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Department of Planning and Community Development
333 Washington Street
Brookline, MA 02445

From: James. D. Fitzgerald, P.E., LEED AP

Date: August 15, 2017

Subject: 111 Cypress Street, Brookline (40B)
Traffic Peer Review

In general, the June 2017 Traffic Impact Assessment (TIA) by Vanasse & Associates, Inc. (VAI) for the proposed development located at 111 Cypress Street in Brookline, Massachusetts has been prepared in a professional manner, consistent with standard engineering practices with the exception of the issues identified below.

The Memorandum provides the number of anticipated trips generated by the proposed apartments as well as a sight distance evaluation. The following is a summary of Environmental Partners Group's (EPG's) traffic review of available documents. A review of proposed parking and has been provided under separate cover by Walker Parking Consultants.

Existing Conditions

Cypress Street travels in a general north-south direction and is classified as an urban minor arterial. In the vicinity of the project the roadway consists of one travel lane in each direction, separated by a double yellow centerline. In the vicinity of the project site, the roadway is 30 to 34 feet wide with bicycle ðsharrowö pavement markings and a short segment of bicycle lane in the southbound direction; a cement concrete sidewalk is located along each side. Within the study area, on-street parking is prohibited along Cypress Street except for two (2) loading zone spaces and five (5) metered parking spaces along the east side, north of Brington Road. Within the vicinity of the site, southbound Cypress Street is posted at 25 mph. Land use along Cypress Street consists of residential and commercial properties.

Brington Road is a primarily residential roadway that travels in a circuitous route between Boylston Street (Route 9) and Cypress Street, intersecting Cypress Street to form an unsignalized T-intersection with STOP sign control along Brington Road. ðDo Not Blockö pavement markings and signage are provided along southbound Cypress Street at the intersection. Brington Road is classified as a local road and provides one travel lane in each direction. It is 22 to 24 feet wide and has no pavement markings. Cement concrete sidewalks run along each side of the road with grass strips along much of the road. On-street parking is permitted on the south/east side of the street except where posted otherwise. There is no posted speed limit.

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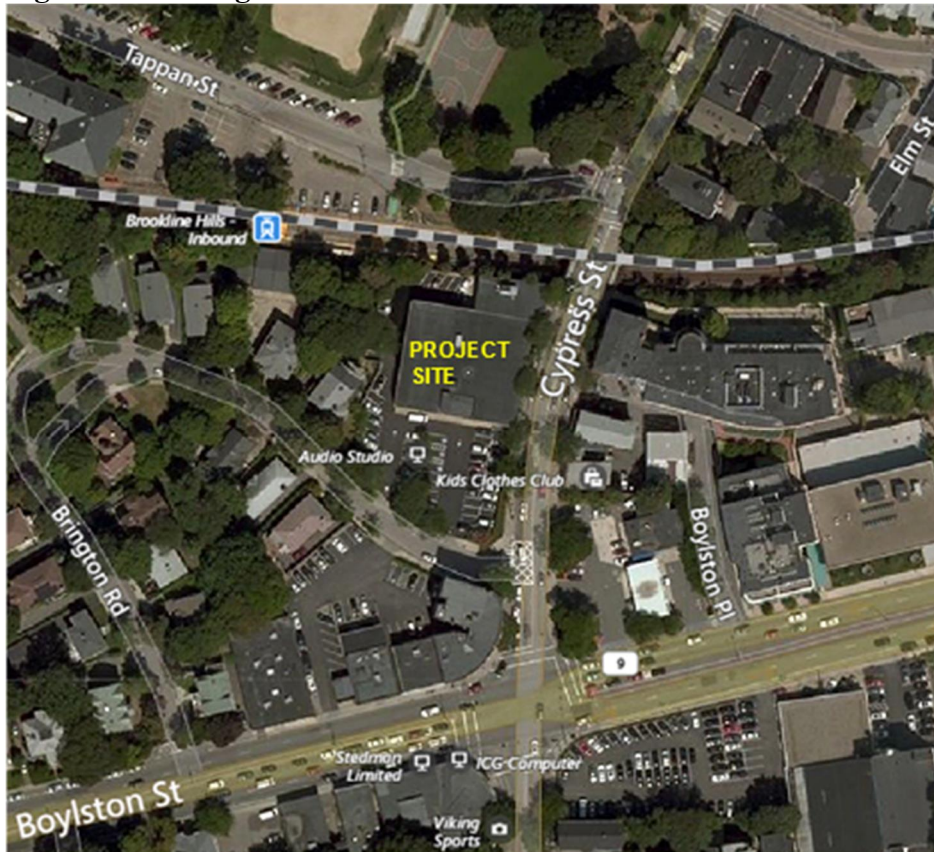
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Boylston Street (Route 9) travels primarily in an east-west direction and is classified as an urban principal arterial. In the vicinity of the project the roadway consists of two travel lanes in each direction, separated by a raised concrete median. Land use along Boylston Street consists primarily of residential and commercial properties. Cement concrete sidewalks are provided along both sides of Boylston Street.

