National Transportation Safety Board
Washington, D.C. 20594

Aircraft Accident Brief

Accident Number: DCA07MA003
Operator: Private Owner
Aircraft and Registration: Cirrus SR20, N929CD
Location: Manhattan, New York City
Date: October 11, 2006
Adopted On: May 1, 2007

HISTORY OF FLIGHT

On October 11, 2006, about 1442 eastern daylight time,[1] a Cirrus Design SR20, N929CD, operated as a personal flight, crashed into an apartment building in Manhattan, New York City, while attempting to maneuver above the East River. The two pilots on board the airplane, a certificated private pilot who was the owner of the airplane and a passenger who was a certificated commercial pilot with a flight instructor certificate, were killed. One person on the ground sustained serious injuries, two people on the ground sustained minor injuries, and the airplane was destroyed by impact forces and postcrash fire. The flight was operating under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91, and no flight plan was filed. Marginal visual flight rules (MVFR) conditions[2] prevailed at the time of the accident.

The accident airplane departed Teterboro Airport (TEB), Teterboro, New Jersey (see point A in figure 1, which shows the accident flight track), about 1429 and was cleared for a visual flight rules (VFR) departure. According to air traffic control (ATC) transcripts, the pilots acknowledged that they were to stay out of the New York class B airspace.[3] After takeoff, the accident airplane turned southeast and climbed to an altitude of about 600 to 800 feet.[4] When the flight reached the western shore of the Hudson River (see point B in figure 1), it turned to the south, remaining over the river, then descended to 500 feet.[5] The flight continued southbound

[1] Unless otherwise noted, all times in this brief are eastern daylight time based on a 24-hour clock.

[2] MVFR conditions are those in which a cloud ceiling or lowest layer of clouds is reported as broken or overcast and between 1,000 and 3,000 feet above ground level and/or visibility is from 3 to 5 miles. In class B airspace, visual flight rules conditions should be free of clouds with a minimum visibility of 3 miles.

[3] Paragraph 3-2-3 of the *Aeronautical Information Manual* defines class B airspace as follows, "Generally, that airspace from the surface to 10,000 feet MSL [mean sea level] surrounding the nation's busiest airports in terms of IFR [instrument flight rules] operations or passenger enplanements. The configuration of each Class-B airspace area is individually tailored and consists of a surface area and two or more layers … and is designed to contain all published instrument procedures once an aircraft enters the airspace. An ATC [air traffic control] clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace. The cloud clearance requirement for VFR operations is 'clear of clouds.'"

[4] Unless otherwise indicated, all altitudes referenced in this report are reported as height above mean sea level.

[5] The floor of the New York class B airspace transitioned from 1,800 to 1,500 feet in this area, which is known as the Hudson River exclusion. Regarding minimum safe altitudes, 14 CFR 91.119 states that "except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes: (a) *Anywhere*. An

over the Hudson River until abeam of the southern tip of Manhattan (see point C in figure 1), at which point, the flight turned southwest bound.[6] Radar data from John F. Kennedy International Airport (JFK), Jamaica, New York; Newark International Airport (EWR), Newark, New Jersey; and Westchester County Airport (HPN), White Plains, New York, indicated that the accident airplane's altitude varied from 500 to 700 feet for the remainder of the flight.

