

February 1, 2021

Jennifer Raitt
Director of Planning and Community Development
Town of Arlington
730 Massachusetts Avenue Annex
Arlington, MA 02476

Re: Thorndike Place – Arlington, MA
Traffic Peer Review (November 2020 Submission)

Dear Ms. Raitt:

BETA Group, Inc. (BETA) has completed a review of responses to peer review comments initially provided in BETA's letter dated December 1, 2020 for the proposed 176-unit residential development known as Thorndike Place proposed for the Mugar Parcel off Dorothy Road in East Arlington, MA (the Site).. Responses were provided by Vanasse & Associates, Inc. (VAI) *Responses to Peer Review Comments* letter and Appendix dated January 15th, 2021 and by BSC Group (BSC) *Responses to Peer Review Comments – Traffic Impact Assessment* letter dated January 25, 2021. This letter provides resolution of previous comments and/or identifies follow-up comments. BETA's original comment is outlined in plain text, with response from VAI or BSC in *italic text* and BETA's follow-up in **bold text**.

PROJECT DESCRIPTION

The Project Site (the Site), commonly known as the Mugar parcel, comprises approximately 17 acres bounded by Route 2, Dorothy Road, Burch Street and Thorndike Field in Arlington, Massachusetts. The Site currently contains undeveloped land.

The Project proposes the construction of 176 residential units within one structure and parking for 239 vehicles, including: 204 garage spaces, 8 courtyard spaces, and 27 surface lot spaces. The Project also proposes to provide 144 bicycle parking spaces within the garage. Full access to the Site will be provided via one full-access driveway on the corner of Littlejohn Street and Dorothy Road and one U-Shaped driveway serving the eight angled courtyard spaces off Dorothy Road. The Site is proposed to provide emergency vehicle circulation around the building via structural soil. Other on-site amenities include a playground and seating/courtyard areas.

SITE ACCESS, CIRCULATION, AND PARKING

The Project Site Plan was updated in accordance with the change in Project Program. The following comments are offered based on the updated Site Plans.

- T1.** Include dimensioning of parking stalls and drive aisles for the parking garage.

BSC: The parking space lengths and drive aisle widths were shown on the Garage Plan included in the Architectural Drawing set dated November 3, 2020. The parking spaces are proposed at 8.5 feet wide.

Information provided; item resolved.

- T2.** Identify snow storage areas and verify that snow storage will not reduce parking capacity.

BSC: Snow storage for the surface parking lot and primary access drive will be provided off the pavement on the west side of the parking lot. Snow storage for the courtyard entrance will be provided off pavement within landscape areas and to the east and west of the courtyard between the building and back of sidewalk. These designated snow storage areas will be depicted in the final site plans submitted for review for consistency with the Board's decision. Any excess snow will be removed and properly disposed of offsite.

Information provided; item resolved. Will be verified in final site plans.

- T3.** Clarify whether visitor parking spaces will be designated, and the suggested number of visitor spaces and resident spaces.

BSC: Visitor parking spaces will not be designated but will be located in the front courtyard area and surface parking lot, on the western side of the property. The garage spaces will be for residents only. The Arlington Zoning Bylaw does not differentiate visitor parking spaces when determining the required parking for multi-family development. For projects similar to this, it is estimated that there may be 1 visitor for every 10 dwelling units any time, or approximately 17 visitor spaces for this project.

Information provided; item resolved.

- T4.** Long term, presumed tenant, bicycle parking is designated within the garage. Recommend designating exterior bike racks for visitor/short term use near a location of public building access, such as within the proposed parking courtyard area.

BSC: Bicycle parking for residents is provided in the garage and ground floor as shown on the Garage Plan and Ground Floor Plan included in the Architectural Drawing set dated November 3, 2020. Exterior bike racks will be provided for visitors/short term use in the main entrance courtyard area will be depicted in the final site plans submitted for review for consistency with the Board's decision.

Information provided; item resolved. Will be verified in final site plans.

- T5.** Include swept path analysis on Site Plans to ensure Municipal Fire vehicles can adequately maneuver the Site.

BSC: A truck turning exhibit has been prepared showing the emergency vehicle route, a copy of which is enclosed herein. The turning radius specifications were provided by the Arlington Fire Department.

Information provided; item resolved.

- T6.** The Site Plan should define pedestrian connections to the Minuteman Commuter Bikeway. If an on-site connection is not provided, clarify the shortest route to/from the bikeway.

BSC: No on-site pedestrian connection is currently proposed to the Minuteman Commuter Bikeway. The most direct route to the Minutemen is approximately 1/3 mile by taking Dorothy Road to Margaret Street south. For people who want to travel to the north, it is a similar distance taking Dorothy Road to Margaret Street north to Lake Street east.

Recommend improving pedestrian crossing conditions, including ramps, warning panels, and crosswalks along the expected primary pedestrian route from the site to the Commuter Bikeway.

- T7.** An existing pedestrian bridge over Route 2 is located on the southern frontage of the Site. If the bridge is structurally sound, recommend providing an on-site pedestrian pathway between the bridge, the Project, and the Commuter Bikeway/Thorndike Field. This would allow direct connection between residential uses and commercial/office/medical space south of Route 2.

BSC: No pedestrian access is currently proposed to the existing pedestrian bridge over Route 2. Additionally, the TAC stated that use of the pedestrian bridge was not recommended and, therefore, a pedestrian connection is not proposed.

Information provided; item resolved. BETA agrees with the TAC assessment.

- T8.** Verify locations of accessible entrances. Accessible spaces in the surface lot may be closer to an accessible entrance if they are relocated to the courtyard parking area.

