

EXECUTIVE SUMMARY

Vanasse & Associates, Inc. (VAI) has revised the Traffic Impact Study and Access Plan (TISAP) prepared in February 2008 to incorporate comments from The BETA Group, specifically to include the Cypress Street and Washington Street intersection in the study area, the Children's Hospital Brookline Place project as a background development, the Gateway East roadway improvements, and a trip generation comparison for general office and medical-office. The TISAP was prepared to identify traffic impacts associated with a proposed medical-office building with ancillary retail space to be located at 111 Boylston Street (Route 9) in Brookline, Massachusetts. This report identifies existing traffic operating parameters on key roadways and intersections within the study area, estimates the anticipated traffic-volume increases as a result of the proposed project, analyzes the project's traffic-related impacts, and evaluates access and egress requirements.

PROJECT DESCRIPTION

The proposed project entails the construction of a 70,636 square foot (sf) building which will contain approximately 66,616 sf of medical-office space and 4,020 sf of ancillary retail space on the north side of Boylston Street, west of Washington Street and High Street in Brookline, Massachusetts. The project site currently contains a vacant building formerly occupied by the Red Cab Company, an abutting single story vacant building, a three-story residential dwelling, a private way (Kerrigan Place), and parking areas that can accommodate approximately 36 vehicles, which are currently being used as temporary parking for the Town offices. The project site is generally bounded by the Massachusetts Bay Transit Authority (MBTA) railroad tracks to the north, residential properties to the east, Boylston Street to the south, and Davis Path to the west.

Parking for the proposed development will be provided in an underground garage and a surface lot accommodating a total of 253 parking spaces. Access to and egress from the project site is proposed via a right-in driveway and a right-out driveway. The eastern driveway will be marked as an exit only and the western driveway will be an entrance only.

- Provide a crosswalk on the east leg of Route 9 to High Street.
- Remove the existing pedestrian bridge on Route 9 and provide an at-grade, signal-protected crossing of Route 9 at the realigned Walnut Street and Pearl Street intersection.

This project is currently in the preliminary stages of design and traffic that will be diverted due to the new traffic signal at Pearl Street and the realigned Walnut Street has not yet been identified. However, at the request of BETA, some assumptions were made for the proposed realignment and signalization of the Pearl Street and Walnut Street intersection and future 2013 analysis was conducted with and without the Gateway East improvements. It should be noted that VHB is currently conducting a study to identify the traffic impacts of the Gateway East Public Realm Plan and it will include the traffic projections from our proposed medical office building.

SITE-GENERATED TRAFFIC

Empirical trip generation data collected by VAI at 830-850 Boylston Street was compared to data contained in the Institute of Transportation Engineers (ITE) *Trip Generation* manual⁸ for a similar land use, Land Use Code (LUC) 720, Medical-Dental Office Building. The buildings at 830-850 Boylston Street are located approximately 1.5 miles from the project site and contain similar uses as those expected to occupy the proposed medical office building at 111 Boylston Street. A comparison of ITE trip rates to the empirical trip rates collected at 830-850 Boylston Street is provided in Table 4.

⁸*Trip Generation, Seventh Edition*; Institute of Transportation Engineers; Washington, DC; 2003.

Table 4
MEDICAL OFFICE BUILDING
TRIP RATE COMPARISON

Time Period/Direction	ITE Trip Rates ^a (Trips/ksf)	Empirical Trip Rates ^b (Trips/ksf)
<i>Weekday Morning:</i>		
Entering	1.95	1.06
<u>Exiting</u>	<u>0.53</u>	<u>0.58</u>
Total	2.48	1.64
<i>Weekday Evening:</i>		
Entering	0.87	0.53
<u>Exiting</u>	<u>2.37</u>	<u>0.69</u>
Total	3.24	1.22
<i>Saturday Midday:</i>		
Entering	2.07	NA
<u>Exiting</u>	<u>1.56</u>	<u>NA</u>
Total	3.63	NA

^aBased on ITE LUC 720, Medical-Dental Office Building; 66,616 sf.

^bBased on counts conducted by VAI at 830-850 Boylston Street in November 2007.

NA = not available.

As can be seen in Table 4, the trip rates contained in the ITE *Trip Generation* manual for a medical-dental office building are considerably higher than those observed at an existing medical office building similar in use and in close proximity to the proposed site. However, to present a conservative analysis scenario, the ITE trip rates were used to develop the traffic characteristics of the proposed medical office building.

