**Howard/Stein-Hudson Associates, Inc.**
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# MEMORANDUM

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| To: | Steve Heikin<br>Vice President and Senior Principal,<br>ICON architecture, inc. | Date: | November 13, 2012 |
| From: | Keri Pyke, P.E., PTOE | HSH Project No.: | 2012045.00 |
| Subject: | Cushing Village, Belmont, MA<br>Peer Review of Traffic Impact Study | | |

As requested, Howard/Stein-Hudson Associates (HSH) conducted a peer review of the Traffic Impact Study prepared for Cushing Village in Belmont, Massachusetts. The Project encompasses the southwest corner of the intersection of Trapelo Road/Common Street/Cushing Avenue with frontage along the entire block of Common Street between Trapelo Road and Belmont Street. Our evaluation is based upon the following documents:

- *Traffic Impact, Access & Parking Study, Proposed "Cushing Village" Mixed Use Redevelopment, Cushing Square, Belmont, Massachusetts,* prepared by TEC, Inc., dated October 12, 2012.
- *Memorandum, Cushing Village Redevelopment Project, Updated Trip Generation Assessment,* prepared by TEC, Inc., dated October 24, 2012.

The purpose of this review is to ensure that the traffic study analysis conforms to industry standards, to confirm that accepted traffic study methods were used, and to ensure that the recommendations contained in the report adequately address potential project impacts.

The project site is located on the southwest corner of the intersection of Common Street/Cushing Avenue/Trapelo Road with frontage along the entire block of Common Street between Trapelo Road and Belmont Street. The project description contained in the traffic study indicates redevelopment of the existing site, which currently contains a vacant CVS/Pharmacy (6,200 SF), a Starbucks (2,430 SF) with 30 seats, approximately 12,065 SF of specialty retail and restaurant space, the foundation of a former 3,590 SF retail building, and a municipal parking lot containing 50 public parking spaces. The proposed development consists of a maximum of 118 residential apartment units, a 2,000 square-foot (SF) Starbucks, a 5,200 SF quality restaurant, and a 3,430 SF health and fitness club. Access to the site will be provided via two access driveways, a consolidation of the nine driveways that currently exist. According to the Town of Belmont's zoning and regulations, the required parking is 224 spaces, not accounting for allowed reductions for proximity to municipal parking and public transportation, which can be granted at the Planning Board's discretion. Accounting for those reductions, the Project would require 157 parking spaces. The Project will also replace the municipal surface parking lot, an additional 50 spaces, that it will displace, and four on-street spaces on Horne Road that will be displaced. Without the discretionary reductions, the Project would be required to provide 278 parking spaces. The Project will provide 234 parking spaces, including the 50 municipal public parking spaces and four on-street spaces.

The key findings of our peer review of the traffic assessment are presented in the following sections.

# Scope of Review

The following issues were reviewed in the traffic assessment as part of the peer review:

- Study Area Boundaries
- Traffic Data Collection
- Selection of Peak Hour
- Safety Information
- Background Traffic Growth
- Planned Transportation Improvements
- Site Traffic Generation and Distribution
- Parking Demand
- Traffic Impact Analysis
- Mitigation Measures
- Construction Period Traffic
- Site Access
- Truck Traffic

# Review Results

Each of the key issues of the peer review is discussed below.

## Study Area Boundaries

The study area in the report includes the following intersections:

1. Trapelo Road/Common Street/Cushing Avenue (signalized)
2. Trapelo Road/Starbuck's Driveway/future Northerly Site Driveway (unsignalized)
3. Trapelo Road/Williston Road (unsignalized)
4. Common Street/Horne Road (unsignalized)
5. Williston Road/Horne Road (unsignalized)
6. Horne Road/Poplar Street (unsignalized)
7. Common Street/Belmont Street (signalized)

Based on the size of the project, the study area is appropriate.

## Traffic Data Collection

The turning movement counts (TMCs) were conducted at the aforementioned locations on June 15, 2010, during the weekday AM (7:00 – 9:00 AM) and weekday PM (4:00 – 6:00 PM). The Saturday midday peak period (11:00 AM – 2:00 PM) TMCs were conducted on June 12, 2010. The raw count data is included in an appendix of the traffic report. For comparison, HSH reviewed the count data collected as part of the re-design of Belmont Street and Trapelo Road. These data were collected in June 2005. The review indicates no obvious flaws in the data, and the turning movements recorded appear to match expected traffic patterns in the study area.

