

Ref: 7276

April 26, 2019

Ms. Rachna D. Balakrishna  
Mason & Murphy, Inc.  
1299 Beacon Street  
Brookline, MA 02446

Re: Supplemental Traffic Information  
1180 Boylston Street  
Brookline, Massachusetts

Dear Rachna:

Vanasse & Associates, Inc. (VAI) has provided supplemental traffic information with respect to the proposed mixed-use development located at 1180 Boylston Street in Brookline, Massachusetts. Since the time of the 2019 approval, the development proposed has been modified. The number of units has increased from 45 to 50 units and the retail space has been increased from 5,300 sf to 6,424 sf. Access and egress will remain off Boylston Street. The number of parking spaces has been increased from 69 to 70 and the 24-hour valet service has been eliminated due to the parking now being all self-park. The purpose of this letter is to update the traffic generation and accident data and review the condition of approval with respect to traffic.

### **PROJECT-GENERATED TRAFFIC**

The project entails the development of 50 age-restricted (55+) apartments and 6,424 sf of retail space. In order to develop the traffic characteristics of the proposed project, trip-generation statistics published by the Institute of Transportation Engineers (ITE)<sup>1</sup> for LUC 252, Senior Adult Housing - Attached and LUC 820, Shopping Center were used to develop the traffic characteristics of the project. It should be noted that since the project approval in 2017, a new Trip-Generation Manual has been published. The site was previously a gas station and the Project trips were compared to the trip generation from LUC 944, Gasoline/Service Station. Vehicle trip estimates were adjusted to account for transit trips, walk trips, and pass-by trips for the retail use. A summary of the expected vehicle trip generation is summarized in Tables 1-3.

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<sup>1</sup>*Trip Generation Manual*, Tenth Edition; Institute of Transportation Engineers; Washington, DC; 2017.

**Table 1**  
**TRIP GENERATION SUMMARY: RETAIL**

Time Period	6,424 sf		Vehicle Trips						
	Retail Trips <sup>a</sup>	Occupancy <sup>b</sup>	Person Trips	Transit Trips (5%) <sup>b</sup>	Walk Trips (30%) <sup>b</sup>	New Person Trips	New Vehicle Trips	Pass-By Trips (25%)	New Vehicle Trips
Average Weekday Daily Traffic	242	1.78	430	22	130	278	156	40	116
<i>Weekday Morning</i>									
<i>Peak Hour:</i>									
Entering	10	1.78	18	1	5	12	7	1	6
Exiting	<u>6</u>	1.78	<u>10</u>	<u>0</u>	<u>3</u>	<u>7</u>	<u>4</u>	<u>1</u>	<u>3</u>
Total	16	1.78	28	1	8	19	11	2	9
<i>Weekday Evening</i>									
<i>Peak Hour:</i>									
Entering	23	1.78	41	2	12	27	15	4	11
Exiting	<u>24</u>	1.78	<u>43</u>	<u>2</u>	<u>13</u>	<u>28</u>	<u>16</u>	<u>4</u>	<u>12</u>
Total	47	1.78	84	4	25	55	31	8	23

<sup>a</sup>Based on ITE LUC 820, Shopping Center.

<sup>b</sup>Based on Traffic Analysis Zone 752 data obtained from Central Transportation Planning Staff.

**Table 2**  
**TRIP GENERATION SUMMARY: RESIDENTIAL**

Time Period	Residential		Person Trips	Transit Trips (28.7%) <sup>c</sup>	Walk Trips (11.4%) <sup>c</sup>	Vehicle Trips	
	Trips <sup>a</sup>	Occupancy <sup>b</sup>				New Person Trips	New Vehicle Trips
Average Weekday Daily Traffic	186	1.1	204	58	24	122	110
<i>Weekday Morning Peak Hour:</i>							
Entering	4	1.1	4	1	0	3	3
Exiting	<u>6</u>	1.1	<u>7</u>	<u>2</u>	<u>1</u>	<u>4</u>	<u>3</u>
Total	10	1.1	11	3	1	7	6
<i>Weekday Evening Peak Hour:</i>							
Entering	7	1.1	8	2	1	5	4
Exiting	<u>6</u>	1.1	<u>6</u>	<u>2</u>	<u>0</u>	<u>4</u>	<u>4</u>
Total	13	1.1	14	4	1	9	8

<sup>a</sup>Based on ITE LUC 252, Senior Adult Housing - Attached.

<sup>b</sup>Based on Traffic Analysis Zone 752 data obtained from Central Transportation Planning Staff.

<sup>c</sup>Based on journey to work data for Brookline obtained from the United States Census Bureau in 2000.



