

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR24FA304

INVESTIGATIVE SUPPLEMENTAL MATERIAL

ACCIDENT

Location: Minden, Nevada
Date: September 16, 2024
Time: 0946 Pacific daylight time
Airplanes: Cessna 206 and Globe Swift GC-18

INVESTIGATIVE SUPPLEMENTAL MATERIAL

IIC Zoë Keliher
National Transportation Safety Board
Portland, Oregon

Party Member Brent Hardgrave
Federal Aviation Administration
Reno, Nevada

HISTORY OF FLIGHT

On September 16, 2024, at 0946 Pacific daylight time, a Globe Swift GC-1B, N78074, and a Textron Aviation Cessna T206H Stationair, N844CP, were substantially damaged when they were involved in a midair collision near Minden-Tahoe Airport (KMEV), Minden, Nevada. The Swift pilot was fatally injured. The Cessna pilot and instructor pilot were not injured. The Swift was operated as a Title 14 Code of Federal Regulations Part 91 personal flight. The Cessna was operated as a Title 14 Code of Federal Regulations Part 91 instructional flight.

The left-seated Cessna pilot stated that the purpose of the flight was to complete a Civil Air Patrol Form 5 annual check flight. The flight included high maneuvers, coordinated turns, slow flight, stalls, and an RNAV GPS runway 34 instrument approach. The pilot stated that he was not using a view-limiting device during the approach or at any time before the accident. After the approach, the airplane overflowed the airport and entered the traffic pattern for runway 34. The pilot subsequently completed a short-field landing followed by a touch-and-go landing.

After the touch-and-go, the Cessna continued on runway heading and then turned left crosswind. The left-seated pilot stated that the airplane was climbing toward the published traffic pattern altitude, which he described as about 5,700 ft msl. He stated that the airplane was at about 5,400 ft msl when the collision occurred. The right-seated instructor pilot stated that after the touch-and-go, the Cessna climbed out normally, turned left crosswind, and was turning crosswind to downwind when a radio call was heard from another airplane reporting a 45° entry for runway 34.

The Cessna was equipped with a Garmin G1000 system that recorded trip parameters on an SD card. The recorded data showed that the Cessna departed Minden at 0908. After departure, the airplane maneuvered south of the airport, returned, overflowed runway 34 about 0941 at 5,700 ft msl, and entered the traffic pattern. The airplane completed the touch-and-go at 0945:20 and turned crosswind about 0.4 nautical mile north of the approach end of runway 16 at 0946:25, at an altitude of 5,225 ft msl. The final recorded Cessna data point was at 09:46:42, about 11 seconds before the presumed impact time. At that time, the airplane was about 5,339 ft msl, 97 knots indicated airspeed, 104 knots groundspeed, 107 knots true airspeed, on a heading of 251°, and on a ground track of 255°.

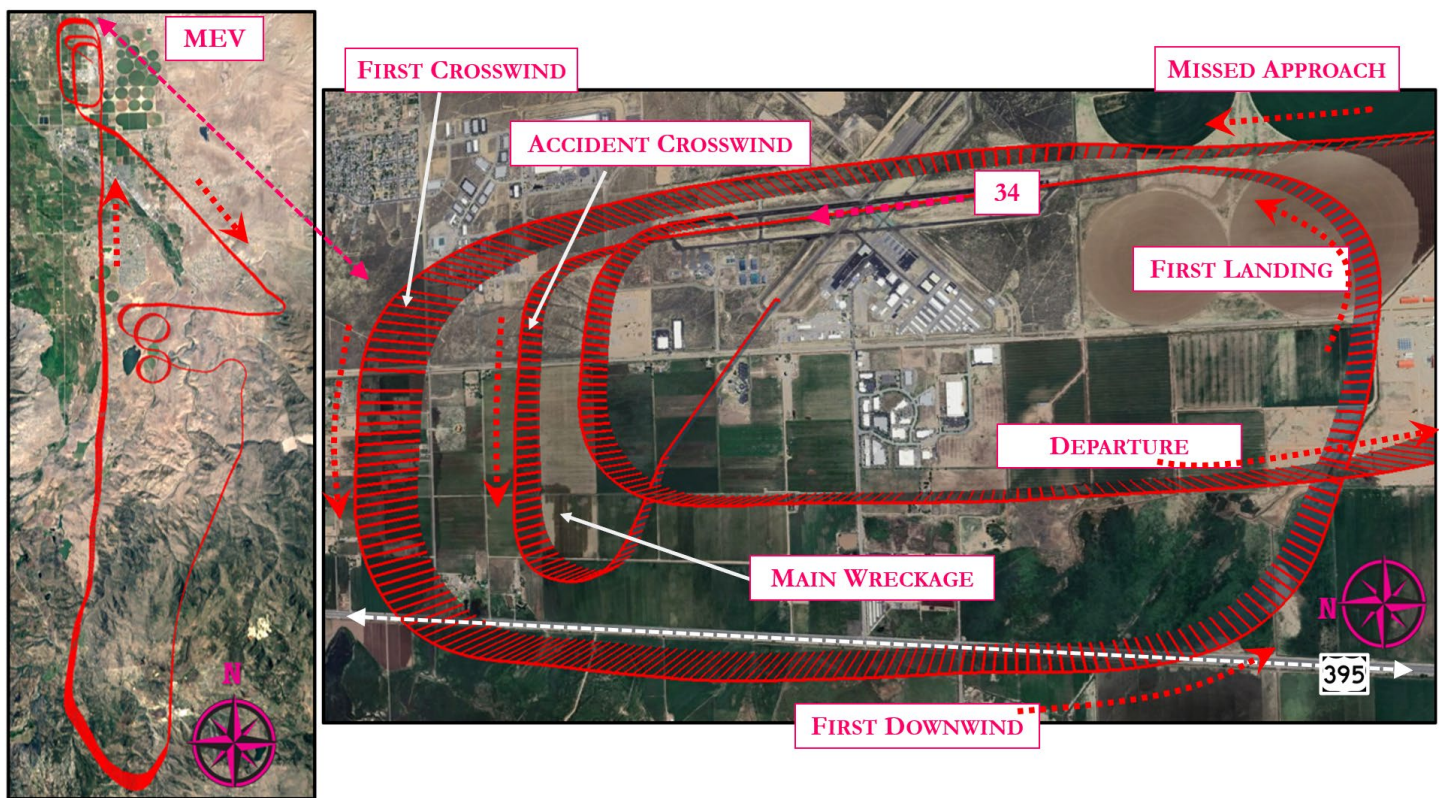


Figure 1: Flight path of the Cessna

The left-seated Cessna pilot stated that, after hearing a radio call from an airplane entering the 45° for runway 34, both Cessna pilots began scanning outside for traffic. The left-seated pilot asked the right-seated pilot to check the iPad/ADS-B display for traffic. The right-seated pilot stated that he looked outside, scanned through the side window and windscreen, glanced at the

