Vanasse & Associates inc
Transportation Engineers & Planners

35 New England Business Center Drive
Suite 140
Andover, MA 01810

Ref: 8451

January 15, 2021

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

Re: Responses to Peer Review Comments
Thorndike Place Traffic Impact Assessment
Proposed 176-Unit Residential Development
Arlington, Massachusetts

Dear Ms. Raitt:

Vanasse & Associates, Inc. (VAI) is pleased to submit responses to the December 1, 2020 letter from BETA GROUP, Inc. (BETA) the Town of Arlington's Peer Review consultant. For ease of review, we have listed the comments followed by our responses. Please note there are several comments related to site design that will be responded to under separate cover by the Project's civil engineer, BSC Group.

BETA Peer Review Letter – December 1, 2020

SITE ACCESS, CIRCULATION, AND PARKING

Comment Nos. 1-9: ***"T1. Include dimensioning of parking stalls and drive aisles for the parking garage.***

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

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

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.

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

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.

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.

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.

T9. Verify intended circulation of the courtyard parking area."

Response: Comment Nos. 1 through 9 are responded to by BSC Group in a separate response letter.

STUDY AREA

Comment No. 10: ***"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."***

Response: 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.

Comment No. 11: ***"Diagrams suggest there is no connection between Dorothy Road and Margaret Street. Revise accordingly."***

Response: 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.

TRAFFIC VOLUMES

Comment No. 12: ***"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." (highlighted intersections: 1) Lake Street at Littlejohn Street, 2) Lake Street at Brooks Avenue, 3) Massachusetts Avenue at Lake Street)***

Response: 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.

Comment No. 13: ***"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."***

Response: 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.

PEDESTRIAN AND BICYCLE FACILITIES

Comment No. 14: ***"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."***

Response: 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.

THORNDIKE PARK

Comment No. 15: ***"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."***

Response: 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 Margert Street were increased by 19 trips entering and 19 trips exiting. These trips were distributed using existing travel patterns.

PUBLIC TRANSPORTATION

Comment No. 16: ***"Note there is a discrepancy in Table 2 of the TIA stating Alewife Station is southwest of the Site."***

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

Table 2R
PUBLIC TRANSPORTATION SERVICES

Service	Stop Closest to Site	Distance from Site	Weekday Hours of Operation	Weekday Headway (minutes)	Saturday Hours of Operation	Saturday Headway (minutes)	Sunday Hours of Operation	Sunday Headway (minutes)
Bus Route 67: Turkey Hill – Alewife Station	West Service Road at Lake Street	0.3 mi. NW	5:53 AM – 8:32 PM	25-50	**No Weekend Service**			
Bus Route 77: Arlington Heights – Harvard Station	Mass Ave at Lake Street	0.7 mi. NE	4:48 AM – 1:25 AM	9-20	4:48 AM – 1:26 AM	10-17	6:00 AM – 1:25 AM	10-20
Bus Route 79: Arlington Heights – Alewife Station	Mass Ave at Lake Street	0.7 mi. NE	6:35 AM – 7:24 PM	5-50	**No Weekend Service**			
Bus Route 350: North Burlington – Alewife Station	Mass Ave at Lake Street	0.7 mi. NE	5:53 AM – 11:08 PM	15-56	6:25 AM – 11:10 PM	40-60	7:05 AM – 7:35 PM	55-90
Rapid Transit: Red Line	Alewife Station	0.8 mi. SE	5:16 AM – 12:30 AM	5-9	5:16 AM – 12:30 AM	12-16	6:00 AM – 12:30 AM	12-16

MOTOR VEHICLE CRASH DATA

Comment No. 17: ***"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."***

Response: 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.

Comment No. 18: ***"Crash Rate worksheets utilize a K-Factor of 0.082 for all intersections. Clarify the origin of this K-Factor."***

Response: 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.

Comment No. 19: ***"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."***

Response: 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.

PLANNED ROADWAY IMPROVEMENTS

Comment No. 20: ***"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."***

Response: 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.

