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Ref: 7070

June 19, 2015

Mr. Edward L. Pesce, P.E., LEED® AP
Pesce Engineering & Associates, Inc.
451 Raymond Road
Plymouth, MA 02360

Re: Traffic Engineering Peer Review
Blackledge Farm – Franklin Street
Halifax, Massachusetts

Dear Ed:

Vanasse & Associates, Inc. (VAI) has completed a review of the materials submitted on behalf of Bowker LLC (the “Applicant”) in support of the proposed Blackledge Farm residential community to be located off Franklin Street in Halifax, Massachusetts (hereafter referred to as the “Project”). The Project has been submitted to the Town for consideration of the issuance of a Comprehensive Permit under the provisions Massachusetts General Laws, Chapter 40B, Sections 20-23 (Chapter 40B). Our review focused on the following areas as they relate to the Project: i) vehicle and pedestrian access and circulation; ii) Massachusetts Department of Transportation (MassDOT) design standards; iii) Town of Halifax Zoning requirements as they relate to access, parking and circulation; and iv) accepted Traffic Engineering and Transportation Planning practices.

In support the Project, the Applicant submitted the following materials which are the subject of this review:

1. *Traffic Impact Study for the Blackledge Farm Residential Development*, Franklin Street, Halifax, Massachusetts; McMahon Associates; March 2009;
2. *Supplemental Traffic Assessment*, Blackledge Farms, Halifax, MA; McMahon Associates; April 16, 2015; and
3. *Comprehensive Permit Plans*, Blackledge Farms, Franklin Street, Halifax, Massachusetts; Coneco Engineers & Scientists; April 2015, no revisions.

By way of background, VAI completed a review of the Project and the March 2009 *Traffic Impact Study* on behalf of the Town in June 2009,¹ which, at that time, was to consist of the construction of 104 single-family homes. The current submission represents a reduction in the number of homes from 104 to 52, and includes refinements to the Project layout. At the request of VAI, the Applicant’s engineer prepared a *Supplemental Traffic Assessment* in order to document the changes to the Project and to update the relevant calculations and analyses that were presented in the March 2009 *Traffic Impact Study*.

¹*Traffic Engineering Peer Review*, Blackledge Farm Residential Development, Halifax, Massachusetts; VAI; June 12, 2009.

Based on our review of the information submitted in support of the Project, we have determined that the materials were prepared in a professional manner and following the applicable standards of care. The supplemental analysis that has been provided by the Applicant's engineer validates the use of the March 2009 *Traffic Impact Study* as a reasonable basis to assess the potential impact of the Project on the transportation infrastructure and demonstrates the reduction in traffic that the current development proposal (52 single-family homes) will have over the previously proposed development (104 single-family homes). That being said, we have indicated areas where the Applicant should provide additional information in order to ensure that safe and efficient access can be afforded to the Project site. Specifically, we have requested that the Applicant review emergency vehicle access to the Project site and verify certain elements of the design of the Project site roadway.

The following summarizes our review of the materials submitted in support of the Project. Our comments are indicated in *italicized* text, with those requiring responses or additional information **bolded**.

PROJECT DESCRIPTION

As proposed, the Project will entail the construction of a residential community consisting of 52 single-family homes to be known as Blackledge Farm and located off Franklin Street, south of South Street, in Halifax, Massachusetts. The Project site encompasses approximately 63-acres of land along the east side of Franklin Street and is bounded by Franklin Street, residential properties and areas of open and wooded space to the west; and residential properties and areas of open and wooded space to the north, south and east. At present, the Project site consists of areas of open and wooded space, and low-lying wetland areas. Access to the Project site will be provided by way of a new roadway that will intersect the east side of Franklin Street, south of South Street.

MARCH 2009 TRAFFIC IMPACT STUDY AND THE APRIL 2015 SUPPLEMENT

General

Comment: *The March 2009 Traffic Impact Study (the "March 2009 TIS") as amended by the April 16, 2015 Supplemental Traffic Assessment (the "April 2015 Supplemental TA") was prepared in a professional manner and following the applicable standards of care, and a letter was provided by the Professional Engineer in responsible charge for the preparation of the documents as required pursuant to Massachusetts General Law attesting to their oversight in the preparation of the documents.*

Existing Conditions

Study Area

The study area evaluated for the Project consisted of Plymouth Street (Route 106), Carver Street, South Street and Franklin Street, as well as the following specific intersections: Plymouth Street at Carver Street; Plymouth Street at South Street; Carver Street at South Street; South Street at Franklin Street; and Franklin Street at the Project roadway. In addition, at the request of the Town a review of the general impact of the Project relative to traffic volume increases and safety was undertaken



at the intersection of River Street at Wood Street, River Street at South Street and Hayward Street at Franklin Street.