multi-function display, and did not observe any traffic target. Both pilots reported that they did not visually acquire the Swift before impact. The left-seated pilot initially believed that the Cessna had experienced a catastrophic engine or propeller failure because he had not seen another airplane before the impact.

After the impact, the Cessna's windscreen was covered with oil, and the engine cowling moved upward and aft against the windscreen. The right-seated instructor pilot assumed the flight controls. The pilots discussed the engine shutdown procedure, fuel isolation, and the available landing options. The right-seated pilot maneuvered toward runway 12 and landed the airplane. At 09:48:02, the Cessna pilot reported over the radio that the airplane was on the runway and had lost engine power. At 09:48:30, the right-seated pilot reported that they had been involved in a midair collision and requested emergency medical and fire response.

A friend of the Swift pilot stated that the pilot sent him a text message at 0925 on the morning of the accident and stated that he was preparing to move the Swift from Pinenut Airport (NV55), Gardnerville, Nevada, to KMEV. The friend was waiting for the pilot at KMEV and planned to drive him back to Gardnerville. The friend stated that the pilot wanted to move the airplane before an incoming storm because NV55 had a dirt runway and he did not want the airplane to remain there if the runway became muddy.

The friend stated that he knew the Swift pilot well and had purchased his own Swift from him. He described the pilot as meticulous and stated that the pilot consistently followed the same routines during flights. He described the pilot's typical route from NV55 to KMEV as initially westbound, then northbound along the mountain range. As the airplane neared the ski pools, the pilot would make a radio call to enter the 45° angle to join the left downwind for runway 34. The airplane would then cross over Highway 395 and proceed in a close-in traffic pattern. The friend stated that the pilot typically flew about 200 ft above the KMEV traffic pattern altitude of 5,700 ft msl.

The Swift was not equipped with ADS-B, and no accident-flight radar data were available at the time of this report. The Swift pilot often flew the friend's GC-1B Swift, which was equipped with ADS-B. Investigators reviewed prior ADS-B flight tracks from that airplane, including a July 20, 2024 flight from NV55 to KMEV. The friend confirmed that the July 20, 2024 flight represented the pilot's normal arrival pattern to runway 34. The prior tracks showed a route from the NV55 area toward the mountain range west of the valley, followed by a southeast bound intercept toward the left downwind for runway 34.

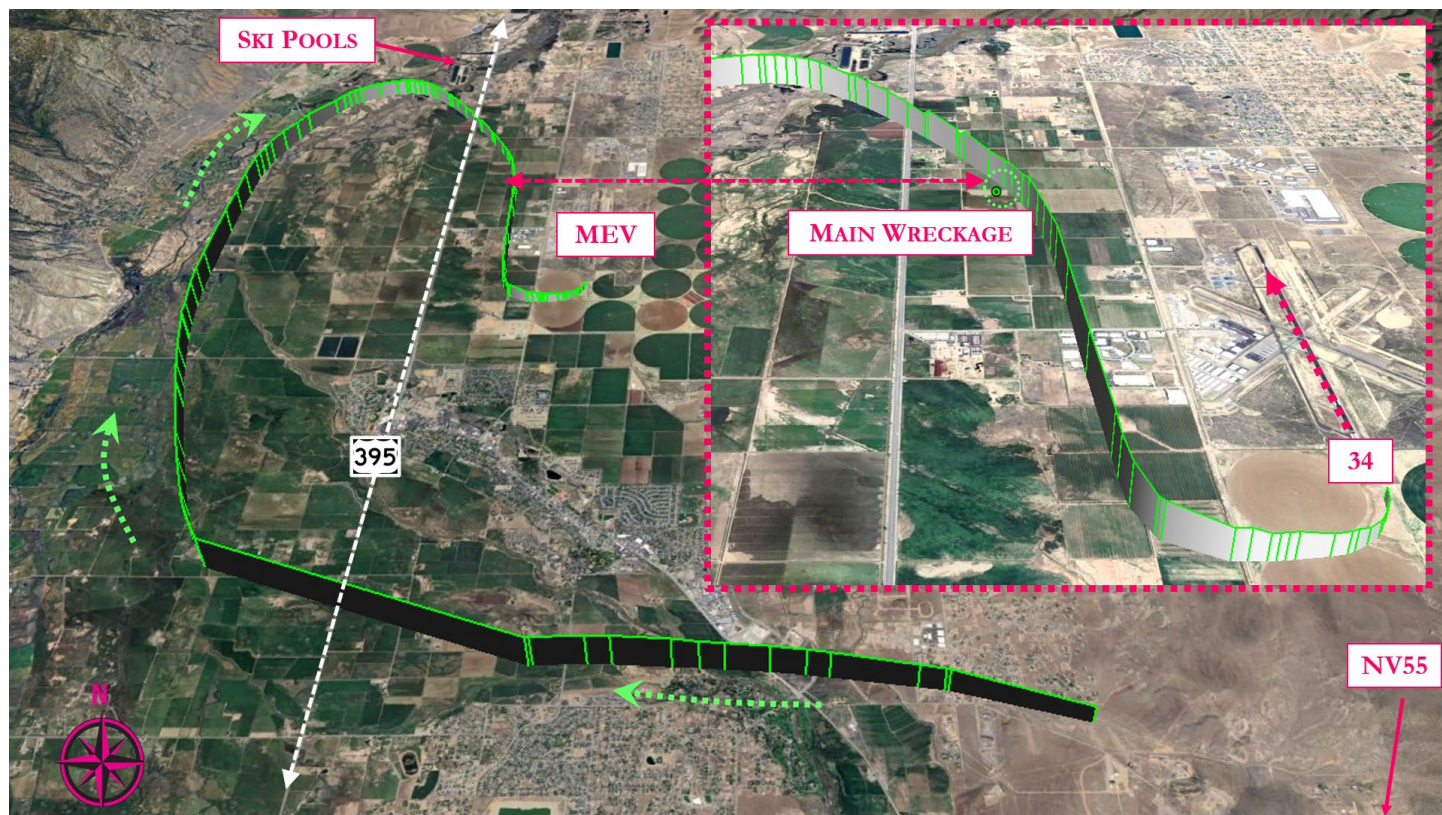


Figure 2: Presumed flight path of the Swift (from June 20th flight)