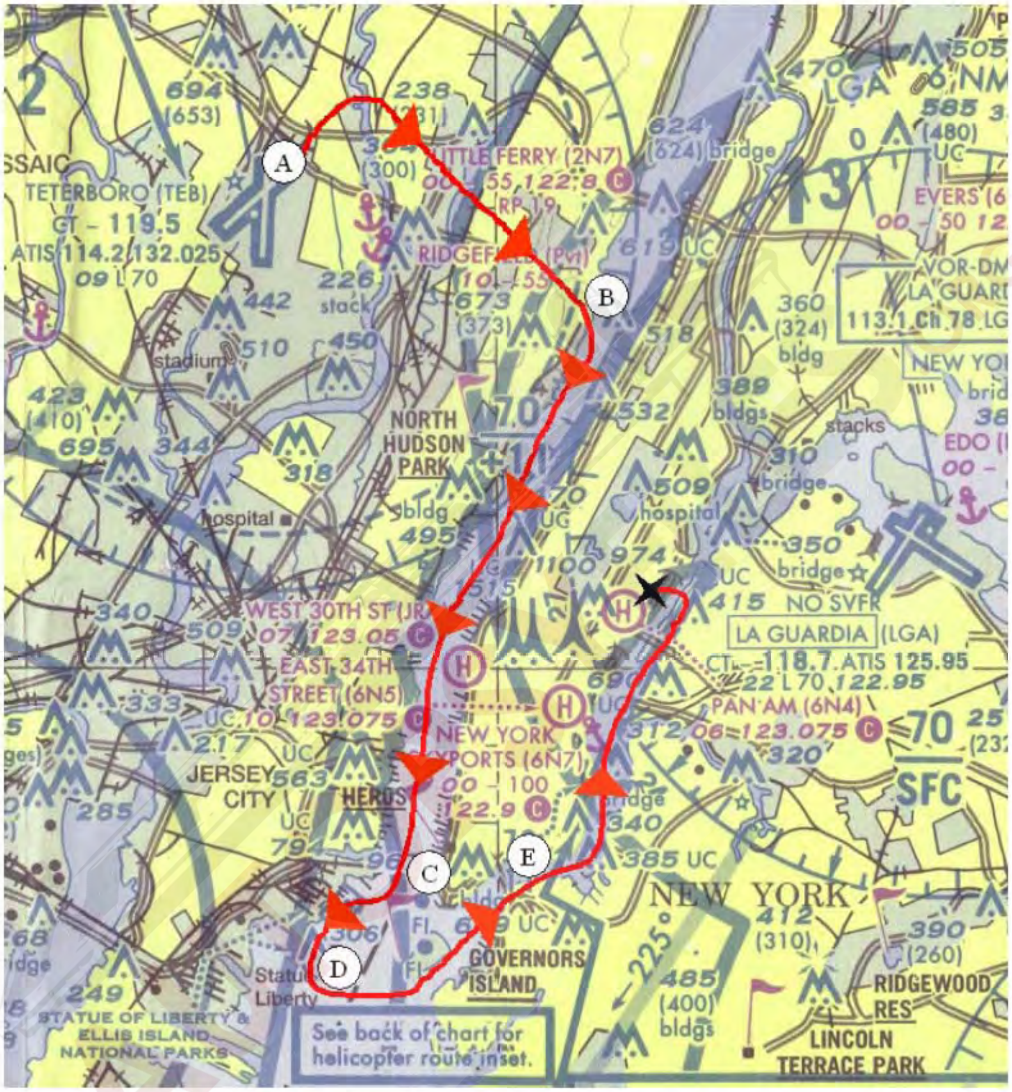

Figure 1. Accident flight track for N929CD.

About 1436, the airplane flew around the Statue of Liberty (see point D in figure 1) then headed to the northeast, at which point, it proceeded to fly over the East River (see point E in

altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface. … (c) *Over other than congested areas*. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle or structure."

[6] The floor of the New York class B airspace in this area transitioned from 1,500 to 1,100 feet.

figure 1).[7] About 1 mile north of the Queensboro Bridge, the airplane made a left turn to reverse its course. Radar contact was lost about 1442. The airplane impacted a 520-foot tall apartment building at 524 East 72nd Street, 333 feet above street level (see figure 2).

Figure 2. Photograph of apartment building that N929CD impacted.

PERSONNEL INFORMATION

Pilot/Owner

The pilot/owner, age 34, held a private pilot certificate with a rating for airplane single-engine land, issued February 9, 2006. His most recent Federal Aviation Administration (FAA) third-class medical certificate was issued on November 18, 2005, with no waivers or limitations. A review of his FAA airman file and medical records did not reveal any discrepancies or enforcement actions or preexisting medical conditions. He purchased the accident airplane on June 9, 2006.

According to the pilot/owner's logbook at the time of the accident, he had accumulated 87.8 hours total flight time, all of which were accumulated in the last 12 months, including 12.5 hours in Cirrus aircraft, 3.9 hours of which were as pilot-in-command (PIC). In the last

[7] The floor of the New York class B airspace in this area transitioned from 1,100 to 1,500 feet. The floor of the New York class B airspace transitioned from 1,500 to 1,100 feet as N929CD passed the Williamsburg Bridge on the East River; this area is known as the East River exclusion.

90 days, 30 days, and 24 hours before the accident flight, he flew 13.7, 0, and 0 hours, respectively.

The pilot/owner's logbook indicated that he received three instructional flights in a Cirrus SR22[8] between July 11 and 13, 2006. His first flight in the accident airplane was on July 20, 2006, and there was a flight instructor with him on that flight. He flew the airplane again on July 24, 2006, without an instructor. The pilot/owner had flown with six different flight instructors since receiving his private pilot's certificate and had received a total of 11.5 hours of flight instruction in Cirrus aircraft. Most of his flight time was conducted in California, and there was no record that he had previously flown in the New York East River class B exclusion airspace.

A previous flight instructor described the pilot/owner as being "quick to adapt, conscientious, and checklist-oriented," and another instructor stated that his flying skills were average, or as expected, for a pilot of his experience. The instructor who flew with the pilot/owner in the Cirrus SR22 stated that he was "one of the better pilots" he had flown with and that he flew "extremely well" for a pilot with his experience. According to his logbook, this instructor also provided him with 3.5 hours of ground instruction on Cirrus airplane systems, including the multifunctional display, the Garmin 430 avionics, and a "high performance briefing."

