



February 16, 2021

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

**Re: 1165R Mass Ave Apartments – Arlington, MA  
Traffic Peer Review**

Dear Ms. Raitt:

BETA Group, Inc. (BETA) has reviewed documents for the proposed multi-unit housing redevelopment of the 1165R Massachusetts Avenue parcel (the Site) within the Mirak Innovation Park in the Arlington Heights neighborhood. This letter is provided to outline BETA's findings, comments, and recommendations related to **Traffic** issues.

## **BASIS OF REVIEW**

BETA reviewed the following documents:

- **Traffic Impact Report (TIR), 1165R Mass Ave Apartments, Arlington, MA**, dated July 6, 2020 prepared by Nitsch Engineering (Nitsch) of Boston, MA
- Preliminary Site Development Plans (6 Sheets) including:
  - ALTA Survey Plans (4 Sheets), dated July 2020 prepared by Control Point Associates, Inc. of Southborough, MA
  - Site Layout Plans (2 Sheets), dated June 2020 prepared by Bohler Engineering of Southborough, MA
- Architectural Drawings (16 Sheets), dated June 2020 prepared by Bargmann Hendrie + Archetype, Inc. (bh+a) of Boston, MA

Review by BETA included the above items for conformance with the following, as applicable:

- **Town of Arlington Zoning Bylaw**, Adopted by Town Meeting on April 22, 2019
  - **Section 5 District Regulations**
  - **Section 6 Site Development Standards**
- **Transportation Impact Assessment (TIA) Guidelines**, by MassDOT dated March 2014
- **Manual on Uniform Traffic Control Devices (MUTCD) 2009 and Revisions, Federal Highway Administration**
- **Trip Generation Manual, 10<sup>th</sup> Edition (and Supplement)**, Institute of Transportation Engineers (ITE)
- **Parking Generation Manual, 5<sup>th</sup> Edition**, ITE

## PROJECT DESCRIPTION

The Project Site (the Site) is located at 1165R Massachusetts Avenue (Mass Ave) within an area known as the Mirak Innovation Park in Arlington, Massachusetts. The Site is bounded by Massachusetts Avenue, Forest Street, Ryder Street, Quinn Road, and the Minuteman Commuter Bikeway. Adjacent land uses consist of auto dealerships, light industrial/commercial, and residential. The Site generally provides three structures, previously operating as a mill, that have been repurposed for office use. The Mill Brook, a walled east/west waterway, bisects the Site. Access across the Mill Brook (north/south) is provided by small bridges; one along Quinn Road to the Mirak Chevrolet Dealership and one on-site traveling between the mill structures. Two structures are located south of the Mill Brook, include a two-story brick building to the southwest and a three-story brick building to the southeast. A four-story brick building and single-story annex building are provided north of the Mill Brook. The southwest structure, recently repurposed as a shared use community office space known as *Workbar*, is intended to be retained as an independent use. The existing Site provides approximately 76 parking spaces on the north side of the Mill Brook which serve the existing Mill Building tenants and the Workbar.

The Proposed Redevelopment Project will raze the existing southeastern three-story brick building and the northern one-story annex. The four-story brick building (“Building 1”) and a one-story annex to the east (“Building 3”) will be repurposed. “Building 1” is intended to provide housing units, while “Building 3” will provide tenant amenities. A new four-story (atop basement parking) residential (“Building 2”) building will be constructed in place of the southeastern building. A new four-story (atop a two-story garage) residential building (“Building 4”) will be constructed in place of the northern one-story annex. Covered pedestrian access is intended to be provided between the three structures north of the Mill Brook. The Project intends to provide 130 dwelling units, including: 31 studios, 55 one-bedroom units, 31 two-bedroom units, and 13 three-bedroom units.

## SITE ACCESS, CIRCULATION, AND PARKING

Site access will be provided via Ryder Street to the west, Massachusetts Avenue to the south, and Quinn Road to the east. The TIR notes that the Site will be signed directing vehicles to enter via Mass Ave or Quinn Road and exit via Ryder Street. Both the Ryder Street and Mass Ave/Quinn Road driveways will allow two-way travel abutting uses.

