Delay		30.2	32.8	30.3	35.4			111.2	66.8		85.7	36.9		
Queue Delay		0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0		
Total Delay		30.2	32.8	30.3	35.4			111.2	66.8		85.7	36.9		
LOS		C	C	C	D			F	E		F	D		
Approach Delay			32.0	32.9					92.6					
Approach LOS			C	C					F					
Queue Length 50th (ft)		88	297	127	134			86	60		202	88		
Queue Length 95th (ft)		#309	#761	284	#344			#271	#193		#522	#220		
Internal Link Dist (ft)			724	212					665					
Turn Bay Length (ft)		75			125			150						
Base Capacity (vph)		418	881	565	480			173	165		407	364		
Starvation Cap Reductn		0	0	0	0			0	0		0	0		
Spillback Cap Reductn		0	0	0	0			0	0		0	0		
Storage Cap Reductn		0	0	0	0			0	0		0	0		
Reduced v/c Ratio		0.75	0.86	0.57	0.68			1.01	0.76		1.03	0.57		

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 82.4
Natural Cycle: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 47.9 — Intersection LOS: D
Intersection Capacity Utilization 80.3% — 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: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street



Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	760	385	10	620	0	0
Future Vol, veh/h	760	385	10	620	0	0
Conflicting Peds, #/hr	0	14	14	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	4	4	2	2
Mvmt Flow	826	418	11	674	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1259	0	-	1049
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.236	-	-	3.318
Pot Cap-1 Maneuver	-	-	546	-	0	276
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	546	-	-	272
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	546	-
HCM Lane V/C Ratio	-	-	-	0.02	-
HCM Control Delay (s)	0	-	-	11.7	0
HCM Lane LOS	A	-	-	B	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	105	0	5	310	95	15	5	110	0	0	0	0
Future Vol, veh/h	105	0	5	310	95	15	5	110	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	114	0	5	337	103	16	5	120	0	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9	13.6	9.5
HCM LOS	A	B	A

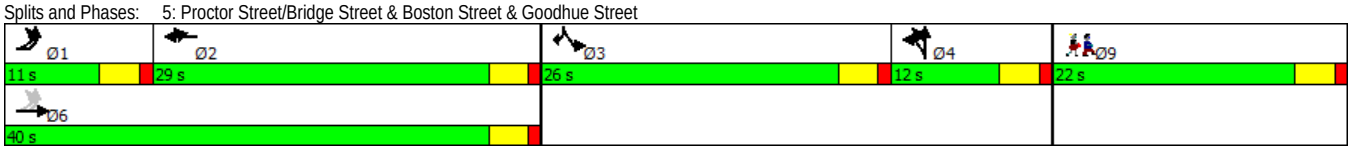
Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	4%	95%	74%
Vol Thru, %	96%	0%	23%
Vol Right, %	0%	5%	4%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	115	110	420
LT Vol	5	105	310
Through Vol	110	0	95
RT Vol	0	5	15
Lane Flow Rate	125	120	457
Geometry Grp	1	1	1
Degree of Util (X)	0.183	0.164	0.576
Departure Headway (Hd)	5.271	4.939	4.539
Convergence, Y/N	Yes	Yes	Yes
Cap	678	723	794
Service Time	3.324	2.985	2.571
HCM Lane V/C Ratio	0.184	0.166	0.576
HCM Control Delay	9.5	9	13.6
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.7	0.6	3.7

Lane Group	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	SBL	SBR	SBR2	Ø9
Lane Configurations														
Traffic Volume (vph)	45	245	620	345	250	170	95	65	40	50	505	275	40	
Future Volume (vph)	45	245	620	345	250	170	95	65	40	50	505	275	40	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		75			125			150		0	0	0		
Storage Lanes		1			1			1		0	1	1		
Taper Length (ft)		25						25			25			
Satd. Flow (prot)	0	1787	1881	1881	1599	0	0	1770	1641	0	1787	1599	0	
Flt Permitted		0.270						0.950			0.950			
Satd. Flow (perm)	0	508	1881	1881	1599	0	0	1714	1641	0	1759	1599	0	
Right Turn on Red						No				No			No	
Satd. Flow (RTOR)														
Link Speed (mph)			30	30					30					
Link Distance (ft)			804	292					737					
Travel Time (s)			18.3	6.6					16.8					
Confl. Peds. (#/hr)		3				3	5			8	8	5		
Confl. Bikes (#/hr)					4	4								
Peak Hour Factor	0.96	0.96	0.96	0.97	0.97	0.97	0.92	0.92	0.92	0.92	0.93	0.93	0.93	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	2%	1%	1%	1%	
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	302	646	356	433	0	0	174	97	0	543	339	0	
Turn Type	pm+pt	pm+pt	NA	NA	Prot		Split	Split	NA		Prot	Prot		
Protected Phases	1	1	6	2	2		4	4	4		3	3		9
Permitted Phases	6	6												
Detector Phase	1	1	6	2	2		4	4	4		3	3		
Switch Phase														
Minimum Initial (s)	6.0	6.0	10.0	10.0	10.0		6.0	6.0	6.0		6.0	6.0		7.0
Minimum Split (s)	10.0	10.0	22.0	14.0	14.0		10.0	10.0	10.0		10.0	10.0		22.0
Total Split (s)	11.0	11.0	40.0	29.0	29.0		12.0	12.0	12.0		26.0	26.0		22.0
Total Split (%)	11.0%	11.0%	40.0%	29.0%	29.0%		12.0%	12.0%	12.0%		26.0%	26.0%		22%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0		3.0
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		
Total Lost Time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lag	Lag		Lead	Lead		
Lead-Lag Optimize?														
Recall Mode	None	None	Min	Min	Min		None	None	None		None	None		None
Act Effct Green (s)		36.4	36.4	25.2	25.2			8.1	8.1		22.2	22.2		
Actuated g/C Ratio		0.44	0.44	0.31	0.31			0.10	0.10		0.27	0.27		
v/c Ratio		0.90	0.78	0.62	0.89			1.01	0.60		1.13	0.79		
Control Delay		52.3	29.4	31.7	50.3			111.2	55.0		111.6	44.3		
Queue Delay		0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0		
Total Delay		52.3	29.4	31.7	50.3			111.2	55.0		111.6	44.3		
LOS		D	C	C	D			F	D		F	D		
Approach Delay			36.7	41.9					91.1					
Approach LOS			D	D					F					
Queue Length 50th (ft)		91	246	143	194			86	46		~299	149		
Queue Length 95th (ft)		#354	#625	#337	#499			#271	#146		#666	#391		
Internal Link Dist (ft)			724	212					657					
Turn Bay Length (ft)		75			125			150						
Base Capacity (vph)		334	830	576	489			173	161		482	431		
Starvation Cap Reductn		0	0	0	0			0	0		0	0		
Spillback Cap Reductn		0	0	0	0			0	0		0	0		
Storage Cap Reductn		0	0	0	0			0	0		0	0		
Reduced v/c Ratio		0.90	0.78	0.62	0.89			1.01	0.60		1.13	0.79		

