

April 1, 2021

Scott P. Miccile, P.E.
 Toll Brothers, Inc., New England Division
 134 Flanders Road, Suite 275
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RE: **55+ Active Residential Community
 Parking Area Access Sight Distance Review
 Willow Road, Boxford, MA**

McMahon Associates has completed a sight distance review for the proposed parking area serving the trails to be maintained as part of the Toll Brothers residential development on the north side of Willow Road (Route 133) in Boxford, Massachusetts. A field visit was conducted to review available sight distance at the proposed parking access road on Willow Road (Route 133) on March 17, 2021.

The American Association of State Highway and Transportation Officials (AASHTO) publication, *A Policy on Geometric Design, 2018 Edition*, defines minimum and recommended sight distances at intersections. The minimum sight distance is based on the required stopping sight distance (SSD) for vehicles traveling along the main road. The recommended sight distance allows vehicles to enter the main street traffic flow without requiring the mainline traffic to slow to less than 70% of their speed and is referred to as intersection sight distance (ISD). According to AASHTO, "If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient time to anticipate and avoid collisions."

A speed limit of 40 miles per hour is posted in both directions along Willow Road (Route 133). A 48-hour Automatic Traffic Recorder (ATR) count was conducted on Willow Road in the vicinity of the parking area in September 2018. The ATR data indicated an 85th percentile speed of 43 miles per hour in both directions of travel, which was utilized for analysis of the sight distance at the proposed parking area. Table 1 below summarizes the AASHTO sight distance standards for the 85th percentile speeds on Willow Road and the available sight distance measured at the location of the proposed parking area.

Table 1: Sight Distance Review

Location	Looking	Speed	85th %	SSD ¹ Required	ISD ² Recommended	Sight	Meets
		Limit (mph)	Speed (mph)			Distance Measured	Required SSD?
Parking Area Access	Left (East)	40	43	375	415	470	Yes
	Right (West)	40	43	340	475	>600 ³	Yes

1 AASHTO stopping sight distance (see AASHTO equations 3-2 and 3-3) for the 85th percentile speed.

2 AASHTO intersection sight distance (see AASHTO equations 9-1 and 9-2) for the 85th percentile speed.

3 Sight distance measured with anticipated landscaping along Willow Street (Route 133).

As shown in Table 1, the available sight distance for vehicles exiting the proposed parking area onto Willow Road (Route 133) looking left towards the east was measured to be approximately 470 feet, which satisfies the required and recommended AASHTO sight distances for the 85th percentile speeds on Willow Road. At a location approximately 470 feet from the site access driveway, sight distance was obstructed by the existing guardrail on the northern side of Willow Road (Route 133), and the existing "School Bus Stop Ahead" sign.

The available sight distance for vehicles exiting the proposed parking area and looking right towards the west was measured to be greater than 600 feet, which exceeds the required and recommended AASHTO sight distances for the measured 85th percentile speed along Willow Road (Route 133). The 600-foot sight line is possible with landscaping that would need to be maintained west of the proposed parking area.

Based on the sight distance review completed at the location of the proposed parking area on Willow Road (Route 133) and the anticipated landscaping along the roadway, vehicles should be able to safely enter and exit the proposed parking area.

Sincerely,



Erin Fredette, P.E.

