

Memorandum

15367

To: Robert Malley, CE Public Works Director

From: Steve Sawyer & Steve Harding

Date: November 5, 2015

Subject: Proposed Suggestions – Intersection of Bowery Beach Road at Spurwink Avenue

We first made contact with MaineDOT's Accident Records Section to obtain the crash history of this intersection for the most recent 3 year period (2012-2014). The results of this inquiry revealed a total of 4 reported crashes in this timeframe. Two of the four included a personal injury, with one involving a bicyclist. MaineDOT measures intersection and roadway link crash histories statewide on a yearly basis and has developed a means of comparing this data to determine notable problem locations. The benchmarks they use are the Critical Rate Factor (CRF) and number of crashes in a 3-year period. A location (intersection or roadway link) must have a total of 8 crashes in 3 years and a CRF greater than 1.0 to be considered a High Crash Location (HCL) or location requiring some attention. According to the Summary Crash Report attached hereto from MaineDOT, this intersection does not meet this criteria – it has a CRF greater than 1.0 but only has had 4 crashes in the last 3 years. We have included an accident diagram for the 4 crashes and provided you copies of the individual crash reports which do not reveal any geometric deficiencies as contributing factors to these incidents. On this basis, we do not see crash history by itself as a justification for improvements to this location.

However, based on the discussions of our September 23, 2015 meeting with you and our observations at the site, we have prepared exhibits to address some of the issues that were identified. These issues include the following items:

- Limited Sight Distance of vehicles traveling southeasterly on Bowery Beach Road (Route 77)
- Sharp Alignment and superelevation of the curve on Bowery Beach Road at the Spurwink Avenue intersection
- Pedestrian traffic safety between the grass parking lot on the southeasterly side of Spurwink Avenue and the Spurwink Church located on the northwesterly side of Spurwink Avenue.

Our comments and suggested solutions for these issues are included in the following discussion.

Sight Distance

The attached exhibit entitled *Sight Distance Evaluation* (Sheet 1 of 2) shows multiple sight distances at three locations for a vehicle traveling southeasterly on Bowery Beach Road (Route 77). Table 1 on the next page summarizes these various sight distances. As referenced in Table 1, Stopping Sight Distance (SSD) is the required length of roadway for a driver to recognize a stationary obstruction in their path and come to a full stop. SSD is largely based on design speed and is the minimum required sight distance along all roadways and intersections.

The *Sight Distance Evaluation* exhibit and Table 1 also includes Decision Sight Distance (DSD), which is the length of roadway required for a driver to recognize an unexpected or otherwise difficult to perceive situation and select an appropriate speed and path for avoidance. An example use of DSD would be a driver having to decide whether to slow down or come to a full stop before making a left turn. DSD has a range of required lengths of roadway depending on the design speed of the road and the reaction time of the driver.

Table 1
Sight Distance Requirements for 35 MPH
(AASHTO Geometric Design of Highways and Streets 2011, "Green Book")

	<i>Required Length of Roadway</i>	<i>Estimated Reaction Time</i>	<i>Represented Color On Sight Distance Evaluation</i>
Stopping Sight Distance (SSD)	250 Feet	2.5 seconds	Magenta
Minimum Decision Sight Distance (DSD)	275 Feet	2.5 + 3.0 seconds	Blue
Average Decision Sight Distance (DSD)	435 Feet	2.5 + 6.0 seconds	Green
Maximum Decision Sight Distance (DSD)	540 Feet	2.5 + 9.1 seconds	Orange

As can be seen on the attached *Sight Distance Evaluation* exhibit, the trees to the southwest along Bowery Beach Road limit the sight distance of vehicles traveling southeasterly on Bowery Beach Road. By clearing these trees, both the safety and driver comfort related to the intersection area can be improved. The suggested edge of a clearing easement determined by a 5-foot offset of the Average DSD as shown on the *Sight Distance Evaluation* drawing.

Alignment

As noted in the field, the curve between Spurwink Road and Bowery Beach Road is sharper than expected for a design speed of 35 miles per hour. Also, both Bowery Beach Road approaches of the Spurwink Avenue intersection have 30 miles per hour advisory speed warning signs. Using the aerial base map, we estimated the curve radius at this intersection to be about 150 feet, which would be appropriate for a reduced design speed of 25 miles per hour. The AASHTO Geometric Design of

Highways and Streets 2011 suggests a minimum curve radius of 340 feet for a speed of 35 miles per hour and a roadway superelevation cross-section slope of 6 percent. The *Concept Alignment* exhibit (Sheet 2 of 2) shows how the suggested curve radius would layout at this intersection. From this graphic, it appears that the realignment would impact approximately 3,000 square feet of land outside the existing right of way (ROW). The proposed ROW for the realignment is also shown.

