NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

June 8, 2021

Specialist Factual Report

OPERATIONAL FACTORS

CEN21FA199

Table Of Contents

A. ACCIDENT

Location: Mustang Beach Airport (KRAS); Port Aransas, Texas
Date: April 24, 2021
Time: 1312 CDT (1812Z)
Airplane: Cirrus SR-22, N587CD

B. OPERATIONAL FACTORS SPECIALIST

Captain David Lawrence
National Resource Specialist
Senior Aviation Accident Investigator (AS-30)

C. SUMMARY

On April 24, 2021 about 1312 central daylight time (CDT), a Cirrus SR-22 airplane, N587CD, was destroyed when it impacted terrain in Port Aransas, Texas. The private pilot was fatally injured, and the two passengers received serious injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* (CFR) Part 91 personal flight.

D. DETAILS OF THE INVESTIGATION

The Operational Factors Specialist launched to Port Aransas, Texas on April 25, 2021 to support the National Transportation Safety Board (NTSB) Investigator-in-Charge (IIC), who was unable to travel to the scene. Also present at the accident site was a Federal Aviation Administration

(FAA) Aviation Safety Inspector (Airworthiness) from the San Antonio, Texas Flight Standards District Office (FSDO SW-17), and the Manager Air Safety for Cirrus Aircraft.

Documentation was collected at the accident site and witness statements were obtained. Selected components from the aircraft were retained and sent to the NTSB recorders lab in Washington, DC. The pilot's logbooks and the aircraft logbooks were recovered, documented, and sent to the IIC, along with field notes of activities conducted on April 25, 2021.

E. FACTUAL INFORMATION

1.0 History of Flight

On April 24, 2021, the Experimental Aircraft Association (EAA) was sponsoring a Young Eagles event where volunteer private pilots would fly young children and their parents on a 15-to-20-minute discovery flight to introduce the children to aviation. According to the Young Eagles Day Registration Website, there were eight airplanes participating in the event that day. The accident pilot was listed as one of the volunteer pilots.[1]

On April 24, 2021 the accident pilot flew his Cirrus from his home base of McCampbell-Porter Airport (KTFP) in Port Aransas, Texas (located about 9 nautical miles northwest of KRAS) to KRAS that morning, departing runway 31 at 1034 CDT (1534Z) and arriving on runway 30 at KRAS at 1042 CDT (1542Z).[2]

[1] See Attachment 8 – Young Eagles Information.

[2] The 1535Z weather was METAR (Meteorological Aerodrome Report) KRAS 241535Z AUTO 30003KT 7SM HZ CLR 25/22 A2987 RMK AO2 T02530220=.

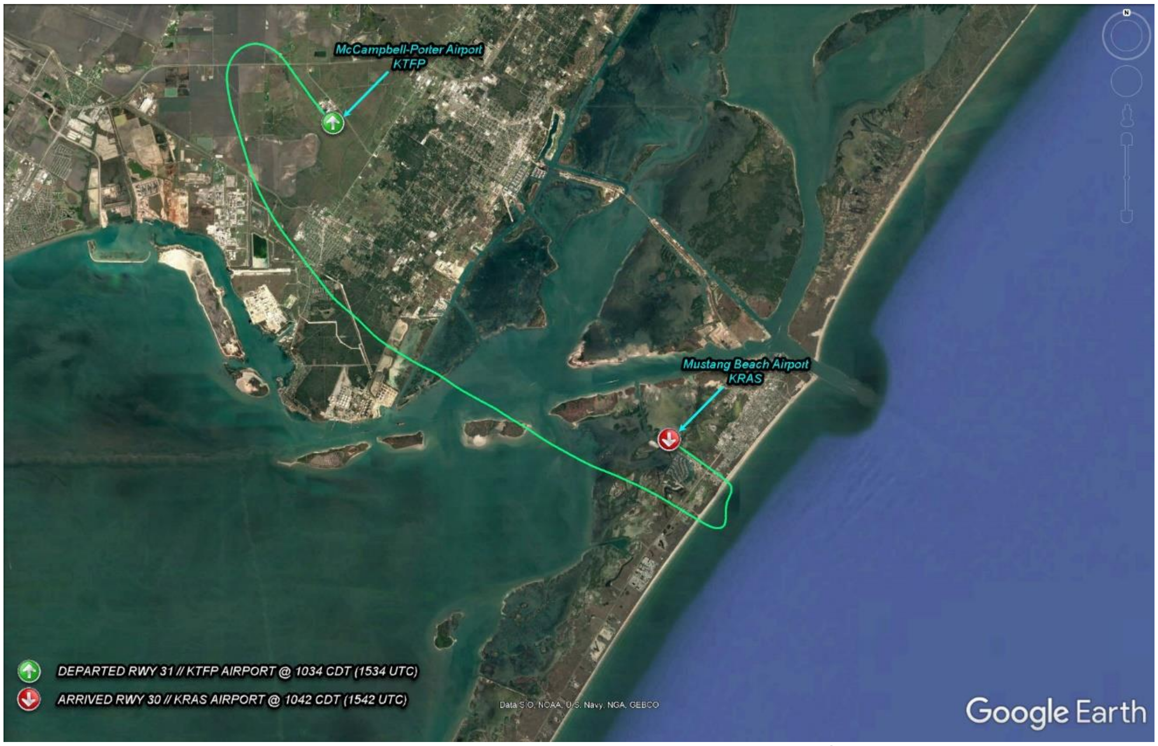

Figure 1: Radar ground track of N587CD's first flight on April 24, 2021.[3]

On his second flight of the day (his first flight of the day as a Young Eagles volunteer at KRAS), the pilot departed runway 30 at KRAS at 1153 CDT (1653Z).[4] Young Eagles volunteer pilots were provided with a suggested flight path for runway 30 departures. The procedure called for a right turn at 500 feet after takeoff and to visually fly along the Corpus Christi Ship Channel until reaching the harbor. The procedure then called for a left turn towards a lighthouse, and then a right turn to fly along the beach southbound. The procedure finally called for two right turns to enter back into a right downwind traffic pattern to runway 30 at KRAS.[5]

According to radar data and witness statements, the accident pilot made three approaches to runway 12 on his first Young Eagles flight at KRAS before landing on runway 12 at 1221 CDT (1721Z).[6]

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[3] Source: FAA ADS-B data.

[4] The 1655Z weather was METAR KRAS 241655Z AUTO 14005KT 7SM CLR 27/22 A2988 RMK AO2 T02720217=.

[5] See Attachment 6 - Young Eagles KRAS Runway 30 Procedure.

[6] The 1715Z weather was METAR KRAS 241715Z AUTO 14006KT 7SM CLR 27/22 A2988 RMK AO2 T02720215=.