BSC: The accessible parking spaces will be relocated to the courtyard parking area to be closer to the main building entrance.

Information provided; item resolved. Will be verified in final site plans.

- T9.** Verify intended circulation of the courtyard parking area.

BSC: The proposed courtyard circulation will be reversed to provide counter clockwise circulation.

Information provided; item resolved. Will be verified in final site plans.

TRAFFIC IMPACT ASSESSMENT REVIEW

The TIA was generally found to have been prepared in accordance with MassDOT guidelines and provides an updated traffic assessment for the re-envisioned Site Plan and Project Program. Detailed comments are presented herein.

STUDY AREA

The study area includes the following intersections:

- Route 2 at Route 16
- Lake Street at Route 2 Eastbound Ramps
- Lake Street at Route 2 Westbound Ramps
- Lake Street at Wilson Avenue
- Lake Street at Littlejohn Street
- Lake Street at Homestead Road
- Lake Street at Burch Street and Alfred Road
- Lake Street at Margaret Street and Lakehill Avenue
- Lake Street at Minuteman Commuter Bikeway
- Lake Street at Brooks Avenue
- Massachusetts Avenue at Lake Street

BETA finds the above study area to be appropriate. The TIA discussed roadway lane widths, lane configurations, sidewalks, bike accommodation, intersection geometry and configuration.

- T10.** Figure 2 and all subsequent volume diagrams show the Alewife Station Access Road as one-way southbound, though lane uses are shown traveling northbound. Revise orientation of the one-way arrow.

VAI: Figures 2 through 11 have been revised to show the correct one-way northbound orientation of Alewife Station Access Road. These revisions are depicted on Figures 2R through 11R, which can be found in the Appendix of this letter.

Figures have been updated. Item resolved.

- T11.** Diagrams suggest there is no connection between Dorothy Road and Margaret Street. Revise accordingly.

VAI: Figures 2 through 11 have been revised to show that Dorothy Road connects to Margaret Street. These revisions are depicted on Figures 2R through 11R, which can be found in the Appendix of this letter.

Figures have been updated. Issue resolved.

TRAFFIC VOLUMES

Typically, new traffic volume data would be collected for the study area in conjunction with a wholly new TIA supplanting the April 2014 Traffic Impact and Access Study (TIAS). Due to the ongoing COVID-19 pandemic, traffic volume data for the study area were instead compiled from various sources and years dating back to the April 2014 TIAS. A summary of the intersection data is provided in Table 1.

Table 1: Data Date Summary

Location	Month	Year
Route 2 at Route 16	May	2019
Lake Street at Route 2 Eastbound Ramps	September	2016
Lake Street at Route 2 Westbound Ramps	September	2016
Lake Street at Wilson Avenue	September	2020
Lake Street at Littlejohn Street	March	2014
Lake Street at Homestead Road	September	2020
Lake Street at Burch Street and Alfred Road	September	2020
Lake Street at Margaret Street and Lakehill Avenue	September	2020
Lake Street at Minuteman Commuter Bikeway		2019
Lake Street at Brooks Avenue	September	2020
Massachusetts Avenue at Lake Street	March	2014

- T12.** Backup traffic volume information is not presented in the appendix for **highlighted intersections**. Backup data should justify the peak hour factor and heavy vehicle percentages utilized in the traffic analysis.

VAI: The backup traffic-volume information for Lake Street at Brooks Avenue is provided in the Appendix of this letter. The backup traffic-volume information for the intersections of Lake Street with Littlejohn Street and Massachusetts Avenue with Lake Street was obtained from the initial traffic study prepared for Thorndike Place, and raw traffic count data was not available. The peak-hour factor (PHF) at the intersection of Lake Street with Littlejohn Street were assumed to be the same as Lake Street at Homestead Road. No trucks were assumed to access Littlejohn Street and the truck percentages for Lake Street were carried over from Lake Street at Homestead Road. For the intersection of Massachusetts Avenue at Lake Street, the Massachusetts Avenue PHFs were unknown and assumed to be 0.92 (consistent with MassDOT guidance for urban conditions) while

the PHF on Massachusetts Avenue was carried over from the intersection of Lake Street with Brooks Avenue. The truck percentages for the Massachusetts Avenue through movements were assumed to be 2 percent. The Massachusetts Avenue turning movement truck percentages were carried back from Lake Street at Brooks Avenue and split proportionally based on the turning volumes. Similarly, the Lake Street turning movement truck percentages were carried over from Lake Street at Brooks Avenue and split proportionally based on the turning volumes.

Backup information was provided for Lake Street at Brooks Avenue. Some discrepancies in Peak Hour Factor were found in the backup traffic analysis worksheets. The additional methodology described regarding Peak Hour Factors and Heavy Vehicle Percentages is reasonable given a lack of existing backup. It is noted that the Traffic Analysis Worksheets use a minimum Peak Hour Factor of 0.75, despite some approaches seeing lower PHF.

BETA notes that use of adjusted historical data is accepted for planning study as part of MassDOT Engineering Directive E-20-005, which provides a guidance memorandum to estimate existing and future traffic volume data. Where historical data is not available, current industry practice is to collect current 2020 data and adjust it based on pre-COVID historical conditions. The Applicant adjusted the traffic data to estimate September 2020 (Non-COVID) conditions based on MassDOT Continuous Count Station 4065 volumes on Interstate 95 south of Route 2. It is generally understood that peak hour volumes collected in March and May were seasonally adjusted to represent September volumes within their respective count year. The adjusted September volumes were then grown to represent September 2020 Conditions. Data collected in September 2020 were adjusted based on a COVID correction factor, estimated by comparing count station data in August 2019 and August 2020. It was noted that the COVID correction factor resulted in volumes significantly lower than the grown (2014/2016) volumes at neighboring intersections. As such, the network was balanced in accordance with the higher volume intersections.

