ENGINEERING SUCCESS **TOGETHER**

August 5, 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. has completed a review of the Traffic Impact and Access Study for the proposed development to be located between Greendale Avenue to the west and Interstate 95 (I-95) to the east at 692 and 744 Greendale Avenue in Needham. The proposed project includes constructing 300 residential apartment units. Access will be provided via two driveways on Greendale Avenue on the northern and southern edge of the property. The property currently consists of two single family residential houses.

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.
- 692 & 744 Greendale Avenue Layout Plan, TetraTech, April 12, 2013.
- Comprehensive Permit Plans, Needham Mews Residential Development, TetraTech, April 12, 2013.

As part of the peer review, BETA visited the site to verify and confirm information related to traffic issues, intersection geometries, traffic operations, sight distances and the overall study area roadway network.

The TIAS did not adequately address the traffic impacts associated with the proposed development, therefore, potential mitigation measures cannot be determined at this time. Additional traffic data and analysis would be required to fully determine and address the impact of the proposed development.

For ease of review, our review comments are described as follows in numerical order.

1. STUDY AREA

The study area includes sporadic intersections along Greendale Avenue including the intersection of Great Plain Avenue at Greendale Avenue, Greendale Avenue at Bird Street, and Kendrick Street at Hunting Road. However, additional intersections should be included in order to fully determine the impact of the project. These intersections include the following:

a. Highland Avenue at Hunting Road. Traffic to and from the site destined to and from points north on I-95 and the Mass Pike (35% of the site related traffic) will travel through this intersection. Although the Kendrick Street interchange would reduce the impact on this intersection for traffic heading to the site, vehicles traveling north from the site will continue to travel through this intersection (of particular concern during the weekday morning peak hour as residents leave the proposed site and travel to I-95 northbound) as there will not be a northbound I-95 entrance on Kendrick Street.

b. Greendale Avenue at Brookline Street. Brookline Street provides access to the Mitchell Elementary School and points west in Needham. The traffic volume accessing Greendale Avenue from Brookline Street should be collected and included as part of the traffic study due to its close proximity to the north of the proposed site and potential impact and associated need for improvements/mitigation.

c. Greendale Avenue at Bird Street and Rybury Hillway. Although traffic volumes were collected at the intersection of Greendale Avenue at Bird Street, it did not include the volumes associated with Rybury Hillway, which is located adjacent 45 feet to this intersection. The interaction of all three of these roadways is necessary to determine the overall potential impacts.

d. Greendale Avenue at Broad Meadow Road. Broadmeadow Road provides access to the Broadmeadow Elementary School, the Hersey Commuter Rail Station and Needham Center. The traffic volume accessing Greendale Avenue from Broad Meadow Road should be collected due to its close proximity to the south of the site and in order to determine if there is a potential impact and need for improvements/mitigation.

The preceding four intersections should be included as part of the TIAS. The traffic counts for these intersections should not be conducted until school is in session this fall.

2. TRAFFIC COUNTS

Traffic volumes were collected during the month of March. Typically traffic volumes collected in March represent higher than average traffic volume conditions, especially towards the end of the month.

However, VAI should provide a reasoning why the Turning Movement Counts (TMCs) were collected on March 20, 2013, but the Automatic Traffic Recorder (ATRs) collected volumes on March 27 and 28, 2013. Weather could have impacted the collection of data via ATRs on March 20, which would have also impacted volumes.

The TMC data collected on March 20th should be validated.

The week of the 27th and 28th also did not have typical traffic volumes as March 27th was a limited schedule for the Needham Public Schools, the March 28th was Holy Thursday and both days occurred during Passover.

The ATR data collected on March 27th and March 28th should be collected again when the traffic counts for the expanded study area intersections are conducted.

3. CRASH DATA

The TIAS included crash data obtained from MassDOT. However, crash data from the local Police Department is typically more accurate.

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

4. SPECIFIC DEVELOPMENTS BY OTHERS

The TIAS included traffic volumes associated with two other approved developments in the area that will impact traffic along Greendale Avenue. These projects include the Greendale Village 40B project (12 single family houses and eight units located four duplex buildings) located south of the proposed project and the Center 128 Commercial development (740,000 square feet of office space and a 128-room hotel) located off of Kendrick Street east of I-95.

Although the traffic studies for each of these projects are referenced, the Appendix of the TIAS includes traffic volume networks that have been created by VAI. Therefore, it is not possible to verify if the approved trip generation, distribution, and assignments have been properly incorporated.

