



Timothy Olson
Director of Public Works
Town of Hamilton
557 Bay Road
Hamilton, MA 01936

February 19, 2020

Ref. T0973

Re: Sharon Road – Hamilton, Massachusetts
Traffic Safety Analysis

Dear Mr. Olson:

TEC, Inc. (TEC) was retained by the Town of Hamilton to assess resident concerns regarding the volume of vehicular traffic utilizing Sharon Road between Asbury Street and Highland Street in Hamilton, Massachusetts. Specifically, the assessment evaluated the intersections of Sharon Road / Highland Street, Sharon Road / Asbury Street, and Highland Street / Asbury Street to determine the impact of closing one access/egress location to the Sharon Road neighborhood to prohibit the potential for cut-through traffic. A similar temporary closure for one access/egress location, Sharon Road at the intersection with Asbury Street, was recently employed and was deemed successful. The temporary closure was since been removed.

TEC has evaluated the traffic patterns entering and exiting the Sharon Road neighborhood, considered the existing school bus routes and measured the existing intersection sight distances. These conditions are compared to determine what, if any, changes to roadway geometry or traffic flow are beneficial to address resident concerns while maintaining safe roadway conditions for the general public.

EXISTING CONDITIONS

A field inventory of existing traffic conditions at the study area intersections was conducted by TEC staff in February 2020 to obtain information related to intersection geometry and safety characteristics. A description of the existing roadway and intersection inventory is provided below.

Highland Street

Highland Street is a north-south urban minor arterial roadway under the jurisdiction of the Town of Hamilton. The corridor runs approximately five miles connecting Route 1A (as Arbor Street in Wenham) to the south and Topsfield Road (as Mill Road in Ipswich) to the north. Highland Street generally provides one travel lane in each direction and directional flow separated by a marked centerline. The posted speed limit along Highland Street is 40 miles per hour (mph) in the vicinity of the study area. No formal bicycle accommodations or sidewalks are present within the study area. Land uses along the roadway are primarily residential, with the Pingree School just to the north of the study area and a gas station to the south of the study area. At the intersection of Sharon Road with Highland Street, a “Do Not Enter” sign is posted with hours of restriction between 3:00 PM and 6:00 PM.

Asbury Street

Asbury Street is a north-south urban collector roadway under the jurisdiction of the Town of Hamilton. The corridor runs 2.8 miles connecting Highland Street to the south and Ipswich Road to the north. Asbury Street provides one travel lane in each direction with directional flow separated by a marked centerline. The posted speed limit along Highland Street is 35 mph in the vicinity of the study area. No formal bicycle accommodations or sidewalks are present. Land uses along the roadway are primarily residential. A secondary access to the Asbury Grove neighborhood is provided from Asbury Street to the south of Sharon Road. A new residential development is under construction to the north of Sharon Road with direct access to Asbury Street. At the intersection of Sharon Road with Asbury Street, a “Do Not Enter” sign is posted with hours of restriction between 6:30 AM to 9:00 AM.

Highland Street / Asbury Street

Asbury Street intersects Highland Street to form a three-legged Y-shaped unsignalized intersection. The Asbury Street eastbound approach operates under stop-control while the Highland Street northbound and southbound approaches are free-flowing. Asbury Street enters Highland Street at a significant angle which results in a large area of open pavement. The angle allows Asbury Street eastbound right-turn and Highland Street northbound left-turns make turning movements at higher speeds than normal for turning vehicles. The Highland Street northbound and southbound approaches consist of a single general-purpose travel lane with directional flow separated by a marked centerline. The Asbury Street eastbound approach consists of a single general-purpose travel lane with directional flow separated by a marked centerline. No sidewalks or crosswalks are provided at the intersection. There are no traditional bicycle accommodations at the intersection.

SIGHT DISTANCES

TEC measured the available sight distances at the intersections of Highland Street / Sharon Road and Asbury Street / Sharon Road. The available sight lines were compared to minimum requirements established by the American Association of State Highway and Transportation Officials (AASHTO).

Sight distance represents the length of roadway that is visible to a driver traveling within the roadway. Two types of sight distances are typically evaluated for driveways and intersections: stopping sight distance (SSD) and intersection sight distances (ISD). SSD is the minimum distance required for a driver traveling along a roadway to perceive an object in the roadway and stop safely in advance of the object when traveling on a wet pavement surface.

ISD represents the length of the roadway of the roadway visible to a driver waiting to exit a driveway or minor street. Minimum ISD requirements are based on the distance required for a driver to exit a minor street onto a major street without requiring an approaching vehicle to reduce its speed from the design speed to less than 70 percent of the design speed. SSD is typically considered the critical sight distance, as it represents the minimum distance required for safe stopping, while ISD represents an acceptable speed reduction for approaching vehicles. The ISD, however, must be at least equal to the minimum required SSD in order to prevent a driver from entering the roadway when an approaching vehicle is too close to safely stop.

