November 15, 2017

Michael Kulesza, Chairman
Town of Norfolk – Zoning Board of Appeals
One Liberty Lane
Norfolk, MA 02056

Re: Norfolk, MA – Abbyville Commons and Preserve at Abbyville
Traffic Peer Review – Third Comment Letter

Dear Mr. Kulesza:

BETA Group, Inc. (BETA) has conducted a review of the April 2017 Traffic Impact and Access Study prepared for 48 apartment units with access on Lawrence Street in Norfolk, Massachusetts (Abbyville Commons). As part of a separate project, 148 single family homes would be constructed as part of a full build-out of the site (Preserve at Abbyville). Our original traffic peer review comments and recommendations were summarized in July 21, 2017 letters prepared for each project. Subsequent to our initial review, discussions have been held with the applicant's traffic engineering consultant (Green International Affiliates, Inc. [Green]) and supplemental documents have been submitted by the applicant's project team in an effort to address outstanding concerns and clarify uncertainties.

We have prepared this letter to identify the remaining concerns that were discussed at the October 11, 2017 Norfolk Zoning Board of Appeals meeting and as outlined in Green's November 6, 2017 response to comments letter. Additional traffic peer review efforts may be required as the projects proceed through the permitting process.

FINDINGS, COMMENTS AND RECOMMENDATIONS

BETA's Original T2 (Commons and Preserve) Comment – July 2017:

Based on ITE methodologies, standard traffic engineering practice is to evaluate the impacts of a development during the time periods that would result in the highest cumulative directional demands (i.e., the combination of adjacent street traffic and site trips).[1] This approach is consistent with MassDOT standard operating procedures in that the peak periods for analysis should be based on the site trip generation and existing conditions.[2] Since the traffic study states that MassDOT and ITE guidelines were used in preparing the assessment, it is recommended that the Applicant confirm that the Saturday Midday peak hour is not a critical time period for the proposed development based on the combination of site trips and adjacent street traffic volumes. This effort could be accomplished by either collecting traffic counts within the study area during the Saturday Midday peak period (11 AM-1 PM) or researching available traffic counts on a Saturday from the records of the Town of Norfolk, Metropolitan Area Planning Council (MAPC), and MassDOT.

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[1] *Transportation Impact Analyses for Site Development: An ITE Proposed Recommended Practice*. Washington, DC: Institute of Transportation Engineers, 2010.

[2] Massachusetts Department of Transportation. "Transportation Impact Assessment (TIA) Guidelines." *MassDOT Development Review – Planning Process*. Commonwealth of Massachusetts, 13 Mar. 2014.

Green's Response – August 2017:

Weekday peak hour analysis is considered sufficient for residential projects, per Section II.D of the March 13, 2014, Transportation Impact Assessment Guidelines ("while most office/ industrial/residential studies include the weekday a.m. and p.m. peak hours", as opposed to just "weekday evening…peak hour analysis"). This is also consistent with ITE guidelines, which we have attached a relevant excerpt from the ITE Recommended Practice that indicates the typical study periods for residential based developments. The predominant land use in the vicinity of the proposed development is residential. All of the roadways intersecting Lawrence Street and Park Street have only residential or some farm land uses. In conclusion, this is not a retail area or a unique (i.e. resort area) environment in which Saturday conditions could be substantively higher than the weekday periods. Consequently, it can be reasonably concluded that the study periods used for this assessment are adequate to understand its impacts and access requirements.

BETA's Supplemental Comment – October 2017:

As supported by MassDOT and ITE, standard traffic engineering practice is to assess the traffic impacts of a development (regardless of land use type) during the time periods that would provide the highest traffic volumes based on a combination of site traffic and adjacent street traffic and at locations considered to be critical. Based on ITE Land Use Code 210 (Single-Family Detached Housing), residential developments generate more vehicular trips during the Saturday Midday peak hour as compared with the Weekday AM peak hour. In addition, the roadways in the vicinity of the site are residential in nature. Therefore, the Saturday Midday peak hour may be a critical time period in the area of the subject site.