- T1. Clarify how these signs will be implemented. Site Plans do not propose any changes for the Massachusetts Avenue driveway.
- T2. The Site Plan shows DO NOT ENTER markings for the Ryder Street Driveway, suggesting a one-way “Exit Only” condition. This is not replicated on Architectural Plans.

The existing 9-foot wide bridge over the Mill Brook between the Workbar and the Mill Buildings will be widened to accommodate two-way vehicle travel and a raised sidewalk.

Approximately 124 garage parking spaces are proposed (110 in the larger “Building 4” and 14 in the smaller “Building 2”). Garage entry points are proposed on the southwest side of “Building 4” and the northeast side of “Building 2.” Approximately 11 surface parking spaces are proposed, including three denoted as “short term.” This yields a total of 135 proposed parking spaces. The TIR noted that a total of 40 parking spaces are contracted to be shared use for the adjacent Workbar on weekdays and 10 on weekends. Architectural plans do not specify parking space dimensions, though they generally appear to have minimum dimensions consistent with the 8.5’ x 18’ specified in the Zoning Bylaws.

- T3. Garage parking aisles appear to be less than the required 24-foot width in some instances.
- T4. Clarify that vehicles can maneuver within the parking garages, including usage of the ramp and maneuverability for parking stalls closest to the entrance at Building 4.
- T5. Clarify whether parking garage will be gated and how access will be managed for tenants and Workbar tenants.
- T6. Clarify whether garage parking will be deeded per unit.
- T7. Clarify which spaces will be designed for Workbar tenants. Given the tight maneuvering spaces within the garages, these spaces should be accessible for higher turnover activity.
- T8. While peak Workbar activity is expected during normal business hours, it is noted that Workbar provides 24/7 access to members.
- T9. One accessible parking space is provided per the Site Plans within the “Short Term” parking area. This is not represented in the Architectural Plans. Zero accessible spaces are provided in the parking garages. Confirm the adequacy of the provided accessible spaces and define adequate accessible routes to both residential and the Workbar.

## TRAFFIC IMPACT REPORT REVIEW

The TIR was generally found to be prepared in accordance with MassDOT guidelines. Specific comments are presented herein.

### STUDY AREA

The study area includes the following intersections:

- Massachusetts Avenue at Appleton Street, Appleton Place, and a Commercial Driveway
- Massachusetts Avenue at Forest Street, Burton Street, and the Mirak Innovation Park West Driveway
- Massachusetts Avenue at Pine Court
- Massachusetts Avenue at Quinn Road
- Mirak Innovation Park West Driveway at Quinn Road
- Forest Street at Ryder Street and Peirce Street
- Ryder Street at Mirak Innovation Park Driveway

BETA finds the above study area to be appropriate. The TIR discussed roadway lane configurations, intersection geometry and control. The above discussion was found to be adequate, with the following notes:

- T10. Forest Street is classified as a collector roadway.
- T11. The intersection of Massachusetts Avenue at Appleton Street and Appleton Place provides a pedestrian activated traffic signal that operates under “flash” when not activated and steady “yellow/red” with “Walk/Don’t Walk” when activated. Per section 4E.06 of the MUTCD, pedestrian signal heads shall not be displayed when the vehicular traffic control signal is being operated in the flashing mode.

### PUBLIC TRANSPORTATION

Public transportation is available via subway/heavy rail and local bus service, both provided by the Massachusetts Bay Transportation Authority (MBTA). Subway service (Red Line) is provided at Alewife

Station approximately 3.5 miles to the southeast of the Site. Access to Alewife Station is provided by Route 2 (Concord Turnpike), Massachusetts Avenue, and the Minuteman Commuter Bikeway. Local bus service is provided via MBTA Route 67, MBTA Route 77, and MBTA Route 79. The Route 67 bus provides stops north of the Site along Summer Street. Route 77 and 79 provide stops along Massachusetts Avenue south of the Site. Bus services provide connections to Alewife Station and Harvard Square.