As stated in the TIAS, BETA did discuss and confirm the Applicant's traffic consultant's approach to traffic data collection, adjustments, and application of specific development projects. The approach is adequate and appropriate based on general industry practice.

In addition to seasonal adjustment, COVID-19 adjustment, and growth, the TIA included projected traffic volumes from four nearby planned or recently completed developments: Vox on Two, Residence at Alewife Station, Belmont Highlands, Discovery Park Hotel. This methodology is consistent with industry standards.

- T13.** Transportation trends throughout the months of COVID-19 have shown increased recreational pedestrian and bicycle activity with decreased commuting vehicular activity. Given the proximity to Alewife Station, it is presumed that significant Bikeway activity is related to commuter trips. With more employees working from home, clarify the validity of the pedestrian and bike volumes utilized for this study.

VAI: The bicycle and pedestrian volumes on the Minuteman Commuter Bikeway were collected pre-COVID-19 and therefore are valid. Pedestrian and bicycle volumes at the intersection of Lake Street with Margaret Street have been adjusted using data from the Massachusetts Department of Transportation (MassDOT) Mobility Dashboard. This data indicated that pedestrian volumes in September 2020 (when the intersection was counted) decreased by 31.53 percent over the September 2019 volumes. Therefore, the pedestrian volumes at this intersection used in the analysis were increased by 31.53 percent. Pedestrian volumes for the intersection of Massachusetts Avenue at Lake Street were obtained from a 2010 Functional Design Report conducted for Massachusetts Avenue by Fay, Spofford & Thorndike, LLC. To adjust these volumes

to 2020 baseline conditions, data from the Minuteman Commuter Bikeway was used. Counts on the bikeway at the dog park from 2019 indicate a 54 percent increase in pedestrian activity over 2010 counts during the weekday morning peak period and 37 percent increase during the weekday evening peak period. Calculations are provided in the Appendix of this letter.

Data presented in the Appendix. Issue resolved. As a point of clarification, the MassDOT Mobility Dashboard indicates an *increase* in pedestrian activity from September 2019 to September 2020. Since data was collected in September 2020, no adjustment was necessary.

The TIA estimated peak hour volumes along Lake Street of approximately 1,662 vehicles per hour in the morning and 1,351 vehicles per hour in the evening. Traffic patterns generally suggest westbound traffic to Route 2 in the morning, with returning traffic in the evening.

PEDESTRIAN AND BICYCLE FACILITIES

The TIA briefly summarized the surrounding pedestrian and bicycle facilities within the study area. The summary did not discuss facility condition or recommend any specific improvements to existing facilities.

- T14.** Recommend the Applicant summarize the condition of nearby pedestrian and bicycle facilities and specify if improvements are required to safely accommodate added non-motorized traffic to/from the Site.

VAI: Pedestrian and bicycle facilities were reviewed along Dorothy Road, Littlejohn Street, Burch Street, and Margaret Street. In general, sidewalks are in fair to good condition. Wheelchair ramps are present at intersections along each roadway. Dorothy Road, Burch Street, and Littlejohn Street have tactile warning panels present on wheelchair ramps. Some of the panels are filled with dirt and some have been worn down. Margaret Street has no tactile warning panels present on wheelchair ramps at intersections. There are no painted crosswalks present at any of the intersections on these streets besides at Lake Street.

Summary provided. Recommend improving pedestrian crossing conditions, including ramps, warning panels, and crosswalks along the expected primary pedestrian route to the Commuter Bikeway.

THORNDIKE PARK

The TIA briefly summarized the nearby Thorndike Field located south of Margaret Street. The park provides athletic fields, a dog park, and a small parking lot. The Minuteman Commuter Bikeway bisects Thorndike Field and Magnolia Park. Non-motorized access is also provided via Varum Street and Thorndike Street. This summary is acceptable.

- T15.** The intersection of Lake Street and Margaret Street was counted in September 2020, during the current COVID-19 pandemic. As this intersection is likely most heavily influenced by Thorndike Field activity, identify whether additional adjustments to the September 2020 data are appropriate to account for typical Field activity, which may not have been present due to the pandemic.

VAI: Traffic volumes on Margaret Street have now been adjusted to account for a decrease in activity at Thorndike Field due to COVID-19. These corrections are only made during the weekday evening peak hour as the field is not open until 9:00 AM, which is after the morning peak hour. Based on discussions with Joe Connelly, the Director of the Department of Recreation for Arlington, approximately five teams are on the field during the afternoon peak hour. He indicated an average of 15 people per team. That is a total of 75 people using the field during this time period. Many

people, in particular children, carpool to events such as soccer games and practice. Therefore, it was assumed that there are at least 2 people per vehicle. Using 2 people per vehicle, it is expected that about 38 vehicles access the field during this time period. It was assumed that 50 percent (19) of these vehicles will use Margaret Street to access the field. The weekday evening 2020 Baseline traffic volumes on Margaret Street were increased by 19 trips entering and 19 trips exiting. These trips were distributed using existing travel patterns.

Volume figures and analysis worksheets were updated based on the above methodology. BETA notes that vehicular access to the Field is only provided via Margaret Street. This methodology therefore assumes that 19 vehicles park on nearby local streets east of the Bikeway and walk to the fields. It is noted that Margaret Street is evaluated to operate with Level of Service F and over 130 seconds of delay per vehicle in the evening peak hour.