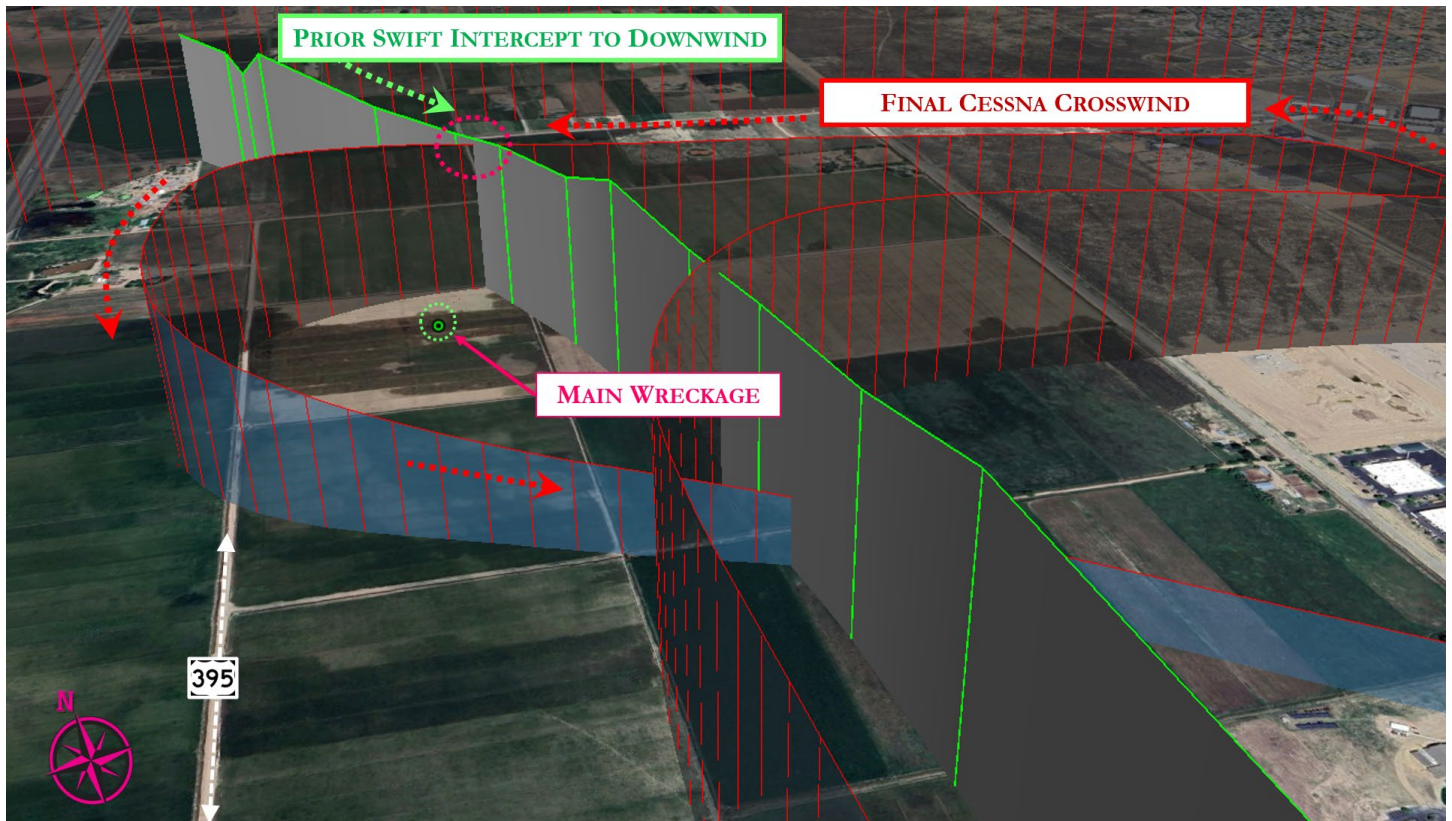


Figure 3: Flight paths showing presumed collision point in reference to the main wreckage

Numerous cameras captured low-quality footage of the airplanes' movements before and after the collision. An airport security camera showed the Cessna on crosswind in a gradual climb and the Swift arriving from the Jack's Valley area northwest of KMEV. A dashcam video from a vehicle traveling on US-395 showed the Swift crossing from west of the highway toward the east at a slightly higher altitude than the Cessna immediately before impact. The Swift was then observed to erupt in flames and descend toward the field below. The videos were not of sufficient quality to determine whether the Swift made an evasive maneuver before impact or whether either airplane had navigation or strobe lights operating.



