Airborne Lidar Report

East Tennessee FY16 Lidar

Contract Number: G16PC00022
Task Number: G16PDO0425

Contractor: Woolpert, Inc.
Woolpert Project # 76269

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Section 1: Overview

TASK ORDER NAME: East Tennessee FY16 Lidar

Project: # 76269

This report contains a comprehensive outline of the East Tennessee FY16 Lidar. Processing task order for the United States Geological Survey (USGS). This task is issued under USGS Contract No. G16PC00022, Task Order No. G16PDO0425. This task order requires lidar data to be acquired over 7,863 square miles in eastern Tennessee including Davidson, Macon, Monroe, Loudon, Blount, Sevier, Knox, Union, Jefferson, Cocke, Grainger, Hamblen, Greene, Hawkins, Sullivan, Washington, Carter, and Unicoi counties collected at a nominal pulse spacing (NPS) of 0.7 meters. The NPS assessment is made against single swath, first return data located within the geometrically usable center portion (typically ~90%) of each swath.

The data was collected using:

- Two Leica ALS80 HP 1000 kHz Multiple Pulses in Air (MPiA) lidar systems on board Woolpert aircraft. The ALS80 sensor collects up to four returns per pulse, as well as intensity data, for the first three returns. If a fourth return was captured, the system does not record an associated intensity value. The aerial lidar was collected at the following sensor specifications:

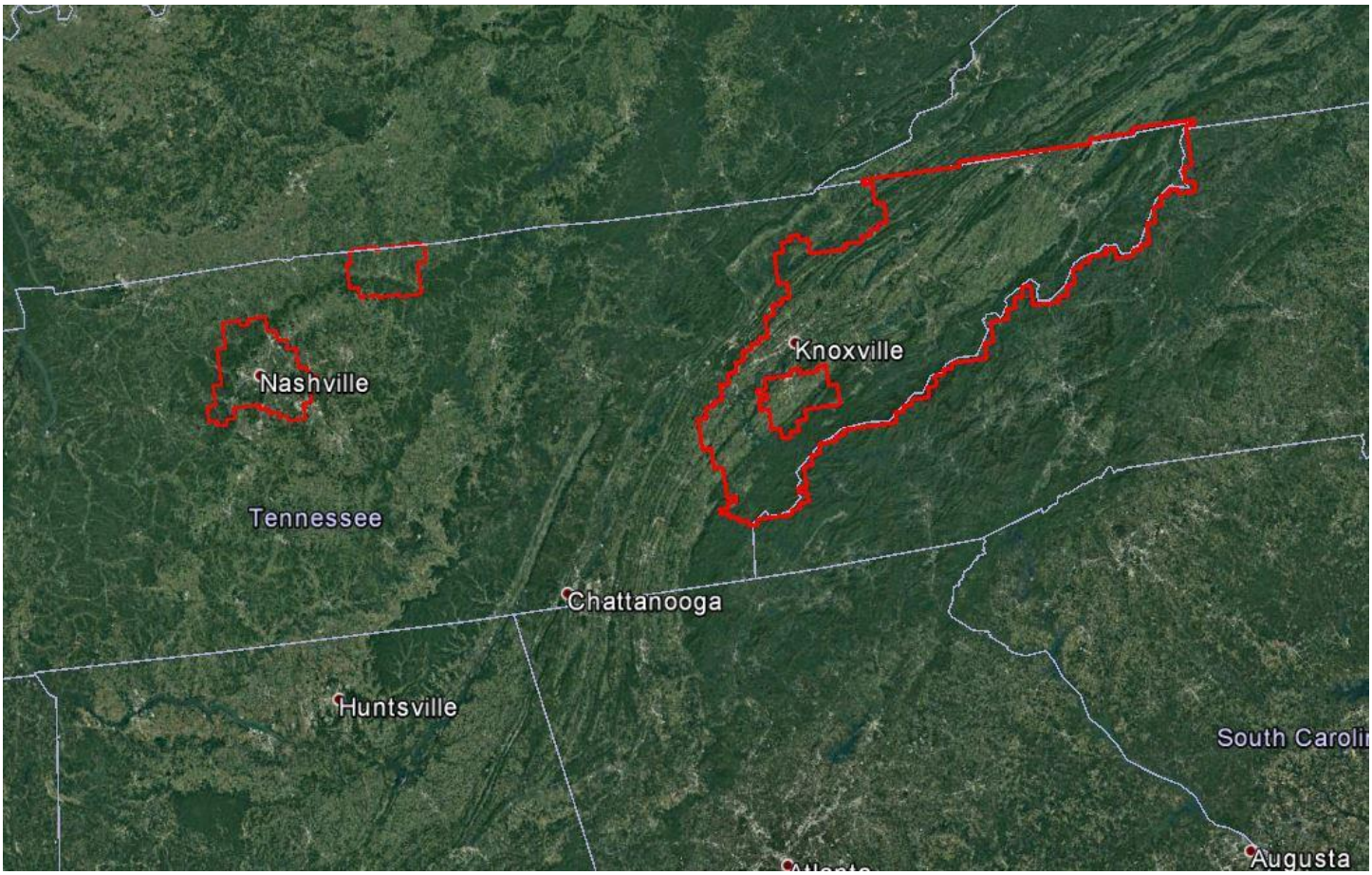
Table 1.1: ALS80 Specifications	
Post Spacing	0.70 m
AGL (Above Ground Level) average flying height	1,981 m
Average Ground Speed:	150 knots
Field of View (full)	40 degrees
Pulse Rate	272 kHz
Scan Rate	50 Hz
Side Lap	25%

- One Leica ALS70 500 kHz Multiple Pulses in Air (MPiA) lidar sensor owned and operated by **PAR**. The sensor was mounted in PAR Spatial aircraft. The aerial lidar was collected at the following sensor specifications:

Table 1.2: ALS70 Specifications PAR	
Post Spacing	0.7 m
AGL (Above Ground Level) average flying height	1,900m
Average Ground Speed:	115 knots
Field of View (full)	40 degrees
Pulse Rate	136 kHz
Scan Rate	46 Hz
Side Lap	25%

The LiDAR data was produced in Tennessee State Plane (FIPS Zone 4100), NAD83 (2011) U.S. Survey Feet.

Figure 1.1: East Tennessee FY16 Lidar Task Order AOI



Section 2: Acquisition

The lidar data was acquired with three Leica ALS80HP 1000 kHz Multiple Pulses in Air (MPiA) Lidar Sensor Systems. The ALS80 HP lidar system, developed by Leica Geosystems of Heerbrugg, Switzerland, includes the simultaneous first, intermediate and last pulse data capture module, the extended altitude range module, and the target signal intensity capture module.

The ALS80HP 1000 kHz Multiple Pulses in Air (MPiA) Lidar System has the following specifications:

Table 2.1: ALS80 HP Lidar System Specifications	
Operating Altitude	100 – 7,620 meters
Scan Angle	0 to 72° (variable)
Swath Width	0 to 1.5 X altitude (variable)
Scan Frequency	0 – 200 Hz (variable based on scan angle)
Maximum Pulse Rate	1000 kHz (Effective)
Range Resolution	Better than 1 cm
Elevation Accuracy	6 - 19 cm single shot (one standard deviation)
Horizontal Accuracy	5 – 43 cm (one standard deviation)
Number of Returns per Pulse	Unlimited
Number of Intensities	3 (first, second, third)
Intensity Digitization	8 bit intensity + 8 bit AGC (Automatic Gain Control) level
MPiA (Multiple Pulses in Air)	8 bits @ 1nsec interval @ 50kHz
Laser Beam Divergence	0.22 mrad @ $1/e^2$ (~0.15 mrad @ 1/e)
Laser Classification	Class IV laser product (FDA CFR 21)
Eye Safe Range	400m single shot depending on laser repetition rate
Roll Stabilization	Automatic adaptive, range = 75 degrees minus current FOV
Power Requirements	28 VDC @ 25A
Operating Temperature	0-40°C
Humidity	0-95% non-condensing
Supported GNSS Receivers	Ashtech Z12, Trimble 7400, Novatel Millenium

The lidar data was acquired with a Leica ALS70 500 kHz Multiple Pulses in Air (MPiA) Lidar Sensor System. The ALS70 lidar system, developed by Leica Geosystems of Heerbrugg, Switzerland, includes the simultaneous first, intermediate and last pulse data capture module, the extended altitude range module, and the target signal intensity capture module.

The ALS70 500 kHz Multiple Pulses in Air (MPiA) Lidar System has the following specifications:

Table 2.2: ALS70 Lidar System Specifications	
Operating Altitude	200 – 3,500 meters
Scan Angle	0 to 75° (variable)
Swath Width	0 to 1.5 X altitude (variable)
Scan Frequency	0 – 200 Hz (variable based on scan angle)
Maximum Pulse Rate	500 kHz (Effective)
Range Resolution	Better than 1 cm
Elevation Accuracy	7 - 16 cm single shot (one standard deviation)
Horizontal Accuracy	5 – 38 cm (one standard deviation)
Number of Returns per Pulse	7 (infinite)
Number of Intensities	3 (first, second, third)
Intensity Digitization	8 bit intensity + 8 bit AGC (Automatic Gain Control) level
MPiA (Multiple Pulses in Air)	8 bits @ 1nsec interval @ 50kHz
Laser Beam Divergence	0.22 mrad @ $1/e^2$ (~0.15 mrad @ 1/e)
Laser Classification	Class IV laser product (FDA CFR 21)
Eye Safe Range	400m single shot depending on laser repetition rate
Roll Stabilization	Automatic adaptive, range = 75 degrees minus current FOV
Power Requirements	28 VDC @ 25A
Operating Temperature	0-40°C
Humidity	0-95% non-condensing
Supported GNSS Receivers	Ashtech Z12, Trimble 7400, Novatel Millenium

Prior to mobilizing to the project site, flight crews coordinated with the necessary Air Traffic Control personnel to ensure airspace access.

Crews were onsite, operating a Global Navigation Satellite System (GNSS) Base Station for the airborne GPS support.

The LiDAR data was collected in Sixty (60) missions, flown as close together as the weather permitted, to ensure consistent ground conditions across the project area. An initial quality control process was performed immediately on the LiDAR data to review the data coverage, airborne GPS data, and trajectory solution.

Figure 2.1: LiDAR Flight Layout, East Tennessee 2016 Lidar

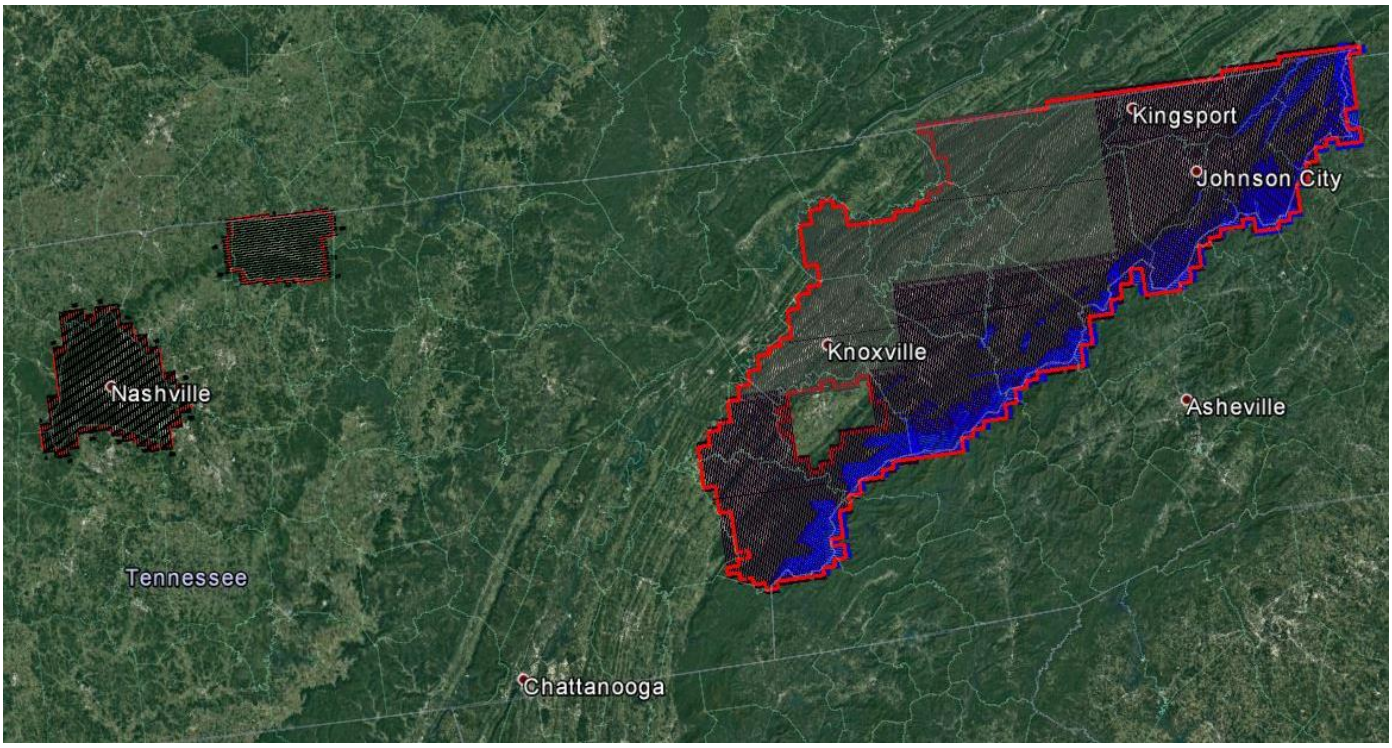


Table 2.3: Airborne Lidar Acquisition Flight Summary

Date of Mission	Lines Flown	Mission Time (UTC) Wheels Up/ Wheels Down
February 5, 2016_PAR_A	**1-17**	**22:26 – 2:18**
February 5, 2016_SH8194_A	**61-76**	**14:40 – 19:30**
February 5, 2016_SH8194_B	**53-60**	**21:10 – 00:10**
February 6, 2016_PAR_B	**18-27**	**3:28 – 5:28**
February 6, 2016_PAR_A	**1-19**	**16:41 – 20:18**
February 6, 2016_PAR_B	**20-21**	**21:.38 – 1:32**
February 6, 2016_SH8194_A	**39-52**	**13:48 – 18:35**

February 6, 2016_SH8194_B	**35-38, 53-65**	**20:10 – 23:22**
February 7, 2016_PAR_A	**35-43**	**14:27 – 16:51**
February 7, 2016_PAR_B	**44-59**	**18:05 – 20:51**
February 7, 2016_SH8194_A	**1-35, 77**	**13:49 – 18:37**
February 7, 2016_SH8194_B	**1-8**	**19:57 – 2:48**
February 27, 2016_SH8194	**66-85**	**20:31 – 23:22**
February 28, 2016_SH8194_A	**9-18**	**15:04 – 17:48**
February 28, 2016_SH8194_B	**19-25, 27**	**19:25 – 22:39**
February 28, 2016_SH8194_C	**19-25, 27**	**19:25 – 22:39**
February 29, 2016_SH8194	**26-38**	**19:41 – 23:49**
March 6, 2016_SH8170	**1-35**	**15:08 – 22:28**
March 7, 2016_SH8170	**36-61**	**15:29 – 22:53**
March 8, 2016_SH8170	**62-65, 90-109**	**15:40 – 20:20**
March 8, 2016_SH8194	**86-100**	**19:41 – 22:34**
March 9, 2016_SH8194_A	**51, 52, 101, 107-122**	**15:28 – 18:24**
March 9, 2016_SH8194_B	**123-134**	**22:28 – 23:41**
March 15, 2016_SH8194	**24, 39-50**	**18:31 – 22:20**
March 17, 2016_PAR	**1, 2, 100-107**	**21:16 – 0:38**
March 17, 2016_SH8194_A	**102-106, 135-159**	**13:19 – 17:31**
March 17, 2016_SH8194_B	**1, 2, 160**	**19:44 – 20:20**
March 18, 2016_PAR_A	**89-99**	**11:10 – 14:53**
March 18, 2016_PAR_B	**78-88**	**17:17 – 20:56**
March 18, 2016_PAR_C	**66-77**	**22:11 – 2:13**
March 18, 2016_SH8194	**2-10, 160-178**	**13:40 – 18:41**
March 21, 2016_PAR	**52-63**	**23:09 – 2:55**
March 22, 2016_PAR_A	**41-51**	**12:21 – 15:59**
March 22, 2016_PAR_B	**31-40**	**17:02 – 20:42**
March 22, 2016_PAR_C	**22-30**	**22:10 – 1:50**
March 22, 2016_SH8216	**11-33**	**13:27 – 19:02**
March 23, 2016_PAR_A	**13-21**	**15:20 – 18:59**
March 23, 2016_PAR_B	**4-12, 64**	**20:36 – 0:25**
March 24, 2016_PAR	**65-86**	**12:33 – 16:02**
March 26, 2016_PAR	**1-3, 87-93, 102**	**13:28 – 16:25**
March 26, 2016_SH8170	**81-89**	**13:59 – 18:45**
March 26, 2016_SH8194_A	**34-39, 41, 110-116, 136**	**13:40 – 17:03**

March 26, 2016_SH8194_B	**34-39, 41, 110-116, 136**	**13:40 – 17:03**
March 28, 2016_PAR	**92-108**	**21:35 – 1:00**
March 28, 2016_SH8170	**60-65**	**22:06 – 1:07**
March 28, 2016_SH8194	**40-52**	**22:01 – 0:40**
March 29, 2016_PAR	**117-144, 156-160**	**17:53 - 21:55**
March 29, 2016_SH8170_A	**145-155, 198-226**	**14:03 – 18:53**
March 29, 2016_SH8170_B	**161-165**	**22:36 – 23:52**
March 29, 2016_SH8194	**36-39, 136-139, 166-192**	**13:00 – 18:35**
March 30, 2016_PAR_A	**1-10**	**0:47 – 3:43**
March 30, 2016_PAR_B	**11-19, 158-164**	**13:03 – 16:44**
March 30, 2016_PAR_C	**20-28**	**18:13 – 20:56**
March 30, 2016_PAR_D	**28-39**	**22:06 – 1:31**
March 30, 2016_SH8170	**40-67**	**13:39 – 18:41**
March 30, 2016_SH8194	**68-91**	**14:00 – 17:16**
April 3, 2016_PAR_A	**92-107**	**14:36 – 17:00**
April 3, 2016_PAR_B	**107-133, 150-152**	**17:59 – 22:03**
April 3, 2016_PAR_C	**134-149, 153-157**	**23:29 – 3:05**
April 4, 2016_PAR	**34**	**13:55 – 14:15**

Section 3: LiDAR Data Processing

Applications and Work Flow Overview

1. Resolved kinematic corrections for three subsystems: inertial measurement unit (IMU), sensor orientation information and airborne GPS data. Developed a blending post-processed aircraft position with attitude data using Kalman filtering technology or the smoothed best estimate trajectory (SBET).
Software: POSPac Software v. 5.3, IPAS Pro v.1.35., Novatel Inertial Explorer v8.60.6129
2.Calculated laser point position by associating the SBET position to each laser point return time, scan angle, intensity, etc. Created raw laser point cloud data for the entire survey in LAS format. Automated line-to-line calibrations were then performed for system attitude parameters (pitch, roll, heading), mirror flex (scale) and GPS/IMU drift.
Software: ALS Post Processing Software v.2.75 build #25, Proprietary Software, TerraMatch v. 16.01., Add Leica Cloud Pro v1.2.3
3.Imported processed LAS point cloud data into the task order tiles. Resulting data were classified as ground and non-ground points with additional filters created to meet the task order classification specifications. Statistical absolute accuracy was assessed via direct comparisons of ground classified points to ground RTK survey data. Based on the statistical analysis, the lidar data was then adjusted to reduce the vertical bias when compared to the survey ground control.
Software: TerraScan v.16.01.
4.The LAS files were evaluated through a series of manual QA/QC steps to eliminate remaining artifacts from the ground class.
Software: TerraScan v.16.01.

Global Navigation Satellite System (GNSS)–Inertial Measurement Unit (IMU) Trajectory Processing

Equipment

The pilots are skilled at maintaining their planned trajectory, while holding the aircraft steady and level. If atmospheric conditions are such that the trajectory, ground speed, roll, pitch and/or heading cannot be properly maintained, the mission is aborted until suitable conditions occur.