We have recommended that the Applicant confirm that the Saturday Midday peak hour is not a critical time period for the proposed development by either collecting a spot traffic count within the study area during the Saturday Midday peak period (11 AM-1 PM) or researching available traffic counts on a Saturday from the records of the Town of Norfolk, MAPC, and MassDOT. If the Saturday Midday peak period is found to be a critical time period in the area (i.e., higher traffic volumes than the traffic counts originally collected during the Weekday AM and Weekday PM peak hour), then a full analysis should be conducted at all of the study area intersections during the Saturday Midday peak period.

The Applicant's traffic engineer has subsequently conducted traffic counts along Lawrence Street, Park Street, and Main Street on a Saturday. Based on those findings, the Saturday Midday peak-hour traffic volumes are lower than traffic volumes during the Weekday AM and Weekday PM peak hours. Therefore, the Applicant's traffic engineer has concluded that the Saturday Midday peak hour is not a critical time period for the proposed development. Once the Saturday Midday peak-hour traffic counts are provided, we will review and comment accordingly.

Green's Response – November 2017:

Green has submitted the Saturday Midday peak-hour traffic counts to BETA on October 11, 2017. A copy of these counts is attached to this letter. These counts were provided to BETA and as they indicated at the last hearing, it is reasonable to conclude that Saturday analysis is not required. Consequently, we believe this comment is now fully addressed and no further action is required.

BETA's Supplemental Comment – November 2017:

Based on a review of the Saturday traffic counts collected on September 9, 12017 that were provided by Green combined with the estimated site-generated traffic for the proposed developments, the Saturday

Midday peak hour has been determined not to be a critical time period as compared to the Weekday AM and Weekday PM peak hours. No further response required.

BETA's Original T12 (Commons) and T5 (Preserve) Comment – July 2017:

Based on MassDOT guidelines, the proponent may need to commit to a mitigation program if the development is anticipated to add vehicle trips to an intersection that is already performing with poor operations (e.g., LOS D or below in rural areas and LOS E or below in urban areas). In addition, state guidelines suggest that a development might have a significant impact at an intersection that should be mitigated if the addition of site trips results in an increase of 10 seconds of delay (Weekday AM = +17.5 seconds, Weekday PM = +38.2 seconds). Since the traffic study states that MassDOT guidelines were used in preparing the assessment, it is recommended that the Applicant coordinate with the Norfolk Planner and Director of Public Works to develop and implement mitigation measures to improve operations and offset the project's impacts at this intersection.

Green's Response – August 2017:

A proposed mitigation program has been outlined by the Applicant and is summarized later in the response as well as described in the April 2017 study. The intersection of Main Street at Park Street experiences long estimated delays during the peak hours under current conditions, however, there are no feasible alternatives to alleviate the delays due to the location and design of the MBTA bridge on Park Street. Safety related actions at this intersection, however, have been included in the proposed mitigation plan.

BETA's Supplemental Comment – October 2017:

<u>Sight Lines</u>

The Applicant's traffic engineer has proposed to post an advance warning sign along the Main Street eastbound approach west of Park Street. We concur with this improvement to help provide Main Street eastbound vehicles an indication that there is an intersection downstream (ahead) and motorists should be prepared to react accordingly. Based on our field visits, we noted that sight lines to and from the west of Park Street are limited due to the horizontal curvature of Main Street, as well as vegetation located along the southwest corner of the intersection and along the north side of Lawrence Street (see picture below). As requested at the August 22, 2017 Zoning Board of Appeals meeting, we recommended that the Applicant evaluate sight lines at this intersection and research the right-of-way boundaries along Main Street to develop safety improvement measures to improve sight lines.

The Applicant's traffic engineer has subsequently researched the existing rights-of-way in these areas and has accordingly committed to assist the Norfolk Department of Public Works (DPW) in trimming/ clearing vegetation near the intersection. The Applicant's traffic engineer has proposed to conduct these efforts at the time the construction-related Traffic Management Plan (TMP) is being implemented. We have requested that the Applicant's traffic engineer provide an aerial image to depict the areas of vegetation trimming/clearing. Once the plan is provided, we will review and comment accordingly.

