Aviation Investigation Final Report

Location:	Santa Monica, California	**Accident Number:**	WPR13FA430
Date & Time:	September 29, 2013, 18:20 Local	**Registration:**	N194SJ
Aircraft:	Cessna 525A	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control on ground	**Injuries:**	4 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was returning to his home airport; the approach was normal, and the airplane landed within the runway touchdown zone markings and on the runway centerline. About midfield, the airplane started to drift to the right side of the runway, and during the landing roll, the nose pitched up suddenly and dropped back down. The airplane veered off the runway and impacted the 1,000-ft runway distance remaining sign and continued to travel in a right-hand turn until it impacted a hangar. The airplane came to rest inside the hangar, and the damage to the structure caused the roof to collapse onto the airplane. A postaccident fire quickly ensued. The subsequent wreckage examination did not reveal any mechanical anomalies with the airplane's engines, flight controls, steering, or braking system.

A video study was conducted using security surveillance video from a fixed-base operator located midfield, and the study established that the airplane was not decelerating as it passed through midfield. Deceleration was detected after the airplane had veered off the runway and onto the parking apron in front of the rows of hangars it eventually impacted. Additionally, video images could not definitively establish that the flaps were deployed during the landing roll. However, the flaps were deployed as the airplane veered off the runway and into the hangar, but it could not be determined to what degree. To obtain maximum braking performance, the flaps should be placed in the "ground flap" position immediately after touchdown. The wreckage examination determined that the flaps were in the "ground flap" position at the time the airplane impacted the hangar.

Numerous personal electronic devices that had been onboard the airplane provided images of the passengers and unrestrained pets, including a large dog, with access to the cockpit during the accident flight. Although the unrestrained animals had the potential to create a distraction during the landing roll, there was insufficient information to determine their role in the accident sequence or what caused the delay in the pilot's application of the brakes.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's failure to adequately decrease the airplane's ground speed or maintain directional control during the landing roll, which resulted in a runway excursion and collision with an airport sign and structure and a subsequent postcrash fire.

Findings

Personnel issues	Delayed action - Pilot
Aircraft	Directional control - Not attained/maintained
Aircraft	Surface speed/braking - Incorrect use/operation
Personnel issues	Aircraft control - Pilot
Personnel issues	(general) - Pilot
Environmental issues	Airport structure - Contributed to outcome
Environmental issues	Sign/marker - Contributed to outcome

Factual Information

History of Flight

Landing-landing roll	Loss of control on ground (Defining event)
Landing-landing roll	Runway excursion
Landing-landing roll	Collision during takeoff/land

HISTORY OF FLIGHT

On September 29, 2013, at 1820 Pacific daylight time, a Cessna 525A Citation, N194SJ, veered off the right side of runway 21 and collided with a hangar at the Santa Monica Municipal Airport (SMO), Santa Monica, California. The private pilot and three passengers were fatally injured, and the airplane was destroyed by a post-crash fire. The airplane was registered to CREX-MML LLC, and operated by the pilot under the provision of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed for the flight, which operated on an instrument flight rules flight plan. The flight originated from Hailey, Idaho, about 1614.

Witnesses reported observing the airplane make a normal approach and landing, on centerline and within the runway touchdown zone markings. The airplane started to drift to the right side of the runway during the roll out, the nose pitched up suddenly and dropped back down, then the airplane veered off the runway, and impacted the 1,000-foot runway distance remaining sign. It continued to travel in a right-hand turn, and impacted a hangar structural post with the right wing. The airplane came to rest inside the hangar, and the damage to the hangar structure caused the roof to collapse onto the airplane. A post-accident fire quickly ensued.

On-scene examination of the wreckage and runway revealed that there was no airplane debris on the runway. The three landing gear tires were inflated and exhibited no unusual wear patterns. The Federal Aviation Administration (FAA) control tower local controller reported that the pilot did not express over the radio any problems prior to or during the landing.