Base stations were set by acquisition staff and were used to support the LiDAR data acquisition. The GNSS base station operated during the Lidar acquisition missions is listed below:

Table 3.1: GNSS Base Station

Station (Name)	Latitude (DMS)	Longitude (DMS)	Ellipsoid Height (L1 Phase center) (Meters)
1G0_Arpt_Base	41°23'09.68786"	83°38'06.40796"	169.423m
NGS PID GC2742	36°31'03.54535"	86°03'27.77264"	262.957
KTYS Airport	35°48'34.52212"	83°59'19.26185"	258.627
KJWN Airport	36°10'42.68818"	86°52'55.84832"	114.22
TN12 CORS	36°14'52.93790"	83°17'11.07230"	337.218
TND5 CORS	36°01'15.94482"	83°18'13.58232"	294.815
TN13 CORS	35°56'37.03156"	83°12'26.41623"	360.579
KTYS Airport 2	35°48'34.52360"	83°59'19.26559"	258.769

KMOR Airport	36°10'46.87283"	83°22'37.02838"	361.35
KTRI Airport - PAR	36°29'02.36887"	82°24'14.31288"	431.734
KMOR Airport - Wlpt	36°10'46.87275"	83°22'37.02849"	361.314
KMOR Airport - PAR	36°10'47.01548"	83°22'36.73402"	361.346
TND6 CORS	36°01'15,73100"	83°18'12.54049"	294.917

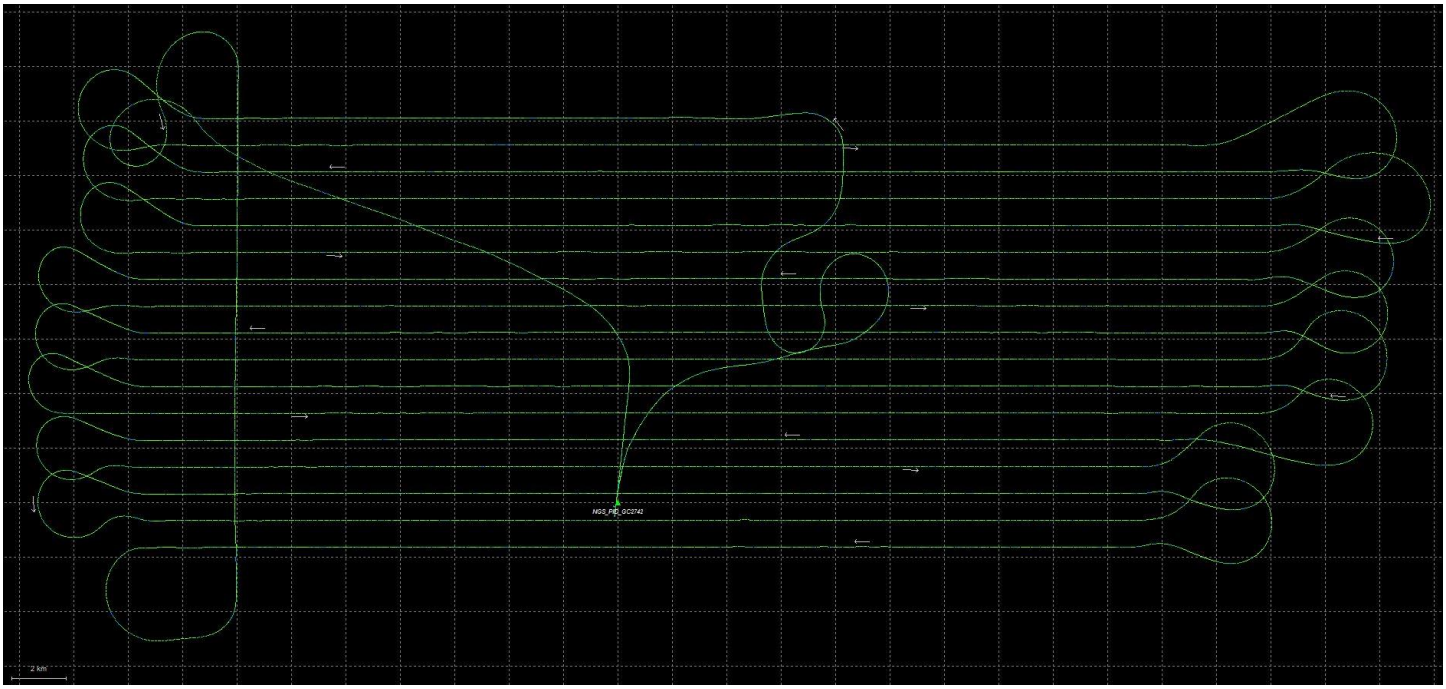
Data Processing

All airborne GNSS and IMU data was post-processed and quality controlled using Applanix MMS software. GNSS data was processed at a 1 and 2 Hz data capture rate and the IMU data was processed at 200 Hz.

Trajectory Quality

The GNSS Trajectory, along with high quality IMU data are key factors in determining the overall positional accuracy of the final sensor data. Within the trajectory processing, there are many factors that affect the overall quality, but the most indicative are the combined separation, the estimated positional accuracy, and the Positional Dilution of Precision (PDOP).

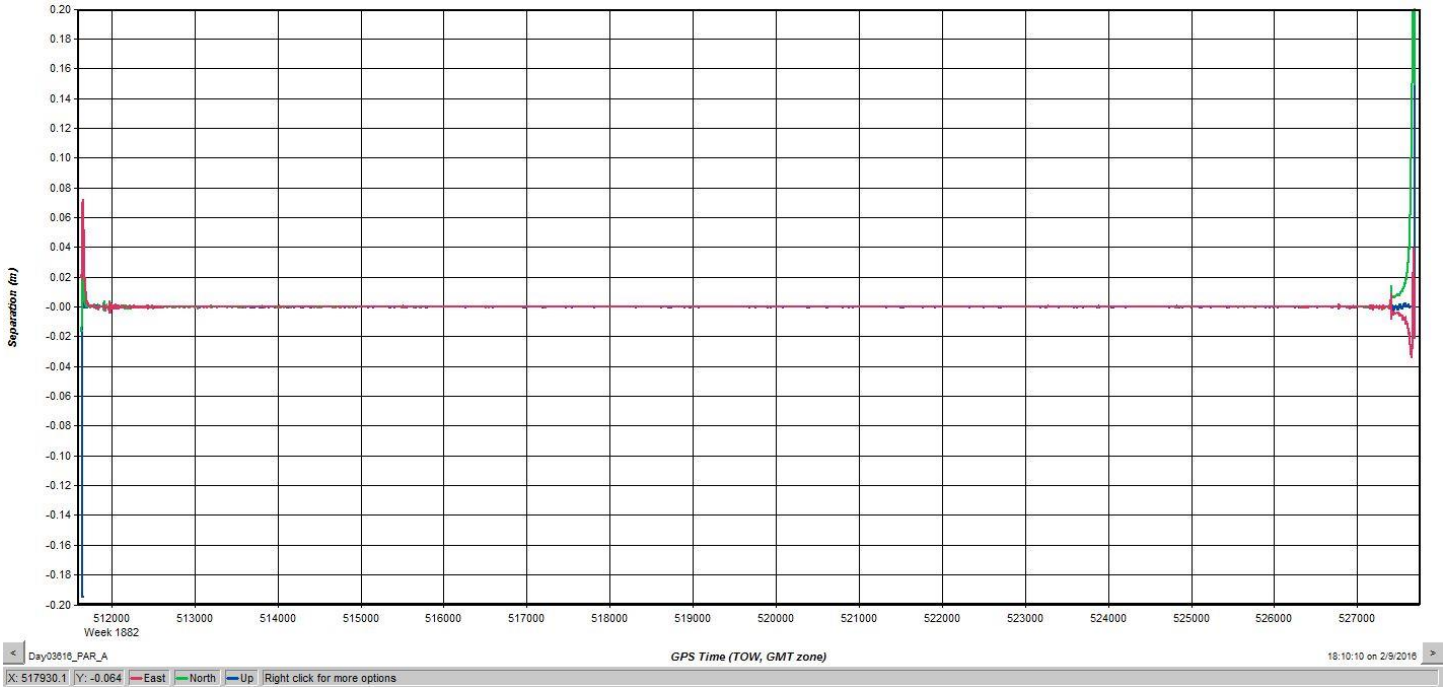
Figure 3.1: Trajectory, Day03616_PAR_A



Combination Separation

The Combined Separation is a measure of the difference between the forward run and the backward run solution of the trajectory. The Kalman filter is processed in both directions to remove the combined directional anomalies. In general, when these two solutions match closely, an optimally accurate reliable solution is achieved.
Woolpert's goal is to maintain a Combined Separation Difference of less than ten (10) centimeters. In most cases we achieve results below this threshold.

Figure 3.2: Combined Separation, Day03616_PAR_A

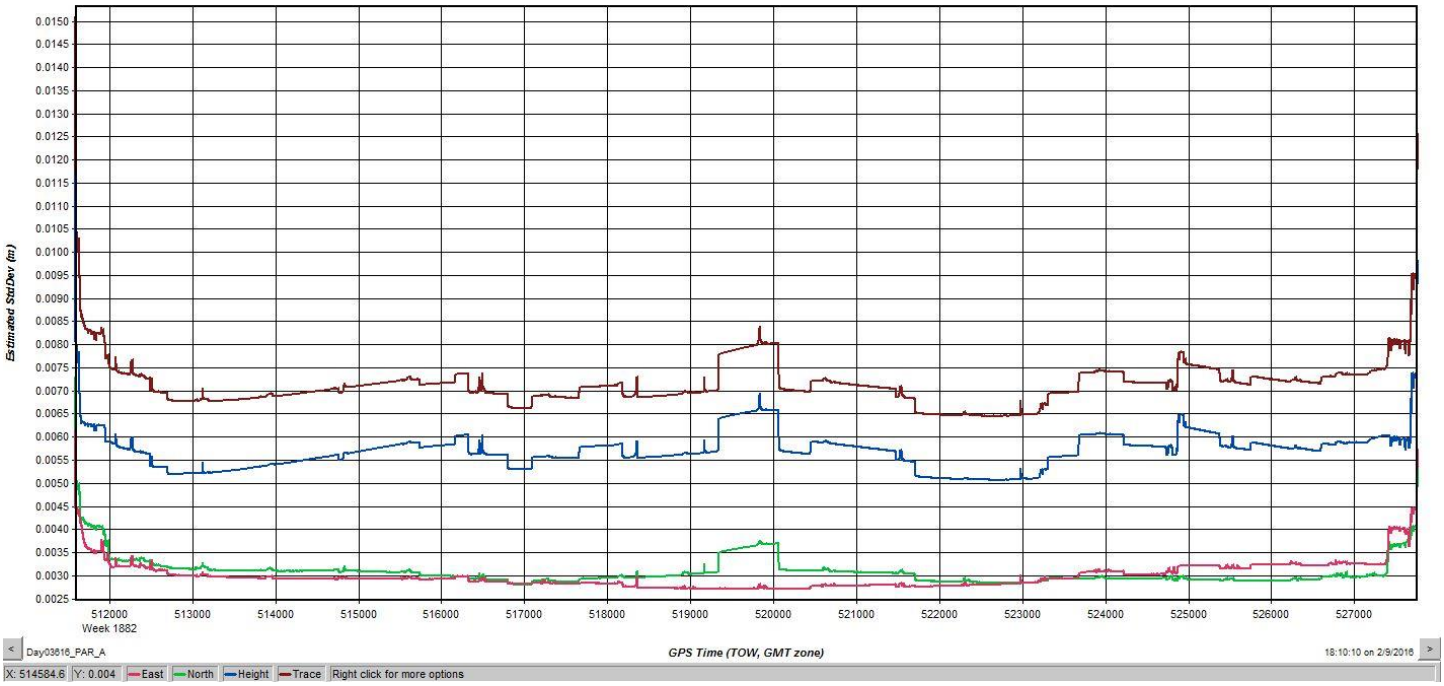


Estimated Positional Accuracy

The Estimated Positional Accuracy plots the standard deviations of the east, north, and vertical directions along a time scale of the trajectory. It illustrates loss of satellite lock issues, as well as issues arising from long baselines, noise, and/or other atmospheric interference.

Woolpert's goal is to maintain an Estimated Positional Accuracy of less than ten (10) centimeters, often achieving results well below this threshold.

Figure 3.3: Estimated Positional Accuracy, Day03616_PAR_A

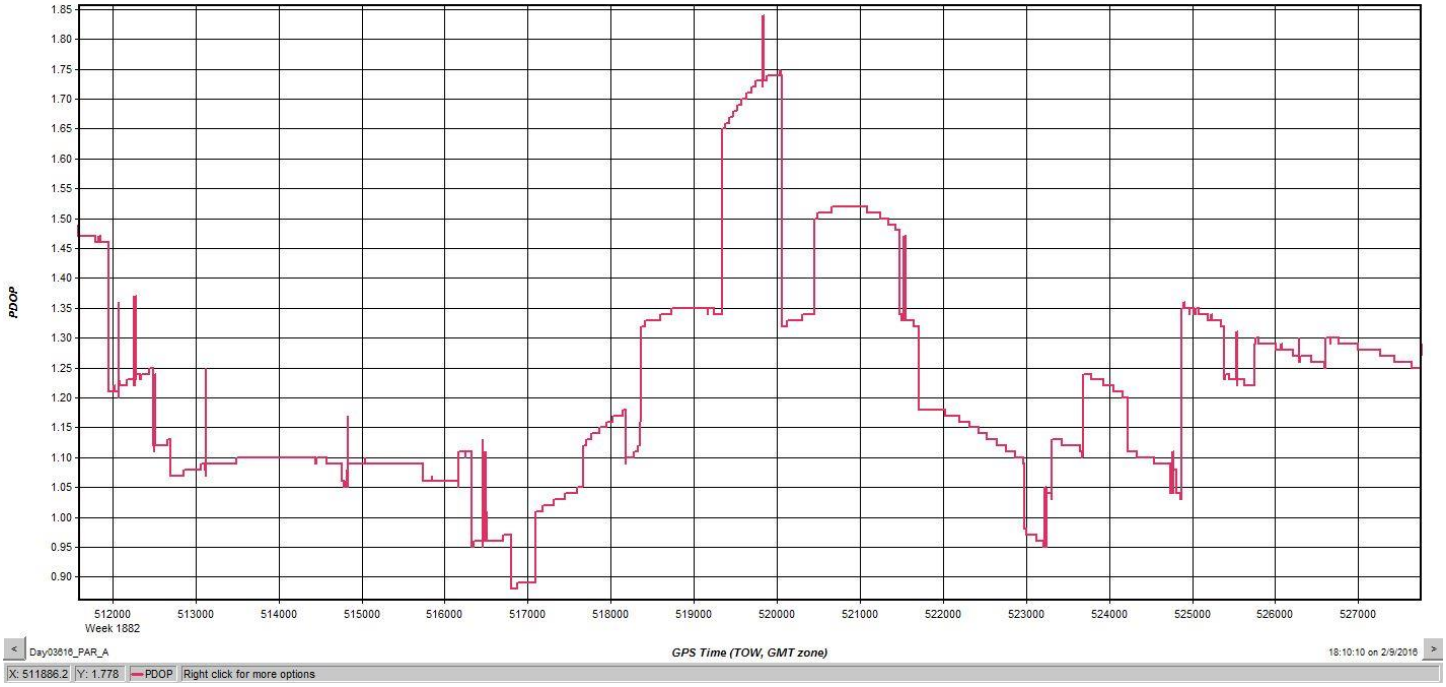


PDOP

The PDOP measures the precision of the GPS solution in regards to the geometry of the satellites acquired and used for the solution.

Woolpert's goal is to maintain an average PDOP value below 3.0. Brief periods of PDOP over 3.0 are acceptable due to the calibration and control process if other metrics are within specification.

Figure 3.4: PDOP, Day03616_PAR_A



LiDAR Data Processing

When the sensor calibration, data acquisition, and GPS processing phases were complete, the formal data reduction processes by Woolpert lidar specialists included:

- Processed individual flight lines to derive a raw "Point Cloud" LAS file. Matched overlapping flight lines, generated statistics for evaluation comparisons, and made the necessary adjustments to remove any residual systematic error.
- Calibrated LAS files were imported into the task order tiles and initially filtered to create a ground and non-ground class. Then additional classes were filtered as necessary to meet client specified classes.
- Once all project data was imported and classified, survey ground control data was imported and calculated for an accuracy assessment. As a QC measure, Woolpert has developed a routine to generate accuracy statistical reports by comparisons against the TIN and the DEM using surveyed ground control of higher accuracy. The lidar is adjusted accordingly to meet or exceed the vertical accuracy requirements.
- The lidar tiles were reviewed using a series of proprietary QA/QC procedures to ensure it fulfills the task order requirements. A portion of this requires a manual step to ensure anomalies have been removed from the ground class.
- The lidar LAS files are classified into the Default (Class 1), Ground (Class 2), Buildings (Class 6), Low noise (Class 7), Water (Class 9), Ignored ground (Class10), Bridge Decks (Class 17), High Noise (Class 18) classifications.
- FGDC Compliant metadata was developed for the task order in .xml format per product.
- The horizontal datum used for the task order was referenced to Tennessee State Plane Zone NAD83(2011) US Survey Feet. The vertical datum used for the task order was referenced to NAVD 1988, US Survey Feet, GEOID12B.
- The East Tennessee FY16 Lidar project shares a border with the TN 27 County (Cumberland Plateau) 0.7m NPS Lidar task order. A small amount of TN 27 County data was used to fill out coverage in the East Tennessee project. 91 tiles contains TN 27 County data. Raw swath data is not being delivered for the TN27 County data as only a small portion of the swath was used to fill out coverage.
- Data user note: Five tiles located along the south west boundary of Blount Co, Tennessee, are partially covered with an existing QL2 lidar dataset provided by Blount County. These tiles include 2598493SW, 2598493SE, 2612493SW, 2570477SE, and 2556461SE.The total amount of combined land area covered by the existing Blount County data is approximately equal to 0.41 square miles. The data was acquired with a Leica ALS-70 HP lidar sensor between March 22, 2015 and March 29, 2015.

Section 4: Hydrologic Flattening

HYDROLOGIC FLATTENING OF LIDAR DEM DATA

East Tennessee FY16 Lidar processing task order required the compilation of breaklines defining water bodies and rivers. The breaklines were used to perform the hydrologic flattening of water bodies, and gradient hydrologic flattening of double line streams and rivers. Lakes, reservoirs and ponds, at a minimum size of 2-acre or greater, were compiled as closed polygons. The closed water bodies were collected at a constant elevation. Rivers and streams, at a nominal minimum width of 30 meters (100 feet), were compiled in the direction of flow with both sides of the stream maintaining an equal gradient elevation.

LIDAR DATA REVIEW AND PROCESSING

Woolpert utilized the following steps to hydrologically flatten the water bodies and for gradient hydrologic flattening of the double line streams within the existing lidar data.

1. Woolpert used the newly acquired lidar data to manually draw the hydrologic features in a 2D environment using the lidar intensity and bare earth surface. Open Source imagery was used as reference when necessary.
2. Woolpert utilizes an integrated software approach to combine the lidar data and 2D breaklines. This process “drapes” the 2D breaklines onto the 3D lidar surface model to assign an elevation. A monotonic process is performed to ensure the streams are consistently flowing in a gradient manner. A secondary step within the program verifies an equally matching elevation of both stream edges. The breaklines that characterize the closed water bodies are draped onto the 3D lidar surface and assigned a constant elevation at or just below ground elevation.
3. The lakes, reservoirs and ponds, at a minimum size of 2-acre or greater and streams at a minimum size of 30 meters (100 feet) nominal width, were compiled to meet task order requirements. **Figure 4.1** illustrates an example of 30 meters (100 feet) nominal streams identified and defined with hydrologic breaklines. The breaklines defining rivers and streams, at a nominal minimum width of 30 meters (100 feet), were draped with both sides of the stream maintaining an equal gradient elevation.
4. All ground points were reclassified from inside the hydrologic feature polygons to water, class nine (9).
5. All ground points were reclassified from within a buffer along the hydrologic feature breaklines to buffered ground, class ten (10).
6. The lidar ground points and hydrologic feature breaklines were used to generate a new digital elevation model (DEM).