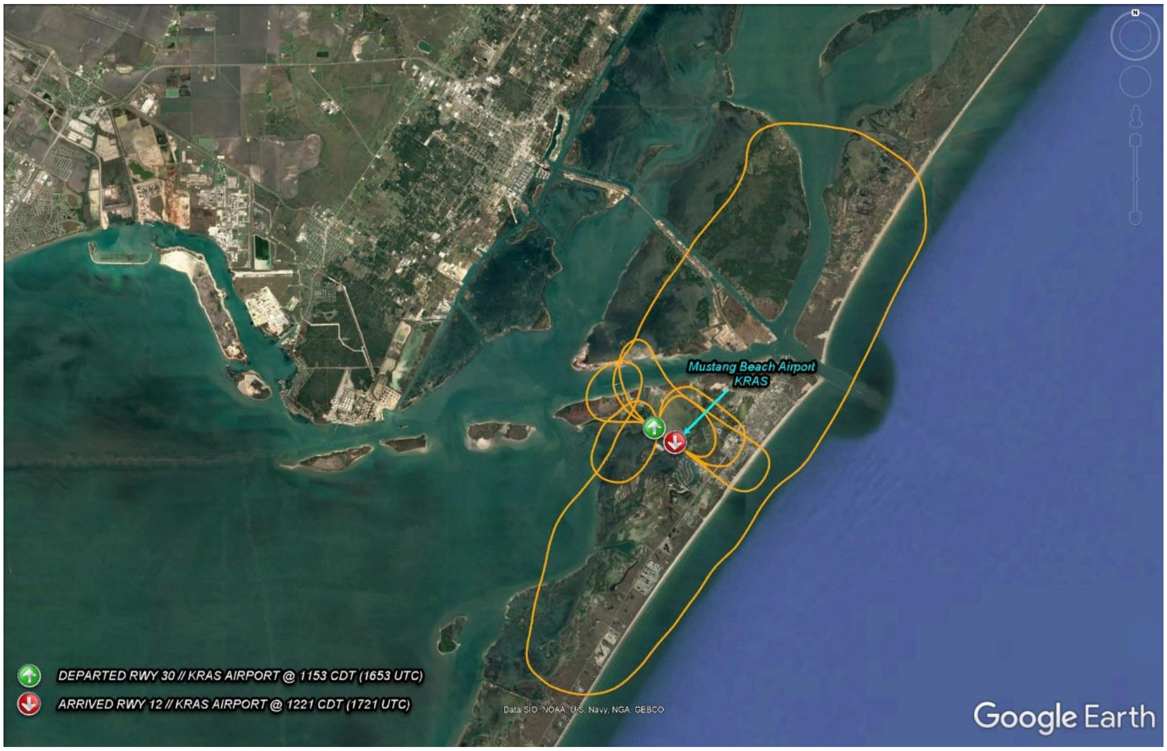

Figure 2: Radar ground track of N587CD's first Young Eagles flight on April 24, 2021.[7]

On his second Young Eagles flight (the accident flight), the pilot flew an 8-year-old boy who sat in the right aft passenger seat of the airplane, and his father who sat in the forward right passenger seat next to the pilot. The accident flight departed KRAS runway 30 at 1305 CDT (1805Z) and initially flew to the north of the airport, returning to KRAS in a right traffic pattern. Weather at KRAS was winds 350º at 10 knots, clear skies, 10 statute miles or greater visibility, and an altimeter setting of 29.86.[8]

[7] Source: FAA ADS-B data.

[8] Weather based on the 1815Z KRAS METAR automatic weather observation. For more information, see Section 6.0 Meteorological Information in this Factual Report.

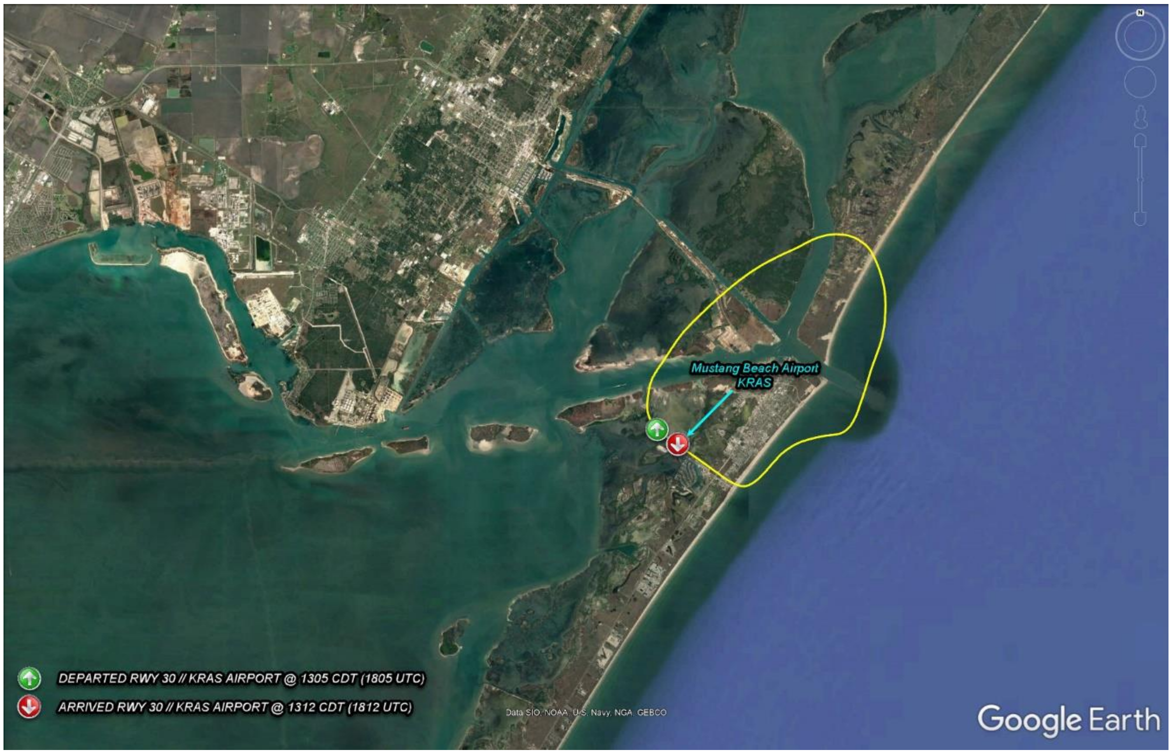

Figure 3: Radar ground track of N587CD's second Young Eagles flight on April 24, 2021 (accident flight).[9]

Witnesses stated that the flight appeared low on the approach to the runway 30, and almost touched down short of the runway. Witnesses told the NTSB that they observed the pilot's left-side door was opened out about a foot prior to landing.[10]

[9] Source: FAA ADS-B data.
[10] See Attachment 1 - Records of Conversations and Witness Statements.

Figure 4: Radar ground track of N587CD's accident flight approach to KRAS runway 30 on April 24, 2021.[11]

Prior to touching down on runway 30, the pilot appeared to execute a go-around. At 1312 CDT (1812Z) witnesses observed the N587CD pitch up sharply, then rolled off to the left and impact the ground inverted in front of a row of hangers at KRAS. Witnesses also reported that the Cirrus Airframe Parachute System (CAPS) system deployed on impact.[12] The pilot was fatally injured, and the father and his son were severely injured.

The initial impact was located at 27°48'37"N and 97°05'12"W, and the main accident airplane wreckage was located at 27°48'37"N and 97°05'13"W. The direction of travel (energy path) of the wreckage indicated about 260º magnetic, and the main wreckage was oriented about 45º magnetic. The airplane was destroyed, and there was no evidence of post-crash fire.

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[11] Source: OpsVue track data, which was compared to FAA certified ADS-B data for the flight. Speeds in the figure are software calculated ground speeds. OpsVue data is track data only. L3Harris' OpsVue uses NextGen Data which includes flight identification and location data for advisory purposes only. This NextGen Data is a multi-sensor system that aggregates and georeferences FAA data sources including data from FAA ASDE-X and ASSC systems, FAA Terminal and En Route Radars, the FAA certified ADS-B Network and Flight Plan data from the En Route Automation Modernization (ERAM) system. The reported altitude is derived from the reported pressure altitude, adjusted for the local pressure reported with the Rapid Update Cycle (RUC) data within the Continental United States (CONUS). Outside of the CONUS, only pressure altitude is reported. The accuracy of altitude data can vary, sometimes up to several hundred feet, however trend information (ie; rates of climb and descent) is considered accurate and reliable.