PERSONNEL INFORMATION

The pilot, age 63, held a private pilot certificate with ratings for airplane single & multiengine land, and instrument airplane, issued March 27, 2004, and a third-class medical certificate issued May 21, 2012, with the limitation that he must wear corrective lenses. The pilot's current logbook was not located. An examination of copies from the pilot's previous logbook showed the last entry was dated June 5-7, 2009, and totaled his flight time as 3,463.1 hours, with 1,236.2 hours in the Cessna 525A. On the pilot's May 21, 2012, application for his FAA medical certificate he reported 3,500 hours total time, and 125 hours within the previous 6 months. The pilot had logbook endorsements from Flight Safety International, Orlando, Florida, for flight reviews and proficiency checks dated January 19, 2002, November 2, 2002, November, 15, 2003, June 4, 2004, March 2, 2005, March 22, 2006, March 21, 2007, and March 31,

2008. Training records provided by Flight Safety showed that he had completed the Citation Jet (CE525) 61.58 Recurrent PIC training on February, 27, 2013.

The person occupying the right seat in the cockpit was a non-pilot rated passenger.

AIRCRAFT INFORMATION

The low wing, six-seat, retractable landing gear, business jet, serial number 525A0194, was manufactured in 2003, and was based at the Santa Monica Airport. It was powered by two Williams International FJ44-2C engines, each capable of producing 2,400 pounds of static thrust at sea level. A review of the maintenance records revealed that the most recent maintenance was performed on September 7, 2013, and included hydrostatic test of the fire extinguisher bottles, battery functional check, pitot-static system check, transponder calibration check, visual corrosion inspections on the landing gear and horizontal/vertical stabilizer spars, and a generator control unit wire bundle service bulletin. The records showed that as of September 7, the total airframe hours were 1,932.8. Total time on the number one engine (SN 126257) was 1,932.8 hours with 1,561 cycles, and the total time on the number two engine (SN 126256) was 1,932.8 hours with 1,561 cycles. Total landings were 1,561. The aircraft was not equipped with a flight data recorder or a cockpit voice recorder.

Flap Position & Speed Brakes

The flap system description from the Cessna 525 Operating Manual states: "The trailing edge flaps are electrically controlled and hydraulically actuated by the main hydraulic system. Normal flap travel is from 0 to 35 degrees and any intermediate position can be selected. A mechanical detent is installed at the takeoff and approach (15 degrees) position of the flap lever. The full flap position (35 degrees) is reached by pushing down on the flap lever when passing through the takeoff and approach detent."

"The flaps have an additional position called GROUND FLAPS (60 degrees) which provides additional drag during the landing roll."

The speed brake system description from the Operating Manual states: "The speed brakes are installed on the upper and lower surfaces of each wing to permit rapid rates of descent, rapid deceleration, and to spoil lift during landing roll. The speed brakes are electrically controlled and hydraulically actuated by a switch located on the throttle quadrant and may be selected to the fully extended or fully retracted positions. When the speed brakes are fully extended a white SPD BRK EXTEND annunciator will illuminate to remind the pilot of the deployed status of the speed brakes. The angular travel for the upper speed brake panels is 49 degrees, +2 or -2 degrees and the lower panels travel 68 degrees, +2 or -2 degrees. The lower speed brake panels close with the upper panel. The speed brakes will also automatically deploy when GROUND FLAPS position or selected on the flap handle."

Brake System

The brake system description from the Operating Manual states: "An independent power brake and anti-skid system is used for wheel braking. The closed center hydraulic system is comprised of an independent power pack assembly (pump, electric motor, and filter), accumulator and reservoir which provides pressurized hydraulic fluid to the brake metering valve and anti-skid valve. A hand-controllable pneumatic emergency brake valve is provided in the event of a power brake failure. Pneumatic pressure is transmitted to the brakes though a shuttle valve integral to each brake assembly."

"The brake metering valve regulated a maximum of 1,000 psi +50/-20 psi to the brakes based upon pilot/copilot input to the left and right rudder pedals. RPM transducers at each wheel sense the onset of a skid and transmit information to the anti-skid control box. The anti-skid control box reduces brake pressure by sending electronic inputs to the anti-skid valve. Pressure to the brake metering valve is controlled by mechanical input through a bellcrank and push-rod system from either the pilot or the copilot's rudder pedals. A manually operated parking brake valve allows the pilot to increase the brake pressure while the brake is set, and provide thermal relief at 1,200 psi. After thermal relief, pressure will drop to no less than 600 psi, and the pilot or copilot must restore full brake pressure prior to advancing both engines to take-off power."

