

MEMORANDUM

Date: December 9, 2021

To Ms. Jane Fisher Carlson, Chair, Weston Zoning Board of Appeals

From Greg E. Lucas, P.E., PTOE, RSP

CC James D. Fitzgerald, P.E., LEED AP, Environmental Partners, Director of Transportation
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Subject Hanover Weston – 518 South Avenue – Weston, MA
Chapter 40B Project Traffic Review – Updated Findings

Environmental Partners (EP) have provided ongoing traffic-focused review of documents and site details related to the Proposed Residential Development in Weston, Massachusetts on behalf of concerned abutters. To date, EP has provided findings, comments, and recommendations in review memoranda dated June 23, 2021, July 16, 2021, and July 30, 2021, and has provided testimony before the Zoning Board of Appeals (ZBA) in a public meeting held on July 20, 2021 as a part of the public hearing process conducted by the Board for the subject project's application before the Board.

It is understood that the Applicant team has since submitted revised plan exhibits and presented material representing a reduction in the number of units for the proposed development, from 200 units to 180 units. Presented materials indicate a reduction in overall trips per day from 1,088 to 980, and a reduction in peak hour trips. Overall, trip reductions are consistent with the 10 percent reduction in units. The modification of the proposed development also includes changes to the building and garage configuration, as well as the circulatory roadways.

EP has prepared this memorandum to summarize review efforts to date, highlighting critical, unresolved issues related to sight distance and emergency access, provide additional commentary on site details based on revised materials, and provide a summary of all outstanding issues raised to date deserving further consideration by the Zoning Board of Appeals.

Sight Distance

Substantial focus has been given to sight distance characteristics of the proposed site driveways, primarily focused on visibility of the primary site driveway at 540 South Avenue for vehicles approaching from the west. No discussion has taken place related to sight distance for the emergency site driveway at 518 South Avenue. During the July 20th hearing, testimony and professional opinion was provided by EP as well as from Vanasse & Associates, Inc. (VAI), the Applicant's traffic engineer, and MDM Transportation Consultants, Inc., the Board's traffic peer review consultant. **It should be noted that the reduction in size of the overall development has no effect on sight distance along South Avenue.**

The Applicant's Traffic Impact and Access Study (TIAS) submitted in July 2019 and revised and resubmitted in May 2021 includes an assessment of sight distance based on a 45 mph design speed in both directions, and states that a total of 360 feet of sight distance is required from the proposed primary site driveway location at 540 South Avenue. The TIAS also states that this sight distance is provided, "with the exception of sight lines for motorists looking left as they exit the site driveway".

In their initial peer review comments dated May 14, 2021, MDM recommended that supplemental speed data be collected along Route 30, and that Intersection Sight Distance (ISD) should be calculated following AASHTO criteria. Supplemental materials and analysis were provided by VAI in response to both items, and further discussion of both items was a core component of the traffic-focused discussion in the July 20th public hearing. Both issues deserve further clarification and consideration by the Board, as they directly relate to the proposed project's impact on public safety.

Measured Speed

As discussed, the TIAS for the project utilized a 45 mph design speed in both directions, resulting in a required Stopping Sight Distance (SSD) of 360 feet. This is based on speed data collected for the project in March 2019, which determined 85th percentile speeds of 45 mph in the eastbound direction and 41 mph westbound. Data was collected in the vicinity of DiBenedetto Drive, east of the proposed primary site drive, in the approximate location of the proposed emergency access drive.

Supplemental data collected in response to MDM comments was measured in June 2021 at a point west of the proposed primary site drive, in the approximate vicinity of the seminary driveway, and determined an 85th percentile speed of 41 mph eastbound. Westbound speeds were not recorded and/or not presented for this data point.

Based on the updated data, VAI presented updated sight distance calculations requiring SSD of 315 feet eastbound based on a 41 mph speed. This revision is in direct conflict with the TIAS, which presented different speeds in each direction but stated "in order to provide a conservative assessment of sight distance requirements, a 45 mph design speed was utilized for both travel directions." **It is unclear why this conservative approach has been abandoned by VAI.** Variances in data collected at different points along South Avenue supports this conservative approach, showing variances in driver behavior as they navigate the existing roadway. Data taken at a single point, and design based on speeds recorded at a single point, do not account for this variance and therefore do not safely accommodate the known characteristics of approaching traffic. **It is recommended that the Board continue to apply the conservative approach initially adopted**

by VAI, using a 45 mph design speed to calculate sight distance. This conservative approach is particularly appropriate considering the proposed primary site drive's proximity to the existing intersection at Highland Street, which would create additional safety concerns for all drivers in this area, as discussed below.