Pilot-Rated Passenger

The pilot-rated passenger, age 26, held a commercial pilot's certificate, issued August 25, 2003, with ratings for airplane single-engine land, airplane multi-engine land, and instrument airplane. He also held a flight instructor certificate, with ratings for airplane single-engine land and instrument airplane (issued on September 23, 2003). The pilot-rated passenger's most recent FAA second-class medical certificate was issued on June 15, 2004, with no waivers or limitations. A review of the pilot-rated passenger's FAA airman file and medical records did not reveal any discrepancies or enforcement actions or preexisting medical conditions. In addition, the pilot-rated passenger held a ground instructor certificate and an airframe and powerplant certificate.

The pilot-rated passenger conducted most of his flights in California where he owned and operated a fixed-based operation that provided flight training, aircraft rental, and sightseeing flights to the general aviation community, as well as maintenance on all their aircraft. The pilot-rated passenger had not received the Cirrus Standardization Instructor Program offered by the airplane manufacturer. However, there is no FAA requirement to complete this program before providing instruction in a Cirrus aircraft. It could not be determined if he was acting as an instructor during the flight.

The pilot-rated passenger's logbook documented his flight experience from September 11, 1998, to February 9, 2004. There were no personal flight records from February 10, 2004, to November 2, 2005. The pilot-rated passenger kept an electronic spreadsheet for his flight record from November 3, 2005, to October 1, 2006. According to the

[8] The SR22 is the next-generation model of the SR20, with more speed and performance.

logbook and electronic spreadsheet, the pilot-rated passenger had accumulated 861 total flight hours, 759.3 hours of which were as PIC. In the last 90 days, 30 days, and 24 hours before the accident flight, he flew 81, 35, and 0 hours, respectively. There was no record that he had previously flown in the East River class B exclusion airspace or had piloted a Cirrus aircraft.

Recent Activities

According to family and friends, both the pilot/owner and the pilot-rated passenger and their respective families were touring New York City during the days preceding the accident. The night before the accident, both families dined at a local restaurant and attended a musical. Both families retired to a New York City hotel for the evening. The morning of the accident, the pilot/owner and pilot-rated passenger assisted their families for their departure to California, via a commercial airline flight. According to the families, the pilot/owner and pilot-rated passenger planned to fly the accident airplane from New Jersey to California in the coming days. About 1022, the pilot/owner telephoned the fixed base operator (FBO) at TEB to inform them that he would arrive about 1230 to fly his airplane. The pilot/owner and pilot-rated passenger arrived at TEB about 1230, and both were observed obtaining weather data and planning a flight. The pilot/owner and pilot-rated passenger indicated to friends that the intent of the flight was to circle the Statue of Liberty. Personnel at the FBO observed the pilot/owner performing a preflight inspection of the accident airplane before departure.

AIRPLANE INFORMATION

The Cirrus SR20 is a single-engine, single-pilot, low-wing airplane with four seats, fixed tricycle landing gear, and dual-side yoke controls. The accident airplane, serial number 1230, was manufactured in 2002. It was equipped with a 200-horsepower Teledyne Continental Motor IO-360-E(6)B six-cylinder, air-cooled, fuel-injected, horizontally opposed reciprocating engine. The three-blade, constant speed propeller was a Hartzell Model PHC-J3YF-1RF. The accident airplane was equipped with a Cirrus Airplane Parachute System designed to recover the airplane from catastrophic emergencies in which normal emergency procedures are ineffective. The airplane was also equipped with an electro-pneumatic stall warning system to provide audible warning of an approach to aerodynamic stall.

National Transportation Safety Board investigators reviewed the airplane's maintenance records and found that all service bulletins and airworthiness directives had been complied with.

AIR TRAFFIC CONTROL

This accident occurred in a complex section of airspace surrounding Manhattan Island, near three major air carrier airports and a variety of other general aviation facilities accommodating both fixed-wing and rotary-wing aircraft. Because of the high density of air traffic in this area, the FAA has designated most of the airspace "class B," the second most restrictive designation for airspace in the United States.

VFR operations are authorized below the class B airspace surrounding Manhattan Island in designated zones called the Hudson River and East River exclusion areas (the shaded area in figure 3 outlines the East River exclusion area, where the accident occurred). These exclusion areas were first defined in 1971. The FAA stated that the purpose of the Hudson and East River exclusion areas was to provide for VFR aircraft operations over the rivers for transiting, landing, or departing aircraft. Before the exclusion areas were defined, the floor of the class B airspace was typically at the surface of the rivers in the current areas of exclusion, and any aircraft operations over the rivers in these areas had to be coordinated with ATC. Seaplane and helicopter bases are currently located in or near these exclusion areas, and aircraft also use the Hudson River exclusion area to transit under the class B airspace.