## **PEDESTRIAN AND BICYCLE FACILITIES**

Sidewalks were reported along both sides of the primary off-site study area roadways. The Site is accessible to the Minuteman Commuter Bikeway, a 10-mile paved trail between Bedford and Alewife Station. It is known that the Commuter Bikeway is heavily used for both commuting and recreational bicycle/pedestrian activity throughout the year. Massachusetts Avenue is noted to have shared lane markings.

- T12. 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.

## **TRAFFIC COUNT DATA**

Roadway traffic volume data was collected via Automatic Traffic Recorder (ATR) on Tuesday, February 4 and Wednesday, February 5, 2020 for Massachusetts Avenue, Mirak Mill Park West Driveway, Quinn Road, Forest Street, and Burton Street. The data collection generally found Massachusetts Avenue to be the primary corridor with an Average Daily Traffic (ADT) volume of 13,000. Traffic was generally found to travel westbound in the morning and eastbound in the evening. Forest Street was found to have an ADT of 4,000. Traffic was generally found to travel southbound in the morning and northbound in the evening.

- T13. The evening peak hour ATR volumes for Massachusetts Avenue could not be validated and appear low. Review and revise accordingly.
- T14. Backup ATR volume sheets for Burton Road show zero volume over the course of the day. Review and provided updated sheets as appropriate.

Turning movement counts (TMC) were collected on Tuesday, February 4, 2020 during the morning commuting (7:00-9:00 AM) and evening commuting (4:00-6:00 PM) periods. The peak hours were generally found to be between 7:30-8:30 AM and 5:00-6:00 PM.

It should be noted that traffic volume data was collected prior to the Governor's March 10, 2020 Declaration of a State of Emergency to Respond to COVID-19. The direct impact of COVID-19 on traffic volumes was not realized until March 2020.

### *SEASONAL ADJUSTMENT*

The collected ATR and TMC were evaluated for seasonal adjustment based on the MassDOT Seasonal Adjustment Factors Worksheet. The worksheet shows that volumes along principal arterials in the month of February are slightly lower (3%) than the average month. February volumes along other roadway types (collector, local, etc.) are generally consistent with the average month. For these purposes, the collected traffic volumes along Massachusetts Avenue were adjusted upwards by 3%, all other roadways were not adjusted. This methodology is in accordance with industry standards and applies to the discussion above.

## PARKING

A parking assessment was conducted on Wednesday, January 29<sup>th</sup> from 6:00-8:00 PM; Thursday, January 30<sup>th</sup> from 6:00-8:00 AM and 12:00-2:00 PM; and Saturday, February 1<sup>st</sup> from 9:00-11:00 AM. The parking assessment summarized the number of parked vehicles within the existing 76 space parking facility in half hour intervals. The peak parking demand was observed during weekday mid-day from 12:30-1:00 PM, at 52 vehicles (68%). The weekday morning, weekday evening, and Saturday morning observations all found parked vehicle demand of 5 or fewer vehicles. As the existing parking facility serves both the Workbar and the existing Mill Building office space, it was unclear which vehicles were associated with either use. This was estimated by applying the Institute of Transportation Engineers (ITE) *Parking Generation* methodologies for a 17,000 Square Foot "General Office Building" (Land Use Code 710). The ITE methodology found the Mill Building Office Space to generate a peak parking demand of 41 spaces. The TIR applied a 67% auto trip mode split to these 41 spaces to estimate that the Mill Building Office Space represented 28 of the observed 52 peak parking spaces, suggesting a peak Workbar parking demand of 24 spaces. The Applicant has agreed to provide shared parking for the proposed Residential uses and the Workbar, representing 40 weekday spaces and 10 evening and weekend spaces. Based on the above assessment, the TIR suggests the contracted shared parking is adequate for existing Workbar use.

- T15. It is generally assumed that the parking assessment was conducted in 2020.
- T16. Backup information for the parking assessment was not provided in the Appendix.
- T17. Clarify the occupancy of the Mill Building Office Space. Existing Site Plans show the Mill Buildings to be larger than 17,000 square feet. Should the building not be fully utilized, the parking demand would be lower, suggesting a higher proportion of Workbar usage.
- T18. The text and footnote on page 16 of the TIR references *Trip Generation, 10<sup>th</sup> Edition* instead of *Parking Generation, 5<sup>th</sup> Edition*.