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 82.4
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 58.2 Intersection LOS: E
Intersection Capacity Utilization 89.9% 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.

Splits and Phases: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street



Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	625	495	20	770	0	0
Future Vol, veh/h	625	495	20	770	0	0
Conflicting Peds, #/hr	0	17	17	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	93	93	90	90
Heavy Vehicles, %	1	1	2	2	1	1
Mvmt Flow	665	527	22	828	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1208	0	-	945
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.309
Pot Cap-1 Maneuver	-	-	578	-	0	319
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	578	-	-	314
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	578	-
HCM Lane V/C Ratio	-	-	-	0.037	-
HCM Control Delay (s)	0	-	-	11.5	0
HCM Lane LOS	A	-	-	B	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	16.1
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	0	1	370	125	25	2	150	0	0	0	0
Future Vol, veh/h	70	0	1	370	125	25	2	150	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	76	0	1	402	136	27	2	163	0	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9	18.7	10.3
HCM LOS	A	C	B

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	1%	99%	71%
Vol Thru, %	99%	0%	24%
Vol Right, %	0%	1%	5%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	152	71	520
LT Vol	2	70	370
Through Vol	150	0	125
RT Vol	0	1	25
Lane Flow Rate	165	77	565
Geometry Grp	1	1	1
Degree of Util (X)	0.25	0.112	0.722
Departure Headway (Hd)	5.441	5.224	4.601
Convergence, Y/N	Yes	Yes	Yes
Cap	656	681	786
Service Time	3.511	3.296	2.647
HCM Lane V/C Ratio	0.252	0.113	0.719
HCM Control Delay	10.3	9	18.7
HCM Lane LOS	B	A	C
HCM 95th-tile Q	1	0.4	6.3

Attachments

Capacity Analysis Worksheets

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	SBL	SBT	SBR	SBR2
Lane Configurations												
Traffic Volume (vph)	25	265	575	125	10	405	185	225	125	260	180	10
Future Volume (vph)	25	265	575	125	10	405	185	225	125	260	180	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		75		0	0		125		0		0	
Storage Lanes		1		0	0		1		0		1	
Taper Length (ft)		25			25				25			
Satd. Flow (prot)	0	1752	1786	0	0	1843	1568	0	0	1815	1568	0
Flt Permitted		0.235				0.976				0.984		
Satd. Flow (perm)	0	432	1786	0	0	1800	1510	0	0	1811	1568	0
Right Turn on Red				No				No				No
Satd. Flow (RTOR)												
Link Speed (mph)			30			30				30		
Link Distance (ft)			804			292				416		
Travel Time (s)			18.3			6.6				9.5		
Confl. Peds. (#/hr)		9		7	7			9	4			
Confl. Bikes (#/hr)				1			1	1				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	315	761	0	0	451	446	0	0	419	207	0
Turn Type	D.P+P	D.P+P	NA		Perm	NA	Perm		Split	NA	Prot	
Protected Phases	2	2	2 3			3			1	1	1	
Permitted Phases	3	3			3		3					
Minimum Split (s)	14.5	14.5			16.5	16.5	16.5		16.5	16.5	16.5	
Total Split (s)	20.0	20.0			30.0	30.0	30.0		30.0	30.0	30.0	
Total Split (%)	25.0%	25.0%			37.5%	37.5%	37.5%		37.5%	37.5%	37.5%	
Yellow Time (s)	2.5	2.5			3.5	3.5	3.5		3.5	3.5	3.5	
All-Red Time (s)	0.0	0.0			2.0	2.0	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)		0.0				0.0	0.0			0.0	0.0	
Total Lost Time (s)		2.5				5.5	5.5			5.5	5.5	
Lead/Lag	Lag	Lag							Lead	Lead	Lead	
Lead-Lag Optimize?												
Act Effct Green (s)		45.0	47.5			24.5	24.5			24.5	24.5	
Actuated g/C Ratio		0.56	0.59			0.31	0.31			0.31	0.31	
v/c Ratio		0.59	0.72			0.82	0.97			0.75	0.43	
Control Delay		14.4	16.4			39.9	64.1			35.4	25.6	
Queue Delay		0.0	0.0			0.0	0.0			0.0	0.0	
Total Delay		14.4	16.4			39.9	64.1			35.4	25.6	
LOS		B	B			D	E			D	C	
Approach Delay			15.8			51.9				32.2		
Approach LOS			B			D				C		
Queue Length 50th (ft)		71	244			207	218			187	82	
Queue Length 95th (ft)		133	381			#361	#401			#320	143	
Internal Link Dist (ft)			724			212				336		
Turn Bay Length (ft)		75					125					
Base Capacity (vph)		531	1060			551	462			555	480	
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		0.59	0.72			0.82	0.97			0.75	0.43	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 65
Control Type: Pretimed
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 32.2 — Intersection LOS: C
Intersection Capacity Utilization 108.4% — 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: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street

