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TO:	Chris Ryan Town of Belmont	DATE:	February 18, 2025
FROM:	Keri Pyke, P.E., PTOE Michael White	SHS PROJECT NO.:	2024188.00
SUBJECT:	Transportation Peer Review McLean Hospital Zone 4, Belmont, Massachusetts		

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As requested, *Howard Stein Hudson (HSH)* has conducted a peer review of the materials prepared for the proposed Child and Adolescent Campus (CAC) and supporting parking (the Project) in Belmont, Massachusetts. Our evaluation is based on the following document:

- *Transportation Impact Assessment (TIA), McLean Hospital – Zone 4: Child and Adolescent Campus, Belmont, Massachusetts*, prepared by Vanasse Hangen Brustlin, Inc. (VHB), February 4, 2025.

The Project proposes to construct three new buildings within McLean District Zone 4. The first building, an approximately 60,000-square-foot (-sf), four-story structure will house the Residential/Partial Hospital program, will serve approximately 90 residential students, 32 partial hospital patients, and 106 staff members. The second building, an approximately 29,500-sf, two-story structure, will house the Pathways Academy and Arlington School in separate wings of the building. The building will serve approximately 75 day students and 53 employees. The Residential and Partial Hospital Programs, the Arlington School, and the Pathways Academy are all being relocated from their existing locations within McLean District Zone 5 and an off-site location in Arlington, Massachusetts. The third building will be a 226-space parking garage constructed in support of the CAC. An additional 44-space surface parking lot will be constructed adjacent to the parking garage, providing a total of 270 parking spaces.

The purpose of this review is to ensure that the study analysis conforms to industry standards, to confirm that the traffic study methods are applicable to the study area and region, and to address the traffic and transportation concerns of the Town of Belmont. The key findings of our review of the document are summarized and presented in the following sections. The comments are organized by the same headers provided in our outlined scope of services.



## Scope of Review

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The following items were reviewed as part of our approved scope of services:

- Study Area Boundaries
- Traffic Data Collection
- Selection of the Peak Hour
- Off-site changes
- Non-site Traffic
- Trip Generation
- Sight Distance
- Signal Warrant Analysis
- Parking Demand
- Site Traffic Distribution and Assignment
- Traffic Impact Analysis
- Mitigation/TDM Measures
- On-site Planning and Parking
- Pedestrians/Cyclists
- Construction Period Issues
- Geometric Design Criteria

## Existing Condition

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### STUDY AREA BOUNDARIES

The Applicant, in consultation with the Town of Belmont Planning Department, defined the study area to include the following two locations:

- Trapelo Road/Pleasant Street (signalized); and
- Olmsted Drive/Pleasant Street (unsignalized).

The Applicant provides a brief summary of the existing condition at study area intersections and along study area roadways in proximity to the Project site.

***HSH Comment 1: HSH generally agrees with the study area intersections. HSH notes that per Massachusetts Department of Transportation (MassDOT) Transportation Impact Study (TIS) guidelines, intersections where site-generated trips increase the peak hour traffic volume by more than 100 vehicles should be included in impact studies. Based on the Site-Generated Weekday Peak Hour Traffic Volumes presented in Figure 5, approximately 135 trips during the a.m. peak hour will utilize Trapelo Road, north of Pleasant Street. However, because the Applicant consulted with the Town of Belmont Planning Board, no further action is required.***



*A site visit was conducted to verify the roadway and intersection geometries provided by the Applicant. The existing roadway and intersection conditions that have been described in the TIA are accurate. No further action is required.*

## TRAFFIC DATA COLLECTION

The Applicant conducted manual turning movement counts (TMCs) on Thursday, November 21, 2024, for a 12-hour period (7:00 a.m. – 7:00 p.m.) at the intersection of Olmstead Drive/Pleasant Street. Additionally, the Applicant conducted TMCs on Thursday, November 21, 2024, during the weekday morning (7:00 – 9:00 a.m.) and weekday evening (4:00 – 6:00 p.m.) periods at the intersection of Trapelo Road/Pleasant Street. Lastly, the Applicant conducted Automatic Traffic Recorder (ATR) counts along Olmsted Drive, north of Pleasant Street as well as along Pleasant Street, west of Olmsted Drive. The ATR data was collected over a 48-hour period beginning on Wednesday, November 20, 2024, and ending on Thursday, November 21, 2024.

The Applicant reviewed the most recent MassDOT seasonal adjustment factors and determined that November traffic volumes represent above-average-month conditions and do not require additional adjustments.

