



October 15, 2013

Mr. Jon D. Schneider
Zoning Board of Appeals Chairman
Public Service Administration Building
500 Dedham Ave.
Needham, MA 02492

Re: Peer Review of Traffic Impact & Access Study
Proposed Needham Mews 40B
Needham, Massachusetts

Dear Mr. Schneider:

At the request of the Town of Needham, BETA Group, Inc. (BETA) has reviewed the revised site plan and the traffic impacts associated with the proposed Needham Mews residential development to be located on the east side of Greendale Avenue at 692 and 744 Greendale Avenue in Needham. The revised proposed project now includes constructing 268 residential apartment units (reduced from 300 units). Access will be provided via two driveways on Greendale Avenue; one on the southern edge of the property and one at the center of the property compared to the previous design that included driveways along the southern and northern edges of the site. The following documents have been provided to BETA as part of this review:

- Traffic Impact and Access Study Needham Mews Residential 40B, Vanasse & Associates, Inc. (VAI), May 2013.
- Response to Traffic Review Comments Letter, Needham Mews Residential Community, VAI, October 2, 2013
- Response to Traffic Review Comments-Addendum Letter, Needham Mews Residential Community, VAI, October 7, 2013
- Traffic Signal Warrants Analysis Memorandum, Needham Mews Residential Community, VAI, October 9, 2013
- Comprehensive Permit Plans, Needham Mews Residential Development, TetraTech, September 30, 2013.

BETA has previously issued traffic comments in our letter dated August 5, 2013. Since our previous review, the site plan has been drastically modified and updated traffic data and analysis has been provided. For ease of review, a summary of our previous review comments from the August 5th letter are included below. The comments are described following the same numerical order as the previous review letter.

1. STUDY AREA

The study area should include the intersections of Great Plain Avenue at Greendale Avenue, Greendale Avenue at Broad Meadow Road, Greendale Avenue at Bird Street and Rybury Hillway, Greendale Avenue at Brookline Street, Kendrick Street at Hunting Road, and Highland Avenue at Hunting Road.

The supplemental traffic data includes all of the requested study area intersections.

2. TRAFFIC COUNTS

The previously collected traffic volumes (ATRs and TMCs) should be collected again when the traffic counts for the expanded study area intersections are conducted.

The traffic counts were collected on Wednesday, September 11th and Thursday, September 12th. September traffic volumes are typically some of the highest traffic volumes that occur throughout the year. The traffic counts were collected at each of the six study area intersections (TMCs) during the peak commuter periods and along Greendale Avenue (ATR) for a 48 hour period in order to obtain ADT volumes and vehicle speeds.

3. CRASH DATA

The Needham Police Department crash data should be reviewed and compared to the MassDOT crash data.

The local police department data was reviewed and compared to the MassDOT data. Similar to the MassDOT data, the local data does not show that there are any safety issues at the study area intersections.

4. SPECIFIC DEVELOPMENTS BY OTHERS

Traffic data for the Wingate Senior Living development should be included as part of the No Build condition. The trip assignment networks from each of the three No Build developments (Greendale Village 40B, Center 128, Wingate Senior Living) should be provided in order to confirm the specific developments have been properly incorporated.

The supplemental traffic analysis includes all three developments. In addition, the necessary back up data was supplied for all three developments for our review.

5. BACKGROUND TRAFFIC GROWTH

VAI should provide the appropriate traffic growth data from the MassDOT permanent count stations in the Appendix of the TIAS.

The necessary backup data has been supplied in the supplemental submission.

6. I-95 ADD-A-LANE PROJECT/KENDRICK STREET INTERCHANGE

The traffic study should contain a Build condition that determines the impact of the proposed development providing a worst case scenario analysis that does not assume a reduction in volumes on Greendale Avenue due to the Add-A-Lane project and a Build condition that takes into account the expected reduction of traffic associated with the reconstruction of I-95.

The supplemental submission includes traffic data and analysis for future year conditions both with and without the inclusion of the I-95 project. It is important to analyze both conditions to determine the impacts to the future conditions of the study area. Should the expected reduction in traffic not be realized, the traffic operations in the study area will be worse than expected. The traffic operations analysis results are discussed in Item #9.

7. TRIP GENERATION

The trip generation methodology and calculations were appropriate for the previous building program.

The trip generation has been updated based on the revised site plan with the new number of units. The trip generation of the revised site was updated and the proposed development is expected to generate 135

vehicles trips during the weekday morning peak hour and 165 vehicle trips during the weekday evening peak hour. Under the previous site plan the trip generation was calculated to be 150 trips and 185 trips during the morning and evening peak hours, respectively.

8. TRIP DISTRIBUTION

In the future conditions that accounts for the I-95 project, the trip distribution in the northern portion of the study area should contain separate distribution percentages for vehicles traveling to the site and vehicles traveling from the site.

