National Transportation Safety Board
Office of Research and Engineering
Washington, D.C. 20594

Aircraft Performance

Wreckage Site Factual Report

A. ACCIDENT

Location:	Lexington, KY
Date:	August 27, 2006
Time:	1007 GMT (6:07 am EDST)
Airplane:	Bombardier CRJ-100, N431CA
NTSB Number:	DCA06MA064

B. GROUP

Chairman: Timothy Burtch
National Transportation Safety Board
Washington, DC

Member: Brandon Helm
CRJ Program Coordinator, Flight Operations
Comair Airlines

Member: Pierre Huggins
Staff Engineer, Air Safety Department
Air Line Pilots Association

C. SUMMARY

On August 27, 2006, about 0607 eastern daylight time, Comair Flight 5191, a Bombardier CL-600-2B19 (CRJ-100), N431CA, crashed during takeoff from Blue Grass Airport, Lexington, Kentucky (LEX). The airplane, which had been cleared for runway 22, taxied onto runway 26 instead and ran off the end of runway 26. Of the 47 passengers and 3 crewmembers on board the airplane, 49 were killed, and 1 received serious injuries. The airplane was destroyed by impact forces and postcrash fire. The flight was operating under the provisions of 14 *Code of Federal Regulations* Part 121 and was en route to Hartsfield-Jackson Atlanta International Airport, Atlanta, Georgia (ATL).

D. DETAILS OF FIELD INVESTIGATION

Wreckage

The NTSB team arrived at the accident site on Sunday morning. The team first surveyed the entire wreckage area. The Performance group then retraced and documented the accident flight track. The area of focus included the last 2000 ft of LEX runway 26 and stretched to the main wreckage located approximately 1900 ft off the west end of the runway.

Runway 26 is a 3501ft long / 150 ft wide runway with a gradient of -0.1%. However, the paint markings limit the runway width to 75 ft. Runway 26 is designated the "general aviation runway" at Lexington Blue Grass Airport and its lights have been deactivated. Lexington's instrument-equipped runway 22 is 7003 ft long / 150' wide and has high intensity approach lighting, as well as runway centerline lights. However, the centerline lights were out of service for the accident flight. Runway 22 was the intended departure runway for Comair Flight 5191. The Jeppesen Airport Diagram for LEX can be found in Attachment 1 and the NOS/NACO Diagram for the accident date can be found in Attachment 2.

There were no obvious marks or skids found on approximately the last 2000 ft of the accident runway 26. There were three gear marks immediately off the end of the runway, two main and a nose gear. See Figures 1 and 2. Approximately 200 ft off the end of the runway, the nose gear tire mark appeared to become lighter. At approximately 265 ft past the end of the runway, on the crest of a berm, the tire marks disappeared. See Figure 3.

Figure 1: Departure End of Runway 26 Looking Back Towards the East

Figure 2: Departure End of Runway 26 Looking East

Figure 3: Departure End of Runway 26 Looking West

GPS measurements taken by the Systems Group indicate that the crest of the berm is about thirteen feet higher than the end of runway 26. However, a profile view provided by the airport subsequent to the accident and shown in Figure 4 indicates that the crest is only four feet higher than the end of runway 26. While there are discrepancies for the terrain height between the runway end and the berm, both measurements indicate that the height of the berm relative to the immediate terrain is approximately four feet.