Traffic Signal Warrant Analysis

Due to the long delays along the Park Street approach to the Main Street intersection documented by the Applicant's traffic engineer, it was previously recommended that a traffic signal warrant analysis be conducted in accordance with Manual on Uniform Traffic Control Devices (MUTCD) guidelines. If a traffic signal was found to be warranted, then the Applicant should work with the Town of Norfolk in the design and installation a traffic signal at this location.

The Applicant's traffic engineer has subsequently conducted a traffic signal warrant analysis at the Park Street and Main Street intersection. According to the Applicant's traffic engineer, Warrant 1 (Eight Hour Vehicular Volume) and Warrant 2 (Four-Hour Vehicular Warrant) are not satisfied. Typically, Warrant 1 should be met before traffic signal control is considered. Therefore, the Applicant's traffic engineer has determined that a traffic signal should not be installed at this location. We have requested that the Applicant's traffic engineer provide the traffic signal warrant analysis. Once the analysis is provided, we will review and comment accordingly.

Green's Response – November 2017:

A graphic has been developed depicting approximate areas of recommended vegetation trimming within the Town and State right-of-way at the corners and along the north side of the intersection of Park Street at Main Street. This figure also depicts minimum required sight distances which are exceeded by existing available sight distances. Vegetation clearing around the corners would provide additional visibility and safety benefits. Green has submitted this requested information to BETA on October 12/13, 2017. A copy of this figure is attached to the letter. Consequently, we believe this comment is now fully addressed and no further action is required.

An eight-hour signal warrant analyses was conducted according to the guidelines provided in the 2009 edition of the Manual on Uniform Traffic Control Devices (MUTCD). The analyses examined the average weekday each for both the Existing and Future (seven-year time frame) conditions. In no case are more than 5 hours of a warrant are met. Green submitted the signal warrant calculations to BETA on October 11, 2017. At the last hearing, Beta reported concurrence with our finding in that signal warrant criteria is not satisfied. The signal warrants calculation sheets are attached to this letter. Consequently, we believe this comment is now fully addressed and no further action is required.

BETA's Supplemental Comment – November 2017:

Sight Lines

In the November 6, 2017 response letter, Green provided an aerial graphic (Recommended Vegetation Trimming – Park Street at Main Street, Sight Triangles Based on 85th-Percentile Travel Speed – Abbyville Commons and The Preserve at Abbyville, Norfolk, MA) that depicts areas of vegetation clearing along the northern side of Main Street and along the southwest corner of the Main Street and Park Street intersection. We recommend that the Norfolk Planning Board require these measures to be conducted as part of any approvals for the proposed development. No further response required.

Traffic Signal Warrant Analysis

In accordance with the MUTCD, at least one of the eight-hour warrants (Warrant 1, Condition A or B) should typically be met before signal control is considered. For a traffic signal to be considered under Warrant 1, thresholds must be met along the major street and the minor street approaches for eight hours of the day.

Within the November 6, 2017 response letter, Green provided a traffic signal warrant analysis for the Main Street and Park Street intersection. Green concluded that a traffic signal should not be installed at this intersection because the Existing, No-Build, and Build traffic volumes do not satisfy the MUTCD Warrant 1 thresholds. In the response, Green states that "In no case are more than 5 hours of a warrant are met." Based on a review of the traffic signal warrant analysis worksheets, however, we note that the Build traffic volumes satisfy 7 of the 8 hours required for Warrant 1A and 6 of the 8 hours required for Warrant 1B.

In addition to the 7 hours that satisfy Warrant 1A (between 6-7 AM, 7-8 AM, 8-9 AM, 3-4 PM, 4-5 PM, 5-6 PM, and 6-7 PM), the Build traffic signal warrant analysis worksheet shows the following:

- Between 9 and 10 AM, Main Street satisfies the mainline threshold with the Park Street approach 8 vehicles less than the minor street threshold.
- Between 1 and 2 PM, Main Street satisfies the mainline threshold with the Park Street approach 9 vehicles less than the minor street threshold.
- Between 2 and 3 PM, Main Street satisfies the mainline threshold with the Park Street approach only 1 vehicle less than the minor street threshold.