Figure 4.1: Example Hydrologic Breaklines

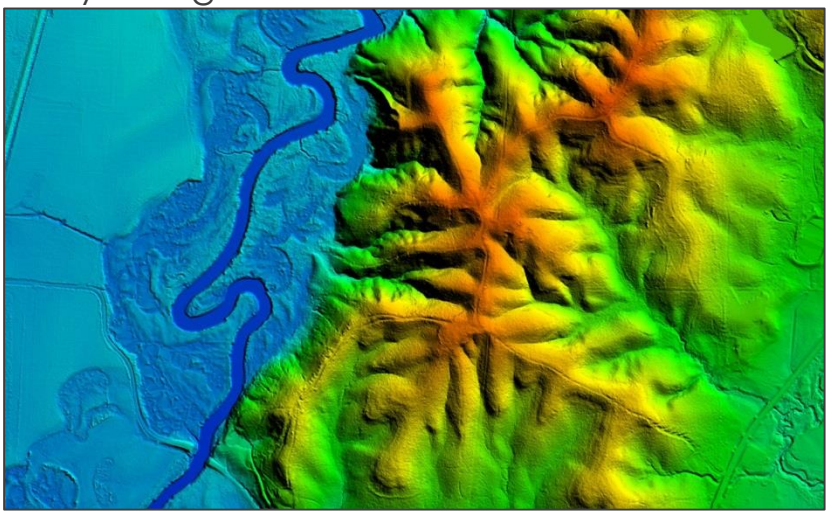


Figure 4.2 reflects a DEM generated from original lidar bare earth point data prior to the hydrologic flattening process. Note the "tinning" across the lake surface.

Figure 4.3 reflects a DEM generated from lidar with breaklines compiled to define the hydrologic features. This figure illustrates the results of adding the breaklines to hydrologically flatten the DEM data. Note the smooth appearance of the lake surface in the DEM.

Figure 4.2

Figure 4.3

Terrascan was used to add the hydrologic breakline vertices and export the lattice models. The hydrologically flattened DEM data was provided to USGS in ERDAS .IMG format.

The hydrologic breaklines compiled as part of the flattening process were provided to the USGS in ESRI geodatabase format. The breaklines defining the water bodies greater than 2-acre and for the gradient flattening of all rivers and streams at a nominal minimum width of 30 meters (100 feet) were provided as a Polygon-Z and Polyline-Z shape file, respectively.

DATA QA/QC

Initial QA/QC for this task order was performed in Global Mapper v17, by reviewing the grids and hydrologic breakline features. Additionally, ESRI software and proprietary methods were used to review the overall connectivity of the hydrologic breaklines.

Edits and corrections were addressed individually by tile. If a water body breakline needed to be adjusted to improve the flattening of the DEM data, the area was cross referenced by tile number, corrected accordingly, a new DEM file was regenerated and reviewed.

Section 5: ACCURACY ASSESSMENT

Accuracy Assessment

The vertical accuracy statistics were calculated by comparison of all lidar points to the ground surveyed QC points.

Table 5.1: Overall Vertical Accuracy Statistics		
Average error	0.007	Sv Feet
Minimum error	-0.390	Sv Feet
Maximum error	1.180	Sv Feet
Average magnitude	0.107	Sv Feet
Root mean square	0.159	Sv Feet
Standard deviation	0.159	Sv Feet

Table 5.2: RAW Swath Quality Check Point Analysis NVA

Point ID	Easting (Sv Feet)	Northing (Sv Feet)	Elevation (Sv Feet)	TIN Elevation (Sv Feet)	Dz (Sv Feet)
2001	1942282.650	839624.180	888.270	888.380	0.110
2002	2014977.800	827963.530	941.280	941.050	-0.230
2003	1979766.940	816630.860	930.240	930.200	-0.040
2004	1898687.270	808322.290	943.390	943.480	0.090
2005	1959625.130	800240.290	971.870	972.060	0.190
2006	2010004.750	795733.060	933.980	934.180	0.200
2007	1911389.040	781689.860	659.540	659.440	-0.100
2008	1951709.170	767415.150	591.970	591.860	-0.110
2009	2002940.260	767156.880	1014.010	1014.280	0.270
2010	1919363.070	828095.330	942.590	942.670	0.080
2011	1979198.710	785472.880	972.560	972.620	0.060
2012	1926103.580	804972.360	999.380	999.380	0.000
2013	1908557.660	789021.980	1018.410	1018.280	-0.130
2014	1950651.920	793720.910	987.170	987.010	-0.160
2015	1953844.380	822266.150	902.530	902.410	-0.120
2016	1976616.550	833974.500	873.730	873.490	-0.240
2017	1980233.610	806728.810	935.830	935.890	0.060
2018	1982848.040	768863.700	667.780	667.690	-0.090
2019	1933883.840	777782.740	551.740	551.620	-0.120
2020	1929563.550	795805.050	972.150	972.140	-0.010
2021	1917683.890	814226.660	943.380	943.650	0.270
2022	1972094.710	825321.890	871.820	871.920	0.100
2023	2022244.290	820995.550	909.690	909.500	-0.190
2024	1999857.430	814002.630	938.260	938.350	0.090

2024A	1999857.390	814002.660	938.200	938.350	0.150
2024B	1999857.400	814002.680	938.130	938.350	0.220
2025	1966219.730	775830.740	612.700	612.580	-0.120
2026	1995142.170	804480.960	981.130	980.830	-0.300
2027	2004303.790	778991.780	1025.200	1025.370	0.170
2028	1967722.730	763172.980	618.930	618.930	0.000
2029	1951303.270	811906.720	903.420	903.580	0.160
2030	1655559.250	610251.160	858.720	858.960	0.240
2031	1660758.900	639431.040	547.130	547.190	0.060
2032	1676094.370	682392.430	403.450	403.440	-0.010
2033	1697866.280	744176.970	740.860	740.950	0.090
2034	1708587.750	722540.900	822.940	823.830	0.890
2035	1722876.950	678144.960	497.860	497.990	0.130
2036	1736474.530	621543.670	762.650	762.650	0.000
2037	1698291.680	625503.750	582.830	582.860	0.030
2038	1703567.010	673805.470	416.320	416.200	-0.120
2039	1753753.120	745802.010	525.350	525.550	0.200
2040	1748048.930	703046.090	654.050	654.240	0.190
2041	1773578.730	659769.610	473.860	473.960	0.100
2042	1786839.040	595098.210	820.440	820.390	-0.050
2043	1794328.850	628730.690	521.620	521.610	-0.010
2044	1805037.310	668944.570	619.530	619.590	0.060
2045	1821389.100	647031.490	597.460	597.660	0.200
2046	1683113.220	634133.380	560.670	560.470	-0.200
2047	1778794.700	716620.890	500.970	500.870	-0.100
2048	1760278.860	641900.970	499.770	499.840	0.070
2049	1693535.810	668677.410	437.200	437.310	0.110
2050	1687636.750	710955.090	785.510	785.490	-0.020
2051	1733194.960	748615.930	712.330	712.360	0.030
2052	1738976.570	729178.590	785.580	785.510	-0.070
2053	1735461.810	712949.580	602.680	602.710	0.030
2054	1705188.260	703215.630	822.870	822.920	0.050
2055	1769940.110	696118.910	502.230	502.140	-0.090
2056	1752301.800	678974.700	557.380	557.490	0.110
2057	1785351.920	680314.510	484.440	484.210	-0.230
2058	1792766.600	655347.100	502.390	502.380	-0.010
2060	1761202.730	610702.990	543.450	543.390	-0.060
2061	1781842.700	630455.320	599.300	599.240	-0.060
2062	1739221.540	649070.380	486.710	486.750	0.040
2063	1721584.070	635690.600	631.820	631.910	0.090
2064	1706897.310	658239.710	428.590	428.620	0.030
2065	1680628.500	621485.190	658.730	658.780	0.050
2066	1670387.960	605900.630	628.320	628.470	0.150
2067	1730181.260	695321.150	500.390	500.330	-0.060
2068	1707815.900	741009.960	741.120	741.200	0.080

2069	1661002.080	623699.540	538.190	538.200	0.010
2070	1684086.290	658501.840	464.800	464.590	-0.210
2071	1691047.080	695555.940	490.180	490.040	-0.140
2072	1695599.620	738347.420	780.700	780.750	0.050
2073	1725363.560	734321.470	813.990	814.100	0.110
2074	1753867.780	692619.340	495.900	495.890	-0.010
2075	1753202.770	633043.210	593.970	593.950	-0.020
2076	1706451.360	649783.960	531.860	531.960	0.100
2077	1746071.150	668842.660	515.590	515.680	0.090
2078	1758454.040	725633.970	498.530	498.660	0.130
2079	1774066.580	681621.130	470.000	470.010	0.010
2080	2419487.510	461596.700	991.580	991.660	0.080
2081	2434231.200	425675.240	932.570	932.570	0.000
2082	2445097.300	352408.110	1136.970	1136.950	-0.020
2083	2456640.930	400439.130	1027.550	1027.620	0.070
2084	2443745.690	513525.430	895.880	895.960	0.080
2085	2466468.640	474028.060	935.370	935.430	0.060
2086	2480026.670	548590.440	876.140	876.200	0.060
2087	2484058.010	388145.630	868.760	868.740	-0.020
2088	2459342.800	437817.540	993.010	992.810	-0.200
2089	2477364.420	341248.790	1641.520	1641.450	-0.070
2090	2500193.580	518642.450	1055.380	1055.270	-0.110
2091	2526921.180	549787.810	908.390	908.420	0.030
2092	2510447.140	488369.070	895.800	895.990	0.190
2093	2491242.640	454201.950	901.800	901.600	-0.200
2094	2531617.700	443472.250	831.610	831.460	-0.150
2095	2502475.870	416086.690	928.800	928.910	0.110
2096	2529828.980	380354.930	3355.050	3355.010	-0.040
2097	2561357.920	360276.980	5383.780	5383.680	-0.100
2098	2558633.210	364229.130	4890.120	4890.060	-0.060
2099	2554377.510	374206.730	4458.800	4458.750	-0.050
2100	2518019.620	410233.390	976.580	976.750	0.170
2102	2549989.100	447215.790	889.450	889.120	-0.330
2103	2566014.840	432321.400	879.870	879.830	-0.040
2104	2541425.050	427845.000	1342.280	1342.290	0.010
2109	2626983.410	554369.000	1012.780	1012.800	0.020
2110	2671376.880	540759.090	1053.280	1053.230	-0.050
2111	2669589.580	557002.540	947.390	947.450	0.060
2112	2659793.950	506684.320	1543.050	1543.080	0.030
2115	2733403.070	474822.690	5048.070	5048.080	0.010
2116	2714949.230	484728.260	3006.730	3006.630	-0.100
2117	2699630.550	501265.190	1477.690	1477.810	0.120
2118	2869352.080	547726.670	4252.450	4252.380	-0.070
2119	2885406.360	572336.490	2321.120	2321.050	-0.070
2120	2884516.160	591707.590	1435.640	1435.540	-0.100

2121	2919468.290	617578.700	2232.680	2232.590	-0.090
2122	2935565.450	653427.710	1616.610	1616.340	-0.270
2123	2914914.860	637245.830	1507.590	1507.460	-0.130
2124	2905460.930	628854.510	1402.540	1402.320	-0.220
2125	2884265.490	647007.140	1227.250	1227.470	0.220
2126	2833001.410	657172.890	1095.570	1095.440	-0.130
2127	2769453.470	652885.630	1176.450	1176.420	-0.030
2128	2691797.380	652413.910	1006.150	1006.240	0.090
2129	2677848.950	612419.200	1130.600	1130.580	-0.020
2130	2695651.930	591050.540	946.920	946.840	-0.080
2131	2713468.550	559238.460	1030.220	1030.090	-0.130
2132	2727314.390	519914.970	1715.110	1715.180	0.070
2133	2741684.520	554799.220	1083.910	1083.940	0.030
2134	2721134.190	612759.020	1087.220	1087.170	-0.050
2135	2755704.250	634081.420	1096.060	1096.020	-0.040
2136	2776821.390	602138.880	1425.610	1425.570	-0.040
2137	2788221.530	543031.870	1519.450	1519.490	0.040
2138	2817693.490	553175.610	1299.100	1299.090	-0.010
2139	2807859.130	614266.040	1040.270	1040.210	-0.060
2140	2850172.080	593299.760	1174.770	1174.740	-0.030
2141	2859984.750	571456.710	1641.370	1641.370	0.000
2142	2871366.750	625001.930	1311.750	1311.820	0.070
2143	2793694.210	636760.420	995.960	996.000	0.040
2144	2752817.090	591633.690	1096.440	1096.470	0.030
2145	2668679.680	724762.910	1242.920	1242.990	0.070
2146	2646357.880	673459.400	996.060	995.960	-0.100
2147	2628154.920	725746.390	1159.140	1159.310	0.170
2148	2606284.950	756992.700	1068.920	1068.830	-0.090
2149	2592700.780	709617.170	1034.780	1035.960	1.180
2150	2584034.820	666583.780	1146.350	1146.420	0.070
2151	2544387.060	642935.170	905.690	905.740	0.050
2152	2533479.850	610577.230	980.250	980.190	-0.060
2153	2506125.630	579639.450	952.730	952.790	0.060
2154	2471958.500	563610.080	890.980	890.990	0.010
2155	2559721.160	586146.420	918.360	918.480	0.120
2156	2599858.030	579919.230	1041.490	1041.460	-0.030
2157	2619086.790	677933.350	1141.600	1141.550	-0.050
2158	2615143.430	645753.120	1028.680	1028.690	0.010
2159	2594836.980	637064.740	1088.920	1088.920	0.000
2160	2626279.470	614318.900	933.070	933.060	-0.010
2161	2653008.250	582422.300	1015.220	1015.280	0.060
2162	2650464.700	607807.810	863.500	863.640	0.140
2163	2681547.430	685898.920	1166.430	1166.480	0.050
2164	2712244.550	740856.700	1435.070	1435.020	-0.050
2165	2729281.960	677107.970	1337.760	1337.850	0.090

2166	2724081.450	830607.250	1650.600	1650.650	0.050
2167	2757949.370	798927.170	1272.360	1272.440	0.080
2168	2762746.780	731198.940	1149.620	1149.520	-0.100
2169	2794587.420	711513.390	1271.270	1271.270	0.000
2170	2782684.160	833565.960	1535.000	1535.100	0.100
2171	2804745.750	783202.610	1552.550	1552.640	0.090
2172	2822572.330	745290.780	1248.730	1248.610	-0.120
2173	2857714.560	709590.590	1160.060	1159.910	-0.150
2174	2836114.610	828469.160	1208.010	1208.160	0.150
2175	2882020.270	797065.530	1402.700	1402.700	0.000
2176	2875421.060	758958.740	1114.650	1114.780	0.130
2177	2902861.790	676707.980	1453.150	1453.070	-0.080
2178	2925073.120	838503.490	1412.430	1412.410	-0.020
2179	2946609.670	788615.240	1404.640	1404.630	-0.010
2180	2933403.180	760524.120	1323.290	1323.460	0.170
2181	2960137.290	714452.600	1502.020	1501.940	-0.080
2182	2986008.540	607790.890	3745.620	3745.420	-0.200
2183	3019981.740	639817.430	2983.240	2983.180	-0.060
2184	3080431.290	680188.970	3712.850	3712.800	-0.050
2185	3107532.970	692693.740	3529.690	3529.570	-0.120
2186	3117824.780	667823.100	5494.900	5494.950	0.050
2188	3169620.930	734675.170	2685.930	2685.760	-0.170
2190	3227193.390	767400.230	3463.120	3463.060	-0.060
2191	3223983.790	754629.880	3342.260	3342.030	-0.230
2192	3235994.680	860098.330	3264.010	3264.210	0.200
2193	3246735.940	860501.040	3188.930	3189.150	0.220
2194	3198142.100	854737.840	2057.620	2057.430	-0.190
2195	3207921.090	828558.920	2531.900	2531.860	-0.040
2196	3222191.910	851810.400	2634.260	2634.090	-0.170
2197	3211905.250	788261.630	2386.060	2385.710	-0.350
2198	3183295.410	773705.470	2167.250	2166.860	-0.390
2199	3165254.010	760964.510	2221.710	2221.510	-0.200
2200	3149734.350	730421.640	1986.530	1986.480	-0.050
2201	3193651.790	810684.480	2513.810	2514.070	0.260
2202	3174359.990	796984.380	2394.590	2394.590	0.000
2203	3163339.540	821422.770	2771.000	2771.120	0.120
2204	3168416.600	855762.820	2009.650	2009.840	0.190
2205	3130253.430	847973.470	1754.390	1754.330	-0.060
2206	3064983.060	843015.410	1837.790	1837.910	0.120
2207	3106068.260	828587.900	1638.970	1638.960	-0.010
2208	3099570.250	807743.130	1493.940	1494.030	0.090
2209	3140376.740	798423.370	2267.080	2267.160	0.080
2210	3143894.450	829133.920	2106.030	2106.100	0.070
2211	3121773.900	780299.880	1852.710	1852.750	0.040
2212	3093303.790	760848.350	1537.810	1537.860	0.050

2213	3121401.390	746390.530	1986.310	1986.340	0.030
2214	3098271.710	732182.040	1814.950	1814.960	0.010
2215	3075854.360	699374.740	2432.990	2432.950	-0.040
2216	3026439.530	679425.510	1675.900	1675.520	-0.380
2217	2971858.380	679781.900	1452.820	1452.880	0.060
2218	2997195.560	712790.180	1699.020	1698.830	-0.190
2219	2974738.860	751579.550	1729.710	1729.710	0.000
2220	2982988.190	836187.090	1500.380	1500.550	0.170
2221	3002173.310	804146.200	1269.990	1269.900	-0.090
2222	3019452.870	761896.040	1528.920	1529.080	0.160
2223	3058003.170	722098.830	1773.050	1773.240	0.190
2224	3037170.690	793742.330	1434.370	1434.390	0.020
2225	3088398.190	843746.740	1699.780	1699.900	0.120
2226	3063415.760	773525.120	1496.840	1496.960	0.120
2227	3028978.470	834791.380	1444.960	1444.780	-0.180
2228	3072513.980	822499.230	1466.990	1466.900	-0.090
2229	2987755.570	637589.060	2138.400	2138.390	-0.010
2230	2916499.920	734249.410	1211.820	1211.890	0.070
2231	2906547.990	715814.170	1319.830	1319.540	-0.290
2232	2820732.770	691070.340	1124.290	1124.200	-0.090
2070E	2737997.120	819154.480	1183.210	1182.920	-0.290
2075E	2582810.980	669437.230	1142.410	1142.640	0.230
2076E	2553590.920	653009.660	943.350	943.350	0.000
2102E	2543428.220	619926.660	1038.730	1038.780	0.050
2105E	2510235.510	598275.540	1009.980	1009.870	-0.110
2231E	2752495.010	796167.590	1230.950	1231.050	0.100

VERTICAL ACCURACY CONCLUSIONS

Raw Swath Non-Vegetated Vertical Accuracy (NVA) Tested 0.395 Feet Non vegetated vertical accuracy at a 95 percent confidence level, derived according to NSSDA, in open terrain using (RMSEz) x 1.96000 as defined by the National Standards for Spatial Data Accuracy (NSSDA); assessed and reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the TIN using all lidar points. Accuracy was tested against 230 NVA points.

LAS Swath Non-Vegetated Vertical Accuracy (NVA) Tested 0.311 Feet Non vegetated vertical accuracy at a 95 percent confidence level, derived according to NSSDA, in open terrain using (RMSEz) x 1.96000 as defined by the National Standards for Spatial Data Accuracy (NSSDA); assessed and reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the TIN using ground lidar points. Accuracy was tested against 230 NVA points.