The project site is located at 107-111 Cypress Street, on the northwestern corner of the Brington Road at Cypress Street intersection. A two (2) story office building and parking lot currently occupy the parcel. The existing project site is shown in Figure 1.

Figure 1: Existing Conditions



The Project site consists of approximately 0.91-acres of land and is bounded by the Massachusetts Bay Transportation Authority (MBTA) Green Line tracks to the north. The MBTA Green Line (D Branch) has a local stop at Brookline Hills ó a walking distance of approximately 200 feet from the project site via Tappan Street (a 2 minute walk).

The MBTA also operates fixed-route bus services for Route 60 along Boylston Street and Cypress Street (south of Route 9) with a bus stop 380 feet south of the site at the Cypress Street/Milton Street intersection (towards Kenmore Station) and a stop 800 feet westerly at the Boylston Street at Clark Road intersection (towards Chestnut Hill). Also a bus stop for Route 51 is located at the Tappan Street/Greenough Street intersection, approximately 930 feet to the west of the site.

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Proposed Project

The proposed project entails the removal of the existing two (2) story office building and the proposed construction of a residential apartment community to be known as Cypress Apartments at Brookline Hills. The development will consist of 99 apartment units and on-site parking will be provided for 66 vehicles consisting of both surface parking (5 spaces) and garage spaces (61 spaces) beneath the proposed building. The ratio of parking spaces per unit has been commented on under separate cover by Walker Parking Consultants.

Access to 107-111 Cypress Street will be provided by way of the westernmost driveway that currently serves as a one-way entrance to the Project site and intersects the north side of Brington Road west of Cypress Street. This westernmost driveway will be reconstructed to provide full access to the Project site. Opposite this access point, a curb extension is located along the southern side of Brington Road, narrowing the roadway width to only approximately 16 feet. As a result the bump-out is proposed to be relocated westerly. The existing easternmost driveway on Brington Road (one-way exit) will be closed.

Existing Traffic Volumes

The following study intersections were included in the study:

- Cypress Street at Davis Avenue
- Cypress Street at Tappan Street
- Cypress Street at Brington Road
- Boylston Street at Cypress Street
- Boylston Street at Brington Road

Traffic data was collected at the study intersections and roadways in March 2017 while public schools were in session. MassDOT data indicates that the month of March carries slightly greater than average traffic volumes; no seasonal adjustment factors were used to lower traffic volumes to an average month in order to remain slightly conservative.

In Table 2 (Existing Traffic Volumes), for the weekday morning at Brington Road, west of Cypress Street, a typo of 33 vehicles per hour is listed. It was intended to be 53 vehicles per hour per Figure 3 (2017 Existing Weekday Morning Peak Hour Traffic Volumes).

Spot Speed Measurements

A typo exists in Table 3 (Vehicle Travel Speed Measurements), indicating two "Northbound" columns while one should read "Southbound."

The 85th percentile travel speeds along Brington Road and Cypress Street within the vicinity of the site were found to be relatively low- 22 to 23 mph along Cypress Street (consistent with the posted speed limit) and 19 mph along Brington Street.

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Existing Pedestrian and Bicycle Volumes

A significant amount of pedestrian traffic exists adjacent to the site with 258 pedestrians counted crossing the western Brington Street approach to Cypress Street during the morning peak hour. Since these counts were performed during winter months (March), it is likely that the pedestrian and bicycle volumes are greater during the warmer times of year.

Despite existing sharrow and bicycle lane pavement markings along Cypress Street, light bicycle volumes were counted at the study intersections. 11 to 12 cyclists were counted along Cypress Street adjacent to the site during both the peak morning and evening hours.