At the intersection of Asbury Street / Sharon Road, the required sight distances are based upon the posted 35 mph speed limit. The minimum SSD recommended is 250 feet northbound and southbound along Asbury Street. The desired ISD for a vehicle exiting Sharon Road is 390 feet for vehicles turning left from Sharon Road (worst-case). Sight distances (both ISD and SSD) of over 400 feet were observed, meeting all AASHTO recommendations for sight distances at this intersection.

At the intersection of Highland Street / Sharon Road, the required sight distances are based upon the posted 40 mph speed limit. The minimum SSD required is 305 feet northbound and southbound along Highland Street. The desired ISD for a vehicle exiting Sharon Road is 445 feet for vehicles turning left from Sharon Road. Upon observation, both SSD and ISD south of the intersection were measured at greater than 500 feet meeting AASHTO recommendations for sight distances. To the north of the intersection, sight lines are partially obstructed by a short bush and by the vertical curvature of Highland Street. The height of this bush (private property) generally aligns with the crest vertical curvature along Highland Street for the point of view of a vehicle along Sharon Road and restricts the ISD to 425 feet. Similarly, the curvature in the roadway restricts the SSD along Highland Street to 375 feet. Based on these measurements, the recommended SSD is met; however, the desired ISD is not. Although the desired ISD is not met, the minimum sight distance for safe operations is equivalent to the SSD which is available for vehicles exiting Sharon Road.



Figure 1: View from Sharon Road at Highland Street looking north.

TRAFFIC VOLUMES

In order to establish existing traffic volume conditions along Sharon Road, the Town of Hamilton Police Department placed an Automatic Traffic Recorder (ATR) on Sharon Road between June 18 and June 30, 2019, when area schools were in regular session. The results of the ATR counts indicate a calculated average eastbound (from Asbury Street to Highland Street) volume of 7 vehicles during the morning peak hour, 15 vehicles during the evening peak hour and 54 vehicles on a Saturday midday. TEC calculated average westbound (from Highland Street to Asbury Street) volumes of 6 vehicles during the morning peak hour, 7 vehicles during the evening peak hour and 22 vehicles on a Saturday midday. The average peak hour volumes are in general conformity with the number of single-family homes within the neighborhood and the traffic that can be expected to be associated with these homes. However, some individual weekday peak

hour periods and the Saturday midday hours indicate a higher traffic volume than the homes would represent, potentially indicating some cut-through traffic to avoid the Highland Street / Asbury Street intersection.

To provide further analysis, TEC staff observed the existing turning movement traffic patterns at the intersections of Sharon Road / Highland Street and Sharon Road / Asbury Street during the weekday morning (7:30 AM – 8:30 AM) and weekday afternoon (4:30 PM – 5:30 PM) commuter peak hours on Wednesday, February 5, 2020 and Wednesday February 12, 2020 while area schools were in regular session. Specifically, TEC aimed to determine the vehicles that are using the Sharon Road neighborhood as a cut-through to avoid the Highland Street / Asbury Street intersection. These movements would include those vehicles making a right turn from southbound Highland Street onto Sharon Road and then turning right from Sharon Road onto northbound Asbury Street and those vehicles making a left from southbound Asbury Street onto Sharon Road and then turning left from Sharon Road onto northbound Highland Street.

Table 1 provides a summary of the vehicles that entered the intersections of Highland Street / Sharon Road and Asbury Street / Sharon Road and the potential cut-through traffic.

Table 1 – Existing Turning Movement Summary

Highland St / Sharon Rd	Southbound Right*	Northbound Left	Eastbound Left*	Eastbound Right	Total
7:30AM – 8:30AM	6	5	5	9	26
4:30 PM – 5:30 PM	2	3	3	1	9

Asbury St / Sharon Rd	Northbound Right	Southbound Left*	Westbound Left	Westbound Right*	Total
7:30AM – 8:30AM	3	2	7	3	15
4:30 PM – 5:30 PM	11	5	5	1	22

*Potential Cut-through movements

As summarized in Table 1, three (3) vehicles were identified as potential cut-through vehicles traveling along Sharon Road westbound (from Highland Street to Asbury Street) and two (2) vehicles traveling along Sharon Road eastbound (from Asbury Street to Highland Street) during the weekday morning peak hour. One (1) vehicle was identified as potential cut-through vehicles traveling through Sharon Road westbound and three (3) vehicles traveling through Sharon Road eastbound during the weekday evening peak hour. Overall, TEC would note that the number of vehicles potentially cutting-through the neighborhood is generally limited; however, cut-through traffic does exist. As volumes were assessed as potentially cutting-through the Sharon Road neighborhood, the current “Do Not Enter” restrictions do not appear to be entirely effective during the peak hours.

