



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	Harrisville, Michigan	Accident Number:	CEN18TA374
Date & Time:	September 1, 2018, 14:00 Local	Registration:	N5321E
Aircraft:	Beech 35	Aircraft Damage:	Substantial
Defining Event:	Runway excursion	Injuries:	1 Minor, 3 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot reported that he completed a preflight inspection and an engine run-up with no anomalies noted. With about 20 gallons of fuel in the left tank, he taxied the airplane to the runway and extended the flaps to 10°. He started the takeoff roll and noted that the first 200 ft of the runway was soft and consisted of long grass, while the rest of the runway consisted of sand and weed patches. The pilot stated that during the takeoff roll, the nosewheel lifted off the runway around 300 ft and the main landing gear lifted off near midfield; he kept the airplane in ground effect. When the airplane was about 3/4 of the way down the runway, while still in ground effect, it would not gain altitude, and the left wing contacted trees. The pilot aborted the takeoff and attempted to stop the airplane in the grass but collided with trees at the end of the runway. The pilot reported that there were no mechanical malfunctions or anomalies with the engine or airplane that would have precluded normal operation. The pilot stated that he could not get the airplane up to speed because of the tall grass on the runway.

A 32-second video of the takeoff attempt revealed the beginning of the takeoff roll on the grass runway. At 14 seconds, the airplane veered toward the left side of the runway until 22 seconds, when a loud noise was heard, likely the airplane colliding with trees. The airplane made a sharp right turn, then slid on the runway where it came to rest in trees at the end of the runway. It is not clear from the video if the airplane became airborne as the pilot stated.

The calculated takeoff weight was 12 lbs under the maximum takeoff weight of 2,950 lbs. The calculated center of gravity was 0.07 inch beyond the aft limit of 84.7 inches aft of datum. In addition, the pilot stated after the accident that the data he had for the airport showed an additional 600 ft of available runway.

Based on the available video evidence, the pilot's delayed decision to abort the takeoff did not leave enough runway length for the airplane to stop before colliding with trees at the end of the runway. It is likely that the airplane being loaded near the maximum gross weight and the airplane's center of gravity aft of the allowable limit contributed to its difficulty gaining adequate speed for takeoff. These factors,

along with the pilot's incorrect runway length data, likely contributed to his delayed decision to abort the takeoff, as he expected the airplane to gain adequate speed for takeoff without difficulties.

Probable Cause and Findings

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

The pilot's delayed decision to abort the takeoff, which resulted in the loss of lateral control of the airplane and collision with trees at the end of the runway. Contributing to the accident was the pilot's decision to depart with a center of gravity exceeding the aft limit and his inadequate preflight planning of the airplane's weight and balance calculations and runway length data.

Findings

Personnel issues	Decision making/judgment - Pilot
Aircraft	Directional control - Not attained/maintained
Personnel issues	Performance calculations - Pilot
Personnel issues	Weight/balance calculations - Pilot
Environmental issues	Tree(s) - Contributed to outcome

Factual Information

History of Flight

Takeoff	Collision during takeoff/land
Takeoff	Runway excursion (Defining event)
Takeoff-rejected takeoff	Runway excursion

On September 1, 2018, about 1400 eastern daylight time, a Beech K35 airplane, N5321E, overran the runway during an aborted takeoff at Harrisville Airport (5Y0), Harrisville, Michigan. The private rated pilot sustained minor injuries and the three passengers were not injured. The airplane sustained substantial damage. The airplane was registered to and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight. Visual meteorological conditions prevailed at the time of the accident and no flight plan was filed. The flight was departing at the time of the accident.

A 32 second video of the takeoff attempt was reviewed and showed the following. As the video began the airplane was already in the takeoff roll on the grass runway that was defined by large yellow cones. At 14 seconds the airplane veered toward the left side of the runway until 22 seconds when a loud noise was heard from the end of the runway. The airplane made a sharp right turn then slid on the runway toward the trees where it came to rest (figure 1).



Figure 1 – Accident site (Courtesy of FAA)

The Sheriff's deputy who responded to the scene reported that he spoke to the pilot after the accident. The pilot stated that he could not get the airplane up to speed because of the tall grass on the runway. The pilot added that the data he had for the airport showed an additional 600 ft available runway. The pilot also stated that he knew he did not have the speed or altitude to make it over the trees at the end of the runway so he put the airplane back on the ground before going into the woods.

The deputy's photos from the accident site revealed several lopped tree limbs and tire marks in the grass beyond the left side of the runway.

In a postaccident statement the pilot reported that he flew the same three passengers earlier that morning to an airport where he filled the left fuel tank with 25 gallons of fuel; the right fuel tank contained 2 to 3 gallons and the auxiliary fuel tank was empty. After fueling, the pilot proceeded to takeoff from a 2,952-ft-long asphalt runway and climbed to 50 ft above ground level before reaching 1,500 ft of runway distance. They landed at 5Y0, a 2,140 ft x 60 ft grass runway, without incident and consumed about 5 gallons of fuel during the flight.