Table 5.3: NVA Check Point Analysis DEM

Point ID	Easting (Sv Feet)	Northing (Sv Feet)	Elevation (Sv Feet)	DEM Elevation (Sv Feet)	Dz (Sv Feet)
2001	1942282.650	839624.180	888.270	888.364	0.094
2002	2014977.800	827963.530	941.280	940.984	-0.296

2003	1979766.940	816630.860	930.240	930.244	0.004
2004	1898687.270	808322.290	943.390	943.484	0.094
2005	1959625.130	800240.290	971.870	972.074	0.204
2006	2010004.750	795733.060	933.980	934.214	0.234
2007	1911389.040	781689.860	659.540	659.443	-0.097
2008	1951709.170	767415.150	591.970	591.822	-0.148
2009	2002940.260	767156.880	1014.010	1014.284	0.274
2010	1919363.070	828095.330	942.590	942.764	0.174
2011	1979198.710	785472.880	972.560	972.634	0.074
2012	1926103.580	804972.360	999.380	999.394	0.014
2013	1908557.660	789021.980	1018.410	1018.274	-0.136
2014	1950651.920	793720.910	987.170	987.004	-0.166
2015	1953844.380	822266.150	902.530	902.414	-0.116
2016	1976616.550	833974.500	873.730	873.483	-0.247
2017	1980233.610	806728.810	935.830	935.814	-0.016
2018	1982848.040	768863.700	667.780	667.693	-0.087
2019	1933883.840	777782.740	551.740	551.622	-0.118
2020	1929563.550	795805.050	972.150	972.164	0.014
2021	1917683.890	814226.660	943.380	943.624	0.244
2022	1972094.710	825321.890	871.820	871.923	0.103
2023	2022244.290	820995.550	909.690	909.344	-0.346
2024	1999857.430	814002.630	938.260	938.364	0.104
2024A	1999857.390	814002.660	938.200	938.364	0.164
2024B	1999857.400	814002.680	938.130	938.364	0.234
2025	1966219.730	775830.740	612.700	612.642	-0.058
2026	1995142.170	804480.960	981.130	980.834	-0.296
2027	2004303.790	778991.780	1025.200	1025.374	0.174
2028	1967722.730	763172.980	618.930	618.952	0.022
2029	1951303.270	811906.720	903.420	903.544	0.124
2030	1655559.250	610251.160	858.720	858.973	0.253
2031	1660758.900	639431.040	547.130	547.192	0.062
2032	1676094.370	682392.430	403.450	403.442	-0.008
2033	1697866.280	744176.970	740.860	740.953	0.093
2034	1708587.750	722540.900	822.940	823.823	0.883
2035	1722876.950	678144.960	497.860	497.962	0.102
2036	1736474.530	621543.670	762.650	762.663	0.013
2037	1698291.680	625503.750	582.830	582.872	0.042
2038	1703567.010	673805.470	416.320	416.152	-0.168
2039	1753753.120	745802.010	525.350	525.682	0.332
2040	1748048.930	703046.090	654.050	654.223	0.173
2041	1773578.730	659769.610	473.860	473.912	0.052
2042	1786839.040	595098.210	820.440	820.373	-0.067
2043	1794328.850	628730.690	521.620	521.612	-0.008
2044	1805037.310	668944.570	619.530	619.582	0.052
2045	1821389.100	647031.490	597.460	597.662	0.202
2046	1683113.220	634133.380	560.670	560.502	-0.168

2047	1778794.700	716620.890	500.970	500.782	-0.188
2048	1760278.860	641900.970	499.770	499.852	0.082
2049	1693535.810	668677.410	437.200	437.302	0.102
2050	1687636.750	710955.090	785.510	785.453	-0.057
2051	1733194.960	748615.930	712.330	712.313	-0.017
2052	1738976.570	729178.590	785.580	785.453	-0.127
2053	1735461.810	712949.580	602.680	602.712	0.032
2054	1705188.260	703215.630	822.870	822.883	0.013
2055	1769940.110	696118.910	502.230	502.152	-0.078
2056	1752301.800	678974.700	557.380	557.522	0.142
2057	1785351.920	680314.510	484.440	484.222	-0.218
2058	1792766.600	655347.100	502.390	502.382	-0.008
2060	1761202.730	610702.990	543.450	543.362	-0.088
2061	1781842.700	630455.320	599.300	599.262	-0.038
2062	1739221.540	649070.380	486.710	486.742	0.032
2063	1721584.070	635690.600	631.820	631.873	0.053
2064	1706897.310	658239.710	428.590	428.642	0.052
2065	1680628.500	621485.190	658.730	658.793	0.063
2066	1670387.960	605900.630	628.320	628.463	0.143
2067	1730181.260	695321.150	500.390	500.302	-0.088
2068	1707815.900	741009.960	741.120	741.233	0.113
2069	1661002.080	623699.540	538.190	538.192	0.002
2070	1684086.290	658501.840	464.800	464.582	-0.218
2071	1691047.080	695555.940	490.180	490.042	-0.138
2072	1695599.620	738347.420	780.700	780.743	0.043
2073	1725363.560	734321.470	813.990	814.083	0.093
2074	1753867.780	692619.340	495.900	495.912	0.012
2075	1753202.770	633043.210	593.970	593.952	-0.018
2076	1706451.360	649783.960	531.860	531.962	0.102
2077	1746071.150	668842.660	515.590	515.692	0.102
2078	1758454.040	725633.970	498.530	498.622	0.092
2079	1774066.580	681621.130	470.000	470.042	0.042
2080	2419487.510	461596.700	991.580	991.674	0.094
2081	2434231.200	425675.240	932.570	932.494	-0.076
2082	2445097.300	352408.110	1136.970	1136.925	-0.045
2083	2456640.930	400439.130	1027.550	1027.664	0.114
2084	2443745.690	513525.430	895.880	895.914	0.034
2085	2466468.640	474028.060	935.370	935.434	0.064
2086	2480026.670	548590.440	876.140	876.234	0.094
2087	2484058.010	388145.630	868.760	868.843	0.083
2088	2459342.800	437817.540	993.010	992.984	-0.026
2089	2477364.420	341248.790	1641.520	1641.467	-0.053
2090	2500193.580	518642.450	1055.380	1055.314	-0.066
2091	2526921.180	549787.810	908.390	908.394	0.004
2092	2510447.140	488369.070	895.800	895.994	0.194
2093	2491242.640	454201.950	901.800	901.614	-0.186
2094	2531617.700	443472.250	831.610	831.463	-0.147
2095	2502475.870	416086.690	928.800	928.904	0.104
2096	2529828.980	380354.930	3355.050	3355.043	-0.007
2097	2561357.920	360276.980	5383.780	5383.722	-0.058
2098	2558633.210	364229.130	4890.120	4890.110	-0.010
2099	2554377.510	374206.730	4458.800	4458.808	0.008

2100	2518019.620	410233.390	976.580	976.724	0.144
2102	2549989.100	447215.790	889.450	889.134	-0.316
2103	2566014.840	432321.400	879.870	879.834	-0.036
2104	2541425.050	427845.000	1342.280	1342.305	0.025
2109	2626983.410	554369.000	1012.780	1012.804	0.024
2110	2671376.880	540759.090	1053.280	1053.244	-0.036
2111	2669589.580	557002.540	947.390	947.454	0.064
2112	2659793.950	506684.320	1543.050	1543.116	0.066
2115	2733403.070	474822.690	5048.070	5048.090	0.020
2116	2714949.230	484728.260	3006.730	3006.652	-0.078
2117	2699630.550	501265.190	1477.690	1477.846	0.156
2118	2869352.080	547726.670	4252.450	4252.397	-0.053
2119	2885406.360	572336.490	2321.120	2321.049	-0.071
2120	2884516.160	591707.590	1435.640	1435.566	-0.074
2121	2919468.290	617578.700	2232.680	2232.579	-0.101
2122	2935565.450	653427.710	1616.610	1616.366	-0.244
2123	2914914.860	637245.830	1507.590	1507.396	-0.194
2124	2905460.930	628854.510	1402.540	1402.336	-0.204
2125	2884265.490	647007.140	1227.250	1227.305	0.055
2126	2833001.410	657172.890	1095.570	1095.384	-0.186
2127	2769453.470	652885.630	1176.450	1176.305	-0.145
2128	2691797.380	652413.910	1006.150	1006.204	0.054
2129	2677848.950	612419.200	1130.600	1130.545	-0.055
2130	2695651.930	591050.540	946.920	946.864	-0.056
2131	2713468.550	559238.460	1030.220	1030.104	-0.116
2132	2727314.390	519914.970	1715.110	1715.217	0.107
2133	2741684.520	554799.220	1083.910	1083.944	0.034
2134	2721134.190	612759.020	1087.220	1087.164	-0.056
2135	2755704.250	634081.420	1096.060	1096.004	-0.056
2136	2776821.390	602138.880	1425.610	1425.566	-0.044
2137	2788221.530	543031.870	1519.450	1519.496	0.046
2138	2817693.490	553175.610	1299.100	1299.075	-0.025
2139	2807859.130	614266.040	1040.270	1040.184	-0.086
2140	2850172.080	593299.760	1174.770	1174.755	-0.015
2141	2859984.750	571456.710	1641.370	1641.347	-0.023
2142	2871366.750	625001.930	1311.750	1311.815	0.065
2143	2793694.210	636760.420	995.960	995.974	0.014
2144	2752817.090	591633.690	1096.440	1096.454	0.014
2145	2668679.680	724762.910	1242.920	1242.945	0.025
2146	2646357.880	673459.400	996.060	995.994	-0.066
2147	2628154.920	725746.390	1159.140	1159.295	0.155
2148	2606284.950	756992.700	1068.920	1068.914	-0.006
2149	2592700.780	709617.170	1034.780	1035.984	1.204
2150	2584034.820	666583.780	1146.350	1146.435	0.085
2151	2544387.060	642935.170	905.690	905.704	0.014
2152	2533479.850	610577.230	980.250	980.184	-0.066
2153	2506125.630	579639.450	952.730	952.824	0.094
2154	2471958.500	563610.080	890.980	890.964	-0.016
2155	2559721.160	586146.420	918.360	918.494	0.134
2156	2599858.030	579919.230	1041.490	1041.434	-0.056
2157	2619086.790	677933.350	1141.600	1141.585	-0.015
2158	2615143.430	645753.120	1028.680	1028.714	0.034

2159	2594836.980	637064.740	1088.920	1088.934	0.014
2160	2626279.470	614318.900	933.070	933.064	-0.006
2161	2653008.250	582422.300	1015.220	1015.304	0.084
2162	2650464.700	607807.810	863.500	863.633	0.133
2163	2681547.430	685898.920	1166.430	1166.555	0.125
2164	2712244.550	740856.700	1435.070	1435.016	-0.054
2165	2729281.960	677107.970	1337.760	1337.785	0.025
2166	2724081.450	830607.250	1650.600	1650.667	0.067
2167	2757949.370	798927.170	1272.360	1272.435	0.075
2168	2762746.780	731198.940	1149.620	1149.525	-0.095
2169	2794587.420	711513.390	1271.270	1271.295	0.025
2170	2782684.160	833565.960	1535.000	1535.136	0.136
2171	2804745.750	783202.610	1552.550	1552.626	0.076
2172	2822572.330	745290.780	1248.730	1248.615	-0.115
2173	2857714.560	709590.590	1160.060	1159.935	-0.125
2174	2836114.610	828469.160	1208.010	1208.155	0.145
2175	2882020.270	797065.530	1402.700	1402.676	-0.024
2176	2875421.060	758958.740	1114.650	1114.814	0.164
2177	2902861.790	676707.980	1453.150	1453.056	-0.094
2178	2925073.120	838503.490	1412.430	1412.346	-0.084
2179	2946609.670	788615.240	1404.640	1404.576	-0.064
2180	2933403.180	760524.120	1323.290	1323.425	0.135
2181	2960137.290	714452.600	1502.020	1501.966	-0.054
2182	2986008.540	607790.890	3745.620	3745.385	-0.235
2183	3019981.740	639817.430	2983.240	2983.182	-0.058
2184	3080431.290	680188.970	3712.850	3712.815	-0.035
2185	3107532.970	692693.740	3529.690	3529.604	-0.086
2186	3117824.780	667823.100	5494.900	5495.032	0.132
2188	3169620.930	734675.170	2685.930	2685.701	-0.229
2190	3227193.390	767400.230	3463.120	3463.064	-0.056
2191	3223983.790	754629.880	3342.260	3342.073	-0.187
2192	3235994.680	860098.330	3264.010	3264.183	0.173
2193	3246735.940	860501.040	3188.930	3189.213	0.283
2194	3198142.100	854737.840	2057.620	2057.468	-0.152
2195	3207921.090	828558.920	2531.900	2531.870	-0.030
2196	3222191.910	851810.400	2634.260	2634.031	-0.229
2197	3211905.250	788261.630	2386.060	2385.700	-0.360
2198	3183295.410	773705.470	2167.250	2166.949	-0.301
2199	3165254.010	760964.510	2221.710	2221.559	-0.151
2200	3149734.350	730421.640	1986.530	1986.488	-0.042
2201	3193651.790	810684.480	2513.810	2514.080	0.270
2202	3174359.990	796984.380	2394.590	2394.600	0.010
2203	3163339.540	821422.770	2771.000	2771.111	0.111
2204	3168416.600	855762.820	2009.650	2009.798	0.148
2205	3130253.430	847973.470	1754.390	1754.307	-0.083
2206	3064983.060	843015.410	1837.790	1837.917	0.127
2207	3106068.260	828587.900	1638.970	1639.137	0.167
2208	3099570.250	807743.130	1493.940	1494.076	0.136
2209	3140376.740	798423.370	2267.080	2267.139	0.059
2210	3143894.450	829133.920	2106.030	2106.118	0.088
2211	3121773.900	780299.880	1852.710	1852.767	0.057
2212	3093303.790	760848.350	1537.810	1537.856	0.046

2213	3121401.390	746390.530	1986.310	1986.328	0.018
2214	3098271.710	732182.040	1814.950	1814.987	0.037
2215	3075854.360	699374.740	2432.990	2432.960	-0.030
2216	3026439.530	679425.510	1675.900	1675.687	-0.213
2217	2971858.380	679781.900	1452.820	1452.886	0.066
2218	2997195.560	712790.180	1699.020	1698.907	-0.113
2219	2974738.860	751579.550	1729.710	1729.697	-0.013
2220	2982988.190	836187.090	1500.380	1500.576	0.196
2221	3002173.310	804146.200	1269.990	1269.895	-0.095
2222	3019452.870	761896.040	1528.920	1529.186	0.266
2223	3058003.170	722098.830	1773.050	1773.137	0.087
2224	3037170.690	793742.330	1434.370	1434.426	0.056
2225	3088398.190	843746.740	1699.780	1699.917	0.137
2226	3063415.760	773525.120	1496.840	1496.916	0.076
2227	3028978.470	834791.380	1444.960	1444.856	-0.104
2228	3072513.980	822499.230	1466.990	1466.916	-0.074
2229	2987755.570	637589.060	2138.400	2138.319	-0.081
2230	2916499.920	734249.410	1211.820	1211.885	0.065
2231	2906547.990	715814.170	1319.830	1319.495	-0.335
2232	2820732.770	691070.340	1124.290	1124.125	-0.165
2070E	2737997.120	819154.480	1183.210	1182.915	-0.295
2075E	2582810.980	669437.230	1142.410	1142.645	0.235
2076E	2553590.920	653009.660	943.350	943.344	-0.006
2102E	2543428.220	619926.660	1038.730	1038.744	0.014
2105E	2510235.510	598275.540	1009.980	1009.894	-0.086
2231E	2752495.010	796167.590	1230.950	1231.055	0.105

VERTICAL ACCURACY CONCLUSIONS

Bare-Earth DEM Non-Vegetated Vertical Accuracy (NVA) Tested 0.317 Feet Non-Vegetated vertical accuracy at a 95 percent confidence level, derived according to NSSDA, in open terrain using (RMSEz) x 1.96000 as defined by the National Standards for Spatial Data Accuracy (NSSDA); assessed and reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the DEM. Accuracy was tested against 230 NVA points.

Table 5.4: VVA Quality Check Point Analysis DEM

Point ID	Easting (Sv Feet)	Northing (Sv Feet)	Elevation (Sv Feet)	DEM Elevation (Sv Feet)	Dz (Sv Feet)
3001	1941616.950	838692.740	862.920	863.173	0.253
3002	2014876.550	827029.260	933.600	932.844	-0.756
3003	1979450.670	817802.930	931.420	931.784	0.364
3004	1899371.410	807367.340	921.810	922.394	0.584
3005	1960044.980	797443.630	962.890	963.164	0.274
3006	2009453.600	795377.330	951.010	951.204	0.194
3007	1910523.840	782449.910	662.060	662.223	0.163
3008	1951132.660	769162.330	537.670	537.722	0.052
3009	1998630.350	763320.440	1088.980	1089.354	0.374
3010	1920084.580	827477.740	957.620	957.964	0.344
3011	1980454.340	785173.490	969.000	969.014	0.014
3012	1926231.030	805117.770	991.330	991.484	0.154

3013	1908621.610	788840.290	1012.650	1012.564	-0.086
3014	1950618.950	793655.420	987.800	987.614	-0.186
3014	1950618.950	793655.470	987.590	987.614	0.024
3015	1955773.440	821931.870	887.260	887.684	0.424
3016	1977447.860	833783.600	861.970	861.833	-0.137
3017	1980256.160	806689.630	935.670	935.714	0.044
3018	1982826.820	768898.420	667.250	667.143	-0.107
3019	1655450.170	610320.220	866.340	867.263	0.923
3020	1661221.230	638746.290	530.180	530.552	0.372
3021	1676854.670	682219.390	424.420	424.632	0.212
3022	1697579.000	740563.840	750.470	750.533	0.063
3023	1708443.360	721653.010	803.730	803.683	-0.047
3024	1723628.210	677767.850	475.510	475.692	0.182
3025	1736066.250	622336.070	756.680	756.733	0.053
3026	1698241.300	625433.310	583.150	583.092	-0.058
3027	1703468.570	677020.130	447.700	447.802	0.102
3028	1754477.660	745971.490	570.460	570.532	0.072
3029	1748805.850	703093.630	590.970	590.942	-0.028
3030	1773168.160	659258.690	502.810	502.692	-0.118
3031	1789700.570	594980.200	802.130	802.213	0.083
3032	1794315.820	628689.600	520.630	520.662	0.032
3033	1805638.440	668467.450	618.920	618.852	-0.068
3034	1821339.850	647044.230	603.190	599.572	-3.618
3035	1682953.840	635348.770	557.540	557.972	0.432
3036	1778820.480	716489.800	509.130	508.952	-0.178
3037	1761495.900	641525.660	475.280	475.202	-0.078
3038	1693871.580	668228.560	453.460	453.652	0.192
3039	1687730.340	711006.400	781.170	781.243	0.073
3040	1721936.770	748627.160	651.690	651.973	0.283
3041	1739259.150	729218.150	801.980	801.873	-0.107
3042	1735216.400	713012.600	605.730	605.752	0.022
3043	1705177.080	703171.270	822.960	823.363	0.403
3044	1769988.350	696108.810	502.340	502.372	0.032
3045	1752082.560	679542.500	557.100	556.822	-0.278
3046	1785419.560	680352.230	479.740	479.842	0.102
3047	1792705.280	655378.970	502.190	502.122	-0.068
3048	1821450.030	635464.430	538.470	538.382	-0.088
3049	1761384.460	610535.020	540.760	540.932	0.172
3050	1781954.380	630893.250	604.950	605.262	0.312
3051	1739218.020	649184.620	484.130	484.102	-0.028
3052	1721815.970	635645.320	644.430	644.523	0.093
3053	1706884.480	658113.750	428.080	428.222	0.142
3054	1680553.730	621343.400	659.050	659.053	0.003
3055	1670316.580	605783.060	613.320	613.912	0.592
3056	1730192.680	695456.140	497.750	497.862	0.112
3057	1707828.590	741049.750	741.160	741.603	0.443
3058	2419608.130	461543.250	988.330	988.734	0.404
3059	2430912.790	424063.610	884.900	885.394	0.494
3060	2443871.650	350693.080	1121.050	1121.234	0.184
3061	2456528.160	400012.590	1037.980	1038.044	0.064
3062	2439655.610	514774.970	840.830	841.223	0.393
3063	2466672.070	473383.450	983.290	983.404	0.114