In addition to the turning movement counts, hourly traffic volume data was collected on Trapelo Road, Horne Road, and Common Street in June and July 2010. As with the TMCs, HSH compared the count data for Trapelo Road collected as part of the re-design of Belmont Street and Trapelo Road with the data collected to prepare the impact study. Table 1 summarizes those data for ease of comparison.

Table 1. Comparison of ATR Data – Trapelo Road

| Source | Location | Weekday Volume (vpd) |
|---|---|---|
| Trapelo Road/Belmont Street Corridor Improvements FDR, data collected June 2005 | East of Common Street | 15,737 |
| Cushing Village Mixed Use Redevelopment TIAPS, data collected June 2010 | West of Common Street | 16,170 |
| | **Difference** | **+433** |

This indicates that the traffic volumes in the area have experienced a 2.75% increase over 5 years, or approximately 0.5%/year.

MassDOT no longer publishes seasonal factors, but instead recommends use of monthly ADTs from a nearby permanent count station to determine the seasonal variations. The study reviewed data at MasssDOT permanent count stations in Woburn (#4049) and Lexington (#4118) to determine whether seasonal adjustment was required. According to the report, the traffic volumes collected in June 2010 did not require an adjustment to reflect annual average conditions, because June volumes are typically 4% above the annual average. However, the count station data included in Appendix C do not include station #4049 in Woburn but do include several other count stations along I-93 and I-95/Route 128. There is only one year of data provided for Station #4118 in Lexington, which indicates that June volumes are only 1% above the annual average. **The Applicant should provide the data for Station #4049 so that HSH can verify the seasonal factor to determine whether seasonal adjustment should be applied.**

Regardless of the data issues cited, the volumes were not adjusted down to reflect average conditions. Because the volumes were not adjusted, this has the effect that the analysis done using these volumes may be overly conservative, especially considering other compounding factors, such as annual growth rate. By extension because they are the basis of the No Build and Build Conditions volumes, the lack of seasonal adjustment may also have the effect of minimizing the impacts of the project.

## Selection of Peak Hour

The peak hour identifies the critical time periods of the day, along the adjacent roadway network. Identifying the peak helps assess impact of the site traffic on the adjacent roadway network and to define the roadway configurations and traffic control measure changes in the study area.

Based on a review of the raw count data, the peak hours at the two major intersections, Cushing Square and Belmont Street/Common Street occur at different times in the weekday AM peak period. It is unclear whether a system peak hour for each peak period was used. **The Applicant should clarify whether a system peak hour or individual intersection peak hours were used.** Table 2 summarizes the peak hours at the two signalized intersections.

Table 2. Summary of Peak Hours

| Location | Weekday AM peak hour | Weekday PM Peak Hour | Saturday Midday Peak Hour |
|---|---|---|---|
| Cushing Square (Trapelo Road/ Common Street/Cushing Avenue) | 8:00 – 9:00 AM | 5:00 – 6:00 PM | 11:45 AM – 12:45 PM |
| Belmont Street/Common Street | 7:30 – 8:30 AM | 5:00 – 6:00 PM | 11:45 AM – 12:45 PM |

## Safety Information

Review of existing crash data within the study area should include recent (within 3 years) crash experience. This review should identify locations where traffic safety should be given extra consideration. High crash locations on roadways serving the study area site should be analyzed, and measures to alleviate crash hazards should be considered.

The crash data was obtained from the MassDOT database for the years 2007 – 2010, four years of data. The data represented the most recent four-year period available from MassDOT. The Applicant did not obtain crash data from the Belmont Police Department. According to the data, approximately 11 crashes occurred at Cushing Square; 6 crashes occurred at Trapelo Road/Williston Road; and 7 crashes occurred at Belmont Street/Common Street. No potential hazards were identified at any of the aforementioned study intersections that will not be corrected as part of the Trapelo Road/Belmont Street corridor project.

As part of the project, the Applicant will close all nine existing driveways, relocating two of them for use by the development. The Applicant did not review sight distance at the proposed driveway locations. **We recommend that they provide sight distance information for the two proposed driveway locations.**

## Background Traffic Growth

Two procedures are used to determine background traffic growth. The first method of determining background traffic growth is to apply a general growth rate to account for changes in demographics, auto usage, and ownership. The second procedure is to estimate and distribute specific traffic volumes generated by planned new major developments and anticipated roadway changes.

