

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, D.C. 20594

August 4, 2021

Video Study

**NTSB Case Number:
CEN20LA352**

A. ACCIDENT

Location: Rockford, Illinois
Date: August 20, 2020
Time: 1542 CDT
Aircraft: Beech 200

B. AUTHOR

Dan T. Horak
NTSB

C. ACCIDENT SUMMARY

On August 20, 2020, at 1542 CDT, a Beech 200, N198DM, departed controlled flight and impacted terrain shortly after takeoff from the Chicago Rockford International Airport (RFD). Post-crash fire ensued. The pilot sustained fatal injuries.

D. DETAILS OF INVESTIGATION

The goal of this investigation was estimating the ground speed based on videos recorded by airport cameras. There were several videos available, two of which were used in the analysis. The video recorded by the Jet Bridge – Gate 1 camera was 97.9 seconds long, had 1280x720 resolution and frame rate of 30 fps. The video recorded by the 29. EXT PTZ – SE Ramp A camera was 20.9 seconds long, had 1920x1080 resolution and frame rate of 15 fps.

Figure 1 shows an aerial view of the accident area. The ground track, based on L3Harris' OpsView, shows that the airborne airplane started turning left about 3000 feet from where it started its takeoff roll. It impacted the ground several seconds later. Several videos showed that the airplane developed a large left bank angle as it was turning.

