ENVIRONMENTAL PARTNERS

MEMORANDUM

Date: June 23, 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

Subject Hanover Weston – 518 South Avenue – Weston, MA
Chapter 40B Project Traffic Peer Review

Environmental Partners (EP) have conducted an independent traffic-focused review of documents and site details related to the Proposed Residential Development in Weston, Massachusetts on behalf of concerned abutters. The development as currently envisioned proposes to redevelop an existing residential property to accommodate a 200-unit affordable housing residential development off South Avenue (Route 30) in Weston. This memorandum is provided to outline our findings, comments, and recommendations.

Basis of Review

EP received and reviewed the following items:

- **Traffic Impact and Access Study – Proposed Residential Development – Weston, Massachusetts,** dated May 2021, prepared by Vanasse & Associates, Inc., Andover, MA
- **Traffic Volume Comparison – Proposed Residential Community – 518 South Avenue (Route 30), Weston, Massachusetts**, dated November 4, 2019, prepared by Vanasse & Associates, Inc., Andover, MA
- **Comprehensive Permit Package (37 sheets),** dated April 27, 2021, prepared by Cube 3, Lawrence, MA and Tetra Tech, Marlboro, MA
- **Transportation Peer Review Comments – 518 South Avenue (Route 30) 40B Development – Weston, MA**, prepared by MDM Transportation Consultants, Inc., Marlboro, MA

Review by EP will include the above items for consistency with the following:

- Town of Weston Zoning By-Law and Map, amended through May 2017

- Site visits by BETA Group, Inc. (BETA) on August 1, 2019 and April 28, 2021
- Applicable federal and state regulations

Introduction

The project site is located on the south side of South Avenue (Route 30), with a proposed primary site drive opposite and slightly offset from Highland Street. The proposed project is an affordable housing development under the Chapter 40B state statute that allows local Zoning Board of Appeals approval with flexible rules if at least 20-25% of the units have long-term affordability restrictions.

South Avenue (Route 30) adjacent to the site is under Town of Weston jurisdiction and is functionally classified as an Urban Minor Arterial. The segment of South Avenue in which the project is located has a posted speed limit of 40 miles per hour (mph). The Town of Weston is currently in the process of designing corridor improvements for South Avenue in the vicinity of the project. The South Avenue improvement project had a 25% submittal to MassDOT Highway Division in October 2020 but is not currently programmed for construction funding through the region's Transportation Improvement Program (TIP).

Summary of Findings

Several critical issues deserve closer consideration and study by the Applicant to allow the Board to fully evaluate the impact of the proposed development on South Avenue (Route 30) and the surrounding area. Comments are noted by bulleted list at the end of each section.

Trip Generation and Distribution

Project-generated traffic volumes were determined by utilizing trip-generation statistics published by the Institute of Transportation Engineers (ITE) for land use code 221 (Multifamily Housing (Mid-Rise)). The land uses and methodology chosen are accurate and consistent with industry standards. This calculation results in 1,088 new vehicle trips on an average weekday, with 72 trips (19 entering, 53 exiting) in the weekday morning peak hour and 88 trips (54 entering, 34 exiting) in the weekday afternoon peak hour.

Trip distribution was based on anticipated commuter patterns and existing travel patterns within the study area. It is expected that the majority of trips (52%) will be oriented to and from the east on South Avenue, which generally matches commuter travel patterns and provides the most direct travel path towards I-95/Route 128 Southbound and the Mass Turnpike. Remaining trips are distributed with 25% oriented to/from the west on South Avenue, 17% oriented to/from Wellesley Street to the north, 3% oriented to/from Wellesley Street to the south, and 3% oriented to/from Highland Street to the north.

- Trip generation calculations are consistent with industry standards based on the 200 dwelling units proposed for the site. The entering and exiting trips during the weekday morning and weekday afternoon peak hours are of a level that justifies extensive consideration of site access on South Avenue (Route 30).
- Given the sensitivity of the impact of existing traffic in the area, more detailed review and calculation is warranted. Commuter patterns should be derived and/or validated through

review of US Census Journey to Work data, reviewing the likely destinations and travel paths of area commuters.

- It is likely that the proposed development would attract renters from Regis College. The impact of this scenario on trip distribution must be considered.

Site Access

The project is located on the site of an existing single-family residential property at 518 South Avenue. The project also includes the acquisition of a single-family residential property at 540 South Avenue, which is to be demolished to provide access to South Avenue for the primary site driveway. The Site Layout Plans indicate that the proposed site drive will be approximately along the eastern property line of the existing 540 South Avenue parcel, with a wastewater treatment building to be constructed to the west side of the proposed site driveway approximately where the residential structure exists today.

