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ROADWAY MAINTENANCE MACHINE SPEED ESTIMATION

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A. ACCIDENT

Location: Great Barrington, Massachusetts
Date: August 4, 2023
Time: 10:05 am eastern daylight time
Roadway Maintenance Machine: Middlesex Tie Drilling Machine #MS097

B. SUMMARY

B.1. The accident

On August 4, 2023, about 10:05 am local time, an employee of the Middlesex Corporation assigned to perform maintenance-of-way work was fatally injured when struck by a roadway maintenance machine (a driller) in Great Barrington, Massachusetts on the Berkshire Line, which is owned by the Massachusetts Department of Transportation and operated by the Housatonic Railroad Company (HRRC).

B.2. Objective and scope of the analysis

The objective of this Video Study was estimating the speed of the driller.

B.3. Summary of results

The driller was moving at the estimated speed of 13.2 ± 0.5 mph when it was at the location of the camera that recorded it.

C. DETAILS OF THE INVESTIGATION

The analysis was based on a video that was recorded by a camera mounted on a commercial building located about 2400 feet before the location of the accident. The video had 2688x1520 resolution and frame rate of 30 fps (frames per second).

Speed was estimated based on the time it took the driller to travel the distance equal to its length. Figure 1 shows the driller as seen in video frame No. 10907. In this frame, the yellow part of the rear bumper is aligned with the left side of the gray pole. Figure 2 shows the driller as seen in video frame No. 10932. In this frame, the yellow part of the front bumper is aligned with the left side of the gray pole.

The elapsed time between the two video frames is $(10932-10907)/30=0.833$ seconds where the number 30 is the frame rate of the video in frames per second. The length of the driller frame was measured as 183 inches. Each bumper is 8 inches long but its yellow segment that is visible in the video is only about 5 inches long. Adding

two 5-inch-long yellow segments to the frame length gives the visible length of 193 inches.

Consequently, the nominal estimated speed of the driller is $193/12/0.833=19.3$ feet/second = 13.2 mph. Assuming that there is a possible timing error of one frame spacing of $1/30=0.033$ seconds, the speed estimate becomes $193/12/0.80=20.1$ feet/second = 13.7 mph. The speed error due to timing relative to the nominal speed estimate is $13.7-13.2=0.5$ mph. The error due to timing could be either positive or negative, resulting in a driller speed estimate of 13.2 ± 0.5 mph.

D. CONCLUSIONS

The speed of a roadway maintenance machine was estimated based on a video recorded with a camera located about 2400 feet before the location of the accident. The estimated speed was 13.2 ± 0.5 mph.

FIGURES



Figure 1. Video frame No. 10907



Figure 2. Video Frame No. 10932