Although the traffic volumes presented in Green's traffic signal warrant analysis do not satisfy the requirements for the installation of a traffic signal under the eight-hour warrants, it is recommended that a traffic monitoring study be conducted at the Main Street and Park Street intersection to determine if a traffic signal may be warranted in the future (i.e., 1 vehicle short of satisfying the requirements for a traffic signal under Warrant 1A). No further response required.

BETA's Original T13 (Commons) Comment – July 2017:

The traffic study identified that the horizontal curvature of Lawrence Street hinders sight lines. In addition, our field reconnaissance revealed that Lawrence Street adjacent to the site has a vertical curve that could contribute to limited sight lines at the proposed site driveways. It is recommended that Sight Line Profile Plans be prepared to demonstrate that sight lines would be available to meet minimum AASHTO [American Association of State Highway and Transportation Officials] requirements to provide safety for the future residents of the development as well as for the traveling public along this section of Lawrence Street.

Green's Response – August 2017:

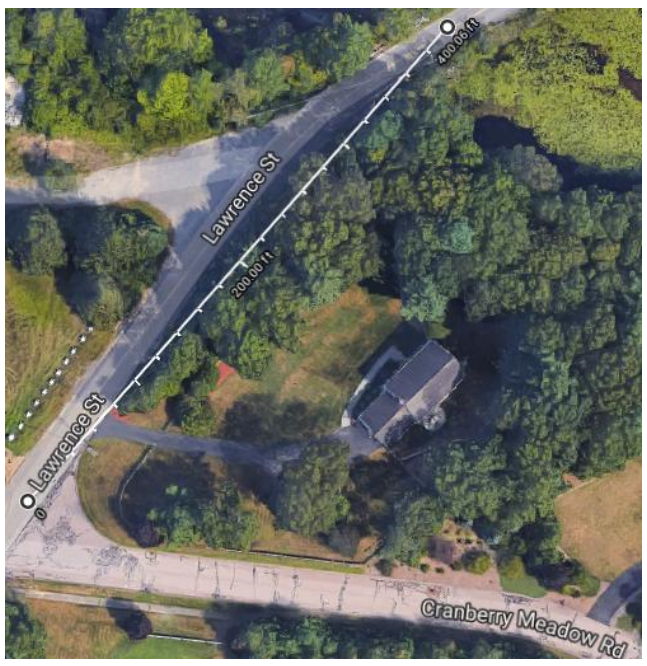
Analysis of sight lines has been completed and we have worked closely with the site engineer in developing the site access drive intersections. As indicated in the traffic report, there will be clearing and re-grading in the vicinity of the proposed site drives to ensure adequate visibility. The sight line triangle necessary to meet minimum criteria was demonstrated in the traffic report. A more detailed sight line profile plan will be prepared and submitted separately.

BETA's Supplemental Comment – October 2017:

Based on a review of the Sight Line and Profile plans submitted by the Applicant's traffic engineer on September 21, 2017, the available sight lines are shown to exceed minimum AASHTO requirements within the existing rights of way or through portions of the Applicant's property. In order to achieve these sight distances, the areas of vegetation and trees that will be required to be cleared or trimmed have been identified on the plans.

Based on field reconnaissance, however, sight lines may be limited for Lawrence Street eastbound vehicles turning left into the proposed east site driveway (Elliot Boulevard) due to the horizontal alignment of Lawrence Street and the vegetation located along the south side of Lawrence Street. The concern is that vehicles turning left into the site from Lawrence Street eastbound may not be able to appropriately judge the gaps in the Lawrence Street westbound traffic stream and that Lawrence Street westbound approaching vehicles may not have adequate time to react to a downstream turning vehicle into the site. For reference, the picture to the right was taken from the approximate location of the proposed east site driveway with the area of concern circled. Therefore, we requested that the Applicant's traffic engineer research the existing right-of-way along the south side of Lawrence Street in this area for potential vegetation clearing/trimming to improve safety.