Revised sight distance profiles prepared by VAI dated September 30, 2021 maintain calculations showing a required SSD of 315 feet and show proposed regrading providing a 345 foot sight line. **A number of inconsistencies exist on the presented materials.**

- **First, reference is made in all three profiles to South Avenue (Route 30) northbound. It is believed that this should be eastbound, as Route 30 is an east-west roadway.**
- **Second, the profiles reference Intersection Sight Distance (ISD) but are comparing measured distances to calculations based on SSD. As noted in this memorandum, the difference between SSD and ISD must be clearly understood, and both values should be calculated and tabulated to provide a full understanding of sight distance and the resultant deficiencies that exist for the proposed design.**

An additional data point for measured speed is available from the Functional Design Report (FDR) prepared by Howard Stein Hudson for the Route 30 Reconstruction project, which proposes to reconstruct 3.7 miles of Route 30, including the area of the proposed project site. The FDR provides data at a point west of DiBenedetto Drive, determining an 85th percentile speed of 41 mph eastbound and 45 mph westbound, and provides additional data points showing speeds varying between 40 mph and 44 mph eastbound along the corridor. This data, along with the two data points collected by VAI for the subject project, confirm varying speeds along the corridor and support the use of a conservative approach, applying a 45 mph design speed. Furthermore, the two data points collected by VAI suggest that vehicles are slowing entering the horizontal curve in the vicinity of Highland Street and accelerating through and exiting the curve in the area of the two proposed site drives. **This additional information confirms the appropriateness of using a 45 mph design speed for sight distance calculations.**

Calculated Sight Distance

EP agrees with the recommendation in the May 14th MDM letter, which states that "(c)alculation of SSD and ISD criteria should be provided in tabular and summary form..." **To date, this has not been provided by the Applicant.** For the reasons stated above, both criteria should be calculated based on a 45 mph design speed.

It is important to understand the two sight distance criteria, and their mutual importance to provide safe access for the proposed site. Both are defined through AASHTO's *A Policy on Geometric Design of Highways and Streets*.¹

Stopping Sight Distance (SSD) is the distance a driver needs to be able to see in order to stop before colliding with an object in the roadway. It is calculated as the sum of two distances: the distance traversed by the vehicle from the instance the driver sights an obstruction to the instant before the brakes are applied, and the distance needed to stop the vehicle once the brakes are

¹ A Policy on Geometric Design of Highways and Streets, 2018 7th Edition. AASHTO, 2018.

applied. In simplest terms and in specific consideration of this site, SSD must be measured and evaluated or vehicles approaching the main site drive and emergency access drive as they travel on South Avenue in both directions. SSD is calculated at 360 feet for a design speed of 45 mph.

Intersection Sight Distance (ISD) is the distance a driver needs to be able to see approaching vehicles before their line of sight is blocked by an obstruction. ISD is calculated based on a clear sight triangle from a point departing the stop-controlled approach, which in this case is both the proposed main site drive and emergency access drive. Procedures to calculate ISD vary by different types of traffic control. In this instance, it is appropriate to evaluate *Case B1 – Left turn from the minor road* and *Case B2 – Right turn from the minor road*.² Design ISD for a design speed of 45 mph is 500 feet for a left turn from stop, and 430 feet for a right turn from stop for vehicles exiting both proposed drives. These values vary because a left turning vehicle looking in both directions needs more time to complete their turn than a right-turning vehicle, where the driver would only be looking left.

The appropriateness of meeting both SSD and ISD has been discussed through review materials and public hearing testimony and must be further considered through the lens of providing adequate vehicular safety for the proposed project. AASHTO states that “the provision of stopping sight distance...is fundamental to intersection operation.” **It is understood that meeting SSD is paramount to safety; therefore, SSD must be met for the proposed project. The data and materials provided to the Board to date do not establish that SSD has been met for the project.**