[12] According to the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, the SR22 is equipped with a Cirrus Airplane Parachute System (CAPS) designed to bring the aircraft and its occupants to the ground in the event of a life-threatening emergency.

2.0 Pilot Information

The pilot was 76 years old and resided in Corpus Christi, Texas. He was retired from Lockheed-Martin and began taking flying lessons on July 7, 2018. He was issued a student pilot's license July 25, 2018 and was issued a private pilot's license March 8, 2019 (Airplane Single Engine Land). According to the pilot's logbooks, he began flying the SR22 (N587CD) on March 11, 2019 when he had about 99.6 hours total time. He received a 14 *CFR* 61.31(f) high performance check out on the SR-22 on December 15, 2019, and satisfactorily completed a 14 *CFR* 61.56(a) flight review on March 6, 2021.

A review of the FAA Program Tracking and Reporting Subsystem (PTRS), Accident/Incident Data System (AIDS) and Enforcement Information System (EIS) showed no records or reports of any previous aviation accidents or incidents involving the pilot.

2.1 The Pilot's Certification Record[13]

Student Pilot – (Carrying Passengers Prohibited) certificate issued July 25, 2018.

Private Pilot – Airplane Single Engine Land certificate issued March 8, 2019.[14]

2.2 The Pilot's Certificates and Ratings Held at Time of the Accident

Private Pilot – Airplane Single Engine Land certificate issued March 8, 2019.

Second Class Medical certificate issued July 2020.
Limitations: Must wear corrective lenses

2.3 The Pilot's Cirrus SR22 Training

The pilot received Cirrus SR22 flight training at Addison Airport, Dallas, Texas (KADS) and McKinney NTL Airport, Dallas, Texas (KTKI) between November 16, 2019 and December 15, 2019, logging 17.3 hours dual instruction and 19 hours ground instruction.[15]

2.4 The Pilot's Flight Times[16]

The pilot's flight times, based on his personal logbook information:

Total pilot flying time	173.1
Total Pilot-In-Command (PIC) time	88.7
Total Cirrus SR22 flight time	73.3

[13] Source: FAA.
[14] The accident pilot's Private Pilot practical exam on March 8, 2019 was conducted in a PA-28-181. His FAA Form 8710-1 for March 8, 2019 indicated he had 98.0 hours total time, 87.4 hours instruction received, 10.6 hours pilot in command time, and 11.0 hours in a PA28-181.
[15] See Attachment 3 – Pilot's Cirrus SR22 Transition Training.
[16] Flight times includes 0.8 hours for the 3 flights conducted on April 24, 2021. See Attachment 2 - Accident Pilot's Logbook.

Total flying time last 24 hours	0.8
Total flying time last 7 days	1.8
Total flying time last 30 days	1.8
Total flying time last 90 days	1.8
Total flying time last 12 months	33.7

3.0 Medical and Pathological Information

According to his most recent FAA Form 8500-8 (Third Class Medical), dated July 6, 2020, the pilot was 71 inches tall and weighed 266 pounds. His distant and near vision was corrected 20/20 in both eyes, and he passed a color vision test.[17]

4.0 Airplane Information

4.1 General

Photo 1: Accident airplane (N587CD).[18]

The accident airplane was a Cirrus SR22, registration N587CD, serial number 1695, and was manufactured in 2005. It had an FAA standard airworthiness certificate dated November 23, 2005 as a normal category airplane. It was registered to the accident pilot, with an FAA registration date of March 14, 2019.[19]

The Cirrus SR22 was certificated under the requirements of 14 *CFR* Part 23 as documented by FAA Type Certificate TC A00009CH. It was certified for day and night as well as visual flight rule (VFR) and instrument flight rule (IFR) operations. Flight into known icing and acrobatic maneuvers (including spins) were prohibited. The minimum number of flight crew for the Cirrus SR22 was one pilot.

[17] Toxicology results from the FAA Civil Aerospace Medical Institute (CAMI) were not available when this factual report was written.
[18] Source: https://www.facebook.com/photo/?fbid=3041091112585736&set=a.2317196334975221.
[19] See Attachment 4 - N587CD Registration and Airworthiness Certificates.

4.2 Cirrus SR22 Dimensions

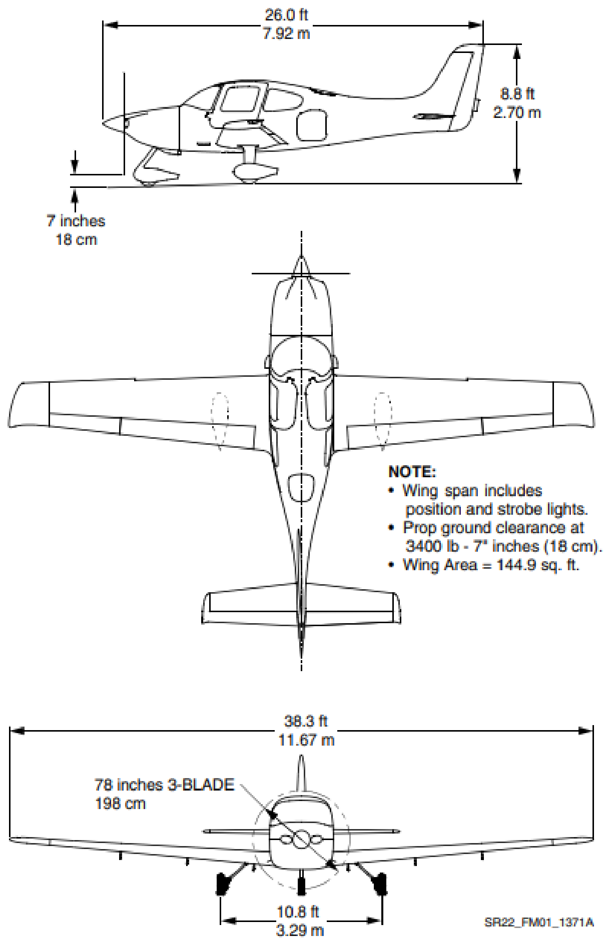

Figure 5: Cirrus SR22 airplane dimensions.[20]

[20] Source: Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003 covering Serial number 1695.

4.3 Cirrus SR22 Airspeeds

4.3.1 Normal Speeds

Airspeeds for Normal Operation

Unless otherwise noted, the following speeds are based on a maximum weight of 3400 lb. and may be used for any lesser weight. However, to achieve the performance specified in Section 5 for takeoff and landing distance, the speed appropriate to the particular weight must be used.

Takeoff Rotation:

- Normal, Flaps 50% ....70 KIAS
- Obstacle Clearance, Flaps 50% ....78 KIAS

Enroute Climb, Flaps Up:

- Normal .... 110-120 KIAS
- Best Rate of Climb, SL ....101 KIAS
- Best Rate of Climb, 10,000...95 KIAS
- Best Angle of Climb, SL..78 KIAS
- Best Angle of Climb, 10,000 ....82 KIAS

Landing Approach:

- Normal Approach, Flaps Up .... 90-95 KIAS
- Normal Approach, Flaps 50% .... 85-90 KIAS
- Normal Approach, Flaps 100% .... 80-85 KIAS
- Short Field, Flaps 100% (V_{REF}) ....77 KIAS

Go-Around, Flaps 50%:

- Full Power...80 KIAS

Maximum Recommended Turbulent Air Penetration:

- 3400 lb..133 KIAS
- 2900 lb..123 KIAS

Maximum Demonstrated Crosswind Velocity:

- Takeoff or Landing ....20 Knots

Figure 6: Cirrus SR22 Airspeeds for Normal Operation chart.[21]

[21] Source: Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, page 4-4.