In addition to the Site parking study, the TIR summarized parking utilization counts conducted in January and February 2020 at three nearby apartment complexes: The Legacy at Arlington Center, Brigham Square Apartments, and Arlington 360. This evaluation compared the parking supply, peak parking demand, and number of bedrooms for each complex to obtain a peak parking utilization rate of spaces per bedroom. These were averaged to approximately 0.55 spaces per bedroom.

- T19. The parking observations were conducted at different times on different days. The Legacy at Arlington Place (lowest ratio, 0.34) was conducted on a Saturday throughout the morning and mid-day hours, while the Arlington 360 (highest ratio, 0.76) was conducted in the mid-day hours on a weekday. The ITE *Parking Generation* rate for bedrooms is 0.75 on weekdays and 0.77 on weekends. This is more consistent with that observed at the Arlington 360 complex.
- T20. BETA generally concurs that parking demand would be lower with adequate connections to the commuter bikeway and the MBTA.

## SAFETY EVALUATION

The TIR summarized MassDOT Crash Data at study area intersections from 2017-2019. The exercise reported 10 crashes at Massachusetts Avenue and Appleton Street, 10 crashes at Massachusetts Avenue at Forest Street/Burton Street, and 12 crashes at Forest Street and Ryder Street/Peirce Street. Crash rates were calculated based on the collected turning movement counts, reported crash history, and K-Factors derived based on ATR data. It was determined that the Forest Street at Ryder Street/Peirce

Street intersection has a crash rate three times higher than the MassDOT Statewide and District 4 averages.

- T21. The TIR summarized crash data for 2018 and 2019, year which were not “closed” by MassDOT. This suggests that the data may not be complete. As of writing this letter, 2018 data is now finalized (“closed”). Typically, it is recommended to summarize the three most recent “closed” years.
- T22. BETA ran crash summaries for the study area intersections and found crash totals to be inconsistent from those presented in the TIR. Crash data backup was not provided in the TIR Appendix for reference. Recommend providing backup in the Appendix to support the table.
- T23. As noted in Comment T22, it is expected that the crash history for Forest Street at Ryder Street/Peirce Street is overstated and not representative of existing conditions. Reevaluate and revise as appropriate.
- T24. The notes for Table 6 of the TIR are not representative of the text and data presented in the TIR and Table.

A discussion of more recent crash history was discussed including a fatal crash involving a bicyclist at the intersection of Massachusetts Avenue and Appleton Street in May 2020 and a non-fatal vehicle crash at Massachusetts Avenue and Forest Street in June 2020. Unusual and complex intersection geometries and control were noted as safety concerns for the study area, though the TIR does not suggest the Project will negatively affect safety conditions.

### **SIGNAL WARRANT ANALYSIS**

A traffic signal warrant analysis was performed for the intersections of Massachusetts Avenue at Forest Street/Burton Street and Massachusetts Avenue at Quinn Road. This exercise found traffic volumes at the intersection of Massachusetts Avenue and Quinn Road were too low to satisfy any signal warrants, suggesting the installation of a traffic signal is not justified. Volumes for the intersection of Massachusetts Avenue at Forest Street/Burton Street meet Warrant 1, Warrant 2, and Warrant 3 suggesting the installation of a traffic signal is justified. The TIR noted that the Project does not have a significant impact on operating conditions that would warrant the installation of a traffic signal.

**Traffic signal warrants were not performed at the intersection of Massachusetts Avenue at Appleton Street and Appleton Place.** This intersection currently operates with a pedestrian activated traffic signal. While sufficient data is not available to evaluate Warrant 1 (8-Hour Volume), the intersection does meet Warrant 2 (4-Hour Volume) and Warrant 3 (Peak Hour Volume). The intersection does not currently meet Warrant 4 (Pedestrian Volume) as the pedestrian activity peaks in the 7:00 AM hour, albeit not high enough to meet the warrant, and drops significantly thereafter.

