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TO:	Mr. David Kucharsky	DATE:	October 4, 2018
FROM:	Keri Pyke, P.E., PTOE Ian McKinnon, P.E., PTOE	SH PROJECT NO.:	2018149
SUBJECT:	Waterstone and Bridges at Lexington, Lexington, Massachusetts Traffic Engineering Peer Review Services		

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## Introduction

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Howard Stein Hudson (HSH) has conducted a peer review of the materials prepared for the proposed development at 55 & 56 Watertown Street in Lexington, Massachusetts. The purpose of the review is to ensure that the traffic analysis conforms to industry standards, to confirm that the traffic study methods are appropriate for the setting, and to ensure that the recommendations and proposed mitigation adequately address potential project impacts and are consistent with the Town of Lexington's guidelines for transportation improvements.

Our evaluation is based on the following documents:

- *Traffic Impact Study, Waterstone and Bridges at Lexington – Lexington, MA*, Prepared by Stantec Consulting Services, Inc., Dated April 27, 2018;
- *Appendix for Traffic Impact Study, Waterstone and Bridges at Lexington – Lexington, MA*, Prepared by Stantec Consulting Services, Inc., Dated April 27, 2018; and
- *Site Development Plan Set, Waterstone at Lexington, 55 Watertown Street Lexington, MA*, Prepared by Stantec Planning and Landscape Architecture P.C., Dated June 8, 2018.
- *Site Development Plan Set, Bridges at Lexington, 56 Watertown Street Lexington, MA*, Prepared by Stantec Planning and Landscape Architecture P.C., Dated June 8, 2018.
- *Traffic Impact Study Letter Amendment, Waterstone and Bridges at Lexington – Lexington, MA*, Prepared by Stantec Consulting Services, Inc., Dated August 29, 2018.

The Project consists of the construction of two developments on two separate parcels directly across the street from one another. The first proposed development, Bridges at Lexington, includes 48 units of Memory Care assisted living. The second development, Waterstone at Lexington, comprises a senior living community including 40 units of assisted living and 116 units of independent living.

Access to the site(s) would be provided by one unsignalized, full access driveway along Watertown Street. The western driveway will serve the entirety of the Waterstone at Lexington facility on Lot B. The eastern driveway will provide access to the Bridges at Lexington on Lot A.



The key findings of the review of these documents are summarized below and presented in the following sections. The comments are organized by the same headers provided in our outlined scope of services.

## Summary of Review

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HSH conducted a comprehensive peer review of the Traffic Impact Study (TIS) for the proposed senior living community(s) located 55 & 56 Watertown Street in the Town of Lexington. This memorandum consists of a review of the methodology and assumptions used in the TIS, the key findings of the TIS, the appropriateness of the proposed mitigation, and the consistency of the mitigation with Town guidelines. HSH also conducted a site visit on September 27<sup>th</sup>, 2018 to observe existing traffic conditions, and area bike and pedestrian activity.

The review of the methodology and assumptions used in the TIS indicates that in general, the traffic study conforms to industry standards and best engineering practices. The TIS includes an analysis of Existing, No-Build (future conditions without the Project), and Build (future conditions with the Project) conditions. The Applicant identified the potential transportation related impacts of the Project by estimating the number of trips expected to travel to and from the Project site during the weekday a.m. and weekday p.m. peak hours of traffic operations. Data provided in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual* and empirical count data was used, and projected traffic volumes were assigned to the study area to develop the Build conditions.

In summary, the proposed Project is expected to generate approximately 41 new trips (19 entering, 22 exiting) in the weekday a.m. peak period and 55 new trips (26 entering, 29 exiting) in the weekday p.m. peak period. Based on the analysis provided in the TIS, the surrounding roadways and intersections have adequate capacity to handle the increase in traffic volumes.