4.3.2 Emergency Speeds

Airspeeds for Emergency Operations

Maneuvering Speed:

3400 lb ....133 KIAS

Best Glide:

3400 lb ....88 KIAS

2900 lb ....87 KIAS

Emergency Landing (Engine-out):

Flaps Up..90 KIAS

Flaps 50% ....85 KIAS

Flaps 100% ....80 KIAS

Figure 7: Cirrus SR22 Airspeeds for Emergency Operations.[22]

5.0 Estimated Weight and Balance

WEIGHT & BALANCE (maximum certificated weights in **bold**) (weight in pounds)		
	Basic Empty Weight	2,346.5[23]
	Front Seat Occupants (pilot and passenger – total)	401[24]
	Rear Seat Occupant	60
	Zero Fuel Weight	2,807.5
	Maximum Zero Fuel Weight	**n/a**
	Fuel loading (42.4 gallons @ 6.0 lb/gallon)[25]	254.4
	Landing Weight (estimated)	3,061.9
	Maximum Takeoff Weight	**3,400**
	Maximum Landing Weight	**n/a**
	Center of Gravity (limits: 140.7 fwd – 148.1 aft)[26]	141.54[27]

[22] Source: Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, page 3-4.
[23] Source: Cirrus Aircraft weight and balance work order TKI0653010-2020 dated March 4, 2021 for N587CD. See Attachment 5 – Weight and Balance Information.
[24] According to the pilot's July 6, 2020 3rd Class Medical Certificate (FAA form 8500-9), his weight was listed as 226 pounds. The front seat occupant's weight was 175 pounds (source: Shanna Steward of Sahadi Legal in an email sent to the NTSB Thursday, May 13, 2021 4:57 PM).
[25] Total fuel onboard (42.4 gallons) derived from screenshot of the front seat passenger's video. According to the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003 the maximum usable fuel capacity (all flight conditions) was 81.0 gallons. See Attachment 5 – Weight and Balance Information.
[26] Forward and aft limits are based on the flight station (FS) location inches aft of datum. The reference datum was 100 inches forward of the firewall. Source: Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, page 2-9.
[27] NTSB calculation based on a total landing weight of 3,061.9 pounds and total moment of 433,388 in- lbs.

6.0 Meteorological Information

Airport weather observations for KRAS were obtained from the National Weather Service. The following METARs were issued for KRAS for the time period surrounding the accident:

METAR KRAS 242215Z AUTO 16006KT 10SM CLR 27/21 A2984 RMK AO2 T02670208=

METAR KRAS 242155Z AUTO 16006KT 10SM CLR 26/22 A2984 RMK AO2 T02630221=

METAR KRAS 242135Z AUTO 12010KT 10SM CLR 26/22 A2984 RMK AO2 T02640222=

METAR KRAS 242115Z AUTO 12008KT 7SM CLR 26/23 A2984 RMK AO2 T02610228=

METAR KRAS 242055Z AUTO 12008KT 7SM CLR 27/21 A2985 RMK AO2 T02750214=

METAR KRAS 242035Z AUTO 13007KT 10SM CLR 29/21 A2985 RMK AO2 T02860209=

METAR KRAS 242015Z AUTO 35013KT 10SM CLR 34/08 A2984 RMK AO2 T03360085=

METAR KRAS 241955Z AUTO 35013KT 10SM CLR 33/08 A2985 RMK AO2 T03350082=

METAR KRAS 241935Z AUTO 36014KT 10SM CLR 33/08 A2985 RMK AO2 T03350084=

METAR KRAS 241915Z AUTO 01012KT 10SM CLR 33/08 A2985 RMK AO2 T03350080=

METAR KRAS 241855Z AUTO 35013KT 10SM CLR 34/08 A2985 RMK AO2 T03370077=

METAR KRAS 241835Z AUTO 36011KT 10SM CLR 33/08 A2986 RMK AO2 T03310078=

Accident occurred at 1812Z

METAR KRAS 241815Z AUTO 35010KT 10SM CLR 33/11 A2986 RMK AO2 T03290106=

METAR KRAS 241755Z AUTO 35011KT 10SM CLR 32/11 A2987 RMK AO2 T03240109 10327 20218=

METAR KRAS 241735Z AUTO 36007KT 340V050 10SM CLR 29/18 A2988 RMK AO2 T02880182=

METAR KRAS 241715Z AUTO 14006KT 7SM CLR 27/22 A2988 RMK AO2 T02720215=

METAR KRAS 241655Z AUTO 14005KT 7SM CLR 27/22 A2988 RMK AO2 T02720217=

METAR KRAS 241635Z AUTO 32006KT 10SM CLR 28/20 A2987 RMK AO2 T02850200=

METAR KRAS 241615Z AUTO 31003KT 10SM CLR 27/21 A2988 RMK AO2 T02700206=

METAR KRAS 241555Z AUTO 33003KT 7SM CLR 26/21 A2987 RMK AO2 T02620211=

METAR KRAS 241535Z AUTO 30003KT 7SM HZ CLR 25/22 A2987 RMK AO2 T02530220=

METAR KRAS 241515Z AUTO 32006KT 5SM BR CLR 24/22 A2987 RMK AO2 T02430220=

METAR KRAS 241455Z AUTO 32007KT 5SM BR SCT006 24/22 A2987 RMK AO2 T02360221=

METAR KRAS 241435Z AUTO 32009KT 4SM BR OVC004 23/23 A2986 RMK AO2 T02320225=

METAR KRAS 241415Z AUTO 31008KT 2 1/2SM BR BKN001 OVC007 22/22 A2986 RMK AO2 T02250224=

METAR KRAS 241355Z AUTO 30007KT 1/2SM FG OVC001 22/22 A2985 RMK AO2 T02230222=

METAR KRAS 241335Z AUTO 28004KT 3/4SM BR OVC001 22/22 A2985 RMK AO2 T02220221=

7.0 Airport Information[28]

KRAS was an uncontrolled (no operating control tower), general aviation airport located 2 miles southwest of Port Aransas, Texas. The airport was publicly owned by the City of Port Aransas. The surveyed airport elevation was 5 feet, and it was located at a latitude/longitude of 27-48-42.6000N 097-05-19.5000W. The magnetic variation was 05Eº (as of 2005) and was in a time zone of UTC -5 hours (-6 hours during Standard Time). The airport had a lighted wind indicator and a segmented circle.[29]

[28] Source: https://www.airnav.com/airport/KRAS and https://nfdc.faa.gov/nfdcApps/services/ajv5/airportDisplay.jsp?airportId=kras.

[29] According to the FAA Aeronautical Information Manual (AIM), section 4-3-4, at those airports without an operating control tower, a segmented circle visual indicator system, if installed, is designed to provide traffic pattern information.