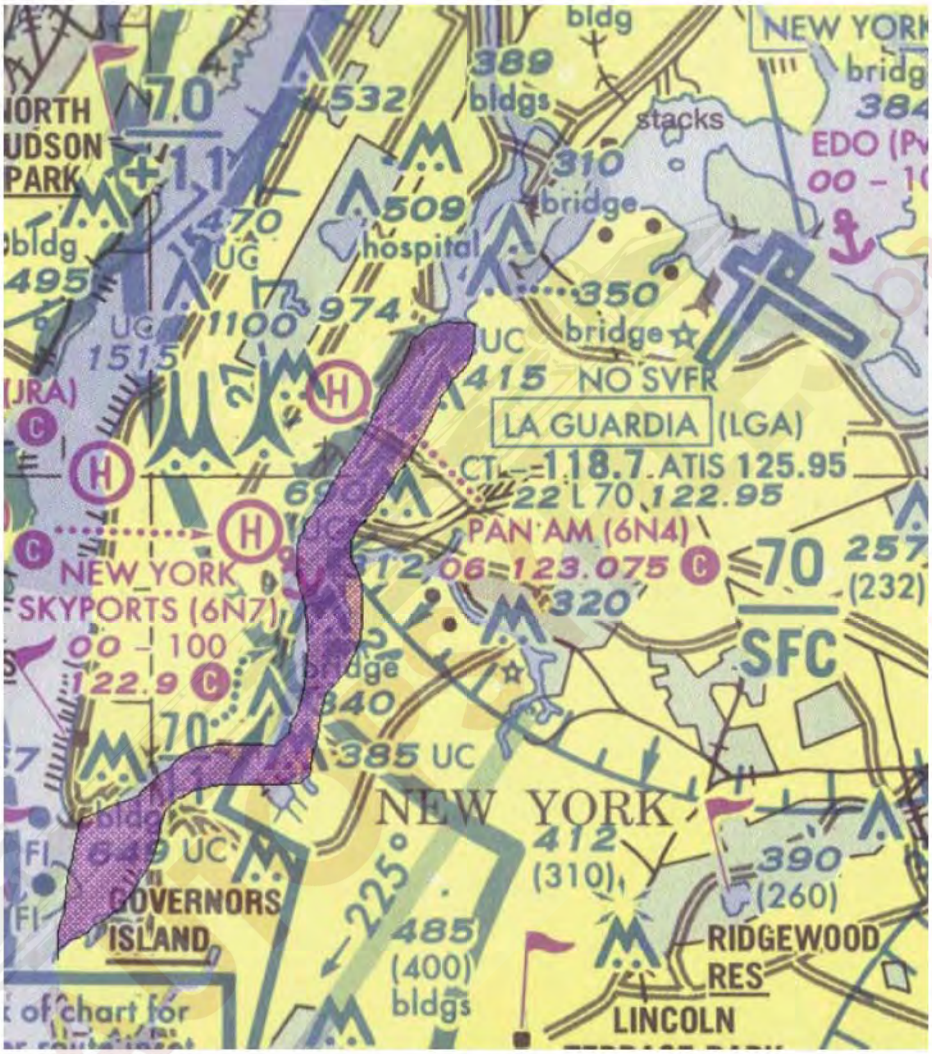

Figure 3. Map depicting New York East River class B exclusion.

The last communication between ATC and the accident flight was about 1433 when the accident pilots acknowledged that they were to squawk VFR.[9] No further ATC communication was required while the flight was conducted in the Hudson and East River class B exclusion areas. Pilots are advised to announce their position and intentions on common traffic advisory frequency (CTAF) 123.05 Mhz when operating in the Hudson River exclusion area and CTAF 123.075 Mhz when operating in the East River exclusion area, but the announcements are not

[9] Squawk VFR meant that the accident pilots were to change their transponder beacon code from 0312 to 1200, which is the designated code for all VFR aircraft.

mandatory. There were no reports of the accident flight communicating on either of these frequencies. Pilots are also responsible for maintaining their own traffic separation.

METEOROLOGICAL INFORMATION

The New York Central Park Automated Surface Observing System reported at the time of the accident that winds were from 060° at 6 knots, visibility was at 7 statute miles, the ceiling was overcast at 1,800 feet above ground level (agl), the temperature was 17° Celsius (C), the dewpoint was 13° C, and the altimeter was 29.90 inches of mercury. No visibility restrictions were reported at any of the surrounding airport weather stations. An aircraft that was landing at Newark Liberty International Airport at the time of the accident was equipped with a weather reporting capability that indicated that the winds at 700 feet were from 095° at 13 knots.

FLIGHT RECORDERS

The airplane was not equipped with a cockpit voice recorder or a flight data recorder and was not required by Federal regulations to be so equipped.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted the 32nd and the 33rd floors of the north face of an apartment building located at 524 East 72nd Street. The engine, propeller, the right portion of the engine mount, and the nose landing gear strut were found in an apartment on the 32nd floor. The engine was found inverted with the propeller separated. The engine and propeller exhibited thermal damage and were coated with ash, debris, and fire-extinguishing agent.