## Scope of Review

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The following issues were reviewed:

- Study Area Boundaries
- Traffic Data Collection
- Selection of Peak Hour
- Off-site Changes
- Non-site Traffic
- Trip Generation
- Parking Demand
- Site Traffic Distribution and Assignment
- Traffic Impact Analysis
- Mitigation Measures
- On-site Planning and Parking
- Pedestrians
- Construction-period Issues
- Geometric Design Criteria



## Existing Conditions

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### STUDY AREA BOUNDARIES

The Applicant has studied intersections as part of the proposed rezoning. As such, they tried to follow the standards of the existing zoning bylaws, which require study based on projected 5% or higher change in volume at intersection approaches. The Applicant included the following three intersections in the TIS:

- Watertown Street at Route 2 Westbound ramps (unsignalized);
- Watertown Street at Route 2 Eastbound ramps (unsignalized); and
- Watertown Street at Lot A & Lot B driveways (unsignalized);

The roadway network defined by the Applicant includes the following streets:

- Watertown Street; and
- Route 2.

*HSH agrees with the defined study area boundaries.*

### TRAFFIC DATA COLLECTION

The Applicant conducted turning movement counts (TMCs) at each of the study area intersections during the weekday morning peak period (7:00 – 9:00 a.m.) and weekday evening peak period (4:00 – 6:00 p.m.). The counts were conducted in December 2017, when Lexington public schools were in session. The Town of Lexington requested a second count in February 2018, but the applicant chose to use the higher December counts to represent a more conservative analysis. A nearby MassDOT permanent count station on Route 2 showed that the month of December has lower than average traffic volumes, and the TMC data was adjusted upward five percent (5%). Upon review, only the morning peak hour data was adjusted, but the afternoon data remained unadjusted. While not typical traffic engineering methodology, the difference in volumes has a nominal effect on operations analysis. Automatic Traffic Recorder (ATR) counts were conducted concurrent with the TMCs on Watertown Street for a 48-hour weekday period.

*HSH agrees with the Applicant's data collection methodology. HSH confirms the low non-motorized activity along Watertown Street as presented in the traffic count data appendix. During morning peak hour observations, only two pedestrians and two bicycles were observed travelling southbound toward Belmont. Conversations with pedestrians indicated destinations to and from MBTA bus stops and the Belmont Country Club for work. Afternoon peak hour observations indicated just one pedestrian and no bicycle activity.*



## SELECTION OF PEAK HOUR

The Applicant studied a morning peak period of 7:00 – 9:00 a.m. and a weekday evening peak period of 4:00 – 6:00 p.m. and did not specifically identify the peak hours. While not critical to this review, typically studies have identified a specific 60-minute period. The applicant used peak hour volumes and not two hours of volume data. Per the traffic data included in the appendix the peak hours for the morning and afternoon are 7:15 - 8:15 a.m. and 4:15 – 5:15 p.m., respectively. This definition of the “peak period” matches Section 135-10.0 of the Zoning Bylaws.

*HSH agrees with the Applicant’s selection of peak hour.*

## Future Conditions

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### OFF-SITE CHANGES

The Applicant lists future roadway improvement projects that are proposed to be completed by the Town of Lexington or MassDOT, which consist of intersection geometry and signal enhancements, as well as roadway and sidewalk improvements, within the study area.

The Lexington Planning Department has concluded that no projects or improvements are proposed or recently completed near the Project. Other improvements outside the study area are not expected to impact vehicular operations.

*HSH generally agrees with the Applicant’s methodology in determining if there are any relevant off-site transportation changes.*

### NON-SITE TRAFFIC

The Applicant used nearby MassDOT continuous count stations on Route 2 to identify annual traffic growth in the area. The Applicant indicated that although the traffic volumes have increased consistently in recent years, a 1% annual growth rate was used to provide a conservative analysis.

The Applicant consulted with the Lexington Planning Department and identified no other development projects that would affect traffic in the study area.

