**NATIONAL TRANSPORTATION SAFETY BOARD**
Office of Research and Engineering
Washington, D.C. 20594

February 6, 2019

# Video Study

**NTSB Case Number:**
**HWY18FH013**

## A. ACCIDENT

| | |
|---|---|
| Location: | Fort Lauderdale, Florida |
| Date: | May 8, 2018 |
| Time: | 6:46 p.m. EDT |
| Vehicle: | Tesla Model S |

## B. AUTHOR

Dan T. Horak
NTSB

## C. ACCIDENT SUMMARY

For a summary of the accident, refer to the *Crash Summary Report* in the docket for this investigation.

## D. DETAILS OF INVESTIGATION

The goal of this study was estimating the speed of the vehicle involved in the accident. A secondary goal was estimating the speed of another vehicle to be used for speed comparison. The vehicles were recorded by three traffic cameras and one security camera. The traffic cameras had 1920x1080 resolution and frame rate of 30 fps. The security camera, installed on a building, had 1280x720 resolution and frame rate of 25 fps.

Figure 1 shows an aerial map of the accident area with marked locations related to the analysis of the videos. The traffic cameras are labeled C1, C2 and C3. The red triangles indicate the orientations of the cameras. Camera C1 was aimed at traffic moving south. Cameras C2 and C3 were aimed at traffic moving north. The accident vehicle was moving south on Seabreeze Boulevard. The line of sight of security camera C4 was approximately perpendicular to Seabreeze Boulevard.

There are five reference locations, P1, P2, P3 P4 and P5, marked in Figure 1. Camera C1 was used to estimate the speed of the accident vehicle as it was approaching from the north. It was estimated over a 280-foot-long road segment that ended at P1. The estimated average speed over that segment was 48±1 mph. The accident vehicle was moving behind a white car that was moving at the same speed.

Figure 2 shows a segment from a frame recorded by camera C1. The accident vehicle and the white car are marked in the figure. For analysis and presentation purposes, the time corresponding to the video frame in Figure 2 was set to T=0 seconds.

Camera C2 was used to estimate the average speed of the accident vehicle as it traveled from reference point P2 to reference point P3, a distance of approximately 248 feet. The estimated speed was 75±2 mph. The estimated average speed of the white car on this road segment was 47±1 mph. The average speed of the accident vehicle was about 1.6 times the average speed of the white car.

Figure 3 shows a segment from a frame from the video recorded by camera C2. Note that the accident vehicle already moved from the left lane to the right lane and was in the process of passing the white car. The frame in Figure 3 was recorded at time T=4 seconds, about 4 seconds after the frame shown in Figure 2 was recorded.

Camera C4 was used to estimate the average speed of the accident vehicle as it traveled from reference point P4 to reference point P5, a distance of approximately 120 feet. The estimated speed was 112±3 mph. A segment of a frame from camera C4 video, acquired at about T=12 seconds, is shown in Figure 4.

The white car was approximately 4 seconds behind the accident vehicle when it reached reference point P4. Its estimated average speed between reference points P4 and P5 was 55±2 mph. The average speed of the accident vehicle was about twice the average speed of the white car.

Camera C3 was not used for speed estimation but it provided information on the accident vehicle after it exited the field of view of camera C4 and was entering the curve between reference point P5 and the wall impact location marked in Figure 1. Figure 5 shows segments from four frames from the camera C3 video. The frames are separated by one second. The accident vehicle is marked by yellow arrows.

At time T=11 seconds, the vehicle is still in the right lane. At time T=12 seconds, it is seen moving into the left lane. At time T=13 seconds, it is already in the left lane. It is believed that at time T=14 seconds, it is left of being centered in the left lane, possibly indicating difficulties negotiating the lane change and the curve ahead.