The majority of the wreckage was on the street level at East 72nd Street, directly below the impact point. The wreckage was destroyed by impact forces and postcrash fire. Some wreckage debris was found on adjacent rooftops, balconies, and building projections. The examination of the wreckage indicated that there was no sign of an in-flight fire or any preexisting damage to the airplane.

MEDICAL AND PATHOLOGICAL INFORMATION

The Office of the Chief Medical Examiner, New York City, New York, performed an autopsy on both pilots. The City Medical Examiners determined that the cause of death for the pilots was "multiple blunt trauma."

The Civil Aerospace Medical Institute, Oklahoma City, Oklahoma, conducted a toxicological examination on tissue specimens from both pilots. The specimens tested negative for alcohol and other performance-impairing drugs.

TESTS AND RESEARCH

Engine and Propeller Examination

The engine was sent to the Teledyne Continental Motors facility in Mobile, Alabama, for teardown and examination directed by Safety Board investigators. The propeller was torn down and examined at the Hartzell Propeller facility in Piqua, Ohio. The teardowns revealed no evidence of pre-impact failure. All damage could be attributed either to impact forces or the postcrash fire. Approximately 50 percent of the No. 1 blade and about 25 percent of the No. 3 blade were missing due to thermal damage. The No. 2 blade exhibited no signs of thermal damage and was intact. The No. 2 propeller blade and the No. 1 and 2 blade stubs showed leading edge damage and a large-radius forward bend. The propeller flange had separated in the radius immediately aft of the flange, and the appearance and location of the fracture were typical of torsional overload failure. These findings indicated that the powerplant was operating properly and did not contribute to the accident and that the propeller was being driven by the engine upon impact.

Components Examination

The airplane contained a multifunctional display that housed a memory chip for storing data. The memory chip was located within the wreckage and sent to the Safety Board's vehicle recorder laboratory for examination. However, due to impact damage, no data could be extracted. Two hand-held Garmin global positioning system (GPS) units (GPSMAP 396 and GPSMAP 496) were found in the wreckage. Both units were examined; however, no data could be extracted due to impact forces with the building and then the street and postcrash water damage.

Aircraft Performance

The accident airplane's constant-altitude turn performance was determined using recorded radar data, airplane performance data,[10] recorded winds at 700 feet, and standard aerodynamic calculations. Radar data indicated that the airplane was flying north over the East River at about 97 knots and initiated a left turn over Roosevelt Island (see figure 4 for position location). Roosevelt Island divides the East River into west and east channels. Although the East River is about 2,100 feet wide at the turn location, the effective turn width available was reduced to about 1,400 feet because the airplane was flying near the middle of the East Channel at the start of the turn and the 13-knot easterly wind caused a measurable westward drift.[11]

[10] Airplane performance data were based on the Cirrus Pilot Operating Handbook, an estimated operating weight of 3,000 pounds, and a flaps-up stall speed of 67 knots.

[11] The calculated westward drift is about 300 feet based on a turn diameter of 1,750 feet and about 400 feet based on a turn diameter of 2,100 feet. For more information, see Aircraft Performance Study, dated November 16, 2006, in the docket for this accident.

Figure 4. Radar tracks of the accident flight over the East River.

A 1,400-foot diameter constant-altitude turn at 97 knots would have required a minimum bank angle of 50°[12] and a load factor of 1.55 Gs. At this airspeed, the airplane could produce a load factor of 2.1 Gs at a bank angle of 61° before reaching wing aerodynamic stall. If the initial portion of the turn were less aggressive than a constant bank angle of 50°, a sufficiently greater bank angle would have been required as the turn progressed, which would have placed the airplane dangerously close to an aerodynamic stall at relatively low altitude.

WITNESS OBSERVATIONS

There were predominantly five eyewitnesses to the accident. One eyewitness stated that the airplane entered a steep turn left toward the south, which continued until it struck a building. Another reported that she saw the airplane in a left turn toward the south. The airplane continued in the turn until it crashed into a building. Two witnesses reported that the airplane entered a left turn and was pulling up at the time it impacted the building. A fifth witness stated that as the airplane was heading straight toward the building, the wings were "wobbling," like the pilot was fighting for control. The airplane then pitched down and to the right and descended below his field of view prior to impact.