*HSH agrees with the background growth rate applied and the methodology in determining No-Build volumes within the study area.*

### TRIP GENERATION

To estimate the site-generated traffic for the proposed Project, the Institute of Transportation Engineers’ (ITE’s) *Trip Generation, 10<sup>th</sup> Edition* was utilized based on Land Use Codes (LUC) 254 –



Assisted Living and 252 Senior Adult Housing – Attached. The applicant used the Land Use Assisted Living for the Memory Care component of the project due to similar expected trip making propensity. Project trips were dwelling units for the Senior Adult Housing and beds for the Assisted Living. The proponent used a density of 1.1 beds per dwelling unit for these calculations. The Applicant estimates that 41 new trips (19 entering, 22 exiting) will be generated by the Project in the weekday a.m. peak period and 55 new trips (26 entering, 29 exiting) will be generated by the Project in the weekday p.m. peak period. These trips were applied to the No-Build volumes to calculate Build volumes.

The proponent utilized the entering/exiting ratios for assisted living LUC 254 for new trips of both land uses on Lot B. This ratio is relatively balanced in both periods, capturing the balance of resident and employee trips. The senior independent living facility portion of the development would be more typical of a residential land use with a higher percentage of vehicles leaving in the morning and higher percent entering in the afternoon peak hour. While not typical of larger traffic studies, this methodology on a small trip generating facility will not affect traffic operations drastically. No mode share credit was applied to the trip generation.

*HSH agrees with the Applicant's trip generation methodology.*

## **PARKING DEMAND**

The Project proposes up to 225 parking spaces across the two parcels. The Bridges at Lexington will have 50 surface parking spaces, of which four will be handicap accessible. The Waterstone at Lexington will have 152 spaces upon opening spread across surface and garage bays, of which four will be handicap accessible. The proponent indicated an area for an additional 23 parking spaces have been set aside if future need arises. The proponent used ITE's 4<sup>th</sup> Edition Parking Generation manual to generate parking supply needs for the site. Rates of 0.59 and 0.41 for senior independent living and assisted living, respectively, were used to project minimum parking space demands. In addition to parking demand projections, the Town of Lexington Zoning Bylaws specify parking requirements based on land use. Per Town Bylaws, assisted living residences require 0.4 parking spaces per living unit, therefore the proposed 48 living units on Lot A requires approximately 20 parking spaces for residents, employees, and guests. Lot B with 40 assisted living units require approximately 16 spaces. Also, on Lot B the senior independent living units would likely fall under Lexington bylaws definition of a Congregate living facility requiring 0.75 parking space per bedroom. The proponent has identified adequate parking facilities to support the needs of residents, staff and visitors.



Due to the unconnected facilities comprising the Project, each development will require individual loading facilities. According to the Town of Lexington Zoning Bylaws, long-term care facilities require 1 loading bays per 100 beds; therefore, the Bridges at Lexington facility with 48 units or 53 beds requires 1 bay. The Waterstone at Lexington with 40 assisted living units or 44 beds and 116 independent senior units would require 2 bays. Per the site plans, the Bridges at Lexington has one loading/service door and the Waterstone at Lexington also has one loading/service door proposed.

*HSH agrees with the Applicant's parking demand methodology and confirms adherence to Town of Lexington Zoning Bylaw parking requirements.*

## SITE TRAFFIC DISTRIBUTION AND ASSIGNMENT

The Applicant developed the trip distribution based on the existing travel patterns of the adjacent roadways as shown in Figure 4. The Applicant's t assignment approach is appropriate given the central location along Route 2. The trip distribution balances trip purposes of a residential facility and a place of business attracting daily commuters. This is consistent with the prevailing entering and exiting ratio of a senior housing facility without a regular resident work-based commuting pattern.

*HSH generally agrees with the trip distribution and assignment based on existing travel patterns but suggests that the Applicant reference the U.S. Census data to confirm the trip distribution.*

## TRAFFIC IMPACT ANALYSIS

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

- Determine existing volumes and analyze existing traffic operating conditions for the study intersections;
- Generate and analyze 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;
- Determine the traffic volumes to be generated by the proposed development; distribute and assign traffic throughout the study area network; and
- Combine the background traffic volumes with the proposed traffic volumes to establish Build traffic volumes, analyze traffic operations, and identify mitigation (if any) of potential impacts.