Comment: *The study area evaluated in the March 2009 TIS is sufficient to assess the impact of the Project on the transportation infrastructure.*

Traffic Volumes and Data Collection

Traffic volumes were collected along Franklin Street in the vicinity of the Project site over a continuous 7-day period (Wednesday through Tuesday, inclusive) in December 2008 by means of an automatic traffic recorder. In addition, manual turning movement counts were conducted at the study intersections during the weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak periods also in December 2008 while public schools were in regular session. A review of seasonal adjustment data available from MassDOT indicated that traffic volume conditions during the month of December are representative of an “above average” condition and, as such, no adjustment was required to the raw traffic count data.

Supplemental traffic counts were conducted at the intersection of Plymouth Street at Carver Street during the weekday evening peak period in March 2015 in order to validate the 2008 traffic count data and was presented in the April 2015 Supplemental TA. The weekday evening peak period was selected as it is representative of both the peak traffic volume period and critical analysis condition. Based on a comparison of the 2008 and 2015 traffic volumes at the subject intersection, no statistically significant variations were identified. As such, the 2008 traffic volume data and the associated analyses that were presented in the March 2009 TIS remain valid for use in assessing the potential impact of the Project on the transportation infrastructure.

Comment: *The traffic counts and establishment of the seasonal adjustment were completed in accordance with standard Traffic Engineering and Transportation Planning practices, and we are in agreement that the 2008 traffic count data remains valid for use in assessing the potential impact of the Project on the transportation infrastructure.*

Pedestrian and Bicycle Facilities

An inventory of pedestrian and bicycle facilities within the study area was included in the roadway and intersection descriptions presented in the March 2009 TIS. As noted therein, a sidewalk is provided along Plymouth Street, with a marked crosswalk provided for crossing the South Street leg of the Plymouth Street/South Street intersection.

While not explicitly identified in the March 2009 TIS, no formal bicycle facilities are present within the immediate study area and, with the exception of Plymouth Street, the study area roadways do not appear to provide sufficient width to accommodate formalized bicycle travel (by way of a shared travelled-way or marked bicycle lane).

Comment: *The description of existing pedestrian and bicycle facilities within the study area is consistent with field observations.*

Public Transportation

An inventory of available public transportation resources serving the study area was not included in the March 2009 TIS.

Comment: *A review of public transportation alternatives within the Town indicates that the Project site and the study area are not currently served by regularly scheduled public transportation services. Commuter Rail service is provided to the Town of Halifax by the Massachusetts Bay Transportation Authority (MBTA) by way of Halifax Station on the Old Colony line of the Commuter Rail system. Halifax Station is located at 6 Garden Road and is approximately 6 miles from the Project site.*

Motor Vehicle Crash Summary

Motor vehicle crash information was obtained for the study area intersections from MassDOT for the 3-year period 2004 through 2006, inclusive, and presented in the March 2009 TIS, with updated crash data (2010 through 2012, inclusive) provided as a part of the April 2015 Supplemental TA. Based on a review of this information, it was determined that the study area intersections averaged approximately two (2) or fewer crashes per year over each of the respective 3-year review periods. The intersection of Plymouth Street at Carver Street was reported to have experienced the largest number of motor vehicle crashes (4 to 5 total), with all of the study intersections found to have a motor vehicle crash rate (average number of motor vehicle crashes reported per year per million vehicles travelling through an intersection) below the MassDOT average motor vehicle crash rate for an unsignalized intersection and/or a reported low incidence of motor vehicle crashes where traffic count data was not available.

Comment: *The motor vehicle crash analysis was completed in accordance with MassDOT standards and following standard Traffic Engineering and Transportation Planning practices, and we are in agreement with the findings of the analysis.*

Future Conditions

No-Build Conditions

Traffic volumes within the study area were projected to 2013, a 5-year planning horizon from the base traffic volume year presented in the March 2009 TIS (2008). The 2013 No-Build condition (without the Project) was developed by applying a compounded annual background traffic growth rate of 1.0 percent per year to the 2008 Existing traffic volumes. The background traffic growth rate reflects normal traffic volume increases that would be expected in the area as a result of presently undefined development projects external to the study area, increases in household automobile ownership, etc. At the time of preparation of the March 2009 TIS, The Applicant's engineer also consulted with MassDOT and the Town of Halifax to identify specific development projects by others that may contribute traffic to the study area in excess of the background traffic growth rate and to determine if there were any planned roadway improvement projects in the area that may impact future traffic volumes and operating conditions within the study area. No specific development projects by others or planned roadway improvements were identified to be planned within the study area at that time.