3064	2480485.990	548271.670	889.250	889.664	0.414
3065	2485781.750	388849.300	926.510	926.734	0.224
3066	2460383.220	438246.410	1004.670	1004.974	0.304
3067	2478583.700	341344.850	1639.950	1640.277	0.327
3068	2526808.370	549796.030	903.760	904.044	0.284
3069	2509959.200	487606.590	889.920	889.944	0.024
3070	2493771.540	451564.410	860.760	860.263	-0.497
3071	2531582.260	443520.780	830.440	830.983	0.543
3072	2502829.940	416332.200	911.960	912.094	0.134
3073	2526141.450	376533.940	2925.430	2925.782	0.352
3074	2557503.410	364356.680	4819.360	4819.629	0.269
3075	2553489.880	375332.200	4505.530	4505.478	-0.052
3076	2519141.840	408927.620	1032.340	1032.644	0.304
3077	2566108.430	432458.270	879.780	879.754	-0.026
3078	2541512.130	427649.190	1346.510	1346.225	-0.285
3082	2628416.620	556015.700	985.120	985.474	0.354
3083	2671303.040	540745.180	1050.320	1050.194	-0.126
3084	2668594.810	556470.540	959.670	960.264	0.594
3085	2659824.510	506598.400	1548.580	1548.766	0.186
3088	2733294.710	474841.270	5051.280	5051.400	0.120
3089	2717538.740	485014.430	3206.600	3206.523	-0.077
3090	2699738.760	502232.660	1453.610	1453.566	-0.044
3091	2869187.350	546522.980	4354.300	4354.557	0.257
3093	2884402.470	591639.190	1436.790	1437.106	0.316
3094	2919626.560	617573.580	2229.650	2229.939	0.289
3095	2932606.970	654101.560	1518.140	1518.146	0.006
3096	2913984.340	637366.080	1494.900	1495.046	0.146
3097	2904179.950	628769.090	1386.300	1386.596	0.296
3098	2884400.070	646578.400	1192.860	1193.305	0.445
3099	2837857.010	657850.790	1119.130	1119.354	0.224
3100	2676349.490	612089.310	1001.110	1001.314	0.204
3101	2696659.210	595626.100	948.580	948.724	0.144
3102	2713947.070	558413.910	1061.830	1062.224	0.394
3103	2742107.850	554061.160	1056.870	1057.084	0.214
3104	2720081.550	612732.590	1087.440	1087.544	0.104
3105	2755760.000	633979.950	1077.490	1077.604	0.114
3106	2776737.500	601987.680	1432.930	1433.056	0.126
3107	2788623.480	542477.100	1535.090	1535.126	0.036
3108	2817548.860	553150.130	1298.130	1298.325	0.195
3109	2807800.940	614196.520	1037.590	1037.684	0.094
3110	2850670.720	592554.020	1141.270	1141.355	0.085
3111	2860404.670	571082.470	1675.660	1676.057	0.397
3112	2870665.200	625348.450	1286.920	1287.275	0.355
3113	2793602.840	636839.390	991.620	992.634	1.014
3114	2754423.440	591828.310	1055.760	1055.854	0.094
3115	2668872.810	724437.000	1263.280	1263.385	0.105
3116	2646268.570	673432.260	990.480	990.544	0.064
3117	2628549.820	725499.980	1184.650	1184.955	0.305
3118	2606149.700	758207.590	1080.860	1081.224	0.364
3120	2584756.690	666424.980	1163.800	1164.485	0.685
3121	2543925.760	641626.860	882.820	882.834	0.014
3122	2472725.570	562934.850	855.420	855.513	0.093

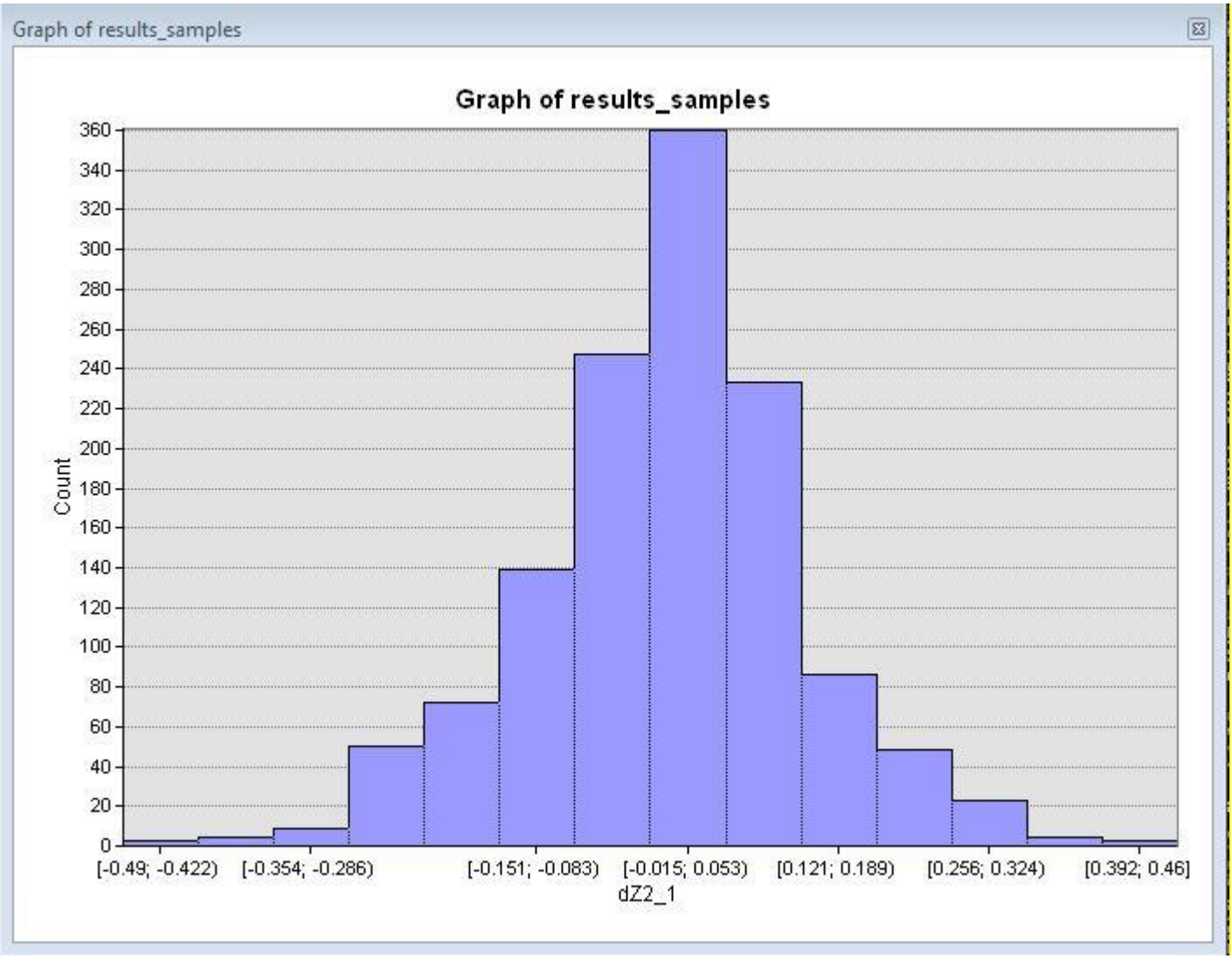
3123	2559150.470	585918.300	901.730	902.084	0.354
3124	2506236.040	579183.370	928.830	928.984	0.154
3125	2533649.150	611709.200	971.180	971.114	-0.066
3126	2594619.940	634807.240	1021.100	1021.024	-0.076
3127	2599833.430	579983.550	1041.710	1041.814	0.104
3128	2619326.830	678695.410	1117.370	1117.834	0.464
3129	2627116.390	614726.920	943.380	943.584	0.204
3130	2653896.600	582978.270	979.650	979.774	0.124
3131	2647857.650	606733.380	913.930	914.054	0.124
3132	2683329.920	689049.900	1143.680	1143.885	0.205
3133	2713061.060	741064.920	1429.200	1429.226	0.026
3134	2730257.880	677903.370	1397.590	1397.816	0.226
3135	2725455.980	831253.590	1574.830	1574.996	0.166
3136	2755430.440	796578.100	1209.010	1209.145	0.135
3137	2760749.930	731275.980	1152.420	1152.435	0.015
3138	2793225.650	711392.980	1286.850	1286.915	0.065
3139	2782951.630	834520.350	1561.640	1561.906	0.266
3140	2804820.330	783196.370	1551.680	1552.086	0.406
3141	2823096.100	745637.210	1242.420	1242.535	0.115
3142	2856158.970	709019.410	1178.300	1178.115	-0.185
3143	2837805.210	827830.190	1153.500	1153.765	0.265
3144	2883533.170	798327.690	1372.730	1372.766	0.036
3145	2873377.880	757277.370	1151.610	1151.725	0.115
3146	2923553.680	837815.620	1424.500	1424.976	0.476
3147	3169562.090	734690.230	2687.100	2686.901	-0.199
3148	3207655.820	761380.170	3753.750	3753.655	-0.095
3149	3227257.670	767196.710	3453.460	3453.614	0.154
3150	3198265.690	854738.470	2055.160	2055.168	0.008
3151	3207119.120	827682.490	2542.250	2542.510	0.260
3152	3224271.620	852523.590	2788.970	2789.351	0.381
3153	3183889.560	774093.880	2156.630	2156.529	-0.101
3154	3164341.870	760446.520	2196.450	2196.479	0.029
3155	3149690.440	731567.000	1981.210	1981.378	0.168
3156	3191474.100	810975.550	2557.430	2557.780	0.350
3157	3174236.130	795126.820	2351.770	2351.849	0.079
3158	3167966.350	855413.490	2045.840	2046.128	0.288
3159	3130322.430	848038.730	1739.720	1740.017	0.297
3160	3105462.630	828101.320	1632.650	1632.737	0.087
3161	3098096.610	807269.720	1493.050	1493.356	0.306
3162	3138356.800	797595.220	2225.270	2225.329	0.059
3162	3138356.800	797595.220	2225.280	2225.329	0.049
3163	3093615.360	759932.160	1535.500	1535.796	0.296
3164	3121581.070	746033.020	1977.530	1977.688	0.158
3165	3071475.280	693865.130	2366.820	2366.949	0.129
3166	2969001.620	680696.960	1525.500	1525.436	-0.064
3167	2997229.260	712737.830	1696.110	1696.247	0.137
3168	2972204.960	752897.800	1849.830	1850.217	0.387
3169	3017891.700	763012.430	1615.590	1615.686	0.096
3170	3037801.490	794656.870	1386.040	1385.726	-0.314
3171	3064597.550	773563.180	1513.670	1513.866	0.196
3172	3027830.710	834319.050	1390.560	1390.506	-0.054
3173	2988211.740	638225.780	2136.230	2136.239	0.009

3056E	2738004.680	819082.060	1182.000	1181.915	-0.085
3066E	2583015.560	669543.250	1162.760	1163.095	0.335
3089E	2553089.860	652449.040	928.780	928.904	0.124
3090E	2510202.540	598206.360	1010.070	1010.084	0.014

VERTICAL ACCURACY CONCLUSIONS

Vegetated Vertical Accuracy (VVA) Tested 0.557 Feet at the 95th percentile reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the DEM. Accuracy was tested against 172 VVA points. VVA Errors larger than 95th percentile include:
Point 3002, Easting 2014876.550, Northing 827029.260, Z-Error 0.756 Feet
Point 3004, Easting 1899371.410, Northing 807367.340, Z-Error 0.584 Feet
Point 3019, Easting 1655450.170, Northing 610320.220, Z-Error 0.923 Feet
Point 3034, Easting 1821339.850, Northing 647044.230, Z-Error 3.618 Feet
Point 3055, Easting 1670316.580, Northing 605783.060, Z-Error 0.592 Feet
Point 3084, Easting 2668594.810, Northing 556470.540, Z-Error 0.594 Feet
Point 3113, Easting 2793602.840, Northing 636839.390, Z-Error 1.014 Feet
Point 3120, Easting 2584756.690, Northing 666424.980, Z-Error 0.685 Feet

Figure 5.1: Lidar Relative Accuracy Histogram



RELATIVE ACCURACY ASSESSMENT AND CONCLUSION

Relative accuracy also known as "between swath" accuracy was tested through a series of well distributed flight line overlap locations. The relative accuracy for the East Tennessee FY16 Lidar measured at 0.123 Survey Feet RMSDz.

Approved by:	Name	Signature	Date
Associate Member, Lidar Specialist Certified Photogrammetrist #1381	Qian Xiao		February 2017

Section 6: Flight Logs

Flight logs for the project are shown on the following pages:

PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 1	

Project #	00113-07
Project Description	TN Macon
Location	Lafayette TN

Lever Arm

	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
2/5/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160205_220245

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed
	1	LDR160205_222	22:26:07	22:30:32	0:04:25	448	45.9	136000	YES	Y	1908	6260	
	2	LDR160205_223	22:33:48	22:43:18	0:09:30	448.1	45.9	136000	YES	Y	1946	6385	
	3	LDR160205_224	22:47:14	22:58:12	0:10:58	448.3	45.9	136000	YES	Y	1899	6230	
	4	LDR160205_230	23:01:24	23:11:18	0:09:54	448.2	45.9	136000	YES	Y	1909	6263	
	5	LDR160205_231	23:15:23	23:26:22	0:10:59	448.2	45.9	136000	YES	Y	1909	6263	
	6	LDR160205_232	23:29:33	23:39:28	0:09:55	448.3	45.9	136000	YES	Y	1910	6266	
	7	LDR160205_234	23:42:51	23:54:21	0:11:30	448.8	45.9	136000	YES	Y	1927	6322	
	8	LDR160205_235	23:57:13	0:07:40	0:10:27	448.5	45.9	136000	YES	Y	1915	6283	
	9	LDR160206_001	0:10:58	0:22:29	0:11:31	448.3	45.9	136000	YES	Y	1908	6260	
	10	LDR160206_002	0:25:23	0:35:49	0:10:26	448.4	45.9	136000	YES	Y	1892	6207	
	11	LDR160206_003	0:39:14	0:50:44	0:11:30	448.5	45.9	136000	YES	Y	1907	6257	
	12	LDR160206_005	0:53:40	1:04:14	0:10:34	448.5	45.9	136000	YES	Y	1917	6289	
	13	LDR160206_010	1:08:25	1:18:44	0:10:19	448.4	45.9	136000	YES	Y	1843	6047	
	14	LDR160206_012	1:21:34	1:30:57	0:09:23	448.4	45.9	136000	YES	Y	1891	6204	
	15	LDR160206_013	1:34:16	1:44:26	0:10:10	448.7	45.9	136000	YES	Y	1920	6299	
	16	LDR160206_014	1:47:22	1:56:52	0:09:30	448	45.9	136000	YES	Y	1982	6503	
	17	LDR160206_015	2:00:07	2:10:17	0:10:10	448.2	45.9	136000	YES	Y	1889	6197	
	UL001	LDR160206_021	2:12:48	2:18:01	0:05:13	448.3	45.9	136000	YES	Y	1888	6194	

LIDAR FLIGHT SUMMARY

		Hobbs Start	2946.8
Aircraft IMU Time	1:54:30	Hobbs Stop	2951.6
Sensor Collection Time	2:56:24	Hobbs Total	4.8
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/5/2016	36	76269	2	East TN Block 1

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Swain	N111SD	296.4	9:40:00	14:40:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
SWAIN	ALS-8194	300.9	14:30:00	19:30:04	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	ktys
020/5kts	10 sm	clear	0	-1	-7	30.44	Light Haze	Arriving	ktys

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
154	Kts	1922	Ft		Ft	Yes		No	x	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At: 14:35:00
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission: Yes X No
76	S	15:10:51	15:22:19	0:11:28	20	1.2		7135	
75	N	15:25:39	15:37:30	0:11:51	19	1.2		7138	
74	S	15:39:41	15:51:57	0:12:16	18	1.4		7135	
73	N	15:53:54	16:06:42	0:12:48	18	1.4		7132	
72	S	16:09:36	16:21:00	0:11:24	21	1.2		7139	
71	N	16:24:13	16:36:25	0:12:12	22	1.1		7183	
70	S	16:38:55	16:50:21	0:11:26	21	1.1	158	7130	
69	N	16:53:33	17:05:45	0:12:12	22	1.1	151	7140	
68	S	17:08:22	17:19:43	0:11:21	21	1.1	157	7152	
67	N	17:22:24	17:34:28	0:12:04	20	1.1	150	7158	
66	S	17:37:05	17:48:22	0:11:17	19	1.1	161	7153	
65	N	17:51:13	18:03:20	0:12:07	20	1.0	150	7146	
64	S	18:05:56	18:17:15	0:11:19	20	1.0	162	7125	
63	N	18:20:41	18:33:02	0:12:21	17	1.2	151	7121	
62	S	18:35:26	18:46:46	0:11:20	16	1.3	154	7114	
61	N	18:49:18	19:01:12	0:11:54	16	1.1	156	7141	
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
				0:00:00					
				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		1			Verify S-Turns After Mission: Yes X No

Additional Comments:

Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/5/2016	36	76269	2	East TN Block 1

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Swain	N111SD	300.9	15:10:00	21:10:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
SWAIN	ALS-8194	303.6	18:22:00	0:10:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	ktys
Variable/5	10	25,000 broken	75	7	-9	30.38	Light Haze	Arriving	ktys

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
154	Kts	1922	Ft		Ft	Yes		No	x	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At: 14:35:00
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission: Yes X No
60	S	21:39:23	21:52:24	0:13:01	17	1.1	155	7180	Several lines returned an error:
59	N	21:55:09	22:08:20	0:13:11	17	1.1	164	7167	"ALS Warning AG % return (76) is less
58	S	22:11:01	22:23:54	0:12:53	19	1.0	160	7147	than the selected value (80)"
57	S	22:26:44	22:39:59	0:13:15	16	1.2	153	7144	The return values would fluctuatute.
56	S	22:42:22	22:55:16	0:12:54	16	1.3	152	7125	The errors sometimes referred to the
55	N	22:58:44	23:12:56	0:14:12	17	1.4	158	7138	BG % as well.
54	S	23:15:28	23:29:23	0:13:55	18	1.2	165	7130	
53	N	23:32:17	23:46:15	0:13:58	17	1.2	162	7150	
				0:00:00					Note: Upon retrieving the GPS Base
				0:00:00					Station, the FBO had park a
				0:00:00					Gulfstream next to the station.
				0:00:00					The tail of the jet could have possibly
				0:00:00					blocked some of the satellites.
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		1			Verify S-Turns After Mission: Yes X No

Additional Comments: Drive #

PAR LLC
PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 2	

Project #	00113-07
Project Description	TN Macon
Location	Lafayette TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
2/6/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160206_030628

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed
	18	LDR160206_032	3:28:50	3:38:20	0:09:30	448	45.9	136000	YES	Y	1910	6266	
	19	LDR160206_034	3:41:44	3:52:02	0:10:18	448.3	45.9	136000	YES	Y	1877	6158	
	20	LDR160206_035	3:54:52	4:04:14	0:09:22	448.5	45.9	136000	YES	Y	1873	6145	
	21	LDR160206_040	4:07:36	4:16:50	0:09:14	448.5	45.9	136000	YES	Y	1915	6283	
	22	LDR160206_041	4:20:00	4:28:18	0:08:18	448.1	46.0	136000	YES	Y	1908	6260	
	23	LDR160206_043	4:31:56	4:40:54	0:08:58	448.3	45.9	136000	YES	Y	1861	6106	
	24	LDR160206_044	4:44:17	4:52:35	0:08:18	448.5	46.0	136000	YES	Y	1943	6375	
	25	LDR160206_045	4:56:37	5:05:19	0:08:42	448.4	45.9	136000	YES	Y	1859	6099	
	26	LDR160206_050	5:09:05	5:15:15	0:06:10	448.5	45.9	136000	YES	Y	2003	6572	
	27	LDR160206_051	5:18:31	5:21:59	0:03:28	448.4	45.9	136000	YES	Y	1880	6168	
	UL001	LDR160206_052	5:24:56	5:28:25	0:03:29	448.4	45.9	136000	YES	Y	1981	6499	

LIDAR FLIGHT SUMMARY

		Hobbs Start	2951.6
Aircraft IMU Time	2:35:40	Hobbs Stop	2954.8
Sensor Collection Time	1:25:47	Hobbs Total	3.2
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 1	

Project #	00113-07
Project Description	TN Davidson
Location	Nashville, TN

Lever Arm

	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
2/6/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160206_161121

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed
	1	LDR160206_164	16:41:17	16:43:41	0:02:24	447.5	45.9	136000	YES	Y	1965	6447	
	2	LDR160206_164	16:47:09	16:49:41	0:02:32	447.6	45.9	136000	YES	Y	1883	6178	
	3	LDR160206_165	16:52:48	16:55:13	0:02:25	447.5	45.9	136000	YES	Y	1936	6352	
	4	LDR160206_165	16:58:56	17:01:28	0:02:32	447.6	45.9	136000	YES	Y	1947	6388	
	5	LDR160206_170	17:06:57	17:12:35	0:05:38	448	45.9	136000	YES	Y	1923	6309	
	6	LDR160206_171	17:16:25	17:22:27	0:06:02	447.9	45.9	136000	YES	Y	1846	6056	
	7	LDR160206_172	17:25:47	17:31:25	0:05:38	448.1	45.9	136000	YES	Y	1857	6093	
	8	LDR160206_173	17:34:56	17:40:49	0:05:53	448.1	45.9	136000	YES	Y	1857	6093	
	9	LDR160206_174	17:44:13	17:49:42	0:05:29	448.3	45.9	136000	YES	Y	1864	6115	
	10	LDR160206_175	17:53:01	18:03:43	0:10:42	448.2	45.9	136000	YES	Y	1852	6076	
	11	LDR160206_180	18:06:56	18:16:18	0:09:22	448.3	45.9	136000	YES	Y	1876	6155	
	12	LDR160206_181	18:19:38	18:19:43	0:00:05	448.1	45.9	136000	YES	Y	1924	6312	
	12	LDR160206_182	18:24:29	18:34:23	0:09:54	447.7	45.9	136000	YES	Y	1858	6096	
	13	LDR160206_183	18:37:22	18:46:36	0:09:14	448.3	45.9	136000	YES	Y	1854	6083	
	14	LDR160206_184	18:49:59	19:03:22	0:13:23	448.8	46.0	136000	YES	Y	1835	6020	
	15	LDR160206_190	19:06:35	19:17:42	0:11:07	448.2	45.9	136000	YES	Y	1893	6211	
	16	LDR160206_192	19:21:07	19:33:10	0:12:03	447.4	45.9	136000	YES	Y	1958	6424	
	17	LDR160206_193	19:35:57	19:47:04	0:11:07	448.3	45.9	136000	YES	Y	1915	6283	
	18	LDR160206_195	19:50:29	20:02:24	0:11:55	448.5	45.9	136000	YES	Y	1969	6460	
	19	LDR160206_200	20:05:10	20:16:24	0:11:14	448.3	45.9	136000	YES	Y	1910	6266	
	UL001	LDR160206_201	20:18:18	20:23:23	0:05:05	448.5	46.0	136000	YES	Y	1897	6224	