Intersection	
Int Delay, s/veh	52.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↖	↗
Traffic Vol, veh/h	705	0	0	630	220	55
Future Vol, veh/h	705	0	0	630	220	55
Conflicting Peds, #/hr	0	14	14	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	4	4	2	2
Mvmt Flow	766	0	0	685	239	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	1452	766
Stage 1	-	-	-	-	766	-
Stage 2	-	-	-	-	686	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	-	0	0	-	~ 144	403
Stage 1	-	0	0	-	459	-
Stage 2	-	0	0	-	500	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	~ 144	403
Mov Cap-2 Maneuver	-	-	-	-	~ 144	-
Stage 1	-	-	-	-	459	-
Stage 2	-	-	-	-	500	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	$ 307.6
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	WBT
Capacity (veh/h)	144	403	-	-
HCM Lane V/C Ratio	1.661	0.148	-	-
HCM Control Delay (s)	$ 380.6	15.5	-	-
HCM Lane LOS	F	C	-	-
HCM 95th %tile Q(veh)	17.1	0.5	-	-

Notes

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

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	105	5	0	0	0	5	0	110	15	310	95
Future Vol, veh/h	0	105	5	0	0	0	5	0	110	15	310	95
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	114	5	0	0	0	5	0	120	16	337	103
Number of Lanes	0	1	0	0	0	0	0	1	0	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.3	7.9	12.2
HCM LOS	A	A	B

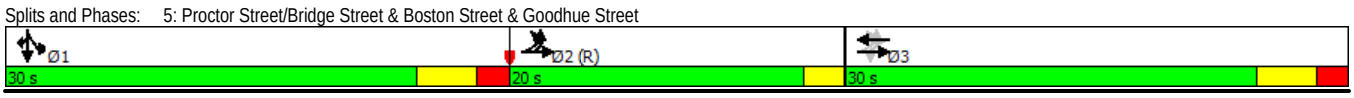
Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	4%	0%	4%
Vol Thru, %	0%	95%	74%
Vol Right, %	96%	5%	23%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	115	110	420
LT Vol	5	0	15
Through Vol	0	105	310
RT Vol	110	5	95
Lane Flow Rate	125	120	457
Geometry Grp	1	1	1
Degree of Util (X)	0.144	0.171	0.539
Departure Headway (Hd)	4.154	5.142	4.247
Convergence, Y/N	Yes	Yes	Yes
Cap	861	696	849
Service Time	2.19	3.188	2.273
HCM Lane V/C Ratio	0.145	0.172	0.538
HCM Control Delay	7.9	9.3	12.2
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.5	0.6	3.3

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	SBL	SBT	SBR	SBR2
Lane Configurations												
Traffic Volume (vph)	45	245	475	145	20	440	315	210	155	350	275	40
Future Volume (vph)	45	245	475	145	20	440	315	210	155	350	275	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		75		0	0		125		0		0	
Storage Lanes		1		0	0		1		0		1	
Taper Length (ft)		25			25				25			
Satd. Flow (prot)	0	1787	1800	0	0	1877	1599	0	0	1853	1599	0
Flt Permitted		0.170				0.954				0.985		
Satd. Flow (perm)	0	319	1800	0	0	1794	1544	0	0	1846	1599	0
Right Turn on Red				No				No				No
Satd. Flow (RTOR)												
Link Speed (mph)			30			30				30		
Link Distance (ft)			804			292				416		
Travel Time (s)			18.3			6.6				9.5		
Confl. Peds. (#/hr)		3		17	17			3	8		5	
Confl. Bikes (#/hr)				1			4	4				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	315	674	0	0	500	570	0	0	548	342	0
Turn Type	D.P+P	D.P+P	NA		Perm	NA	Perm		Split	NA	Prot	
Protected Phases	2	2	2 3			3			1	1	1	
Permitted Phases	3	3			3		3					
Minimum Split (s)	14.5	14.5			16.5	16.5	16.5		16.5	16.5	16.5	
Total Split (s)	20.0	20.0			30.0	30.0	30.0		30.0	30.0	30.0	
Total Split (%)	25.0%	25.0%			37.5%	37.5%	37.5%		37.5%	37.5%	37.5%	
Yellow Time (s)	2.5	2.5			3.5	3.5	3.5		3.5	3.5	3.5	
All-Red Time (s)	0.0	0.0			2.0	2.0	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)		0.0				0.0	0.0			0.0	0.0	
Total Lost Time (s)		2.5				5.5	5.5			5.5	5.5	
Lead/Lag	Lag	Lag							Lead	Lead	Lead	
Lead-Lag Optimize?												
Act Effct Green (s)		45.0	47.5			24.5	24.5			24.5	24.5	
Actuated g/C Ratio		0.56	0.59			0.31	0.31			0.31	0.31	
v/c Ratio		0.63	0.63			0.91	1.21			0.97	0.70	
Control Delay		18.5	13.9			50.5	140.2			60.0	33.6	
Queue Delay		0.0	0.0			0.0	0.0			0.0	0.0	
Total Delay		18.5	13.9			50.5	140.2			60.0	33.6	
LOS		B	B			D	F			E	C	
Approach Delay			15.4			98.3				49.9		
Approach LOS			B			F				D		
Queue Length 50th (ft)		75	199			238	~352			268	150	
Queue Length 95th (ft)		161	306			#420	#543			#466	#245	
Internal Link Dist (ft)			724			212				336		
Turn Bay Length (ft)		75					125					
Base Capacity (vph)		500	1068			549	472			567	489	
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		0.63	0.63			0.91	1.21			0.97	0.70	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 30 (38%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 1.21
Intersection Signal Delay: 55.9 Intersection LOS: E
Intersection Capacity Utilization 115.6% 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: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street



Intersection	
Int Delay, s/veh	43.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↖	↗
Traffic Vol, veh/h	575	0	0	790	200	50
Future Vol, veh/h	575	0	0	790	200	50
Conflicting Peds, #/hr	0	17	17	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	1	1
Mvmt Flow	625	0	0	859	217	54