PUBLIC TRANSPORTATION

A summary of available public transportation was summarized to include four MBTA local bus routes (67, 77, 70, and 350). The nearest Route 67 stop is located on Lake Street at Route 2 (0.3 miles west of the Site). The remaining three bus routes are all accessible on Massachusetts Avenue (0.7 miles east of the Site). Rapid transit (MBTA Red Line) is available within 0.8 miles (southeast) at Alewife Station. While the heavy rail terminal provides a large parking garage accessible from Route 2 and Route 16, it is noted that the Minuteman Commuter Bikeway provides a direct connection between Dorothy Road and Alewife Station.

T16. Note there is a discrepancy in Table 2 of the TIA stating Alewife Station is southwest of the Site.

VAI: Agreed. See Table 2R below with revision that Alewife Station is southeast of the site.

Table revised. Issue resolved.

MOTOR VEHICLE CRASH DATA

A summary of MassDOT Crash Information was provided for the most recent five years (2013-2017) at all study area intersections. The complex signalized intersection of Route 2 at Route 16 experienced the most reported crashes (88), followed by Massachusetts Avenue at Lake Street (22), and Lake Street at the Minuteman Commuter Bikeway (18). While crash activity was apparent, all other intersections were found to have less than three crashes per year on average. Signalized intersections were generally found to have angle, rear-end, and sideswipe type crashes consistent with the congested conditions within the study area. Seven of the bikeway crashes were reported involving a pedestrian or a bicycle. Motor vehicle crash rates were calculated and compared to the MassDOT District 4 average crash rates. The TIA determined that all of the study area intersections have calculated crash rates lower than the district average. BETA generally finds this analysis to be appropriate but offers the following comments.

T17. The Massachusetts Avenue Corridor through which Lake Street intersects is within a 2008-2017 MassDOT HSIP Bicycle Cluster. It is noted that the Minuteman Commuter Bikeway and the Alewife Greenway Bike Path serve as an appropriate alternative to points South on Massachusetts Avenue.

VAI: Noted. It is anticipated that most residents will use the Minuteman Commuter Bikeway to access points south on Massachusetts Avenue. This type of commuter information will be provided in the welcome packet to residents and available at a central location on site.

No further comment.

- T18.** Crash Rate worksheets utilize a K-Factor of 0.082 for all intersections. Clarify the origin of this K-Factor.

VAI: Spot counts from MassDOT Count Station 4925 and Station 4911 that were conducted on July 2019 were used to calculate the K-Factor of 0.082. Backup calculations for the K-Factor are provided in the Appendix.

Backup calculations provided, item resolved.

- T19.** Crash rate worksheets utilize the PM Peak Hour volumes, despite higher volumes in the AM peak hour at some locations. This provides a higher calculated crash rate which is conservative.

VAI: Noted. Even with conservative values at some locations, the crash rates were observed to be lower than the MassDOT District 4 crash rates for unsignalized and signalized intersections.

No further comment.

FUTURE TRAFFIC GROWTH

A 0.5 percent per year compounded annual growth rate was applied to the Adjusted September 2020 Existing traffic volumes for seven years to represent 2027 future conditions. The Appendix listed Count Station 4925 for Waverly Oaks Road near Beaver Street (Waltham) which found volumes to be decreasing approximately 2% per year from 2013 to 2019. This is slightly different than presented in the TIA (-0.15 percent per year). That said, given the nearby count station data it is expected that the 0.5% used is conservative.

Development traffic from two nearby planned projects; Hardy School Expansion and Discovery Park Buildings 400/500; were added to the grown volumes to establish the 2027 No-Build conditions. BETA finds this methodology to be in accordance with industry standards.

PLANNED ROADWAY IMPROVEMENTS

The future conditions (No-Build and Build) incorporate the signalization of the Minuteman Commuter Bikeway at Lake Street. It is noted that the new signal will be coordinated with the existing signal at Brooks Avenue.

- T20.** Clarify/confirm the future (no-build/build) traffic signal phasing for Lake Street at Brooks Avenue and Lake Street at Minuteman Bikeway. As currently evaluated, the pedestrian phase would activate at both the Bikeway and Brooks Avenue at the same time. It is expected that the Bikeway would call more frequently, potentially causing worse operations at Brooks Avenue.

VAI: The phasing design of the new pedestrian signal on Lake Street was reviewed and revised analysis was conducted. The updated analysis can be found in Table 12R, which is provided in VAI's response to BETA Comment No. 37. In addition, it should be noted that with the new pedestrian signal currently in service, it was incorporated into the 2020 Baseline analysis.

Updated analysis was provided that includes the signalized intersection(s). See Comment T39.

It is noted that bicycle and pedestrian volumes were not grown as part of the forecasting exercise. For analysis purposes, this is acceptable as the current volume is large enough such that the pedestrian phase at the proposed signal is expected to be called/activated nearly every cycle.

PROJECT GENERATED TRAFFIC

Project trip generation was estimated using the Institute of Transportation Engineers' *Trip Generation Manual* for Land Use Code 221: Multifamily Housing (Mid-Rise) and 176 residential units. This exercise

estimated the project would generate approximately 958 weekday vehicle trips, 60 weekday morning peak hour vehicle trips, and 76 weekday evening peak hour vehicle trips.