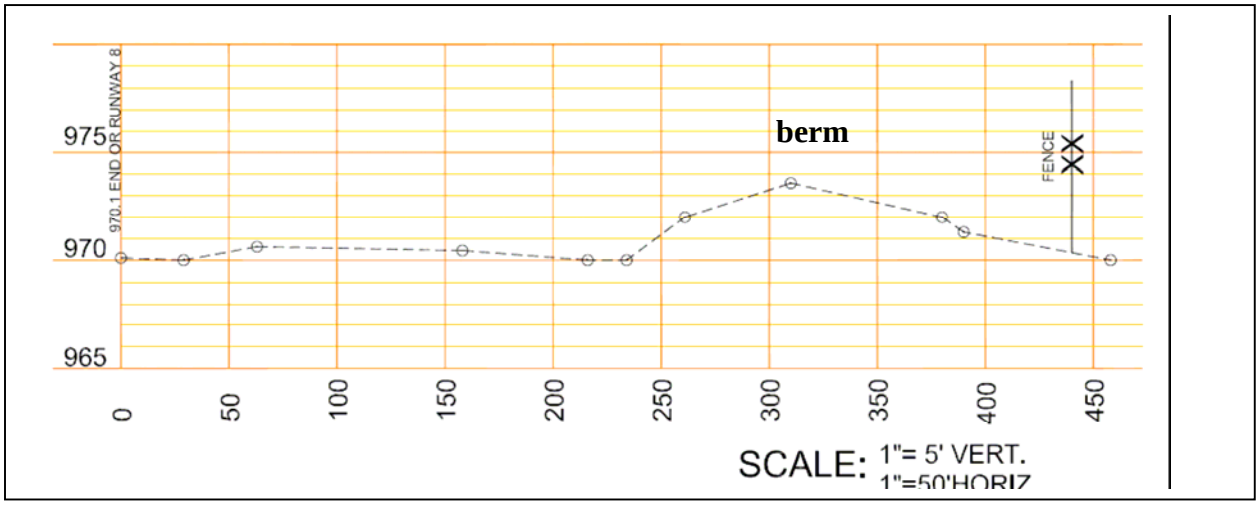


Figure 4: Profile View Off End of LEX Runway 26 (view looking south)

In addition to the tire marks found at the crest of the berm, two ground rubs that were canted inward were found outboard of the main gear tire marks. These appear to be consistent with the main landing gear door locations, one of which was found approximately 20 yd to the right and 7 yd forward (i.e., east of) the berm. (The second gear door was found approximately 132 yd off the end of runway 26, just beyond the airport perimeter fence.)

While there were a few smaller pieces of debris found just beyond the berm, no significant wreckage was observed until reaching the airport perimeter fence. The perimeter fence is located about 131 yards off the end of runway 26 and was the next point of impact for Comair Flight 5191. A 15 ft wide gate in the perimeter fence and in-line with the extended centerline of runway 26 was torn from its hinges. Black rubber was found on the top of the detached gate. See Figures 5 and 6.

Continuing west, between the airport perimeter fence and the first tree strike, a debris field containing various aircraft pieces, a fence post, a ground rub, and two tire marks was found. The only sizeable aircraft wreckage observed was what appeared to be a segment of the wing flap found approximately 354 ft beyond the perimeter fence and about 50 ft left of the extended runway centerline. (The wreckage had Shorts Drawing No. 60|R|4002-A.) The ground rub was approximately 49 yd beyond the perimeter fence while the two tire marks were beyond that at about 108 yd. Both the ground rub and tire marks were close to the extended runway centerline. In addition, the tire marks appeared to be that of a nose and main with approximately 6 ft separating the two. See Figure 7 for a diagram of the debris field. Attachment 3 contains a copy of the original field sketch.