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	1485	625
Stage 1	-	-	-	-	625	-
Stage 2	-	-	-	-	860	-
Critical Hdwy	-	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	-	0	0	-	~ 138	487
Stage 1	-	0	0	-	536	-
Stage 2	-	0	0	-	416	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	~ 138	487
Mov Cap-2 Maneuver	-	-	-	-	~ 138	-
Stage 1	-	-	-	-	536	-
Stage 2	-	-	-	-	416	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	281.3
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	WBT
Capacity (veh/h)	138	487	-	-
HCM Lane V/C Ratio	1.575	0.112	-	-
HCM Control Delay (s)	$ 348.3	13.3	-	-
HCM Lane LOS	F	B	-	-
HCM 95th %tile Q(veh)	15.3	0.4	-	-

Notes

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

Intersection	
Intersection Delay, s/veh	12.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	70	1	0	0	0	2	0	150	25	370	125
Future Vol, veh/h	0	70	1	0	0	0	2	0	150	25	370	125
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	76	1	0	0	0	2	0	163	27	402	136
Number of Lanes	0	1	0	0	0	0	0	1	0	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.2	8.1	14.8
HCM LOS	A	A	B

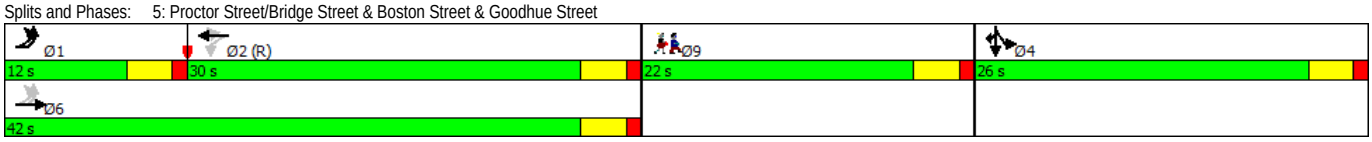
Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	1%	0%	5%
Vol Thru, %	0%	99%	71%
Vol Right, %	99%	1%	24%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	152	71	520
LT Vol	2	0	25
Through Vol	0	70	370
RT Vol	150	1	125
Lane Flow Rate	165	77	565
Geometry Grp	1	1	1
Degree of Util (X)	0.189	0.117	0.655
Departure Headway (Hd)	4.118	5.443	4.173
Convergence, Y/N	Yes	Yes	Yes
Cap	871	657	865
Service Time	2.149	3.49	2.196
HCM Lane V/C Ratio	0.189	0.117	0.653
HCM Control Delay	8.1	9.2	14.8
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.7	0.4	5

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	SBL	SBT	SBR	SBR2	Ø9
Lane Configurations													
Traffic Volume (vph)	25	265	575	125	10	405	185	225	125	260	180	10	
Future Volume (vph)	25	265	575	125	10	405	185	225	125	260	180	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		75		0	0		125		0		0		
Storage Lanes		1		0	0		1		0		1		
Taper Length (ft)		25			25				25				
Satd. Flow (prot)	0	1752	1783	0	0	1843	1568	0	0	1815	1568	0	
Flt Permitted		0.316				0.981				0.984			
Satd. Flow (perm)	0	583	1783	0	0	1810	1509	0	0	1810	1568	0	
Right Turn on Red				No				No				No	
Satd. Flow (RTOR)													
Link Speed (mph)			30			30				30			
Link Distance (ft)			804			292				416			
Travel Time (s)			18.3			6.6				9.5			
Confl. Peds. (#/hr)		9		7	7			9	4				
Confl. Bikes (#/hr)				1			1	1					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	315	761	0	0	451	446	0	0	419	207	0	
Turn Type	pm+pt	pm+pt	NA		Perm	NA	Perm		Split	NA	Prot		
Protected Phases	1	1	6			2			4	4	4		9
Permitted Phases	6	6			2		2						
Detector Phase	1	1	6		2	2	2		4	4	4		
Switch Phase													
Minimum Initial (s)	8.0	8.0	12.0		12.0	12.0	12.0		11.0	11.0	11.0		18.0
Minimum Split (s)	12.0	12.0	22.0		16.0	16.0	16.0		16.5	16.5	16.5		22.0
Total Split (s)	12.0	12.0	42.0		30.0	30.0	30.0		26.0	26.0	26.0		22.0
Total Split (%)	13.3%	13.3%	46.7%		33.3%	33.3%	33.3%		28.9%	28.9%	28.9%		24%
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0		3.0
All-Red Time (s)	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		
Total Lost Time (s)		4.0	4.0			4.0	4.0			4.0	4.0		
Lead/Lag	Lead	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?													
Recall Mode	None	None	None		C-Min	C-Min	C-Min		None	None	None		None
Act Effct Green (s)		55.8	55.8			43.8	43.8			21.8	21.8		
Actuated g/C Ratio		0.62	0.62			0.49	0.49			0.24	0.24		
v/c Ratio		0.68	0.69			0.51	0.61			0.96	0.55		
Control Delay		20.9	18.5			23.1	26.0			68.8	36.0		
Queue Delay		0.0	1.1			1.5	1.8			0.0	0.0		
Total Delay		20.9	19.7			24.6	27.8			68.8	36.0		
LOS		C	B			C	C			E	D		
Approach Delay			20.0			26.2				57.9			
Approach LOS			C			C				E			
Queue Length 50th (ft)		64	222			133	160			235	103		
Queue Length 95th (ft)		#268	#677			#401	#448			#415	174		
Internal Link Dist (ft)			724			212				336			
Turn Bay Length (ft)		75					125						
Base Capacity (vph)		465	1106			881	734			443	383		
Starvation Cap Reductn		0	0			254	151			0	0		
Spillback Cap Reductn		0	152			0	0			0	0		
Storage Cap Reductn		0	0			0	0			0	0		
Reduced v/c Ratio		0.68	0.80			0.72	0.77			0.95	0.54		