The Applicant reviewed the Functional Design Report (FDR) for the Trapelo Road/Belmont Street Corridor Improvements project and compared the turning movement counts for Cushing Square collected in 2005 to their turning movement counts collected in 2010. These indicated a decrease in traffic volume, on the order of -1.3% per year. The Applicant also reviewed MassDOT temporary count station data for surrounding cities and towns, including both highways and local arterial streets. These data indicate a general decreasing trend of -2.6% per year. To provide a conservative analysis, the Applicant used a 1% per year growth rate.

HSH reviewed the ATR counts from the same two sources (FDR and Applicant's study) for Trapelo Road. These data indicate a small positive change (see Table 1 of this report) in traffic volumes over 5 years. The FDR for the Trapelo Road/Belmont Street Corridor Improvements used an annual growth rate of 0.4% per year, based on Central Transportation Planning Staff (CTPS) regional model data. Based on the combination of the ATR comparison and other studies in the area, HSH believes that an annual growth rate of 0.5% per year is more appropriate. The higher background growth rate compounded with no seasonal adjustment means that the project's generated traffic is being compared to larger volumes, having the effect of diminishing its overall impact on traffic operations.

The Applicant consulted with the Town's Community Development Department and determined there were no other imminent development projects to be added as background. The Applicant did add trips into the 2017 No Build Condition to account for re-use of the existing vacant properties, which could be done by right. In the memo detailing the updated trip generation for the re-use, it does not appear as though the Applicant applied the multi-use trip methodology to the re-use trip generation as they did for the proposed development trips, thus resulting in more primary trips related to the re-use. This has the effect of potentially overstating the effect of the re-use, so that the No Build condition analysis looks worse than it may actually be under the No Build Condition.

**We request that the Applicant update the No Build traffic volumes using a 0.5% per year growth rate. We also request that they apply the multi-use trip generation principle to the re-use trip generation calculation for consistency of methodology. The No Build Conditions traffic analysis should be updated once the revised No Build volumes have been calculated.**

The Town's recent special zoning overlay allows for mixed use redevelopment in Cushing Square. It would be helpful for the Town to see the overall traffic impacts of these potential changes on operations in the area. The Town's Community Development Department and/or the Town's land use and traffic consultants can provide guidance as to the worst-case land use scenario to be analyzed as the full build out condition. **We request that the Applicant provide traffic analysis of the potential full build out of Cushing Square. The Applicant should provide the trip generation for weekday daily, weekday PM peak hour, and Saturday daily conditions. The Applicant should also detail what percentage of the potential full build out traffic the Applicant is contributing in each time period.**

## Planned Transportation Improvements

The traffic analysis must also take into account planned improvements to the transportation network. In this case, the Applicant has included the improvements of the Trapelo Road/Belmont Street Corridor Improvements project, currently under construction.

## Site Traffic Generation and Distribution

Trip generation is used for forecasting travel demands and predicts the number of trips originating in or destined for a particular use. The industry standard method for trip generation uses the Institute of Transportation Engineers (ITE's) *Trip Generation, 9th edition*. However, the 9th edition was only released recently, October 2012, so the 8th edition is also acceptable.

The process that the Applicant applied to calculate the proposed trips of the new development is as follows:

1. Generate trips for proposed land uses including pass-by and multi-use trips;
2. Generate trips for reoccupancy of existing buildings including pass-by trips; and
3. Subtract reoccupancy trips from proposed trips, including pass-by and multi-use trips.

Table 3 summarizes the proposed land uses, with the quantities and land use codes used for trip generation purposes, according to the memo dated October 24, 2012. A review of the site traffic projections finds that the trip generation rates used in the traffic study do not correspond to the applicable ITE land use categories for the land use proposed for the project. While the land uses shown in Table 3 are those cited in the body of the technical memorandum updating the trip generation, review of the calculations indicate that not all of these land use codes were included in the analysis. It appears that the walk-in bank, the specialty retail, and the market/drugstore were all generated using the shopping center land use code. In addition, there are discrepancies among the square footages used to generate trips for the various land uses. While these discrepancies may or may not result in significant changes to the overall project trip generation, the Applicant should correct them. For example, the memo cites the size of the quality restaurant as 5,200 SF, but the calculations use 5,000 SF.