As documented in a subsequent October 6, 2017 letter, the Applicant's traffic engineer stated that the horizontal curvature in Lawrence Street located approximately 200 feet from Cranberry Meadow Road and the associated vegetation located along the southern side of Lawrence Street would not limit sight lines to and from the proposed east site driveway (Elliot Boulevard). Further, the Applicant's traffic engineer states that sight distance measurements of over 400 feet can be achieved (that exceeds the minimum requirement for the 85th percentile speeds) even if vegetation extends to the edge of the roadway. Therefore, the Applicant's traffic engineer has determined that no vegetation clearing along the south side of Lawrence is necessary, but the Applicant is willing to work with the Norfolk DPW and Conservation Commission staff in relation to any additional vegetative trimming within the Lawrence Street right-of-way east of the proposed east site driveway.



Based on information provided by the Applicant's traffic engineer and our research, however, it appears that sight lines would be significantly less than 400 feet for vehicles turning left from Lawrence Street eastbound into the proposed site driveway opposite Cranberry Meadow Road attempting to see Lawrence Street westbound approaching vehicles. The line drawn on the aerial image to the right is approximately 400 feet from Cranberry Meadow Road (i.e., the location of where Lawrence Street eastbound left turns would turn to the driveway).

In accordance with AASHTO guidelines (Case F – Left Turns from the Major Road), roadways that allow vehicles on a major roadway to turn left across opposing traffic (i.e., at intersections and driveways) should have sufficient sight lines to accommodate this left-turn movement. At three-legged intersections, these types of sight distances should be evaluated especially when located near a horizontal cure or crest vertical curve along the major roadway.

While we agree that the Applicant should coordinate with the Norfolk DPW and Conservation Commission staff regarding any vegetation clearing/trimming, we also recommend that the Applicant's traffic engineer

prepare a sight line plan for Lawrence Street vehicles turning left into the proposed east site driveway in accordance with AASHTO guidelines.

Green's Response – November 2017:

A figure has been prepared depicting sight distances and, following further correspondence with BETA, an area of approximate vegetation clearing along the south side of the bend on Lawrence Street east of the proposed east site drive (Eliot Drive) location with respect to the eastbound motorist turning left into the site. Based on our evaluation, available sight distance looking eastbound from Lawrence Street at this location is expected to exceed the minimum sight distance required, which is 235 feet along Lawrence Street east of the proposed driveway. More than 350 feet is estimated to be available.

In further discussions with Beta, they have raised the potential need to provide some vegetative trimming along the south side of Lawrence Street to ensure maximum visibility is available. We believe that the tree canopy is sufficiently high to not affect visibility, but the Applicant is agreeable to reviewing in the field with town staff and where required within public right of way, will perform selective trimming. Green has submitted a diagram to BETA on October 13, 2017 that indicates the estimated sight line distances and the potential area of trimming. A copy of this figure is also attached to this letter. Consequently, we believe this comment is now fully addressed and no further action is required.

BETA's Supplemental Comment – November 2017:

In the November 6, 2017 response letter, Green has provided an aerial graphic (Vegetation Clearing and Trimming Location – Based on Looking Eastbound from Lawrence Street – Abbyville Commons and The Preserve at Abbyville, Norfolk, MA) that depicts areas of vegetation clearing within the right-of-way along the southern side of Lawrence Street. Based on our previous comment (BETA's T13 Supplemental Comment – October 2017) and as reflected in the associated picture, the clearing of vegetation should not be limited to the tree canopy along the south side of Lawrence Street. We recommend that the Norfolk Planning Board require this measure to be conducted as part of any approvals. No further response required.

If we can be of any further assistance regarding this matter, please contact me.

Very truly yours,
BETA Group, Inc.

Jason R. Plourde

Jason R. Plourde, P.E., PTP
Project Manager

cc: Amy Brady – Norfolk Zoning Clerk

Job No: 4980

BETA