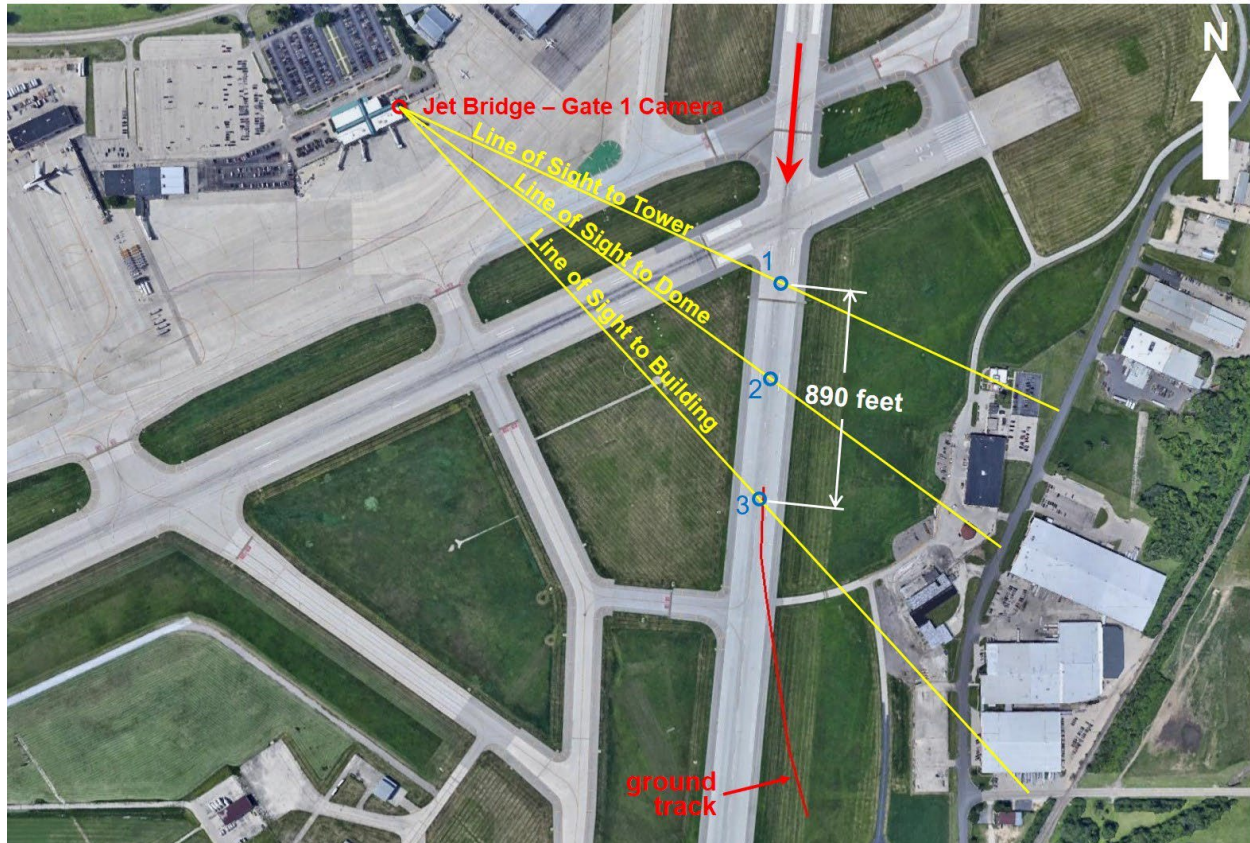


Figure 1. Aerial Image of the Accident Area

Only one of the available videos, the one recorded by the Jet Bridge – Gate 1 camera, allowed speed estimation based on a flight segment that was independent of the left turn indicated by the ground track provided by L3Harris’ OpsView. It was so because it was based on video evidence that corresponded to times when the airplane was still above the runway. Speed estimation was based on estimating airplane locations along the runway using lines of sight from the camera to ground references at the times when the airplane image coincided with the images of the ground references.

Figure 2 shows a subset from a video frame from the Jet Bridge – Gate 1 video that shows the nose of the airplane coinciding with the image of the northern side of the airport tower. The time when the airplane was at this location, 49.8 seconds into the video, was known because the frame rate of the video was known. The yellow line marked Line of Sight to Tower in Figure 1 was used to estimate the location of the airplane at that time. It is at the intersection of the line of sight and the runway centerline, at point No. 1.

A similar process was used to estimate the location of the airplane when its nose was seen coinciding with the image of the northern side of a dome structure. The corresponding line of sight is labeled Line of Sight to Dome and the estimated airplane location is at point No. 2 in Figure 1. Similarly, point No. 3 was estimated when the nose

of the airplane was seen coinciding with the image of the center of the front wall of a building.



Figure 2. Segment from a Video Frame at Video Time 49.8 seconds

Figure 1 shows that the distance along the runway between point No. 1 and point No. 3 is 890 feet. The time elapsed between these airplane locations was 5.00 seconds. Therefore, the estimated speed was $890/5=178$ ft/s or 105.5 knots. Estimating the speeds from point No. 1 to point No. 2 and from point No. 2 to point No. 3 showed that the speed during the five seconds between point No. 1 and point No. 3 was constant.

The 105.5 knots speed estimate based on the Jet Bridge – Gate 1 camera video was based only on the video and on the aerial view. It was independent of the ground track provided by L3Harris' OpsView. Of the other videos, the 29. EXT PTZ – SE Ramp A video was only slightly dependent on L3Harris' OpsView ground track because the airplane was just beginning to turn left when the nose of the airplane was seen coinciding with the second available ground reference point that was used for speed estimation. All the other videos were significantly dependent on the L3Harris' OpsView ground track because the airplane was well into its left turn when it was seen in the videos at all available ground reference locations.

Consequently, only the 29. EXT PTZ – SE Ramp A video that was only slightly dependent on the ground track was analyzed in addition to the Jet Bridge – Gate 1 video. When the airplane location was assumed to be above the runway centerline, the speed estimate was 103 knots. When the location was assumed to be on the ground track shown in Figure 1, the estimate was 107 knots.

The three speed estimates, 105.5 knots, 103 knots and 107 knots are in close agreement with L3Harris' OpsView data that shows the speed as 107 knots decreasing to 104 knots when the airplane started turning left and was deviating from the runway.

E. CONCLUSIONS

The ground speed of an airplane that crashed shortly after takeoff was estimated as 105.5 knots based on a video recorded by an airport camera.