Discussion in the July 20th hearing included the concept of “minimum” and “ideal” ISD. It is important to understand that AASHTO criteria for ISD does not differentiate between “minimum” and “ideal” ISD and does not include variable values where meeting SSD at an intersection allows “minimum” ISD to be met. As such, recommended ISD values of 500 feet looking left and 430 feet looking right are the only appropriate values to be considered for ISD. **If these values are not met, ISD is not met.** Although no formal evaluation of ISD has been provided by the Applicant, **the available data and materials (including the FDR) establish that recommended ISD values are not met for the proposed site driveways at both 540 South Avenue and 518 South Avenue.** A letter to the Board dated June 29, 2021 from Gillon Associates provides confirmation that SSD and ISD are not met at either driveway. **Indeed, the applicant has not provided sight distance triangles looking east from the primary site drive.**

Supplemental materials produced by the applicant provide sight line profiles and plans detailing regrading that is proposed to meet the minimum SSD value. Further comments have been provided by MDM on these supplemental materials. EP recommends that these materials be expanded to evaluate SSD and ISD based on a 45 mph design speed, and to evaluate both SSD and ISD in both directions at both site driveways.

It is critical that adequate sight distance be provided at both site driveways, and that exhibits are provided by the applicant to confirm that safe sight distance is provided, to the satisfaction of the Board. Materials provided to date solely focus on sight distance

² A Policy on Geometric Design of Highways and Streets, 2018 7th Edition Chapter 9. AASHTO, 2018.

approaching from the west, and do not provide adequate proof that SSD can be met without obtaining legal rights to modify private property.

Highland Street Intersection

Additional discussion through review documents, supplemental materials, and the July 20th hearing was focused on the offset between the existing unsignalized intersection at Highland Street and the proposed primary site drive. Site plans illustrate approximately 180 feet between these two intersections. Inherently, calculated SSD of 360 feet cannot be met in this situation. While vehicles starting from a stop-controlled position from either Highland Street or the proposed site driveway may have clear sight of each other, drivers from either approach are assessing the presence of entering traffic from the offset intersection at the same time that they are judging gaps in approaching traffic on South Avenue. **A vehicle turning left from Highland Street onto South Avenue eastbound may not expect to encounter turning vehicles so soon after completing a turning maneuver, creating an unsafe condition.**

AASHTO's guidelines state that an intersection is defined by both its functional and physical areas. AASHTO further defines the functional area of an intersection extending both upstream and downstream of the intersection and including queue storage distance, maneuver distance, and decision distance, and states that "ideally, driveways should not be located within the functional area of an intersection."

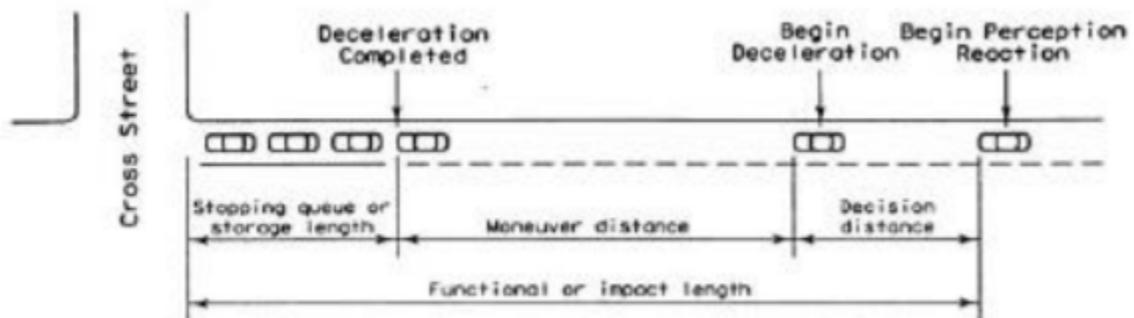


Figure 1: Elements of the Functional Area of an Intersection (AASHTO)

The proposed location of the primary site drive does not meet this guideline. Given that the westbound roadway widens to accommodate the right turn to Highland Street generally at the location of the proposed site drive, it stands to reason that westbound vehicles are beginning their decision and maneuver to turn right to Highland Street and may not be expecting a vehicle to stop to turn left into the site. **The unique characteristics of the Highland Street intersection suggest that the introduction of a driveway within the intersection functional area will create a safety concern due to conflicts between entering, exiting, slowing, and turning vehicles.**

Emergency Access

Design details related to the proposed emergency access drive have been discussed through prior peer review commentary and Board hearings. To date, outstanding issues exist that must be

resolved for the safety of both potential tenants and neighbors. Specifically, the following items have not been resolved based on supplemental materials provided by the Applicant team.

