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MEMORANDUM

TO: Mr. Eric Botterman
Millennium Engineering

FROM: Kenneth P. Cram, P.E.

DATE: September 3, 2021

RE: Sight Distance Assessment
Hampstead Street
Methuen, MA

This memorandum has been prepared to assess the sight distances at the intersection of the proposed intersection of Hampstead Street with a proposed sub-division roadway in Methuen, MA as it relates to a potential residential development to be located at 23 Hampstead Street. The project consists of the sub-division of the existing lot at 23 Hampstead Street and the creation of three additional buildable lots with access to/from Hampstead Street. As part of this assessment, stopping sight distances (SSD) were measured at the intersection of Hampstead Street with the new proposed sub-division roadway. The SSD measurements performed along Hampstead Street at its intersection with the proposed sub-division roadway currently exceed the recommended minimum requirements based on the speed limit of 30 miles per hour (mph) on Hampstead Street.

EXISTING CONDITIONS

Hampstead Street will provide the sole access to the site. Hampstead Street is a City owned and maintained local street. Hampstead Street in the vicinity of the proposed sub-division roadway is approximately twenty-four (24) feet wide and provides one travel lane per direction with variable width shoulders (one (1) to two (2) feet). The posted speed limit along this section of Hampstead Street is 30 mph. There is a crest vertical curve on Hampstead Street in the vicinity of the proposed sub-division roadway with approach grades of approximately 4 percent. A sidewalk is provided along the north side of Hampstead Street. Land use along Hampstead Street in the vicinity of the site consists of residential homes.

SIGHT DISTANCE ANALYSIS

Sight distance measurements were performed at the proposed intersection of Hampstead Street and the proposed sub-division roadway in accordance with MassDOT and American Association of State Highway and



Transportation Officials (AASHTO) standards. Stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. Intersection sight distance (ISD) or corner sight distance (CSD) is the sight distance required by a driver entering or crossing an intersecting roadway, to perceive an on-coming vehicle and safely complete a turning or crossing maneuver with on-coming traffic.

Available SSD is determined using a height of 3.5 feet (eye of the driver of a passenger car) and a 2.0 foot high object (representing a passenger car bumper). For an intersection, available SSD is measured along the center of the travel lane of the through street looking towards the intersection at a 2.0 foot high object at the edge of the travel way. Available ISD is determined using a height of 3.5 feet (eye of the driver of a passenger car) and a 3.5 foot high object (eye of the driver of the approaching passenger car) and is measured along the hypotenuse of the sight distance triangle extending from the decision point (at the center of the approach lane on the minor street at a point 14.5 feet back from the edge of traveled way of the through street) looking toward the center of the travel lane of the approaching vehicle on the through street.

Table 1 presents the measured SSD and ISD at the intersection. The sight distance calculations are included in the Appendix.

TABLE 1
SIGHT DISTANCE SUMMARY

	Required Minimum 30 MPH (Feet) ^a	Required Minimum 40 MPH (Feet) ^b	Measured (Feet)
<i>Hampstead Street and Proposed Sub-Division roadway</i>			
<i>Stopping Sight Distance:</i>			
Hampstead Street approaching from the north	188	285	300
Hampstead Street approaching from the south	188	286	400+
<i>Intersection Sight Distance:</i>			
Sub-division roadway looking to the north	287 ^c /331 ^d	382 ^c /441 ^d	300
Sub-division roadway looking to the south	287 ^c /331 ^d	382 ^c /441 ^d	400

^aRecommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*; American Association of State Highway and Transportation Officials (AASHTO); 2010, and based on a 30 mph speed (Posted Speed Limit) on Hampstead Street, adjusted for grade.

^bRecommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*; American Association of State Highway and Transportation



Officials (AASHTO); 2010, and based on a 40 mph (85th percentile) speed on Hampstead Street, adjusted for grade.

^cRecommended minimum value for vehicles turning right exiting a roadway under STOP-sign control.

^dRecommended minimum value for vehicles turning left exiting a roadway under STOP-sign control.

In accordance with the AASHTO manual, *“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 sight distance to anticipate and avoid collisions. However, in some cases, this may require a major-road vehicle to stop or slow to accommodate the maneuver by a minor-road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road.”* Accordingly, the ISD should be at least equal to the SSD, which would allow a driver approaching the minor road to safely stop.

As can be seen in Table 1, the SSD measurements performed at the intersection indicate that the intersection SSD exceeds the recommended minimum requirements based on the posted speed limit, as well as up to 10 mph above the posted speed limit (40 mph, or the observed 85th percentile speed). It is noted that the growth along the back of the sidewalk could affect the SSD and ISD approaching from/to the south. It is recommended that along the property frontage and within the layout of Hampstead Street, this growth be cut-back and maintained so sight lines are not impacted.

CONCLUSION

The SSD measurements performed at the Hampstead Street intersection with proposed sub-division roadway exceeds the recommended minimum requirements based on the speeds of 30 to 40 mph on Hampstead Street (posted speed limit is 30 mph), adjusted for grade. It is recommended that along the property frontage and within the layout of Hampstead Street, this growth be cut-back and maintained so sight lines are not impacted.