Figure 4: Video footage showing impact



Figure 5: Video footage showing after impact

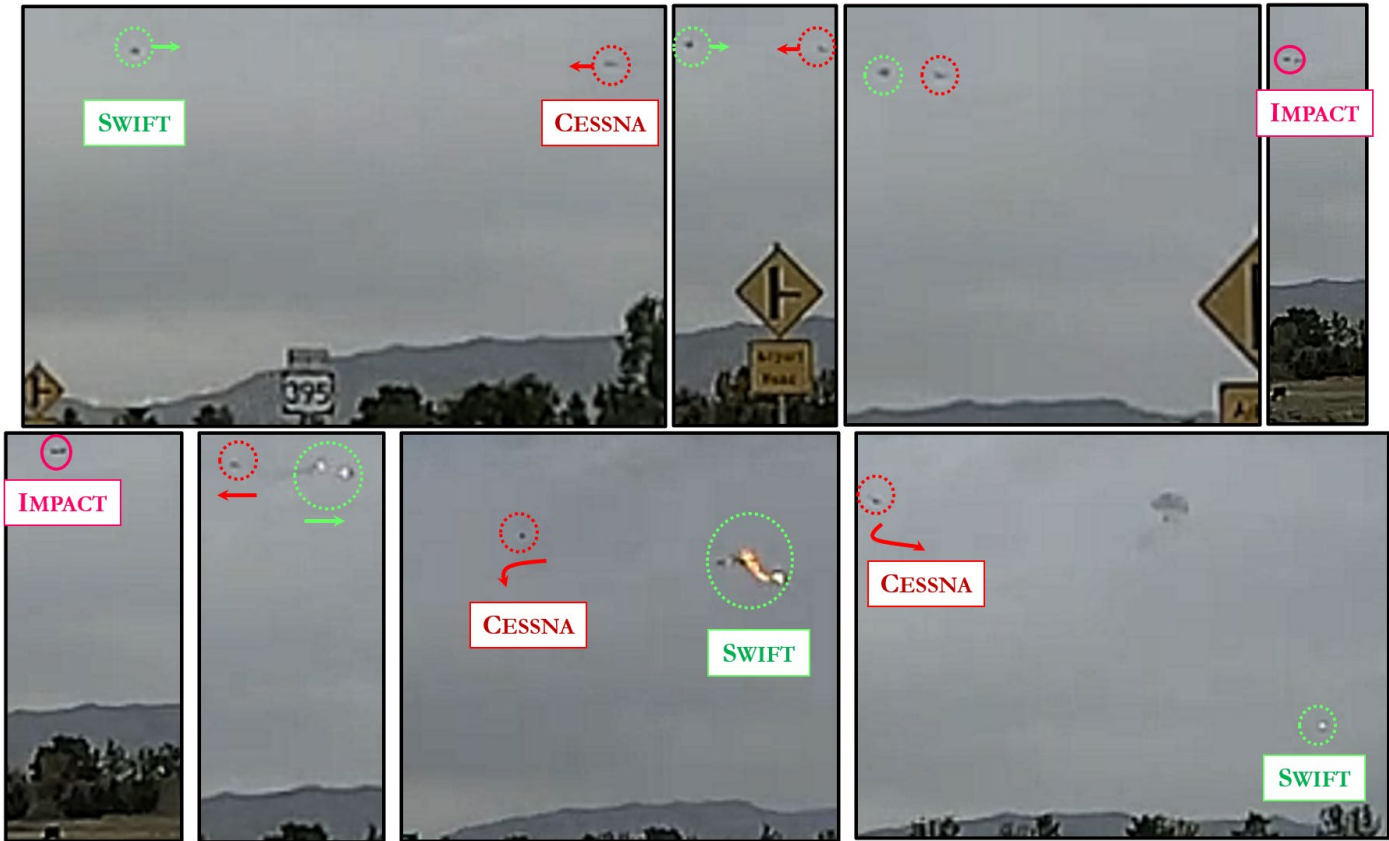


Figure 6: Video footage showing impact

The KMEV Common Traffic Advisory Frequency was recorded. At 09:35:53, the Cessna pilot transmitted that the airplane was 10 miles from the airport and that the crew intended to perform a touch-and-go landing. At 09:40:56, the Cessna pilot reported overflying the airport and entering the left downwind for runway 34. The pilot subsequently reported being on the left downwind, left base, and final approach for runway 34. At 09:44:14, the Cessna pilot reported final for runway 34. At 09:46:36, the Swift pilot reported being on a 45° intercept to the downwind for runway 34. At 09:46:46, the Cessna pilot transmitted that the airplane was on “crosswind to left...” The collision was presumed to have occurred during or shortly after that transmission, with an impact time of about 09:46:53.