Comment: *We are in agreement with the methodology that was used to develop the future condition traffic volume projections for the Project, including the background traffic growth rate used in the base calculations. We also note that the March 2015 updated traffic counts indicate that traffic volumes within the study area remain generally unchanged (i.e., little if any growth) since 2008. As such, it is reasonable to assume that the 5-year traffic volume projection incorporating the 1.0 percent per year compounded annual background traffic growth rate would continue to represent an appropriate planning condition from which to assess the potential impact of the Project on the transportation infrastructure.*

Build Conditions

Future Build condition (with the Project) traffic volume projections were developed by the Applicant's engineer following standard Traffic Engineering and Transportation Planning practices. In order to determine the traffic characteristics of the Project, trip-generation methodologies established by the Institute of Transportation Engineers (ITE)² were used. The ITE provides trip-generation information for various types of land uses developed as a result of scientific studies that have been conducted over the past 50 plus years. This data includes trip estimates for land uses similar to the Project (residential apartments). ITE Land Use Code 220, *Apartment*, was determined to be the most appropriate land use classification to establish the traffic characteristics of the Project.

As mentioned previously, the Project has been downsized from the 104 single-family home development that was assessed in the March 2009 TIS to 52 single-family homes. The table below summarizes and compares the traffic characteristics that were defined for the Project and illustrates the reduction in traffic that is represented by the current decrease in the number of residential units as presented in the April 2015 Supplemental TA.

²*Trip Generation*, 9th Edition; Institute of Transportation Engineers; Washington, DC; 2012.



**BLACKLEDGE FARM
 TRIP GENERATION SUMMARY^a**

Time Period/Direction	(A) Current Development Program (52 Dwelling Units)	(B) March 2009 TIS Development Program (104 Dwelling Units) ^b	(A - B) Difference
<i>Average Weekday:</i>			
Entering	288	539	
<u>Exiting</u>	<u>288</u>	<u>539</u>	
Total	576	1,078	-502
<i>Weekday Morning Peak Hour:</i>			
Entering	12	20	
<u>Exiting</u>	<u>34</u>	<u>62</u>	
Total	46	82	-36
<i>Weekday Evening Peak Hour:</i>			
Entering	37	70	
<u>Exiting</u>	<u>21</u>	<u>41</u>	
Total	58	111	-53

^aBased on ITE LUC 220, *Apartment*.

^bAs presented in the March 2009 TIS.

Project-related traffic was assigned onto the roadway network and to the study intersections based on Journey-to-Work data for persons residing within the Town of Halifax obtained from the 2000 U.S. Census. Based on this methodology, the Proponent’s engineer estimated that approximately 63 percent of Project-related traffic would be oriented to/from the west of the Project along Plymouth Street, with approximately 33 percent oriented to/from the east along Plymouth Street and the remaining 4 percent oriented to/from the southeast along Franklin Street.

Comment: *We are in agreement with the methodology that was used to develop the anticipated traffic characteristics of the Project and the resulting values, and acknowledge the reduction in traffic that the current development program represents over the development program that was assessed in the March 2009 TIS.*

As noted as a part of our June 2009 review of the March 2009 TIS, it appears that the assignment of traffic to Plymouth Street may be overstated with a corresponding underestimation of trips to/from the southeast of the Project site along Franklin Street (toward Center Street and Route 58); however, these variations would be considered minor (less than 10 vehicles during the peak-hour) and would not result in an appreciable change in the analysis results or the findings of the March 2009 TIS, particularly given the reduction in the number of residential units that are proposed.



Traffic Operations Analysis

In order to assess the potential impact of the Project on the transportation infrastructure, a detailed traffic operations analysis was performed for the study intersections under 2008 Existing, 2013 No-Build (without the Project) and 2013 Build (with the Project) conditions. In brief, traffic operations are described by six “levels of service” which are defined by letter grades from “A” through “F”, with a level-of-service (LOS) “A” representing the best operating conditions (average motorist delays of less than 10 seconds and little or no apparent vehicle queuing) and a LOS “F” representing constrained operating conditions (average motorist delays of 50 to 60 seconds or more and often with apparent vehicle queuing). A LOS of “E” is representative of an intersection or traffic movement that is operating at its design capacity, with a LOS of “D” typically representing the limit of “acceptable” traffic operations.