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 31.3 Intersection LOS: C
Intersection Capacity Utilization 105.9% 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: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street

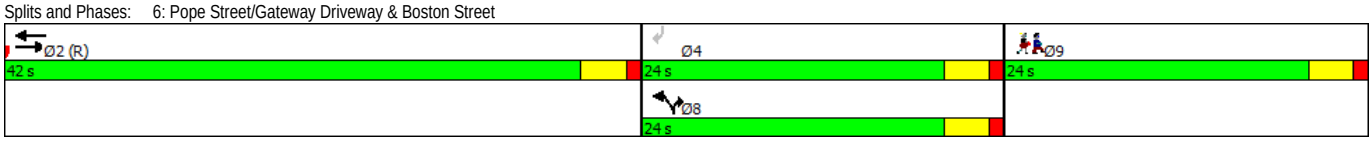


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	0	705	0	0	630	4	220	0	55	0	0	10	
Future Volume (vph)	0	705	0	0	630	4	220	0	55	0	0	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		0	0		50	0		0	
Storage Lanes	0		0	0		0	1		1	0		1	
Taper Length (ft)	25			25			25			25			
Satd. Flow (prot)	0	1863	0	0	1825	0	1770	0	1583	0	0	1611	
Flt Permitted							0.950						
Satd. Flow (perm)	0	1863	0	0	1825	0	1766	0	1583	0	0	1611	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)									61			460	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		292			117			232			72		
Travel Time (s)		6.6			2.7			5.3			1.6		
Confl. Peds. (#/hr)			14	14			1						
Confl. Bikes (#/hr)			1										
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	2%	2%	4%	4%	2%	2%	2%	2%	2%	2%	2%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	766	0	0	689	0	239	0	60	0	0	11	
Turn Type		NA			NA		Prot		Prot			Perm	
Protected Phases		2			2		8		8				9
Permitted Phases												4	
Detector Phase		2			2		8		8			4	
Switch Phase													
Minimum Initial (s)		10.0			10.0		6.0		6.0			6.0	5.0
Minimum Split (s)		14.0			14.0		10.0		10.0			10.0	24.0
Total Split (s)		42.0			42.0		24.0		24.0			24.0	24.0
Total Split (%)		46.7%			46.7%		26.7%		26.7%			26.7%	27%
Yellow Time (s)		3.0			3.0		3.0		3.0			3.0	3.0
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			4.0		4.0		4.0			4.0	
Lead/Lag													
Lead-Lag Optimize?													
Recall Mode		C-Min			C-Min		Min		Min			Min	None
Act Effct Green (s)		55.8			55.8		16.6		16.6			16.6	
Actuated g/C Ratio		0.62			0.62		0.18		0.18			0.18	
v/c Ratio		0.66			0.61		0.73		0.18			0.02	
Control Delay		16.3			18.6		47.9		9.2			0.0	
Queue Delay		2.4			0.4		1.8		0.0			0.0	
Total Delay		18.8			19.1		49.7		9.2			0.0	
LOS		B			B		D		A			A	
Approach Delay		18.8			19.1			41.6					
Approach LOS		B			B			D					
Queue Length 50th (ft)		128			149		128		0			0	
Queue Length 95th (ft)		m#664			#575		201		31			0	
Internal Link Dist (ft)		212			37			152			1		
Turn Bay Length (ft)									50				
Base Capacity (vph)		1155			1131		393		399			715	
Starvation Cap Reductn		258			0		0		0			0	
Spillback Cap Reductn		0			125		59		0			131	
Storage Cap Reductn		0			0		0		0			0	
Reduced v/c Ratio		0.85			0.68		0.72		0.15			0.02	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 22.6 Intersection LOS: C
Intersection Capacity Utilization 60.6% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Pope Street/Gateway Driveway & Boston Street



Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	SBL	SBT	SBR	SBR2	Ø9
Lane Configurations													
Traffic Volume (vph)	45	245	475	145	20	440	315	210	155	350	275	40	
Future Volume (vph)	45	245	475	145	20	440	315	210	155	350	275	40	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		75		0	0		125		0		0		
Storage Lanes		1		0	0		1		0		1		
Taper Length (ft)		25			25				25				
Satd. Flow (prot)	0	1787	1787	0	0	1877	1599	0	0	1853	1599	0	
Flt Permitted		0.251				0.960				0.985			
Satd. Flow (perm)	0	472	1787	0	0	1806	1542	0	0	1845	1599	0	
Right Turn on Red				No				No				No	
Satd. Flow (RTOR)													
Link Speed (mph)			30			30				30			
Link Distance (ft)			804			292				416			
Travel Time (s)			18.3			6.6				9.5			
Confl. Peds. (#/hr)		3		17	17			3	8		5		
Confl. Bikes (#/hr)				1			4	4					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	315	674	0	0	500	570	0	0	548	342	0	
Turn Type	pm+pt	pm+pt	NA		Perm	NA	Perm		Split	NA	Prot		
Protected Phases	1	1	6			2			4	4	4		9
Permitted Phases	6	6			2		2						
Detector Phase	1	1	6		2	2	2		4	4	4		
Switch Phase													
Minimum Initial (s)	8.0	8.0	12.0		12.0	12.0	12.0		11.0	11.0	11.0		18.0
Minimum Split (s)	13.0	13.0	23.0		17.0	17.0	17.0		16.5	16.5	16.5		22.0
Total Split (s)	13.0	13.0	45.0		32.0	32.0	32.0		33.0	33.0	33.0		22.0
Total Split (%)	13.0%	13.0%	45.0%		32.0%	32.0%	32.0%		33.0%	33.0%	33.0%		22%
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0		3.0
All-Red Time (s)	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		
Total Lost Time (s)		4.0	4.0			4.0	4.0			4.0	4.0		
Lead/Lag	Lead	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?													
Recall Mode	None	None	None		C-Min	C-Min	C-Min		None	None	None		None
Act Effct Green (s)		58.6	58.6			45.6	45.6			29.0	29.0		
Actuated g/C Ratio		0.59	0.59			0.46	0.46			0.29	0.29		
v/c Ratio		0.80	0.64			0.61	0.81			1.02	0.74		
Control Delay		31.4	19.9			28.3	35.0			80.6	43.2		
Queue Delay		0.0	23.8			10.4	33.8			0.0	0.0		
Total Delay		31.4	43.8			38.7	68.7			80.6	43.2		
LOS		C	D			D	E			F	D		
Approach Delay			39.8			54.7				66.2			
Approach LOS			D			D				E			
Queue Length 50th (ft)		82	233			186	213			~361	197		
Queue Length 95th (ft)		#323	#628			m#499	m#665			#577	#312		
Internal Link Dist (ft)			724			212				336			
Turn Bay Length (ft)		75					125						
Base Capacity (vph)		394	1046			823	703			537	463		
Starvation Cap Reductn		0	0			292	162			0	0		
Spillback Cap Reductn		0	386			0	0			0	0		
Storage Cap Reductn		0	0			0	0			0	0		
Reduced v/c Ratio		0.80	1.02			0.94	1.05			1.02	0.74		