"Pneumatic pressure from the emergency air bottle is available as a backup to the normal system."

METEOROLOGICAL INFORMATION

Recorded weather data from the Santa Monica Airport automated surface observation system (ASOS elevation 177 feet) at 1824 showed the wind was from 240 degrees at 4 knots, visibility was 10 statute miles with clear sky, temperature was 21 degrees C and dew point 12 degrees C, and the altimeter was 29.97 inHg.

Sun position was calculated using the National Oceanic and Atmospheric Administration (NOAA) solar position calculator. The Los Angeles location of 34 degrees, 3 minutes, 0 seconds latitude, and 118 degrees, 13 minutes, 59 seconds longitude was used for the solar position calculation on September 29, 2013, at 1820 PDT. The solar azimuth was calculated to be 264.33 degrees, and solar elevation was 3.59 degrees above the horizon. This position placed the Sun near horizon level, about 54 degrees to the right of the centerline of runway 21.

AERODROME INFORMATION

The Santa Monica Municipal Airport (KSMO), is at an elevation of 177 feet msl. The airport consists of a single 4,973 by 150-foot asphalt/grooved runway oriented southwest to northeast (03/21), with a downhill gradient to the west of 1.2%. There are no overrun areas for either runway, and the departure end of runway 21 terminates in an approximately 50-foot drop off into residential housing to the west and south (residential homes are located approximately 220 feet from the departure end of both runways). Along the last 3rd of the northern side of runway 21 are privately-owned hangars with an approximately 30-foot rising embankment behind the hangars. The runway physical condition was good with no evidence of broken asphalt, debris, pot holes, or water on the runway at the time of the accident.

WRECKAGE & IMPACT INFORMATION

Visible tire track marks from the right main landing gear tire on the runway started at 2,840 feet from the threshold of runway 21; the airplane veered right, colliding with the 1,000-foot runway remaining sign, crossing over the tarmac between taxiway A2 and A1, and finally colliding with the last row of hangars on the northwest corner of the airport. The tire marks on the runway consisted of light scuff marks from the right main landing gear tire and became dark black transfer marks of all three landing gear tires after the airplane had veered off the runway and impacted the 1,000-foot remaining sign. The collision with the hangar resulted in the hangar collapsing over the airplane. A post-accident fire erupted, damaging adjacent hangars.

The collapsed hangar structure was lifted using cranes and shored up using wood timbers. The wreckage was removed by attaching chains to the airframe structure and pulling it out of the hangar with a forklift loader. The fuselage had separated from the wing structure in scissor fashion. The fuselage had rotated counter clockwise about 60 degrees around the longitudinal axis so that the cabin door was pointed towards the ground. The pilot was located in the left front seat, an adult female passenger was in the right front seat, an adult female was located with her back against the cabin door, and an adult male was sitting in a right-hand seat mid cabin. The remains of two cats and a dog were also located within the cabin. The tail section aft of the pressure bulkhead was exposed to extreme heat/fire. The nose landing gear was extended with the wheel and tire attached to the mount. The continuity between the nose wheel steering linkage up to the cockpit rudder pedals was verified. The tire was inflated and exhibited no usual wear.

The right wing had separated from the fuselage at the attach points. The wing spar had broken outboard of the wheel well rib, and a semicircular leading edge indentation was evident at the fuel filler cap location. Aileron and flaps were attached to the wing, and the speed brake/spoiler was deployed. The aileron control cable was attached to the aileron bell crank and the cables were traced to the center fuselage. The right main landing gear was extended with the wheel and tire attached. The tire was inflated and did not exhibit any unusual bald or flat spots.

The tail section aft of the pressure bulkhead separated from the airframe due to extreme fire damage, and was the only part of the airplane that remained outside of the collapsed hangar structure. The horizontal stabilizer was present with both elevators attached. The vertical stabilizer was present with the rudder attached. Both engines remained attached to their respective engine mounts. The emergency locator transmitter (ELT), manufactured by ACR Electronics, was located in the tail section, exhibited minor heat damage and was transmitting during the time immediately following the accident.