LIDAR FLIGHT SUMMARY

		Hobbs Start	2955.4
Aircraft IMU Time	4:29:08	Hobbs Stop	2960
Sensor Collection Time	2:33:44	Hobbs Total	4.6
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew		Project #	00113-07	Lever Arm	x	y	z
		Project Description		GPS (m)	-0.110	0.210	-1.220
DRIVE A		TN Davidson					
		Location					
MISSION 2		Nashville, TN					

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
2/6/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160206_211155

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed
	20	LDR160206_213	21:38:00	21:49:54	0:11:54	448.4	45.9	136000	YES	Y	1858	6096	
	21	LDR160206_215	21:53:00	22:04:23	0:11:23	448.4	45.9	136000	YES	Y	1893	6211	
	22	LDR160206_220	22:07:31	22:19:25	0:11:54	448.5	45.9	136000	YES	Y	1870	6135	
	23	LDR160206_222	22:22:16	22:33:31	0:11:15	448.4	45.9	136000	YES	Y	1878	6161	
	24	LDR160206_223	22:36:52	22:48:14	0:11:22	448.4	45.9	136000	YES	Y	1902	6240	
	25	LDR160206_225	22:54:32	23:05:06	0:10:34	448.5	45.9	136000	YES	Y	1923	6309	
	26	LDR160206_230	23:08:38	23:19:53	0:11:15	448.5	45.9	136000	YES	Y	1939	6362	
	27	LDR160206_232	23:23:00	23:33:42	0:10:42	448.6	45.9	136000	YES	Y	1837	6027	
	28	LDR160206_233	23:37:21	23:49:48	0:12:27	448.4	45.9	136000	YES	Y	1936	6352	
	29	LDR160206_235	23:52:55	0:04:50	0:11:55	448.6	45.9	136000	YES	Y	1853	6079	
	30	LDR160207_000	0:08:17	0:20:44	0:12:27	449.6	45.9	136000	YES	Y	1930	6332	
	31	LDR160207_002	0:24:00	0:36:03	0:12:03	448.6	45.9	136000	YES	Y	1881	6171	
	32	LDR160207_003	0:39:26	0:52:33	0:13:07	448.7	45.9	136000	YES	Y	1903	6243	
	33	LDR160207_005	0:55:34	1:08:01	0:12:27	448.6	45.9	136000	YES	Y	1859	6099	
	34	LDR160207_011	1:11:48	1:24:55	0:13:07	448.2	45.9	136000	YES	Y	1903	6243	
	UL001	LDR160207_012	1:28:01	1:32:18	0:04:17	448.4	45.9	136000	YES	Y	1955	6414	

LIDAR FLIGHT SUMMARY

		Hobbs Start	2960
Aircraft IMU Time	4:37:44	Hobbs Stop	2964.9
Sensor Collection Time	3:02:09	Hobbs Total	4.9
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour		#DIV/0!	

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/6/2016	37	76269	2	TN E Co

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Swain	N111SD	303.6	8:48:00	13:48:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
SWAIN	ALS-8194	307.9	13:35:00	18:35:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	ktys
080/3kts	10	10K scattered	50%	-2	-7	30.39	Slight Haze	Arriving	ktys

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
165	Kts	1878	M		Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At: 13:51:30
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission: Yes X No
52	S	14:30:43	14:44:32	0:13:49	18	1.1	163	7114	
51	N	14:47:06	15:00:50	0:13:44	19	1.1	157	7148	
50	S	15:03:19	15:17:08	0:13:49	20	1.1	161	7124	
49	N	15:19:38	15:33:25	0:13:47	19	1.2	158	7144	
48	S	15:36:11	15:49:33	0:13:22	18	1.3	157	7113	
47	N	15:52:07	16:05:32	0:13:25	17	1.5	158	7136	
46	S	16:08:09	16:21:22	0:13:13	20	1.1	161	7122	
45	N	16:24:23	16:37:53	0:13:30	21	1.0	160	7121	
44	S	16:40:27	16:53:42	0:13:15	21	1.1	158	7116	
43	N	16:56:57	17:09:02	0:12:05	24	1.1	162	7134	
42	S	17:11:25	17:23:12	0:11:47	22	1.1	159	7145	
41	N	17:25:57	17:37:46	0:11:49	21	1.1	161	7166	
40	S	17:40:03	17:51:53	0:11:50	22	1	157	7126	
39	N	17:54:39	18:07:13	0:12:34	22	1	157	7131	
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
				0:00:00					
				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		1			Verify S-Turns After Mission: Yes X No

Additional Comments: Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/6/2016	37	76269	2	TN E Co

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Swain	N111SD	307.9	15:10:00	20:10:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
SWAIN	ALS-8194	0.8	23:22:00	23:22:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	ktys
360/7	10	8K scattered	50	9	-9	30.3	Haze	Arriving	ktys

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
155	Kts	1832	M		Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At: 13:37:00
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission: Yes X No
38	S	20:38:29	20:45:56	0:07:27	17	1.1	150	7150	
37	N	20:48:37	20:56:03	0:07:26	16	1.2	158	7171	
36	S	20:58:39	21:06:06	0:07:27	15	1.3	157	7138	
35	N	21:08:55	21:11:37	0:02:42	14	1.4	152	7139	Clouded out. Aborted line at 21:12:42
				0:00:00					
				0:00:00					
				0:00:00					Moved to Block 2. Started with line 53
53	S	21:20:20	21:29:20	0:09:00	14	1.3	161	7137	
54	N	21:32:44	21:40:11	0:07:27	16	1.2	160	7128	
55	S	21:42:36	21:47:00	0:04:24	17	1.1	155	7173	
56	N	21:49:32	21:54:03	0:04:31	17	1.1	158	7134	
57	S	21:56:25	22:00:56	0:04:31	17	1.1	154	7131	
58	N	22:04:28	22:08:29	0:04:01	18	1.2	159	7133	
59	S	22:10:43	22:14:55	0:04:12	17	1.1	158	7134	
60	N	22:17:24	22:21:48	0:04:24	16	1.2	157	7136	
61	S	22:24:17	22:28:48	0:04:31	16	1.2	155	7136	
62	N	22:31:09	22:35:43	0:04:34	16	1.3	159	7132	
63	S	22:38:14	22:42:50	0:04:36	16	1.3	159	7130	
64	N	22:45:36	22:49:55	0:04:19	16	1.3	160	7134	
65	S	22:52:52	22:57:44	0:04:52	16	1.4	159	7131	
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
				0:00:00					
				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		1			Verify S-Turns After Mission: Yes X No

Additional Comments: Drive #

PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 3	

Project #	00113-07
Project Description	TN Davidson
Location	Nashville, TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
2/7/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160207_135717

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	35	LDR160207_142	14:27:52	14:40:27	0:12:35	447.2	45.9	136000	YES	Y	1838	6030		
	36	LDR160207_144	14:44:09	14:56:28	0:12:19	447.6	45.9	136000	YES	Y	1904	6247		
	37	LDR160207_145	14:59:56	15:13:27	0:13:31	447.6	45.9	136000	YES	Y	1886	6188		
	38	LDR160207_151	15:17:06	15:28:12	0:11:06	448.3	45.9	136000	YES	Y	1900	6234		
	39	LDR160207_153	15:32:03	15:43:42	0:11:39	448.1	45.9	136000	YES	Y	1952	6404		
	40	LDR160207_154	15:47:29	15:58:51	0:11:22	448.3	45.9	136000	YES	Y	1926	6319		
	41	LDR160207_160	16:02:42	16:14:45	0:12:03	448.3	45.9	136000	YES	Y	1926	6319		
	42	LDR160207_161	16:18:40	16:29:30	0:10:50	448.4	45.9	136000	YES	Y	1891	6204		
	43	LDR160207_163	16:33:21	16:43:55	0:10:34	448.5	45.9	136000	YES	Y	1952	6404		
	UL001	LDR160207_164	16:48:24	16:51:28	0:03:04	448.4	45.9	136000	YES	Y	1869	6132		

LIDAR FLIGHT SUMMARY

		Hobbs Start	2965
Aircraft IMU Time	3:09:29	Hobbs Stop	2968.4
Sensor Collection Time	1:49:03	Hobbs Total	3.4
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour		#DIV/0!	

PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 4	

Project #	00113-07
Project Description	TN Davidson
Location	Nashville, TN

Lever Arm

	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
2/7/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160207_173458

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed
	44	LDR160207_180	18:05:11	18:15:37	0:10:26	448.3	45.9	136000	YES	Y	1911	6270	
	45	LDR160207_181	18:19:37	18:30:35	0:10:58	448.2	45.9	136000	YES	Y	1952	6404	
	46	LDR160207_183	18:34:03	18:44:37	0:10:34	448.5	45.9	136000	YES	Y	1894	6214	
	47	LDR160207_184	18:48:45	18:58:15	0:09:30	448.4	45.9	136000	YES	Y	1997	6552	
	48	LDR160207_190	19:01:53	19:11:15	0:09:22	448.5	45.9	136000	YES	Y	1891	6204	
	49	LDR160207_191	19:14:47	19:24:26	0:09:39	448.5	45.9	136000	YES	Y	1947	6388	
	50	LDR160207_192	19:27:35	19:37:05	0:09:30	448.6	45.9	136000	YES	Y	1943	6375	
	51	LDR160207_194	19:41:33	19:46:31	0:04:58	448.5	45.9	136000	YES	Y	1946	6385	
	52	LDR160207_194	19:49:51	19:54:48	0:04:57	448.6	45.9	136000	YES	Y	1936	6352	
	53	LDR160207_195	19:58:29	20:03:26	0:04:57	448.5	45.9	136000	YES	Y	1942	6371	
	54	LDR160207_200	20:06:32	20:11:29	0:04:57	448.5	45.9	136000	YES	Y	1940	6365	
	55	LDR160207_201	20:14:48	20:19:45	0:04:57	448.4	45.9	136000	YES	Y	1946	6385	
	56	LDR160207_202	20:23:11	20:25:35	0:02:24	448.6	45.9	136000	YES	Y	1970	6463	
	57	LDR160207_202	20:29:25	20:31:57	0:02:32	448.3	45.9	136000	YES	Y	1931	6335	
	58	LDR160207_203	20:34:55	20:37:20	0:02:25	448.2	45.9	136000	YES	Y	1967	6453	
	59	LDR160207_204	20:40:56	20:43:21	0:02:25	448.3	45.9	136000	YES	Y	1930	6332	
	UL001	LDR160207_204	20:46:11	20:51:16	0:05:05	448.3	45.9	136000	YES	Y	1940	6365	

LIDAR FLIGHT SUMMARY

		Hobbs Start	2968.4
Aircraft IMU Time	3:33:31	Hobbs Stop	2972.1
Sensor Collection Time	1:49:36	Hobbs Total	3.7
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/7/2016	38	76269	2	TN E Co

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Swain	N111SD	310.8	8:49:00	13:49:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
SWAIN	ALS-8194	315.2	13:37:00	18:37:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	7	Haze/Fire/Cloud	Departing	KTYS
Calm/0	10	Clear	0%	-1	-4	30.20	Haze	Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
156	Kts	1926	M		Ft	Yes		No	x	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At: 13:32:00
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission: Yes X No
35	N	14:18:05	14:25:30	0:07:25	18	1.1	156	7133	Reflight. Aborted on 02/06/2016
34	S	14:28:38	14:35:55	0:07:17	20	1.1	158	7122	
33	N	14:38:00	14:46:34	0:08:34	19	1.2	158	7131	
32	S	14:49:31	14:55:54	0:06:23	19	1.2	162	7126	
31	N	14:58:47	15:05:19	0:06:32	20	1.1	160	7145	
30	S	15:07:40	15:14:05	0:06:25	20	1.1	157	7121	
29	N	15:17:04	15:23:37	0:06:33	20	1.1	152	7154	
28	S	15:25:57	15:32:24	0:06:27	20	1.1	160	7125	
27	N	15:35:01	15:39:31	0:04:30	18	1.4	156	7168	
26	S	15:41:47	15:46:13	0:04:26	18	1.4	163	7142	
25	N	15:48:46	15:53:16	0:04:30	18	1.4	162	7145	
24	S	15:55:51	16:00:18	0:04:27	20	1.2	161	7122	
23	N	16:02:46	16:07:18	0:04:32	20	1.1	155	7157	
22	S	16:10:12	16:14:07	0:03:55	20	1.1	155	7161	
21	N	16:16:38	16:20:37	0:03:59	20	1.1	151	7163	
20	S	16:23:06	16:26:59	0:03:53	22	1.0	161	7144	
19	N	16:29:26	16:33:26	0:04:00	21	1.1	156	7163	
18	S	16:35:47	16:39:39	0:03:52	22	1.1	160	7125	
17	N	16:41:58	16:46:00	0:04:02	22	1.1	155	7186	
16	S	16:48:46	16:52:10	0:03:24	22	1.1	162	7124	
15	N	16:54:41	16:58:11	0:03:30	22	1.1	156	7150	
14	S	17:00:45	17:04:11	0:03:26	20	1.2	157	7111	
13	N	17:06:39	17:10:10	0:03:31	20	1.2	155	7129	
12	S	17:12:34	17:15:58	0:03:24	20	1.1	158	7143	
11	N	17:18:40	17:21:10	0:02:30	19	1.2	152	7168	
10	S	17:23:48	17:26:16	0:02:28	20	1.2	155	7132	
9	N	17:28:37	17:31:06	0:02:29	21	1.0	155	7130	
8	S	17:33:43	17:36:05	0:02:22	20	1.0	160	7124	
7	N	17:38:38	17:41:06	0:02:28	19	1.1	154	7145	
6	S	17:44:07	17:45:32	0:01:25	21	1.0	157	7134	
5	N	17:47:53	17:49:25	0:01:32	22	1.0	148	7134	
↑ Times entered are Zulu / GMT ↑				Page		1			Verify S-Turns After Mission: Yes X No

Additional Comments: Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/7/2016	38	76269	2	TN E Co

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
	N111SD	310.8	9:18:05	14:18:05	WOOLPERT PIN
Pilot	Sensor Type	HOBBS END	Local End Time	Zulu End Time	PID
SWAIN		315.2	13:18:39	18:18:39	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	
Calm/0	10	Clear	0%	-1	-4	30.20		Arriving	

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain		Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi		B	

Air Speed		AGL		MSL		Waveform Used		Waveform Mode	Pre-Trigger Dist.
Kts		Ft		Ft	Yes		No		@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	13:32:00
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes ☐ No ☐
4	**S**	**17:51:54**	**17:53:19**	**0:01:25**	**22**	**1.0**	**159**	**7133**	
3	**N**	**17:55:57**	**17:57:26**	**0:01:29**	**21**	**1.1**	**150**	**7128**	
2	**S**	**17:59:58**	**18:01:24**	**0:01:26**	**20**	**1.1**	**156**	**7122**	
1	**N**	**18:03:58**	**18:05:26**	**0:01:28**	**20**	**1.1**	**154**	**7115**	
77	**E**	**18:10:27**	**18:18:39**	**0:08:12**	**20**	**1.1**	**161**	**7091**	
				0:00:00					
				0:00:00					
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↑ Times entered are Zulu / GMT ↑				**Page**		**2**		Verify S-Turns After Mission	Yes ☐ No ☐

Additional Comments:	Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/7/2016	38	76269	2	TN E Co

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Swain	N111SD	315.2	14:57:00	19:57:00	WOOLPERT PIN
Pilot	Sensor Type	HOBBS END	Local End Time	Zulu End Time	PID
SWAIN	ALS-8194	316.7	21:48:00	2:48:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
0	0	Few 25K	5%	10	-6	30.02	Slight Haze	Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used				Waveform Mode	Pre-Trigger Dist.
160	Kts	1931	M		Ft	Yes		No	x	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At: 13:32:00
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission Yes X No
1	S	20:21:28	20:24:55	0:03:27	16	1.2	158	7126	
2	N	20:27:23	20:30:55	0:03:32	16	1.2	152	7125	
3	S	20:33:48	20:37:12	0:03:24	17	1.1	160	7123	
4	N	20:39:36	20:43:07	0:03:31	16	1.2	157	7128	
5	S	20:45:44	20:49:06	0:03:22	16	1.2	159	7119	
6	N	20:51:34	20:55:06	0:03:32	16	1.2	156	7117	
7	S	20:58:32	21:09:28	0:10:56	15	1.3	156	7144	
8	N	21:11:58	21:22:57	0:10:59	14	1.3	158	7188	
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
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↑ Times entered are Zulu / GMT ↑				Page		1			Verify S-Turns After Mission Yes X No

Additional Comments:	Drive #
Block 2	

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/27/2016	58	75556	2	Block2_East TN Lidar

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
GALAMBOS	N111SD	318.7	3:31:00	20:31:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	322.0	6:22:00	23:22:00	KTYS-2:37 PM

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
240 11	10	Clear		11	-2	30.19		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	Varies	Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	20:06:04
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
				17:06:46				sensor 8194/takeoff: 2016z	
66	S	20:31:06	20:35:40	0:00:00	16	0.7	1.3	refly to fast	
67	N	20:40:07	20:45:41	0:00:00	18	0.6	1.1		
68	S	20:49:21	20:54:26	0:00:00	18	0.6	1.2		
69	N	20:58:03	21:04:54	0:00:00	16	0.7	1.3		
70	S	21:08:38	21:14:54	0:00:00	16	0.7	1.3		
71	N	21:18:23	21:24:10	0:00:00	16	0.7	1.4		
72	S	21:27:15	21:32:42	0:00:00	16	0.7	1.3		
73	N	21:36:21	21:42:03	0:00:00	16	0.7	1.5	Slightly offline	
74	S	21:45:25	21:50:42	0:00:00	16	0.7	1.3	Light Dusting of Snow Mount Tops	
75	N	21:54:23	21:59:04	0:00:00	18	0.6	1.2		
76	S	22:03:27	22:08:46	0:00:00	18	0.6	1		
77	N	22:13:06	22:17:30	0:00:00	18	0.6	1		
78	S	22:20:57	22:25:12	0:00:00	18	0.6	1.1		
79	N	22:29:33	22:34:04	0:00:00	18	0.6	1.2		
80	S	22:37:57	22:42;16	0:00:00	18	0.6	1.3		
81	N	22:45:52	22:50:17	0:00:00	17	0.6	1.4		
82	S	22:53:48	22:58:13	0:00:00	18	0.6	1		
83	N	23:01:52	23:06:18	0:00:00	18	0.6	1		
84	S	23:09:41	23:14:00	0:00:00	18	0.6	1.2		
85	N	23:17:28	23:22:04	0:00:00	18	0.6	1.2		
				0:00:00				Landing 2332z	
				0:00:00				Ending Static: 23:34:50	
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission	Yes X No

Additional Comments: Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2'/28/16	59	76269	2	2016_East_TN_Lidar