***HSH Comment 2:** HSH generally agrees with the Applicant’s traffic data collection methods; however, HSH notes that a comprehensive data collection effort that includes the Project specific p.m. peak period (2:00 – 3:00 p.m.) was not conducted. HSH requests the Applicant provide justification for the limited volume data collected at the Trapelo Road/Pleasant Street intersection.*

*HSH agrees with the Applicant’s decision not to seasonally adjust the November traffic volumes. No further action is required.*

## SELECTION OF THE PEAK HOUR

The Applicant determined that the weekday morning peak hour at the study area intersections occurred from 7:30 – 8:30 a.m. and that the weekday evening peak hour occurred from 4:45 – 5:45 p.m. The Applicant performed the traffic impact analysis during these peak hour periods.

***HSH Comment 3:** HSH generally agrees with the Applicant’s selection of the morning peak hour. While it is standard practice to analyze a weekday p.m. peak hour between 4:00 - 6:00 p.m., consideration must also be given to an analysis period in which the proposed Project’s traffic impact is most significant. Based on the Applicant’s calculated trip generation, the Project is expected to generate approximately 200 unadjusted trips between 2:00 – 3:00 p.m., approximately 176 more unadjusted trips than generated during the*



*Applicant's selected weekday p.m. peak hour. HSH requests the Applicant provide justification for the omission of the Project specific p.m. peak period between 2:00 – 3:00 p.m. as an analysis period.*

## Future Condition

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### OFF-SITE CHANGES

The Applicant, in consultation with the Town of Belmont, identified planned improvements at the McLean Driveway/Mill Street intersection located to the north and west of the study area. The improvements included upgrades to the existing traffic signal system at the intersection.

The Applicant also identified the planned signalization of Olmsted Drive/Pleasant Street as a potential roadway improvement. This signalization is dependent on future traffic volumes exceeding the thresholds for signalization.

***HSH Comment 4:** HSH generally agrees with the identification of the proposed roadway improvements projects in the vicinity of the study area. No further action is required.*

### NON-SITE TRAFFIC

The Applicant reviewed historical traffic data from MassDOT continuous count stations and referenced previous traffic studies to develop an annual background growth rate of 1% to be applied to existing traffic volumes. The Applicant also consulted with the Town of Belmont Planning Department to identify recent traffic studies for planned developments in the vicinity of the study area. The Applicant incorporated the traffic volumes associated with the McLean District Zone 3 Residential Development, in addition to the annual background growth rate, to develop the No-build condition traffic volumes.

***HSH Comment 5:** HSH generally agrees with the Applicant's methodology in determining background traffic growth and specific planned development traffic. HSH also finds the 1.0% annual background growth rate to be appropriate. No further action is required.*

### TRIP GENERATION

To estimate the site-generated traffic for the proposed development, the Applicant used projections of the number of future staff and students and the operational characteristics of each program to develop empirical trip generation data. The Applicant estimates a total of 284 vehicle trips (176 entering and 67 exiting) during the weekday a.m. peak hour and 24 vehicle trips (0 entering and 24 exiting) during the weekday evening peak hour. The Applicant compared these estimates to the trip thresholds for Zone 4 as outlined in the 1999 Transportation Monitoring and Mitigation Agreement



(TMMA) between the Town of Belmont and McLean Hospital. The TMMA was amended in June 2024, and the trip thresholds were removed in favor of specific mitigation actions that would need to be taken by the Proponent.

***HSH Comment 6:** HSH generally agrees with the Applicant’s trip generation methodology and use of empirical data to estimate the Project trips. However, as noted previously in Comment #3, the Applicant did not analyze the Project-specific peak trip generation period of 2:00 – 3:00 p.m. when approximately 200 vehicle trips have been estimated to occur. HSH requests the Applicant provide justification for the omission of 2:00 – 3:00 p.m. as an analysis period.*

## **SIGHT DISTANCE**

Sight distance analysis at the site’s proposed driveways along Olmsted Drive was not included as part of the TIA. The Applicant states that landscaping and building features will be designed to not limit the sight line of motorists.

***HSH Comment 7:** Stopping Sight Distance (SSD) and Intersection Sight Distance (ISD) are key parameters to provide and maintain safe operations at an unsignalized intersection. HSH requests the Applicant provide minimum required sight distances, calculated in conformance with the latest edition of the American Association of State Highway Transportation Officials’ (AASHTO’s) A Policy on the Geometric Design of Highway and Streets (the Green Book). HSH encourages the Applicant to utilize these dimensions to ensure that the Project maintains the minimum required sight lines at all proposed driveway intersections.*

## **SIGNAL WARRANT ANALYSIS**

The Applicant performed a preliminary signal warrant analysis evaluation at the intersection of Olmsted Drive/Pleasant Street. The warrant analysis was conducted for the three most applicable vehicular traffic volume-based warrants, Warrant 1 (Eight-hour), Warrant 2 (Four-hour), and Warrant 3 (Peak Hour), as outlined by the *Manual on Uniform Traffic Control Devices (MUTCD)*.