PROJECT-GENERATED TRAFFIC

Comment No. 21: ***"Recommend providing backup Vehicle Occupancy information in the Appendix for review."***

Response: 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.

Comment No. 22: ***"Recommend providing backup Modal Split data in the Appendix."***

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

Comment No. 23: ***"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."***

Response: The Vox on Two mode split survey indicates 19 percent of commuters 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.

Comment No. 24: ***""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."***

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

Comment No. 25: ***"Clarify and provide detail for the connection between the Site and the Minuteman Bikeway, including interface with Thorndike Field and its parking area."***

Response: 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.

Comment No. 26: ***"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."***

Response: 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.

Comment No. 27: ***"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."***

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

Comment No. 28: ***"Consult with MassDOT on any available structural assessment of the existing pedestrian overpass, and provide comment on its suitability for future use."***

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

TRIP DISTRIBUTION AND ASSIGNMENT

Comment No. 29: ***"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."***

Response: 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.

Comment No. 30: ***"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."***

Response: 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.

Table 11R
UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/	2020 Baseline				2027 No-Build				2027 Build			
Critical Movement/Peak Hour	V/C[a]	Delay[b]	LOS[c]	Queue[d]	V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Lake Street at Wilson Avenue:												
Weekday Morning:												
Wilson Avenue NB LT/RT	0.11	>50	F	10	0.13	>50	F	10	0.14	>50	F	13
Weekday Evening:												
Wilson Avenue NB LT/RT	0.13	36	E	10	0.15	40	E	13	0.15	42	E	13
Lake Street at Littlejohn Street:												
Weekday Morning:												
Littlejohn Street NB LT/RT	0.47	>50	F	50	0.56	>50	F	60	0.87	>50	F	103
Weekday Evening:												
Littlejohn Street NB LT/RT	0.18	35	E	15	0.20	39	E	18	0.31	48	E	30
Lake Street at Homestead Road:												
Weekday Morning:												
Homestead Road NB LT/RT	0.13	>50	F	10	0.16	>50	F	13	0.29	>50	F	23
Weekday Evening:												
Homestead Road NB LT/RT	0.08	28	D	8	0.09	31	D	8	0.09	31	D	8
Lake Street at Burch Street and Alfred Road:												
Weekday Morning:												
Burch Street NB LT/TH/RT	0.23	43	E	20	0.27	>50	F	25	0.27	>50	F	25
Alfred Road SB LT/TH/RT	0.13	38	E	10	0.15	44	E	13	0.15	45	E	13
Weekday Evening:												
Burch Street NB LT/TH/RT	0.24	47	E	23	0.28	>50	F	25	0.28	>50	F	25
Alfred Road SB LT/TH/RT	0.05	41	E	5	0.06	48	E	5	0.06	48	E	5
Lake Street at Margaret Street and Lakehill Avenue:												
Weekday Morning:												
Margaret Street NB LT/TH/RT	0.67	>50	F	73	0.80	>50	F	83	0.89	>50	F	100
Lakehill Avenue SB LT/TH/RT	0.16	34	D	15	0.20	40	E	18	0.20	41	E	18
Weekday Evening:												
Margaret Street NB LT/TH/RT	0.78	>50	F	98	0.90	>50	F	113	0.98	>50	F	125
Lakehill Avenue SB LT/TH/RT	0.34	>50	F	33	0.40	>50	F	38	0.48	>50	F	45
Dorothy Road/Littlejohn Street at Site Driveway:												
Weekday Morning:												
Site Driveway NB TH/RT	**Intersection constructed under 2027 Build conditions**								0.03	9	A	2
Weekday Evening:												
Site Driveway NB TH/RT									0.02	9	A	1

[a]Volume to capacity ratio.
[b]Delay in seconds per vehicle.
[c]Level of service.
[d]95th percentile queue length in feet.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

Comment No. 31: ***"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."***

Response: 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 queueing issues, and it is anticipated that most users would try to enter the queue on Route 2 to as far east as possible.

BUILD CONDITION VOLUMES

Comment No. 32: ***"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."***

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

Comment No. 33: ***"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."***

Response: 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.