VAI should include copies of the trip assignment networks from each of the approved developments in order to confirm the specific developments have been properly incorporated.

A third development should have been included as well, the Wingate Senior Living residential development.

The TIAS should include the traffic associated with this development as part of the No Build condition.

5. BACKGROUND TRAFFIC GROWTH

The study used a one percent growth rate per year for the five year future projections. The use of a one percent growth rate compounded for five years (5.1 percent total growth) is appropriate.

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

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

The TIAS reduced the volumes along Greendale Avenue in accordance with the Functional Design Report (FDR) that was completed in association with this construction project. **It should be noted that this reduction in traffic is significant. It results in a reduction of approximately 20 percent of the weekday morning peak hour traffic volumes traveling past the site and 40 percent of the weekday evening peak hour traffic volumes passing the site.** The proponent should confirm the construction schedule for this project.

The TIAS should include an Existing condition based on the collected traffic volumes. A typical No Build condition should be included that accounts for the applied growth rate and the traffic associated with each of the three background developments. The TIAS should then contain a Build condition that determines the impact of the proposed development providing a worst case scenario analysis in the event the Add-A-Lane project is not completed prior to the proposed project. Lastly, the TIAS should contain a future condition that takes into account the reduction of traffic associated with the reconstruction of I-95.

The four condition method described will provide a true comparison of the impact of the proposed project with current traffic patterns in the study area, provide a worst case scenario should the Add-A-Lane not progress at the same pace as the proposed development and also provide future potential traffic conditions in the area should the final phase of the Add-A-Lane project come to fruition.

In addition, as with the site specific development networks, the TIAS includes regenerated networks instead of the networks from the FDR. The regenerated networks cannot be used to verify the proper traffic volume reductions that should be applied due to the FDR.

VAI should include copies of the trip reduction networks from the most recent FDR in order to confirm the specific developments have been properly incorporated.

7. TRIP GENERATION

The report utilized the Institute of Transportation Engineers' (ITE) manual, *Trip Generation* to determine the trip generation of a fully occupied development. Land Use Code (LUC) 220 was used to calculate the expected trip generation. The proposed 300 units are expected to generate approximately 150 trips during the morning peak hour and approximately 185 trips during the evening peak hour.

The trip generation methodology is appropriate for this project.

8. TRIP DISTRIBUTION

The trip distribution used for the trip assignment is based on U.S. Census journey-to-work data. Approximately 80 percent of the traffic will be to and from north of the site and the remaining 20 percent will be to and from the south of the site.

The vehicle trips associated with the proposed development were added to the traffic volume networks using the appropriate methodology.

However, in any condition that assumes completion of the I-95 reconstruction, the trip distribution should be modified to the north of the site in order to account for the Kendrick Street interchange. Should the Kendrick Street interchange be constructed, the traffic accessing the site from the north will be greatly impacted as there would be an increase in westbound left turns from Kendrick Street to Hunting Road. In addition, there would be a decrease in southbound Hunting Road through movement at Kendrick Street. Traffic departing the site to the north will continue to utilize Hunting Road to Highland Avenue due to the Kendrick Street interchange not providing access to I-95 northbound.

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

9. LEVEL OF SERVICE ANALYSIS

The study area intersections were analyzed to determine the capacity and the intersection operations. In Accordance with industry standards, the analysis was conducted using the latest version of Synchro software.

However, since the study area is in adequate the TIAS needs to be updated to provide a more complete study area.

In addition, analysis must be provided that shows the worst case scenario, the completed project without the reduction in traffic due to the Add-A-Lane project (the requested modified Build condition).

Traffic operations analysis should be provided for the additionally requested intersections ad all of the study area intersections should be analyzed utilizing the four conditions methodology described in this review.

10. SIGHT DISTANCE

The minimum sight distance requirements at the proposed site driveway intersections were calculated in accordance with industry standard. The 85th percentile speed (48 and 49 mph) was used to calculate the minimum required distance (425 feet). The 85th percentile speed is almost 10 mph higher than the state determined posted speed limit of 40 mph. Sight distance information was not provided for the unsignalized study area intersection of Greendale Avenue at Bird Street.

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).

11. MITIGATION

The TIAS did not include any off site mitigation (other than potential signal retiming) in order to offset the transportation impact of the proposed development. Since the traffic study did not adequately address the traffic impacts associated with the proposed development, the potential mitigation measures cannot be determined at this time.