The traffic operations analysis presents detailed measures of effectiveness (MOEs) to assess the operating characteristics of the study intersections. The MOEs reported are level of service (LOS), average vehicle delay (Delay), and volume to capacity ratio (V/C). LOS designations are based on average delay per vehicle for all vehicles entering an intersection. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst condition. LOS D or better is typically considered acceptable in an urban area. However, LOS E or F is often typical for a stop controlled minor street that intersects a major roadway and does not necessarily indicate that the operations at the intersection are poor or failing.

The Applicant based the intersection capacity analysis on the *2010 Highway Capacity Manual (HCM)* methodologies for unsignalized facilities. The results were calculated using the Synchro traffic engineering software. Synchro engineering software is an industry standard that allows traffic engineers to model traffic operations based on various inputs such as traffic volumes and traffic control devices (stop signs, traffic signals, etc.).

The analysis was completed on the existing traffic condition, a no-build alternative and the future build condition with site improvements. The analysis indicates that the under all three conditions the unsignalized intersections of Watertown Street at Route 2 westbound off ramp operates at LOS C during the weekday morning and a LOS B during evening peak hours. Additionally, the analysis indicates at the unsignalized intersections of Watertown Street at Route 2 eastbound both operate at LOS B during both the weekday morning and evening peak hours. The new two-way stop-controlled driveway of the Project along Watertown Street will operate at LOS C in the morning peak hour and LOS D in the afternoon peak hour of the future Build year 2025. The proposed development has forecasted impacts of less than one second of average delay in both peak periods at all study area intersections.

*HSH agrees with this operation analysis assessment.*

## **MITIGATION MEASURES**

The TIS recommended mitigation measures including access-related improvements, off-site improvements, and Transportation Demand Management (TDM) policies.

## **ACCESS IMPROVEMENTS**

The Project will include the construction of two new driveways. The Applicant conducted stopping sight distance (SSD) measurements at both proposed site driveways and indicated future right of way clearing on adjacent land to the south of the proposed intersection. The proponent has an agreement with the Belmont Country Club to trim foliage and clear right of way along Watertown Street along the southerly edge of the site to improve vehicular site lines when exiting from Lot A



and looking left. The available sight distances at each of the project site driveways will meet the required SSD for the posted speed of 35 mph as well as the 85<sup>th</sup> percentile operating speed of 41 mph southbound and 43 mph northbound along Watertown Street. The TIS included a SSD figure for both site driveways indicating the extent of sightlines. The revised TIS amendment acknowledges a new municipal-standard street light to be provided at the site driveways to illuminate the street junction for crosswalk and driveway safety.

*HSH agrees with the proposed access improvements and the methodology for SSD calculations.*

### **OFF-SITE AND PEDESTRIAN IMPROVEMENTS**

The Applicant has proposed to complete a gap in the sidewalk network to provide access to bus stops north of Route 2. A sidewalk currently exists across the Route 2 bridge on the easterly side of Watertown Street but ends short of the project site. The Proponent will build a pedestrian crossing across the Route 2 eastbound ramp and along Watertown Street connecting to proponents' Lot A development. Another marked and signed crossing will connect the easterly sidewalk to the proponents Lot B on the other side of Watertown Street. Pedestrian facilities are not present or currently infeasible to the south or west of the project site. Site proponents have discussed the improvement with MassDOT but will need to continue to pursue permits to work in the public right of way to build pedestrian amenities to State and Town standards. Additional improvements acknowledged as part of the TIS amendment include new street signage, municipal boundary signs, new shoulder pavement markings and designated bike lanes up to the site from the North on Watertown Street.