- As noted above, sight distance exhibits, calculations and summary tabulations should include the emergency driveway at 518 South Avenue as well as the primary site driveway at 540 South Avenue.
- Turning exhibits provided by the Applicant show that the Town ladder truck will encroach on westbound traffic on Route 30 when exiting the emergency driveway at 518 South Avenue from the west or when exiting to the east. Curb radii and driveway width appear to be restricted to avoid environmental impacts and result in encroachment and compromised safety for vehicles on South Avenue. **The Board is being asked to compromise emergency access and roadway safety to minimize environmental impacts due to the scale of the proposed project.**
- A review of the grading plan provided in the March 19, 2021 Site Development Plan set indicates potentially steep grades at either end of the emergency access drive. **A driveway profile should be provided for review by the Board and submitted to the Weston Fire Chief for approval. Updated grading details and a roadway profile should also be provided and reviewed for the site circulating driveway.**

Site Design

Prior memoranda prepared by EP have primarily focused on the impact of the project on the existing roadway infrastructure. It is understood that while an updated site layout plan was provided to the ZBA for review following the reduction from 200 to 180 residential units, details for the revised building and parking garage have not been provided. We offer the following items that should be considered by the Board:

- The site revisions eliminated 20 units, but reduced the overall parking supply by 60 spaces, from 353 to 293. The Applicant has requested a waiver to allow for this ratio of approximately 1.63 spaces/unit. A parking analysis should be provided by the applicant to verify that the parking supply is adequate to meet expected demand, including analysis of comparable developments in suburban areas not served by public transportation, and not within walking distance of retail, restaurants, or other amenities. Given the absence of public transportation to the site, all residents, employees, guests, and others will need to drive to the site.
- Details on parking management should be provided, including employee parking, visitor parking, and garage access restrictions. It was previously stated that parking will be fee based and garage access will be controlled by a fob. Accommodations for visitors including service provides must be clarified.

Planned Improvements and Traffic Analysis

Prior memoranda prepared by EP have included findings and commentary on both the planned improvements for the Route 30 corridor, as well as results of existing and future traffic analyses presented in the TIAS. The following comments remain unaddressed by the Applicant to date.

The project described (MassDOT Project File No. 608954) is not yet programmed for funding through the Boston Region MPO. It is premature to take credit for its completion by 2026 unless the proponent is committed to funding the project. **The Boston MPO has recently approved the Transportation Improvement Program (TIP) for federal fiscal years 2022 through 2026; this program does not include funding for the Route 30 project.** The projected total federal participating construction cost (i.e., the amount needed to be funded through the TIP) is \$15 million; **it is premature to speculate on a project of that size being funded until 2027 or beyond.**

- Due to the uncertain nature of proposed improvements, the project site development must design for a scenario where the Route 30 project is not complete, but also contemplate the cumulative impact of the Route 30 project and the residential development either at the time of construction or in the immediate future. Both potential site driveways will intersect the proposed SUP on the south side of South Avenue, and the potential conflicts between vehicles, bicyclists and pedestrians must be considered. The impact of the curvature of the roadway on visibility both for and of bicyclists must be evaluated. Furthermore, the SUP requires further setback of a stopped vehicle exiting from the site drive(s) onto South Avenue. The impact of this setback on sight distance should be evaluated, and the potential for exiting vehicles to block the proposed SUP must be considered. **Calculations, summary tabulation and sight triangles should be provided for both the primary and emergency driveways showing the impact of the SUP on ISD and SSD.**
- The applicant cannot take credit for the Town's proposed Route 30 reconstruction project. No assumptions should be made regarding the funding and approval for the project, which may not occur until 2027 or beyond.

The proposed residential development introduces 180 rental units and nearly 1,000 daily trips to an area that has known safety and operational concerns, based on data included in the TIAS prepared for the development. The development is proposed in a single-family residential area with other incidental land uses nearby, including Beechwood Stables and Pope St. John XXIII Seminary.

The proposed project would add substantial traffic to an area that already operates at LOS F under existing conditions. The proximity of Weston High School, abutting South Avenue approximately 1/3 mile east of the proposed site drive and with primary access vis Wellesley Street, requires careful consideration of the resultant impact of the proposed development on the roadway network. Analyses summarized in the TIAS suggest existing operational concerns at the signalized intersection of South Avenue and Wellesley Street, with no mitigation proposed to improve said conditions. If built, the Route 30 reconstruction project would modify this intersection to accommodate a proposed shared use path but would not modify roadway geometry and, as such, would not improve capacity at the intersection.