OPERATIONS ANALYSIS

Comment No. 34: ***"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."***

Response: 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.

Comment No. 35: ***"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."***

Response: 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.

Comment No. 36: ***""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."***

Response: See VAI's response to BETA Comment No. 36.

Comment No. 37: ***"Minor discrepancies in the labeling of Lane Uses and intersections are apparent throughout Table 12. Recommend updating the table for clarity."***

Response: 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.

Table 12R
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/ Critical Movement/Peak Hour	2020 Baseline				2027 No-Build				2027 Build			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] 50th/95th	V/C	Delay	LOS	Queue 50th/95th	V/C	Delay	LOS	Queue 50th/95th
ROUTE 2 AT ROUTE 16 (4 SIGNALS)												
Signal 1: Route 2 WB at Route 16 SB:												
Weekday Morning:												
Route 2 WB TH	0.81	8	A	41/40	0.85	10	B	43/40	0.85	10	B	43/40
Route 16 SB RT	0.98	53	D	502/613	1.02	63	F	581/659	1.02	63	F	581/659
Overall	--	**27**	**C**	--	--	**32**	**C**	--	--	**32**	**C**	--
Weekday Evening:												
Route 2 WB TH	1.04	31	F	656/52	1.08	48	F	702/57	1.08	49	F	704/56
Route 16 SB RT	0.91	42	D	442/606	0.95	47	D	472/644	0.95	47	D	472/644
Overall	--	**35**	**C**	--	--	**48**	**D**	--	--	**48**	**D**	--
Signal 2: Route 2 EB at Route 16 NB/SB/Alewife Station Access Road:												
Weekday Morning:												
Route 2 EB LT	0.89	67	E	197/291	0.92	72	E	206/308	0.92	72	E	206/308
Alewife Station Access Road WB TH	0.25	17	B	82/134	0.26	17	B	86/138	0.26	17	B	86/138
Route 16 NB LT	1.04	69	F	665/804	1.09	>80	F	728/868	1.09	>80	F	730/868
Route 16 SB TH	0.70	46	D	213/259	0.72	47	D	223/269	0.72	47	D	223/269
Overall	--	**61**	**E**	--	--	**73**	**E**	--	--	**73**	**E**	--
Weekday Evening:												
Route 2 EB LT	1.14	>80	F	300/418	1.19	>80	F	326/446	1.19	>80	F	326/446
Alewife Station Access Road WB TH	0.82	29	C	399/578	0.85	33	C	422/639	0.85	33	C	422/639
Route 16 NB LT	1.10	89	F	741/880	1.14	>80	F	792/931	1.14	>80	F	794/933
Route 16 SB TH	0.30	38	D	81/119	0.31	38	D	84/123	0.31	38	D	84/123
Overall	--	**>80**	**F**	--	--	**>80**	**F**	--	--	**>80**	**F**	--
Signal 3: Route 16 NB/SB at Alewife Station Access Road:												
Weekday Morning:												
Alewife Station Access Road WB TH	0.17	8	A	48/78	0.17	9	A	50/81	0.17	9	A	50/81
Alewife Station Access Road WB RT	0.06	8	A	15/30	0.07	8	A	15/31	0.07	8	A	15/31
Route 16 NB TH	0.30	38	D	80/117	0.32	38	D	83/121	0.32	38	D	83/121
Overall	--	**23**	**C**	--	--	**23**	**C**	--	--	**23**	**C**	--
Weekday Evening:												
Alewife Station Access Road WB TH	0.54	15	B	227/320	0.56	16	B	239/337	0.56	16	B	239/337
Alewife Station Access Road WB RT	0.35	10	B	106/159	0.36	11	B	110/165	0.36	11	B	110/165
Route 16 NB TH	0.29	38	D	78/115	0.30	38	D	81/119	0.30	38	D	81/119
Overall	--	**18**	**B**	--	--	**19**	**B**	--	--	**19**	**B**	--

See notes at end of table.