Figure 5: Perimeter Fence Gate Post Impact Damage

Figure 6: Perimeter Fence Gate Top with Tire Rubber Marks

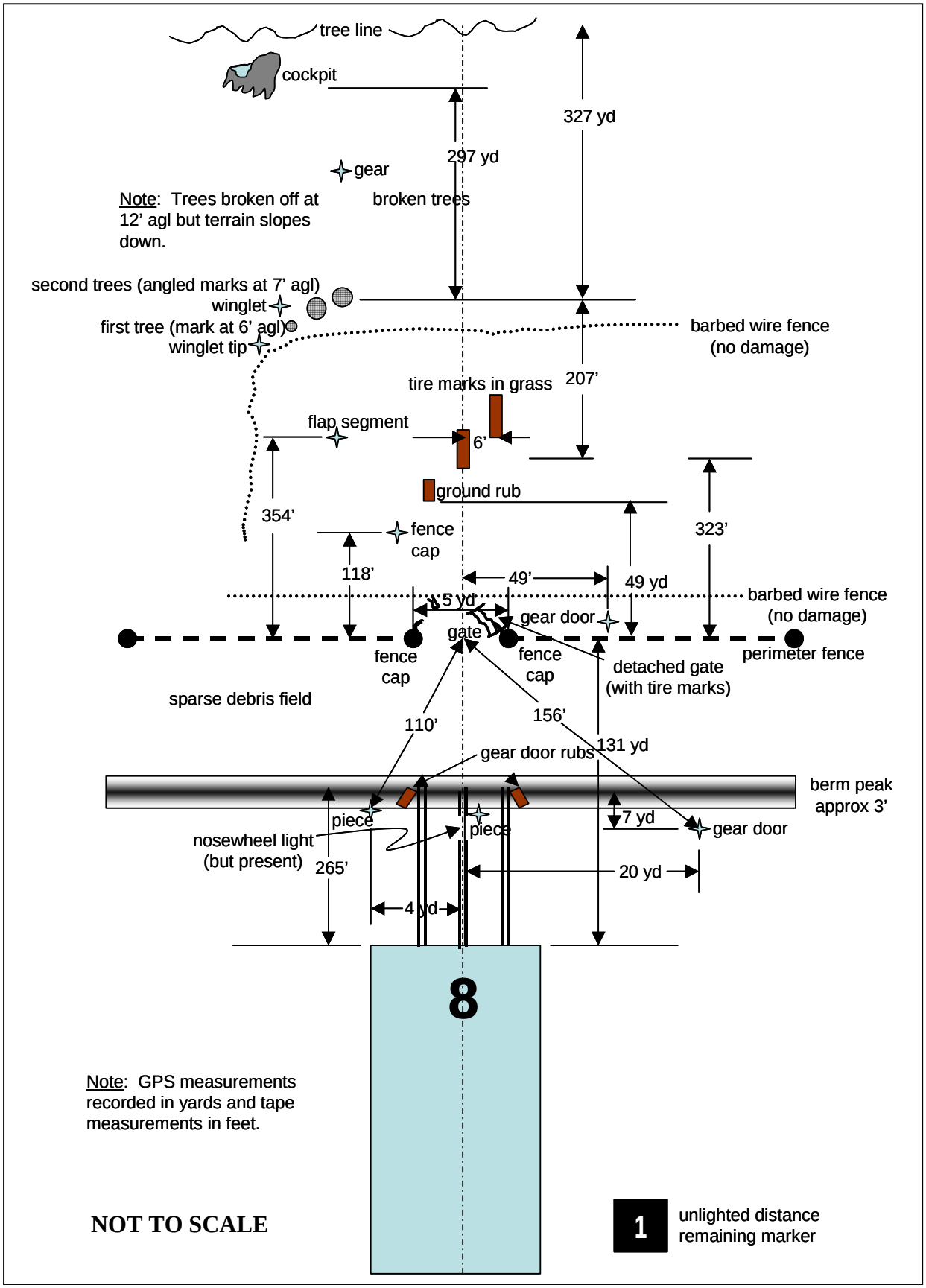


Figure 7: Sketch of Debris Field

Approximately 920 ft beyond the end of the departure runway is the first observed tree strike. The tree had blue paint markings as well as small pieces of wreckage impregnated in the bark. See Figure 8. The winglet tip was found just forward and to the left of this tree. The left winglet was found just beyond the tree. See Figure 9.

After the first tree strike, the next two trees were contacted consistent with a left-wing-down attitude (approximately 20°). A section of the outboard wing was found just beyond the two trees, and the smell of aircraft fuel became strong at this point. Post-fire evidence was observed just west of the two trees, consistent with a light spraying of jet fuel and the presence of an ignition source.

Figure 8: First Tree Strikes

Beyond the initial three tree strikes by about 40 ft and along the flight path was a series of trees that were sheared off at approximately the same level (about 6 ft agl with respect to the first tree) but at an increasing height above the terrain as the ground sloped down after the first tree. A portion of the gear was found beyond the sheared-off trees. The cockpit was found approximately 900 ft beyond the initial tree strike. The cabin was found in a westerly direction near the cockpit and was largely destroyed by the post-crash fire.

Figure 9: Left Winglet from First Tree Strike

In addition to the measurements taken by the team and recorded in Attachment 4, laser transit/total station data have been requested of the Jessup County Sheriff.

Aircraft Configuration (see Operations Factual for more details)