The existing driveway at 518 South Avenue is essentially retained in its location and proposed as an emergency access drive. The plans and the TIAS are consistent in their description of this driveway as emergency access only, with an emergency access gate shown on the plans to prohibit connection between the site parking and the emergency access drive.

Vehicle speeds were measured along South Avenue by automatic traffic recorder (ATR) and reveal 85th percentile speeds of 45 mph eastbound and 41 mph westbound. The TIAS calculates that 360 feet of sight distance is required for the proposed driveway location based on a 45 mph design speed under current field conditions, EP concurs that it is appropriate to calculate required sight distance based on measured travel speeds rather than posted speed limit.

The TIAS states that the required sight distance is provided at the proposed driveway location looking right, but not looking left for motorists as they exit.

- Given the terrain constraints looking left, the applicant should provide a more detailed analysis of both Stopping Sight Distance (SSD), which is the length of roadway visible to the motorist to a fixed object, and Intersection Sight Distance (ISD), which calculates sight lines visible for the exiting vehicle. In short, SSD allows a driver on South Avenue to detect and take corrective action (i.e., stop) due to a stationary object in its path (i.e., an exiting vehicle). ISD ensures adequate distance for visibility of an approaching vehicle on South Avenue for a driver exiting from the site driveway. **It is critical that both SSD and ISD be met to ensure adequate sight lines for drivers exiting from the site and for drivers traveling along South Avenue.** Requirements and detailed measurements should be provided for both SSD and ISD looking in each direction from each proposed site driveway.

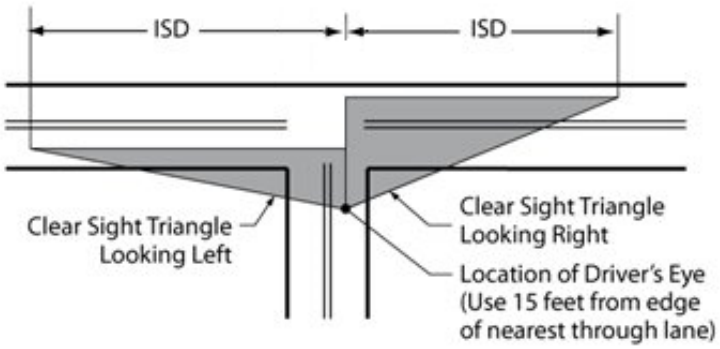

Figure 1: Diagram of Intersection Sight Distance Triangle (FHWA)

- It is assumed that measured sight distance of 360 feet represents SSD. This should be more clearly stated in the TIAS.
- The proponent should provide sketch plans clearly showing the measured sight lines and ISD in both directions. Exhibits provided in Appendix F of the TIAS do not adequately show all sight triangles.
- Stopping Sight Distance (SSD) is not met to the west of the proposed site access drive at 540 South Avenue. Our independent evaluation of sight distance for the proposed site drive is based on field evaluation, which identified utility poles, an earthen berm, stone walls and tree root system**. It is critical for adequate SSD to be provided for safe operation of the proposed site driveway. If adequate SSD is not provided, approaching drivers on South Avenue may not see a site exiting vehicle in time to prevent a collision. The exiting driver, in turn, could enter South Avenue when it is not safe to do so because they do not have adequate visibility of approaching vehicles, and have not been able to adequately judge a safe gap in approaching traffic.**
- Existing utility poles along the south side of South Avenue complicate clear sight lines for drivers, adding to the constraints on site distances presented by the existing intersections, curvature, and grade in this section of South Avenue. Consideration needs to be given to relocating or adjusting the location of any utility poles within the sight distance triangle.
- Preliminary site plans do not indicate grading to provide adequate sight lines. An engineered plan should be provided which shows the limits of regrading, ensuring that regrading can be accomplished within the street layout. If work outside the street layout is required, rights must be obtained from the affected property owner. The existing earthen berm opposite Highland Street in front of 546 South Avenue presents a notable obstruction to sight distance that must be corrected if primary site access is to be accommodated where presently proposed.
- The offset between Highland Street and the proposed site drive must be considered when evaluating the expected operation and safety of the area. Build condition operational analysis for this intersection included in the TIAS presents and analyzes this area as two adjacent unsignalized intersections, one for South Avenue at Highland Street and one for South Avenue at the site driveway. **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.** This potential conflict

requires qualitative safety analysis and will not be considered through traditional intersection capacity analysis results. Qualitative safety analysis may include a more detailed analysis of the existing crash history of the intersection considering crash types and direction of vehicle travel, a safety-focused assessment of driver behavior, or analysis of similar geometric conditions for other residential developments in the region.