The left wing exhibited extreme fire damage at the wing root, and the wing extending outboard of the root was discolored gray/black. There was slight denting along the leading edge of the wing. The flap and aileron were attached to the wing, and the speed brake/spoiler was deployed. The aileron control cables were traced from the aileron bell crank to the center fuselage section.

The fuel control cables were attached to both engines fuel control units; both engine's bleed valves were movable. The left engine N1 section had seized and the visible fan blades were free of dirt or soot. The right engine N1 section could be rotated by hand, and the intake fan blades were evenly coated with black soot. Borescope examination of the high pressure compressor of both engines showed soot and small particulate matter within the compressor section, consistent with the engines operating while ingesting smoke, soot, and ash.

MEDICAL & PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot on October 3, 2013, by the Los Angeles County Coroner. The cause of death was ascribed to the combined effects of inhalation of combustion products and thermal burns.

The FAA Civil Aerospace Medical Institute (CAMI) performed toxicology on specimen from the pilot with negative results for ethanol, and positive results for 10 ug acetaminophen detected in urine, and Rosuvastatin detected in urine.

An autopsy was performed on the passenger, who was in the cockpit's right seat, on October 3, 2013, by the Los Angeles County Coroner. The cause of death was ascribed to the combined effects of inhalation of combustion products and thermal burns.

The FAA Civil Aerospace Medical Institute (CAMI) performed toxicology on specimen from the passenger with negative results for ethanol, and positive results for 0.077 ug/ml diazepam detected in liver, 0.042 ug/ml diazepam detected in blood, 0.524 ug/ml dihydrocodeine detected in liver, 0.109 ug/ml dihydrocodenine detected in blood, 0.659 ug/ml hydrocodone detected in liver, 0.258 ug/ml hydrocodone detected in blood, 0.132 ug/ml nordiazepam detected liver, and 0.064 ug/ml nordiazepam detected in blood.

ADDITIONAL INFORMATION

Brake System Examinations

The following airplane brake system components were removed from the wreckage; skid control unit fault display, left and right wheel transducers, brake control valve assembly, and the skid control box. The components were examined at Crane Aerospace, Burbank, California, on January 22, 2014, under the oversight of the NTSB investigator-in-charge (IIC). Each component was examined and tested per Crane Aerospace acceptance testing procedures. No discrepancies or anomalies were identified that would have precluded normal operation of the components. The complete examination report is available in the public docket of this investigation.

Both the left and right main brake assemblies were examined at UTC Aerospace Systems, Troy, Ohio, under the oversight of the NTSB IIC, on February 11, 2014. A hydraulic fitting was placed on the primary port of the shuttle valve and pressurized to 100 psi. No leakage was observed, piston movement was observed on all 5 pistons, and the rotors could not be moved by hand. Hydraulic pressure was released and adjuster assemblies were observed to return to their normal position. The system was pressurized to 850 psi, no leaks were observed and the rotors could not be moved by hand. The wear pins extensions indicated about 2/3 wear on both brake assemblies. The system held pressure at 850 psi for 5 minutes. The system was depressurized to 9 psi. The pistons retracted and a feeler gauge measured a gap between rotor and stator disks. The hydraulic fitting was removed from the primary port and placed on the pneumatic port (emergency system). When pressurized to 100 psi the shuttle valve could be heard to move from primary to emergency, indicating the last actuation was via the normal (primary) brake system. The system was pressurized to 850 psi, no leaks were observed, and piston movement was evident. The complete examination factual report is available in the public docket of this investigation.

The parking brake valve assembly had been exposed to extreme thermal heat and was deformed in such a way that disassembly by normal means was impossible. To determine the parking brake internal configuration and condition, the parking brake valve was subjected to x-ray computed tomography (CT) scanning. The scanning was conducted from April 29-30, 2014. The scans were performed by Varian Medical Systems, Inc., under the direction of the NTSB using the Varian Actis 500/225 microfocus CT system CT system. The components were scanned using a total of 1,522 slices. The images were examined for any signs of missing or damaged parts, contamination, or any other anomalies. Nothing was identified in the scan images that would have precluded normal operation of the parking brake. The complete examination factual report is available in the public docket of this investigation.