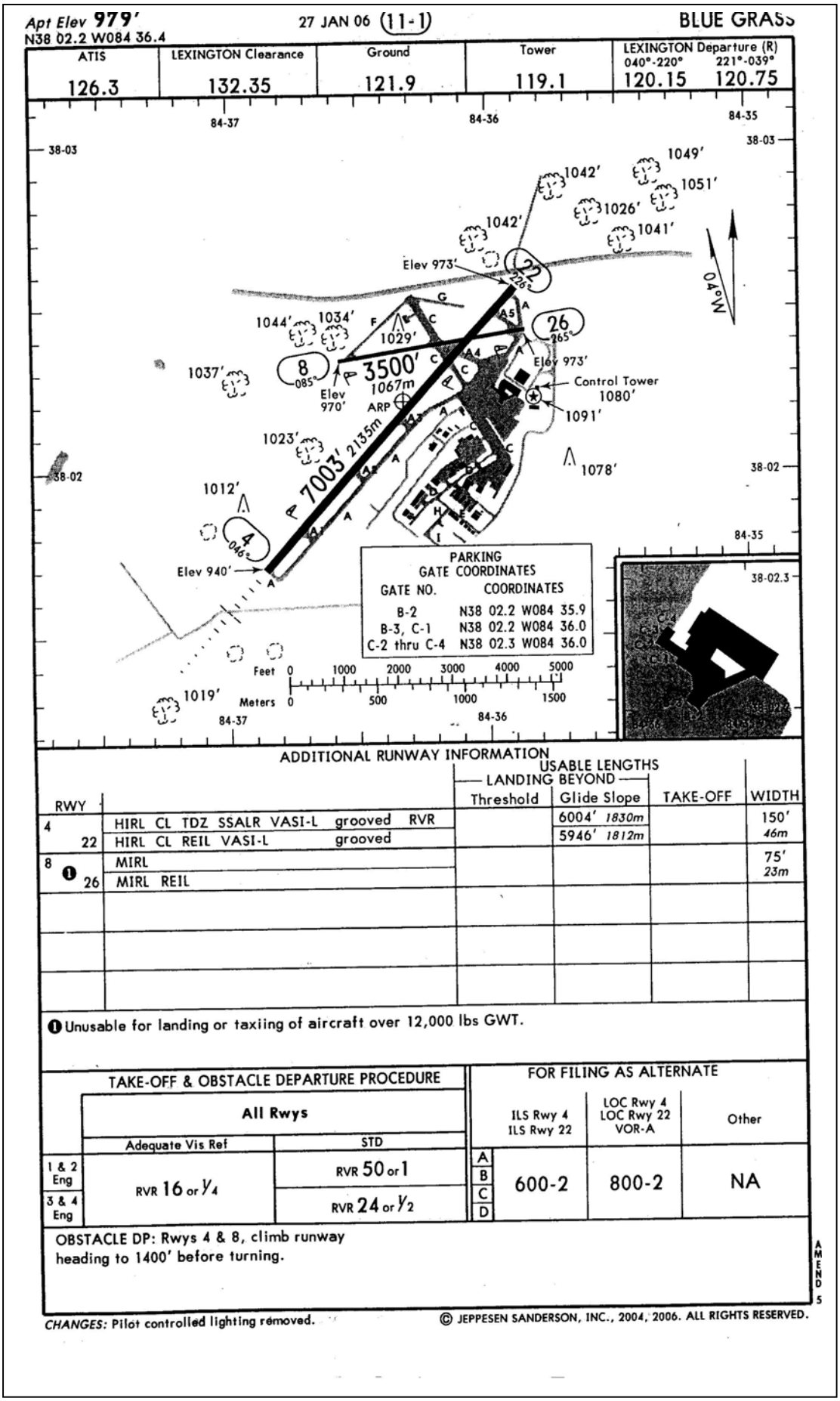
The aircraft Load Manifest showed an aircraft takeoff weight of 49,087 lb and a center of gravity of 12% mac. Of the 49,087 lb, 7300 lb was fuel, 8648 lb was passengers, and 1640 lb was bags. The Dispatch Release indicated a maximum structural weight of 53,000 lb, a maximum ramp weight of 53,250 lb, and a basic operating weight of 31,499 lb.

The aircraft was configured with 20˚ flaps, the bleeds were closed on the GE CF34-3A1 engines, and the auxiliary power reserve was armed. The thrust setting designated for the takeoff was 90% N1. (Normal take-off power setting for the conditions is 89 to 91% N1.)

Weather (see Meteorogical Factual for more details)

Weather reported at the time of the takeoff was information Bravo: Wind 220˚/7 kts, visibility 8 statute miles, a few clouds at 9,000, scattered clouds at 12,000, temperature 24˚C, dew point 19˚C, altimeter setting 30.00 in Hg, active runway 22. Field elevation was 979’. Sunrise was at 7:03 am EDST.

Timothy Burtch
Senior Aerospace Engineer



ADDITIONAL RUNWAY INFORMATION

RWY		USABLE LENGTHS — LANDING BEYOND — Threshold	Glide Slope	TAKE-OFF	WIDTH
4	HIRL CL TDZ SSALR VASI-L grooved RVR		6004' *1830m*		150' *46m*
22	HIRL CL REIL VASI-L grooved		5946' *1812m*		
8 ❶	MIRL				75' *23m*
26	MIRL REIL				

❶ Unusable for landing or taxiing of aircraft over 12,000 lbs GWT.