*HSH agrees with the mitigation provided as the project is projected to have negligible impact on the surrounding roadway network. The proponent has indicated in the TIS amendment that proposed offsite sidewalks will now connect to all future internal site pedestrian amenities and each major building entrance. Since the draft peer review letter, the proponent has provided a more detailed sidewalk and crosswalk plan that crossing the Route 2 eastbound ramp in a perpendicular fashion near the existing streetlight.*

### **TRANSPORTATION DEMAND MANAGEMENT (TDM)**

Will not specifically mentioned within the TIS, the Applicant mentioned elements a Transportation Demand Management (TDM) program, suggesting a commitment to reducing the dependency on single occupancy vehicle (SOV) trips. An effort will be made to implement the TDM measures outlined below:

- Provide a shuttle service for residents; and



- Provide bicycle parking facilities to encourage bicycle commuting;

Per the TIS amendment, the proponent has agreed to expand the bicycle parking facilities to racks accommodating eight bikes for Lot A and 22 bikes at Lot B. Additionally, a shower/locker area will be provided in each building to accommodate bicycle commuters.

*HSH generally agrees with the proposed employee TDM measures. HSH encourages the Applicant to consider appointing a TDM coordinator to facilitate staff and residents use of TDM services available and their benefits and coordinate with the Town of Lexington Senior Services Department. Additionally, the Applicant should consider working with a car sharing service (such as Zipcar) to provide residents that are able to drive access to a private vehicle without the need to own their own vehicle. The applicant should consider providing a subsidy or incentive for employees to use public transportation system that serves the site. The applicant should consider providing preferential parking for carpool vehicles.*

## SITE PLAN

The Site Development Plan Set shows the general site layout, the surface and garage parking spaces, and the access throughout the site. The plans show two full access driveways intersecting with Watertown Street directly opposite one another. The eastern driveway to the Bridges at Lexington quickly splits two ways, one direction to a parking lot and the other to a pick-up/drop-off area. The western driveway to Waterstone at Lexington leads to the side and back of the site with access to the underground parking garage and surface parking between the building. The Applicant also provided a fire truck turning plan showing a 42' Lexington Fire Department truck successfully maneuvering throughout both sites. The site plan shows continuous pedestrian paths throughout the site with connections to Watertown Street on Lot B.

*HSH suggests that a note be added to indicate: “Signs, landscaping, and other features located within the site triangle areas shall be designed, installed, and maintained so as not to exceed 2.5 feet in height. Snow windrows located within the sight triangle areas that exceed 3.5 feet in height or that would otherwise inhibit sight lines shall be promptly removed.” Tactile warning pedestrian ramps should be provided at all crosswalks and curb ramps and installed perpendicular to the pedestrian route.*

## CONSTRUCTION PERIOD-ISSUES

The Applicant does not discuss construction period issues in the TIS.



*HSH recommends that the Applicant include information on the traffic impacts during the construction phase.*

## GEOMETRIC DESIGN CRITERIA

The Project will include the construction of two new driveways. The Applicant analyzed the sightlines at both the existing driveway locations. In accordance with the American Association of State Highway and Transportation Officials (AASHTO) standards, both stopping sight distance (SSD) and intersection sight distance (ISD) were examined.

The Applicant indicated that available sight distances at each of the project site driveways will be met after right of way clearing to the south of the Project driveway. The required SSD of 360 feet for the posted speed of 35 mph as well as the 85<sup>th</sup> percentile operating speed of 41 mph southbound and 43 mph northbound will be achievable after trimming foliage. The ISD was evaluated for both left and right turns from a minor-road approach to a major road under STOP control at both driveways.

*HSH agrees with the proposed access improvements and the methodology for SSD calculations. HSH encourages the Applicant to design the driveways with an apron at sidewalk level encouraging pedestrian priority at the driveways and traffic calming for all entering and exiting vehicles. HSH observations acknowledged the high speeds adjacent to the site and the need for ample stopping sight distance will be paramount to safe new access points.*

## Conclusions

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Based on the overall review of the TIS, HSH generally agrees with the methodology used. The Project is expected to generate about one new vehicle trip every 1-2 minutes during both the weekday morning and evening peak hours and is not forecasted to increase average delay at study area intersection more than one second. The Applicant should continue to seek permits to build the off-site improvements and establish a TDM program to reduce SOV trips to and from the Project.