Trip generation for the proposed retail portion of the project was developed using the Institute of Transportation Engineers (ITE) *Trip Generation* manual⁹, LUC 814, Specialty Retail Center.

Non-Auto Trips

The project site is located in close proximity to the MBTA Brookline Village Station, which provides service to the Green subway line, as well as four bus routes. In addition, MASCO operates a shuttle service between the LMA area and Chestnut Hill via Route 9, passing by the project site. It is probable that the tenants of the project site will be part of the MASCO shuttle service. It is expected that a portion of the traffic generated by the proposed development will use the existing shuttle service or transit, pedestrian, or bicycle facilities in the area. Journey-to-work data compiled from the 2000 U.S. Census estimates approximately 41 percent of the people that work in the Census Tract that the project site is located, Tract 4007, use public transportation, walk or bicycle to work. However, for purposes of this study, it was assumed that a conservative 15 percent of the traffic generated by the proposed project will use the existing shuttle service or pedestrian, bicycle, or transit facilities.

⁹Ibid.

Pass-By Trips

Not all of the vehicle trips expected to be generated by the proposed retail space will be new trips on the roadway network. A significant portion of these trips will consist of pass-by trips, vehicles already traveling along Route 9 for other purposes that will patronize the proposed development in conjunction with their trip and then continue on to their original destination. These trips are not new trips on the roadway network as a result of the planned project. In accordance with state standards for the preparation of TIAs, a 25 percent pass-by trip rate was used. Table 5 summarizes the anticipated traffic characteristics of the proposed development.

Table 5
TRIP-GENERATION SUMMARY

Time Period/Direction	(A) Medical-Office Trips ^a	(B) Retail Trips ^b	(C = A+B) Total Trips	(D) Non-Auto Trips ^c	(E = C-D) Auto Trips	(F) Pass-By Trips ^d	(F-E) New Trips ^e
Weekday Daily	2,508	178	2,686	402	2,284	38	2,246
<i>Weekday Morning:</i>							
Entering	130	2	132	20	112	0	112
Exiting	<u>35</u>	<u>1</u>	<u>36</u>	<u>5</u>	<u>31</u>	<u>0</u>	<u>31</u>
Total	165	3	168	25	143	0	143
<i>Weekday Evening:</i>							
Entering	58	14	72	11	61	3	58
Exiting	<u>158</u>	<u>17</u>	<u>175</u>	<u>26</u>	<u>149</u>	<u>3</u>	<u>146</u>
Total	216	31	247	37	210	6	204

^aBased on ITE LUC 720, Medical-Dental Office Building; 66,616 sf.

^bBased on ITE LUC 814, Specialty Retail Center; 4,020 sf.

^cBased on 15 percent of total trips.

^dBased on 25 percent of retail auto trips.

^eNew trips to the roadway.

Existing Trips

As mentioned previously, the project site is currently being used temporarily to accommodate parking for the Town offices. TMCs conducted at Kerrigan Place indicate that 6 vehicles currently enter the site during the weekday morning peak hour and 4 vehicles currently exit the site during the weekday evening peak hour. These vehicles will not enter and exit the site with the development of the site. The net increase in trip generation for the site is summarized in Table 6.

Table 6
TRIP GENERATION – NET INCREASE

Time Period/Direction	Total New Vehicle Trips	Existing Vehicle Trips	Net Increase
Daily	2,246	NA	2,246
<i>Weekday Morning:</i>			
Entering	112	6	106
<u>Exiting</u>	<u>31</u>	<u>0</u>	<u>31</u>
Total	143	6	137
<i>Weekday Evening:</i>			
Entering	58	0	58
<u>Exiting</u>	<u>146</u>	<u>4</u>	<u>142</u>
Total	204	4	200

NA = not available.

As shown in Table 6, the proposed project is expected to generate approximately 2,246 daily trips on an average weekday (1,123 vehicles entering and 1,123 vehicles exiting), with approximately 137 new vehicle trips (106 vehicles entering and 31 vehicles exiting) during the weekday morning peak hour and 200 new vehicle trips (58 vehicles entering and 142 vehicles exiting) during the weekday evening peak hour.

General Office Trip Generation Comparison

For comparison purposes, trip generation for general office space was estimated using ITE LUC 710, General Office Building, with the independent variable of 1,000 sf of gross floor area equal to 66.616 (66,616 sf). The trip generation for a general office building and a proposed medical office building is compared in Table 7.