- T25. While the Project may not significantly increase traffic volumes through these intersections, activity will increase when accounting for increased vehicle, pedestrian, and bicycle travel to/from the Site. Recommend the Applicant offer safety related recommendations to improve conditions.

### **FUTURE NO-BUILD TRAFFIC CONDITIONS**

The TIR evaluated a five-year buildout to represent future year 2025. It was noted that the Arlington Master Plan projected a 0.33% per year background traffic growth rate between 2020 and 2030. To be conservative, the TIR applied a background growth rate of 2% per year for five years to the turning movement count volumes. Pedestrian volumes were not adjusted. While MassDOT guidelines typically

suggest a 7-year design horizon, BETA finds the background growth rate of 2% per year to be conservative. A recent study in Arlington used a 0.5% growth rate for seven years which represents a lower growth than 2% over five years. The above methodology is acceptable.

In addition to background growth, the TIR referenced a nearby 50-unit hotel development at 1207-1211 Massachusetts Avenue. This development was projected to generate 18 trips in the morning and 23 trips in the evening through the Study Area. For the purposes of the TIR, the Applicant assumed the Hotel trips would be captured as part of the 2% per year growth rate. BETA finds this methodology to be acceptable.

- T26. Figure 5 (2025-No-Build Peak Hour Volumes) of the TIR was found to have misrepresented volumes for some turning movements. In one intersection, volumes decreased when compared to the existing conditions. These discrepancies are not expected to dramatically change the conclusions of the report.

## PROPOSED FUTURE CONDITIONS

The TIR's discussion of the proposed Site was generally found to be in accordance with the *Architectural Drawings*. It is noted that these drawings do not contain the locations of signs or other traffic control measures. **See Comment T1 through Comment T8.**

- T27. Site access is to be provided via Quinn Road and the access road between Quinn Road and the site. Although these roadways exist today, they essentially serve as local access to abutting businesses, including Mirak Chevrolet, DeVito Funeral Home, and service facilities for Mirak Chevrolet and Mirak Hyundai. The Mirak Chevrolet dealership has head-in parking along the building with direct entry from Quinn Road. Provide commentary on how additional site-generated traffic will impact access and operations to Mirak Chevrolet and DeVito Funeral Home, and whether additional measures are necessary to accommodate, restrict, and/or delineate parking along Quinn Road serving both abutting businesses.

### PEDESTRIAN AND BICYCLE ACCOMMODATIONS

The TIR highlighted measures to improve safety for pedestrians and bicycles accessing the Site. This includes: a raised sidewalk with guardrail along the south side of the Ryder Street Driveway, raised sidewalk on the new (widened) Mill Brook bridge. The Project is intended to provide indoor bicycle parking for 100 bicycles and repair/maintenance stations.

- T28. See Comment T12. Off-site multimodal improvements should be considered to promote connectivity to Mass Ave and to the Minuteman Commuter Bikeway.

### TRIP GENERATION

Project generated trips were estimated based on ITE's *Trip Generation, 10<sup>th</sup> Edition*, for Land Use Code 710 – General Office Building and Land Use Code 221 – Multifamily Housing (Mid-Rise). Trips associated for the existing office use were estimated based on 17,000 square feet for the weekday morning and evening peak hours. This methodology found the existing office generates approximately 25 vehicle trips (21 enter/4 exit) in the morning and 26 vehicle trips (4 enter/22 exit) in the evening. A similar exercise was performed for the proposed Housing, representing 130 dwelling units, which found 47 vehicle trips (9 enter/38 exit) in the morning and 68 vehicle trips (46 enter/22 exit) in the evening. To determine the net new trips generated by the Project, the existing office trips were subtracted from the proposed housing trips. This yielded a net decrease in entering trips during the morning peak hour, and a net zero

increase in exiting trips in the evening peak hour. BETA generally finds this methodology to be in accordance with industry standards.

- T29. Backup calculations for Trip Generation were not appended for reference. Calculations for the Office use appear to utilize the “Peak Hour of Generator” which generates a larger number of trips than the “Peak Hour of Adjacent Street.” This represents a larger existing credit for proposed trips; recommend using “Peak Hour of Adjacent Street”. The calculations for housing trip generation could not be verified. Provide calculation backup for review.