The estimated vehicle trips were adjusted for modal split given the proximity to nearby pedestrian, bicycle, and transit facilities. For the purposes of the TIA, it was assumed that the modal split for the Project Site would be similar to that of the Vox on Two, located south of Route 2 in Cambridge, MA. The Vox on Two impact study found the following:

Mode	Vox on 2	Census
Single Occupancy Vehicle	39%	42.9%
High Occupancy Vehicle	6%	11.6%
Transit	35%	31.6%
Bike	5%	6.1%
Walk	14%	0%
Other	1%	7.8%

Modal split requires the estimated vehicle trips be converted to person trips. The TIA used a vehicle occupancy rate of 1.13 persons per vehicle based on American Community Survey data for Census Tract 3561. The modal split percentages were applied to the estimated total person trips. The resulting vehicle trips were calculated by applying the 1.13 vehicle occupancy rate to the sum of Single Occupancy Vehicle and High Occupancy Vehicle person trips. This methodology found approximately 430 weekday vehicle trips, 27 weekday morning peak hour vehicle trips, and 33 weekday evening peak hour vehicle trips. In general, accounting for modal split reduces the estimated vehicle trip generation per ITE by 55%. BETA finds this methodology to be appropriate and in accordance with industry standards.

- T21.** Recommend providing backup Vehicle Occupancy information in the Appendix for review.

VAI: Vehicle occupancy data was obtained from US Census and the American Community Survey for Census Tract 3561, the tract in which the Project site is located. This information is provided in the Appendix of this letter.

Backup information provided; item resolved.

- T22.** Recommend providing backup Modal Split data in the Appendix.

VAI: Back up data for the Mode Split used in the report are provided in the Appendix of this letter.

Backup information provided; item resolved.

- T23.** Modal split includes a 35% transit split in addition to bicycling and walking. Given the proximity to Alewife Station (0.8 miles), it is assumed that all transit trips will initially be Walk/Bike trips. Provide additional justification for walk/bike trips outside of transit trips.

VAI: The Vox on Two mode split survey indicates 19 percent of commuter's bike or walk to work. The US Census data for Census Tract 3561, the tract in which the Project site is located, indicates 6.1 percent of commuters bike and 0 percent walk. However, the Vox on Two survey also indicates 1 percent "other" trips while the census data indicates 7.8 percent "other" trips. The bicycle volumes are similar from both sources. Therefore, the estimated pedestrian volumes may be higher using the Vox on Two survey than that of the Census data, however, 8 percent of the 14 percent walking trips would be converted to other trips using the census data, leaving a 6 percent increase in the auto mode share. A 6 percent increase in auto mode share would increase the anticipated site volumes by 56 daily trips, 4 weekday morning peak-hour trips and 5 weekday

evening peak-hour trips. The estimated bicycle volumes would be the same using either set of data and the pedestrian volumes are high using the Vox on Two data. However, the estimated vehicle volumes do not change significantly if the pedestrian mode share is reduced to 0 in the analysis.

The Census data reveals a total of 54.5% of trips using single or high occupancy vehicles, an increase of 9.5% over Vox on 2 survey data. It can also reasonably assumed that a percentage of the "other" trips include vehicle trips. At a conservative estimate of 10% increase in vehicle trips, this results in approximately 93 more weekday daily vehicle trips, 6 weekday morning peak hour trips (2 entering, 4 exiting), and 9 weekday evening peak hour trips (5 entering, 4 exiting) when compared to the Vox on Two split percentages.

- T24.** "Other" most likely represents taxi and/or rideshare. It is noted that these trips should be included within the vehicle trip category. Given the small percentage, peak hour estimates are not projected to change.

VAI: Noted. Also, the "Other" category typically includes working from home/telecommuting as well as other personal commuting devices including scooters and motorcycles.

No further comment.

- T25.** Clarify and provide detail for the connection between the Site and the Minuteman Bikeway, including interface with Thorndike Field and its parking area.

VAI: Currently, there is no plan to connect the Site directly to the Minuteman Commuter Bikeway. Residents will likely follow Dorothy Road east to Margaret Street then follow Margaret Street south to the bikeway.

Discussion provided. As this will be the only reasonable pedestrian/bike connection, recommend upgrading the pedestrian infrastructure as required to provide a safe and accessible route.

- T26.** Provide graphics showing the expected walking path between the Site and both the Red Line and bus platforms within Alewife Station, including an estimation of walking travel time.

VAI: Figure PR-1 depicting the anticipated pedestrian walking path from the Site to the Red Line and bus platforms within Alewife Station is provided in the Appendix of this letter. As depicted on Figure PR-1, the path follows Dorothy Street northeast from the site to Margaret Street then south to the Minuteman Commuter Bikeway which intersects with Steel Place. Alewife Station is accessed directly from Steel Place.

Figure provided. Issue resolved.

- T27.** Provide detail regarding the connection between the Site to the existing pedestrian overpass of Route 2, and provide detail regarding the connectivity that the pedestrian overpass affords between the Site and facilities on the south side of Route 2.

VAI: Currently, there is no plan to provide a pedestrian connection from the Site to the pedestrian overpass of Route 2.

Response noted.

- T28.** Consult with MassDOT on any available structural assessment of the existing pedestrian overpass and provide comment on its suitability for future use.

VAI: See VAI's response to Comment No. 27.

See response to T27.

TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution was estimated based on Journey to Work data for Arlington as reported by the US Census. The data displays the percentage of Arlington residents who commute to various municipalities. This methodology found 15% to/from the north on Massachusetts Avenue, 20% to/from the south on Massachusetts Avenue, 10% to/from the south on Alewife Brook Parkway (Route 16), 45% to/from the west on Route 2, and 10% to/from the west on Lake Street.

- T29.** The Journey To Work evaluation includes commuter trips to both Towns/Cities and Counties. Discuss whether the inclusion of counties over-weights percentages for previously included municipalities.

