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Memorandum

To: Maryann McCall-Taylor
Town of Lexington
Planning Department
1625 Massachusetts Avenue
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Date: September 2, 2009

Project No.:

From: Howard Muise
Senior Project Manager

Re: Review of Traffic Study for
Proposed Expansion of
Lexington Technology Park

Vanasse Hangen Brustlin, Inc. (VHB) has performed a professional and independent technical review of the traffic study prepared by Tetra Tech Rizzo for the proposed expansion of the Lexington Technology Park. The project site is located near the intersection of Spring Street and Hayden Avenue. Site access is via Patriot Way, a private way which intersects Spring Street directly opposite Hayden Avenue. In 2007, the Town of Lexington granted permits for the development and occupancy of up to 696,600 gross square feet (gsf) of office and laboratory space at the site. Some of the site has been constructed and is partially occupied. The remaining approved development is under construction. As identified in the Traffic Study, the additional development proposed for the site includes 380,000 gsf of office and laboratory space, raising the total space in Lexington Technology Park to 1,076,600 gsf.

Submission Materials

VHB reviewed the following report submitted by the applicant:

- *Traffic Study, Lexington Technology Park, Lexington, Massachusetts; Prepared by Tetra Tech Rizzo; August 2009*

VHB was originally provided a copy of the May 26, 2009 version of the Traffic Study but subsequently received the August version, which added four intersections to the study. VHB also met with Rick Bryant of Tetra Tech Rizzo at VHB on August 26, 2009 to review the document. Mr. Bryant answered additional questions by phone. This memorandum is based on the August version of the Traffic Study, and responses to questions and clarifications provided by Rick Bryant.

Overview

In general, the study has been prepared according to industry standards using information and methods suitable for a traffic impact study. Based on the methods and information used, the study presents reasonable findings regarding traffic operations under Existing, No-build and Build conditions. The May 2009 study was prepared prior to the submission of the July 2009 Traffic Impact and Access Study (TIAS) for Cubist Pharmaceuticals, which is also under review by VHB. As a result, neither it nor the August 2009 update includes traffic from the proposed Cubist expansion but the Cubist TIAS does include the traffic from the Lexington Technology Park expansion. Taking this difference into account, the findings of both studies are consistent with each other.

The Traffic Mitigation section includes several potential intersection improvements that would be funded from the Town's Traffic Mitigation Stabilization Fund at the Town's discretion. In a proposed Memorandum of Understanding, the applicant commits to providing almost \$1.3 million to the fund. Analysis of traffic operations with the proposed mitigation indicates improved level of service at all but one location, including elimination of deficiencies at several of the intersections. The capacity analysis work sheets for mitigation were not included in the Appendix of the Study but were subsequently provided to VHB. They should also be provided to the Town.

One of the proposed mitigation measures involves installing a STOP sign on westbound Concord Avenue at the intersection with the Route 2 eastbound off ramp. This would give priority to the ramp, which has a higher volume than westbound Concord Avenue. The geometry of this location would result in the STOP sign being placed on a straight section of roadway which would intersect the main roadway (the off ramp) at an acute angle. This would introduce a STOP sign at a location where most drivers would not expect it. It is suggested that if this measure is pursued, consideration be given to shifting westbound Concord Avenue at this location to the north to intersect the off ramp at a less acute angle.

Traffic Study Review

The following sections highlight the key methods and findings in the Lexington Technology Park Traffic Study with regard to Existing conditions, No-build conditions, Build conditions, and traffic mitigation.

Existing Conditions

The following are major features of the Existing conditions analyses:

- The study area includes 11 intersections (2 signalized and 9 unsignalized) and appears reasonable considering the project size and the roadway network in the area. It includes all intersections that exceed a 5 percent increase in traffic from the project as required by the Town.
- Traffic volumes were collected in February 2009 and compared to volumes from the Ledgemont Study, which were collected in June 2008. The Technology Park study concluded there was no significant difference in the two sets of volumes and used the existing conditions volumes from Ledgemont for its Existing conditions analysis to provide consistency between the two studies.
- According to Massachusetts Highway Department (MassHighway) crash data for the years 2004 through 2006 (the latest three-year period available), three of the locations analyzed had crash rates exceeding statewide and MassHighway District 4 crash rates. The most common accident type was rear end, which is common at STOP controlled intersections.
- There is no estimate of the amount and time of peak accumulation of off-street parking, as required by the Town regulations, because the existing buildings are partially occupied and additional approved development is under construction. As a result, a parking accumulation count would not yield useful information.