Intersection Summary

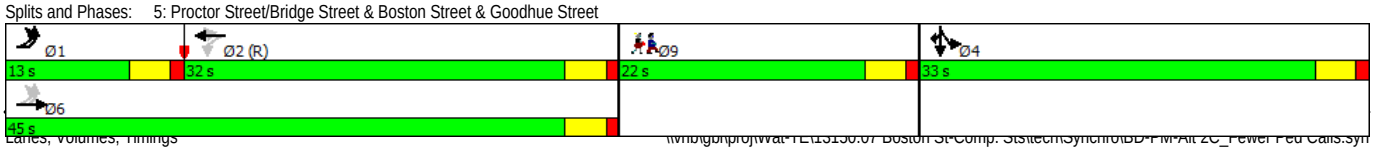
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 53.2 Intersection LOS: D
Intersection Capacity Utilization 113.1% ICU Level 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.

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

Splits and Phases: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street

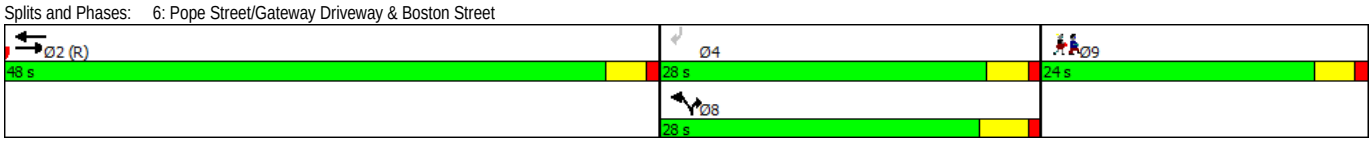


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	0	575	0	0	790	19	200	0	50	0	0	5	
Future Volume (vph)	0	575	0	0	790	19	200	0	50	0	0	5	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		0	50		0	0		0	
Storage Lanes	0		0	0		0	1		1	0		1	
Taper Length (ft)	25			25			25			25			
Satd. Flow (prot)	0	1881	0	0	1857	0	1787	0	1599	0	0	1611	
Flt Permitted							0.950						
Satd. Flow (perm)	0	1881	0	0	1857	0	1782	0	1599	0	0	1611	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)					2			104	55			397	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		292			117			232			87		
Travel Time (s)		6.6			2.7			5.3			2.0		
Confl. Peds. (#/hr)			17	17			1						
Confl. Bikes (#/hr)			2						3				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	1%	1%	2%	2%	2%	1%	2%	1%	2%	2%	2%	
Shared Lane Traffic (%)									10%				
Lane Group Flow (vph)	0	625	0	0	880	0	217	5	49	0	0	5	
Turn Type		NA			NA		Prot		Prot			Perm	
Protected Phases		2			2		8		8				9
Permitted Phases												4	
Detector Phase		2			2		8		8			4	
Switch Phase													
Minimum Initial (s)		10.0			10.0		5.0		5.0			6.0	5.0
Minimum Split (s)		14.0			14.0		22.5		22.5			10.0	24.0
Total Split (s)		48.0			48.0		28.0		28.0			28.0	24.0
Total Split (%)		48.0%			48.0%		28.0%		28.0%			28.0%	24%
Yellow Time (s)		3.0			3.0		3.5		3.5			3.0	3.0
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			4.0		4.5		4.5			4.0	
Lead/Lag													
Lead-Lag Optimize?													
Recall Mode		C-Min			C-Min		None		None			None	None
Act Effct Green (s)		59.8			59.8		17.3	0.0	17.3			17.8	
Actuated g/C Ratio		0.60			0.60		0.17	0.00	0.17			0.18	
v/c Ratio		0.56			0.79		0.70	0.05	0.15			0.01	
Control Delay		16.7			27.4		50.8	0.0	8.9			0.0	
Queue Delay		1.5			1.2		72.9	0.0	0.0			0.0	
Total Delay		18.2			28.5		123.7	0.0	8.9			0.0	
LOS		B			C		F	A	A			A	
Approach Delay		18.2			28.5			100.7					
Approach LOS		B			C			F					
Queue Length 50th (ft)		349			509		132	0	0			0	
Queue Length 95th (ft)		m473			#867		196	0	26			0	
Internal Link Dist (ft)		212			37			152			7		
Turn Bay Length (ft)							50						
Base Capacity (vph)		1124			1111		419	104	417			688	
Starvation Cap Reductn		305			0		0	0	0			0	
Spillback Cap Reductn		0			84		296	0	0			0	
Storage Cap Reductn		0			0		0	0	0			0	
Reduced v/c Ratio		0.76			0.86		1.76	0.05	0.12			0.01	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 35.8 Intersection LOS: D
Intersection Capacity Utilization 68.8% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Pope Street/Gateway Driveway & Boston Street