VAI: Any Town or City with 1 percent or more of the overall commuter traffic is assigned individually. The municipalities with less than 1 percent are grouped together and assigned by county. Most municipalities close to the site have percentages over 1 percent and are assigned directly to the municipality. Most municipalities in the county groups are further from the site and require accessing a highway/interstate to be reached. Therefore, the county trips would exit the study area heading towards the same highway/interstate access point before diverting to their specific destinations.

Discussion provided; item resolved.

Project generated vehicle trips were assigned to the network based on the above distribution percentages. Vehicles to/from the south were generally assigned as right/left turns at Littlejohn Street, while vehicles to/from the north were assigned as right/left turns at Burch Street.

- T30.** Clarify why this Burch Street is preferred for northern vehicles rather than Littlejohn Street, Homestead Road, and Margaret Street which are also accessible for similar movements. Mapping services often suggest using Margaret Street instead of Burch Street.

VAI: As existing turning restrictions exist from 7:00 to 9:00 AM and from 4:00 to 7:00 PM on weekdays from Lake Street onto Wilson Avenue, Littlejohn Street, and Homestead Road, the 2027 Build analysis was revised to send all entering vehicles to Margaret Street. Table 11R summarizes the results. It should be noted that Burch Street does not have a turning restriction.

Agree with reassigning trips based on existing turn restrictions. Table 11R shows LOS F for Burch Street and Margaret Street in both the morning and evening peak hours in both the 2027 No-Build and 2027 Build conditions.

Vehicles to/from points south along Route 16 were assigned to the Route 2 ramps at Lake Street. While an alternative route is available via Massachusetts Avenue, mapping services typically recommend Route 2 as the faster route.

- T31.** The TIA routes Route 2 eastbound vehicles to turn left onto Frontage Road towards Acorn Park Drive and Route 2 East. This is conservative as Route 2 Eastbound can also be accessed with a right turn ramp approximately 500 feet to the west on Lake Street.

VAI: The Route 2 eastbound ramp on Lake Street would have people enter Route 2 further west than the Frontage Road ramp. Route 2 has heavy congestion and queuing issues, and it is anticipated that most users would try to enter the queue on Route 2 to as far east as possible.

No further comment.

BUILD CONDITION VOLUMES

The 2027 Build condition volumes were established by adding the assigned project trips to the 2027 No-Build volume networks. It was noted that the traffic volume from the Project resulted in an increase of 0.1 to 0.8 percent during peak hours on study area roadways. It is noted that this percentage is substantially higher, more than tripling, for local roadways in the Littlejohn Street and Dorothy Road neighborhood, despite the relatively low Project increase in hourly vehicle volumes. This is generally due to the very small existing volume during the peak hour in this neighborhood. It is not immediately clear if the existing Do Not Enter signs are the reasoning for the lower volumes.

- T32.** Existing signed turning restrictions exist from 7-9 AM and from 4-7 PM on weekdays from Lake Street onto Wilson Avenue, Littlejohn Street, Homestead Road, and Burch Street. Assess the impact of this restriction and clarify whether discontinuance of this restriction is proposed.

VAI: See VAI's response to Comment No. 30. A discontinuance to the restrictions is not being proposed.

No further comment.

- T33.** Minor discrepancies were found in the 2027 Build networks (Figure 10 and Figure 11) that did not accurately incorporate the assigned Project volumes (Figure 8 and Figure 9). This discrepancy does not appear within the operations analysis worksheets.

VAI: Figure 10R and Figure 11R show the updated 2027 Build networks with the discrepancies rectified. These figures can be found in the Appendix of this letter.

Figures provided. No further comment.

PARKING ANALYSIS

The TIA evaluated the required parking for the Project based on the Town of Arlington Zoning Bylaw. According to the Project Program, the Site would accommodate: 11 Studio Units, 87 Single Bedroom Units, 58 Two Bedroom Units, and 20 Three Bedroom Units. The Zoning Bylaw specifies varying parking rates for each unit size from One Space per Studio to Two Spaces per Three Bedroom Unit. The exercise found the Project to require 239 Parking spaces, which is specified as being provided per the Site Plan.

The TIA compared this evaluation with data presented in ITE's *Parking Generation Manual* for Land Use Code 221: Multifamily Housing (Mid-Rise) which suggests an average parking rate of 1.31 spaces per unit (231 Total Spaces). BETA finds this evaluation to be acceptable, particularly given the access to the commuter bikeway, Alewife Station, and 144 interior bicycle parking spaces.

OPERATIONS ANALYSIS

Study area traffic operations analysis was performed for the 2020 Existing, 2027 No-Build, and 2027 Build conditions for each of the study area intersections using Synchro software. The evaluation summarized intersection and lane use Level of Service (LOS), delays, volume to capacity ratio (v/c), and Queue. It was noted that unsignalized lane uses operating with over 50 seconds of delay per vehicle or signalized lane uses operating with over 80 seconds of delay per vehicle are considered as LOS F (over capacity/failing). These instances are labeled in Table 11 and Table 12 as either ">50" or ">80" despite the lane use operating at larger delays. It is also noted that lane uses are also considered as operating with LOS F if the calculated v/c is greater than 1.0, even if the delay suggests a better LOS.

UNSIGNALIZED INTERSECTIONS

In general, all unsignalized intersections were found to retain or slightly improve upon the LOS reported under No-Build conditions. It is noted that delays slightly improve for the northbound Burch Street movements in the Build conditions give a projected increase in right turning volume which drives down (± 3 seconds) the average delay per vehicle. The projected increase in northbound left turns from Littlejohn Street to Lake Street was found to increase delays ± 66 seconds per vehicle and queues by 40 feet (two cars) in the weekday morning peak hour. A milder increase of 7 seconds per vehicle was reported in the evening peak hour.