No-Build Conditions

The following are major features of the No-Build conditions analyses:

- The Build traffic volumes from the Ledgemont study were used as No-Build traffic volumes for the Technology Park Traffic Study. Those volumes were based on:
 - An overall traffic growth rate of 1 percent per year over five years (probably an overestimate given that there has been little to no growth in area traffic since 2003)
 - Traffic from the Avalon Bay residential development at the former Metropolitan State Hospital site
 - Traffic from the proposed expansion of Ledgemont
 - The projected traffic associated with the already approved development of 696,600 gsf at Lexington Technology Park

It should be noted that the TIAS for Cubist Pharmaceuticals, filed after the initial Technology Park filing, includes the assumed occupancy of 62,000 gsf of existing vacant space at 45/55 Hayden Woods Corporate Center in its No-Build analysis. This does not appear to be included in the No-Build analysis for Technology Park (or the Ledgemont traffic impact study). The traffic study requirements for the Town of Lexington do not require unoccupied space to be included in the No-Build condition nor is such information routinely included in most traffic studies. It is not clear whether the inclusion of an additional 62,000 gsf would have any impact on the effectiveness of the traffic mitigation measures presented in the Traffic Study and described below.

- The following planned future roadway improvements were included in the No-Build analysis:
 - Addition of sidewalks and crosswalks along Spring Street between the bridge over Route 2 and Marrett Road
 - Signalization of the intersection of Spring Street, Marrett Road and Bridge Street
 - Improvements to the signalized intersection of Marrett Road and Waltham Street

Build Conditions

The following are major features of the Build conditions analysis:

- **Trip generation** for the proposed expansion was determined using trip rates from the *Institute of Transportation Engineers (ITE)*¹. The projected trips from the approved 696,600 gsf of development plus the proposed additional development were calculated using ITE trip generation rates. The rates were applied to existing space, space under construction, and an additional 380,000 gsf of office space. Although the proposed additional space is planned to be a mix of office and laboratory space, the office trip rate was used provide a more conservative estimate of trips. Since the total number of trips already permitted by the Town for Technology Park is included in the No-Build analysis, those trips were subtracted from the trip generation for the full development to determine the added trips for the Build analysis.

The traffic study includes an alternative trip generation methodology based on the number of trips generated by existing development on Patriot Way (222,541 gsf) and the number of trips entering and exiting Patriot Way (February 2009). The resulting trip rates are between 30 and 45 percent lower than ITE rates would be for the same development.

¹ Trip Generation; Eighth Edition; Institute of Transportation Engineers (ITE); Washington, DC; 2008.

Using ITE rates and assuming the additional development is all office space is a conservative approach. The methodology and the number of trips estimated for the proposed development appear to provide a reasonable basis for projecting the impact of the additional development.

- **Trip distribution** for the new project trips were distributed to the roadway network consistent with the trip distribution assumptions used in the Ledgesmont report. The Ledgesmont study distribution was based on existing traffic volumes and the geographic distribution of employee residences. The Ledgesmont distribution was used because Technology Park is expected to have a similar employee distribution and is located across Spring Street from Ledgesmont. This method appears to provide a reasonable basis for projecting the impact of the additional development.

Traffic Operations and Signal Warrant Analyses.

The following are major features of the level of service (LOS) and signal warrant analyses:

- Intersection operations and levels of service were analyzed using the appropriate methodology provided in the 2000 *Highway Capacity Manual*². The analysis was conducted appropriately and according to standard industry practice using the Synchro Version 6 software.
- Under Existing conditions seven of the nine unsignalized intersections and one of the two signalized intersections analyzed operate at unacceptable levels of service in one or both peak hours.
- Under No-Build conditions two additional locations become deficient in the morning peak hours. One of these locations is deficient in the evening peak hour under Existing conditions. Planned improvements at the intersection of Waltham Street and Marrett Road improve morning peak hour operations from LOS F to LOS E and evening peak hour operations from LOS F to LOS D.
- Under Build conditions, two additional deficiencies are created. These include Concord Avenue at Route 2 eastbound ramps (LOS D to LOS F in the morning peak hour) and Marrett Road at Waltham Street (LOS D to LOS E in the evening peak hour)
- A signal warrant analysis was conducted according to procedures in the Manual on Uniform Traffic Control Devices³ for the Spring Street/Hayden Avenue/Patriot Way intersection based on the February 2009 counts, which represent the most recent counts with the highest occupancy level for Technology Park.
 - Only the peak hour warrant is met for Existing conditions (triggered by traffic volumes on the Hayden Road approach).
 - The peak hour and four hour warrants are met under No-Build conditions.
 - The peak hour, four hour, and eight hour warrants are met under Build conditions.