- Additionally, the gentle angle of the right turn from South Avenue westbound to Highland Street likely results in little reduction in vehicle speed when navigating this turn. A driver heading westbound on South Avenue turning towards Highland Street may not anticipate a driver slowing or stopping to turn left into the site drive, increasing the potential for rear-end crashes. Furthermore, in the area of the proposed site drive, **South Avenue is too narrow to accommodate passing vehicles, which would result in vehicle queuing from any potential delay for westbound vehicles stopped to turn left into the proposed site driveway**. Westbound queueing has the potential to back up to the intersection at Wellesley Street, exacerbating queuing that already exists for South Avenue westbound under existing conditions.
- It is understood that preliminary public forums on the project have included some discussion on the potential to use the driveway at 518 South Avenue as an egress-only drive for residents rather than an emergency-only driveway. If this is considered, sight distance evaluation must be expanded to evaluate both stopping sight distance and intersection sight distance at this location. Utility poles obstruct visibility when looking left from this location, while the curvature of the roadway restricts visibility when looking right. Furthermore, the introduction of another access point would create an additional complication to traffic flow along this segment of South Avenue – the Pope St. John XXIII Seminary driveway, split approach and departure roadways for Highland Street, both site driveways, and DiBenedetto Drive along a horizontal curve within a short (800± foot) segment of the roadway would present a complex geometry that would be extremely difficult to remediate for safety.
- Beechwood Stables is a prominent abutter on the north side of South Avenue at Highland Street, directly opposite the proposed site drive location. The applicant should identify either by description or analysis whether equestrian activities impact the intersection: i.e. delays for entering/exiting trailers, or riders crossing either South Avenue or Highland Street.

Safety Analysis

Safety analysis was included in the initial TIAS and evaluated crash data collected for a five- year period from 2012 through 2016 based on the most recent data available at the time from MassDOT. This has been updated in the May 2021 TIAS to include the years 2017 through 2019, resulting in an eight- year study period. Crash rates quantified in number of crashes per million entering vehicles were found to be 1.10 for South Avenue at Wellesley Street, 0.63 for South Avenue at Winter Street, and 0.08 for South Avenue at Highland Street. Crash rates at both Wellesley Street and Winter Street exceed MassDOT statewide and District 6 averages. The TIAS notes that geometric and traffic signal improvements were implemented in 2017 at the intersection of South Avenue and Wellesley Street.

- The horizontal curvature of the roadway 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.

Planned Transportation Improvement Projects

The TIAS discussed corridor improvements planned for the Route 30 corridor, which at the time included buffered bicycle lanes adjacent to the South Avenue travel lanes, with a 5-foot sidewalk on one side separated from the roadway by a grass strip. 25% plans and related documents have since been prepared and submitted to MassDOT in October 2020 for the subject project, which depict a 10-foot shared use path (SUP) accommodating pedestrian and bicycle travel along the south side of South Avenue, with a buffer of varying width between the SUP and the roadway edge.

A new traffic signal is proposed for the intersection of South Avenue and Winter Street. It is noted that 2026 traffic analyses in the TIAS reflect the proposed traffic signal.

- 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.**
- Traffic volumes collected in March 2019 show relatively low volumes from Winter Street even in peak periods. It appears unlikely that volumes would meet traffic signal warrants established in the Manual on Uniform Traffic Control Devices (MUTCD)[1]. Specifically, MassDOT expects that the 8-hour warrant (Warrant 1) be satisfied, as stated in the 2012 Massachusetts Amendments to the 2009 MUTCD[2]. **The TIAS should provide an alternate analysis assuming a future unsignalized condition at this intersection.**

[1] *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD), 2009 Edition with Revisions 1 and 2, Federal Highway Administration (FHWA), May 2012.

[2] The Massachusetts Amendments to the 2009 Manual on Uniform Traffic Control Devices and the Standard Municipal Traffic Code, MassDOT Highway Division, January 2012.

Traffic Analysis and Results

Level of service (LOS) analyses were conducted for 2019 Existing, 2026 No-Build and 2026 Build traffic volumes and are summarized in the TIAS.