Table 7
MEDICAL OFFICE AND GENERAL OFFICE
TRIP GENERATION COMPARISON

<u>Time Period/Direction</u>	<u>Medical Office Building</u>	<u>General Office Building</u>	<u>Difference</u>
Daily	2,508	976	1,532
<i>Weekday Morning:</i>			
Entering	130	120	10
Exiting	<u>35</u>	<u>16</u>	<u>19</u>
Total	165	136	29
<i>Weekday Evening:</i>			
Entering	58	26	32
Exiting	<u>158</u>	<u>127</u>	<u>31</u>
Total	216	153	63

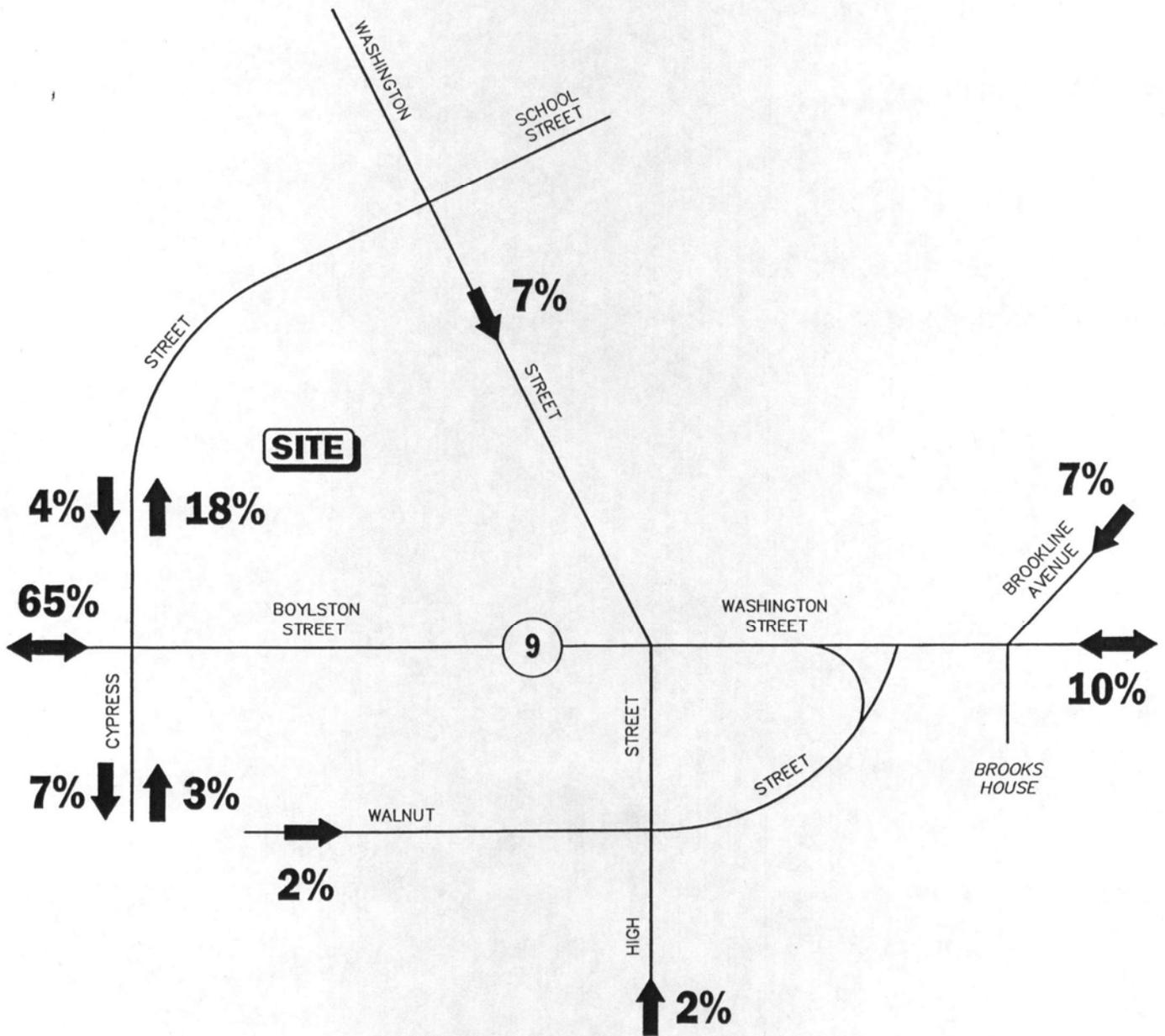
NA = not available.