If the intersection was realigned, there would be an increase in both driver comfort and in safety due to the adjustment of the stop bar on Spurwink Avenue. The adjustment would move the stop bar approximately 25 feet to the southwest from its current position and remove the sight obstruction caused by the Spurwink Church. In doing so, the visibility onto Bowery Beach Road from the Spurwink Avenue approach would be significantly increased.

In addition, the realignment would allow for the superelevation of the curve to be improved. Currently, the roadway is crowned along the Bowery Beach Road centerline. This condition causes the outside (northeast) lane to be graded away from the center of the curve when traveling northwesterly along Bowery Beach Road thus leading to driver discomfort and increasing the potential for vehicles to lose control. The danger is compounded by the proximity of the Spurwink Church to the roadway, which is also located on the most likely path of an out-of-control vehicle. Traditionally, the outside lane around a curve is superelevated (i.e., sloped) so that at the peak of the curve both the inside and outside lanes are graded at the same cross slope. This improves driver comfort for the outside lane and decreases the likelihood of a vehicle losing control.

Pedestrian Traffic

Currently, the parking for visitors to the Spurwink Church is located in a grass surface parking lot on the opposite side of Spurwink Avenue. There is an existing pedestrian access point near the northwest corner of the lot. Concern have been raised regarding the safety of pedestrians crossing Spurwink Avenue from the parking lot which is likely due to the limited visibility of Spurwink Avenue from Bowery Beach Road.

We recommend that a formal painted crosswalk be placed across Spurwink Avenue to increase the safety of people making this road crossing. Traditionally, the crosswalk would be located at the intersection just ahead of the stop bar. The visibility of the Bowery Beach approach from the northwest to Spurwink Avenue is already limited by the Spurwink Church, however, so moving the stop bar only slightly further away (i.e., to the northeast) from the intersection to allow for a crosswalk would only add to the lack of visibility problem.

Therefore if the intersection is not realigned, we recommend that the crosswalk be placed 50 feet further back from the intersection (i.e., to the northeast) as shown on the *Concept Alignment* drawing. This crosswalk location would allow turning traffic to have ample time to react and stop for crossing pedestrians. In this scenario, the pedestrian entrance for the grass parking lot would also have to be relocated further to the northeast to accommodate the new crosswalk. The old entrance should also be closed to deter people from crossing away from the crosswalk.

If the intersection was realigned as suggested in the previous section, the crosswalk could be placed at the location of the current pedestrian entrance. This alternative is also shown on the *Concept Alignment* drawing. The increase in visibility of the Spurwink Avenue approach due to the realignment of the intersection would also improve pedestrian safety.

Conclusion

In order to realign the roadway intersection, the Town would need to acquire additional land to the southwest from a private landowner. Depending on whether the land acquisition is a reasonable outcome, Sebago Technics can proceed further with our analyses and recommendations for the other elements not covered herein, such as the addition of centerline rumble strips, dynamic speed signage, and retaining wall protection for the Spurwink Church. In our view, this additional effort would also include preparing a preliminary project budget cost estimate and outlining MaineDOT's Municipal Partnership Initiative (MPI) Program for potential funding.

The MPI program is an excellent opportunity for municipalities to receive State funding assistance for local roadway improvements. Within the MPI program, the DOT matches up to \$500,000 on a 50/50 match basis for projects with minimal administrative burden. Sebago Technics has done several successful MPI projects with municipalities in the past and, according to our recent conversations with MDOT representatives, we believe that there would be a favorable funding window present during the 2017 calendar.

Should the Town not be able to secure either land rights or funding for a realignment project, we recommend that the Town still pursue the implementation of a new crosswalk and alter the location at which pedestrian access the existing grass surface parking lot for the Spurwink Church. In doing so, pedestrian safety for users of the Spurwink Church can be enhanced from current conditions.

Attachments:

Sheet 1 of 2 - Sight Distance Evaluation

Sheet 2 of 2 - Concept Alignment

Intersection Accident Diagram

Intersection Crash Summary Report