Mitigation should be proposed at any of the study area intersections that degrades to have approaches operating at unacceptable levels (LOS E or F, v/c ratio greater than 0.99).

Wherever traffic signal timing modifications are proposed as mitigation, the actual signal timing modifications, and associated analysis results should be included in the future submitted traffic data.

Signal Warrant analysis should be conducted at any of the unsignalized intersections where levels of operation degrade to unacceptable levels.

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.

12. SITE PLAN REVIEW

BETA has reviewed the site plans submitted to the Town of Needham. The following transportation related concerns should be addressed by the proponent:

a. *Although sidewalks are provided internally on site, there are no pedestrian accommodations along the internal Site Driveways connecting the site to Greendale Avenue. The current design does not provide access from the buildings to the public street (where a school bus stop would be located).*

b. The 10 foot and 15 foot radii are substandard. Small turning radii cannot be navigated by vehicles. 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 possible maneuverability of different types and sizes of automobiles.

c. *Emergency vehicle access to and parking for each building on site should be clearly identified. The loop roadway around the back of the site (east side) should be a minimum of 18 feet wide to provide access for fire apparatus.*

d. The grading of the on site roadways should be verified to meet engineering design standards. There are multiple locations on site where design requirements are not met for grading and or vertical curve transitioning. Any roadway that is consists of a grade change must have a vertical curve transition where it meets a level roadway or a roadway with an opposite grade profile. This is most evident as the driveway between buildings D and E meets the loop roadway since there is a 10 percent downgrade meets a relatively level roadway without a vertical curve. This grade is steeper than typical engineering standards. The appropriate length vertical curve will increase the 10 percent downgrade and may not fit between the garage driveways of building D and E and loop roadway. This roadway, and the connection to the garages may not be built as laid out on the plan.

e. Access to the parking garages below buildings D and E appears to be inefficient. The site driveway is at a labeled 10 percent downgrade (which is steeper than engineering standards). The perpendicular driveway entrances to the garages are flat. The grade discrepancy of the two needs to be rectified in order for the driveways and garage entrances to actually be built. It is likely any modification will increase the already steep 10 percent downgrade.

f. The elevations of driveways and adjacent garage levels do not coincide with each other. The roadway appears to be higher than the garage level elevation, which causes drainage issues and clearance height access issues. The elevations on the plan need to be rectified so that the internal and external elevations are accurate and equal.

g. The garage clearance heights (approximately 6.5 feet) are lower than typical engineering standards (more than 8 feet to meet ADA requirements).

h. ADA accessible parking spaces may not be located on a slope greater than two percent.

i. Although a snow storage location is provided, the area is not large enough to support all of the impervious surface within the site. A snow storage and snow removal plan should be provided.

j. It is not clear how the parking spaces will be allocated to each unit, or whether visiting parking will be provided. A parking plan should be prepared showing including assigned spaces, paid spaces, and visitor spaces.

13. MASSHOUSING CORRESPONDENCE DISCREPANCIES

The transportation components of the MassHousing application were reviewed for accuracy and consistency with the TIAS and submitted site plans that were submitted to the Town. A few inaccuracies or discrepancies were found and are listed below:

a. The commuter rail is not located within a half a mile of the site. The closest commuter rail station is approximately one mile away.

b. The application states there are 510 parking spaces on site.

c. The application states there is a lot coverage of 62 percent. It is unclear whether the drainage for this amount of impervious surface can be accommodated without impacting the traffic operations of the internal roadways.

d. The MassHousing Preliminary Site Approval is granted based on the previously mentioned inaccuracies. The approval letter states that the TIAS should, "review the proposed on-site parking and circulation to ensure accordance with industry standards." This does not appear to have occurred based on the many deficiencies outlined in the Site Plan Review section.

CONCLUSION

The TIAS does not adequately address the potential transportation impact of the proposed development. Therefore, the appropriate mitigation measures cannot be defined based on the information that has been submitted. Additional traffic data and analysis would be required to fully determine and address the impact of the proposed development.

After reviewing the current site plan, we have concerns with the proposed site layout associated with the roadway design related to safe vehicular access and egress including emergency vehicle operations. Roadway grading design does not t meet engineering standards (including vertical curves, grading, and side slopes) and elevation discrepancies between connecting travel ways need to be rectified.

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.