

## EXECUTIVE SUMMARY

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**RE:**  
Traffic Impact and Access Study  
Retail Motor Fuel Outlet Redevelopment  
254-260 Ayer Road – Littleton, Massachusetts

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## EXECUTIVE SUMMARY

Greenman-Pedersen, Inc. (GPI) has prepared this *Traffic Impact and Access Study* (TIAS) for a proposed retail motor fuel outlet redevelopment to be located at 254-260 Ayer Road (Route 2A/110) in Littleton, Massachusetts. The existing site consists of nine (9) vehicle fueling positions (vfps) and a one-story 1,983 square foot (sf) convenience store. The project consists of razing the entire site and constructing a 6,000 ( $\pm$ ) sf convenience store with 12 vfps. Access and egress to the site currently exist via two full-access driveways on the south side of Ayer Road, west of its intersection with Willow Road and Bruce Street. As proposed the site will continue to provide two driveways: the eastern driveway will remain in approximately its current location but will be limited to exit only traffic; and the western driveway will be relocated approximately 140 feet to the west and allowing full-access (entering and exiting traffic).

### Existing Conditions

Base traffic conditions within the study area were developed by conducting manual-turning movement counts (TMCs), vehicle classification counts, and automatic traffic recorder (ATR) counts, including speeds, in September 2022. The TMCs and vehicle classification counts were performed during the weekday AM peak period (7:00 to 9:00 AM), weekday PM peak period (4:00 to 6:00 PM), and the Saturday midday peak period (11:00 AM to 2:00 PM). The ATRs were used to obtain weekday and Saturday daily traffic volumes along Ayer Road (Route 2A/110) adjacent to the site. These counts revealed that the weekday AM peak hour occurred from 7:15 to 8:15 AM, the weekday PM peak hour occurred from 5:00 to 6:00 PM, and the Saturday midday peak hour occurred from 12:45 to 1:45 PM.

Traffic on a given roadway typically fluctuates throughout the year depending on the area and the type of roadway. To determine if the September traffic-volume data needed to be adjusted to account for this fluctuation, historical traffic-volume data were reviewed from the MassDOT records.<sup>1</sup> This information revealed that September traffic volumes are approximately three percent above average-month conditions. Therefore, to be conservative the traffic volumes were not adjusted as to reflect above average-month conditions.

Collision data for the study area intersections were obtained from MassDOT (2015 through 2019) for the latest five years available. Based on the MassDOT data, the Ayer Road (Route 2A/110) / Willow Road / Bruce Street / Eastern Site Driveway / Residential Driveway intersection experienced an average of approximately seven collisions per year with a crash rate (1.36 c/mev), which is greater than the statewide and District 3 averages for signalized or unsignalized intersections. Although the majority of the collisions only resulted in property damage, there was one fatal collision in 2015. One of the contributing factors to the fatal collision was listed as “disregarded traffic signs, signals, road markings”, however, without the detailed crash report, it is difficult to draw any conclusions. Temporary signalization was installed at this intersection in 2016. Additionally, a Road Safety Audit (RSA)<sup>2</sup> was conducted in 2020 with safety enhancements to be incorporated into the current MassDOT intersection improvement project (Project #608443) at this location. Based on the MassDOT data, the Ayer Road / Western Site Driveway intersection experienced less than one crash a year which resulted in a crash rate (0.20 c/mev) which is less than the statewide and District 3 average for unsignalized intersections. Of the four crashes, one was a head-on collision, one was an angle collision, one was unknown, and one was a single vehicle collision with a pedestrian in 2019, which was fatal. Again, without the detailed crash report, it is difficult to draw any conclusions.

### **Future Conditions**

To estimate the impact of site-generated traffic within the study area, existing traffic volumes were projected to the year 2029, representing a seven-year design horizon in accordance with state guidelines. The 2029 No-Build peak-hour traffic volumes were accordingly developed by applying a 0.5 percent compounded annual traffic growth rate (3.55 percent over seven years) to the 2022 Existing traffic volumes.

MassDOT has an intersection improvement project (Project #608443) at the intersection of Ayer Road (Route 2A) / Willow Street / Bruce Street. The PS&E plans were received in June of 2022, the project was advertised for construction bids on September 10, 2022 and is programmed to begin construction in early 2023. The project is planned to be funded through the 2022 Transportation Improvement Program for the Boston Metropolitan Planning Organization. These improvements were incorporated into the 2029 No-Build condition.