Table 3. Proposed Land Use Summary

| Land Use | Amount | Land Use Code |
|---|---|---|
| Market/drugstore | 18,000 SF | 850 - Supermarket |
| Quality restaurant | 5,200 SF | 931 – Quality Restaurant |
| Walk-in bank | 3,800 SF | 911 – Walk-in Bank |
| Health club | 3,430 SF | 492 – Health/Fitness Club |
| Starbucks | 1,800 SF | 936 – Coffee/Donut Shop without Drive-through Window |
| Specialty retail | 5,030 SF | 814 – Specialty Retail |
| Apartment | 118 units | 220 - Apartments |

It is unclear why the Applicant generated trips for the Starbucks, which currently exists, will remain once the Project is complete, and is expected to generate a similar level of traffic when the project is complete. The traffic counts taken in June 2010 at all the intersections should have accounted for the presence of the Starbucks, even though the Applicant did not specifically count the Starbucks driveway. Adding the Starbucks into the trip generation, either for the reuse/reoccupation of the existing buildings or the future development seems to double count its impact.

**As noted regarding the calculations of the re-occupancy trip generation for the No Build volumes, the Applicant should apply the multi-use trip calculation consistently and update the proposed trip generation and assignment.**

In the updated trip generation memo, a footnote of Table 3 states that pass-by trip rates were applied as follows: 44% of restaurant trips, 26% of retail trips during all periods except weekday evening peak hour, 34% of retail trips during the weekday evening peak hour. The calculations attached to the memo indicate that 53% passby was applied in the reoccupancy trip generation to the pharmacy/drug store land use and 49% and 50% passby were applied to the Starbucks trip generation for the weekday AM peak hour and all other time periods, respectively. **The Applicant should clarify whether the statement in the body of the memo regarding passby trips is correct and that the calculations correctly apply the passby rates.**

The directional distribution of project traffic was based on existing travel patterns and varies depending on time of day. Using existing travel patterns to determine the trip distribution pattern for the proposed project's retail/restaurant components is reasonable. Did the Applicant review U.S. Census data for use for the residential trip distribution? **The Applicant should review the 2010 American Community Survey of the U.S. Census data to determine whether information is available for the Project's Census tracts and update the residential trip distribution and assignment, if necessary.**

## Parking Demand

The proposed development includes a total of 234 spaces, including the 50 municipal public parking spaces and replacement of four on-street spaces. The Applicant estimated the parking demand based on both the zoning requirements as well as using ITE parking demand rates. The Applicant calculated the number of spaces required by zoning including taking credit for the allowed reductions in parking based on proximity to municipal parking and public transportation, which are discretionary. We are concerned about those deductions, particularly given that the Applicant currently plans to locate all the municipal spaces in the basement level parking garage. They will not be as accessible and are less likely to be used by patrons of Cushing Square. This could lead to more illegal parking in areas such as loading zones, bus stops, crosswalks, and fire hydrants. **The Applicant should also assess the impacts of the public parking being located underground on the public perception and utilization of them.** How will this affect the overall supply compared to demand? We recommend that the Applicant provide

the replacement municipal parking spaces in the 19-space surface lot and the first floor parking in the Hyland Building. The dedicated commercial parking spaces will most likely be used by owners/employees of the businesses and therefore have lower turnover than the municipal spaces.

**The Applicant should explain how the parking will be managed to prevent illegal parking.** In the parking management plan, the Applicant should specify the maximum number of residential parking spaces.

The Applicant also performed a study of the existing parking supply. As part of that study, they observed existing on-street parking spaces within the study area as well as the municipal parking lot. The study included counts over time of how many spaces in each area were occupied on both a weekday as well as the midday period on a Saturday. However, one unknown that has not been adequately addressed by the Applicant's parking study is the turnover of these parking spaces. Determining the turnover of the public parking spaces in the study area, and particularly the municipal parking lot, helps in understanding how long users are parking in the various areas. In order to understand the parking turnover, the existing parking regulations must also be catalogued. In inventorying the on-street curb use, it is also helpful to note locations such as bus stops, fire hydrants, crosswalks, and loading zones where motorists may park illegally. **We recommend that the Applicant perform a curb use inventory and turnover study to better understand the usage of the public parking in the area.**

## Traffic Impact Analysis

To assess the potential traffic impact of the residential development on the adjacent traffic network, several steps are involved, as follows:

1. Determine existing volumes and analyze existing traffic operating conditions for the study intersections.
2. Generate No Build traffic volumes by applying a background growth factor to the existing traffic volumes and adding approved/pending developments as well as planned transportation improvements. Analyze No Build conditions.
3. Determine the traffic volumes to be generated by the proposed development; distribute and assign traffic throughout the study area network.
4. Combine the background traffic volumes with the proposed traffic volumes to establish Build traffic volumes, analyze traffic operating conditions and identify mitigation of potential impacts.

