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M E M O R A N D U M

DATE: January 7, 2008

TO: Brian C. Curtis, P.E.
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FROM: Bruce Hillson - Traffic Engineering Solutions, P.C.

RE: Review of Traffic Information relating to the proposed 51,545 Square Foot Retail Development – Route 17 at Route 147

As requested Traffic Engineering Solutions, P.C. has initiated review of the traffic impact report prepared by Vanasse Hangen Brustlin, Inc. (VHB) for the 51,545 square foot retail development proposed for the northwest corner of Main Street (Route 17) and Middlefield Road (Route 147) in Durham. Our work included reviewing the following information.

- November, 2007 Traffic Impact and Access Study prepared by VHB.
- December 5, 2007 Memorandum prepared by VHB.

Below is a summary of our findings and review comments:

1. Turning movement traffic counts were made by VHB for the intersections of Main Street at Middlefield Road, Main Street at Haddam Quarter Road and Main Street at Wallingford Road (Route 68) on Saturday, August 4 and Tuesday, August 7, 2007 and machine counts were made on Main Street and Middlefield Road from August 3 to August 9, 2007. **Route 17 is a commuter route from shoreline communities to Middletown and points north and Route 68 is a commuter route to the office and industrial developments in Wallingford. Additionally, there are three schools (Coginchaug High School, Strong Middle School, and Korn School for third and fourth grades) located at or near the intersection of Routes 17 and 68. It is likely that the traffic counts made during August were made during a time when many people were vacationing, meaning commuter traffic along Routes 17 and 68 were likely lighter than would be expected during the Fall, Winter and Spring months. This is substantiated by comparing the afternoon peak hour traffic volumes from the May 2004 ConnDOT traffic count on Route 147 just west of Route 17 (afternoon two-way peak hour traffic volume was 696 vehicles) with the two-way traffic volume on Route 147 from the**

August 2007 traffic count(603 vehicles). Additionally, comparing the afternoon peak hour traffic volumes from the Route 17 Corridor Study (counts made during 1997) with the counts included in the Traffic Impact and Access Study found that the 2007 traffic volumes were less than those counted during 1997. The Applicant should provide information indicating August counts are typical of traffic volumes along the Routes 17 and 68 corridors or provide traffic counts that reflect conditions when a significant number of commuters are not vacationing and when schools are in session.

Traffic Engineering Solutions, P.C. reviewed the traffic count information presented in Figure 4 of the Traffic Impact and Access Study (based on August 2007 traffic counts) with the Statement on Page 12 of the Study which states "Roadway networks depicting the existing Friday evening and Saturday peak hour traffic volumes are presented in Figures 4." Figure 4 clearly depicts the Tuesday, August 7, 2007 traffic counts. VHB should clarify the statement that Figure 4 presents the Friday evening counts and indicate if their intent was to provide Friday counts. If new traffic counts are made, we would encourage that they be made on a Thursday or Friday.

2. The Traffic Impact and Access Study used trip generation information from the Institute of Transportation Engineers (ITE) to determine the morning and afternoon peak hour trips associated with the 51,545 square foot retail development. The trips associated with the development are shown in Table 3 at the top of page 20 of the Traffic Impact and Access Study. **Traffic Engineering Solutions, P.C. reviewed the trips generation information and found that the trips shown in Table 3 are an accurate representation of the trips associated with the development and the pass-by adjustment is consistent with the adjustment allowed by ConnDOT. If a restaurant, bank or other specific use is proposed for either of the out buildings or the main building, new trip generation calculations will need to be provided as many uses have generation rates greater than a shopping center.**

3. The traffic Study indicates that the 2007 traffic volumes were increased by 1.5 percent to reflect growth through the opening date (assumed to be 2008) and that there are no other approved but not yet constructed developments that will have impact on Routes 17 and 68. **Traffic studies typically use a 1.5 to 2.0 percent growth factor to increase base year traffic volumes to the year the development is expected to be completed and occupied. Using a 1.5 percent growth factor is consistent with growth factors typically used.**

4. Table 4 at the bottom of page 20 and Figure 6 (following page 21) of the Traffic Impact and Access Study presents the anticipated distribution of site trips. The study indicates that "Directional distribution of site generated traffic is a function of population surrounding the site, competing shopping opportunities, existing travel patterns, ease of access to the site, and traffic conditions on area roadways." **Traffic Engineering Solutions, P.C. was**

not able to review and confirm the trip distribution for site trips as no supporting information was included in the study for review.