Margaret Street was found to have the highest existing delays per vehicle (± 140 seconds) in the morning peak hour, which is expected given that it has the highest turning volume of the unsignalized intersections along Lake Street, likely due to its direct access to Thorndike Field and parking adjacent to the Minuteman Commuter Bikeway. Despite no Project volume assigned to the STOP sign, Margaret Street delays increase by ± 22 seconds per vehicle in the morning peak hour. This is generally related to increases in Lake Street cross traffic destined to Massachusetts Avenue and points east/north.

- T34.** Should vehicle volume from the Project travel along Margaret Street instead of Burch Street, these delays would likely further increase. See Comment T30 and T32.

VAI: See VAI's response to Comments 30 and 32. Margaret Street continues to operate at level-of-service (LOS) F under all conditions. The queue on Margaret Street increased by less than 1 vehicle during the weekday morning peak hour and by approximately 3 vehicles during the weekday evening peak hour.

Updated analysis found the LOS F delays to increase by 18 seconds per vehicle in the evening peak hour as a result of the Project directing volume towards Margaret Street. Queues are generally found to be short as the majority of volume turns right. BETA notes that the updated analysis found Littlejohn Street to increase in delay approximately 70 seconds per vehicle in the morning peak hour. This is generally due to added vehicles turning left towards Route 2, conflicting with larger volume on Lake Street. No further comment.

SIGNALIZED INTERSECTIONS

Overall, signalized intersections were generally found to retain their LOS reported under No-Build conditions given the added Project traffic. However, it is noted that individual lane uses experience independent increases in delays and queues given increased turning movements.

The complex signalized intersection of Route 2 at Route 16 was analyzed as four independent signalized intersections operating under one controller. While this cluster of intersections was found to have existing queueing and congestion problems, the small number of projected vehicle trips (± 3) to/from the Site was not found to significantly alter operations when compared to the No-Build conditions.

- T35.** The four signalized intersections within the Route 2 at Route 16 intersection were the only intersections evaluated as an Area Type of "Central Business District" which generally suggests a lower saturation flow rate given multiple driveways, parking activity, and pedestrian activity. Given the interchange configuration, this area type does not necessarily apply. It is expected that this methodology was expected to estimate conditions related to blocked intersections consistent with the existing "DO NOT BLOCK THE BOX" markings. Clarify accordingly.

VAI: The Synchro model used for the Route 2 at Route 16 intersection was provided by the City of Cambridge. To be consistent with other area traffic studies analyzing this location changes to the

model outside volumes, PHFs, and truck percentages were not made. However, any effects of the Project on this junction (which is not in Arlington) are minor, due to the large volume of regional traffic this junction processes.

No further comment.

- T36.** “Signal 2” analysis worksheets are listed with an error stating a “Phase conflict between lane groups.” This is expected as both Alewife Station Access Road (WB) and Alewife Brook Parkway/Route 16 (NB) vehicles receive a green at the same time. The receiving leg to the west provides three dedicated through lanes which accommodates this phasing configuration.

VAI: See VAIs response to BETA Comment No. 36.

No response required.

Left turns from the Route 2 Eastbound Off-Ramp to Lake Street were found to operate at LOS F in the No-Build and Build peak hour conditions given their higher delays and v/c ratios. As increased turns are not Projected for the Site, these delays did not significantly change between No-Build and Build.

At the Route 2 Westbound Ramp, Lake Street experiences higher westbound delays in the morning (LOS F) and eastbound in the evening (LOS F). Project related traffic resulted in an increase of 3-4 seconds per vehicle for these movements, granted both experience over 130 seconds of delay in the No-Build condition.

The commuter bikeway was found to operate at LOS E delays for westbound traffic in the morning peak hour that improve to LOS D with the proposed signal implementation. While delays are generally consistent between the No-Build and Build, queues increased about one vehicle length as a result of the Project. **See Comment T20.**

Lake Street at Brooks Avenue was found to have minor increases to delays and queues as a result of the Project. That said, the westbound 95th percentile queues reported in the morning peak hour exceed 1,000 feet which would stretch almost to Massachusetts Avenue. **See Comment T20.**

Massachusetts Avenue at Lake Street suffers the largest overall delay within the study area given the high demand and activity along this roadway. In particular, Lake Street was found to consistently operate with LOS F in both peak hours for all analysis conditions. Site generated trips were found to increase Lake Street eastbound delays by approximately 4-6 seconds per vehicle.

- T37.** Minor discrepancies in the labeling of Lane Uses and intersections are apparent throughout Table 12. Recommend updating the table for clarity.

VAI: There were minor discrepancies in the labeling of lane uses and intersections throughout Table 12. These discrepancies have been corrected as shown in Table 12R. The updated synchro analysis worksheets for both the signalized and unsignalized intersections are provided in the Appendix of this letter.

Issue resolved.

- T38.** Several lane uses were reported operating with v/c greater than 1.0 despite delays suggesting Level of Service of acceptable levels. The larger v/c suggests the movement/lane is over capacity and should be reported as LOS F.

VAI: Table 12R above shows the revised level-of-service results of the analysis. All lanes with a volume-to-capacity ratio greater than 1.0 are presented as LOS F.

Tables have been updated. No further comment.

- T39.** Lake Street through volumes at the Minuteman Bikeway presented in the 2027 No-Build evening analysis were found to be lower than those presented on Figure 6 of the TIA. Update accordingly.

VAI: Table 12R above shows the revised level-of-service results of the analysis. The through volumes at the Minuteman Commuter Bikeway presented in the 2027 No-Build evening analysis have been updated to match the volumes on Figure 6R.