Operator	Aircraft	HOBBS Start	Local Start Time	Zulu Start Time	Base
GALAMBOS	N111SD	322.0	10:04:00	15:04:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	325.2	12:48:00	17:48:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
040 4	10	Clear		6	0	30.19		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	Varies	Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	14:38:02
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
9	S	15:04:17	15:16:09	6:53:19	19	0.7	1.1	SENSOR: 8194/Takeoff 14:47z	
10	N	15:19:48	15:33:31	0:00:00	21	0.6	1	"A" Flight	
11	S	15:34:57	15:47:03	0:00:00	19	0.6	1		
12	N	15:50:38	16:03:26	0:00:00	18	0.6	1		
13	S	16:07:36	16:21:03	0:00:00	20	0.6	1.1		
14	N	16:24:19	16:37:20	0:00:00	19	0.6	1		
15	S	16:41:11	16:54:53	0:00:00	19	0.6	1		
16	N	16:58:19	17:11:27	0:00:00	16	0.7	1.3		
17	S	17:15:35	17:29:35	0:00:00	15	0.7	1.4		
18	N	17:33:20	17:48:40	0:00:00	17	0.7	1.4	Landing: 18:01z	
				0:00:00				Static: 18:02:52	
				0:00:00					
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↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission	Yes X No

Additional Comments:	Drive #
	120

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/28/2016	59	76269	2	2016_East_TN_Lidar

Operator	Aircraft	HOBBS Start	Local Start Time	Zulu Start Time	Base
GALAMBOS	N111SD	325.2	2:25:00	19:25:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	328.9	5:39:00	22:39:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
240 15	10	Clear		8	-1	30.04		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	Varies	Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	18:58:25
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
19	S	19:25:00	19:42:07	0:00:00	15	0.7	1.2	SENSOR: 8194/Takeoff: 19:08	
				0:00:00	15	0.7	1.2	"B" Flight/ Sensor failed at IP Note	
21	S	20:36;58	20:54;11	0:00:00	16	0.7	1.2	Rebooted in air, over base 20:23:10	
20	N	20:57:43	20:57;43	0:00:00	15	0.7	1.2		
23	S	21:17:25	21:34:34	0:00:00	16	0.7	1.2	Turblence south end over Mountain	
22	N	21:38:30	21:53:37	0:00:00	18	0.6	1.2	Turblence south end over Mountain	
25	S	21:57:17	22:15:00	0:00:00	15	0.7	1.2	Off line wih 22 miles to go	
24	N	22:18:32	22:34:29	0:00:00	15	0.7	1.2	Offline with 15 miles to go	
27	S	22:37:30	22:39:00	0:00:00	15	0.7	1.2	24 degrees of crab	
				0:00:00				Red Stop sign, error stopped record	
				0:00:00				Recycle power.....we decided to end	
				0:00:00				todays mission	
				0:00:00					
				0:00:00					
				0:00:00					
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↑ Times entered are Zulu / GMT ↑			Page		1			Verify S-Turns After Mission	Yes No X

Additional Comments: Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/28/2016	59	76269	2	2016_East_TN_Lidar

Operator	Aircraft	HOBBS Start	Local Start Time	Zulu Start Time	Base
GALAMBOS	N111SD	325.2	2:25:00	19:25:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	328.9	5:39:00	22:39:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
240 15	10	Clear		8	-1	30.04		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	Varies	Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	18:58:25
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
19	S	19:25:00	19:42:07	0:00:00	15	0.7	1.2	SENSOR: 8194/Takeoff: 19:08	
				0:00:00	15	0.7	1.2	"B" Flight/ Sensor failed at IP Note	
21	S	20:36;58	20:54;11	0:00:00	16	0.7	1.2	Rebooted in air, over base 20:23:10	
20	N	20:57:43	20:57;43	0:00:00	15	0.7	1.2		
23	S	21:17:25	21:34:34	0:00:00	16	0.7	1.2	Turblence south end over Mountain	
22	N	21:38:30	21:53:37	0:00:00	18	0.6	1.2	Turblence south end over Mountain	
25	S	21:57:17	22:15:00	0:00:00	15	0.7	1.2	Off line wih 22 miles to go	
24	N	22:18:32	22:34:29	0:00:00	15	0.7	1.2	Offline with 15 miles to go	
27	S	22:37:30	22:39:00	0:00:00	15	0.7	1.2	24 degrees of crab	
				0:00:00				Red Stop sign, error stopped record	
				0:00:00				Recycle power.....we decided to end	
				0:00:00				todays mission	
				0:00:00					
				0:00:00					
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↑ Times entered are Zulu / GMT ↑			Page		1			Verify S-Turns After Mission	Yes No X

Additional Comments: Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/29/2016	60	76269	2	2016_East_TN_Lidar

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
GALAMBOS	N111SD	328.9	2:41:00	19:41:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	333.6	6:49:00	23:49:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
240 7	10	Clear	FEW 50	18	3	30.05		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	Varies	Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	19:08:27
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
26	N	19:41:18	19:57;34	16:18:14	15	0.8	1.4	SENSOR: 8194/Takeoff: 1915z	
27	S	20:00:56	20:17:18	0:00:00	18	0.7	1.2		
28	N	20:20:42	20:37:07	0:00:00	16	0.6	1.2		
29	S	20:40:44	20:56:36	0:00:00	16	0.7	1.2		
30	N	21:00:08	21:16:36	0:00:00	16	0.7	1.2		
31	S	21:19:54	21:35:15	0:00:00	17	0.7	1.4		
32	N	21:38:22	21:54:57	0:00:00	16	0.6	1.2		
33	S	21:57:56	22:13:24	0:00:00	16	0.6	1.2		
34	N	22:16;59	22:32:39	0:00:00	17	0.6	1,1		
35	S	22:36:23	22:51:57	0:00:00	18	0.6	1		
36	N	22:55:21	23:11:20	0:00:00	18	0.6	1.3		
37	S	23:14:48	23:30:19	0:00:00	19	0.6	1.2		
38	N	23:33:36	23:49:09	0:00:00	20	0.6	1.1	00:02 landing	
				0:00:00				Static: 00:05:00	
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission	Yes X No

Additional Comments:	Drive #
	00128

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/6/2016	66	76269		TN block 3

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
SMITH	N7079F	318.6	10:08:00	15:08:00	
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
GEBHART	OTHER	326.0	5:28:00	22:28:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	mor
calm	10			7	-2	3030		Arriving	mor

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain		Mode			
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	7360	Ft	Yes		No		@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes	X	No
1	s	15:22:00	15:28:00		22	0.6	1				
2	n	15:32:00	15:38:00		21	0.6	1				
3	s	15:42:00	15:48:00		20	0.6	1				
4	n	15:52:00	15:58:00		20	0.6	1				
5	s	16:01:00	16:07:00		20	0.6	1.1				
6	n	16:10:00	16:17:00		19	0.6	1.3				
7	s	16:20:00	16:27:00		18	0.6	1.2				
8	n	16:30:00	16:37:00		16	0.6	1.4				
9	s	16:40:00	16:46:00		16	0.6	1.4				
10	n	16:50:00	16:56:00		16	0.6	1.2				
11	s	16:59:00	17:05:00		16	0.6	1.2				
12	n	17:09:00	17:15:00		16	0.6	1.2				
13	s	17:19:00	17:25:00		18	0.6	1				
14	n	17:28:00	17:34:00		15	0.6	1.2				
15	s	17:38:00	17:44:00		15	0.6	1.2				
16	n	17:47:00	17:53:00		14	0.6	1.4				
17	s	17:57:00	18:03:00		16	0.6	1.2				
18	n	18:06:00	18:12:00		15	0.6	1.3				
19	s	18:16:00	18:22:00		16	0.6	1.2				
20	n	18:26:00	18:33:00		15	0.6	1.2				
21	s	18:36:00	18:42:00		16	0.6	1.2				
22	n	18:45:00	18:52:00		15	0.6	1.2				
23	s	19:00:00	19:13:00		14	0.6	1.4				
24	n	19:16:00	19:28:00		13	0.6	1.3				
25	s	19:31:00	19:44:00		16	0.6	1.2				
26	n	19:47:00	19:59:00		16	0.6	1.1				
27	s	20:02:00	20:15:00		18	0.6	1.2				
28	n	20:18:00	20:24:00		17	0.6	1.1				
29	s	20:33:00	20:45:00		17	0.6	1.2				
30	n	20:48:00	21:01:00		15	0.6	1.4				
31	s	21:04:00	21:16:00		17	0.6	1.2				
↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission	Yes	X	No

Additional Comments:

Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/6/2016	66	76269	0	TN block 3

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	
								Arriving	

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain		Mode		Threshold Values	
				Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi		B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode	Pre-Trigger Dist.
	Kts		Ft		Ft	Yes		No		@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes ☐ No ☐
32	n	21:19:00	21:32:00		17	0.6	1.2		
33	s	21:35:00	21:47:00		18	0.6	1.2		
34	n	21:50:00	22:02:00		18	0.6	1.2		
35	s	22:05:00	22:17:00		16	0.6	1.5		
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		2		Verify S-Turns After Mission	Yes ☐ No ☐

Additional Comments:	Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/7/2016	67	76269		TN block 3

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
SMITH	N7079F	326.0	10:39:00	15:39:00	
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
GEBHART	OTHER	333.2	5:53:00	22:53:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	mor
010/4	10			11	2	3029		Arriving	mor

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain		Mode			
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	7360	Ft	Yes		No		@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
36	n	15:50:00	16:02:00		22	0.6	1		
37	s	16:06:00	16:19:00		20	0.6	1.2		
38	n	16:22:00	16:35:00		19	0.6	1.3		
39	s	16:38:00	16:51:00		16	0.6	1.4		
40	n	16:54:00	17:06:00		16	0.6	1.2		
41	s	17:10:00	17:22:00		18	0.6	1		
42	n	17:25:00	17:38:00		16	0.6	1.1		
43	s	17:41:00	17:54:00		15	0.6	1.3		
44	n	17:57:00	18:10:00		16	0.6	1.1		
45	s	18:13:00	18:26:00		16	0.6	1.2		
46	n	18:29:00	18:41:00		16	0.6	1.2		
47	s	18:45:00	18:58:00		16	0.6	1.3		
48	n	19:01:00	19:13:00		14	0.6	1.5		
49	s	19:17:00	19:30:00		16	0.6	1.4		
50	n	19:32:00	19:45:00		18	0.6	1.2		
51	s	19:49:00	20:02:00		18	0.6	1.2		
52	n	20:05:00	20:17:00		17	0.6	1.2		
53	s	20:20:00	20:32:00		17	0.6	1.2		
54	n	20:35:00	20:48:00		17	0.6	1.3		
55	s	20:52:00	21:04:00		17	0.6	1.4		
56	n	21:07:00	21:20:00		18	0.6	1.2		
57	s	21:24:00	21:37:00		18	0.6	1.2		
58	n	21:40:00	21:53:00		17	0.6	1.2		
59	s	21:56:00	22:09:00		15	0.6	1.6		
60	n	22:12:00	22:24:00		17	0.6	1.4		
61	s	22:28:00	22:41:00		18	0.6	1.2		
↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission	Yes X No

Additional Comments:

Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/8/2016	68	76269		TN block 3,4

Operator	Aircraft	HOBBS Start	Local Start Time	Zulu Start Time	Base
SMITH	N7079F	333.2	10:40:00	15:40:00	
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
GEBHART	OTHER	337.9	3:20:00	20:20:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	mor
var	10			15	4	3031		Arriving	mor

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain		Mode			
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed	AGL	MSL	Waveform Used	Waveform Mode	Pre-Trigger Dist.
150 Kts	6500 Ft	7360 Ft	Yes / No	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:
		↕ Times entered are Zulu / GMT ↕						Verify S-Turns Before Mission: Yes X No
62	n	15:53:00	16:06:00		20	0.6	1.1	
63	s	16:09:00	16:22:00		19	0.6	1.3	
64	n	16:25:00	16:37:00		17	0.6	1.4	
65	s	16:41:00	16:54:00		15	0.6	1.4	
108	e	17:05:00	17:19:00		17	0.6	1.2	
								block 4
109	s	17:31:00	17:35:00		16	0.6	1.3	
108	n	17:38:00	17:42:00		16	0.6	1.2	
107	s	17:45:00	17:49:00		17	0.6	1.2	
106	n	17:52:00	17:56:00		17	0.6	1.2	
105	s	17:59:00	18:03:00		17	0.6	1.2	
104	n	18:06:00	18:10:00		17	0.6	1.2	
103	s	18:13:00	18:18:00		17	0.6	1.2	
102	n	18:21:00	18:26:00		17	0.6	1.2	
101	s	18:29:00	18:33:00		18	0.6	1.2	
100	n	18:36:00	18:41:00		17	0.6	1.2	
99	s	18:44:00	18:49:00		17	0.6	1.2	
98	n	18:52:00	18:57:00		16	0.6	1.4	
97	s	19:00:00	19:05:00		15	0.6	1.4	
96	n	19:08:00	19:12:00		16	0.6	1.4	
95	s	19:15:00	19:21:00		15	0.6	1.4	
94	n	19:23:00	19:28:00		16	0.6	1.4	
93	s	19:31:00	19:36:00		17	0.6	1.2	
92	n	19:41:00	19:47:00		18	0.6	1.2	
91	s	19:50:00	19:57:00		19	0.6	1.2	
90	n	20:00:00	20:06:00		19	0.6	1.1	
↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission: Yes X No

Additional Comments:

Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/8/2016	68	76269	2	2016_East_TN_Lidar

Operator	Aircraft	HOBBS Start	Local Start Time	Zulu Start Time	Base
GALAMBOS	N111SD	346.9	2:41:00	19:41:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	350.2	5:34:00	22:34:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
310 6 g 17	10	250,OVC		21	8	30.2		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	Varies	Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	19:14:35
		↕ Times entered are Zulu / GMT ↕						Verify S-Turns Before Mission	Yes X No
86	N	19:41:17	19:45:42	15:54:48	18	0.7	1.2	SENSOR: 8194/Takeoff: 1923z	
87	S	19:52:41	20:02:07	0:00:00	19	0.7	1.2		
88	N	20:05;45	20:13;45	0:00:00	20	0.6	1.1		
89	S	20:17:32	20:26:19	0:00:00	18	0.7	1.2		
90	N	20:30:13	20:38:24	0:00:00	16	0.7	1.2		
91	S	20:41:41	20:50:45	0:00:00	17	0.7	1.4		
92	N	20:54:06	21:02:37	0:00:00	16	0.6	1.2		
93	S	21:06:00	21:14:34	0:00:00	19	0.6	1.2		
94	N	21:18:10	21:25:35	0:00:00	19	0.6	1.2		
95	S	21:29:01	21:37:16	0:00:00	19	0.6	1.2		
96	N	21:40:38	21:48:27	0:00:00	19	0.6	1.2		
97	S	21:51:32	21:59:45	0:00:00	17	0.7	1.5		
98	N	22:03:10	22:10:37	0:00:00	19	0.7	1.2		
99	S	22:14:05	22:22:33	0:00:00	19	0.7	1.2		
100	N	22:25:54	22:33:30	0:00:00	19	0.7	1.2		
				0:00:00				static: 22:46:33	
				0:00:00					
				0:00:00					
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↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission	Yes X No

Additional Comments:

Drive # 00129

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/9/2016	69	76269	2	(Block 2) 2016_East_TN_Lidar

Operator	Aircraft	HOBBS Start	Local Start Time	Zulu Start Time	Base
GALAMBOS	N111SD	350.2	10:28:00	15:28:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	353.8	1:24:00	18:24:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
Calm	10	few 40	250 OVC	12	9	30.19		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	9240	Ft	Varies	Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	14:50:27
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
107	NW	15:28:17	15:29:44	7:06:59	19	0.6	1.2	SENSOR: 8194/Takeoff: 15:00	
108	SE	15:32:43	15:34:16	0:00:00	18	0.6	1.2		
109	W	13:37:54	15:42:15	0:00:00	19	0.6	1.1		
110	E	13:45:11	15:48:52	0:00:00	18	0.6	1.2		
111	W	15:52:45	15:57:28	0:00:00	20	0.6	1		
112	E	16:00:37	16:04:42	0:00:00	19	0.7	1.2		
113	W	16:08:23	16:12:30	0:00:00	19	0.7	1.2		
114	E	16:16:49	16:18:53	0:00:00	16	0.9	`1.4		
115	W	16:22:31	16:25:38	0:00:00	16	0.9	`1.4		
116	E	16:29:12	16:32:20	0:00:00	16	0.8	`1.4		
117	W	16:36:51	16:40:32	0:00:00	17	0.7	1.2		
118	E	16:44:05	16:47:49	0:00:00	17	0.7	1.5		
119	W	16:51:06	16:55:45	0:00:00	16	0.7	1.1	OFFLINE	
120	E	17:01:01	17:07:07	0:00:00	16	0.7	1.1		
121	W	17:10:04	17:17:20	0:00:00	14	0.8	1.3		
122	E	17:20:11	17:43:25	0:00:00	13	0.9	1.5	wind at altitude 207 at 38 knots	
101	N	17:36:28	17:43:25	0:00:00	13	0.9	1.5	windshear; airplane stalling	
52	S	17:56:36	18:08:20	0:00:00	15	0.8	1.3		
51	N	18:14:58	18:24:00	0:00:00	16	0.7	1.2	Too fast on line due to moderate	
				0:00:00				Turbulence/Windshear	
				0:00:00				Landing 1837z	
				0:00:00				Static: 18:42:05	
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission	Yes X No

Additional Comments:

Drive #

00129

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/9/16__B	69	76269	2	2016_East_TN_Lidar

Operator	Aircraft	HOBBS Start	Local Start Time	Zulu Start Time	Base
GALAMBOS	N111SD	353.8	5:28:00	22:28:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	355.5	6:41:00	23:41:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
230 15	10	Clear	250 OVC	25	8	30.05		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	Varies	Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	20:00:30
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
123	E	22:28:11	22:32:37	21:18:31	17	0.6	1.2	SENSOR: 8194/2209Z TAKEOFF...	
124	W	22:36:39	22:41:52	0:00:00	17	0.6	1.2	"B" Flight	
125	E	22:44:51	22:48:57	0:00:00	17	0.6	1.2		
126	W	22:52:45	22:56:59	0:00:00	15	0.7	1.4		
127	E	23:00:00	23:03:25	0:00:00	16	0.7	1.4		
128	W	23:07:08	23:10:44	0:00:00	17	0.7	1.4		
129	E	23:13:30	23:14:27	0:00:00	18	0.7	1.2		
130	W	23:18:37	23:19:44	0:00:00	20	0.6	1		
131	E	23:22:57	23:24:00	0:00:00	20	0.6	1		
132	W	23:27:11	23:28:28	0:00:00	18	0.6	1		
133	E	23:31:57	23:32:10	0:00:00	18	0.6	1.1		
134	W	23:38:52	23:40:31	0:00:00	18	0.6	1	land 2355z	
				0:00:00				Static: 23:57:07	
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
				0:00:00					
				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission	Yes X No

Additional Comments:

***Note On Start-up "Freespace is being optimized on the hard drive this may take up to 90 seconds

Drive #

128

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/15/2016	7515	76269	2	2016_East_TN_Lidar

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
GALAMBOS	N111SD	358.6	2:31:00	18:31:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	362.7	6:20:00	22:20:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud		
VAR 3	10	Clear	FEW 250	18	12	29.89	9.89	Departing	KTYS
								Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	Varies	Ft	Yes		No	X	@ NS			Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	17:56:52
		↕ Times entered are Zulu / GMT ↕						Verify S-Turns Before Mission	Yes X No
24	N	18:31:28	18:47:00	#VALUE!	18	0.8	1.4	SENSOR: 8194/Takeoff:18:06z	
39	S	18:51;03	19:07:12	0:00:00	18	0.8	1.4	Fl 24 reflight	
40	N	19:10:24	19:26:25	0:00:00	19	0.7	1.2	FFC 356.6	
41	S	19:29:18	19:45:31	0:00:00	20	0.6	1.1	MDQ 357.6	
42	N	19:38;42	20:04;06	0:00:00	18	0.7	1.2	Turblernce over the mountains	
43	S	20:07:05	20:22:57	0:00:00	19	0.6	1.1		
44	N	20:26;30	20:42;13	0:00:00	19	0.7	1.5		
45	S	20:45:23	21:01:44	0:00:00	21	0.6	1.1		
46	N	21:04:59	21:19:36	0:00:00	18	0.6	1.1		
47	S	21:22:47	21:38:37	0:00:00	17	0.7	1.6		
48	N	21:43:01	21:52;52	0:00:00	17	0.7	1.6		
49	S	21:55:44	22:06:14	0:00:00	19	0.6	1.1		
50	N	22:09:58	22:19:43	0:00:00	17	0.8	1.2		
				0:00:00					
				0:00:00				Static: 22:34:00	
				0:00:00					
				0:00:00					
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				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission	Yes X No

Additional Comments:	Drive #
	00128

PAR LLC
PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	Project #	Lever Arm	x	y	z
	Project Description	GPS (m)	-0.110	0.210	-1.220
DRIVE A	East TN Block 3				
	Location				
MISSION 1	Morristown, TN				