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[12] The practical test standards for private pilots require a demonstration of steep turns to a maximum bank angle of 45°. During the test, the pilot has to maintain the entry altitude, ±100 feet; airspeed, ±10 knots; bank, ±5°; and rolls out on the entry heading, ±10°

ADDITIONAL INFORMATION

Federal Aviation Administration Action

Since the accident, the FAA issued Notice to Airmen (NOTAM) 6/3495 temporarily prohibiting fixed-wing aircraft, such as the accident airplane, from operating in the East River class B exclusion area where the accident occurred unless authorized and controlled by ATC. The East River class B exclusion is in effect, but its use is limited to helicopters and seaplanes that are taking off and landing at nearby sea bases. This prohibition is intended to prevent airplane pilots from encountering a situation in which they must attempt a 180º turn or other abrupt maneuver to avoid penetrating controlled airspace and states the following:

> Effective immediately until further notice, VFR flight operations involving fixed wing aircraft (excluding amphibious fixed wing aircraft landing or departing New York Skyports Inc. Seaplane Base) in the East River class B exclusion area extending from the southwestern tip of Governors Island to the north tip of Roosevelt Island, are prohibited unless authorized and being controlled by ATC.

The NOTAM is in effect until further notice; however, the charts for the area would not be changed until rulemaking action is completed. The FAA indicated in a meeting held in December 2006 between the FAA and Safety Board staff that it was planning rulemaking to make the prohibition contained in the NOTAM permanent. The Safety Board issued Safety Recommendation A-07-38 asking the FAA to make this prohibition permanent.

U.S. Coast Guard Video

A video from a U.S. Coast Guard vessel's surveillance system was received. The camera that recorded the video was positioned at an angle that had a direct view of the last segment of the accident flight. The quality of the video was poor in that the airplane cannot be readily seen. The explosion after impact was the only accident-related event that was captured on the video.

ANALYSIS

There were no system, structural, or engine malfunctions found. The engine was producing power as indicated by the separation of the propeller hub, damage to the blade hubs, and damage to the No. 2 blade. The pilot/owner was properly certificated to fly the accident airplane. The pilot-rated passenger was also a certified flight instructor and qualified to have flown the accident flight.

The Safety Board medical officer reviewed the autopsy results, and the extremity injuries noted for the pilot-rated passenger, who was seated in the aircraft right seat, were potentially consistent with his use of the controls at the time of a substantial impact; however, these injuries are not entirely typical of injuries from such a source, and the complex accident forces may have resulted in such injuries from other sources. No injuries were noted for the pilot/owner, who was seated in the aircraft left seat, that are potentially consistent with his use of the controls at the time of a substantial impact, but the postaccident fire would likely have eliminated much of the evidence of such injuries. On the basis of the injuries noted, the most that can be reasonably concluded is that the observed injuries do not eliminate the possibility that the pilot-rated passenger was on the controls at the time of the accident. Due to the complex accident forces involved in the crash sequence, it is not possible to determine who was the pilot in control of the accident flight, if flight instruction was being given, or who was manipulating the controls during the flight or at the time of the accident. Although the pilot/owner had only 88 hours in single-engine airplanes, he had the basic airmanship knowledge and skill required to perform the preflight planning for and to conduct the accident flight.

As the accident flight proceeded north along the East River, it approached the northern end of the East River exclusion where the floor of the class B airspace transitioned from 1,100 feet to the surface, effectively requiring either a 180° turn to reverse course or an ATC clearance to enter the class B airspace. A constant-altitude 180° turn with an easterly wind of 13 knots and at the calculated airspeed of 97 knots was possible from the position that the accident flight began the turn, as long as a bank angle of at least 50° but no greater than 61° was maintained for the duration of the turn. If the bank angle exceeded 61°, the airplane wing would aerodynamically stall.

Radar data indicate that the accident airplane was at an altitude of 600 feet before the 180° turn was initiated and that the actual turn was accomplished with a bank angle of 40° to 45°, based on ground speed and turn radius. The airplane was only about 75 percent through the 180° turn when it approached the western shoreline of the East River. According to radar data, this is the approximate location where the airplane began to descend. Witnesses who saw the accident airplane in flight described the motion of the airplane as “wobbling” from side to side and reported that it was in a pitch-down attitude and at a steep bank angle at this time. Because the turn was initiated at 40° to 45° rather than the minimally required 50°, the pilots increased the bank angle of the airplane to attempt completion of the 180° turn. On the basis of the witness accounts and the loss of altitude indicated by radar data, it is likely that the pilots put the airplane into an aerodynamic stall while pulling through the turn.

The pilots did not aggressively bank the airplane throughout the turn nor did they use the full available width of the river. Radar data indicate that the airplane was in the middle of the

East Channel at the start of the 180º turn (see figure 5) as opposed to beginning the turn from the eastern shoreline. Although it cannot be determined whether the pilots were aware of the wind's effect on the execution of the 180º turn, they should have been able to observe the difference in the ground track and heading during the flight to determine that there was a wind from the east and compensate for westward drift. Alternatively, the pilots could have dramatically improved the turning performance by transitioning to the west side of the East River, taking advantage of the full width of the river, and making a right turn into the easterly wind. By starting the turn on the west side of the river and turning into the wind, a minimum bank angle of 35° would have been needed, rather than the minimum 50° required by turning in the direction of the wind.