Issue resolved. Note that westbound queueing in the morning peak hour is metered by the upstream signal at Brooks Avenue. Queueing extends through the two intersections. A typo was found inaccurately representing queueing conditions in the 2027 Build Evening peak hour.

- T40.** Lake Street at Massachusetts Avenue flares out to provide a wide area that could be used as two lanes but was modeled as a single lane. Consider modifying analyses to represent actual field conditions.

VAI: The analysis has been updated such that the Lake Street approach to the intersection with Massachusetts Avenue has one left-turn lane and one right-turn lane. Table 12R above shows the revised level-of-service results of the analysis.

Analysis was updated which generally finds better overall operations as right turning vehicles have less delay. No further comment.

CONSTRUCTION IMPACTS

The TIA does not include any discussion related to the traffic impact of site construction.

- T41.** Quantify and analyze the effect of construction on the Dorothy Road neighborhood. It is expected that the earthwork required for the site will result in a significant number of trips for large dump trucks, in addition to other construction vehicles related to the grading and construction of the Site building. Verify turning path of large construction vehicles at affected intersections within the neighborhood and to/from Lake Street.

BSC: Prior to construction, a Construction Traffic Management Plan will be prepared by the General Contractor and submitted to appropriate town staff prior to issuance of building permits. It is anticipated that coordination of the construction vehicle access route and construction hours will be undertaken with input from Public Works, Building and the Police Department prior to commencement of site preparation work. It is likely that construction vehicles will access the site from Route 2 and Lake Street via Littlejohn Street and will exit back to Route 2 via Burch Street or Margaret Street to Lake Street. Temporary parking restrictions during construction hours may be necessary on the construction vehicle route.

While it is expected that a Traffic Management Plan will be required, the response does not quantify the number of construction vehicle trips and as such fails to assess the expected impact of site construction on the Dorothy Road neighborhood.

The January 26th Zoning Board of Appeals meeting included discussion regarding the modular construction of the building. While this will reduce construction duration over traditional construction, it also requires transport of modular units to the site via Lake Street and neighborhood streets, likely Littlejohn Street. The applicant noted that the modular units are 63 feet long. This will likely require a cab and trailer and a wide turning movement from Lake Street to Littlejohn Street. The applicant should provide the following for the Board's consideration:

1. **Swept path analysis for the vehicle expected to transport modular units to the site. Swept paths should include turning from Lake Street to Littlejohn Street or other neighborhood streets, turnaround/backing path as required, and exit back to Lake Street.**
2. **Identify any parking or other access restrictions required along Lake Street or neighborhood streets to accommodate turning and vehicle access to the site.**
3. **Identify the number of modular units expected to be transported to the site. In the January 26th meeting this was estimated to be greater than 250.**
4. **Identify the schedule for transport, including expectation of number of modules to be transported per day and number of days that will be required. This may also include duration and frequency – for example, will it be completed in a shorter duration of continuous days, or along a shorter period of days repeated in specific intervals.**
5. **Identify storage area on site for modules. It is assumed that a crane will be necessary to remove modules from trailers and to move modules into place from the designated storage areas. Identify crane location and its intended operating area. Verify that crane path will not include aerial trespass over abutting properties.**

RECOMMENDATIONS

The TIA recommended the installation of a 23 dock Bluebikes Station in the vicinity of an existing Bluebikes Station at Thorndike Field. BETA finds this recommendation to be appropriate.

On-Site recommendations included improving/maintaining sight lines and providing STOP sign control for the Site Driveway. BETA finds these recommendations to be appropriate.

A Transportation Demand Management (TDM) program was recommended to include:

- On-Site Transportation Coordinator to oversee marketing and promoting transportation options
- Information packets for residents including sustainable transportation options
- Transitscreen installation in the building lobby to depict real-time information for transit, Bluebikes, and Uber/Lyft Services
- Provide information on available pedestrian and bicycle facilities/routes in the vicinity of the Site
- Investigate joining the 128 Business Council or the Alewife TMA, which could provide ridematching services for residents and employers in the area

BETA generally supports these TDM measures.

CONCLUSIONS

The TIA conclusion states that the Project is expected to produce a minor increase in traffic volumes in the vicinity of the site and “minor but manageable” increases to delays in various movements within the study area. While the operational analysis results presented in the TIA generally support this conclusion, the Applicant should provide update and/or response to the recommendations contained herein.

- T42.** Provide additional commentary on the impact of the Project on the Dorothy Road neighborhood, including summarizing expected increases in daily and peak hourly traffic on Littlejohn Street, Dorothy Road, Burch Street and Margaret Street.

VAI: Table 7R shows the traffic-volume increases on Littlejohn Street and Dorothy Road due to the Project. The analysis was updated to send site traffic onto Margaret Street instead of Burch Street, so we have provided the traffic-volume increases for Margaret Street in Table 7R.

Updated table was provided which shows increases along Dorothy Road, Littlejohn Street, and Margaret Street of between 8 to 25 vehicles in the peak hour. In general, traffic from the west would arrive via Littlejohn Street and traffic from the east would arrive via Margaret Street. No further comment.

The conclusion also states that the proposed addition of a Bluebikes station adjacent to the existing station at Thorndike Field and the 144 sheltered bike parking spaces will encourage the use of bicycling as a sustainable commuting measure over the use of personal vehicles; BETA concurs with this assessment, but suggests that the Applicant provide additional clarification on pedestrian, bicycle, and transit connections between the Site and Alewife station, as recommended through the comments contained herein.

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

Very truly yours,
BETA Group, Inc.



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