

Date April 28, 2007
To Sharon Board of Selectmen
From Thomas C. Houston
Project Sharon Hills
Subject Peer Review of *Traffic Impact and Access Study Brickstone at Sharon, Sharon, Massachusetts* and Evaluation of Supplemental Traffic and Access Issues

Professional Services Corporation, PC (PSC) conducted a peer review of the traffic impact analysis performed for the Sharon Hills between Bay Road and Mountain Street in Sharon, Massachusetts. Our evaluation is based upon the following:

- A. Review of the *Traffic Impact and Access Study Brickstone at Sharon, Sharon, Massachusetts prepared for Brickstone Properties, Andover, Massachusetts* dated March 2007 prepared by Vanasse and Associates, Inc.
- B. Review of the conceptual Brickstone Properties' *Development Plan* prepared by the Daylor Consulting Group.
- C. A reconnaissance of the Traffic Study Area.

In summary, we find that the *Traffic Impact and Access Study Brickstone at Sharon, Sharon, Massachusetts prepared for Brickstone Properties, Andover, Massachusetts* (hereinafter cited as the TIAS) is prepared in accord with standard engineering practice and further conforms to the *EOEA/EOTC Guidelines for Traffic Impact Assessment (1989)* which is widely used as a guide for preparing traffic impact and access studies in the Commonwealth of Massachusetts. In addition to the submitted *Traffic Impact and Access Study*, additional traffic studies will be required by the Board of Appeal under site plan review prior to construction.

The Traffic Study Area encompasses 12 intersections throughout the Town of Sharon. The intersections selected for inclusion in the Traffic Study Area are comprehensive and provide a thorough evaluation of the traffic impacts of the project. Intersections included in the Traffic Study Area include five key intersections on Bay Road from Cobbs Corner to Mountain Street at the Easton townline. Three



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additional intersections on East Street are evaluated as well as the Pond and Quincy Streets intersection, the Pond and Billings Streets intersection, and Post Office Square. As part of additional detailed traffic studies submitted in conjunction with site plan review, it may be desirable to also include the Deerfield and Bay Roads intersection as Deerfield Road in combination with Hampton Road and Morse Street collect traffic from a wider area.

The TIAS is based on traffic Automatic Traffic Recorder (ATR) and manual turning counts obtained for this project in May, October, and November of 2006. Manual turning movement counts encompassed three hours in the morning and three hours in the evening which ensures that peak hour flows are accurately identified. Counts were taken primarily on Tuesday, Wednesday, or Thursday and properly represent mid-week conditions. Counts were taken during three months where traffic volumes are typically above the yearly average. To be conservative, counted volumes were not adjusted downward.

The TIAS examined crash data using the most recent three years of data available from the Sharon Police Department and the Stoughton Police Department in accord with standard practice. The calculated crash rate is below the MassHighway District 5 significant crash rate.

The TIAS determined the 85th percentile speed of traffic on Bay Road at the proposed site entrance to be 40 mph both northbound and southbound. For 40 mph, required Stopping Sight Distance (SSD) is 305 feet. Measured stopping sight distance is 400 feet for southbound vehicles (versus 305 feet required) and 500 feet for northbound vehicles (versus 305 feet required). Recommended Intersection Sight Distance (ISD) looking south from the driveway is 441 feet and the measured sight distance is 500 feet. Recommended Intersection Sight Distance looking north from the driveway is 382 feet and the measured sight distance is 470 feet. Accordingly, the TIAS states that required Stopping Sight Distance and recommended Intersection Sight Distance is provided for both northbound and southbound vehicles at the project entrance.

The 2011 No-Build traffic volumes in the TIAS were developed using a factor of 1 percent per year to account for growth in background traffic and traffic generated by three (3) pipeline projects was added including one project each in Sharon, Stoughton, and Easton. We independently evaluated available count data to determine the reasonableness of the one (1) percent growth factor. While counts in Stoughton and Canton have decreased, the MassHighway counts in Sharon show growth of 0.94 to 2.45 percent per year from 1995 to 2004. The average of the count stations in Sharon shows a growth rate of 1.5 percent per year. Based upon the above, we concur with the growth factor used in the analysis.