TAKE-OFF & OBSTACLE DEPARTURE PROCEDURE

All Rwys

	Adequate Vis Ref	STD
1 & 2 Eng	RVR 16 or ¼	RVR 50 or 1
3 & 4 Eng		RVR 24 or ½

FOR FILING AS ALTERNATE

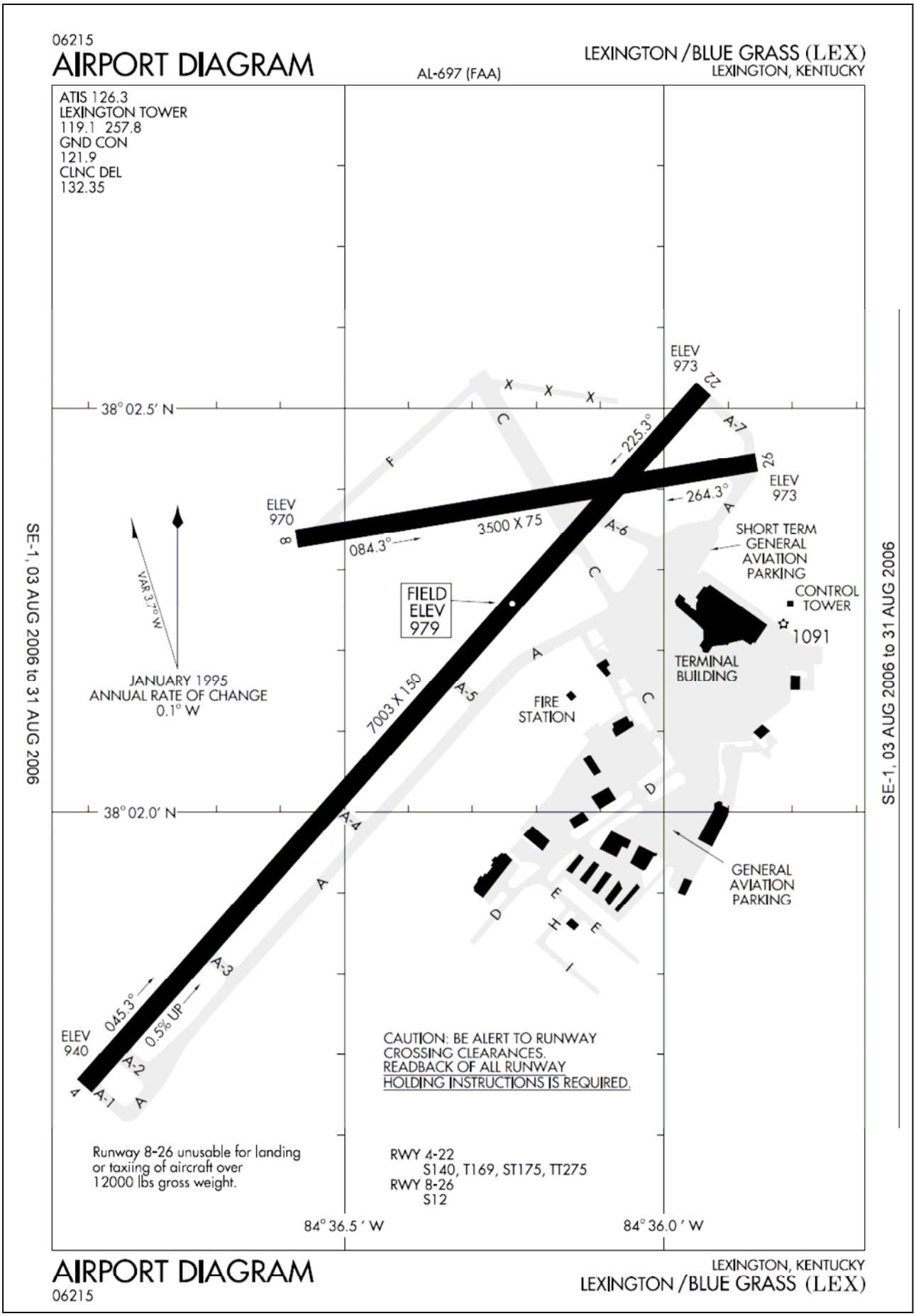
	ILS Rwy 4 ILS Rwy 22	LOC Rwy 4 LOC Rwy 22 VOR-A	Other
A B C D	600-2	800-2	NA

OBSTACLE DP: Rwys 4 & 8, climb runway heading to 1400' before turning.