Enhanced Ground Proximity Warning System (EGPWS) Data

The EGPWS was removed from the airplane and sent to the NTSB Vehicle Recorders Laboratory for further examination. The accident flight was identified as flight leg 1592. Only warning data pertaining to the event flight The data in the warning file for flight leg 1592 began recording at operational time 2614:08:08. The event that triggered this recording was an excessive bank angle warning that occurred at 2614:08:28 operational time, when the aircraft was at about 15,000 feet about 3 minutes after takeoff. There were no other warnings on the accident flight. The landing time was recorded as 2616:08:04. The complete examination factual report is available in the official docket of this investigation.

The complete EGPWS Factual Report is available in the public docket of this investigation.

Airplane Performance Study

Available information for the accident flight included the radar track, ground marks from the aircraft's tires, and airport security camera footage.

Radar data was used to describe the accident airplane's ground track, altitude, speed, and estimated attitude on approach to the airport. Radar data was obtained from the Los Angeles, California, LAXA ASR-9 (airport surveillance radar), and sampled at 4.5-second intervals. The radar is approximately 5.5 nautical miles (NM) from the aircraft's final location. The aircraft approached Santa Monica from the northeast. The last radar return was recorded at 18:20:26 PDT, about 1,500 ft before the airport threshold. The aircraft's groundspeed final groundspeed was about 115 kts. Wind was 4 kts from 240°, which would have added a slight headwind when landing on runway 21. The approach speed (VAPP) for the 525A for 15° of flaps is between 98 kts indicated airspeed (for 8,000 lbs landing weight) and 122 kts (for 12,375 lbs landing weight). The aircraft's glide slope during the approach was 3.9°. Runway 21 at Santa Monica has a four light precision approach path indicator (PAPI) for a 4.00° glide slope.

The rubber tire marks left by the aircraft on the runway and other paved surfaces were photographed and their locations recorded. The first tire mark was found about 2,800 ft from the threshold of runway 21 and 35 ft right of the centerline. The aircraft's path was determined by connecting the recorded tire marks. Aircraft braking causes rubber from the tires to be deposited onto the runway. The tire marks consist of light scuff while on the runway, but become heavy and dark once the airplane departs the runway veering off to the right.

Six security cameras at the airport recorded the accident sequence. The airplane was first recorded on the ground and approximately 2,000 ft from the runway 21 approach threshold. Additional configuration information, such as flap or spoiler settings or thrust reverser deployment could not be determined from the video due to low resolution. However, the average speed of the aircraft was estimated for each camera recording. The calculated speeds do not uniformly decrease between camera views partially due to the uncertainty of estimating the speed from video. The calculated ground speeds as the airplane passed through mid field varied between 82 knots and 68 knots, with a calculated average of 75 knots. The details of the speed calculations can be found in the NTSB Video Study.

Cessna Aircraft Company provided data from two exemplar landings and ground rolls for a Citation 525A. The data included distance along the runway, calibrated airspeed, GPS speed, left and right brake pressures, brake pedal inputs, and flaps. To compare the exemplar and the accident aircraft landings and ground rolls, it was assumed that all aircraft touched down at the 1,000 ft mark. Assuming a 1,000 ft

touchdown point, the first speed estimate is about 10 kts faster than the exemplar ground rolls at the same location. This may indicate that during the first 1,000 ft of the ground roll, the accident aircraft was decelerating near as expected. The exemplar aircraft slowed to a stop more than 1,700 ft before the accident aircraft impacted the hanger.

The aircraft's flight path, altitude, and calculated speeds during the approach were consistent with the standard approach for a Citation 525A into SMO. The aircraft's ground roll was longer and faster than exemplar landings. Tire marks indicate braking occurred late in the ground roll. The aircraft's flap and spoiler settings and thrust reverser deployment are unknown. A reason for the lack of normal deceleration could not be determined using the available data.