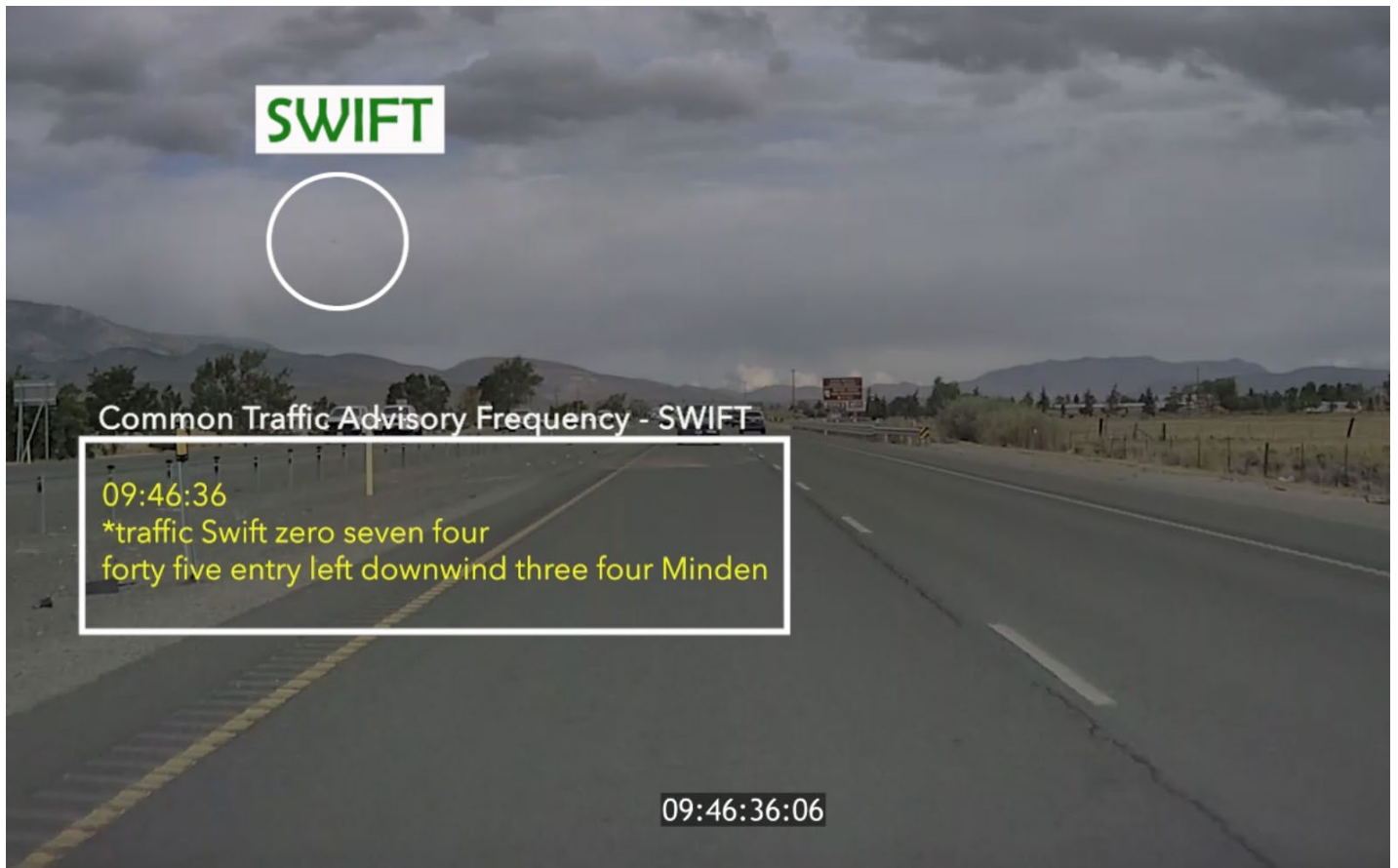


Figure 7: Video footage showing where the last Swift traffic call was made

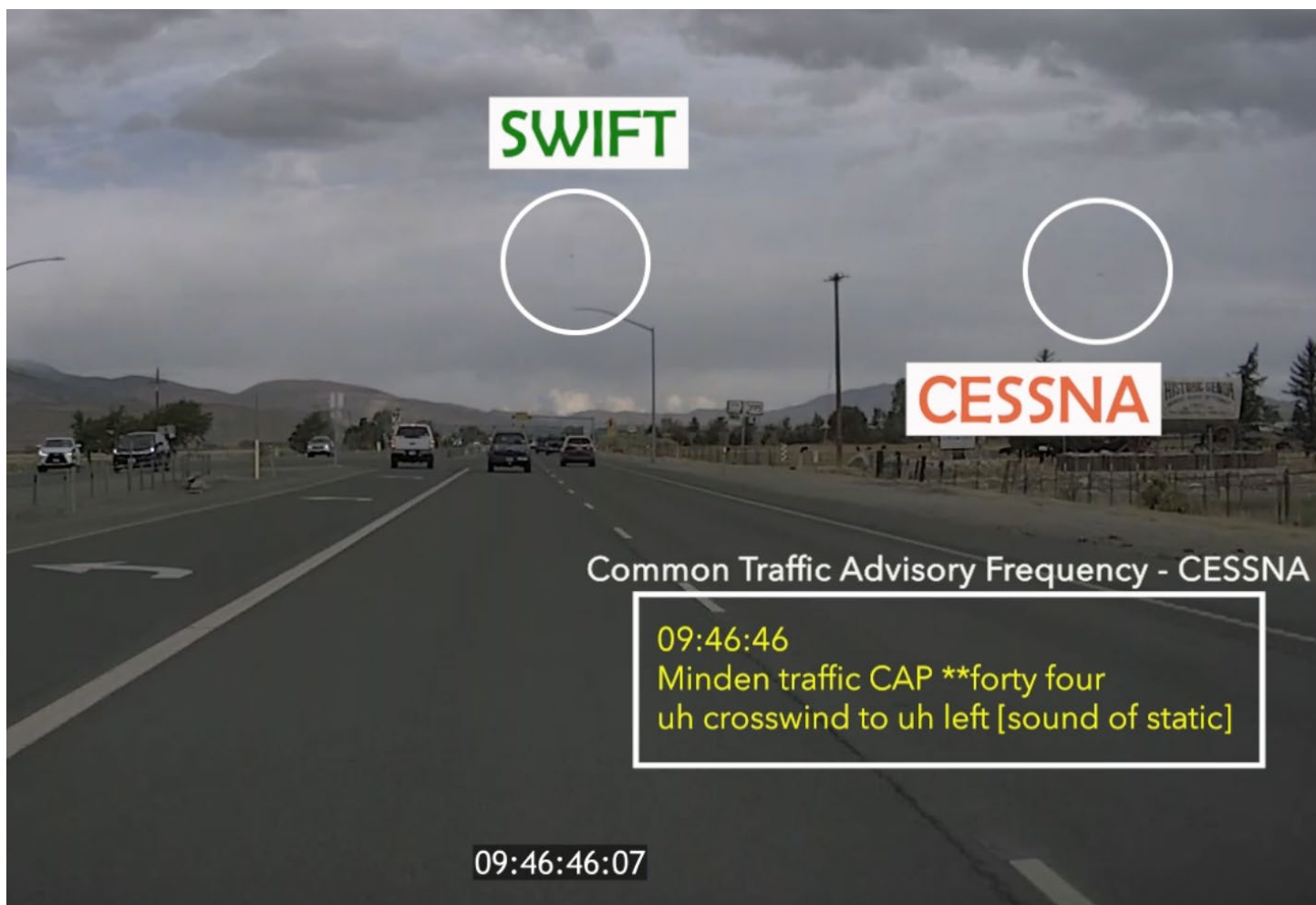


Figure 8: Video footage showing where the last Cessna traffic call was made

AIRPLANE INFORMATION SWIFT

The Swift GC-1B is a two-place, side-by-side, low-wing cabin monoplane of all-metal, semi-monocoque construction. The airplane has a 29 ft 2 inch wingspan, a length of 19 ft 7 3/4 inches plus propeller for the 85 horsepower version, a length of 20 ft 10 3/4 inches plus propeller for the 125 horsepower version, and a height of 6 ft 2 1/2 inches. The wing uses a NACA 23015 root airfoil and a NACA 23009 tip airfoil, with a maximum chord of 75 inches, 2° incidence, 6° dihedral, 3° 54 minutes sweepback, and a wing loading of 11.92 pounds per square foot.