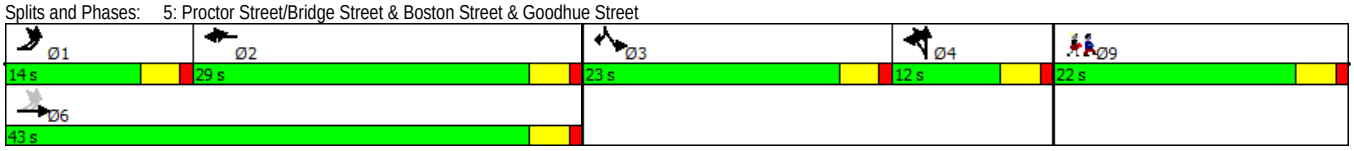


Lane Group	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	SBL	SBR	SBR2	Ø9
Lane Configurations														
Traffic Volume (vph)	25	265	700	295	135	165	110	50	60	55	385	180	10	
Future Volume (vph)	25	265	700	295	135	165	110	50	60	55	385	180	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		75			125			150		0	0	0		
Storage Lanes		1			1			1		0	1	1		
Taper Length (ft)		25						25			25			
Satd. Flow (prot)	0	1752	1845	1845	1568	0	0	1770	1692	0	1752	1568	0	
Flt Permitted		0.313						0.950			0.950			
Satd. Flow (perm)	0	572	1845	1845	1568	0	0	1770	1692	0	1737	1568	0	
Right Turn on Red						No				No			No	
Satd. Flow (RTOR)														
Link Speed (mph)			30	30					30					
Link Distance (ft)			804	292					745					
Travel Time (s)			18.3	6.6					16.9					
Confl. Peds. (#/hr)		9				9				4	4			
Confl. Bikes (#/hr)					1	1								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	2%	3%	3%	3%	
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	315	761	321	326	0	0	174	125	0	418	207	0	
Turn Type	pm+pt	pm+pt	NA	NA	Prot		Split	Split	NA		Prot	Prot		
Protected Phases	1	1	6	2	2		4	4	4		3	3		9
Permitted Phases	6	6												
Detector Phase	1	1	6	2	2		4	4	4		3	3		
Switch Phase														
Minimum Initial (s)	6.0	6.0	10.0	10.0	10.0		6.0	6.0	6.0		6.0	6.0		7.0
Minimum Split (s)	10.0	10.0	22.0	14.0	14.0		10.0	10.0	10.0		10.0	10.0		22.0
Total Split (s)	14.0	14.0	43.0	29.0	29.0		12.0	12.0	12.0		23.0	23.0		22.0
Total Split (%)	14.0%	14.0%	43.0%	29.0%	29.0%		12.0%	12.0%	12.0%		23.0%	23.0%		22%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0		3.0
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		
Total Lost Time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lag	Lag		Lead	Lead		
Lead-Lag Optimize?														
Recall Mode	None	None	Min	Min	Min		None	None	None		None	None		None
Act Effct Green (s)		39.4	39.4	25.2	25.2			8.1	8.1		19.2	19.2		
Actuated g/C Ratio		0.48	0.48	0.31	0.31			0.10	0.10		0.23	0.23		
v/c Ratio		0.75	0.86	0.57	0.68			1.01	0.76		1.03	0.57		
Control Delay		30.2	32.8	30.3	35.4			111.2	66.8		85.7	36.9		
Queue Delay		0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0		
Total Delay		30.2	32.8	30.3	35.4			111.2	66.8		85.7	36.9		
LOS		C	C	C	D			F	E		F	D		
Approach Delay			32.0	32.9					92.6					
Approach LOS			C	C					F					
Queue Length 50th (ft)		88	297	127	134			86	60		202	88		
Queue Length 95th (ft)		#309	#761	284	#344			#271	#193		#522	#220		
Internal Link Dist (ft)			724	212					665					
Turn Bay Length (ft)		75			125			150						
Base Capacity (vph)		418	881	565	480			173	165		407	364		
Starvation Cap Reductn		0	0	0	0			0	0		0	0		
Spillback Cap Reductn		0	0	0	0			0	0		0	0		
Storage Cap Reductn		0	0	0	0			0	0		0	0		
Reduced v/c Ratio		0.75	0.86	0.57	0.68			1.01	0.76		1.03	0.57		

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 82.4
Natural Cycle: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 47.9 — Intersection LOS: D
Intersection Capacity Utilization 80.3% — 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: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street



Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	760	385	10	620	0	0
Future Vol, veh/h	760	385	10	620	0	0
Conflicting Peds, #/hr	0	14	14	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	4	4	2	2
Mvmt Flow	826	418	11	674	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1259	0	-	1049
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.236	-	-	3.318
Pot Cap-1 Maneuver	-	-	546	-	0	276
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	546	-	-	272
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	546	-
HCM Lane V/C Ratio	-	-	-	0.02	-
HCM Control Delay (s)	0	-	-	11.7	0
HCM Lane LOS	A	-	-	B	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	105	0	5	310	95	15	5	110	0	0	0	0
Future Vol, veh/h	105	0	5	310	95	15	5	110	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	114	0	5	337	103	16	5	120	0	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9	13.6	9.5
HCM LOS	A	B	A

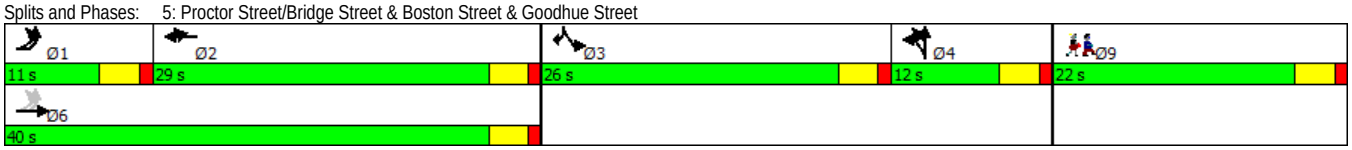
Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	4%	95%	74%
Vol Thru, %	96%	0%	23%
Vol Right, %	0%	5%	4%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	115	110	420
LT Vol	5	105	310
Through Vol	110	0	95
RT Vol	0	5	15
Lane Flow Rate	125	120	457
Geometry Grp	1	1	1
Degree of Util (X)	0.183	0.164	0.576
Departure Headway (Hd)	5.271	4.939	4.539
Convergence, Y/N	Yes	Yes	Yes
Cap	678	723	794
Service Time	3.324	2.985	2.571
HCM Lane V/C Ratio	0.184	0.166	0.576
HCM Control Delay	9.5	9	13.6
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.7	0.6	3.7

