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August 30, 2018

Mr. Christopher Wider, Chairman
Zoning Board of Appeals
Town of Norfolk
Town Hall
78 Main Street
Norfolk, MA 02056

Subject: Proposed Abbyville Development, Norfolk, MA Traffic Analysis Main Street at Park Street

Dear Chairman Wider:

As follow up to the previous memorandum on the Park Street at Main Street analysis, Green completed further analysis in response to discussions with the Town's peer review consultant. It was requested that the single lane approach to Main Street be further tested following final adjustments to the projected traffic volumes including applying MAPC growth projections, the expanded roadway network and developing average weekday conditions. In addition, the site traffic projections for both Abbyville components and Park Place, the major site specific development, were updated using the latest ITE Trip Generation Report[1]. Traffic signal warrants analyses were completed for Park Street conditions with a single travel lane approach to Main Street and total volumes as well as conditions that consider only the left turn exit movements from Park Street. As will be described below prior to summarizing the results of the warrants analysis, the Park Street approach typically operates as a two lane approach with separate left and right turn lanes demarcated. The results, however, indicate that a traffic signal is not justified for this location based on the warrants.

Existing Conditions

The Main Street/Park Street intersection is a 'T' type, unsignalized intersection where the Park Street approach is currently marked as a single lane although it has been observed under existing conditions that the approach substantively functions as a two lane system whereby right turning passenger vehicles do move past several waiting left turning passenger vehicles rather than queuing in a single lane. The corresponding photograph depicts the driving pattern as well as the relative width of the Park Street approach to Main Street where this approach safely accommodates two lanes of traffic for a short distance. The curb to curb roadway width on the MBTA bridge is approximately 36 feet. It is currently marked with an approximately 1 foot shoulder and a single wide travel lane in each direction. From the bridge to Main Street, the pavement widens to 42 feet and then to 65 feet at the mouth of the intersection. While not striped as two lanes, it commonly functions as a two lane approach as depicted in the photograph.

[1] Institute of Transportation Engineers (ITE), Trip Generation, Washington, D.C., 10th Edition, 2017.

The historical traffic data collected for this intersection indicate that approximately 65-70% of the volume exiting Park Street consists of right turn movements. Under those conditions, it is normal to expect that the right turn movement can be made with relatively short delays. Signalization under those conditions would not normally be considered unless the approaching volumes were substantial and steady over the course of the day. That said, the warrants analysis was completed for both the total approach volume and with only the left turn exiting traffic.

Traffic Signal Warrants Analysis

The signal warrants analyses were completed based on estimates of hourly traffic volumes over the course of an average weekday. Minimum traffic volume criteria are defined in the MUTCD[2]. For traffic signals to be considered as an option, the minimum volume criteria must be satisfied for eight (8) hours. Warrants Condition A states that the main street must have at least 500 vehicles per hour (vph) while the minor street approach have at least 150 vph for at minimum the same 8 hours. Condition B requires a main street total hourly volume of at least 750 vph while the minor street approach volume has at least 75 vph, again for at minimum the same eight (8) hours.

As noted above, the analysis was completed for a single lane Park Street approach using the total approach volumes and for conditions that assume a two lane approach and only considering left turn exit volumes. The results for both conditions are shown in the attached tables.

As shown in the tables, signal warrants are not satisfied for either condition. With the single lane approach and total approach volumes, Condition A was satisfied for 6 hours while Condition B for only 4 hours. Once the right turn volume is removed, there were no hours in which the traffic volumes satisfied the criteria.

Based on this final analysis, it can be concluded that under future average weekday conditions, traffic signal warrants are not satisfied and in consideration of other factors including the physical condition of the intersection and the traffic patterns, a traffic signal would not be justified or recommended for this location. However, based on field observations and noted driving patterns on the approach, the town may want to further evaluate the possibility of modifying the lane markings to show separate left and right turn lanes.

If there are any further questions, do not hesitate to contact me.

Very truly yours,
GREEN INTERNATIONAL AFFILIATES, INC.

William J Scully

William J. Scully, P.E.
Vice President
Municipal Transportation &
Infrastructure Services

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Cc T. DiPlacido
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[2] U.S. Department of Transportation, Manual on Uniform Traffic Control Devices, Washington, D.C, 2009.

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JOB	**Norfolk Abbyville**		
SHEET NO.	1	OF	1
CALCULATED BY	SM	DATE	8/20/18
CHECKED BY	WS	DATE	8/20/18
SCALE	n/a		

Signal Warrant 1: Build 2024 Volumes

SCENARIO: All Turns

LOCATION: Main Street at Park Street

TOWN/CITY: Norfolk, MA

DATA COLLECTION DATE: Mon., 9/11/2017

	Condition A Thresholds	Condition B Thresholds	Percentage
Vehicles per hour on major street (total of both approaches)	500	750	100%
Vehicles per hour on higher-volume minor-street approach (one direction only)	150	75	