About 1400 they returned to the airplane and the pilot completed a preflight inspection and an engine run-up with no anomalies noted. He taxied to runway 21 and extended 10° of flaps. He started the takeoff roll and noted that the first 200 ft of the runway was soft and consisted of long grass, while the rest of the runway consisted of sand and patches of weeds. The pilot stated that during the takeoff roll he was able to lift the nose wheel off the runway around 300 ft and the main landing gear lifted off near mid-field where he kept the airplane in ground effect. About three-fourths of the way down the runway, while still in ground effect, the airplane would not gain altitude and the left wing contacted the trees on the left side. The pilot stated that it felt like the airplane was being pulled into the trees. The pilot aborted the takeoff, attempted to stop the airplane in the grass, but collided with trees at the end of the runway.

The pilot reported that there were no mechanical malfunctions or anomalies with the engine or airframe that would have precluded normal operation.

The airplane's pilot operating handbook (POH) states that the maximum ramp weight is 2,960 lbs and the maximum takeoff weight is 2,950 lbs. The aft center of gravity (CG) limit at 2,950 lbs is 84.7 inches aft of datum.

The pilot provided a completed weight and balance loading form for the accident flight, which noted that the ramp weight was 2,948 lbs (12 lbs under the limitation) and the takeoff weight was 2,938 lbs (12 lbs under the limitation). The calculated CG was 84.77 inches aft of datum (0.07 inches over the limitation).

Using the same weight and balance information for the previous flight, except with 25 gallons of fuel, the ramp weight would have been 2,978 lbs and the takeoff weight 2,968 lbs; both of these weights exceeded the maximum ramp and takeoff weights, an exceedance of 18 lbs for both weight limitations as specified in the POH. Also, the calculated CG was 84.7 inches aft of datum.

At the request of the deputy the pilot submitted a blood sample while on scene. Forensic analysis of the sample was negative for alcohol.

Pilot Information

Certificate:	Private	Age:	50,Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Lap only
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 3 With waivers/limitations	Last FAA Medical Exam:	August 13, 2018
Occupational Pilot:	No	Last Flight Review or Equivalent:	September 24, 2017
Flight Time:	242 hours (Total, all aircraft), 156 hours (Total, this make and model), 176 hours (Pilot In Command, all aircraft), 47 hours (Last 90 days, all aircraft), 14 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Passenger Information

Certificate:		Age:	Male
Airplane Rating(s):		Seat Occupied:	Right
Other Aircraft Rating(s):		Restraint Used:	Lap only
Instrument Rating(s):		Second Pilot Present:	No
Instructor Rating(s):		Toxicology Performed:	No
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

Passenger Information

Certificate:		Age:	Female
Airplane Rating(s):		Seat Occupied:	Left
Other Aircraft Rating(s):		Restraint Used:	Lap only
Instrument Rating(s):		Second Pilot Present:	No
Instructor Rating(s):		Toxicology Performed:	No
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

Passenger Information

Certificate:		Age:	Female
Airplane Rating(s):		Seat Occupied:	Right
Other Aircraft Rating(s):		Restraint Used:	Lap only
Instrument Rating(s):		Second Pilot Present:	No
Instructor Rating(s):		Toxicology Performed:	No
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	Registration:	N5321E
Model/Series:	35 K35	Aircraft Category:	Airplane
Year of Manufacture:	1959	Amateur Built:	
Airworthiness Certificate:	Utility	Serial Number:	D-5801
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	January 2, 2018 Annual	Certified Max Gross Wt.:	2950 lbs
Time Since Last Inspection:	76 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	6239 Hrs as of last inspection	Engine Manufacturer:	Continental Motors
ELT:	Installed, not activated	Engine Model/Series:	IO-470-C
Registered Owner:		Rated Power:	250 Horsepower
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:	KOSC,634 ft msl	Distance from Accident Site:	14 Nautical Miles
Observation Time:	18:15 Local	Direction from Accident Site:	197°
Lowest Cloud Condition:	Scattered / 2100 ft AGL	Visibility	10 miles
Lowest Ceiling:		Visibility (RVR):	
Wind Speed/Gusts:	7 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	220°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.03 inches Hg	Temperature/Dew Point:	25°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Harrisville, MI (5Y0)	Type of Flight Plan Filed:	None
Destination:	Detroit/Grosse Ile, MI (ONZ)	Type of Clearance:	None
Departure Time:	14:00 Local	Type of Airspace:	Class E

Airport Information

Airport:	Harrisville 5Y0	Runway Surface Type:	Grass/turf
Airport Elevation:	675 ft msl	Runway Surface Condition:	Vegetation
Runway Used:	21	IFR Approach:	None
Runway Length/Width:	2140 ft / 60 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	3 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Minor, 3 None	Latitude, Longitude:	44.665554,-83.30722(est)

Administrative Information

Investigator In Charge (IIC):	Lindberg, Joshua
Additional Participating Persons:	Steve Betzer; Federal Aviation Administration; Grand Rapids, MI
Original Publish Date:	November 19, 2019
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=98255

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).