As shown in Table 7, a medical office building generates more trips than a general office building, particularly on a daily basis due to patient trips. Trips generated for a medical office building is approximately 21 and 41 percent higher than a general office building during the respective weekday morning and evening peak hours.

TRIP DISTRIBUTION AND ASSIGNMENT

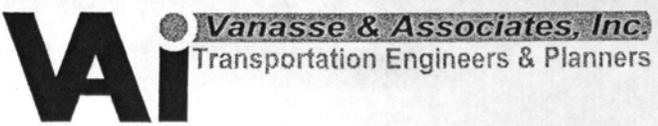
The directional distribution of the site-generated trips to and from the proposed development was based on a review of traffic patterns at the study area intersections, as well as at an existing facility located at 830-850 Boylston Street. The proposed distribution is shown on Figure 6 and summarized in Table 8.

Legend:
 XX Entering Trips
 (XX) Exiting Trips



Not To Scale

Figure 6



Trip Distribution Map

ANALYSIS RESULTS

Level-of-service analyses were conducted for 2007 Existing, 2013 No-Build, and 2013 Build conditions for the study area intersections. The results of the intersection capacity analysis within the study area are described below, with a tabular summary provided in Table 12.

Table 12
CAPACITY ANALYSIS SUMMARY

Signalized Intersection/ Peak Hour	2007 Existing			2013 No-Build			2013 Build		
	V/C ^a	Delay ^b	LOS ^c	V/C	Delay	LOS	V/C	Delay	LOS
Route 9 at Cypress Street									
Weekday Morning	0.76	27.4	C	0.80	29.1	C	0.83	30.3	C
Weekday Evening	0.84	29.7	C	0.91	33.5	C	0.95	38.2	D
Route 9 at Washington Street and High Street									
Weekday Morning	0.92	49.0	D	0.97	59.4	E	1.04	71.7	E
Weekday Evening	0.80	46.1	D	0.85	51.8	D	0.87	52.6	D
Route 9 at Walnut Street									
Weekday Morning	0.55	4.9	A	0.58	5.0	A	0.61	4.6	A
Weekday Evening	0.45	6.6	A	0.48	6.0	A	0.48	5.8	A
Route 9 at Brookline Avenue									
Weekday Morning	0.79	30.5	C	0.85	37.6	D	0.86	37.9	D
Weekday Evening	0.77	35.6	D	0.84	43.1	D	0.85	44.0	D
High Street at Walnut Street									
Weekday Morning	0.65	33.8	C	0.68	37.9	D	0.74	59.6	E
Weekday Evening	0.34	16.3	B	0.35	16.5	B	0.37	17.7	B
Washington Street at Cypress Street and School Street									
Weekday Morning	0.59	27.4	C	0.62	28.2	C	0.62	28.3	C
Weekday Evening	0.52	26.6	C	0.54	27.0	C	0.54	27.1	C
Unsignalized Intersection/ Critical Movement/Peak Hour	Demand ^d	Delay	LOS	Demand	Delay	LOS	Demand	Delay	LOS
Route 9 at Kerrigan Place									
<i>Right-turns from Kerrigan Place/ Western Site Drive:</i>									
Weekday Morning	0	0.0	A	0	0.0	A	--	--	--
Weekday Evening	4	14.2	B	4	15.1	C	--	--	--
Route 9 at Eastern (Exit) Site Drive									
<i>Right-turns from Eastern (Exit) Site Drive:</i>									
Weekday Morning	--	--	--	--	--	--	31	14.4	B
Weekday Evening	--	--	--	--	--	--	149	25.5	D

^aVolume-to-capacity.

^bDelay in seconds per vehicle.

^cLevel of service.

^dDemand in vehicles per hour.

Signalized Intersection Analysis Results

Route 9 at Cypress Street

Under 2007 Existing conditions, the overall operations at this signalized intersection were shown to operate at LOS C during both the weekday morning and weekday evening peak hours. Under 2013 No-Build conditions, the overall operations at this intersection are projected to continue to operate at LOS C during both the weekday morning and weekday evening peak hours. With the addition of project-related traffic, the overall operations at this intersection were shown to operate at LOS C during the weekday morning peak hour and LOS D during the weekday evening peak hour. Although there is a degradation in level-of-service during the weekday evening peak hour, the overall increase in delay is less than 5 seconds.