The supplemental submission dated October 2, 2013 did not address this concern. BETA contacted VAI to inform them the issue had not been resolved. This resulted in the October 7, 2013 addendum letter to account for the different trip distributions with and without the I-95 project.

This modification to the trip distribution results in an additional 37 westbound left turns at the intersection of Kendrick Street at Greendale Avenue. The October 7, 2013 accurately applies the expected trip distribution of the site related trips with the new interchange in place.

9. LEVEL OF SERVICE ANALYSIS

Traffic operations analysis should be provided for all of the study area intersections. The future conditions should be analyzed with and without the I-95 project impacts.

The study area intersections were analyzed to determine the capacity and the traffic operations with and without the I-95 project. The traffic operations analysis shows that during the peak hours, there are congestion issues through much of the study area. In fact even with the reduction of traffic volumes associated with the I-95 project, each intersection has at least one approach that will operate at LOS E or F with the exception of the Greendale Avenue at Brookmeadow Road intersection.

The Brookline Street approach to Greendale Avenue is operating at LOS F during both peak periods. Without the I-95 project the Mews project traffic will cause degradation from LOS B to LOS C for the Rybury Hillway approach to Greendale Avenue during the weekday evening peak period. During the weekday morning peak hour the Bird Street approach to Greendale Avenue to operating at LOS F with a queue length of six vehicles (150 feet). This queue length is expected to increase to 10 vehicles (250 feet) in the Build condition without the I-95 project and eight vehicles (200 feet) with the I-95 project.

During the weekday morning the South Site Driveway approach to Greendale Avenue is expected to operate at LOS E without the I-95 project and LOS D with the I-95 traffic reductions. The North Site Driveway approach is expected to operate at LOS E with or without the I-95 project impacts during the weekday morning peak hour.

10. SIGHT DISTANCE

VAI should provide sight distance information for the intersection of Greendale Avenue at Bird Street and Rybury Hillway, as well as the three additionally requested unsignalized intersections (Greendale Avenue at Brookline Street, Greendale Avenue at Broad Meadow Road, Greendale Avenue at Grosvenor Road).

The minimum sight distance requirements at the unsignalized study area intersections were calculated in accordance with industry standard. VAI compared the available sight distance to the minimum required distance (360 feet) based on the 85th percentile speeds obtained in September (43 mph northbound and 46

mph southbound). BETA used the 85th percentile speed obtained during the March traffic counts (48 mph northbound and 49 mph southbound) to calculate the minimum required distance (425 feet). The required minimum sight distance for each approach to the unsignalized intersections was met utilizing any of the 85th percentile speeds.

11. MITIGATION

- a. *The traffic data submissions include potential signal retiming as part of off site mitigation. The analysis associated with the signal timing modifications should be included in the supplemental traffic data.*

The intersection operations analysis with the signal timing modifications was provided for the three signalized study area intersections. The data shows that the slight modifications will improve, but not alleviate, the congestion at the signalized intersections.

- b. *Signal Warrant analysis should be conducted at any of the unsignalized intersections that operate at unacceptable levels.*

At the two unsignalized intersections in question, (Greendale Avenue at Brookline Street and Greendale Avenue at Bird Street and Rybury Hillway), the peak hour signal warrants are met. This data was provided in the October 2, 2013 supplemental letter. Since the peak hour warrants were met, a more complete signal warrant analysis was conducted for both intersections and additional traffic volume data was collected on October 2nd. The latest supplemental letter, dated October 9, 2013 (received on October 10th), summarized this analysis.

The complete signal warrant analysis shows that the intersection of Brookline Street at Greendale Avenue meets the signalization criteria for the MUTCD 8 hour, 4 hour, and peak hour warrants.

Since this intersection operates at LOS F during the peak periods, the signalization of this intersection will improve the overall capacity and operations. Therefore, BETA recommends the signalization of this intersection. The estimated cost for improvement would be approximately \$300,000.

The intersection of Greendale Avenue at Bird Street and Rybury Hillway meets the peak hour warrant. The 8 hour and 4 hour warrants are not met at this intersection and meeting the peak hour warrant alone is not justification for signalization at this location. However, based on the travel speeds and traffic volumes, the 4 hour warrant would be met with the addition of only five additional trips per hour exiting Bird Street (there is an hourly average of 55 vehicles exiting Bird Street, a minimum of 60 vehicles is necessary).

This analysis also does not take into account the impact of Rybury Hillway, which is a non standard approach to the intersection that the MUTCD signal warrant analysis is not capable of taking into consideration. Should Bird Street and Rybury Hillway be considered one approach (as it operates), the 4 hour signal warrant would be satisfied.