HSH reviewed the existing traffic operations analysis. **Was the existing traffic analysis calibrated to existing field conditions using such measures as peak hour queue lengths?**

**We request that the Applicant update the No Build and Build traffic analysis to reflect the comments regarding the traffic volumes, after which we will update our assessment of the analysis. The Applicant should clarify whether the Build conditions analysis optimized the signal timings at either signalized intersection.**

## Mitigation Measures

*Cushing Square (Trapelo Road/Common Street/Cushing Avenue)*
**We request that the Applicant re-assess potential mitigation at Cushing Square following the update of the analysis related to other comments contained in this memo.**

*Common Street/Belmont Street*
The Applicant proposes restriping the Common Street northbound approach as an exclusive left-turn lane and a through/right-turn lane in place of the existing left-turn/through lane and exclusive right-turn lane. What effect will this have on operations at the intersection? The proposed restriping appears to move the centerline of the Common Street northbound approach farther to the west. Will this have any effect on larger vehicles' ability to turn right from the Belmont Street eastbound approach onto Common Street?

## Construction Period Traffic

There is no discussion in the study of construction period traffic. How will the project be staged for construction? What are the proposed access routes for construction vehicles? How will construction be managed? Is the construction expected to begin before the Trapelo Road/Belmont Street Corridor Improvements Project is complete? Where will construction workers assigned to the site park? **We request that the Applicant provide information regarding the expected amount and management of construction traffic.**

## Site Access

The Applicant is proposing access to the site via two driveways, which is a reduction from the existing nine driveway locations that are currently used to access the various parking areas that serve the existing buildings. The consolidation of driveways is an improvement over the existing condition, providing fewer conflict points for access. The primary access to the site will be via the driveway on Common Street, which provides access to the parking areas, including the underground parking.

## Truck Traffic/Loading

No information was provided in the study regarding loading activities such as deliveries, move-in/move-out, and trash/recycling pickup. **HSH requests that the Applicant provide an estimate of the number of truck trips expected to the site on a daily and peak hour basis. We also request that the Applicant provide information regarding where those activities will take place.**

# Conclusions

HSH requests that the Applicant do the following:

1. Provide the data for MassDOT count station #4049 so that HSH can verify the seasonal factor to determine whether seasonal adjustment should be applied.
2. Clarify whether a system peak hour or individual intersection peak hours were used in the analysis.
3. Provide sight distance calculations for the proposed driveway locations.
4. Update the No Build traffic volumes using a 0.5% per year growth rate.
5. Apply the multi-use trip generation principle to the re-use trip generation calculation for consistency of methodology.
6. Re-analyze No Build Conditions using the revised No Build volumes.
7. Review and confirm the land uses, square footages, passby trip rates and calculations, multi-use trip calculations, etc. in the trip generation calculations for consistency;
8. Revise the Build traffic analysis as necessary as a result of changes to the No Build and Build volumes;
9. Provide traffic analysis of the potential full build out of Cushing Square, including trip generation for weekday daily, weekday PM peak hour, and Saturday daily conditions. The Applicant should also detail what percentage of the potential full build out traffic the Applicant is contributing in each time period.
10. Perform an inventory of existing curbside regulations, including the municipal parking lot; and
11. Perform parking turnover of the same study area as the occupancy study;
12. Assess the proposed parking supply if the utilization of the municipal parking spaces were significantly lower because more than half of the spaces would be located in the underground parking structure.
13. Consider again the mitigation upon completion of the updated Build analysis.
14. Provide information regarding the expected amount and management of construction traffic.
15. Provide information regarding how the Applicant will handle loading activities such as deliveries, trash/recycling pickup, and move-in/move-out activities.

This concludes our review of the traffic impact, access, and parking study of the proposed Cushing Village Mixed Use Redevelopment. If you have any questions or comments, please contact Keri Pyke at (617) 348-3301.