The Applicant states that traffic volumes incorporated into the signal warrant analysis include existing traffic, estimated future traffic generated by the McLean District Zone 3 Residential Development, and the estimated future traffic to be generated by the Project.

The analysis found that Warrant 1, Warrant 2, and Warrant 3 were not satisfied and that the installation of a traffic control signal is not warranted under the Build Condition.



***HSH Comment 8: HSH generally agrees with the signal warrant analysis methodology and conclusions. No further action is required.***

## **PARKING DEMAND**

The Project's proposed parking supply is based on several operational and design factors including daily employee schedules, typical patient/parent appointments, and planned all-school events which will require additional visitor spaces.

The Applicant proposes to construct a parking structure with approximately 226 spaces and a surface parking lot with approximately 44 spaces for a total of 270 parking spaces. Belmont's zoning regulations for Zone 4 allows a maximum parking ratio of 3.5 parking spaces per 1,000 gross square feet (gsf) of development. This indicates the Project's maximum number of allowable parking spaces is 313. The Project parking supply includes 27 electric vehicle (EV) charging spaces to be provided in the surface parking area. Belmont's energy code requires EV charging stations to be provided for 10% of all common parking spaces.

***HSH Comment 9: HSH generally agrees with the Applicant's methodology for developing peak parking demand, but notes empirical data was not provided to justify the various operational factors taken into consideration to develop the peak parking demand estimates. However, HSH agrees that the proposed parking supply complies with the parking requirements outlined in the Town of Belmont's zoning regulations for the Research and Development Subdistrict of the Mclean Zoning District. The Applicant is providing the required 10% EV spaces. No further action is required.***

## **SITE TRAFFIC DISTRIBUTION AND ASSIGNMENT**

The Applicant asserts that the trip distribution patterns were developed using existing student and staff residential zip code data. Based on this methodology and calculations, the student-related site traffic is expected to primarily enter from and exit to the northwest via Trapelo Road and staff-related site traffic is expected to primarily enter from and exit to the east via Pleasant Street. Both students and staff are also expected to utilize Trapelo Road to the southeast to access the site.

***HSH Comment 10: HSH agrees with the methodology used to develop the Project's trip distribution pattern. No further action is required.***



## TRAFFIC IMPACT ANALYSIS

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

- 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, if any, and analyze traffic operations;
- 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 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 average vehicle delay, level of service (LOS), volume-to-capacity (v/c) ratio, and queue lengths. The LOS is a letter grade that is assigned to a range of vehicular delays at the intersection. LOS A represents little delay and is usually associated with low volume movements. LOS F represents higher delays and could indicate issues related to traffic congestion. The Applicant used Synchro traffic engineering software to analyze the two study area intersections. Synchro engineering software is an industry standard that allows engineering practitioners to model traffic operations based on various inputs such as traffic volumes and traffic control devices (stop signs, traffic signals, etc.).

As shown in the analysis, the majority of the study area intersection movements operate at acceptable LOS (LOS D or better) under all three conditions. At the signalized intersection of Trapelo Road/Pleasant Street, the Pleasant Street exclusive southbound left movement operates at LOS E under all three conditions. The Project will generally result in minimal impact to motorist delays at the study area intersections.

***HSH Comment 11: HSH generally agrees with the traffic operations analysis methodology. However, at the unsignalized intersection of Olmsted Drive/Pleasant Street, HSH notes that the Pleasant Street exclusive eastbound left-turn movement was excluded from Table 8. HSH reviewed the Synchro reports provided in the appendix of the TIA and determined this movement is expected to operate at an acceptable LOS (LOS D or better) under all three conditions. No further action is required.***



## MITIGATION/TDM MEASURES

In June 2024, the TMMA between the Town of Belmont and McLean Hospital was amended, restated, and adopted. Based on the 2024 TMMA, the Proponent has committed two key traffic mitigation measures.

The Proponent must contribute up to \$210,000 towards the upgrade of the existing traffic signal at the intersection of Mill Street/McLean Driveway. The Proponent must also, at the direction of the Town Engineer, perform a post-occupancy traffic signal warrant analysis at the intersection of Olmsted Drive/Pleasant Street. When traffic volumes at the intersection warrant installation of a signal, the Applicant will prepare design plans and construct the traffic signal control.

Within the TIA, the Applicant details Transportation Demand Management (TDM) measures that the Project will undertake. The McLean Hospital shuttle service, which currently operates between Zone 5 and the Waverly Massachusetts Bay Transportation Authority (MBTA) Commuter Rail Station, will be available to Zone 4 visitors/employees. The Applicant will also post public transportation schedules in common areas of the proposed buildings. Lastly, the Project will provide secure bicycle parking in the proposed parking garage.