The Swift elevators are aluminum alloy structure covered with 24ST alclad sheet. The elevators are controlled from the cabin through push-pull movement of the control column. The elevator control system consists of cables attached to the control column and routed lengthwise through the fuselage to an elevator bellcrank located at fuselage Station 167.312. Push-pull rods attached to the bellcrank move the elevators as a unit.

The Swift rudder is aluminum alloy structure covered with doped fabric and attached to the vertical fin at three hinge points. Rudder control is provided by two sets of rudder pedals supported from a common tube. Control cables connect the rudder pedals to a rudder bellcrank in the lower forward fuselage section. From that bellcrank, two cables pass through the fuselage to the aft end and attach to a rudder horn mounted directly to the rudder.

The Swift tailwheel is full-swiveling and non-retracting. It consists of a hydraulic spring-loaded cylinder and a Scott solid rubber tailwheel and support. Landing impact loads are absorbed by internal metering of hydraulic fluid and compression of the internal spring. A filler plug is provided on the strut and is accessible through the inspection cover beneath the horizontal stabilizer.

The "Swift" airplane is a definite advancement in present-day personal aircraft. It is a general purpose, two-place, side by side, low-winged cabin monoplane, of all metal, semi-monocoque construction utilizing the latest fabrication and production methods, and the most modern accessories and equipment available. Power is supplied by an 85 or 125 horse-power Continental engine driving a controllable pitch propeller. Luxurious interior appointments, dual controls, readable instruments, electric starter and generator, hydraulic brakes, retractable landing gear, flaps, wing slots and comfortable seats are incorporated to ensure safe and comfortable flying.

The engine mount assembly is a gas welded structure of 3/4 inch chromemolybdenum (XA130) steel tubing, torch normalized and magnaflux inspected after welding. The engine is attached to the mount by means of four point suspension to four (4) integral mounting legs on the engine case. Each leg attachment has hard rubber bushing inserts designed to absorb torsional fluctuations and vibrations of the engine by eliminating all metal-to-metal contact. The engine and mount assembly are bolted at the firewall to the four (4) main fuselage longerons by means of special forged fittings.

AIRPLANE INFORMATION CESSNA

The Cessna T206H was equipped with a Garmin G1000 integrated flight deck and a data logger SD card installed in the multi-function display. The final data logger entry was recorded at 16:46:42 UTC, or 09:46:42 local time. After the impact, the crew pulled the mixture and shut off the master switch in accordance with emergency procedures. The data logger SD card was powered by the primary 28-volt direct current bus, while the G1000 primary flight display remained powered by the emergency bus.

The Cessna engine mount assembly was a welded structure of 3/4-inch chromemolybdenum steel tubing. The engine was attached to the mount by a four-point suspension to four integral mounting legs on the engine case. Each leg attachment used hard rubber bushing inserts designed to absorb torsional fluctuations and vibrations by eliminating metal-to-metal contact. The engine and mount assembly were bolted at the firewall to the four main fuselage longerons by special forged fittings.

WRECKAGE AND IMPACT

The main wreckage of the Swift was located about 1 nautical mile from the approach end of runway 16. The main wreckage came to rest on a heading of 290°. The wreckage had sustained significant fire damage, primarily to the cockpit and inboard wings where the fuel tanks were located. The Swift main landing gear was found in the retracted position. The remaining wing and fuselage skin did not show evidence of broad impact damage from the collision with the Cessna. The Swift propeller remained attached to the engine and was undamaged.

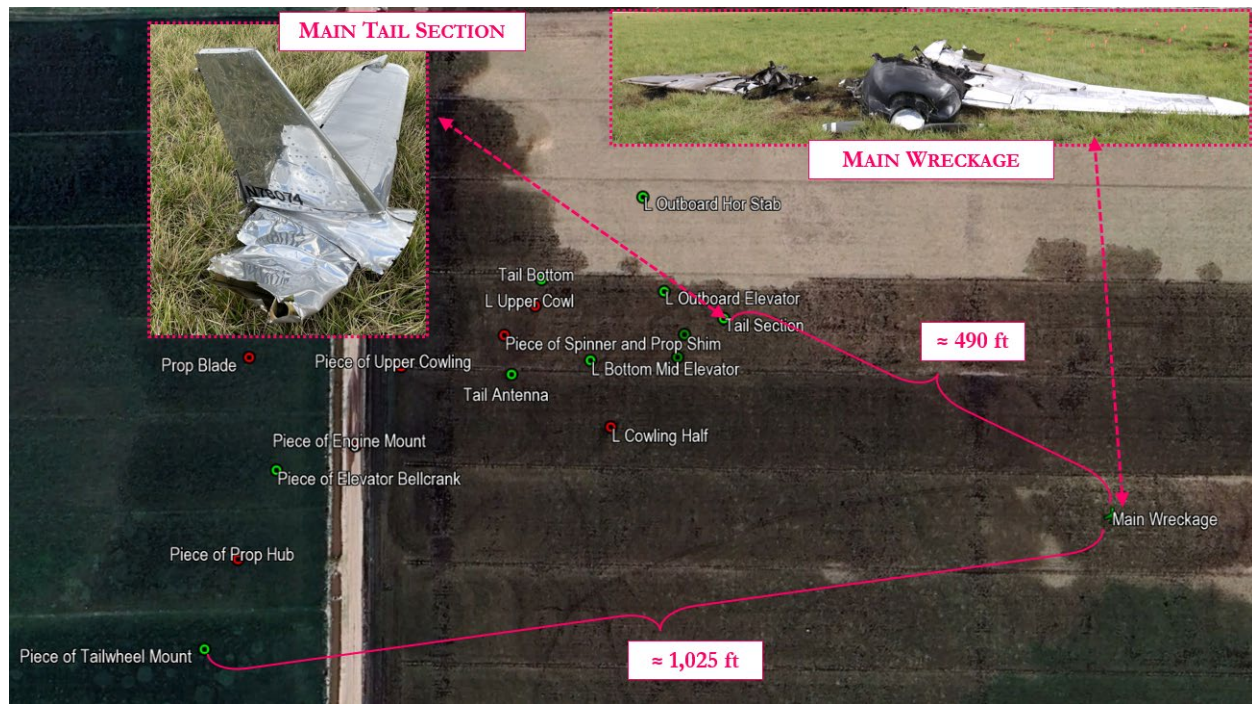


Figure 9: Debris field

The Swift main tail section was located about 450 ft from the main wreckage. The tail section was missing the bottom tail cone, the outboard right elevator, horizontal stabilizer, and rudder, all of which were found nearby in the debris field. The debris field extended about 1,025 ft and contained intermingled components from both airplanes. Numerous Swift skin fragments were scattered throughout the debris field, with most of those fragments originating from the lower tail section. Several debris items were coated with red hydraulic oil from the Cessna propeller hub.