It should be noted that the title of Table 2 incorrectly refers to Broadway and Computer Drive.

² Highway Capacity Manual, Transportation Research Board, Washington, D.C., 2000.

³ Manual on Uniform Traffic Control Devices, Federal Highway Administration, 2003 Edition.

Traffic Mitigation

The Traffic Mitigation chapter provides a description of the 2003/2004 traffic mitigation program for Technology Park, the traffic mitigation measures that have been implemented thus far, future traffic mitigation commitments for the Park independent of any mitigation associated with the proposed addition, and proposed additional mitigation. The proposed additional mitigation is identified as possible improvements to be undertaken with funds from the Town's Traffic Mitigation Stabilization Fund. The document also includes a draft Memorandum of Understanding (MOU) regarding contributions by the project to the Traffic Mitigation Stabilization Fund and Transportation Demand Management Fund.

The following describe the proposed additional mitigation (to be paid for from the Transportation Mitigation Stability Fund) for several locations and list the estimated cost (design and construction):

- Concord Avenue/Route 2 eastbound ramp – give priority to ramp and install STOP sign on Concord Avenue (\$1,000). Improves morning peak hour to LOS E. The geometry of this location would result in the STOP sign being placed on the straight section of roadway which would intersect the main roadway (the off ramp) at an acute angle. This would introduce a STOP sign at a location where most drivers would not expect it. It is suggested that if this measure is pursued, consideration be given to shifting westbound Concord Avenue at this location to the north to intersect the off ramp at a less acute angle.
- Concord Avenue/Spring Street – Install traffic signal and channelize westbound right turn lane (\$300,000). Improves morning peak hour to LOS C and evening peak hour to LOS D.
- Spring Street/Hayden Avenue/Patriot Way – Install a traffic signal and, as an option, construct a southbound right-turn lane (\$250,000 - \$500,000). Improves morning peak hour to LOS E.
- Marrett Road/Spring Street/Bridge Street – Add eastbound right-turn lane (\$300,000). Improves morning peak hour to LOS C and evening peak hour to LOS E.
- Hayden Avenue/Route 2 westbound off ramp – Install signal (\$250,000). Improves morning and evening peak hours to LOS C.
- Hayden Avenue/Waltham Street – Install signal and provide minor widening on Waltham Street to provide two through lanes in each direction (\$600,000). Improves morning peak hour to LOS C and evening peak hour to LOS B.
- Middle Street/Marrett Road – Cut back vegetation to improve sight lines (\$2,500) and make Middle Street one-way eastbound east of Gary Street (\$250,000). No change in level of service is projected but improved sight lines would enhance safety.

The capacity analysis work sheets for mitigation were not included in the Appendix but were subsequently provided to VHB. They should also be provided to the Town.

The following describe the proposed project contributions as outlined in the MOU:

- \$65,000 to the Traffic Mitigation Stabilization Fund to undertake a Corridor Traffic Master Plan for the Spring Street and Hayden Avenue corridors
- \$15,000 to the Traffic Mitigation Stabilization Fund to study the use of traffic calming devices and strategies on Shade Street

- \$500,000 to the Traffic Mitigation Stabilization Fund for roadway improvements specified by the Town
- \$100,000 to the Transportation Demand Management/Public Transportation Stabilization Fund
- Based on the projected increase in parking, an estimated \$811,770, the first \$100,000 of which would go to the Transportation Demand Management/Public Transportation Stabilization Fund and the remaining estimated \$711,770 would go to the Traffic Mitigation Stabilization Fund

The total contribution would be almost \$1.5 million for the proposed 380,000 gsf of development.