A closer look at capacity analysis worksheets in the Appendix to the TIAS reveal overall delay for the Wellesley Street southbound approach of 549 seconds (9 minutes 9 seconds) in the weekday morning peak hour and 1091 seconds (18 minutes 11 seconds) in the weekday afternoon peak hour. **This is excessive and indicative of an intersection which is well over capacity and not equipped to handle additional traffic volume load.**

- Left turns from South Avenue westbound into the site driveway will result in queuing, especially during evening peak hours. The proponent should provide analysis showing the extent of the queuing and whether a single lane is adequate to accommodate vehicles turning into the site driveway during the evening peak hour.
- The horizontal curvature of Route 30 at the site and the frequent access points along this curve suggest the need for corridor crash analysis. This analysis would accurately define the cumulative effect of the existing features on roadway safety.
- The proponent should provide more detail regarding the impact of the development at the Wellesley Street-South Avenue intersection, as well as an analysis of how existing queuing on South Avenue eastbound during the morning peak hour will impact, and be impacted by, traffic exiting or entering the proposed primary site drive.

Conclusion

This memorandum highlights important unresolved issues requiring further consideration by the Board. Additional unresolved issues are summarized below which have been presented in prior memoranda prepared by EP dated July 16, 2021 and July 30, 2021.

For the Board's consideration, the following issues remain unresolved, and are most critical in the ongoing consideration of the Applicant's proposal.

- Both stopping sight distance (SSD) and intersection sight distance (ISD) should be met for both proposed site driveways. Calculations should be based on a 45 mph design speed, consistent with methodology described by VAI in the TIAS.
- A tabular summary should be provided identifying calculated SSD and ISD in both directions from both the main site driveway at 540 South Avenue and the emergency access drive at 518 South Avenue. Site and roadway plans should be provided showing sightlines for SSD and sight triangles for ISD in both directions at both driveways.
- Supplemental materials provided by the proponent do not confirm that adequate sight distance can be provided without impacts to right-of-way.
- Supplemental materials should be updated to correct inconsistencies in both direction and the interchangeable use of SSD and ISD.
- Applicant should provide clarification on how legal rights will be obtained to modify private and/or town-owned property, as required to accommodate sightlines as shown on supplemental materials. It should be noted that this is without additional modifications that will be needed to accommodate sightlines as described in this memorandum.
- The offsetting intersections of the proposed primary site drive and Highland Street with South Avenue create significant safety and operational concerns. Qualitative analysis of these offsetting intersections is needed, including a focus on operational issues with opposing left-hand turns.
- Emergency access and roadway safety should not be comprised to minimize environmental impacts of the emergency access driveway. Exhibits prepared by the Applicant show the Town ladder truck will encroach on westbound traffic on Route 30 when exiting the emergency driveway at 518 South Avenue from the west or when exiting to the east.

- A driveway profile should be provided for the emergency access driveway to verify roadway grades. This plan should be provided to the ZBA as well as the Weston Fire Chief for review and approval.
- A parking analysis should be provided to verify that the reduction of 60 parking spaces is appropriate for a reduction of 20 units.
- Details on parking management should be provided.
- The applicant cannot take credit for the Town's proposed Route 30 reconstruction project. No assumptions should be made regarding the funding and approval for the project, which may not occur until 2027 or beyond.
- Left turns from South Avenue westbound into the site driveway will result in queuing, especially during evening peak hours. The proponent should provide analysis showing the extent of the queuing and whether a single lane is adequate to accommodate vehicles turning into the site driveway during the evening peak hour.
- The horizontal curvature of Route 30 at the site and the frequent access points along this curve suggest the need for corridor crash analysis. This analysis would accurately define the cumulative effect of the existing features on roadway safety.
- The impact of the development on the Wellesley Street-South Avenue intersection requires more analysis. This intersection already operates at LOS F under existing conditions, with delays indicative of an intersection which is well over capacity and not equipped to handle additional traffic volume load. The proponent should provide more detail regarding the impact of the development at this intersection, as well as an analysis of how existing queuing on South Avenue eastbound during the morning peak hour will impact, and be impacted by, traffic exiting or entering the proposed primary site drive.