Parking

Parking demand observations were made along Brington Road and Cypress Street from 7:00 to 9:00 am and from 2:00 to 6:00 pm during a weekday in March. On-street parking along Brington Road was observed from Cypress Street all the way to its connection with Route 9 to the west. Parking was full or near full during half of the morning observation period, from 8:00 to 9:00 am, and during the afternoon observation period from 2:00 to 3:30 pm. Parking along Cypress Street was full or nearly full towards the end of the morning observation period (8:30 to 9:00 am) and during the entire afternoon observation period when additional vehicles were parked (illegally).

An assessment of parking availability and needs has been included under separate cover by Walker Parking Consultants.

Intersection Safety

The report included a review of crash data provided by the MassDOT Highway Division Safety Management/Traffic Operations Unit for the five year period of 2010 to 2014. The crash rate at each of the study intersections were found to be lower than the State or local district averages; no fatalities were recorded. None of the locations were found to be within the State's Highway Safety Improvement Program (HSIP) listing of high crash locations. The town may consider asking the proponent to review crash data from the Brookline Police Department to verify MassDOT crash history at the Cypress Street at Brington Road intersection that shows only one crash during the five year period.

Trip Generation

The report references historical data was found to show a 0.2% decrease in traffic volumes over the past several years. In an effort to remain conservative, existing traffic volumes were projected the required 7 years to 2024 using an assumed background growth rate of 1% per year. While a 0.5% per year growth rate in this instance would have been adequate, the 1% per year growth rate is accepted as conservative.

Additional traffic volumes were also included to reflect individual substantial developments anticipated in the area. These developments included: Children's Hospital Medical Office Building (2 and 4 Brookline Place); Age-Qualified Apartment Community (1180 Boylston

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Street); Brookline Avenue Hotel (700 Brookline Avenue); and Audi of Brookline (308 Boylston Street).

A reduction in anticipated site generated traffic was assumed given the proximity to transit opportunities and general mode splits in the Town of Brookline. The methodology referenced in the report includes census data from 2011-2015 American Community Survey 5-Year Estimates for Brookline showing the distribution of people who carpool (5.4%), use public transportation (28.6%), walk (16.5%), bike (4.5%), use alternate means (1%) and work from home (6.8%). The applicant ultimately used a 30% reduction in site generated trips to account for transit, and an additional 5% reduction for pedestrian trips and 5% reduction for bicycle trips, a lower total reduction than the survey data. Given the proximity of the MBTA Green Line station and bus stops, these values appear to be reasonable and are conservative compared to the census data.

Anticipated site generated trips were projected using the Institute of Transportation Engineers' (ITE) Trip Generation Manual. Land Use Code (LUC) 220 "Apartment" was used to generate trips for the proposed development. According to ITE, "apartments are rental dwelling units located within the same building with at least three other dwelling units." The proposed site is anticipated to generate 434 vehicles per day, 32 vehicles during the morning peak hour and 43 vehicles during the evening peak hour (after accounting for the above noted reduction for mode split).

A comparison was provided of traffic that could be generated by the existing office space assuming *complete occupancy*. Land Use Code 710 "General Office Building" was used to estimate the number of trips that the existing office building generates. Based on this evaluation, the office space could generate 500 vehicles per day, 69 vehicles during the morning peak hour and 66 vehicles during the evening peak hour. (The methodology used for the evening peak hour varied from the ITE fitted curve equation but was more conservative, resulting in fewer existing trips generated by the current usage.) However, no reduction was applied to the office trip generation to account for the same mode split used for the apartment trip generation, accounting for transit, pedestrian and bicycle trips. In order to accurately compare trips between the existing usage and proposed development, mode split should be taken into consideration or traffic counts should be provided at the site driveways accessing the existing parking lot.

Traffic Operations

Traffic analysis was performed to compare the future 2024 No-Build to the 2024 Build, reflecting the proposed residential trips.

- Evaluations show that the Cypress/Tappan intersection will continue to operate at the same Level of Service (LOS) during the morning and evening peak hours (evaluated to be LOS B and A respectively without accounting for queues extending from Route 9).
- Evaluations show that the Cypress/Davis intersection will continue to operate at the same LOS during the morning and evening peak hours (evaluated to be LOS B and A respectively).
- During the existing morning peak hour, the Cypress/Boylston intersection operates as a LOS E under existing conditions and under 2024 No-Build conditions. Under 2024 Build conditions, the intersection delay increased by 6 seconds, just enough to degrade the

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intersection to a LOS F. During the evening peak hour, the intersection currently operates at a LOS D; it will operate as a LOS E under 2024 No-Build and Build conditions with a difference in delay of only 1 second. The proponent proposes to mitigate operations at the intersection by optimizing the traffic signal timing, altering signal phasing timing by up to 3 seconds.