*MODE SHARE*

The Town of Arlington 2015 Master Plan was used to incorporate modal split to the projected trip generation. The TIR noted that there has been a reduction in auto/car split since completion of the 2010 survey, given a smaller reliance on personal vehicles and a greater reliance on public transit and bicycling. For the purposes of the TIR, the Master Plan percentage for cars were reduced by 5% with corresponding increases in transit (2%) and bicycling (3%). See the summary table below.

Mode	Master Plan	TIR	Census Tract 3566.01
Car	72%	67%	74%
Transit	17%	19%	21%
Bike	2%	5%	1%
Walk	3%	3%	2%
Taxi	1%	1%	0%
Work From Home	5%	5%	2%

BETA compared these percentages with American Community Survey (ACS) data published by the US Census (2019) for Census Tract 3566.01 in Middlesex County, Massachusetts (the Site). The ACS data found bicycling, walking, taxi, and Work from Home to be lower than the Arlington Master Plan percentages, with slightly higher Car and Transit percentages.

- T30. Suggest using Census Tract data for application of mode share to determine vehicle trips. Census data is more recent than the 2015 Master Plan and suggests a 7% increase in car trips when compared to the TIR.

The TIR applied the Net Trip Generation to the modal split percentages assuming a vehicle occupancy ratio of 1.0. This is generally conservative and acceptable given the smaller number of generated net trips. The resulting car trips were found to be 15 (-8 entering/23 exiting) in the morning and 28 (28 entering/0 exiting) in the evening. This methodology was found to be in accordance with industry standards.

*TRIP DISTRIBUTION*

Trips were distributed through the study area network based on 60% to/from the East via Massachusetts Avenue, 25% to/from the West via Massachusetts Avenue, and 15% to/from the Southwest via Appleton Street. These percentages were based on the existing turning movements obtained in February 2020. BETA finds this methodology to be appropriate.

*TRIP ASSIGNMENT*

Trips were assigned to the Study Area network based on the distribution patterns discussed. Entering trips were assigned to Quinn Road (10%) and the Driveway opposite Burton Street (90%). Exiting volume



was distributed to the Ryder Street driveway (40%) and Quinn Road (60%). BETA finds this methodology to be appropriate.

T31. Clarify one-way or two-way operation of site driveways. See comments T1 and T2.

The 2025 Build Volume networks were obtained by applying the Trip Assignment to the 2025 No-Build volume networks. This methodology is in accordance with industry standards.

#### *PARKING GENERATION*

Future condition parking generation was evaluated based on rates from the Town of Arlington Zoning By-Laws, the Town of Arlington Master Plan, and the ITE *Parking Generation, 5<sup>th</sup> Edition*. The Zoning regulations specify a parking rate per unit type ranging from one space per studio to two spaces per three-bedroom. These rates result in a parking requirement of 167 spaces. The Master Plan specified a more general parking demand of 1.5 spaces per unit, resulting in 195 parking spaces. For ITE, parking demand was estimated based on 0.75 spaces per **bedroom**, resulting in 140 parking spaces. This was compared with the previously calculated rate of 0.55 spaces per bedroom, based on nearby residential developments, yielding a demand of 103 parking spaces.

T32. The 0.55 spaces per bedroom rate presented in Section 3.3 of the TIR does not definitely represent peak parking utilization of the three nearby complexes. Only one (Brigham Square Apartments) was counted at night, with the count ending at 8:00 PM. A count to determine peak parking utilization should be conducted during the late night or overnight hours. Recommend counting after 10:00 PM on a day other than Friday or Saturday. Demand rates should also consider if there are any vacant apartments at the comparable sites during the data collection period.

The proposed site is expected to provide 136 parking spaces, which was stated to be adequate in accordance with the 103 spaces calculated above. These will include the contracted 40 shared weekday spaces and 10 shared weekend spaces.

T33. Assuming an ITE Parking Generation based on Dwelling Units, the estimated parking demand would be 170 parking spaces. This is more consistent with that of the zoning by-laws. The by-laws do allow for a reduction in parking, provided adequate measures are provided to reduce personal vehicle reliance.