**Figure 1. Aerial Map of the Accident Area**

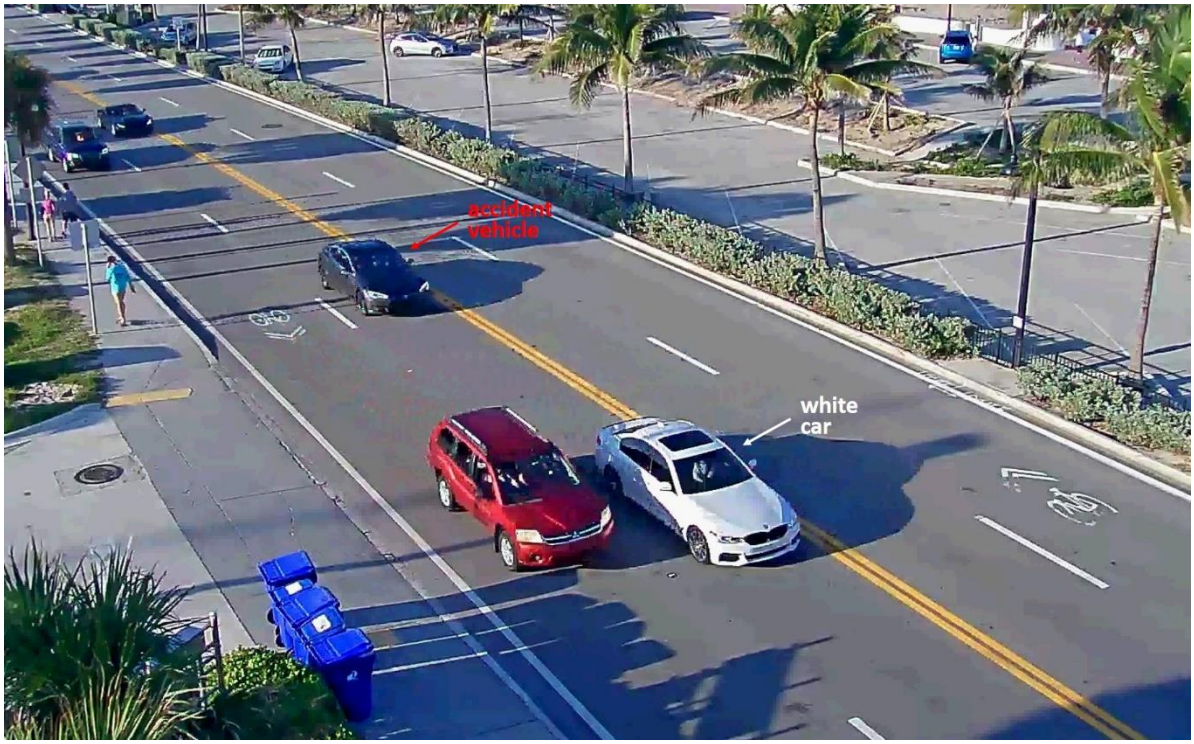


**Figure 2. Segment from a Frame from Camera C1 Video (T=0 seconds)**

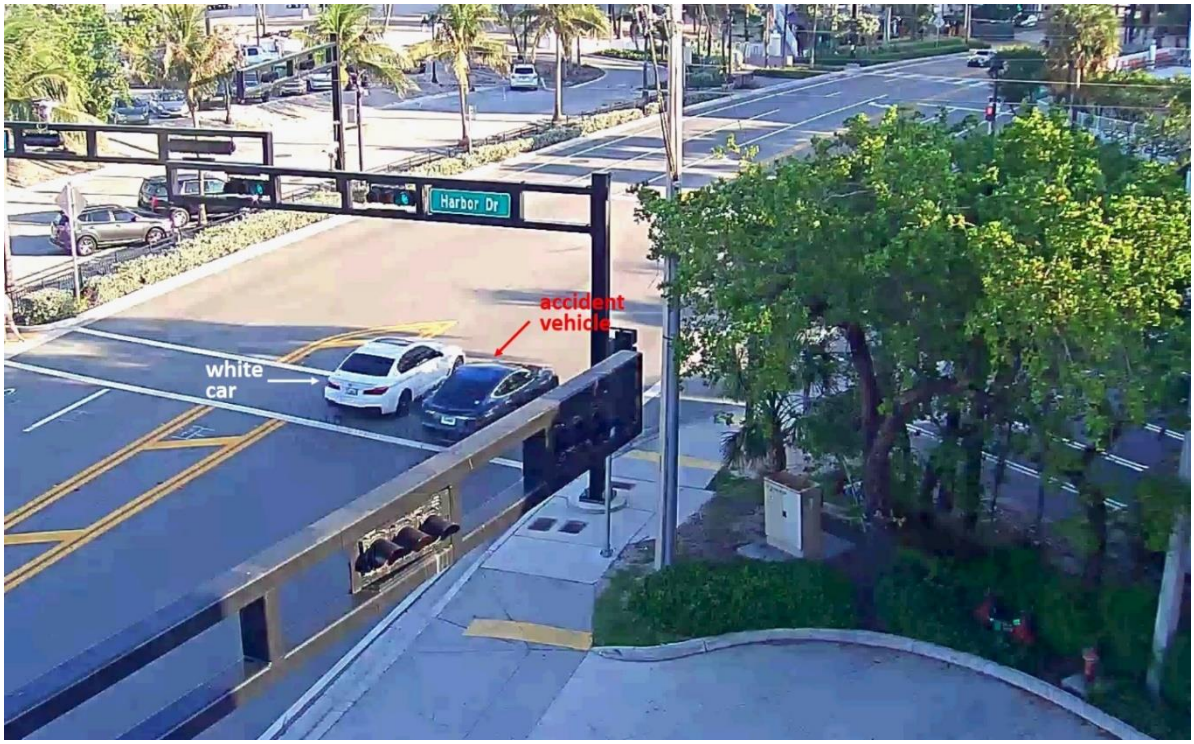


**Figure 3. Segment from a Frame from Camera C2 Video (T=4 seconds)**


**Figure 4. Segment from a Frame from Camera C4 Video (T=12 seconds)**

Because of the distance from the camera, it is not possible to estimate accurately the lateral position of the vehicle relative to the left lane at time T=14 seconds. It is estimated that the vehicle impacted a wall on the west side of Seabreeze Boulevard at about time T=16 seconds and came to rest on the east side of the boulevard at about time T=18 seconds.

Figure 6 shows the estimated speeds of the accident vehicle superimposed on the aerial map of the accident area. The speed labels are at the ends of the road segments over which speeds were estimated.

T=11 seconds

In right lane.

T=12 second

Moving to left lane.

T=13 seconds

In left lane.

T=14 seconds

Beyond left lane.

**Figure 5. Segments from Camera C3 Video Frames**


**Figure 6. Estimated Speeds along Seabreeze Boulevard**

## E. CONCLUSIONS

Videos acquired by four cameras were used for estimating the motion and speed of a vehicle before it crashed into a wall. The highest speed was 112±3 mph, estimated about 4 seconds before the vehicle impacted a wall.