As both projects proceed in the planning process, future traffic studies to be submitted to the Board of Appeals as part of site plan approval review should include trips generated by the Sharon Commons project as a pipeline project.

We concur that the land use categories published in the Institute of Transportation Engineer's *Trip Generation 7th Edition* do not correspond to the continuing care retirement community proposed for



construction by Brickstone. In accordance with recommended practice, the TIAS includes empirical data collected at Brooksby Village in Peabody, Massachusetts.

As a check on the representativeness of the Brooksby Village project, we also obtained counts taken at the Oak Point Retirement Community, a 55 and over project, in Middleborough. The population of a 55 and over facility is likely to generate higher numbers of trips as many of these persons are likely to be employed on a full time basis and may have children living at home. Trips counted (Greenman-Pederson, Inc.) at the Oak Point Retirement Community in Middleborough are as follows:

	680 Units	780 units	Average
Morning Peak Hour			
Enter	0.07	0.08	0.08
Exit	0.19	0.18	0.19
Total	0.26	0.27	0.27
Evening Peak Hour			
Enter	0.21	0.18	0.20
Exit	0.12	0.11	0.12
Total	0.33	0.29	0.31

Trip generation from this other retirement community is higher than those observed at the Brooksby project which is to be expected given the lower age requirements. In addition, the Sharon Hills project will implement a Transportation Demand Management program which will diminish trips generated by the project. Based upon the above, we consider the empirical data collected this project to be representative of future trip generation.

We reviewed the distribution and assignment of trips and find them to be reasonable with 87 percent of trips having origins and destinations north of the site and 13 percent having origins and destinations south of the site.

The TIAS includes an operational analysis of signalized and unsignalized intersections in the Traffic Study Area. Intersection level-of-service (LOS) were determined for all signalized and unsignalized intersections in the project area. We reviewed the level-of-service calculations that are based on the Transportation Research Board (of the National Academies) *Highway Capacity Manual HCM 2000* using the Synchro 6 computer model and find they have been calculated in accord with standard practice. Levels-of-service range from A to F with LOS A describing operating conditions with minimal delay with most vehicles not stopping. LOS E describes operations with high delay values. LOS F describes a failed location with high control delay values. LOS F is characterized by average delay exceeding 50 seconds per vehicle for unsignalized intersections and by average control delay exceeding 80 seconds per vehicle for signalized intersections.



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The Bay Road Corridor is potentially the most directly impacted by the Sharon Hills Project. The unsignalized Bay Road and Mountain Street intersection operates at LOS B during the morning peak hour and the evening peak hour under the Existing Case and will remain at LOS B under the 2011 No-Build Case and the 2011 Build Case. The unsignalized Bay Road, Chemung Street, and Violet Circle intersection operates at LOS F during the morning peak hour and the evening peak hour under the Existing Case and will remain at LOS F under the 2011 No-Build Case and the 2011 Build Case. This condition currently exists and will continue into the future with or without the Sharon Hills project although delays will increase with Sharon Hills. As this is a relatively minor intersection, we concur that signalization or other major improvements at this location are not appropriate.

During the morning and evening peak hours, the unsignalized Bay Road and East Street intersection operates at LOS F for the Existing Case and will remain at LOS F for the 2011 No-Build Case and the 2011 Build Case. Similarly the Bay Road and Plain Street intersection operates at LOS E during the morning peak hour and at LOS F during the evening peak hour for the Existing Case. For both the morning and evening peak hours the Bay Road and Plain Street intersection operates at LOS F under the 2011 No-Build Case and the 2011 Build Case. These operational deficiencies are common at unsignalized locations where main street traffic volumes are moderate to high. While through traffic moves unimpeded, side street traffic is delayed waiting for acceptable gaps in the main street traffic volume. Capacity limitations at both of these intersection locations could be addressed by provision of intersection improvements including traffic signal control.