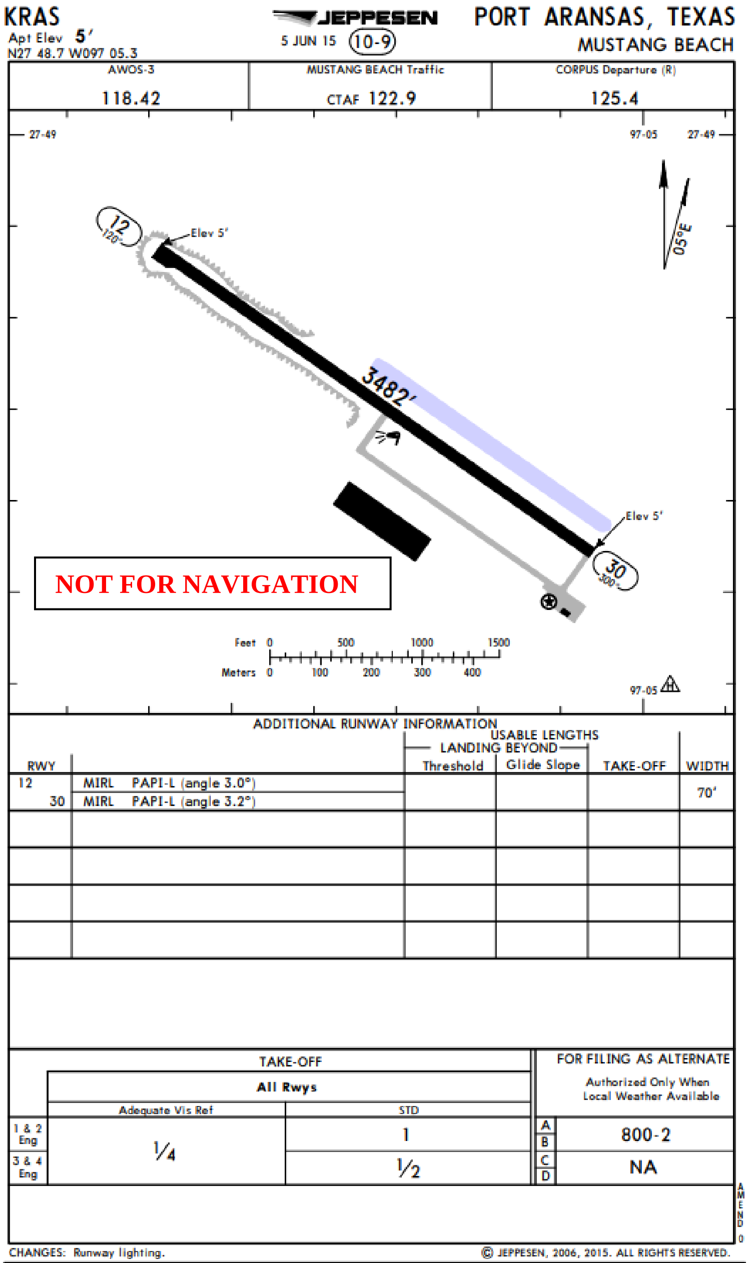

Figure 8: KRAS Airport Chart (source: Jeppesen).

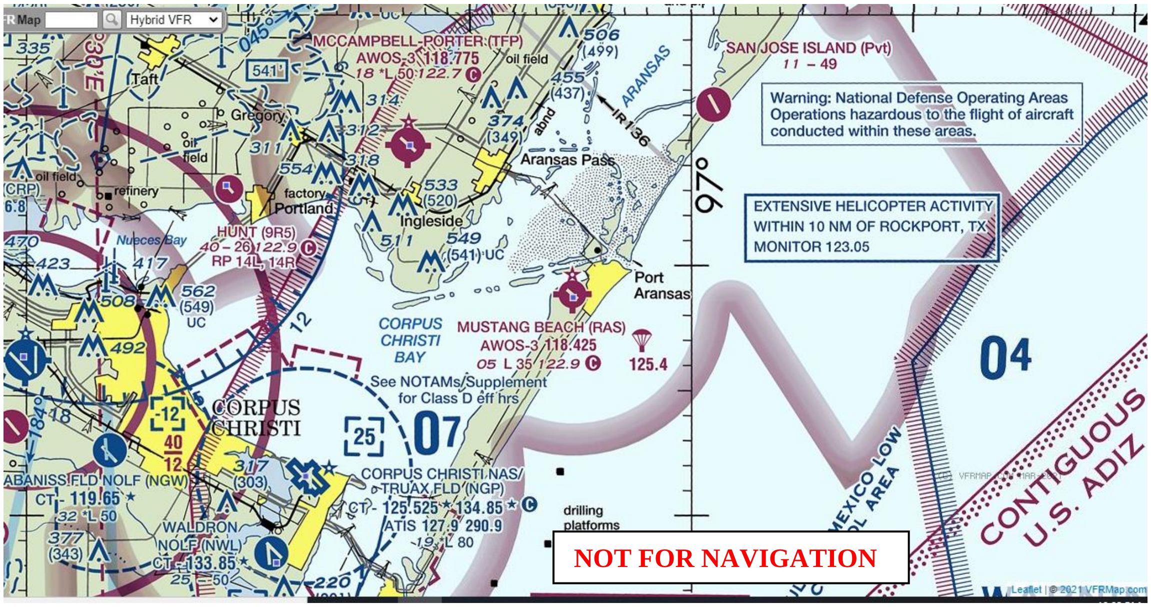

Figure 9: FAA Sectional chart showing KRAS (Mustang Beach).

7.1 Runway Information

The airport had a single asphalt-paved surface (fair condition) with designated runways 12/30. The runway surfaces were 3,482 feet long and 70 feet wide. Both runways had RNAV (GPS) approaches. Runway 30 had an elevation of 4.5 feet, the and the threshold crossing height was 22 feet. Runway 30 was also served by a 2-light Precision Approach Path Indicator (PAPI) on the left side of the runway (3.2º visual glide path angle).[30]

According to the FAA, runway 12 had a 3-foot drop off near the end of the runway, and runway 30 had a 3-foot ditch located 180 feet from the end of the runway. Runway 30 also had a 29-foot power line located 1,133 feet from the threshold both left and right of the runway 30 centerline. There was a 48-foot powerline located 1,791 feet from the runway 30 threshold, both left and right of the runway 30 centerline.

[30] According to the FAA, the PAPI primarily assists by providing visual glide slope guidance in non-precision approach environments. The system has an effective visual range of at least 3 miles during the day and up to 20 miles at night.

PORT ARANSAS

MUSTANG BEACH (RAS)(KRAS) 2 SW UTC–6(–5DT) N27°48.71´ W97°05.33´ **BROWNSVILLE**

5 B NOTAM FILE RAS **L–20I, 21A, GOMW**

RWY 12–30: H3482X70 (ASPH) MIRL **IAP**

RWY 12: PAPI(P2L)—GA 3.0° TCH 20´.

RWY 30: PAPI(P2L)—GA 3.2° TCH 22´. Tree.

SERVICE: **FUEL** 100LL

AIRPORT REMARKS: Attended irregularly. Self serve 24 hrs with credit card. Parachute Jumping. Pedestrians walking on rwy. Rwy 12 has a –3´ drop off near end of rwy, Rwy 30 has a 3´ ditch 180´ from end of rwy. Rwy 30 29´ power line 1133´ from thld left and right of centerline. 48´ power line 1791´ from thld left and right of centerline. Overnight tiedown fee.

AIRPORT MANAGER: 361-749-4008

WEATHER DATA SOURCES: AWOS–3 118.425 (361) 749–0537.

COMMUNICATIONS: CTAF 122.9

®**CORPUS APP/DEP CON** 125.4

CLEARANCE DELIVERY PHONE: For CD ctc Corpus Christi Apch at 361-299-4230.

RADIO AIDS TO NAVIGATION: NOTAM FILE CRP.

CORPUS CHRISTI (H) VORTACW 115.5 CRP Chan 102 N27°54.23´ W97°26.69´ 097° 19.7 NM to fld. 60/9E.