**Table 3**  
**TRIP GENERATION COMPARISON**

Time Period	Residential Trips (A)	Retail Trips (B)	Total New Trips (A+B)	Gas Station Trips <sup>a</sup> (C)	Trip Reduction C-(A+B)
Average Weekday Daily Traffic	110	156	266	1,376	1,110
<i>Weekday Morning Peak Hour:</i>					
Entering	3	7	10	41	31
<u>Exiting</u>	<u>3</u>	<u>4</u>	<u>7</u>	<u>41</u>	<u>34</u>
Total	6	11	17	82	65
<i>Weekday Evening Peak Hour:</i>					
Entering	4	15	19	56	37
<u>Exiting</u>	<u>4</u>	<u>16</u>	<u>20</u>	<u>56</u>	<u>36</u>
Total	8	31	39	112	73

<sup>a</sup>Based on ITE LUC 944, Gasoline/Service Station. This was the previous land use located on the Project site.

As can be seen in Table 3, the Project is expected to generate approximately 266 vehicle trips on an average weekday (two-way, 24-hour volume, or 133 vehicles entering and 133 exiting), with approximately 17 vehicle trips (10 vehicles entering and 7 exiting) expected during the weekday morning peak-hour. During the weekday evening peak hour the Project is expected to generate approximately 39 vehicle trips (19 vehicles entering and 20 exiting). The land uses are expected to result in a reduction of trips compared to the previous land use (a gas station with 8 pumps). On an average weekday that reduction is 1,110 vehicle trips (555 entering and 555 exiting). During the morning peak hour that reduction is 65 vehicle trips (31 entering and 34 exiting) and during the evening peak hour that reduction is 73 vehicle trips (37 entering and 36 exiting).

### **MOTOR VEHICLE CRASH DATA**

Motor vehicle crash information for the study area intersections was provided by the MassDOT Safety Management/Traffic Operations Unit for the most recent five-year period available (2012 through 2016) in order to examine motor vehicle crash trends occurring within the study area. The data is summarized by intersection, type, pavement condition and severity in Table 4.



**Table 4**  
**MOTOR VEHICLE CRASH DATA SUMMARY<sup>a</sup>**

Scenario	Boylston Street (Route 9) at Hammond Street	Hammond Street at Heath Street
<i>Year:</i>		
2012	5	0
2013	4	1
2014	5	0
2015	3	1
<u>2016</u>	<u>12</u>	<u>1</u>
Total	29	3
Average <sup>a</sup>	5.80	0.60
Crash Rate <sup>b</sup>	0.37	0.11
Significant	No	No
<i>Type:</i>		
Angle	8	2
Rear-End	12	0
Head-On	2	0
Sideswipe	4	1
Fixed Object	2	0
<u>Other</u>	<u>1</u>	<u>0</u>
Total	29	3
<i>Pavement Conditions:</i>		
Dry	23	3
Wet	5	0
Snow/Ice	1	0
<u>Unknown/ Other</u>	<u>0</u>	<u>0</u>
Total	29	3
<i>Severity:</i>		
Property Damage Only	16	2
Personal Injury	12	1
Fatality	0	0
<u>Unknown</u>	<u>1</u>	<u>0</u>
Total	29	3

<sup>a</sup>Average crash over five-year period.

<sup>b</sup>Crash rate per million entering vehicles (mev).

Source: MassDOT Crash Data, 2012 through 2016.

As can be seen in Table 4, the intersection of Boylston Street at Hammond Street experienced a total of 29 accidents reported at the intersection over the five-year review period, averaging 5.8 accidents per year. The majority of the accidents were rear-end collisions (12 out of 29), occurred on dry pavement (23 out of 29), and resulted in property damage (16 out of 29). Hammond Street at Heath Street experienced a total of 3 accidents reported at the intersection over the five-year review period, averaging 0.60 accidents per year. No fatalities were reported at the study area intersections over the five-year review period. All of the study intersections were found to have a motor vehicle crash rate below the MassDOT average for the District 6 the district in which the project is located.



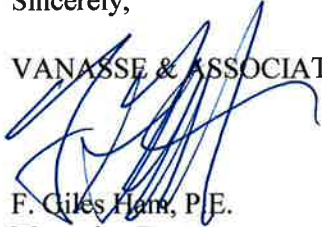
**ZONING BOARD DECISION – MARCH 23, 2017**

All of the Zoning Board Conditions with respect to Traffic Mitigation (Section 14(a)-(q)) shall remain valid as a condition of the modified project approval.