In addition, future satisfaction of the School Crossing warrant is not known at this time. With a minimum of 20 school children crossing during a one hour period, this warrant could be met based on the outcome of a gap analysis that was not performed.

Due to these factors, BETA recommends signalization of this intersection. The estimated cost for this improvement would be approximately \$300,000.

- c. *Pedestrian accommodations should be provided along the east side Greendale Avenue with a connection to the existing sidewalk network on the west side of Greendale Avenue. This pedestrian connection will provide access from the site to elementary schools and the residential neighborhood.*

The proponent has agreed to provide a pedestrian connection from the site to the Bird Street intersection and a crosswalk across Greendale Avenue. As discussed above, post construction analysis at the intersection should be performed to validate the need for the installation of a traffic signal.

12. SITE PLAN REVIEW

BETA has reviewed the site plan dated April 12, 2013 and the revised September 30, 2013. The site driveways have been relocated, internal roadways have been relocated or removed, the garage access points have been moved, the number of units has been modified, and the site circulation is entirely new. The following transportation related concerns for the new site plan should be addressed by the proponent:

- a. *The internal radii are 15 feet and 20 feet. As previously requested, the proponent should provide site plans depicting AutoTurn movements for the vehicles that will circulate through the site (including emergency vehicles, delivery vehicles, resident moving vehicles, etc.). AutoTURN is a computer software program that simulates the maneuverability that is possible for different types and sizes of automobiles.*
- b. *There is a steep grade (6% slope) along a sharp horizontal curve (27 feet) around the southern edge of Building B. The proponent should confirm that the cross slope/superelevation is adequate for this horizontal curve. The steep slope exacerbates the condition and increases the potential for vehicles (especially larger vehicles) to rollover.*
- c. *Along the site driveway to the east of Building B there is an 8% grade between the two garage entrances and 5% grade across each garage entrance. Vertical curves are necessary to transition between longitudinal grades. Suggest providing a profile to show locations and lengths of vertical curves. Also, grading shows 5% across driveway openings to garage entrances where the grades across the garage entrances are typically flat. Provide additional grading details.*
- d. *Along the two Main Site Driveways, vertical curves are required for such abrupt grade changes and are not evident on the plans as shown on the grading plan. From the main road, a vehicle travels down the 2% +/- cross slope onto a 7.5% slope up to a 4% slope down, to an 8% slope down, to a 4% slope down to an intersection. Vertical curves are necessary to transition between longitudinal grades. Verify that the length of the two Main Site Driveways is long enough to provide the minimum lengths necessary for all of the required vertical curves. It appears that the lengths of the two Main Site Driveways are approximately 80 feet in length, which is not adequate and much longer distance will be required. Suggest providing profiles for all on site roads to show locations and lengths of vertical curves.*
- e. *The back of the sidewalk along Greendale Avenue to Bird Street should be along the ROW line. Currently the back of sidewalk is approximately 15 feet inside the ROW line.*
- f. *The site plan includes a winding sidewalk to provide access between the site and Greendale Avenue. The slope of this sidewalk is shown on the plans as 5%, which is the maximum ADA compliant slope for a sidewalk. However, the relocation of the sidewalk along Greendale Avenue will result in a steeper slope that is not ADA compliant.*
- g. *There are ADA parking spaces provided along the internal roadway. This roadway has a cross slope of 4%. ADA requires a maximum cross slope of 2%.*

- h. Safe pedestrian access from the site roadway east of Buildings A and B to the walking trail is not provided due to elevation differences.*
- i. Due to the slope of the driveways, vegetation must be trimmed back and maintained to ensure minimum sight distance requirements are met.*

13. MASSHOUSING CORRESPONDENCE DISCREPANCIES

The MassHousing submission was reviewed for accuracy and consistency with the TIAS and the site plans that were submitted to the Town. Inaccuracies or discrepancies were found to exist between the transportation components of the MassHousing application and the traffic data that has been provided to BETA.

BETA has not received any clarification on the inaccuracies that were noted.

14. CONCLUSION

The three supplemental traffic submissions provide a more accurate depiction of the traffic impact of the proposed development. Mitigation is necessary to offset unacceptable operation levels. BETA recommends the following off site traffic mitigation measures:

1. Retime signal at the three signalized study area intersections after the proposed project is completed.
2. Install signal at the intersection of Greendale Avenue at Brookline Street.
3. Install signal at the intersection of Greendale Avenue at Bird Street and Rybury Hillway.
4. Install a sidewalk on the east side of Greendale Avenue between the site to the south and Bird Street to the north and a crosswalk on Greendale Avenue.

The new site plan that has been submitted still has many access deficiencies and the appropriate plans have not been provided. BETA does not believe that the current site plan can provide safe access for larger vehicles, particularly emergency response vehicles.

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

Very truly yours,



Kien Ho, P.E., PTOE
Vice President,
BETA Group, Inc.