	Main Street		Park Street		Major Road	Minor Road			
	EB Approach	WB Approach	NB Approach		Total of Both Approaches	Higher of two approaches	Condition A met?	Condition B met?	Notes
No. Lanes:	1	1	1						
12:00 AM to 01:00 AM	4	14	5		18	5	no	no	
01:00 AM to 02:00 AM	10	10	7		20	7	no	no	
02:00 AM to 03:00 AM	1	12	3		13	3	no	no	
03:00 AM to 04:00 AM	7	10	5		17	5	no	no	
04:00 AM to 05:00 AM	35	23	14		58	14	no	no	
05:00 AM to 06:00 AM	138	46	47		184	47	no	no	
06:00 AM to 07:00 AM	426	138	183		564	183	**yes**	no	
07:00 AM to 08:00 AM	675	268	285		943	285	**yes**	**yes**	
08:00 AM to 09:00 AM	439	301	265		740	265	**yes**	no	
09:00 AM to 10:00 AM	257	226	123		483	123	no	no	
10:00 AM to 11:00 AM	227	202	110		429	110	no	no	
11:00 AM to 12:00 PM	226	212	111		438	111	no	no	
12:00 PM to 01:00 PM	238	258	106		496	106	no	no	
01:00 PM to 02:00 PM	229	301	124		530	124	no	no	
02:00 PM to 03:00 PM	244	280	135		524	135	no	no	
03:00 PM to 04:00 PM	263	458	145		720	145	no	no	
04:00 PM to 05:00 PM	289	519	168		809	168	**yes**	**yes**	
05:00 PM to 06:00 PM	338	656	172		994	172	**yes**	**yes**	
06:00 PM to 07:00 PM	271	528	167		800	167	**yes**	**yes**	
07:00 PM to 08:00 PM	194	264	105		458	105	no	no	
08:00 PM to 09:00 PM	172	158	75		330	75	no	no	
09:00 PM to 10:00 PM	76	127	43		204	43	no	no	
10:00 PM to 11:00 PM	38	65	15		103	15	no	no	
11:00 PM to 12:00 AM	20	33	9		53	9	no	no	
				Number of Hours in which Condition is met			**6**	**4**	
				Warrant 1 satisfied?			**no**		

Additional Comments:

Includes Park Place and Abbyville projected trips. Based on ITE *Trip Generation* 10th Ed., 2017, and on existing traffic patterns and U.S. Census journey-to-work data.

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JOB	**Norfolk Abbyville**		
SHEET NO.	1	OF	1
CALCULATED BY	SM	DATE	4/19/18
CHECKED BY	WS	DATE	4/19/18
SCALE	n/a		

Signal Warrant 1: Build 2024 Volumes

SCENARIO: Park St Right Turns Excluded

LOCATION: Main Street at Park Street

TOWN/CITY: Norfolk, MA

DATA COLLECTION DATE: Mon., 9/11/2017

	Condition A Thresholds	Condition B Thresholds	Percentage
Vehicles per hour on major street (total of both approaches)	500	750	100%
Vehicles per hour on higher-volume minor-street approach (one direction only)	150	75	

	Main Street		Park Street		Major Road	Minor Road			
	EB Approach	WB Approach	NB Approach		Total of Both Approaches	Higher of two approaches	Condition A met?	Condition B met?	Notes
No. Lanes:	1	1	1						
12:00 AM to 01:00 AM	4	14	1		18	1	no	no	
01:00 AM to 02:00 AM	10	10	1		20	1	no	no	
02:00 AM to 03:00 AM	1	12	0		13	0	no	no	
03:00 AM to 04:00 AM	7	10	0		17	0	no	no	
04:00 AM to 05:00 AM	35	23	3		58	3	no	no	
05:00 AM to 06:00 AM	138	46	10		184	10	no	no	
06:00 AM to 07:00 AM	426	138	39		564	39	no	no	
07:00 AM to 08:00 AM	675	268	61		943	61	no	no	
08:00 AM to 09:00 AM	439	301	59		740	59	no	no	
09:00 AM to 10:00 AM	257	226	28		483	28	no	no	
10:00 AM to 11:00 AM	227	202	26		429	26	no	no	
11:00 AM to 12:00 PM	226	212	27		438	27	no	no	
12:00 PM to 01:00 PM	238	258	27		496	27	no	no	
01:00 PM to 02:00 PM	229	301	34		530	34	no	no	
02:00 PM to 03:00 PM	244	280	37		524	37	no	no	
03:00 PM to 04:00 PM	263	458	42		720	42	no	no	
04:00 PM to 05:00 PM	289	519	50		809	50	no	no	
05:00 PM to 06:00 PM	338	656	58		994	58	no	no	
06:00 PM to 07:00 PM	271	528	59		800	59	no	no	
07:00 PM to 08:00 PM	194	264	34		458	34	no	no	
08:00 PM to 09:00 PM	172	158	25		330	25	no	no	
09:00 PM to 10:00 PM	76	127	13		204	13	no	no	
10:00 PM to 11:00 PM	38	65	4		103	4	no	no	
11:00 PM to 12:00 AM	20	33	2		53	2	no	no	
				Number of Hours in which Condition is met			**0**	**0**	
				Warrant 1 satisfied?			**no**		

Additional Comments:

Includes Park Place and Abbyville projected trips. Based on ITE *Trip Generation* 10th Ed., 2017, and on existing traffic patterns and U.S. Census journey-to-work data.

Right-turning volumes on Park Street between 7:00 am and 6:00 pm estimated using proportion of traffic turning right during the weekday peak periods from four hours of data collected on Thurs. 9/10/2015.

Right turns from Park Street were not subtracted between 7:00 am to 6:00 pm, except for right-turning trips projected from Abbyville and from Park Place.