Table 12R (Continued)
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/ Critical Movement/Peak Hour	2020 Baseline				2027 No-Build				2027 Build			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] 50th/95th	V/C	Delay	LOS	Queue 50th/95th	V/C	Delay	LOS	Queue 50th/95th
Signal 4: Route 2 EB at Route 16 SB:												
Weekday Morning:												
Route 2 EB RT	0.50	11	B	209/258	0.52	12	B	220/272	0.52	12	B	221/272
Route 16 SB TH	0.59	3	A	5/0	0.62	4	A	5/0	0.62	4	A	5/0
Overall	--	**9**	**A**	--	--	**9**	**A**	--	--	**9**	**A**	--
Weekday Evening:												
Route 2 EB RT	0.48	11	B	198/245	0.50	11	B	209/255	0.50	11	B	210/258
Route 16 SB TH	0.25	1	A	0/0	0.26	1	A	0/1	0.26	1	A	0/1
Overall	--	**9**	**A**	--	--	**10**	**A**	--	--	**10**	**A**	--
Lake Street at Route 2 EB On/Off-Ramps:												
Weekday Morning:												
Lake Street EB TH	0.59	25	C	95/176	0.64	28	C	118/204	0.65	28	C	119/205
Lake Street EB RT	0.26	0	A	0/0	0.30	0	A	0/0	0.30	0	A	0/0
Lake Street WB LT	0.56	28	C	62/116	0.58	27	C	83/151	0.58	27	C	84/152
Lake Street WB TH	0.25	7	A	39/53	0.25	7	A	42/57	0.25	6	A	43/57
Route 2 EB Off-Ramp NB LT	0.89	44	D	167/400	1.04	79	F	234/482	1.04	>80	F	236/482
Route 2 EB Off-Ramp NB RT	0.70	12	B	36/191	0.78	17	B	54/243	0.78	17	B	55/246
Overall	--	**18**	**B**	--	--	**26**	**C**	--	--	**27**	**C**	--
Weekday Evening:												
Lake Street EB TH	0.73	26	C	196/337	0.75	27	C	215/361	0.75	27	C	216/362
Lake Street EB RT	0.11	0	A	0/0	0.12	0	A	0/0	0.12	0	A	0/0
Lake Street WB LT	0.59	35	C	71/142	0.61	36	D	79/156	0.61	36	D	80/157
Lake Street WB TH	0.15	5	A	26/38	0.16	5	A	28/40	0.16	5	A	87/40
Route 2 EB Off-Ramp NB LT	1.08	>80	F	253/558	>1.20	>80	F	315/634	>1.20	>80	F	316/635
Route 2 EB Off-Ramp NB RT	0.81	19	B	57/280	0.90	28	C	90/361	0.90	29	C	93/368
Overall	--	**35**	**D**	--	--	**49**	**D**	--	--	**20**	**D**	--

See notes at end of table.