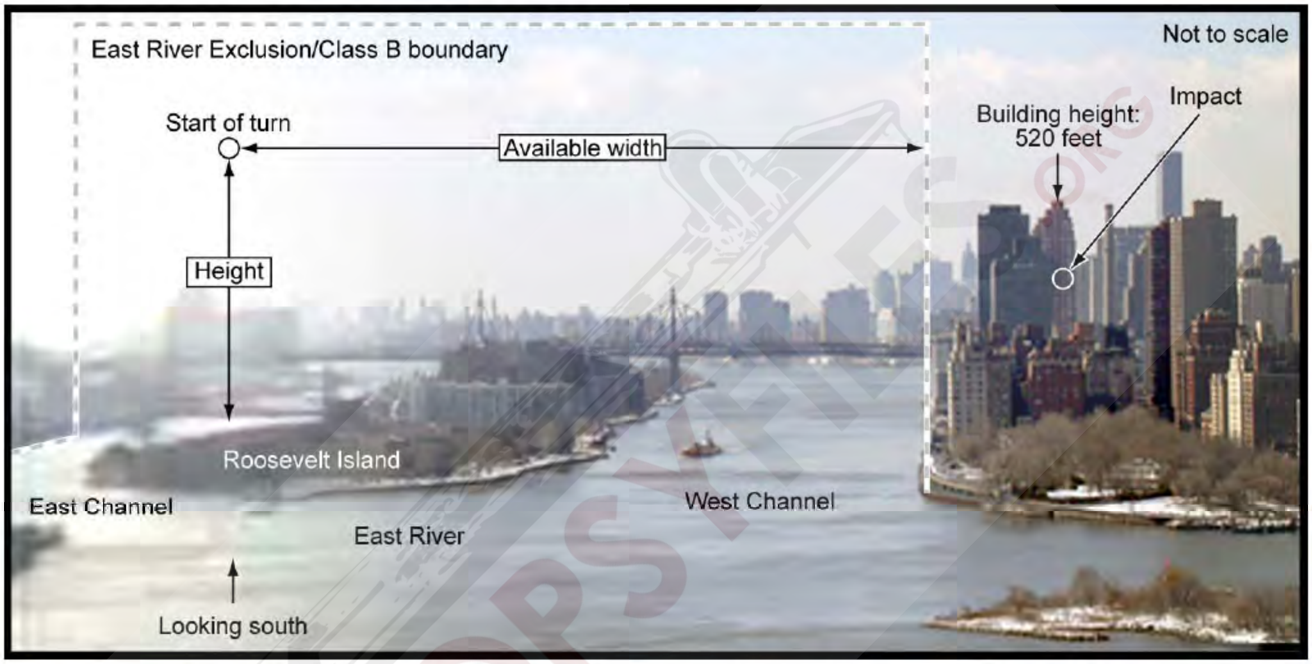

Figure 5. Photo illustration depicting the available width for the turn maneuver and the approximate location of N929CD at the beginning of the turn maneuver.

The pilots may have been concerned about the consequences of inadvertently penetrating the class B airspace or flying over Manhattan Island. However, in a situation such as this, pilots should place a higher priority on maintaining aircraft control. According to radar data and weather reports, no other aircraft were in the area at the time of the accident, and the cloud level was reported to be at 1,800 feet. Although the lower limit of the class B airspace was 1,100 feet, the pilots could have climbed as necessary to avoid buildings in the area.

The pilots should have recognized, during preflight planning or while they were considering flying up the East River after they were already in flight, that there was limited turning space in the East River exclusion area and that they would need to maximize the lateral distance available for turning. Alternatively, the pilots could have chosen to contact ATC and request clearance to transit through the class B airspace instead of turning around in the East River exclusion area. According to FAA ATC, such clearances are relatively common.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was the pilots' inadequate planning, judgment, and airmanship in the performance of a 180º turn maneuver inside of a limited turning space.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

MARK V. ROSENKER
Chairman

ROBERT L. SUMWALT
Vice Chairman

DEBORAH A. P. HERSMAN
Member

KATHRYN O. HIGGINS
Member

STEVEN R. CHEALANDER
Member

Adopted: May 1, 2007

Vice Chairman Sumwalt filed the following concurring statement on May 3, 2007, and was joined by Chairman Rosenker and Members Hersman, Higgins, and Chealander.

Vice Chairman Sumwalt, Concurring:

I firmly agree with and support the Board's report, analysis, probable cause statement and single recommendation stemming from this accident.

The Board determined unanimously that the probable cause was "the pilots' inadequate planning, judgment and airmanship in the performance of a 180 degree turn maneuver inside of a limited turning space."