TACAN AZIMUTH & DME unusable:

024°–036° byd 35 NM blo 1,700´

037°–023° byd 35 NM blo 2,000´

265°–275°

VOR portion unusable:

Byd 30 NM blo 1,500´

TACAN AZIMUTH unusable:

080°–085° byd 30 NM

Figure 10: FAA airport and runway information for KRAS.[31]

8.0 Relevant Systems, etc.

8.1 Wing Flaps

According to the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, the electrically controlled, single-slotted flaps provided low-speed lift enhancement. Each flap was manufactured of aluminum and connected to the wing structure at three hinge points. Rub strips were installed on the top leading edge of each flap to prevent contact between the flap and wing flap cove. The flaps were selectively set to three positions: 0%, 50% (16°) and 100% (32°) by operating the FLAP control switch. The FLAP control switch positioned the flaps through a motorized linear actuator mechanically connected to both flaps by a torque tube. Proximity switches in the actuator limited flap travel to the selected position and provided position indication. The wing flaps and control circuits were powered by 28 VDC through the 15-amp FLAPS circuit breaker on the Non-Essential Bus.

[31] Source: https://aeronav.faa.gov/afd/22apr2021/sc_377_22APR2021.pdf.

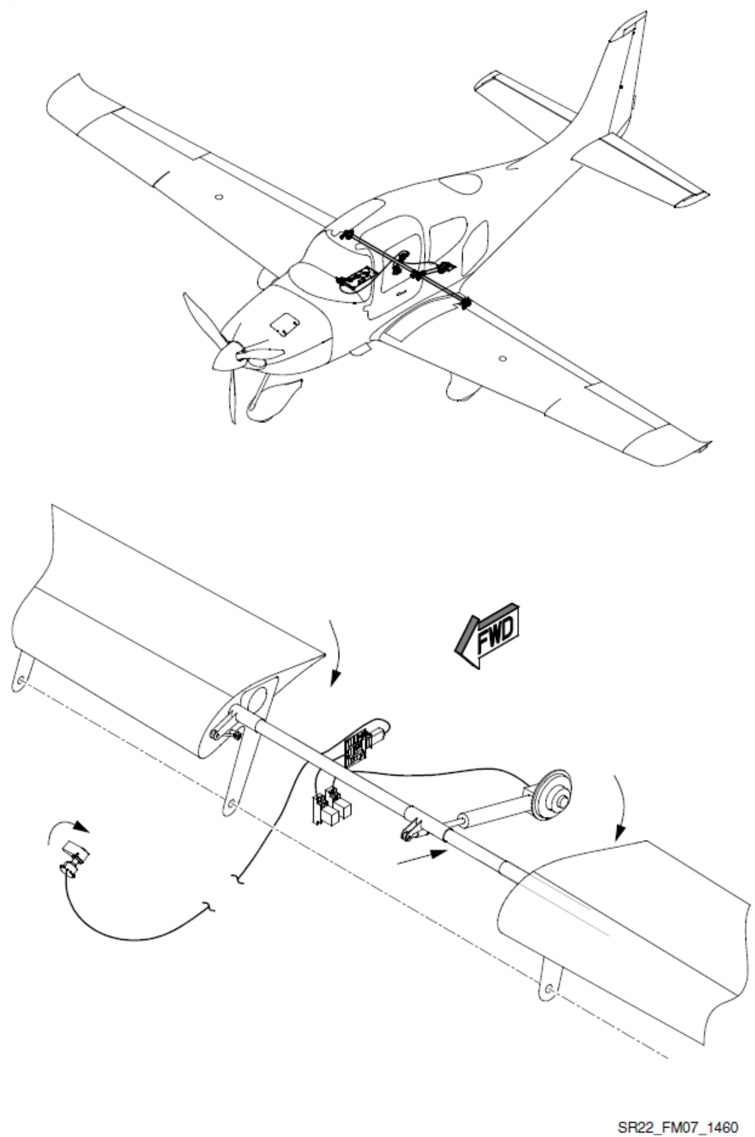

Figure 11: Cirrus SR22 wing flaps diagram.[32]

8.1.1 Wing Flaps Examination

Examination of the N587CD wreckage occurred on April 25, 2021. Representatives from Cirrus Aircraft, the FAA, and the NTSB were present. According to the Cirrus Aircraft representative, the wing flap position of N587CD was consistent with the flaps being UP. Further, the flap actuator extension was measured at 4.5 inches, also consistent with the flaps being UP.

[32] Source: Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, page 7-33.

Photo 2: April 25, 2021 photo of N587CD right wing with flap position consistent with flaps UP (0%).[33]

[33] Source: NTSB, dated April 25, 2021.

Photo 3: April 25, 2021 photo of N587CD flap actuator extended 4.5 inches, consistent with Flaps Up (0%).[34]

8.2 Flap Control Switch

An airfoil-shaped FLAPS control switch was located at the bottom of the vertical section of the center console. The control switch was marked and had detents at three positions: 0% (UP), 50% and 100% (FULL). The appropriate VFE speed[35] was marked at the Flap 50% and 100% switch positions. Setting the switch to the desired position would cause the flaps to extend or retract to the appropriate setting. An indicator light at each control switch position illuminated when the flaps reached the selected position. The UP (0%) light was green and the 50% and FULL (100%) lights were yellow.

8.2.1 Cockpit Video Images

The front seat passenger of N587CD captured cockpit video images of the accident flight on April 24, 2021 with his cell phone. The NTSB received copies of the videos from the passenger's legal representative on May 14, 2021. Screen-shot images from the video, taken about eight seconds

[34] Source: Cirrus Aircraft, dated April 25, 2021.
[35] According to 14 *CFR* 1.2 Abbreviations and symbols, VFE means maximum flap extended speed. Flap extended speed means the highest speed permissible with wing flaps in a prescribed extended position.

prior to impact, showed the flap selector switch consistent with the flaps up position, and the UP (0%) green light illuminated.

Photo 4: Screen shot of cockpit video taken about eight seconds prior to impact.

Photo 5: Enlargement of previous photo showing the flap selector switch consistent with the flaps up position, and the UP (0%) green light illuminated.

8.3 Stall Warning Systems

According to page 7-92 in the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, the SR22 was equipped with an electro-pneumatic stall warning system to provide audible warning of an approach to aerodynamic stall. The system consisted of an inlet in the leading edge of the right wing, a pressure switch and associated plumbing, and a piezo-ceramic horn behind the instrument panel.

According to the Handbook, as the airplane approaches a stall, the low pressure on the upper surface of the wings moves forward around the leading edge of the wings. As a low-pressure area passes over the stall warning sense inlet, a slight negative pressure would be sensed by the pressure switch. The pressure switch would then complete a ground circuit that would cause the warning horn to sound (applicable to Serials 2044 and subsequent) and the autopilot system to disconnect. The warning horn provided a 94-decibel continuous 2800 hertz tone and would sound at approximately 5 knots above stall with full flaps and power off in wings level flight, and at slightly greater margins in turning and accelerated flight. The system operated on 28 volts of direct current supplied though the 2-amp STALL WARNING circuit breaker on the Essential Bus.

9.0 Relevant Procedures

Operational procedures, limitations, performance, and systems information for the Cirrus SR22 was contained in the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003. A current copy of the Handbook was recovered in the accident wreckage of N587CD on April 25, 2021.

9.1 Normal Procedures

9.1.1 Approach

According to page 5-27 in the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, normal landing distances were calculated based on flaps set to 100%, and power set for a 3° descent to an estimated 50-foot obstacle at the end of the runway, with a reduction of power while passing the estimated 50-foot point followed by a smooth continuation of power reduction to idle just prior to touchdown.

9.1.2 Landing

According to page 4-21 of the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, normal landings were made with full flaps with power on or off. Surface winds and air turbulence were usually the primary factors in determining the most "comfortable" approach speeds.