5. Figure 7 presents the assignment of site trips to the surrounding roadway system. **Traffic Engineering Solutions, P.C. multiplied the trip generation information presented in Table 3 by the Trip Distribution shown in Figure 6 to confirm the trip assignment shown in Figure 7. Several inconsistencies (mostly minor) were found, particularly at the site drives. It is suggested that VHB review and correct Figures 7, 8 and 9 (additional inconsistencies were found in Figures 8 and 9 when site trips were added to the no-build traffic volumes).**

6. Intersection Sight Distances from the site drives onto Main Street and Middlefield Road are discussed under the heading of Driveway Sight Distance on Page 21 of the Traffic Impact and Access Study. The Study states: "The sight distance requirement was then calculated in accordance with ConnDOT Highway Design Manual procedures and is based on a design speed of 50 mph on Route 17 (Main Street) and 45 mph on Route 147 (Middlefield Road). For Route 17 (Main Street), the minimum requirement is 550 feet (***should actually be 555 feet per ConnDOT Highway Design Manual***) and for Route 147 the minimum required is 500 feet to the right and left. As measured in the field, sight distance at the drive on Route 17 exceeds the minimum requirement. At the unsignalized intersection of the drive on Route 147, adequate sight distance to the right is achieved by removing the trees and vegetation growth fifteen feet from the edge of the roadway in the proximity of the drive. Adequate sight distance to the left is achieved by removing the trees and vegetation growth fifteen feet from the edge of the roadway as well as regarding (***regrading?***) the embankment area along the northerly edge of the Route 147 roadway." **The Traffic Impact and Access Study does not state the actual sight distance available to drivers looking left from the Route 17 drive (looking right is not necessary as the drive is proposed to be restricted to right turns when leaving the site); however, the December 7, 2007 Vicinity Map (V-1) shows the Intersection Sight Distance as being >600 feet which is adequate for traffic approaching from the north on route 17 at speeds of 54 mph. The Traffic Impact and Access Study indicates that the sight distance for 45 mph design speed can be provided at the Middlefield Road drive. A speed study for Route 147 in the vicinity of the access drive should be done to determine the exact sight distances needed looking left and right from the site drive. The December 7, 2007 Vicinity Map shows a sight distance greater than 500 feet looking to the west (right from the drive) with grading done entirely within the limits of the site frontage. The Traffic Impact and Access Study implies that a sight distance greater than 500 feet looking to the left (east) can be achieved by clearing and grading along the north side of the road. In fact the intersection with Route 17 is 350 feet to the east and the maximum sight distance available is 350 feet (it should be noted that seeing into a nearby intersection is typically adequate since vehicles turning from the main street onto the side street (from Route 17 onto Route 147)**

are typically traveling a speeds far slower than the 85th percentile speed). In order to achieve the sight distance to the Route 17 intersection, clearing and grading is required along the frontage of the abutting property. An easement will be required from that property owner to allow the work needed to provide the sight distance to the intersection. The Applicant should provide a letter from the abutting property owner indicating that he/she is willing to grant the sight line necessary easement. A second sight distance was not discussed by the Traffic Impact and Access Study, the Intersection Sight Distance for a Stopped Vehicle Turning Left. This evaluation should be provided.

7. Page 17 of the Traffic Impact and Access Study provides a brief discussion about the 1998 Route 17 Corridor Study. **Five general strategies were identified but no discussion of any of the specific intersection improvements was presented. The Study recommends improvements to route 17 from north of Middlefield Road to south of Haddam Quarter Road. The Applicant should discuss how the proposed improvements are consistent or differ from the recommendation of the Route 17 Study.**

8. Capacity analyses for the Existing, No-Build, Build and Build with improvements were completed for the intersections of Main street at Middlefield Road and Haddam Quarter Road, Main Street at Route 68 and Middlefield Road at Maple Avenue (included in the December 5, 2007 memorandum). Additionally, capacity analyses were completed for the intersections of Main Street at the site drive and Middlefield Road at the site drive. **Traffic Engineering Solutions, P.C. attempted to review the capacity analyses included in the Appendix to the study but was unable to do so because the printouts did not provide all the input information (i.e. traffic volumes) for all movements to allow confirmation that this information was inputted correctly. However, comments relating to the results of the capacity analyses are provided below.**