Table 12R (Continued)
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/ Critical Movement/Peak Hour	2020 Baseline				2027 No-Build				2027 Build			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] 50th/95th	V/C	Delay	LOS	Queue 50th/95th	V/C	Delay	LOS	Queue 50th/95th
LAKE STREET AT ROUTE 2 WB ON/OFF-RAMPS:												
Weekday Morning:												
Lake Street EB LT	0.73	38	D	81/164	0.77	41	D	88/179	0.77	41	D	88/179
Lake Street EB TH	0.65	14	B	150/238	0.69	15	B	167/265	0.70	15	B	168/268
Lake Street WB TH	0.96	57	E	168/335	1.05	>80	F	214/378	1.06	>80	F	217/381
Lake Street WB RT	0.96	34	C	80/314	1.03	51	F	135/357	1.04	55	F	169/364
Route 2 WB Off-Ramp NB LT	0.18	18	B	22/47	0.23	19	B	28/56	0.23	19	B	28/56
Route 2 WB Off-Ramp NB LT/TH	0.19	18	B	23/48	0.22	19	B	28/55	0.22	19	B	28/55
Route 2 WB Off-Ramp NB RT	0.02	0	A	0/0	0.02	0	A	0/0	0.02	0	A	0/0
Overall	--	**32**	**C**	--	--	**44**	**D**	--	--	**45**	**D**	--
Weekday Evening:												
Lake Street EB LT	1.04	>80	F	155/289	1.18	>80	F	191/331	1.19	>80	F	191/331
Lake Street EB TH	0.89	27	C	247/463	0.94	32	C	275/503	0.94	34	C	283/514
Lake Street WB TH	0.63	27	C	85/152	0.65	27	C	92/162	0.64	27	C	93/163
Lake Street WB RT	0.58	7	A	0/55	0.59	7	A	0/56	0.59	7	A	0/57
Route 2 WB Off-Ramp NB LT	0.25	19	B	33/72	0.27	19	B	35/75	0.27	19	B	35/75
Route 2 WB Off-Ramp NB LT/TH	0.24	19	B	34/72	0.26	19	B	36/76	0.26	19	B	36/76
Route 2 WB Off-Ramp NB RT	0.04	0	A	0/0	0.04	0	A	0/0	0.05	0	A	0/0
Overall	--	**33**	**C**	--	--	**45**	**D**	--	--	**45**	**D**	--
LAKE STREET AT MINUTEMAN COMMUTER BIKEWAY:												
Weekday Morning:												
Lake Street EB TH	0.49	45	D	119/162	0.53	60	E	132/180	0.54	61	E	134/182
Lake Street WB TH	0.77	68	E	535/591	0.82	68	E	569/580	0.82	68	E	570/580
Overall	--	**59**	**E**	--	--	**65**	**E**	--	--	**65**	**E**	--
Weekday Evening:												
Lake Street EB TH	0.69	61	**E**	208/282	0.73	62	E	230/312	0.73	62	**E**	233/316
Lake Street WB TH	0.44	8	**A**	213/289	0.46	9	A	226/307	0.47	9	**A**	31/45
Overall	--	**40**	**D**	--	--	**41**	**D**	--	--	**41**	**D**	--

See notes at end of table.

Table 12R (Continued)
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Intersection/ Critical Movement/Peak Hour	2020 Baseline				2027 No-Build				2027 Build			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] 50th/95th	V/C	Delay	LOS	Queue 50th/95th	V/C	Delay	LOS	Queue 50th/95th
LAKE STREET AT BROOKS AVENUE:												
Weekday Morning:												
Lake Street EB LT/TH/RT	0.57	36	D	224/326	0.64	53	D	246/442	0.64	57	E	249/448
Lake Street WB LT/TH/RT	0.94	>80	F	557/790	1.03	>80	F	635/877	1.03	>80	F	636/879
Brooks Avenue NB LT/TH/RT	0.39	38	D	14/32	0.50	38	D	23/44	0.50	38	D	23/44
Brooks Avenue SB LT/TH/RT	0.52	14	B	5/37	0.48	11	B	5/35	0.48	11	B	5/35
Overall	--	**60**	**E**	--	--	**68**	**E**	--	--	**69**	**E**	--
Weekday Evening:												
Lake Street EB LT/TH/RT	0.83	62	E	251/620	0.87	74	E	274/672	0.88	75	E	281/678
Lake Street WB LT/TH/RT	0.49	12	B	159/269	0.51	13	B	171/284	0.52	13	B	174/289
Brooks Avenue NB LT/TH/RT	0.18	27	C	8/23	0.29	29	C	11/29	0.29	29	C	11/29
Brooks Avenue SB LT/TH/RT	0.50	13	B	2/32	0.50	13	B	2/33	0.50	13	B	2/33
Overall	--	**40**	**D**	--	--	**47**	D	--	--	**47**	**D**	--
MASSACHUSETTS AVENUE AT LAKE STREET:												
Weekday Morning:												
Lake Street EB LT	0.72	46	D	159/245	0.73	47	D	167/257	0.73	47	D	170/259
Lake Street EB RT	0.57	13	B	32/110	0.59	14	B	40/122	0.59	14	B	42/125
Massachusetts Avenue NB LT	>1.20	>80	F	287/502	>1.20	>80	F	336/550	>1.20	>80	F	339/554
Massachusetts Avenue NB TH	0.48	18	B	200/317	0.50	19	B	213/332	0.50	19	B	214/332
Massachusetts Avenue SB TH	0.72	31	C	265/371	0.76	33	C	281/409	0.76	33	C	282/409
Massachusetts Avenue SB RT	0.94	45	D	302/561	0.99	55	E	362/604	0.99	56	E	364/606
Overall	--	**55**	**D**	--	--	**66**	**E**	--	--	**67**	**E**	--
Weekday Evening:												
Lake Street EB LT	0.95	69	E	324/499	1.01	>80	F	359/537	1.01	>80	F	362/541
Lake Street EB RT	0.55	22	C	89/170	0.58	23	C	100/185	0.59	24	C	102/188
Massachusetts Avenue NB LT	1.06	>80	F	191/388	1.13	>80	F	217/422	1.14	>80	F	224/433
Massachusetts Avenue NB TH	0.84	32	C	453/702	0.87	35	C	480/#740	0.87	35	C	480/740
Massachusetts Avenue SB TH	0.60	30	C	202/265	0.62	30	C	211/277	0.62	30	C	211/277
Massachusetts Avenue SB RT	0.35	17	B	54/117	0.37	17	B	58/122	0.37	17	B	59/124
Overall	--	**43**	**D**	--	--	**49**	**D**	--	--	**50**	**D**	--