In order to mitigate the traffic impacts of the proposed project, the TIAS proposes to provide off-site improvements in three locations. Under the 2011 Build Case, critical movements at the unsignalized Bay Road and East Street intersection operate at level-of-service (LOS) F for the morning and evening peak hours under the 2011 No-Build Case and will remain at LOS F for the 2011 Build Case. This intersection meets the MUTCD Warrants for signalization. Geometric improvements set forth in the TIAS including provision of an exclusive northbound left turn lane and separate left and right turn lanes on the East Street approach in combination with provision of traffic signal control will allow this intersection to operate at level-of-service A during the morning peak hour and at level-of-service C during the evening peak hour for the 2011 Build Case..

Improvements are also proposed for the Bay Road and Plain Street intersection. Under the 2011 Build Case, critical movements at this unsignalized intersection operate at level-of-service (LOS) F for the morning and evening peak hours under the 2011 No-Build Case and will remain at LOS F for the 2011 Build Case. This intersection meets the MUTCD Warrants for signalization. Geometric improvements including provision of an exclusive southbound left turn lane on the Bay Road approach in combination with provision of traffic signal control will allow this intersection to operate at level-of-service B or better during the AM and PM peak hours.



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Improvements are also proposed for the Bay Road at the site driveway which include provision of an exclusive northbound left turn lane on the Bay Road. The TIAS indicates this unsignalized location will operate at LOS B for the morning and evening peak hours for the 2011 Build Case.

To further mitigate the impacts of the project, Brickstone has committed to a Transportation Demand Management program that includes shuttle busses for the convenience of residents.

Although not addressed in the TIAS, PSC recommends safety improvements to the segment of Bay Road between Plain Street and Mountain Street at the Easton Town line be required as part of the site plan approval process required under the *Zoning By-Law*. Sight distance limitations currently exist along this section of Bay Road and should be addressed whether or not the Sharon Hills project is constructed. Although Sharon Hills will add less than two cars per minute to Bay Road north of the site during peak hours following full occupancy of the project, many of these drivers will be senior residents and accordingly there is enhanced concerns about vehicle safety. Additionally, these safety improvements will prove valuable with respect to emergency vehicle access and construction vehicle access.

During site plan review, the 85th percentile speed should be determined along each segment of Bay Road south of Plain Street. Obstructions including brush and grading should be removed to provide intersection sight distance at public and private ways along Bay Road. The horizontal and vertical alignment of the roadway should be evaluated with respect to accommodating the 85th percentile travel speed. A reconnaissance of Bay Road indicates isolated locations where substandard crest vertical curves limit sight distance. It is anticipated that the crest of these curves can be lowered one to two feet within the existing right-of-way and that these modifications would significantly improve sight distance. In other locations, horizontal sight distance is limited by roadside obstructions in areas of sharp horizontal curvature. Removal of brush and regarding sideslopes in these locations would significantly improve sight distance.

Under the proposed zoning changes, Brickstone retains the right to develop the property under the current two acre single family residential zoning. If the property were to be developed for single family residences, the overall trip generation would be comparable to the trips generated by the Senior Living District development. Comparative trip generation for these two development alternatives is set forth below.



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Comparative Trip Generation		
Single-Family Detached Housing		
Versus		
Senior Living District Development		
	Single Family Subdivision	Senior Living District
	88 Residences (ITE LUC 210)	624 Senior Residences & 150 Bed Nursing Home
Weekday 24 Hour		
Enter	463	N/A
Exit	463	N/A
Total	926	N/A
Weekday Morning Peak Hour		
Enter	18	74
Exit	54	37
Total	72	111
Weekday Evening Peak Hour		
Enter	60	38
Exit	36	88
Total	96	126

With development of single family residences under a conventional subdivision plan, it is likely that one or more entrances to the development would be located on Mountain Street. Mountain Street would have to be reconstructed and paved to connect to the southerly most subdivision road. It is likely that additional intersection upgrades would be required at intersections along Mountain Street north of the subdivision.