Route 9 at Washington Street and High Street

Under 2007 Existing conditions, the overall operations at this signalized intersection were shown to operate at LOS D during both the weekday morning and weekday evening peak hours. Under future 2013 conditions, the overall operations at this intersection are projected to operate at LOS E during the weekday morning peak hour and LOS D during the weekday evening peak hour, with or without the proposed project. It should be noted that although the analysis indicates that this intersection operates at LOS D under existing conditions, it often takes a few cycles to get through the intersection during the peak periods.

Route 9 at Walnut Street

Under 2007 Existing conditions, the overall operations at this signalized intersection were shown to operate at LOS A during both the weekday morning and weekday evening peak hours. The overall operations at this intersection are projected to continue to operate at LOS A during both the weekday morning and weekday evening peak hours under 2013 No-Build and Build conditions.

Route 9 at Brookline Avenue

Under 2007 Existing conditions, the overall operations at this signalized intersection were shown to operate at LOS C during the weekday morning peak hour and LOS D during the weekday evening peak hour. Under 2013 No-Build and Build conditions, the overall operations at this intersection are projected to operate at LOS D during the weekday morning and evening peak hours. It should be noted that although the analysis indicates that this intersection operates at LOS D, it often takes a few cycles to get through the intersection during the peak periods.

High Street at Walnut Street

Under 2007 Existing conditions, the overall operations at this signalized intersection were shown to operate at LOS C during the weekday morning peak hour and LOS B during the weekday evening peak hour. Vehicle delays at this location are impacted by the Route 9 traffic signal and can be longer than estimated. Under 2013 No-Build conditions, the overall operations at this intersection are projected to operate at LOS D during the weekday morning peak hour and LOS B during the weekday evening peak hour. With the addition of project-related traffic, the overall operations at this intersection were shown to operate at LOS E during the weekday morning peak hour and LOS B during the weekday evening peak hour. Modified signal timing is

recommended to improve the operations at this intersection during the weekday morning peak hour.

Washington Street at Cypress Street and School Street

Under 2007 Existing conditions, the overall operations at this signalized intersection were shown to operate at LOS C during both the weekday morning and weekday evening peak hours. The overall operations at this intersection are projected to continue to operate at LOS C during both the weekday morning and weekday evening peak hours under 2013 No-Build and Build conditions.

Unsignalized Intersection Analysis Results

Route 9 at Kerrigan Place

Under 2007 Existing conditions, the critical movement at this unsignalized intersection (right-turns from Kerrigan Place) currently operates at LOS A and LOS B during the weekday morning and evening peak hours, respectively. Under 2013 No-Build conditions, the critical movement is projected to operate at LOS A and LOS C during the respective weekday morning and evening peak hours.

Route 9 at the Eastern (Exit) Site Driveway

Under 2013 Build conditions, the critical movement (right-turns from the eastern site driveway) is projected to operate at LOS B during the weekday morning peak hour and LOS D during the weekday evening peak hour.

ANALYSIS WITH THE GATEWAY EAST IMPROVEMENTS

As mentioned previously, the Town of Brookline has plans for improvements in the Gateway East area of Brookline. This project is currently in the preliminary stages of design and traffic that will be diverted due to the new traffic signal at Pearl Street and the realigned Walnut Street has not yet been identified. However, at the request of BETA, some assumptions were made for the proposed realignment and signalization of the Pearl Street and Walnut Street intersection. The improvements are expected to have an impact on the Route 9, Washington Street and High Street intersection as well, as removing the split phasing on Route 9 at this location is being considered. The capacity analysis results for the 2013 No-Build and Build conditions with the Gateway East Improvements are summarized in Table 13.

Table 13
CAPACITY ANALYSIS SUMMARY WITH GATEWAY EAST
IMPROVEMENTS

Signalized Intersection/Peak Hour	2013 No-Build with Gateway East Improvements			2013 Build with Gateway East Improvements		
	V/C ^a	Delay ^b	LOS ^c	V/C	Delay	LOS
<i>Route 9 at Washington Street and High Street</i>						
Weekday Morning	0.95	41.1	D	1.02	50.0	D
Weekday Evening	0.85	38.2	D	0.87	39.5	D
<i>Route 9 at Pearl Street and Juniper Street/Walnut Street</i>						
Weekday Morning	0.58	10.3	B	0.60	10.4	B
Weekday Evening	0.50	7.2	A	0.50	7.1	A

^aVolume-to-capacity.

^bDelay in seconds per vehicle.

^cLevel of service.

As can be seen in Table 13, the proposed project will have a minimal impact on operations over the No-Build conditions with the proposed Gateway East improvements.