***HSH Comment 12:** HSH generally agrees with the transportation mitigation and TDM measures outlined in the TIA. HSH recognizes that the June 2024 TMMA requires the Applicant to submit a detailed TDM plan six months after the issuance of a building permit and presumes the Applicant will include these measures within that plan. Additionally, to confirm that the number of bicycle parking spaces provided on-site will meet current zoning by-laws, HSH requests the Applicant detail the number of secure bicycle parking spaces that will be provided within the garage.*

## ON-SITE PLANNING AND PARKING

The Applicant provided the proposed conceptual site plan and a detailed description of vehicular access in and around the site. A 20-foot-wide circulatory driveway is proposed to intersect Olmsted Drive at the western edge of the Project site. The roadway will follow the Project property line along the western and northern edges, looping around the two proposed buildings before connecting back with Olmsted Drive to near the western corner of the proposed parking structure. In general, the proposed circulatory driveway is one-way with vehicles travelling in a clockwise direction. A small section of the driveway will provide two-way access to a loading area. An eight-foot-wide student pick-up/drop-off zone is provided along the right shoulder of the driveway to the north and east of the Residential/Partial Hospital building and the Pathways Academy and Arlington School building. The 20-foot width will allow vehicles to bypass vehicles queued for pick-up/drop-off. Access to the surface parking area will be provided via the circulatory driveway and access to the parking garage will be



provided via a proposed curb-cut near the eastern terminus of Olmsted Drive as well as via a connection within the surface parking area. Along the north side of the circulatory driveway, a gated connection to Zone 5 is proposed. This connection will be available to emergency vehicles and authorized McLean vehicles for transporting supplies between zones.

Emergency vehicle access to the site is proposed from Pleasant Street via Olmsted Drive. The Applicant states the proposed driveways, surface parking area, and gated connection are designed to accommodate aerial ladder trucks from the Town of Belmont.

***HSH Comment 13: HSH finds the preliminary site access details to be sufficient. However, the Applicant has not detailed the anticipated loading and service activity expected to occur on site. The Applicant should provide AutoTURN sketches to demonstrate that both emergency and delivery vehicles can navigate the site. Delivery vehicles should include a moving truck as well as trash/recycling trucks.***

## PEDESTRIANS/CYCLISTS

The Applicant provided the proposed conceptual site plan and a detailed description of pedestrian circulation throughout the site. A sidewalk extension is planned along the north side of Olmsted Drive which will connect to the planned Zone 3 sidewalk. Pedestrian pathways are proposed between buildings and parking facilities. Additionally, a pedestrian connection is proposed to Zone 5 for employee usage. Crosswalks are proposed across the circulatory driveway at both of its intersections with Olmsted Drive. Additional crosswalks are provided across the circulatory driveway near the parking facilities and at the Zone 5 connection pathway.

Bicycles will access the site via shared travel lanes along Olmsted Drive. Additionally, the Applicant will provide covered bicycle parking spaces within the parking garage.

The Applicant notes that the site will discourage general pedestrian access via restricted use signage in order to maintain a private and therapeutic environment for students, patients, and families.

***HSH Comment 14: HSH understands the desire to discourage general pedestrian access throughout the site to maintain a private and therapeutic environment. The pedestrian accommodations proposed as part of the conceptual site plan appear to be sufficient. HSH encourages the Applicant to ensure pedestrian accommodations conform to ADA requirements. HSH also encourages the Applicant to install sharrow pavement markings or other applicable signage that will inform motorists that the roadways are shared with cyclists.***



## CONSTRUCTION PERIOD ISSUES

The Applicant does not provide details on any anticipated construction period issues.

***HSH Comment 15:** HSH requests that the Applicant evaluate the short-term construction impacts of the Project and provide details of the overall construction schedule, working hours, number of construction workers, transportation and parking, number of construction vehicles, and routes to and from the Project site. To minimize transportation impacts during the construction period, HSH recommends the Project Proponent encourage construction workers to carpool by limiting the number of construction worker parking spaces on site and providing secure space on site for workers' supplies and tools.*

## GEOMETRIC DESIGN CRITERIA

As previously mentioned, the Applicant provided a proposed conceptual site plan and a detailed description of vehicle, bicycle, and pedestrian circulation throughout the site. The Applicant notes the proposed circulatory driveway will be approximately 20 feet wide with an eight-foot-wide pick-up/drop-off zone along the right shoulder of a portion of the driveway.

***HSH Comment 16:** HSH requests the Applicant provide the approximate width of proposed pedestrian pathways. The Applicant should provide AutoTURN sketches to demonstrate that emergency, refuse removal service, and delivery vehicles can navigate the site.*