   While the comment in Item 1 above asks the Applicant to demonstrate that the August 2007 traffic counts are typical of traffic flows along the Route 17 and 68 corridors, the results of the capacity analyses and queuing analyses which were based on the August traffic counts were reviewed. One location presently operates at a Level of Service that is typically considered unacceptable (Route 17 at Route 68 operates at Level of Service E during the afternoon peak hour). However, lengthy queues or queues longer than the distance between intersections exist at all three of the signalized intersections that were included in the study. The southbound queue on Route 17 at Middlefield Road is longer than 900 feet, the northbound left turn queue at the same intersection is 250 feet (distance back to Haddam Quarter Road is only 150 feet), the southbound queue on Route 17 at Haddam Quarter Road is 284 feet (distance back to Middlefield Road is 150 feet), the southbound queue on Route 17 at Route 68 is 955 feet

and the eastbound queue on Route 68 at Route 17 is 700 feet. These queues occur during the afternoon peak hour.

With no improvements two locations will operate at Levels of Service which are typically considered unacceptable during the afternoon peak hour. Route 17 at Route 68 will operate at Level of Service F and Route 17 at Middlefield Road will operate at Level of Service E. Saturday Levels of Service are LOS D or better. The southbound queue on Route 17 at Middlefield Road would be longer than 1050 feet, the northbound left turn queue at the same intersection would be 333 feet (distance back to Haddam Quarter Road is only 150 feet), the southbound queue on Route 17 at Haddam Quarter Road would be 226 feet (distance back to Middlefield Road is 150 feet), the southbound queue on Route 17 at Route 68 would be more than 1,100 feet and the eastbound queue on Route 68 at Route 17 would be 772 feet.

With the proposed improvements only the intersection of Route 17 at Route 68 would operate at a Level of Service that is typically considered unacceptable. This intersection would operate at Level of Service E but would be on the cusp of Level of Service F (average delay per vehicle would be 79.8 seconds and the threshold between LOS E and LOS F is 80.0 seconds per vehicle). The southbound queue on Route 17 at Middlefield Road would be 352 feet, the northbound left turn queue at the same intersection would be 265 feet (still greater than the 150 foot distance back to Haddam Quarter Road), the southbound queue on Route 17 at Haddam Quarter Road would be 60 feet (shorter than the 150 foot distance back to Middlefield Road), the southbound queue on Route 17 at Route 68 would be more than 1,250 feet and the eastbound queue on Route 68 at Route 17 would be 868 feet.

9. Page 32 of the Traffic Impact and Access Study discusses the Driveway Access and Figure 10 shows additional lanes proposed for Route 17 south of the site drive. An exclusive northbound left turn lane will be provided on Route 17 at the site drive to allow through traffic to continue past vehicles turning onto the site without being impacted by turning vehicles. **An analysis of the site drive on Middlefield Road should be completed to determine if a left turn lane or by-pass is needed to allow through traffic to continue past vehicles turning left onto the site drive. Additionally, a plan showing the proposed improvements on Route 17 from south of the site drive to south of Haddam Quarter Road should be provided to allow the Commission to see the impact these improvements. Additionally, the second southbound lane will impact vehicles turning left from abutting properties along the west side of Route 17. The Applicant should identify the properties that will be impacted and determine the added delay that should be expected by drivers turning left from these drives.**

Suggestions have been made by residents that additional local roads should have been included in the Study since traffic presently uses these roads

to avoid congestion on Route 17 or Route 68. The Applicant has provided additional information for the intersection of Middlefield Road and Maple Avenue in their December 5, 2007 memorandum. While this review agrees that traffic may presently seek alternate routes to avoid congestion on Route 17, implementation of recommendations included in the Route 17 Corridor Study would be needed to reduce or eliminate drivers from seeking alternate travel routes. Our review of the Applicant's traffic study focused on the impacts of the proposed development, the Applicant's proposed improvements, and the implications of the proposed improvements.

Traffic Engineering Solutions, P.C. has attempted to identify additional information that should be provided by the Applicant and information that should be further reviewed by the Applicant and justified or updated so that the Traffic Impact and Access Study truly represents typical traffic conditions along Route 17 and Route 68. Further review will be needed for responses by the Applicant and further information may be requested at that time to clarify the responses.

If you have any questions, please call me.

Bruce