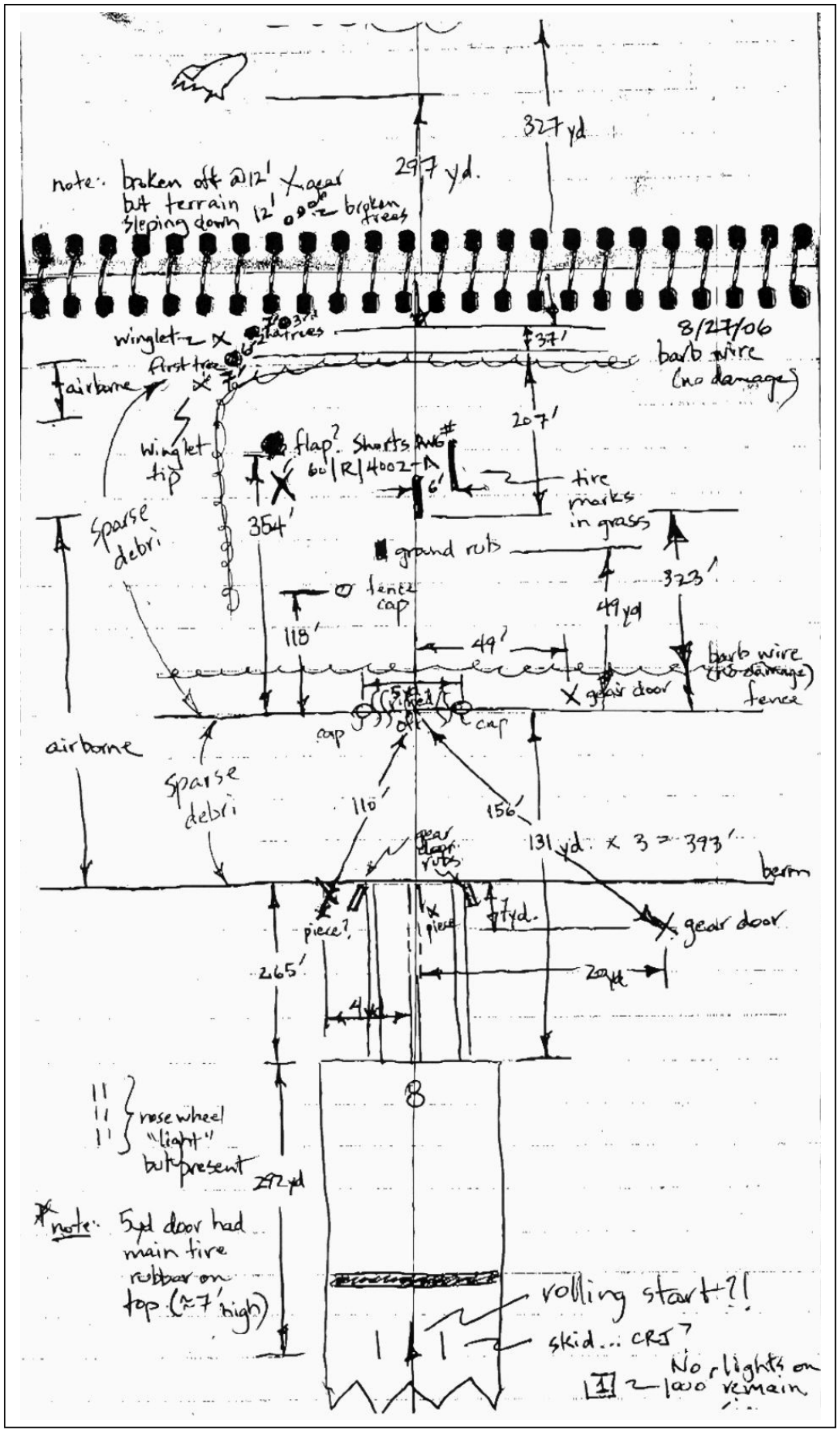
AMEND 5

CHANGES: Pilot controlled lighting removed.