If you should have any questions or require additional information, please feel free to contact me.

Sincerely,

VANASSE & ASSOCIATES, INC.



F. Giles Ham, P.E.  
Managing Partner

FGH/mef

## APPENDIX

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### TRIP-GENERATION

TRIP-GENERATION

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**Institute of Transportation Engineers (ITE)**  
**Trip Generation, 10th Edition**  
**Land Use Code (LUC) 252 - Senior Adult Housing - Attached**

Average Vehicle Trips Ends vs: Dwelling Units  
Independent Variable (X): 50

**AVERAGE WEEKDAY DAILY**

$$T = 3.70 * (X)$$

$$T = 3.70 * 50$$

$$T = 185.00$$

$$T = 186 \text{ vehicle trips}$$

with 50% ( 93 vph) entering and 50% ( 93 vph) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 0.20 * (X)$$

$$T = 0.20 * 50$$

$$T = 10.00$$

$$T = 10 \text{ vehicle trips}$$

with 35% ( 4 vph) entering and 65% ( 6 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 0.26 * (X)$$

$$T = 0.26 * 50$$

$$T = 13.00$$

$$T = 13 \text{ vehicle trips}$$

with 55% ( 7 vph) entering and 45% ( 6 vph) exiting.

**SATURDAY DAILY**

$$T = 3.23 * (X)$$

$$T = 3.23 * 50$$

$$T = 161.50$$

$$T = 162 \text{ vehicle trips}$$

with 50% ( 81 vph) entering and 50% ( 81 vph) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

$$T = 0.33 * (X)$$

$$T = 0.33 * 50$$

$$T = 16.50$$

$$T = 17 \text{ vehicle trips}$$

with 62% ( 11 vph) entering and 38% ( 6 vph) exiting.<sup>1</sup>



**Institute of Transportation Engineers (ITE)**  
**Trip Generation, 10th Edition**  
**Land Use Code (LUC) 944 - Gasoline/Service Station**

Average Vehicle Trips Ends vs: Vehicle Fueling Positions  
Independent Variable (X): 8

**AVERAGE WEEKDAY DAILY**

T = 172.01 \* (X)  
T = 172.01 \* 8  
T = 1376.13  
T = 1,376 vehicle trips  
with 50% ( 688 vpd) entering and 50% ( 688 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

T = 10.28\* (X)  
T = 10.28 \* 8  
T = 82.24  
T = 82 vehicle trips  
with 50% ( 41 vph) entering and 50% ( 41 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

T = 14.03 \* (X)  
T = 14.03 \* 8  
T = 112.24  
T = 112 vehicle trips  
with 50% ( 56 vph) entering and 50% ( 56 vph) exiting.

**SATURDAY DAILY**

T = 182.17 \* (X)  
T = 182.17 \* 8  
T = 1457.36  
T = 1,458 vehicle trips  
with 50% ( 729 vpd) entering and 50% ( 729 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR**

T = 12.77 \* (X)  
T = 12.77 \* 8  
T = 102.16  
T = 102 vehicle trips  
with 50% ( 51 vph) entering and 50% ( 51 vph) exiting.

**Institute of Transportation Engineers (ITE)  
Trip Generation, 10th Edition  
Land Use Code (LUC) 820 - Shopping Center**

Average Vehicle Trips Ends vs: 1,000 Square Feet Gross Leasable Area  
Independent Variable (X): 6.424

**AVERAGE WEEKDAY DAILY**

$T = 37.75 * X$   
 $T = 37.75 * 6.424$   
 $T = 242.51$   
 $T = 242$  vehicle trips  
with 50% ( 121 vpd) entering and 50% ( 121 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 0.94 * (X)$   
 $T = 0.94 * 6.424$   
 $T = 6.04$   
 $T = 6$  vehicle trips  
with 62% ( 4 vph) entering and 38% ( 2 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 3.81 * X$   
 $T = 3.81 * 6.424$   
 $T = 24.48$   
 $T = 24$  vehicle trips  
with 48% ( 12 vph) entering and 52% ( 12 vph) exiting.

**SATURDAY DAILY**

$T = 46.12 * X$   
 $T = 46.12 * 6.424$   
 $T = 296.27$   
 $T = 296$  vehicle trips  
with 50% ( 148 vph) entering and 50% ( 148 vph) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

$T = 4.50 * X$   
 $T = 4.50 * 6.424$   
 $T = 28.91$   
 $T = 29$  vehicle trips  
with 52% ( 15 vph) entering and 48% ( 14 vph) exiting.