A review of the traffic operations analysis results presented in the March 2009 TIS for the then proposed 104-home development proposal indicates that, with the exception of all movements from the Carver Street approach to Plymouth Street, the critical movements at the study intersections (generally turning movements from the approach under stop control) were shown to operate under acceptable conditions (defined as a LOS “D” or better) with or without the Project. All movements from the Carver Street approach to Plymouth Street were shown to operate at LOS “E” under No-Build (without the Project) conditions and to degrade to LOS “F” with the addition of Project-related traffic with the then proposed 104-home development proposal.

All movements at the Project site roadway intersection with Franklin Street were shown to operate at LOS A during the peak hours with minimal vehicle queueing predicted (less than one (1) vehicle).

Comment: *The traffic operations analysis was completed using the appropriate methodologies and we are in agreement with the analysis results and the overall conclusion that the Project will not result in a significant impact (increase) on motorist delays or vehicle queueing within the study area. With the reduction in the number of residential units, operating conditions at the study intersections with the Project are expected to be better than presented in the March 2009 TIS, with a less pronounced impact anticipated at the Plymouth Street/Carver Street intersection.*

Sight Distance

An evaluation of sight distances at the Project site roadway intersection with Franklin Street was conducted by the Applicant’s engineer in accordance with American Association of State Highway and Transportation Officials (AASHTO)³ standards. Based on these measurements, the Applicant’s engineer indicated that lines of sight to and from the north of the Project site roadway are approximately 425 feet, with sight lines to and from the south found to be approximately 310 feet. These distances are sufficient for an approach speed of in excess of 40 miles per hour (mph) along Franklin Street, which is consistent with the travel speed observed by the Applicant’s engineer (35 to 40 mph).

³A Policy on Geometric Design of Highway and Streets, 6th Edition; American Association of State Highway and Transportation Officials (AASHTO); Washington D.C.; 2011.



Comment: *We are in agreement that sight lines at the Project site roadway intersection with Franklin Street exceed the requirements for a 40 mph approach speed along Franklin Street and indicate that the Project site roadway intersection can operate in a safe manner.*

The Applicant's engineer should review the proposed landscaping plan and sign locations for the Project, and provide recommendations to ensure that these proposed features do not inhibit sight lines with consideration for snow accumulation (discussion follows).

Recommendations

The following recommendations were offered by the Applicant's engineer as a result of the analyses and findings of the March 2009 TIS:

1. Proposed plantings or other objects within 15-feet of Franklin Street at the Project site roadway intersection should be below 3.5-feet in height to ensure that sight lines are maintained.
2. All internal roadway intersections within the Project site should be under stop control with corresponding STOP-signs and STOP-lines.
3. Proposed plantings or other objects located within 10-feet of internal roadway intersections within the Project site should be below 3.5-feet in height in order to ensure that sight lines are maintained.

Comment: *We are in agreement with the recommendations of the Applicant's engineer and would suggest that the following additional recommendations and mitigation commitments be considered for implementation as a part of the Project, some of which may be reflected on the Comprehensive Permit Plans:*

1. *The Project site roadway should be a minimum of 24-feet in width with vehicles exiting the Project site placed under STOP-sign with a marked STOP-line provided.*
2. *A marked crosswalk with Americans with Disabilities Act (ADA) complaint wheelchair ramps should be provided for crossing locations within the Project site where pedestrians will be crossing internal roadways.*
3. *All Signs and pavement markings to be installed within the Project site shall conform to the applicable specifications of the Manual on Uniform Traffic Control Devices (MUTCD).⁴*
4. *Signs and landscape features to be installed within the sight triangle areas of the Project site roadway intersection with Franklin Street should not exceed 2.5 feet in height as measured from the surface elevation of the Project site roadway.*

⁴Manual on Uniform Traffic Control Devices (MUTCD); Federal Highway Administration; Washington, DC; 2009.