The Handbook further stated that actual touchdown should be made with power off and on the main wheels first to reduce the landing speed and subsequent need for braking, and indicated to gently lower the nose wheel to the runway after airplane speed had diminished. This was especially important for rough or soft field landings.

The Handbook also provided the following caution, in part:

> *Landings should be made with full flaps. Landings with less than full flaps are recommended only if the flaps fail to deploy or to extend the aircraft's glide distance due to engine malfunction. Landings with flaps at 50% or 0%; power should be used to achieve a normal glidepath and low descent rate. Flare should be minimized.*

9.1.3 Short Field Landings

According to page 4-21 in the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, for a short field landing in smooth air conditions, the pilot was to make an approach at 77 knots-indicated airspeed (KIAS) with full flaps using enough power to control the glide path (slightly higher approach speeds should be used under turbulent air conditions). After all approach obstacles were cleared, the pilot was to progressively reduce power to reach idle just before touchdown and maintain the approach speed by lowering the nose of the airplane. Touchdown should be made power-off and on the main wheels first. Immediately after touchdown, the Handbook indicated to lower the nose wheel and apply braking as required. For maximum brake effectiveness, retract the flaps, hold the control yoke full back, and apply maximum brake pressure without skidding.

9.1.4 Crosswind Landings

According to page 4-12 in the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, normal crosswind landings were made with full flaps. Pilots were advised to avoid prolonged slips. After touchdown, the pilot was to hold a straight course with rudder and brakes as required. The maximum allowable crosswind velocity was dependent upon pilot capability as well as aircraft limitations. Operation in direct crosswinds of 20 knots had been demonstrated.

9.1.5 Balked Landing

According to page 4-22 in the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, in a balked landing (go around) climb, the pilot was to disengage autopilot, apply full power, then reduce the flap setting to 50%. If obstacles must be cleared during the go around, climb at 75-80 KIAS with 50% flaps. After clearing any obstacles, retract the flaps and accelerate to the normal flaps up climb speed.

Balked Landing/Go-Around

In a balked landing (go around) climb, disengage autopilot, apply full power, then reduce the flap setting to 50%. If obstacles must be cleared during the go around, climb at 75-80 KIAS with 50% flaps. After clearing any obstacles, retract the flaps and accelerate to the normal flaps up climb speed.

1. Autopilot .... DISENGAGE
2. Power Lever .... FULL FORWARD
3. Flaps 50%
4. Airspeed .... 75-80 KIAS

After clear of obstacles:

5. Flaps .... UP

Figure 12: Cirrus SR22 Balked Landing/Go-Around Procedure.[36]

9.1.5.1 Balked Landing Performance

[36] Source: Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, page 4-22.

Balked Landing Rate of Climb

Conditions:

- Power .... Full Throttle
- Mixture .... Set per Placard
- Flaps .... 100% (DN)
- Climb Airspeed .... V_{REF}

• Note •

Balked Landing Rate of Climb values shown are the full flaps change in altitude for unit time expended expressed in Feet per Minute.

For operation in air colder than this table provides, use coldest data shown.

For operation in air warmer than this table provides, use extreme caution.

This chart is required data for certification. However, significantly better performance can be achieved by climbing at the Best Rate of Climb speeds shown with flaps down or following the Go-Around / Balked Landing procedure in Section 4.

Weight	Press Alt	Climb Speed	RATE OF CLIMB - Feet per Minute					Best Rate of Climb
			Temperature ~°C					
LB	FT	KIAS	-20	0	20	40	ISA	KIAS
3400	SL	77	996	1035	1057	1067	1053	80
	2000	77	930	959	972	971	966	80
	4000	77	858	876	878	867	878	79
	6000	77	779	784	775	752	784	78
	8000	77	691	683	660	623	684	77
	10000	77	593	571	532	478	578	77
2900	SL	77	1268	1318	1348	1363	1342	
	2000	77	1195	1233	1252	1255	1245	
	4000	77	1115	1140	1146	1137	1144	
	6000	77	1026	1037	1030	1007	1037	
	8000	77	927	923	900	861	923	
	10000	77	817	796	755	696	803	

Figure 13: Cirrus SR22 Balked Landing Rate of Climb.[37]

[37] Source: Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, page 5-26.

9.2 Abnormal Procedures

9.2.1 Door Open in Flight

Door Open In Flight

The doors on the airplane will remain 1-3 inches open in flight if not latched. If this is discovered on takeoff roll, abort takeoff if practical. If already airborne do not allow efforts to close the door interfere with the primary task of maintaining control of the airplane. Do not attempt to hold door closed. Upon landing flare door may swing open - do not attempt to close door.

1. Airplane Control .... MAINTAIN

Figure 14: Cirrus SR22 Door Open in Flight abnormal procedure.[38]

10.0 Aerodynamics

10.1 Stalls

According to page 5-25 in the FAA Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25B, dated 2016), an aircraft stall results from a rapid decrease in lift caused by the separation of airflow from the wing's surface brought on by exceeding the critical Angle of Attack (AOA). The AOA is the angle at which relative wind meets an airfoil and is formed by the chord of the airfoil and the direction of the relative wind or between the chord line and the flight path. The AOA changes during a flight as the pilot changes the direction of the aircraft and is related to the amount of lift being produced. A stall can occur at any pitch attitude or airspeed.

According to 14 *CFR* 1.2 – Abbreviations and symbols, V_S is the stalling speed or the minimum steady flight speed obtained in a specific configuration. Stall speeds for the Cirrus SR22 were provided in the following table:

[38] Source: Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, page 3A-6.

Stall Speeds

Conditions:

- Weight .... 3400 LB
- CG .... Noted
- Power.. Idle
- Bank Angle .... Noted

• Note •

Altitude loss during wings level stall may be 250 feet or more.

- KIAS values may not be accurate at stall.

Weight	Bank Angle	STALL SPEEDS					
		Flaps 0%Full Up		Flaps 50%		Flaps 100%Full Down	
LB	Deg	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
3400 Most FWD C.G.	0	70	69	67	64	59	59
	15	71	70	68	65	62	60
	30	75	74	72	69	66	64
	45	84	82	80	76	73	70
	60	99	97	95	90	87	84
3400 Most AFT C.G.	0	68	67	66	62	61	59
	15	69	68	67	63	62	60
	30	73	72	71	67	65	63
	45	81	79	78	74	72	70
	60	96	94	93	88	86	83

Figure 15: Cirrus SR22 Stall Speeds.[39]

According to page 4-24 in the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, SR22 stall characteristics were conventional. Power-off stalls may be accompanied by a slight nose bobbing if full aft stick is held. Power-on stalls are marked by a high sink rate at full aft stick. Power-off stall speeds at maximum weight for both forward and aft center of gravity (C.G.) positions are presented in Section 5 - Performance Data.

The Handbook further stated that when practicing stalls at altitude, as the airspeed was slowly reduced, the pilot would notice a slight airframe buffet and hear the stall speed warning horn sound between 5 and 10 knots before the stall. Normally, the stall was marked by a gentle nose drop and the wings can easily be held level or in the bank with coordinated use of the ailerons and rudder. Upon stall warning in flight, recovery was accomplished by immediately by reducing back

[39] Source: Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, page 5-10. According to ATC data, the last recorded ground speed for N587CD on April 24, 2021 prior to impact was 71 knots. See previous Figure 4.

pressure to maintain safe airspeed, adding power if necessary and rolling wings level with coordinated use of the controls.