**SUNDAY DAILY**

$T = 21.10 * X$   
 $T = 21.10 * 6.424$

T = 135.55  
T = 136 vehicle trips  
with 50% ( 68 vph) entering and 50% ( 68 vph) exiting.

**SUNDAY MIDDAY PEAK HOUR OF GENERATOR**

T = 2.79 \* X  
T = 2.79 \* 6.424  
T = 17.92  
T = 18 vehicle trips  
with 49% ( 9 vph) entering and 51% ( 9 vph) exiting.

# AM Reference

## Graph Look Up



Query Filter

DATA SOURCE: ITE-TGM 10th Edition

SEARCH BY LAND USE CODE: 820

LAND USE CATEGORY: (800-889) Retail

LAND USE: 820 - Shopping Center

INDEPENDENT VARIABLE (IV): 1000 Sq. Ft. GLA

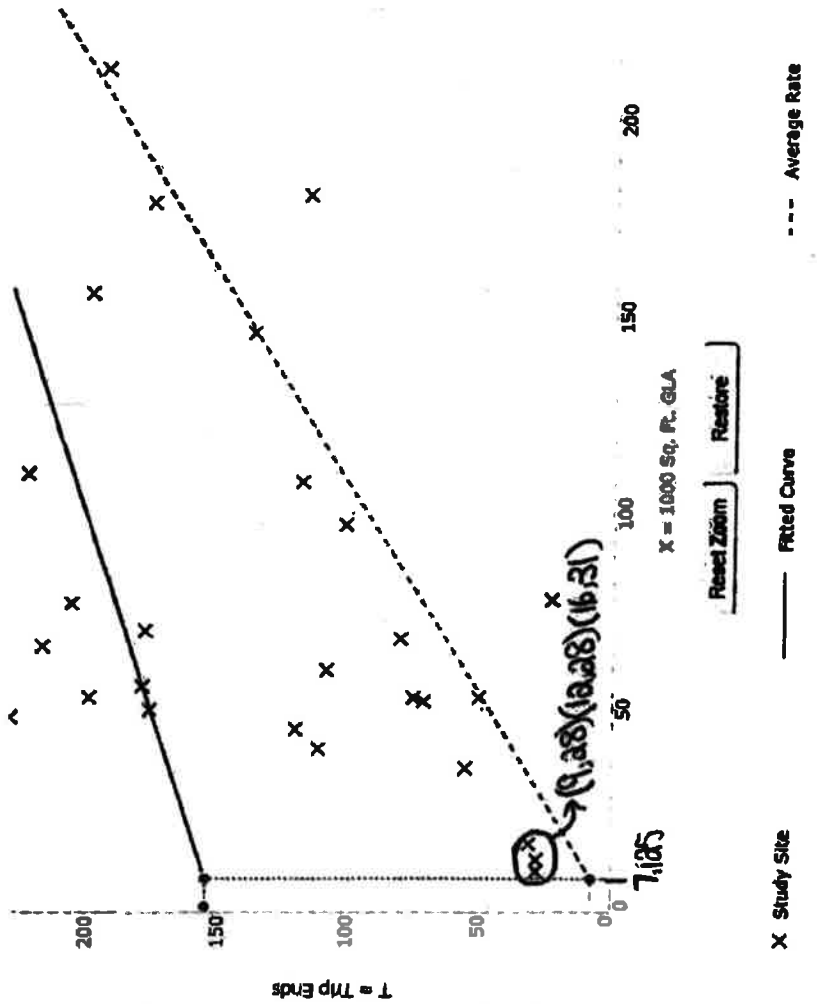
TIME PERIOD: Weekday, Peak Hour of Adjacent Street Traffic

SETTING/LOCATION: General Urban/Suburban

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:  
7.18 Calculate

Data Plot and Equation



**DATA STATISTICS**

1000 Sq. Ft. GLA: 351

Time Period: Weekday

Setting/Location: General Urban/Suburban

Trip Type: Vehicle

Number of Studies: 84

Avg. 1000 Sq. Ft. GLA: 351

Average Rate: 0.94

Range of Rates: 0.18 - 23.74

Standard Deviation: 0.87

Fitted Curve Equation:  $T = 0.50(X) + 151.78$

$R^2$ : 0.50

Directional Distribution: 62% entering, 38% exiting

Calculated Trip Ends: Average Rate: 7 (Total); 4 (Entry); 3 (Exit)

Fitted Curve: 155 (Total); 96 (Entry); 59 (Exit)

Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

3.11 233 1.93      Avc = 2.46  
rate



DATA SOURCE: ITE-TGM 10th Edition

SEARCH BY LAND USE CODE: 820

LAND USE CATEGORY: (800-889) Retail

LAND USE: 820 - Shopping Center

INDEPENDENT VARIABLE (IV): 1000 Sq. Ft. GLA

TIME PERIOD: Weekday, Peak Hour of Adjacent Street Traffic

SETTING/LOCATION: General Urban/Suburban

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS: 7.125

**DATA STATISTICS**

1000 Sq. Ft. GLA

**Time Period:** Weekday  
Peak Hour of Adjacent Street Traffic  
One Hour Between 4 and 6 p.m.

**Setting/Location:** General Urban/Suburban

**Trip Type:** Vehicle

**Number of Studies:** 261

**Avg. 1000 Sq. Ft. GLA:** 327

**Average Rate:** 3.81

**Range of Rates:** 0.74 - 18.69

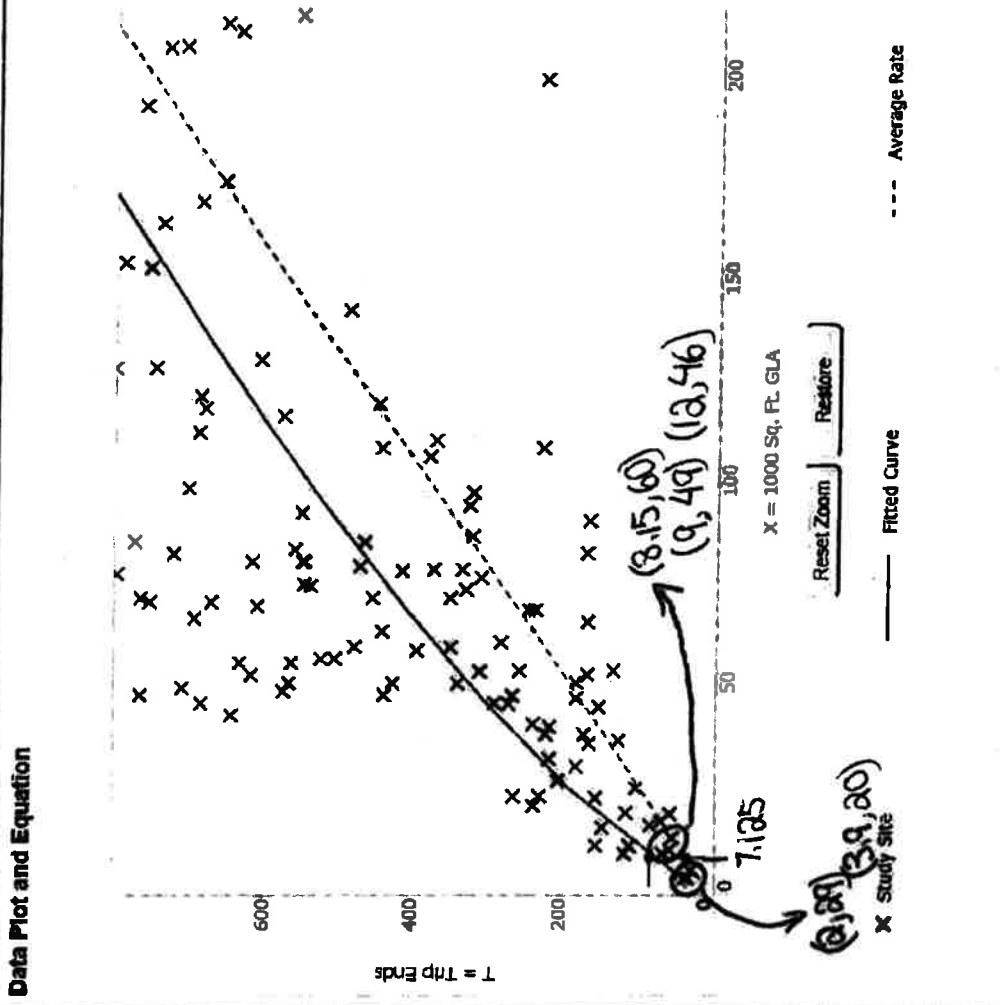
**Standard Deviation:** 2.04

**Fitted Curve Equation:**  
 $\ln(T) = 0.74 \ln(X) + 2.89$

**R<sup>2</sup>:** 0.82

**Directional Distribution:** 48% entering, 52% exiting

**Calculated Trip Ends:**  
Average Rate: 27 (Total), 13 (Entry), 14 (Exit)  
Fitted Curve: 77 (Total), 37 (Entry), 40 (Exit)



Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

14.5  
5.12

7.36  
5.44  
3.83

Ave - 7.25  
Rate