It was also noted that, during the weekday morning peak hour, three (3) school buses turned right from southbound Highland Street onto Sharon Road entering the neighborhood. Two (2) school buses turned right from westbound Sharon Road onto Asbury Street and one (1) school bus turned right from eastbound Sharon Road onto Highland Street exiting the neighborhood. It is TEC’s understanding that one Hamilton/Wenham District school bus route enters the Sharon Road neighborhood to pick up and drop off elementary school students during the school peak hours, turning right from southbound Highland Street onto Sharon Road and then returning to continue traveling southbound along Highland Street.

HIGHLAND STREET / ASBURY STREET GEOMETRY

Asbury Street intersects Highland Street at an acute angle, where drivers turning right from south/eastbound Asbury Street must look over their shoulder to see the southbound Highland Street vehicles approaching the intersection. In addition, the right turn from southbound Highland Street onto north/westbound Asbury Street is sharp and may be difficult for larger vehicles, such as school buses. Minimum stopping sight distances and design intersection sight distances as recommended by AASHTO are met at this intersection.

The Town of Hamilton has a Complete Streets Prioritization Plan, which was approved by MassDOT in September 2019. Project #2 in the Plan is the reconstruction of the intersection of Highland Street / Asbury Street with the following description:

“Realign the Asbury Street approach at the intersection to provide a standard T-intersection to improve vehicle sightlines and reduce crossing distances. Extend existing sidewalk approximately 400 feet along the west side of Highland Street north from Pleasant Avenue to Asbury Street. Construct a new crosswalk with ADA-compliant ramps across Asbury Street. Restripe pavement markings as necessary (e.g., centerline, STOP-bars etc.).

It is anticipated that the Town will apply for Complete Streets funding in the spring 2020 to reconstruct this intersection as described. With the improvements in place, the angle of the intersection will be improved so drivers entering and exiting Asbury Street to/from the north on Highland Street can perform these movements more easily and safely.

CONCLUSIONS AND RECOMMENDATIONS

TEC has observed the traffic patterns entering and exiting the Sharon Road neighborhood, including the existing school bus routes and measured the existing intersection sight distances. These conditions were then evaluated to determine whether closing Sharon Road at either Highland Street or Asbury Street is beneficial to address resident concerns while maintaining safe roadway conditions for the general public.

The Sharon Road neighborhood is experiencing some cut-through traffic between Highland Street and Asbury Street during individual commuter peak hours and Saturdays. This may coincide with events at the Pingree School or other area attractions, such as events at Asbury Grove. Restricting access to Sharon Road would eliminate this cut-through traffic and allow for resident-only traffic within the neighborhood.

Therefore, TEC recommends that the Town of Hamilton close the Sharon Road / Asbury Street intersection based on the existing travel patterns and intersection sight distances. The closure of the roadway will have a negligible impact to traffic operations and safety at the intersection of Highland Street / Asbury Street based upon the observed low level of traffic volumes along Sharon Road. Additional improvements through potential Complete Streets grant funding will also alleviate any constrained turning movements at the intersection.

This closure will not impact Hamilton/Wenham District school bus routes as they will be able to continue to access the Sharon Road neighborhood from Highland Street, circulate the

neighborhood and then return to Highland Street. However, other buses that currently turn from Sharon Road to the north on Asbury Street would have to relocate to the intersection of Highland Street / Asbury Street. Where buses are able to complete the necessary turning movements at the intersection of Highland Street / Asbury Street today, any improvements at this intersection should account for the need of bus turning movements.

Further, TEC recommends the following be implemented upon the closure of Sharon Road at Asbury Street.

- The Sharon Road approach to the intersection should be closed to all vehicular traffic. The intersection should be removed, and a cul-de-sac or hammerhead turn around constructed at the Sharon Road terminus rather than placing concrete barriers. Landscaping could be provided at the former intersection.
- Emergency access could be maintained with the closure via permeable pavers or other means as preferred by the Town of Hamilton Fire Department.
- The “Do Not Enter” signage should be removed from the intersection of Sharon Road / Highland Street.
- “No Outlet” signage (W14-2) should be installed at the intersection of Sharon Road / Highland Street.
- Ensure the sight triangles are maintained at the intersection of Sharon Road / Highland Street to maximize intersection sight distances.

Please do not hesitate to contact me directly if you have any questions concerning our evaluation at 978-794-1792. Thank you for your consideration.

Sincerely,
TEC, Inc.
“*The Engineering Corporation*”



Elizabeth Oltman, PE
Director of Transportation Planning