Attachment 1: Jepp View Airport Diagram for LEX



Attachment 2: NOS/NACO Airport Diagram for LEX

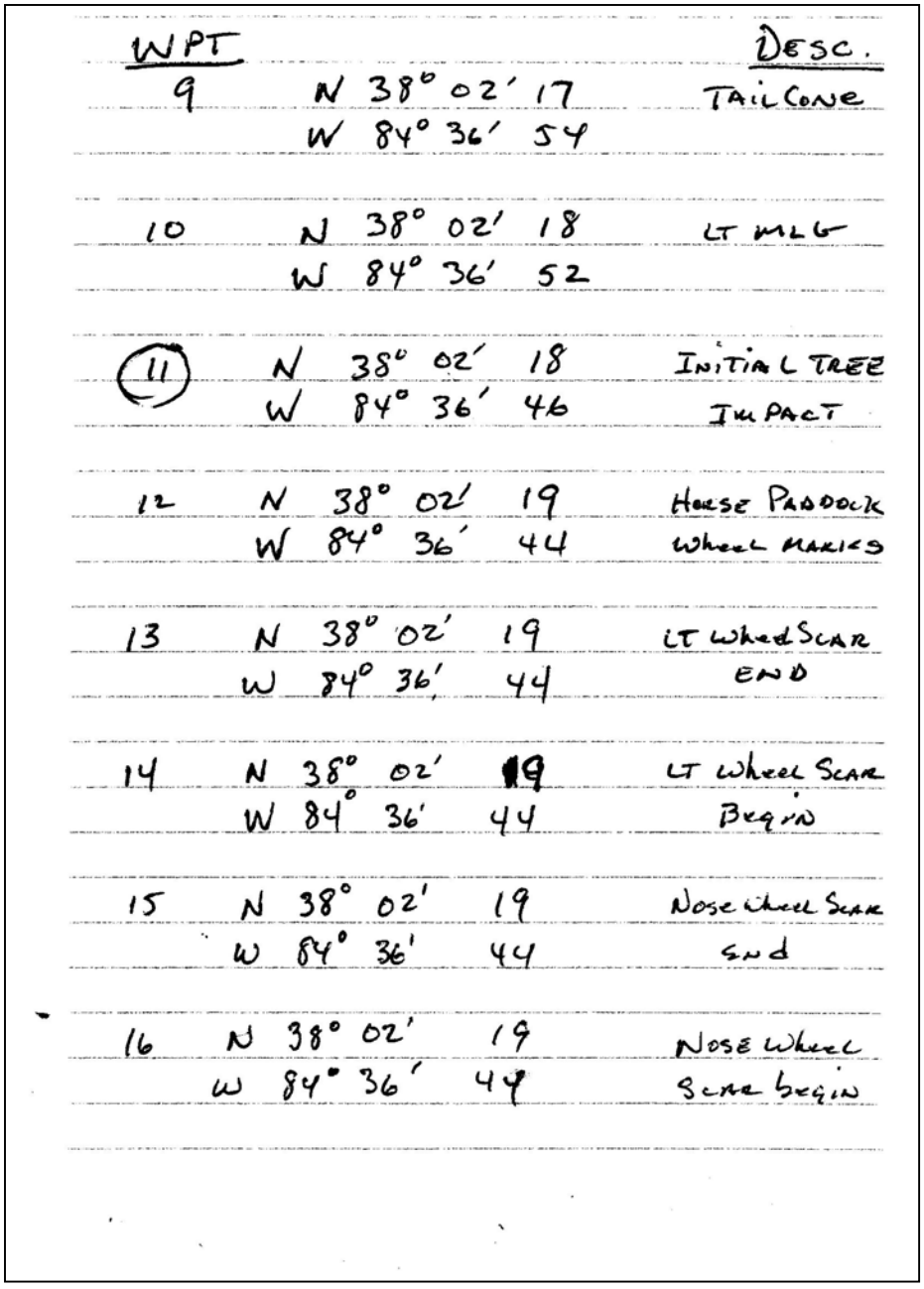


Attachment 3: Original Debris Field Sketch

9/7/06 tjb

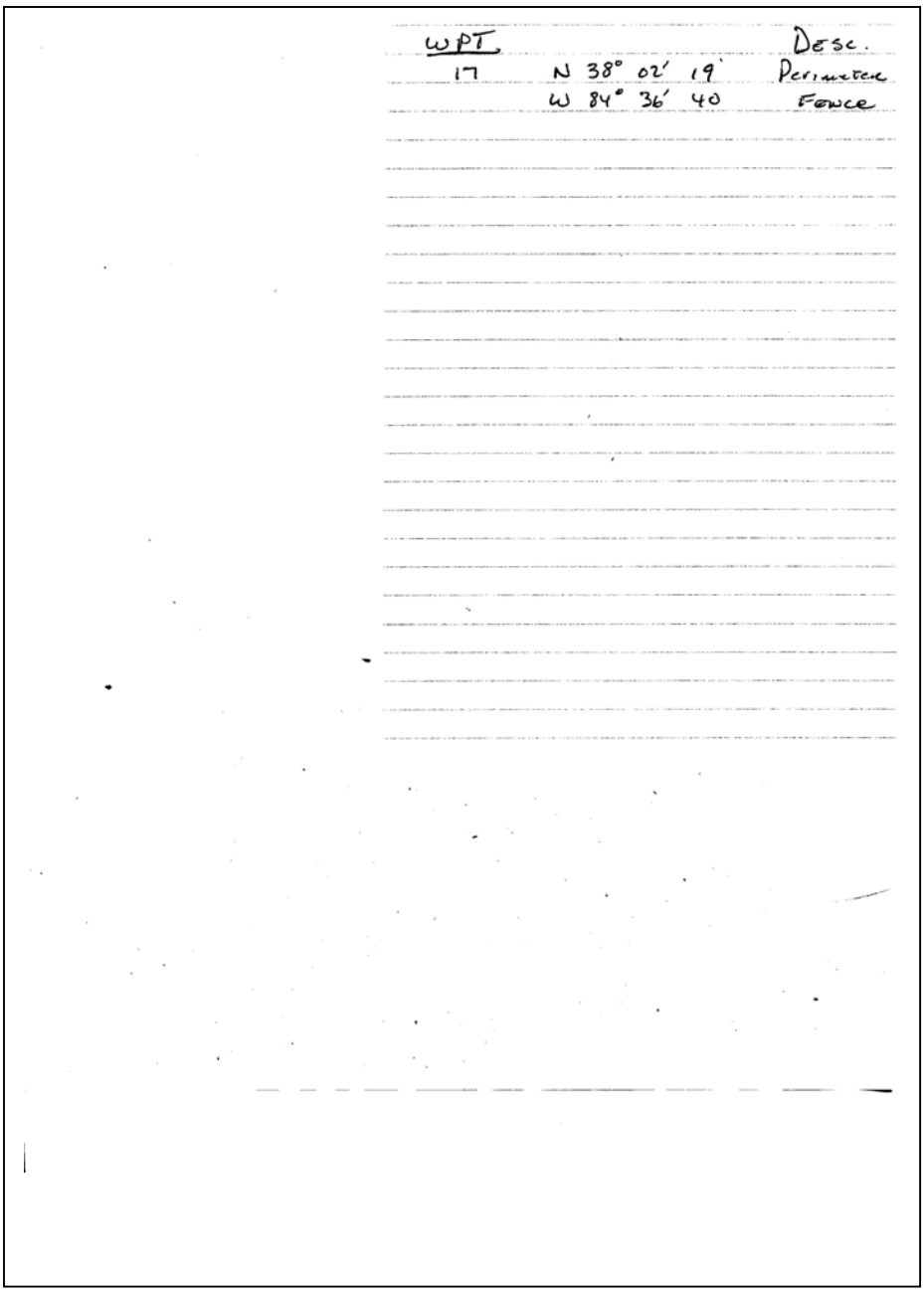
WPT		DESC.
1	N 38° 02′ 16 W 84° 36′ 57	MAIN WRECKAGE
2	N 38° 02′ 17 W 84° 36′ 57	CENTER WING BOX
3	N 38° 02′ 17 W 84° 36′ 57	RT WING MID-SECTION
4	N 38° 02′ 17 W 84° 36′ 56	EMP.
5	N 38° 02′ 16 W 84° 36′ 56	NLG
6	N 38° 02′ 16 W 84° 36′ 56	RMLG
7	N 38° 02′ 16 W 84° 36′ 55	RT WING TIP
8	N 38° 02′ 16 W 84° 36′ 54	RT INBD FLAP

Attachment 4a: GPS Field Measurements



WPT		DESC.
9	N 38° 02′ 17 W 84° 36′ 54	TAIL CONE
10	N 38° 02′ 18 W 84° 36′ 52	LT MLG
11	N 38° 02′ 18 W 84° 36′ 46	INITIAL TREE IMPACT
12	N 38° 02′ 19 W 84° 36′ 44	HORSE PADDOCK WHEEL MARKS
13	N 38° 02′ 19 W 84° 36′ 44	LT WHEEL SCAR END
14	N 38° 02′ 19 W 84° 36′ 44	LT WHEEL SCAR BEGIN
15	N 38° 02′ 19 W 84° 36′ 44	NOSE WHEEL SCAR END
16	N 38° 02′ 19 W 84° 36′ 44	NOSE WHEEL SCAR BEGIN

Attachment 4b: GPS Field Measurements



Attachment 4c: GPS Field Measurements