The complete Aircraft Performance Factual Report is available in the public docket of this investigation.

Personal Electronic Devices (PED)

Five PED's were recovered from the airplane and sent to the NTSB Vehicle Recorder Laboratory for examination. The laboratory was unable to recover data from three of the devices, however, data was recovered from the remaining two devices.

An Apple iPhone 4 contained text messages and photo activity just before and during the accident flight. A text message "Leaving the Valley" and a photo showing a woman in the right cockpit seat of the airplane before departure. A video captured the takeoff from Hailey, Idaho. The phone contained 14 in-flight photos. A photo of the instrument panel showed a climb through 37,300 feet, airspeed was 251 knots, and the anti-skid switch was in the up (ON) position. One photo was oriented aft into the cabin. In the foreground was a large, red/brown-haired dog in the aisle with its head towards the camera and torso forward of the rearward-facing seats; and in the background were two people seated (each with a cat in their lap) in the forward-facing seats. Another photo showed the dog further forward and both cats were now on the lap of one of the occupants. None of the animals were restrained or caged. Most of the remaining photos were pointed outside the airplane.

None of the content on the iPad 2 was from the accident flight, however, it did contain pertinent photos and video related to N194SJ. The iPad contained a low resolution, 52-second, video of the airplane taking off from the Santa Monica Airport on an undetermined date. The video was taken from a position consistent with the right cockpit seat and began as the airplane started its takeoff roll. About 10 seconds into the video, the camera panned left showing the interior of the cockpit. A red/brown-haired dog (same as was seen in the iPhone 4's images), was positioned facing forward with its nose about 18 inches aft of the throttle quadrant. As the airplane rotated, 19 seconds into the video, a person in the cockpit said "…you want to be up front too, huh?" The video then panned outside to show a row of hangers on the right, then the ocean, and generally clear skies. The video ended with Santa Monica Tower directing N194SJ to contact "SoCal departure."

The full PED Factual Report is available in the official docket of this investigation.

Surveillance Video

The NTSB Vehicle Recorder Division's Image Laboratory received two files containing images from 9 unique security camera feeds from a Bosch DIVAR 700 Series recorder. The recording contained six camera streams and captured the accident sequence and subsequent Airport Rescue Firefighting (ARFF).

The six camera streams contained images from cameras 3, 4, 7, 8, 9 and 17, each of which captured the accident aircraft at some portion during its landing roll and subsequent impact with the hangar structure. The recording provided was 1 hour 40 minutes and 5 seconds in length. The beginning portion of the recording showed the landing roll and impact and the remainder of the recordings showed subsequent ARFF activities related to the accident The video file was provided by a local Fixed Base Operator (FBO) and the majority of the cameras (3, 4, 7, 8, and 9) were recorded from a cluster of locations near the FBO ramp entrance area. Camera 17 was mounted remotely on a different area of the airport property.

Images from the collection of cameras in this feed showed view of portions of runway 03/21 and the ramp area of the fixed base operator. Cameras 3, 4, 7, 8 and 9 were oriented toward the southeast and showed the ramp area and the center portion of runway 03/21. Camera 17 faced southwest toward an aircraft parking area and a distant group of hangar structures on the boundary of the airport's property. The camera locations were evaluated in chronological order of the aircraft's appearance in each camera's field of view. The aircraft was first captured by camera 7 as it moved toward the departure end of runway 21, and last captured in camera 17 as it impacted the hangar structure. The aircraft was assumed to be on the centerline of runway 03/21 until it is out of view of camera 4.

Camera 7 - The aircraft first appears in the upper left corner of the frame as the cockpit area of the fuselage is shown behind an open hangar structure. Calculated average speed of the airplane was 82.5 knots.

Camera 8 - The aircraft first appears in the upper left corner of the frame as the cockpit area of the fuselage is shown in front of an open hangar door on the far side of runway 03/21. Calculated average groundspeed was 75.2 knots.

Camera 3 - The aircraft first appears in the upper left corner of the frame as the cockpit area of the fuselage is shown in front of the corner of a large hangar structure on the far side of runway 03/21. Calculated average groundspeed was 68.1 knots.