- Based on the analysis, an increase in delay and queues can be found along the unsignalized Brington Road approach to Cypress Street between the 2024 No-Build and Build conditions as a result of the projected site generated traffic (21 vehicles in the morning peak hour and 12 vehicles in the evening peak hour). The analysis reflects an increase of 21 seconds in delay and queues by 2 vehicles along the Brington Road approach during the morning peak hour (a change from LOS E to F), and 6 seconds in the delay and 1 vehicle queue during the evening peak hour (a change from LOS D to E). However the methodology used does not incorporate a reduction to account for the existing office usage being eliminated and therefore is conservative.
- The unsignalized intersection of Boylston Street at Brington Road sees negligible increases in delay.
- The proposed site driveway on Brington Road will operate at a LOS A.

Some minor discrepancies were made in Tables 11 and 12 that do not reflect the provided Synchro analysis. Clarification is not required.

Sight Distance

Sight distance was reviewed for the intersections of Brington Road at the project driveway and for Cypress Street at Brington Road. Sight distance calculations were performed using the American Association of State Highway and Transportation Officials (AASHTO) guidelines. Intersection Sight Distance (ISD) is the sight distance required by a driver entering or crossing an intersecting roadway to perceive an oncoming vehicle and safely complete a turning or crossing maneuver. Stopping Sight Distance (SSD) is the distance required for a vehicle traveling at the design speed of a roadway to stop prior to striking an object in its travel path. According to AASHTO, "if the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions."

Minimum stopping sight distance requirements are met at the site drive approach to Brington Road assuming obstructions are not installed within the landscaped corners of the driveway. Zoning bylaw requirements for sight distance to pedestrians appear to be met.

At the Cypress Street/Brington Road intersection, site distance is limited by the short (100 foot) distance between Cypress Street's intersection with Route 9 and Brington Road as well as queued vehicles approaching the Route 9 traffic signal. Although pavement markings and "do not block the box" signage exists to direct drivers to not block access at the intersection along the southbound Cypress Street lane, it is frequently not obeyed, further impacting visibility for vehicles approaching from Brington Road. (It is also a challenge for Brington Road vehicles turning right onto Cypress Street to turn left or straight at the Route 9 intersection due to the exclusive right turn lane and queued vehicles.) The short length of Cypress Street between Brington Road and Route 9 and the presence of queued vehicles clogging the intersection result

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in inadequate sight distance from the Brington Road approach looking to the south. This however is a condition that exists today and a frequent challenge for urban communities. Additional treatments at the intersection such as installing a larger Manual on Uniform Traffic Control Devices (MUTCD) compliant "Do Not Block Intersection" sign and improved pavement markings are proposed by the proponent.

Pedestrian Accommodations

The project is anticipated to result in 20 pedestrian trips during the morning peak hour and 28 pedestrian trips during the evening peak hour. As a result, mitigation is proposed by the proponent to include ADA-compliant sidewalk improvements "as may be necessary" adjacent to the project site along Brington Road and Cypress Street. It is recommended that construction limits be clarified.

At the Cypress Street/Brington Road intersection, the proponent proposes to install ADA-compliant wheelchair ramps and to reapply/upgrade pavement markings (intersection box, "do not block" legend, stop line and cross walks) and MUTCD-complaint signage ("Do Not Block Intersection" sign and "Stop" sign).

At the Cypress Street/Tappan Street intersection, the proponent proposes to replace wheelchair ramps and traffic signal equipment where non-ADA compliant ramps or equipment exist. Verification that this will include providing Accessible Pedestrian Signals (APS) and countdown pedestrian heads is requested.

Bicycle

The project is anticipated to generate a minor number of bicycle trips (3 bicycle trips during the morning peak hour and 4 during the evening peak hour).

On-site bicycle storage has been shown on the site plan.

Transit

The report documents anticipated transit trips generated by the site (17 during the morning peak hour and 24 during the evening peak hour) and the total capacity for the Green Line D Branch. However it appears that current ridership and the number of available seats should be referenced to support the statement that the "capacity is sufficient to accommodate the modest increase in peak-hour ridership that is expected as a result of the Project".

The TIA indicates that alternative transportation will be promoted in a number of ways such as posting maps, schedules and fare information in a central location, and providing information on commuter options available through MassRIDES and their NuRide and Emergency Ride Home (ERH) programs.