Lane Group	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	SBL	SBR	SBR2	Ø9
Lane Configurations														
Traffic Volume (vph)	45	245	620	345	250	170	95	65	40	50	505	275	40	
Future Volume (vph)	45	245	620	345	250	170	95	65	40	50	505	275	40	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		75			125			150		0	0	0		
Storage Lanes		1			1			1		0	1	1		
Taper Length (ft)		25						25			25			
Satd. Flow (prot)	0	1787	1881	1881	1599	0	0	1770	1641	0	1787	1599	0	
Flt Permitted		0.270						0.950			0.950			
Satd. Flow (perm)	0	508	1881	1881	1599	0	0	1714	1641	0	1759	1599	0	
Right Turn on Red						No				No			No	
Satd. Flow (RTOR)														
Link Speed (mph)			30	30					30					
Link Distance (ft)			804	292					737					
Travel Time (s)			18.3	6.6					16.8					
Confl. Peds. (#/hr)		3				3	5			8	8	5		
Confl. Bikes (#/hr)					4	4								
Peak Hour Factor	0.96	0.96	0.96	0.97	0.97	0.97	0.92	0.92	0.92	0.92	0.93	0.93	0.93	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	2%	1%	1%	1%	
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	302	646	356	433	0	0	174	97	0	543	339	0	
Turn Type	pm+pt	pm+pt	NA	NA	Prot		Split	Split	NA		Prot	Prot		
Protected Phases	1	1	6	2	2		4	4	4		3	3		9
Permitted Phases	6	6												
Detector Phase	1	1	6	2	2		4	4	4		3	3		
Switch Phase														
Minimum Initial (s)	6.0	6.0	10.0	10.0	10.0		6.0	6.0	6.0		6.0	6.0		7.0
Minimum Split (s)	10.0	10.0	22.0	14.0	14.0		10.0	10.0	10.0		10.0	10.0		22.0
Total Split (s)	11.0	11.0	40.0	29.0	29.0		12.0	12.0	12.0		26.0	26.0		22.0
Total Split (%)	11.0%	11.0%	40.0%	29.0%	29.0%		12.0%	12.0%	12.0%		26.0%	26.0%		22%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0		3.0
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		
Total Lost Time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lag	Lag		Lead	Lead		
Lead-Lag Optimize?														
Recall Mode	None	None	Min	Min	Min		None	None	None		None	None		None
Act Effct Green (s)		36.4	36.4	25.2	25.2			8.1	8.1		22.2	22.2		
Actuated g/C Ratio		0.44	0.44	0.31	0.31			0.10	0.10		0.27	0.27		
v/c Ratio		0.90	0.78	0.62	0.89			1.01	0.60		1.13	0.79		
Control Delay		52.3	29.4	31.7	50.3			111.2	55.0		111.6	44.3		
Queue Delay		0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0		
Total Delay		52.3	29.4	31.7	50.3			111.2	55.0		111.6	44.3		
LOS		D	C	C	D			F	D		F	D		
Approach Delay			36.7	41.9					91.1					
Approach LOS			D	D					F					
Queue Length 50th (ft)		91	246	143	194			86	46		~299	149		
Queue Length 95th (ft)		#354	#625	#337	#499			#271	#146		#666	#391		
Internal Link Dist (ft)			724	212					657					
Turn Bay Length (ft)		75			125			150						
Base Capacity (vph)		334	830	576	489			173	161		482	431		
Starvation Cap Reductn		0	0	0	0			0	0		0	0		
Spillback Cap Reductn		0	0	0	0			0	0		0	0		
Storage Cap Reductn		0	0	0	0			0	0		0	0		
Reduced v/c Ratio		0.90	0.78	0.62	0.89			1.01	0.60		1.13	0.79		

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 82.4
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 58.2 Intersection LOS: E
Intersection Capacity Utilization 89.9% 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.

Splits and Phases: 5: Proctor Street/Bridge Street & Boston Street & Goodhue Street



Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	625	495	20	770	0	0
Future Vol, veh/h	625	495	20	770	0	0
Conflicting Peds, #/hr	0	17	17	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	93	93	90	90
Heavy Vehicles, %	1	1	2	2	1	1
Mvmt Flow	665	527	22	828	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1208	0	-	945
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.309
Pot Cap-1 Maneuver	-	-	578	-	0	319
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	578	-	-	314
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	578	-
HCM Lane V/C Ratio	-	-	-	0.037	-
HCM Control Delay (s)	0	-	-	11.5	0
HCM Lane LOS	A	-	-	B	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	16.1
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	0	1	370	125	25	2	150	0	0	0	0
Future Vol, veh/h	70	0	1	370	125	25	2	150	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	76	0	1	402	136	27	2	163	0	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9	18.7	10.3
HCM LOS	A	C	B

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	1%	99%	71%
Vol Thru, %	99%	0%	24%
Vol Right, %	0%	1%	5%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	152	71	520
LT Vol	2	70	370
Through Vol	150	0	125
RT Vol	0	1	25
Lane Flow Rate	165	77	565
Geometry Grp	1	1	1
Degree of Util (X)	0.25	0.112	0.722
Departure Headway (Hd)	5.441	5.224	4.601
Convergence, Y/N	Yes	Yes	Yes
Cap	656	681	786
Service Time	3.511	3.296	2.647
HCM Lane V/C Ratio	0.252	0.113	0.719
HCM Control Delay	10.3	9	18.7
HCM Lane LOS	B	A	C
HCM 95th-tile Q	1	0.4	6.3