The Cessna sustained damage to the forward engine, propeller, cowling, firewall, and engine mount areas. One Cessna propeller blade separated from the hub. The main portion of the separated propeller blade was found in the debris field, and an 8-inch blade tip section was lodged in the firewall area. The Cessna engine was canted to the right due to fractured mounts. The Swift tailwheel and portions of its mounting structure were lodged entirely underneath the Cessna engine and were not visible until the engine was moved. The Cessna front-right engine mount had separated from the airframe and was found near the Swift tailwheel, having punctured the tunnel.

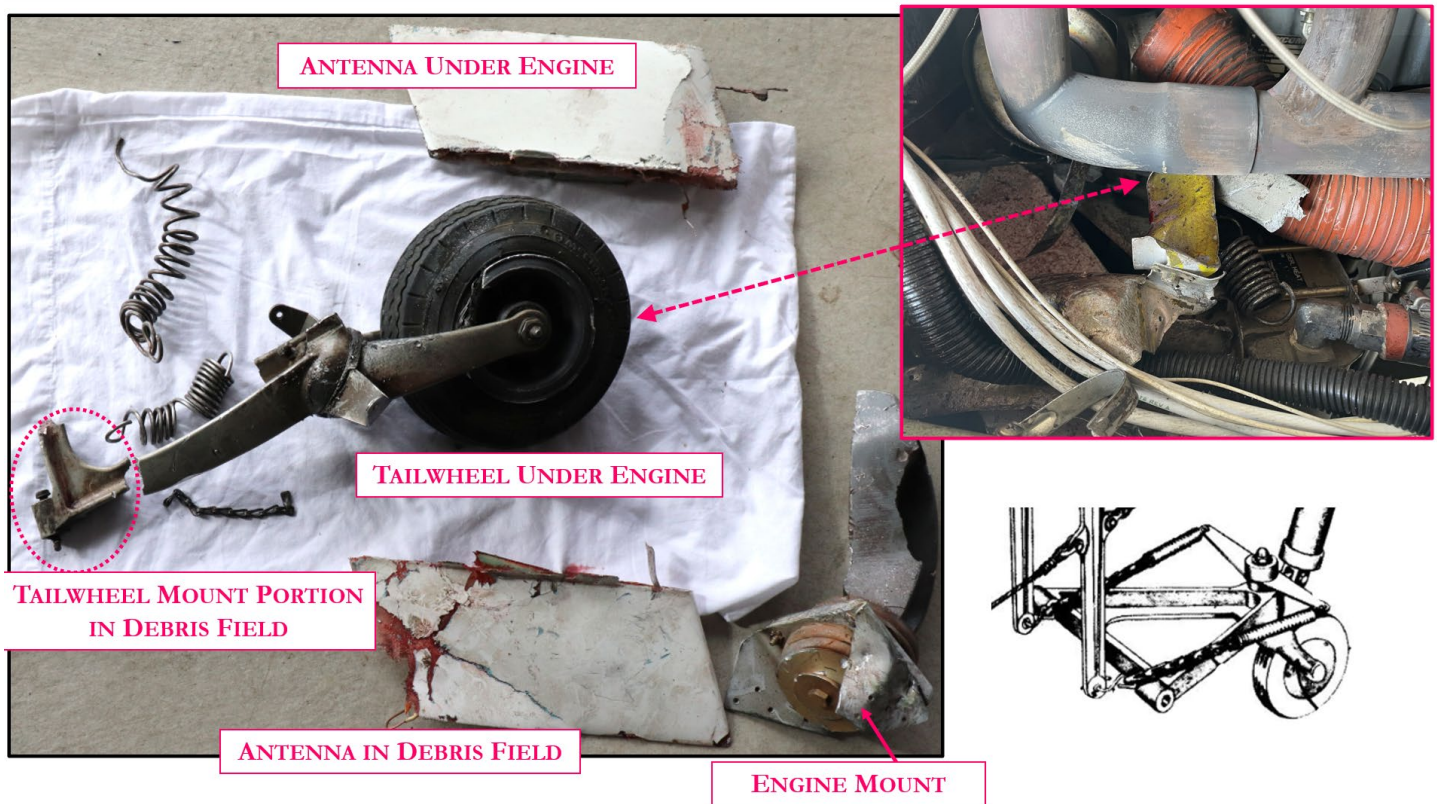


Figure 10: Impact damage of Swift tailwheel in the Cessna's engine compartment



Figure 11: Impact damage showing Cessna propeller

The physical contact evidence were consistent with the Cessna's forward engine/propeller area contacting the lower aft fuselage and tailwheel area of the Swift. The Swift's aft lower fuselage/tailwheel structure was located beneath the Cessna's engine, and damage to the Cessna propeller, engine mount, firewall area, and cowling was concentrated

in the forward section of the Cessna. The Swift damage was concentrated in the lower tail and tail section area rather than the wings or forward fuselage

TESTS AND RESEARCH

Midair Collision Geometry

The Cessna's recorded data provided the most reliable information for one airplane. The Swift's accident-flight heading and speed were not recorded. The Swift's probable flight path was therefore inferred from the pilot's prior ADS-B tracks in another Swift, the friend's description of the pilot's normal arrival route, the CTAF transmission, and video evidence. The prior Swift tracks and the Cessna's final recorded track intersected near the collision location shown in the video and reconstruction imagery.