Traffic to be generated by the proposed development was forecast using trip rates contained in the *ITE Trip Generation, 11<sup>th</sup> Edition*<sup>3</sup> for Land Use Code (LUC) 945 (Convenience Store/Gas Station). All trip-generation data are provided in the Appendix. Not all of the vehicle trips expected to be generated by the proposed development represent new trips on the study area roadway system. Studies have shown that for developments such as the one proposed, a substantial portion of the site-generated vehicle trips are already present in the adjacent passing stream of traffic. Based on information published in the *ITE Trip Generation Manual*, the average pass-by trip percentage is 76 percent during the weekday AM and 75 percent during the weekday PM peak hour for LUC 945 (Convenience Store/Gas Station).

<sup>1</sup> MassDOT Transportation Data Management System; Station 4091, Interstate 495, north of Ramp-Route 2 WB to Route 495 NB (Littleton).

<sup>2</sup> Stantec; *Road Safety Audit, Ayer Road (Routes 2A and 110) at Willow Road and Bruce Street, Town of Littleton, Massachusetts*; April 24, 2020 – Final Report.

<sup>3</sup> *Trip Generation, 11<sup>th</sup> Edition*. Institute of Transportation Engineers; Washington, DC; 2021.

The proposed redevelopment is expected to generate 69 additional *new* vehicles trips (34 entering and 35 exiting) during the weekday AM peak hour, 74 additional *new* vehicles trips (36 entering and 38 exiting) during the weekday PM peak hour, and 86 additional *new* vehicle trips (44 entering and 42 exiting) during the Saturday midday peak hour. Traffic-volume increases beyond the study area during the peak hours are expected to be in the range of 4 to 39 vehicles trips. These increases represent, on average, one additional vehicle trip approximately every 1.5 to 15 minutes during the peak hours.

### **Capacity and Queue Analysis**

Capacity and queue analyses were conducted at all study area locations under 2022 Existing, 2029 No-Build, and 2029 Build traffic-volume conditions. The impact of site-generated traffic can be measured by comparing 2029 No-Build conditions to 2029 Build conditions. The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual* (HCM)<sup>4</sup>. The concept of level of service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.

#### **Ayer Road (Route 2A/110) / Bruce Street / Willow Road / Eastern Site Driveway / Residential Driveway**

Under existing traffic-volume conditions, the overall intersection of Ayer Road (Route 2A/110) / Bruce Street / Willow Road / Eastern Site Driveway / Residential Driveway operates at LOS B with all movements at LOS C or better. Under future conditions, with the MassDOT improvement project in place, the overall intersection is expected to operate at LOS C or better with all movements at LOS D or better. With the proposed redevelopment in place, the signalized intersection is expected to remain at an overall LOS C with all movements at LOS D or better. Increases in delay as a result of the redevelopment are expected to be less than seven (7) seconds on the overall intersection. Under the future build condition, all volume-to-capacity (v/c) ratios are below 1.00 indicating there will be adequate capacity to accommodate the anticipated traffic volumes.

#### **Ayer Road (Route 2A/110) at Western Site Driveway**

Under existing and future traffic-volume conditions, the Ayer Road westbound left-turn movement into the westerly site driveway operates at optimal levels (LOS A) with queue lengths of one vehicle or less. The proposed site driveway approach is expected to operate at LOS C/D during the peak hours with queue lengths of one to two vehicles. The v/c ratios on Ayer Road as well as the site driveway are well below 1.00 indicating there will be adequate capacity to accommodate the anticipated traffic volumes.

In order to determine the appropriate geometric configuration of Ayer Road (Route 2A/110) on its approaches to the proposed western site driveway, auxiliary left-turn lane warrants analyses were conducted. This analysis assessed the need for a separate left-turn lane on the mainline approach to the proposed western site driveway. Analysis of left-turn treatment indicates that a separate westbound left-turn lane on Ayer Road is justified. Operationally, the intersection is expected to operate similarly with or without the westbound left-turn lane, however, the turn lane provides a considerable improvement in terms of safety.

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<sup>4</sup> *Highway Capacity Manual* 2000, Transportation Research Board; Washington, D.C.; 2000.