The Handbook also provided the following warning:

> *Extreme care must be taken to avoid uncoordinated, accelerated or abused control inputs when close to the stall, especially when close to the ground.*

According to page 3-20 in the Cirrus Design SR22 Pilot's Operating Handbook and FAA-approved Airplane Flight Manual, dated October 10, 2003, if, at the stall, the controls were misapplied and abused accelerated inputs were made to the elevator, rudder and/or ailerons, an abrupt wing drop may be felt and a spiral or spin may be entered. In some cases it may be difficult to determine if the aircraft had entered a spiral or the beginning of a spin.

10.1.1 Accelerated Stalls

According to page 4-10 in the FAA Airplane Flying Handbook (FAA-H-8083-3B, dated 2016), at the same gross weight, airplane configuration, and power setting, a given airplane will consistently stall at the same indicated airspeed if no acceleration is involved. The airplane will, however, stall at a higher indicated airspeed when excessive maneuvering loads are imposed by steep turns, pull-ups, or other abrupt changes in its flightpath. Stalls entered from such flight situations are called "accelerated maneuver stall," a term which had no reference to the airspeeds involved.

Stalls which result from abrupt maneuvers tended to be more rapid, or severe, than unaccelerated stalls, and because they occur at higher-than-normal airspeeds, and/or may occur at lower than anticipated pitch attitudes, they may be unexpected by an inexperienced pilot. Failure to take immediate steps toward recovery when an accelerated stall occurred may result in a complete loss of flight control, notably power-on spins.

An accelerated stall may be encountered any time excessive back-elevator pressure is applied and/or angle of attack is increased too rapidly.[40]

10.2 P-Factor, Torque and Slipstream Effects

According to the FAA Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25B, dated 2016), an airplane is subject to multiple left-turning tendencies in flight, which include:

- P-Factor - A tendency for an aircraft to yaw to the left due to the descending propeller blade on the right producing more thrust than the ascending blade on the left (clockwise rotation of the propeller as seen from the cockpit). This occurs when the aircraft's longitudinal axis is in a climbing attitude in relation to the relative wind.
- Torque - In an airplane, the tendency of the aircraft to turn (roll) in the opposite direction of rotation of the engine and propeller.
- Spiraling slipstream - The slipstream of a propeller-driven airplane rotates around the airplane. This slipstream strikes the left side of the vertical fin, causing the aircraft to yaw

[40] Source: FAA Airplane Flying Handbook (FAA-H-8083-3B, dated 2016), page 4-10.

slightly. Rudder offset is sometimes used by aircraft designers to counteract this tendency.

- Corkscrew Effect - The high-speed rotation of an aircraft propeller gives a corkscrew or spiraling rotation to the slipstream. At high propeller speeds and low forward speed (as in the takeoffs and approaches to power-on stalls), this spiraling rotation is very compact and exerts a strong sideward force on the aircraft's vertical tail surface.
- Gyroscopic precession. An inherent quality of rotating bodies, which causes an applied force to be manifested 90° in the direction of rotation from the point where the force is applied.

With an AOA just under the AOA which may cause an aerodynamic buffet or stall warning, the flight controls are less effective. The elevator control is less responsive and larger control movements are necessary to retain control of the airplane. In propeller-driven airplanes, torque, slipstream effect, and P-factor may produce a strong left yaw, which requires right rudder input to maintain coordinated flight. The closer the airplane is to the 1G stall, the greater the amount of right rudder pressure is required.

11.0 EAA Young Eagles Flights

According to its website,[41] the Experimental Aircraft Association (EAA) was an international aviation membership association founded in 1953 and headquartered in Oshkosh, Wisconsin. Local chapters were located in all 50 states and many countries.

Launched in 1992, the EAA's Young Eagles program provided young people free introductory flight through the Young Eagles program to introduce and inspire kids in the world of aviation.

The pilots participating in the Young Eagles program were local members of EAA who volunteered their time and aircraft. According to the website, each pilot was licensed by the FAA (or governing organization outside the U.S., such as Transport Canada) and all aircraft were likewise licensed by the government. The flights were conducted according to federal regulations. No aerobatic maneuvers were to be performed.[42]

11.1 Young Eagle Pilot Requirements

According to its website,[43] to fly passengers in the EAA Young Eagles program, pilots must:

- Be an EAA member.
- Complete the EAA Youth Protection Program, which includes a short training session and background check.
- Have a valid airman's certificate (sport pilot or greater).
- Possess a current medical certificate or BasicMed (if applicable).
- Be current to carry passengers in the aircraft you plan to use.
- Have a current biennial flight review.

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[41] Source: (https://www.eaa.org/eaa/about-eaa).
[42] See Attachment 8 - Young Eagles Information.
[43] Source: https://www.eaa.org/eaa/youth/free-ye-flights/ye-volunteers/ye-volunteer-opportunities/eaa-young-eagles-volunteer-pilots.

- Conduct flights in an aircraft that is in airworthy condition.
- Have Aircraft Passenger Liability Insurance for the aircraft used (owned, rented, or borrowed).
- Adhere to all applicable Federal Aviation Regulations.
- Complete a registration form **before** the flight, signed by you and a parent or legal guardian.

According to the EAA, Young Eagle pilots must complete a non-aviation background check and take an on-line youth protection training course. Pilots must be a current EAA member, have a pilot certificate and valid medical certificate (if applicable), be current in the aircraft they will be flying and have a current flight review. The program is designed to utilize existing FAA oversight and requirements appropriate to a General Aviation privately owned aircraft operation. EAA does not collect and/or store information on pilot's certificate, number of hours flown or medical class.[44]

According to the Young Eagles Chapter 191 Coordinator (Corpus Christi, Texas), volunteer pilots would register online at https://youngeaglesday.org/.[45] The Coordinator stated that the EAA did background checks on pilots participating in Young Eagle events. When asked if there were any proficiency requirements, verifications of qualifications for Young Eagles pilot volunteers, the Coordinator said no, but that the EAA required the pilot to be "legal" and carry insurance.[46]

According to a search of the NTSB accident database, since 1998 there have been 25 accidents involving Young Eagles flights, including the Port Aransas, Texas accident. These accidents included 8 fatalities and 9 serious injuries.[47]

F. LIST OF ATTACHMENTS

Attachment 1 - Records of Conversations and Witness Statements
Attachment 2 - Accident Pilot's Logbooks
Attachment 3 - Pilot's Cirrus SR22 Transition Training
Attachment 4 - N587CD Registration and Airworthiness Certificates
Attachment 5 - Weight and Balance Information
Attachment 6 - Young Eagles KRAS Runway 30 Procedure
Attachment 7 - Cirrus SR22 Normal and Emergency Checklists
Attachment 8 - Young Eagles Information

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[44] Source: Email sent from the EAA Vice President, Risk Management and Human Resources to the NTSB IIC on Monday June 7, 2021.
[45] For the accident pilot's Young Eagles registration, see Attachment 8 - Young Eagles Information.
[46] See Attachment 1 - Records of Conversations and Witness Statements.
[47] For additional information, see NTSB accident cases FTW96LA149, FTW98FA394, FTW99LA167, NYC01LA038, IAD01LA052, SEA02LA159, DEN03LA016, CHI05CA239, SEA06FA007 LAX07CA141, WPR09LA169, ERA10CA002, ERA11FA293, WPR11LA412, WPR12CA440, ERA14FA459, CEN15LA413, CEN17CA218, GAA17CA395, GAA17CA485, GAA18CA132, CEN19LA015, GAA20CA026, CEN21FA199, CEN21LA208. Note that only preliminary reports are available for CEN21FA199 and CEN21LA208 when this factual report was written.

Submitted by:

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National Resource Specialist
Senior Aviation Accident Investigator

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