Camera 4 - The aircraft first appears in the upper left corner of the frame as the cockpit area of the fuselage is shown in front of the three chimney structure on the far side of runway 03/21. Calculated average groundspeed was 70.7 knots.

Camera 9 - The aircraft first appears in the upper left-hand corner of the recording as the fuselage is shown traveling down runway 03/21. Calculated average groundspeed was 79.0 knots.

Camera 17 - The aircraft first appears in the upper left-hand corner of the recording as the nose of the aircraft is shown veering towards a tarmac area between runway 03/21 and the intersection of Taxiway A1 and Taxiway A. A trajectory was estimated using photographs from the on-scene portion of the investigation which showed witness marks from the aircraft's tires as it moved toward the impact location. This trajectory was used to calculate the overall distance the aircraft traveled through the measurable segment. Calculated average groundspeed was 50.5 knots.

The accident aircraft's speed can be averaged throughout a portion of runway 03/21 that is not covered by security camera footage. An image from camera 9 in which the aircraft is shown passing behind a hangar structure near the FBO's ramp area at a recorded common timestamp and the nose of the accident

aircraft appears 9.75 seconds later on camera 17. The calculated distance the airplane traveled was approximately 1,040 feet, providing an estimated average groundspeed of 63.2 knots.

The calculated average groundspeed for the airplane as it passed through the field of view of each camera in sequential order is summarized in the following table.

Camera 7 82.5 kts
Camera 8 75.2 kts
Camera 3 68.1 kts
Camera 4 70.7 kts
Camera 9 79.0 kts
Between 9 – 17 63.2 kts
Camera 17 50.5 kts

Exported still images from each camera position were examined to attempt to make a determination of the accident aircraft's flap position. The still images selected were the best examples of potential flap position recognition. Still images from cameras 7, 8, 3, 4, and 9, provided inconclusive results as to flap position. Camera 17 provided an image that showed the flaps deployed, however, the extent of flap deployment could not be quantified.

The complete Video Study Factual Report is available in the official docket of this investigation.

Pilot Information

Certificate:	Private	**Age:**	63,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	May 21, 2012
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 27, 2013
Flight Time:	3463 hours (Total, all aircraft), 1236 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N194SJ
Model/Series:	525A CITATION	**Aircraft Category:**	Airplane
Year of Manufacture:	2003	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	525A0194
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	September 7, 2013 AAIP	**Certified Max Gross Wt.:**	12500 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo fan
Airframe Total Time:	1932.8 Hrs as of last inspection	**Engine Manufacturer:**	WILLIAMS
ELT:	C126 installed, not activated	**Engine Model/Series:**	FJ 44 SERIES
Registered Owner:	On file	**Rated Power:**	845 Lbs thrust
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KSMO,177 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	18:24 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots / None	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	240°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	29.96 inches Hg	**Temperature/Dew Point:**	21°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Hailey, ID (KSUN)	**Type of Flight Plan Filed:**	IFR
Destination:	Santa Monica, CA (KSMO)	**Type of Clearance:**	IFR
Departure Time:	16:14 Local	**Type of Airspace:**	Class B;Class C

Airport Information

Airport:	Santa Monica Municipal Airport KSMO	**Runway Surface Type:**	Asphalt
Airport Elevation:	177 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	21	**IFR Approach:**	Visual
Runway Length/Width:	4973 ft / 150 ft	**VFR Approach/Landing:**	Straight-in

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	3 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Fatal	**Latitude, Longitude:**	34.015556,-118.45111(est)

Administrative Information

Investigator In Charge (IIC):	McKenny, Van
Additional Participating Persons:	Charles E Johnson; FAA - FSDO ; Van Nuys , CA Khoi Vu; Gar Kenyon Aerospace; Meriden, CT Jon Green; Williams International; Commerce Township, MI Ricardo Asensio; Textron Aerospace; Wichita, KS Tracey Cantubury; UTC Aerospace Systems; Troy, OH Brian Ramsey; Crane Aerospace; Burbank, CA
Original Publish Date:	April 14, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=88155