5. *Snow windrows along the Project site frontage on Franklin Street within the sight triangle areas of the Project site roadway shall be promptly removed where such accumulations would exceed 2.5 feet in height.*
6. *As noted by the Applicant's engineer, the raised island on the Franklin Street approach to South Street should be reviewed and reconstructed or removed as appropriate. In addition, the signs and pavement markings at and approaching the intersection should be reviewed and replaced/supplemented as necessary.*

COMPREHENSIVE PERMIT PLANS

The following comments are offered with respect to our review of the *Comprehensive Permit Plans* prepared by Coneco Engineers & Scientists in support of the Project and dated April 2015, no revisions. We note that a sidewalk is proposed along one side of the Project site roadway that extends to Franklin Street and will facilitate pedestrian accommodations within the Project separate from the travelled-way.

1. *Given the number of residential units to be located within the Project site, a secondary means of access for emergency vehicles should be provided from Franklin Street or an alternate location that is sufficiently removed from the Project site roadway.⁵ If a separate access for emergency vehicles cannot be established, the Applicant's engineer should redesign the Project site roadway as a boulevard-type drive consisting of two (2) 16-foot wide travel lanes (one lane per direction) separated by an 8-foot wide median that is traversable by an emergency vehicle (i.e., sloped curbing with no continuous obstruction that would prevent an emergency vehicle from crossing the median).*
2. *A truck turning analysis completed for the Project using the following design parameters as guidance: i) the analysis should be completed using the AutoTurn® or similar analysis software for the following design vehicles: an SU-30/40 (small delivery/moving vehicle and trash/recycling vehicle) and the Town of Halifax Fire Department design vehicle; ii) the analysis should include the swept path for the front and rear tires of the design vehicles and any overhangs that may extend past the front and rear bumper of the vehicle (i.e., basket of the aerial ladder of the fire truck if so equipped); iii) the analysis should depict all maneuvers required to enter and exit the Project site by way of Franklin Street (both left and right-turn movements entering and exiting), and all turning and maneuvering required within the Project site; iv) Back-up maneuvers, where required, should be clearly identified.*
3. *The grade of the Project site roadway should not exceed 2 percent within 50-feet (two (2) car lengths) of Franklin Street in order to provide a leveling area for vehicles exiting the Project site.*
4. *A school bus waiting area should be provided within the Project site or at an appropriate location defined in consultation with the Town of Halifax School Department.*

⁵*Neighborhood Street Design Guidelines*, A Recommended Practice of the Institute of Transportation Engineers; Institute of Transportation Engineers; Washington, DC; 2010.

5. *A sign and pavement marking plan should be provided as a part of the Comprehensive Permit Plans in order to verify that the proposed traffic control devices are appropriately designed and located within the Project site.*
6. *The sight triangle areas for the Project site roadway at its intersection with Franklin Street should be added to the Comprehensive Permit Plans along with a note to indicate: "Signs, landscaping and other features located within the sight triangle areas shall be designed, installed and maintained so as not to exceed 2.5 feet in height. Snow windrows located within the sight triangle areas that exceed 2.5 feet in height or that would otherwise inhibit sight lines shall be promptly removed."*

SUMMARY

VAI has completed a review of the materials submitted on behalf of Bowker LLC in support of the proposed Blackledge Farm residential community to be located off Franklin Street in Halifax, Massachusetts. Our review focused on the following areas as they relate to the Project: i) vehicle and pedestrian access and circulation; ii) MassDOT design standards; iii) Town of Halifax Zoning requirements as they relate to access, parking and circulation; and iv) accepted Traffic Engineering and Transportation Planning practices.

Based on our review of the information submitted in support of the Project, we have determined that the materials were prepared in a professional manner and following the applicable standards of care. The supplemental analysis that has been provided by the Applicant's engineer validates the use of the March 2009 *Traffic Impact Study* as a reasonable basis to assess the potential impact of the Project on the transportation infrastructure and demonstrates the reduction in traffic that the current development proposal (52 single-family homes) will have over the previously proposed development (104 single-family homes). That being said, we have indicated areas where the Applicant should provide additional information in order to ensure that safe and efficient access can be afforded to the Project site. Specifically, we have requested that the Applicant review emergency vehicle access to the Project site and verify certain elements of the design of the Project site roadway. Written responses to our comments should be provided so that we may continue our review of the Project on behalf of the Town.

This concludes our review of the materials that have been submitted to date in support of the Project. If you should have any questions regarding our review, please feel free to contact me.

Sincerely,

VANASSE & ASSOCIATES, INC.



Jeffrey S. Dirk, P.E., PTOE, FITE
Principal

JSD/jsd

cc: File