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Site Driveway

The plan shows proposed alteration to the existing bump-out (curb extension) located on the southern side of Brington Road, opposite the proposed site driveway. The bump-out is proposed to be relocated just west of the proposed driveway. A driveway is located in what appears to be the proposed bump-out location, requiring the bump-out to be shifted further west which will impact on-street parking.

The site driveway is proposed to meet the zoning requirements of minimum 20 foot width for two-way access or as required to accommodate the turning and maneuvering requirements of the largest anticipated responding emergency vehicle as defined by the Town of Brookline Fire Department. It appears that the driveway opening as shown will restrict passenger vehicles (and larger vehicles) from turning right from the site driveway given the relocated bump-out or on-street parking. Vehicle templates are requested for review.

Trash Pickup/Loading Zone

It is unclear where trash pick-up and loading will take place for the development. Clarification is requested.

Summary

- Observations of on-street parking show full or near full conditions during much of the morning and afternoon observation periods. The ratio of parking spaces per unit has been commented on under separate cover by Walker Parking Consultants.
- In order to accurately compare trips between the existing office usage and proposed apartment development, office mode split should be taken into consideration or traffic counts should be provided at the site driveways accessing the existing office parking lot.
- The proponent proposes to mitigate operations at the Cypress/Boylston intersection by optimizing the traffic signal timing, altering signal phasing timing.
- Based on the analysis, an increase in delay and queues can be found along the unsignalized Brington Road approach to Cypress Street between the 2024 No-Build and Build conditions as a result of the projected site generated traffic (21 vehicles in the morning peak hour and 12 vehicles in the evening peak hour). The analysis reflects an increase of 21 seconds in delay and queues by 2 vehicles along the Brington Road approach during the morning peak hour (a change from LOS E to F), and 6 seconds in the delay and 1 vehicle queue during the evening peak hour (a change from LOS D to E). However the methodology used is conservative and does not incorporate a reduction to account for the existing office usage being eliminated.
- The town may consider asking the proponent to review crash data from the Brookline Police Department to verify the evaluated MassDOT crash history at the Cypress Street at Brington Road intersection that showed only one crash in five years.

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- At the Cypress Street/Brington Road intersection, site distance is limited by the short (100 foot) distance between Cypress Street's intersection with Route 9 and Brington Road as well as queued vehicles approaching the Route 9 traffic signal. Although pavement markings and do not block the box's signage exists to direct drivers to not block access at the intersection along the southbound Cypress Street lane, it is frequently not obeyed, further impacting visibility for vehicles turning left from Brington Road. The short length of Cypress Street between Brington Road and Route 9 and the presence of queued vehicles clogging the intersection result in inadequate sight distance from the Brington Road approach looking to the south. This however is a condition that exists today and a frequent challenge for urban communities. The proponent proposes to install ADA-compliant wheelchair ramps and to reapply/upgrade pavement markings (intersection box, do not block legend, stop line and cross walks) and MUTCD-complaint signage (Do Not Block Intersection sign and Stop sign).
- Mitigation is proposed by the proponent to include ADA-compliant sidewalk improvements as may be necessary adjacent to the project site along Brington Road and Cypress Street. It is recommended that construction limits be clarified.
- At the Cypress Street/Tappan Street intersection, the proponent proposes to replace wheelchair ramps and traffic signal equipment where non-ADA compliant ramps or equipment exist. Verification that this will include providing Accessible Pedestrian Signals (APS) and countdown pedestrian heads is requested.
- The proponent has committed that alternative transportation will be promoted in a number of ways such as posting maps, schedules and fare information in a central location, and providing information on commuter options available through MassRIDES and their NuRide and Emergency Ride Home (ERH) programs.
- The plan shows proposed alteration to the existing bump-out (curb extension) located on the southern side of Brington Road, opposite the proposed site driveway. The bump-out is proposed to be relocated just west of the proposed driveway. A driveway is located in what appears to be the proposed bump-out location, requiring the bump-out to be shifted further west which will impact on-street parking.
- The site driveway is proposed to meet the zoning requirements' minimum 20 foot width for two-way access. However it appears that the driveway opening as shown will restrict passenger vehicles (and larger vehicles) from turning right from the site driveway given the relocated bump-out or on-street parking. Vehicle templates are requested for review.
- Minimum stopping sight distance requirements are met at the site drive approach to Brington Road assuming obstructions are not installed within the landscaped corners of the driveway.
- It is unclear where trash pick-up and loading will take place for the development. Clarification is requested.