[a]Volume to capacity ratio.
[b]Average stopped delay per vehicle (in seconds).
[c]Level-of-service.
[d]Queue length in feet.

Comment No. 38: ***"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."***

Response: 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.

Comment No. 39: ***"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."***

Response: 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.

Comment No. 40: ***"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."***

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

CONSTRUCTION IMPACTS

Comment No. 41: ***"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."***

Response: Comment No. 41 will be responded to by BSC Group in a separate response letter.

CONCLUSIONS

Comment No. 42: ***"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."***

Response: 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.

Table 7
PEAK-HOUR TRAFFIC-VOLUME INCREASES[a]

Location/Peak Hour	2027 No-Build	2027 Build	Traffic-Volume Increase Over No-Build
Route 2, west of Lake Street:			
Weekday Morning	1,958	1,970	12
Weekday Evening	1,913	1,928	15
Lake Street, west of Route 2 EB On/Off-Ramps:			
Weekday Morning	1,444	1,447	3
Weekday Evening	1,554	1,557	3
Massachusetts Avenue, north of Lake Street:			
Weekday Morning	2,171	2,175	4
Weekday Evening	1,999	2,004	5
Massachusetts Avenue, south of Lake Street:			
Weekday Morning	1,998	2,003	5
Weekday Evening	2,004	2,011	7
Alewife Brook Parkway, south of Route 2:			
Weekday Morning	3,259	3,262	3
Weekday Evening	3,093	3,096	3
Dorothy Road, east of the Site Drive:			
Weekday Morning	49	63	14
Weekday Evening	35	60	25
Margaret Street, south of Lake Street:			
Weekday Morning	62	76	14
Weekday Evening	116	141	25
Littlejohn Street, south of Lake Street:			
Weekday Morning	49	62	13
Weekday Evening	35	43	8

[a]Two-way traffic total.

As can be seen in Table 7R, traffic-volume increases range from 8 to 25 vehicle trips on Dorothy Road, Littlejohn Street, and Margaret Street. Increases of 8 to 25 vehicles per hour equates to 1 additional vehicle every 2.4 to 7.5 minutes, which is a minor increase in traffic to the area.

It is anticipated that this information addresses the comments. Please feel free to contact us directly if there should be any further clarification needed.

Sincerely,

VANASSE & ASSOCIATES, INC.

Scott W. Thornton, P.E.
Senior Associate

Derek Roach, P.E.
Transportation Engineer

cc: BETA Group, Inc. – Greg E. Lucas, P.E., P.T.O.E, R.S.P