- Projected site trips were not provided for a Saturday or during the Saturday Midday peak hour. Consistent with Institute of Transportation Engineers (ITE) methodologies[3] and Massachusetts Department of Transportation's (MassDOT's) Transportation Impact Assessment Guidelines[4], it is recommended that traffic generation estimates be provided for these conditions to help determine whether the Saturday Midday peak hour is a critical time period for the proposed development based on the combination of site trips and adjacent street traffic volumes.

The intersection of South Avenue at Wellesley Street operates at LOS F under existing conditions in the weekday morning and weekday afternoon peak hour. In both peaks, the critical movement is the Wellesley Street southbound approach, which operates at LOS F with a volume to capacity (V/C) ratio exceeding 1.2. 2026 No-Build and 2026 Build scenarios continue to operate at LOS F, with incremental delay increases on the South Avenue and Wellesley Street northbound approaches, and LOS degradation from LOS D to LOS E for Wellesley Street northbound in both peak hours analyzed in the 2026 No-Build condition.

- Queue lengths should be evaluated in conjunction with LOS, V/C and delay for all intersections to better demonstrate the impacts of introducing additional traffic to intersections that are already operating at LOS F under existing conditions.

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.**

- The summary on page 20 of the TIAS of Signalized Capacity Analysis Results states that the majority of approaches at South Avenue and Wellesley Street experience "no reduction to overall levels of service." This statement is misleading, as both the Wellesley Street southbound approach and the overall intersection already operate at LOS F, and so no further reduction in LOS is possible; LOS is graded on an A through F scale, with LOS F representing forced or breakdown flow.

The TIAS reports that the intersection of South Avenue at Winter Street operates at LOS F under existing conditions for Winter Street southbound in both peak hours analyzed and for Winter Street northbound in the weekday evening peak hour. This is projected to improve to acceptable LOS (C or

[3] Transportation Impact Analyses for Site Development: An ITE Proposed Recommended Practice. Washington, DC: Institute of Transportation Engineers, 2010.

[4] Massachusetts Department of Transportation. "Transportation Impact Assessment (TIA) Guidelines." *MassDOT Development Review – Planning Process*. Commonwealth of Massachusetts, 13 Mar. 2014.

better) for all approaches in both peak hours analyzed under signalized operation in both the 2026 No-Build and 2026 Build condition.

- As previously noted, the report should provide an alternate analysis assuming a future unsignalized condition at this intersection if installation of a traffic signal is not funded, warranted or otherwise justified.
- If a traffic signal is assumed, the report should identify the potential for vehicles to divert from Highland Street to Winter Street, to take advantage of the traffic signal to accommodate turns to South Avenue. Queuing analysis should be provided for the proposed traffic signal at Winter Street.

The Highland Street approach at the intersection of South Avenue and Highland Street operates at LOS F under existing conditions in both peak hours analyzed and will continue to operate at LOS F with incremental increases in delay in the 2026 No-Build and 2026 Build condition.

The TIAS states that the site driveway will operate at LOS E in both the weekday morning and weekday afternoon peak hour under STOP sign control. As previously noted, existing analysis does not consider the impact of the limited distance between the proposed site driveway and Highland Street.

Study Recommendations

The TIAS recommends that the proposed site drive be placed under STOP sign control, with a painted stop bar at the driveway approach to South Avenue. It also recommends that adequate sight lines be provided in both directions along South Avenue.

- As previously stated, engineered plans should be provided which show the earthwork required to achieve appropriate sight visibility.

It is also recommended in the TIAS that graphical intersection warning signs be placed ahead of the project site driveway, and that radar speed feedback signs be installed for eastbound traffic on South Avenue.

- Proposed signage, including location, type and style, should be verified with Town DPW, Engineering, and Police.

Conclusion

This memorandum has highlighted numerous areas of concern related to traffic and public safety issues for this proposed development. In particular, the following issues are most critical to an analysis of the proposal going forward:

- The main site driveway as shown on the plan does not provide adequate sight distance, at least looking to the west. To provide context and better understanding, the proponent should provide plans showing applicable sight line triangles in all directions.
- Several impediments to sight distance have been identified, and the proponent should provide plans showing proposed mitigation of these impediments and the resultant improvement in sight line triangles.

- The offsetting intersections of the 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.
- 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 2026 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 site driveway as proposed has inadequate turning radius and width to accommodate vehicles turning into the site. This will likely result in vehicles on South Avenue slowing down to negotiate a turn, and in unsafe entry into the driveway if vehicles do not sufficiently reduce speed before turning.
- 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.

The proposed residential development introduces 200 rental units and over 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.