This concurring statement is an appeal to the aviation community and/or aviation researchers to develop innovative ways to improve pilot judgment and decision making skills.[1]

Judgment and decision errors are quite common occurrences and lead to accidents. For example, during this accident's Board Meeting staff reported that according to the NTSB's accident database, about 30 percent of general aviation accidents over the past decade have cited judgment as a predominate factor. The NTSB's 2005 Safety Study, *Risk Factors Associated with Weather-Related General Aviation Accidents* cited a 1977 study conducted by Jensen and Bentel (*Judgment Evaluation and Instruction in Civil Pilot Training, Final Report*) that stated that "approximately 50 percent of aviation fatalities were related to poor pilot judgment." Additionally, FAA Advisory Circular AC 60-22, *Aeronautical Decision Making,* states that decision making accidents account for 52 percent of fatal general aviation pilot error accidents.

The Safety Board continues to cite decision making as a factor in accidents. For example, on February 13, 2007, my colleagues on the Board and I determined that the probable cause of a September 23, 2005 air tour helicopter accident in Kauai to be, in part, "the pilots decision to continue flight into adverse weather conditions, which resulted in a loss of control due to an encounter with a microburst." On that same day, the Board deliberated the September 24, 2004 air tour helicopter accident, also in Kauai, and determined probable cause to be "the pilot's decision to continue flight under visual flight rules into an area of turbulent, reduced weather conditions, which resulted in the pilot's spatial disorientation and loss of control of the helicopter."

The AOPA Air Safety Foundation 2006 *Nall Report* states: "In this year's *Joseph T. Nall Report*, you'll see exactly where the problems arose and where pilots made poor decisions. Of particular note is a sharp rise in fatal maneuvering accidents… Half of these accidents involved wire strikes or collisions with trees, terrain, or obstacles. In many cases the issue wasn't lack of skill; it was the pilot's decision to fly close to the ground and perhaps to maneuver aggressively."

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[1] Judgment and decision making are closely related. Judgment is the overall mental process used to arrive at a decision. Decision making is a process of identifying a problem, gathering data and using sound judgment to reach a logical conclusion in a timely manner. For purposes of this concurring statement I use these terms interchangeably with no attempt to differentiate between them.

After deliberating the October 11, 2006 Cirrus accident in New York City, I agree with my colleagues that this accident involved inadequate pilot judgment. I believe this accident sequence was initiated when the pilots began their trek up the East River without an adequate plan for what they would do once they got to the end of the East River Exclusion. As illustrated in the report, the lack of a plan placed the pilots in the position of having to make a tight turn to remain within the limited airspace. Alternative means of dealing with the situation could have included contacting ATC to request clearance through the airspace; initiating the turn more aggressively in the initial stages of the turn; initiating the turn closer to the eastern edge of the river to allow more available turn distance; initiating the turn on the western edge of the river to allow the turn to be completed into the wind, which would allow for a tighter turn radius; initiating the turn at a higher altitude to provide greater clearance above hazards, or; entirely avoiding the attempt to fly up the river.

According to FAA Advisory Circular AC 60-22, "Contrary to popular opinion, good judgment can be taught." The AC explains that Aeronautical Decision Making (ADM) training has been proven to reduce the number of decision related accidents. "The effectiveness of [ADM training] has been validated in six independent studies where student pilots received such training in conjunction with standard flying curriculum. When tested, the pilots who had received ADM training made fewer in-flight errors than those who had not received ADM training. The differences were statistically significant and ranged from about 10 to 50 percent fewer judgment errors."

The Safety Board has issued several safety recommendations aimed at ADM, including Safety Recommendations A-93-013, A-93-164, A-95-124, A-97-019 and A-97-021. Each of these recommendations is classified as "Closed - Acceptable Action," with the exception of A-95-124 ("Open – Unacceptable Response.")

In spite of ADM being demonstrated to improve pilot decision making, in spite of several NTSB recommendations aimed at implementing ADM, in spite of work that has already been done to further improve judgment and decision making, judgment and decision making accidents like this one, unfortunately, continue to occur. And, they occur all too frequently.

Often, it is those in the industry who are in the best position to develop solutions to avoid accidents in the future. My plea to the aviation community and/or aviation researchers is to work diligently to look for new and effective ways to teach better judgment and decision making.

One significant way to improve aviation safety is to focus on those areas where the problems are occurring. When I conducted aviation safety research for NASA's Aviation Safety Reporting System, I was told to "listen to what the data are trying to tell you." Here we have a large percentage of accidents due to inadequate judgment and decision making. We need to listen to what the data are trying to tell us.

At the entrance to the NTSB's Training Center, there is a plaque that states, "…from tragedy we draw knowledge to improve the safety of us all."

I hope that we will use this tragedy to improve the safety of us all. Until we do, lives will continue to be lost.

Robert L. Sumwalt, III 5/3/07

Robert L. Sumwalt, III