Just prior to the impact, the Cessna's recorded heading was about 251°, and its final recorded ground track was about 255°. The prior Swift track and video evidence were consistent with the Swift approaching from the northwest/west on a southeastbound 45° intercept toward the left downwind leg for runway 34. The July 20 prior Swift track segment near the probable intercept area showed a southeastbound course of about 145° to 170°. The tailwheel-to-engine contact was consistent with the Cessna climbing into the Swift from below and aft.

The dashcam video showed the Swift slightly above the Cessna immediately before impact. The contact relationship was consistent with damage to the Cessna propeller, engine mount, firewall, and cowlings, and with separation and fragmentation of the Swift's aft lower tail section. The available evidence did not permit a precise vertical convergence angle to be calculated.

Visibility

The Cessna pilots heard the Swift pilot's 45° entry call about 17 seconds before the presumed impact time. Both Cessna pilots reported searching outside for the traffic. The right-seated pilot reported scanning through the side window and windscreen and checking the multi-function display for an ADS-B traffic target. No traffic target was displayed, and neither Cessna pilot visually acquired the Swift before impact.

The physical evidence placed the Cessna behind and below the Swift and placed the Swift ahead and slightly above the Cessna. This relative position would have placed the Cessna in or near the Swift pilot's aft blind area. The available evidence did not establish that the Swift pilot had an effective opportunity to visually acquire the Cessna before impact.



Figure 12: 3D models showing probable impact angle

For the Cessna pilots, the Swift would have been ahead and slightly above the airplane during the final seconds. The Cessna was climbing after takeoff, and the Swift likely presented limited relative motion during the closing sequence. The evidence was consistent with neither pilot effectively acquiring the other airplane in time to avoid the collision.

PERSONNEL INFORMATION SWIFT

The 74-year-old pilot reported civil flight experience that included 3100 total and 0 hours in last six months as of exam dated 5/8/2023. This pilot was issued a Third Class Medical Certificate with the following limitation: “Must use corrective lenses to meet vision standards at all required distances.”

PERSONNEL INFORMATION CESSNA

The left-seated Cessna pilot reported that he had more than 1,600 hours of total flight experience, with substantial high-performance and instrument flight experience. He stated that the flight was a Civil Air Patrol Form 5 check flight and that he was familiar with the KMEV traffic pattern. He stated that his iPad was normally strapped to his knee and did not block a window, and that his scan was primarily outside, with the G1000 used as the primary panel reference. He stated that there was no clutter in the airplane during the accident sequence.

The right-seated Cessna pilot was acting as the instructor/check pilot. He stated that the flight included high maneuvers, an RNAV GPS runway 34 approach, pattern work, and a touch-and-go landing. He reported that after the Swift pilot’s radio call, he looked outside, scanned for traffic, and checked the multi-function display for an ADS-B target. He did not observe a traffic target and did not see the Swift before impact.

WEATHER INFORMATION

The left-seated Cessna pilot described the weather as clear below an overcast layer, with no glare or visibility issue. He stated that the flight was conducted below the clouds, that the overcast was about 8,000 ft agl, and that the wind

was calm or less than 5 knots. He stated that he glanced at the windsock before using runway 34 and that the windsock did not indicate a full display.

A witness traveling on Highway 395 stated that the skies were totally overcast, there was no noticeable wind on the highway, there was no sun glare, no rain, and the cloud level was much higher than the altitude of the airplanes. The witness stated that there was slight sun visible through the clouds from the east, but not much.

RECORDED DATA AND VIDEO INFORMATION

The Cessna's Garmin G1000 data showed the airplane's position, altitude, airspeed, groundspeed, heading, and track during the accident flight. The final recorded point was at 09:46:42. The airplane was about 11 seconds before the presumed impact time, at 5,339 ft msl, 97 knots indicated airspeed, 104 knots groundspeed, 107 knots true airspeed, heading 251°, and track 255°.

The airport security video and dashcam video were reviewed. The airport security video showed the Cessna on crosswind and climbing while the Swift approached from the Jack's Valley area northwest of KMEV. The dashcam video showed both airplanes before the impact, with the Swift crossing from west of US-395 toward the east and slightly above the Cessna. The video showed a fireball at impact, followed by the Swift descending toward the field below. The video was not calibrated to a known camera azimuth or field of view and was not used by itself to determine a precise horizontal collision angle.

WITNESS INFORMATION

One witness traveling southbound on Highway 395 near Stephanie Way stated that he saw an airplane that appeared to be flying from the south, almost directly in line with the direction he was driving. A moment later, a large explosion drew his attention back to that area of the sky. He described a bright flash, followed by deep orange fire and black smoke, and an airplane spiraling straight down from the impact location. He also saw another airplane fly west out of the fireball, then turn left and descend. He did not observe smoke trailing from the second airplane.

Another witness traveling northbound on Highway 395 stated that she saw an object in the sky that initially appeared as an "L" shape. She then saw two airplanes and believed that one appeared to be a Cessna with a smaller airplane behind it to the north and slightly lower. She stated that, within one or two seconds, the smaller airplane entered a near-vertical descent, began smoking, and flames began coming from the tail. She later observed the smaller airplane descend in a flat or pancake-type spin before ground impact. She stated that, seconds after the collision, the Cessna made a hard bank to the east, leveled its bank, descended, and continued east or northeast.

ADDITIONAL INFORMATION

Title 14 Code of Federal Regulations 91.126 states, in part, that unless otherwise authorized or required, each person operating an aircraft on or in the vicinity of an airport in a Class G airspace area must comply with the requirements of that section. When approaching to land at an airport without an operating control tower in Class G airspace, each pilot of an airplane must make all turns to the left unless the airport displays approved light signals or visual markings indicating that turns should be made to the right.

Advisory Circular 90-66C, paragraph 11.3, states that entry to the downwind leg should be at a 45° angle abeam the midpoint of the runway to be used for landing. The Swift pilot reported that he was on a 45° intercept to the left downwind for runway 34. The prior Swift tracks and witness information indicated that the pilot's normal route crossed Highway 395 and joined a close-in traffic pattern for runway 34.

Collision avoidance in a non-towered airport environment can include visual scanning, radio communications, ADS-B traffic information, air traffic control services when available, and traffic collision avoidance equipment. Visual scanning alone may be limited, particularly when the other aircraft is small, has limited relative motion, or is not displayed by an electronic traffic system.