



*JAR*  
9/12/05  
Vanasse Hangen Brustlin, Inc.

Summary

Area + Info

meets 3 warrants  
for a traffic light

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Memorandum

To: Barry Lorion  
District Traffic Engineer  
Massachusetts Highway Department  
403 Belmont Street  
Worcester, MA 01604

Date: April 5, 2005

Project No.: 08354

From: Patrick Dunford, P.E.  
Project Manager

Re: Brookside Shops Traffic Monitoring  
Acton, Massachusetts

As a requirement of the Section 61 Finding (dated February 26, 2001) issued for the above-mentioned project the proponent was required to conduct a post-opening traffic monitoring program at the site. Specifically, this traffic monitoring was to occur every six months within two years following the initial opening. This monitoring was to consist of daily traffic counts conducted over a seven-day period. The purpose of this monitoring was to determine if signalization was warranted at the main site driveway on Great Road (Route 2A/119). The Section 61 Finding specifies that, "When signalization becomes warranted and approved by MassHighway, the proponent will signalize this intersection". This document further specifies that this determination will be made based on the results of the Traffic Monitoring Program. During the time of this analysis, the site is operating at full occupancy.

Prior to this assessment, the most recent traffic monitoring was summarized in a technical memorandum dated November 3, 2004. That evaluation included similar information to that presented in this memorandum, and it concluded that:

- 1) The trip generation for the site was generating amounts of traffic similar to those originally anticipated, and
- 2) The three volume based warrants were met at the Brookside Shops main driveway.

**DATA COLLECTION**

Automatic Traffic Recorder (ATR) counts were conducted for seven days in late March 2005 on all three site driveways. To perform the signal warrant analysis, separate counts were conducted for the right and left exit lanes at the Brookside Shops main driveway. Additionally, ATR counts were conducted at Great Road (Route 2A/119) for 24-hours during a typical weekday.

**TRIP GENERATION COMPARISON**

The Brookside Shops development was originally permitted for approximately 82,318 square feet of retail. Ultimately, approximately 74,000 square feet of retail space was built on this site. Nevertheless, the site access plan was designed to accommodate the projected trip generation associated with the original proposal. The estimated trip generation was developed utilizing rates provided in the Institute of Transportation *Trip Generation* report<sup>1</sup> for Shopping Centers.

<sup>1</sup>Institute of Transportation Engineers, *Trip Generation*, Sixth Edition, Washington, D.C., 1997.

The traffic volume data collected at the Brookside Shops driveways were utilized to determine the actual trip generation associated with the site. Table 1 summarizes a comparison between the actual site-generated trips and those estimated during the approval process.

**TABLE 1  
 TRIP GENERATION COMPARISON**

Condition	Originally Estimated Trip Generation <sup>a</sup>	Observed Trip Generation <sup>b</sup>	Difference
<b>Weekday Daily<sup>c</sup></b>			
Enter	3,010	3,165	155
<u>Exit</u>	<u>3,010</u>	<u>3,320</u>	<u>310</u>
Total	6,020	6,485	465
<b>Weekday PM<sup>d</sup></b>			
Enter	265	290	25
<u>Exit</u>	<u>290</u>	<u>320</u>	<u>30</u>
Total	555	610	55
<b>Saturday Daily<sup>c</sup></b>			
Enter	4,050	3,540	-510
<u>Exit</u>	<u>4,050</u>	<u>3,705</u>	<u>-345</u>
Total	8,100	7,245	-855
<b>Saturday Middy<sup>d</sup></b>			
Enter	400	410	10
<u>Exit</u>	<u>370</u>	<u>440</u>	<u>70</u>
Total	770	850	80

- a. Based on ITE LUC 820 (Shopping Center); as presented in the Draft Environmental Impact Report (June 7, 2000) for the Brookside Shops (EOEA 12170) and the Final Environmental Impact Report (October 10, 2000).
- b. Based on counts conducted in March 2004. Average of Monday through Friday used to create weekday trip generation.
- c. Expressed in vehicles per day.
- d. Expressed in vehicles per hour.

As can be seen in Table 1, in March 2005, the Brookside Shops site generated slightly more trips than those used to determine the potential project impacts during the MEPA process. On a daily basis, the project generated 465 more trips than originally estimated for a typical weekday but 855 trips fewer than what was expected for a typical Saturday. However, the difference in weekday evening project generated trips is a small percentage of the total volume of traffic which passes in front of the project site on Great Road. Approximately 20,000 vehicles travel east and west along Great Road which makes the difference in daily site generated trips only 2% of the total volume of trips along Great Road. The project generated 55 more trips during the weekday evening peak hour and 80 more trips than estimated during the Saturday midday peak hour.

Since traffic monitoring has started at this site, this monitoring period is the first time actual site traffic volumes rose above the estimated trip generation volumes. Continued monitoring of the site volumes will determine whether this trip generation observation is a unique occurrence or an on-going trend.

**SIGNAL WARRANT ANALYSIS**

A signal warrants analysis was conducted to determine if a traffic signal would be justified at the full-access site driveway. The traffic signal warrant analysis is based on the thresholds and methodologies described in the Manual on Uniform Traffic Control Devices (MUTCD)<sup>2</sup>. The MUTCD describes eight warrants, which provide a means for determining if a traffic signal should be installed at a particular location. In general, a traffic signal should not be installed unless the criteria for at least one warrant are met. However, while only a signal warrant needs to be satisfied, most municipalities and MassHighway have previously indicated that it is desirable that the 8-hour traffic volume warrant be met prior to the installation of a traffic signal. Table 2 summarizes the signal warrant analysis, which considers the volume of Great Road traffic and the volume of exiting left-turns from the site.

**TABLE 2  
 SIGNAL WARRANT ANALYSIS SUMMARY**

Warrant	2004 Existing Conditions
Warrant 1, Eight-Hour Vehicular Volume	YES
Warrant 2, Four-Hour Vehicular Volume	YES
Warrant 3, Peak Hour	YES
Warrant 4, Pedestrian Volume	NO
Warrant 5, School Crossing	NO
Warrant 6, Coordinated Signal System	NO
Warrant 7, Crash Experience	NO
Warrant 8, Roadway Network	NO
<b>Total Warrants Met</b>	<b>3</b>

As can be seen in Table 2, the three vehicular volume-based warrants have been met under the observed conditions. The specific criterion satisfied under the eight-hour volume warrant is "Condition B - Interruption of Continuous Traffic", which applies where the volume of major road traffic (Great Road) is so heavy that side street traffic (exiting left-turns from the Brookside Shops) suffers excessive delay or conflict. Warrant 1, Condition A - Minimum Vehicular Volume, which considers large volumes of intersecting traffic from both the main roadway and side-street, is not satisfied. Therefore, if deemed necessary by MassHighway a traffic signal could be installed at this location.

**CONCLUSION**

The trip generation data collected at the Brookside Shops site this monitoring period indicates that this development is generating slightly higher amounts of traffic to what was originally anticipated. Continued monitoring of the site traffic will reveal whether these recent monitoring results are unique or if they are a continuing trend. Based on the data collected at the main site driveway and Great Road, VHB found that this location meets the three volume based warrants. Therefore, if

<sup>2</sup> US Department of Transportation, FHWA, Manual on Uniform Traffic Control Devices, Millennium Edition, Washington, D.C., December 2000

deemed necessary by MassHighway a traffic signal could be installed at this location. The proponent remains committed to fulfilling the traffic monitoring obligations of the Section 61 Finding for this project should MassHighway wish to proceed with this matter. The next round of monitoring will be conducted in September 2005.