T34. Clarify the derivation of the 85% factor applied to weekday mid-day parking occupancy in Table 12.

T35. The peak parking rate for Arlington 360 was determined as 0.76 spaces per bedroom during a weekday mid-day. Application of this rate to the Project Site would result in a weekday mid-day demand of 142 spaces for residents alone, before considering the 40 spaces to be designated for Workbar tenants, which would result in a need for 182 parking spaces. Provide commentary clarifying why demand characteristics of the Project Site will differ from those of Arlington 360 or other comparable sites. Even at a rate of 0.55 spaces per bedroom during mid-day hours, the 103 space demand stated in the TIR plus the 40 spaces designated for Workbar results in a net deficit of 7 spaces.

#### *CONSTRUCTION MANAGEMENT*

The TIR stated that construction will not result in long term detours, closures, or impact to pedestrian accessibility.

T36. A construction management plan should be provided for review.

## TRAFFIC OPERATIONS

Intersection Level of Service (LOS) operations were evaluated with Synchro software based on HCM 2000 methodology for unsignalized intersections given the unique intersection configurations. The Massachusetts Avenue intersections of Appleton Street and Forest Street both contain more than four legs. Program limitations do not support analyzing these conditions. As such, intersections were broken into two closely spaced unsignalized intersections. There were no proposed or existing traffic signal intersections. While the intersection of Massachusetts Avenue at Appleton Street does provide a pedestrian signal, it was not analyzed as such. This methodology is generally acceptable. **The analysis was calibrated by reducing the critical gap times for various movements to reduce the calculated average delay per vehicle. It was stated that this more accurately represents field observed conditions. While this practice is generally accepted, it is difficult to verify. Critical gaps were reduced to a minimum of approximately 3 seconds but varied by approach and condition.**

- T37. Recommend these calibrations stay consistent for all conditions (existing, no-build, and build) to accurately represent the change in delays and queues as a reflection of changing volume.

Under existing conditions, all approaches were found to operate with LOS C or better with the exception of Appleton Street (LOS E in the morning and LOS D in the evening) and Forest Street (LOS F in the morning). Traffic growth was found to degrade Appleton Place from LOS C to LOS D and Appleton Street from LOS E to LOS F in the morning peak hour with minor increases in delays and queues. Forest Street continued to operate with LOS F, seeing more significantly increased delays ( $\pm 63$  seconds per vehicle) and queues ( $\pm 130$  feet) in the morning. Weekday morning peak hour conditions slightly improved at the intersection of Massachusetts Avenue and Appleton Street as a result of the Project. It is expected that this is due to a slight reduction in volume entering the Site in the morning, coupled with variable critical gap calibrations. All other results generally stayed consistent with the No-Build analysis, resulting in increases of delay  $\pm 1-5$  seconds.

- T38. Verify how the delays and LOS were combined for the five-legged intersections. It is expected that the delays were summed among common movements, though the reported values in Table 14, Table 15, and Table 16 do not match those reported in the Appendix. This is more specific to the morning peak hour analysis.
- T39. The reported Operations Summary Tables were found to vary slightly from results presented in the Appendix. The discrepancies are unclear, but generally do not affect the conclusions as reported.
- T40. There are two missing 2025 Build Analysis worksheets in the Appendix. Provide for reference.

## TRANSPORTATION DEMAND MANAGEMENT (TDM)

The Project is intended to provide on-site supply of transit information as well as develop a TDM plan in accordance with the Town. The following are proposed examples of TDM measures:

- Provide Orientation Packets to tenants and residents
- Provide interior and exterior bicycle storage, and repair workstations
- Explore electric vehicle charging stations
- Explore providing shared car service (e.g. zipcar)
- Establish a transportation coordinator
- Develop a Project website to disseminate information

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- Develop a Transportation Monitoring Program to evaluate the TDM's effectiveness

BETA supports the development of a successful TDM. Coordination should be provided with the Town regarding implementation.

## GENERAL COMMENTS

T41. A sight distance evaluation should be provided.

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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cc: Douglas W. Heim, Arlington Town Counsel  
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