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/17/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160317_204813

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed
	1	LDR160317_211	21:16:49	21:23:30	0:06:41	448	45.9	68000	YES	Y	1970	6463	
	2	LDR160317_212	21:26:54	21:34:08	0:07:14	447.7	45.9	68000	YES	Y	1828	5997	
	UL001	LDR160317_214	21:48:32	21:57:06	0:08:34	448.1	45.9	68000	YES	Y	1845	6053	
	107	LDR160317_220	22:08:24	22:24:11	0:15:47	447.9	45.9	68000	YES	Y	1766	5794	
	106	LDR160317_222	22:27:00	22:43:19	0:16:19	448	45.9	68000	YES	Y	1814	5951	
	105	LDR160317_224	22:46:28	23:01:51	0:15:23	448.1	45.9	68000	YES	Y	1843	6047	
	104	LDR160317_230	23:05:01	23:21:29	0:16:28	448.1	45.9	68000	YES	Y	1807	5928	
	103	LDR160317_232	23:24:24	23:39:47	0:15:23	448.3	45.9	68000	YES	Y	1872	6142	
	102	LDR160317_234	23:43:30	0:00:21	0:16:51	448.3	45.9	68000	YES	Y	1862	6109	
	101	LDR160318_000	0:03:15	0:18:46	0:15:31	448.2	45.9	68000	YES	Y	1835	6020	
	100	LDR160318_002	0:21:59	0:38:51	0:16:52	448.4	45.9	68000	YES	Y	1660	5446	

LIDAR FLIGHT SUMMARY

		Hobbs Start	3062.2
Aircraft IMU Time	4:11:02	Hobbs Stop	3066.5
Sensor Collection Time	2:31:03	Hobbs Total	4.3
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/17/2016	77	76269	2	2016_East_TN_Lidar

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
GALAMBOS	N111SD	362.7	9:19:00	13:19:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	367.3	1:31:00	17:31:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
Calm	10	Clear		7	2	30.01		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed	AGL	MSL	Waveform Used				Waveform Mode	Pre-Trigger Dist.
150 Kts	6500 Ft	Varies Ft	Yes		No	X	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	12:52:19
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
102	S	13:19:24		4:40:05	19	0.7	1.2	SENSOR: 8194/t/o:13:05Z	
102	S	13:46:13	14:53:52	0:00:00	20	0.6	1.1	TDC Ran out of buffer/reboot	
103	N	13:57:16	14:05:20	0:00:00	20	0.6	1.2	Over Base @ 13:32:45	
104	S	14:08:25	14:16:00	0:00:00	20	0.6	1.2		
106	NE	14:33:04	14:46:13	0:00:00	21	0.6	1.2		
135	W	14:44;46	14:46:38	0:00:00	23	0.6	1.1	"A" Flight	
136	E	14:49:26	14:51:05	0:00:00	24	0.6	1		
137	W	14:54:50	14:56:33	0:00:00	22	0.6	1.1		
138	E	14:59:41	15:00:40	0:00:00	22	0.6	1.1		
139	W	15:03:55	15:06:15	0:00:00	22	0.6	1.1		
140	E	15:09:08	15:10:56	0:00:00	22	0.6	1.1		
141	W	15:13:44	15:16:04	0:00:00	23	0.6	1		
142	E	15:19:10	15:21:25	0:00:00	23	0.6	1		
143	W	15:24:25	15:27:00	0:00:00	23	0.6	1		
144	E	15:30:09	15:32:45	0:00:00	23	0.6	1		
145	W	15:36:40	15:39:49	0:00:00	18	0.9	1.4		
146	E	15:43:16	15:46:15	0:00:00	18	0.9	1.4		
147	W	15:49:26	15:52:54	0:00:00	18	0.9	1.4		
148	E	15:56:24	15:59:39	0:00:00	17	0.7	1.2		
149	W	16:03:06	16:07:01	0:00:00	17	0.7	1.2		
150	E	16:10:11	16:13:34	0:00:00	17	0.7	1.2		
151	W	16:16:46	16:20:48	0:00:00	17	0.7	1.2		
152	E	16:23:45	16:27:28	0:00:00	17	0.7	1.2		
153	W	16:30:54	16:34:25	0:00:00	17	0.7	1.2		
154	E	16:37:14	16:39:08	0:00:00	18	0.7	1.1		
155	W	16:42:20	16:44:44	0:00:00	18	0.7	1.1	Possible smoke west end	
156	E	16:47:52	16:50:03	0:00:00	18	0.7	1.1	Possible smoke west end	
157	W	16:53:59	16:57:22	0:00:00	15	0.8	1.3	Possible smoke west end	
158	E	17:00:35	17:03:26	0:00:00	15	0.8	1.3	Possible smoke west end	
159	W	17:06:28	17:12:01	0:00:00	15	0.8	1.3	Possible smoke west end	
105	E	17:22:26	17:31:41	0:00:00	16	0.7	1.2	Static: 17:46;30	
			Page		1			Verify S-Turns After Mission	Yes X No

Additional Comments:	Drive #
	129

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/17/2016	77	76269	2	2016_East_TN_Lidar

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
GALAMBOS	N111SD	367.3	2:44:00	19:44:00	WOOLPERT PIN
Pilot	Sensor Type	HOBBS END	Local End Time	Zulu End Time	PID
FLOYD	OTHER	368.4	3:20:00	20;20	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
290 5 g 16	10	FEW 180	SCT 250	20	-2	29.96		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used			Waveform Mode	Pre-Trigger Dist.
150	Kts	6500	Ft	Varies	Ft	Yes		No x	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	19:14:00
		↕ Times entered are Zulu / GMT ↕						Verify S-Turns Before Mission	Yes X No
160	**E**	**19:44:11**	**19:47:33**	**16:11:07**	**16**	**0.7**	**1.3**	**SENSOR: 8194/DENSE SMOKE WEST**	
1	**N**	19:59:03	**20:12:04**	**0:00:00**	**17**	**0.7**	**1.3**	**"B" Flight ------Block 4**	
2	**S**	**20:15:06**	**20:20:00**	**0:00:00**	**17**	**0.7**	**1.3**	**TMB 1 error**	
				0:00:00				**Shutdown ALS**	
				0:00:00					
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↑ Times entered are Zulu / GMT ↑				**Page**		**1**		**Verify S-Turns After Mission**	Yes X No

Additional Comments:

Drive #

PAR LLC
PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 2	

Project #	
Project Description	East TN Block 3
Location	Morristown, TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/18/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160318_104100

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	UL001	LDR160318_111	11:10:31	11:13:44	0:03:13	447.2	45.9	68000	YES	Y	1786	5860		
	99	LDR160318_112	11:24:42	11:41:10	0:16:28	447.5	45.9	68000	YES	Y	1832	6010		
	98	LDR160318_114	11:44:22	11:59:54	0:15:32	447.8	45.9	68000	YES	Y	1812	5945		
	97	LDR160318_120	12:03:26	12:20:02	0:16:36	448	45.9	68000	YES	Y	1888	6194		
	96	LDR160318_122	12:22:54	12:38:25	0:15:31	448.1	45.9	68000	YES	Y	1807	5928		
	95	LDR160318_124	12:41:56	12:58:32	0:16:36	448.1	45.9	68000	YES	Y	1887	6191		
	94	LDR160318_130	13:01:47	13:17:11	0:15:24	447.9	45.9	68000	YES	Y	1878	6161		
	93	LDR160318_132	13:20:29	13:36:49	0:16:20	447.9	45.9	68000	YES	Y	1860	6102		
	92	LDR160318_133	13:39:59	13:55:23	0:15:24	448.1	45.9	68000	YES	Y	1794	5886		
	91	LDR160318_135	13:58:46	14:15:05	0:16:19	448.1	45.9	68000	YES	Y	1905	6250		
	90	LDR160318_141	14:18:16	14:33:55	0:15:39	448.4	45.9	68000	YES	Y	1699	5574		
	89	LDR160318_143	14:37:02	14:53:22	0:16:20	448.2	45.9	68000	YES	Y	1872	6142		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3066.6
Aircraft IMU Time	4:35:48	Hobbs Stop	3071.3
Sensor Collection Time	2:59:22	Hobbs Total	4.7
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PAR LLC
PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 3	

Project #	
Project Description	East TN Block 3
Location	Morristown, TN

Lever Arm

	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/18/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160318_165032

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	UL001	LDR160318_171	17:17:36	17:20:32	0:02:56	447.9	45.9	68000	YES	Y	1886	6188		
	88	LDR160318_173	17:31:54	17:47:33	0:15:39	448.1	45.9	68000	YES	Y	1766	5794		
	87	LDR160318_175	17:51:03	18:07:15	0:16:12	448	45.9	68000	YES	Y	1921	6302		
	86	LDR160318_181	18:10:38	18:26:34	0:15:56	447.6	45.9	68000	YES	Y	1807	5928		
	85	LDR160318_182	18:29:49	18:46:32	0:16:43	448.3	45.9	68000	YES	Y	1883	6178		
	84	LDR160318_184	18:49:34	19:05:21	0:15:47	447.6	45.8	68000	YES	Y	1893	6211		
	83	LDR160318_190	19:08:33	19:24:28	0:15:55	448.3	45.9	68000	YES	Y	1911	6270		
	82	LDR160318_192	19:27:48	19:43:03	0:15:15	448.3	45.9	68000	YES	Y	1773	5817		
	81	LDR160318_194	19:46:07	20:01:54	0:15:47	448	46.0	68000	YES	Y	1914	6280		
	80	LDR160318_200	20:04:56	20:20:03	0:15:07	448.6	45.9	68000	YES	Y	1824	5984		
	79	LDR160318_202	20:23:19	20:38:43	0:15:24	448.6	45.9	68000	YES	Y	1885	6184		
	78	LDR160318_204	20:41:51	20:56:58	0:15:07	448.8	45.9	68000	YES	Y	1954	6411		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3071.3
Aircraft IMU Time	4:23:45	Hobbs Stop	3075.8
Sensor Collection Time	2:55:48	Hobbs Total	4.5
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PAR LLC
PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 4	

Project #	
Project Description	East TN Block 3
Location	Morristown, TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/18/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160318_214411

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	UL001	LDR160318_221	22:11:51	22:15:20	0:03:29	447.5	45.9	68000	YES	Y	1904	6247		
	77	LDR160318_222	22:26:39	22:42:02	0:15:23	447.4	46.0	68000	YES	Y	1891	6204		
	76	LDR160318_224	22:45:27	23:01:14	0:15:47	448.1	45.9	68000	YES	Y	1692	5551		
	75	LDR160318_230	23:04:39	23:20:03	0:15:24	448.2	45.9	68000	YES	Y	1890	6201		
	74	LDR160318_232	23:23:15	23:38:54	0:15:39	448.4	45.9	68000	YES	Y	1760	5774		
	73	LDR160318_234	23:42:00	23:57:07	0:15:07	448.1	45.9	68000	YES	Y	1869	6132		
	72	LDR160319_000	0:00:29	0:16:49	0:16:20	448.1	45.9	68000	YES	Y	1834	6017		
	71	LDR160319_001	0:19:56	0:35:03	0:15:07	448.3	45.9	68000	YES	Y	1880	6168		
	70	LDR160319_003	0:38:43	0:54:55	0:16:12	448.1	45.9	68000	YES	Y	1821	5974		
	69	LDR160319_005	0:58:10	1:13:09	0:14:59	448.7	45.9	68000	YES	Y	1925	6316		
	68	LDR160319_011	1:16:57	1:33:24	0:16:27	448.5	45.9	68000	YES	Y	1857	6093		
	67	LDR160319_013	1:36:51	1:51:50	0:14:59	448.4	46.0	68000	YES	Y	1955	6414		
	66	LDR160319_015	1:56:07	2:13:31	0:17:24	448.6	45.9	68000	YES	Y	1920	6299		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3075.9
Aircraft IMU Time	4:47:40	Hobbs Stop	3080.8
Sensor Collection Time	3:12:17	Hobbs Total	4.9
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/18/2016	78	76269	2	2016_East_TN_Lidar BLOCK 2/4

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
GALAMBOS	N111SD	368.4	9:40:00	13:40:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	374.1	2:41:00	18:41:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
Calm	10	Clear	few 200	8	2	30.03		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed	AGL	MSL	Waveform Used				Waveform Mode	Pre-Trigger Dist.
150 Kts	6500 Ft	Varies Ft	Yes		No	X	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	13:09:26
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
160	W	13:40:28	13:46:01	3:43:15	21	0.6	1.2	SENSOR: 8194/1320z	
161	E	13:49:01	13:54:14	0:00:00	20	0.7	1.2	Block 2	
162	W	13:58:00	14:03:41	0:00:00	20	0.6	1.2		
163	E	14::07:09	14:12:45	0:00:00	20	0.6	1.2		
164	W	14:16:35	14:21:15	0:00:00	19	0.7	1.2		
165	E	14:24:41	14:29:46	0:00:00	20	0.7	1.1		
166	W	14:33:29	14:38:33	0:00:00	20	0.6	1.1		
167	E	14:42:04	14:46:28	0:00:00	20	0.6	1.1		
168	W	14:49:51	14:54:09	0:00:00	21	0.6	1.1		
169	E	14:57:40	15:02:20	0:00:00	20	0.7	1.1		
170	E	15:13:33	15:34:40	0:00:00	21	0.6	1.1		
171	W	15:18:15	15:19:40	0:00:00	21	0.6	1.1		
172	E	15:23:02	15:24:27	0:00:00	21	0.6	1.1		
173	S	15:35:01	15:36:36	0:00:00	17	0.8	1.3		
174	N	15:39:32	15:41:03	0:00:00	17	0.8	1.3		
175	S	15:45:15	15:48:18	0:00:00	17	0.8	1.3		
176	N	15:51:28	15:53:42	0:00:00	16	0.8	1.2		
177	S	15:07:26	16:00:18	0:00:00	16	0.8	1.2		
178	N	16:03:23	16:06:01	0:00:00	16	0.8	1.2		
2	N	16:17:35	16:30:40	0:00:00	16	0.7	1.2	Block 4	
3	S	16:33:53	16:45;19	0:00:00	18	0.6	1		
4	N	16:48:16	17:00:10	0:00:00	17	0.7	1.2		
5	S	17:02:57	17:14:50	0:00:00	17	0.7	1.2		
6	N	17:17:50	17:26:45	0:00:00	17	0.7	1.2	ATC Breaks off due to Jumpers	
6	N	17:32:30	17:36:06	0:00:00	16	0.7	1.1	Resume line 6	
7	S	17:40:06	17:52:21	0:00:00	18	0.7	1.1		
8	N	17:55:16	18:07:40	0:00:00	18	0.7	1.1		
9	S	18:10:52	18:22:51	0:00:00	15	0.8	1.3		
10	N	18:29:20	18:41:12	0:00:00	15	0.8	1.3		
				0:00:00				landing:1900z	
				0:00:00				Static:19:03:03	
			Page		1			Verify S-Turns After Mission	Yes X No

Additional Comments:	Drive #
	128

PAR LLC
PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 1	

Project #	
Project Description	East TN Block 5
Location	Blountville TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/21/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160321_223831

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	63	LDR160321_230	23:09:20	23:25:40	0:16:20	447.4	45.9	68000	YES	Y	1886	6188		
	62	LDR160321_232	23:28:55	23:42:26	0:13:31	448.1	45.9	68000	YES	Y	1823	5981		
	61	LDR160321_234	23:46:43	0:00:30	0:13:47	447.8	45.9	68000	YES	Y	1789	5869		
	60	LDR160322_000	0:04:00	0:16:43	0:12:43	447.9	45.9	68000	YES	Y	1776	5827		
	59	LDR160322_002	0:20:28	0:35:51	0:15:23	447.9	45.9	68000	YES	Y	1774	5820		
	58	LDR160322_003	0:38:33	0:51:40	0:13:07	448.3	45.9	68000	YES	Y	1818	5965		
	57	LDR160322_005	0:55:35	1:10:51	0:15:16	448.2	45.9	68000	YES	Y	1814	5951		
	56	LDR160322_011	1:13:29	1:26:36	0:13:07	448.2	45.9	68000	YES	Y	1795	5889		
	55	LDR160322_012	1:30:07	1:44:50	0:14:43	448.1	45.9	68000	YES	Y	2144	7034		
	54	LDR160322_014	1:48:33	2:01:16	0:12:43	448.1	45.9	68000	YES	Y	1742	5715		
	53	LDR160322_020	2:05:33	2:21:20	0:15:47	448.1	45.9	68000	YES	Y	2029	6657		
	52	LDR160322_022	2:24:14	2:38:58	0:14:44	448.1	45.9	68000	YES	Y	1738	5702		
	UL001	LDR160322_025	2:52:39	2:55:20	0:02:41	447.9	45.9	68000	YES	Y	1933	6342		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3082.5
Aircraft IMU Time	4:33:22	Hobbs Stop	3087.3
Sensor Collection Time	2:53:52	Hobbs Total	4.8
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PAR LLC
PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 2	

Project #	
Project Description	
East TN Block 5	
Location	
Blountville TN	

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/22/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160322_114728

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	51	LDR160322_122	12:21:52	12:37:08	0:15:16	446.9	45.9	68000	YES	Y	1357	4452		
	50	LDR160322_123	12:39:46	12:55:17	0:15:31	447.2	45.9	68000	YES	Y	1750	5741		
	49	LDR160322_125	12:57:55	13:12:54	0:14:59	447.5	45.9	68000	YES	Y	1452	4764		
	48	LDR160322_131	13:16:19	13:32:23	0:16:04	447.8	45.9	68000	YES	Y	1739	5705		
	47	LDR160322_133	13:35:10	13:49:54	0:14:44	448	45.9	68000	YES	Y	1596	5236		
	46	LDR160322_135	13:53:24	14:10:23	0:16:59	448.2	45.9	68000	YES	Y	1724	5656		
	45	LDR160322_141	14:13:22	14:28:46	0:15:24	448.1	45.9	68000	YES	Y	1322	4337		
	44	LDR160322_143	14:32:08	14:48:51	0:16:43	448.1	45.9	68000	YES	Y	1812	5945		
	43	LDR160322_145	14:51:49	15:07:05	0:15:16	448	45.9	68000	YES	Y	1554	5098		
	42	LDR160322_151	15:10:38	15:27:46	0:17:08	448.1	45.9	68000	YES	Y	1858	6096		
	41	LDR160322_153	15:32:26	15:49:34	0:17:08	448.5	45.9	68000	YES	Y	1523	4997		
	UL001	LDR160322_155	15:56:40	15:59:05	0:02:25	448.1	45.9	68000	YES	Y	1917	6289		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3087.3
Aircraft IMU Time	4:23:59	Hobbs Stop	3091.9
Sensor Collection Time	2:57:37	Hobbs Total	4.6
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PAR LLC
PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 3	

Project #	
Project Description	East TN Block 5
Location	Blountville TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/22/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160322_163715

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	40	LDR160322_170	17:02:02	17:21:26	0:19:24	447.6	45.9	68000	YES	Y	1757	5764		
	39	LDR160322_172	17:24:11	17:41:35	0:17:24	447.5	45.9	68000	YES	Y	1356	4449		
	38	LDR160322_174	17:44:47	18:04:11	0:19:24	448	45.9	68000	YES	Y	1745	5725		
	37	LDR160322_180	18:07:31	18:24:47	0:17:16	447.8	45.9	68000	YES	Y	1460	4790		
	36	LDR160322_182	18:28:17	18:47:25	0:19:08	447.9	45.9	68000	YES	Y	1812	5945		
	35	LDR160322_185	18:50:59	19:07:35	0:16:36	448	45.9	68000	YES	Y	1803	5915		
	34	LDR160322_191	19:10:55	19:29:47	0:18:52	448.3	45.9	68000	YES	Y	1790	5873		
	33	LDR160322_193	19:32:44	19:49:27	0:16:43	448.2	45.9	68000	YES	Y	1748	5735		
	32	LDR160322_195	19:53:09	20:12:41	0:19:32	448	45.9	68000	YES	Y	1766	5794		
	31	LDR160322_201	20:15:44	20:32:51	0:17:07	447.5	45.9	68000	YES	Y	1863	6112		
	UL001	LDR160322_204	20:40:21	20:42:46	0:02:25	448.2	45.9	68000	YES	Y	1948	6391		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3091.9
Aircraft IMU Time	4:18:43	Hobbs Stop	3096.3
Sensor Collection Time	3:03:51	Hobbs Total	4.4
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PAR LLC
PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 4	

Project #	
Project Description	East TN Block 5
Location	Blountville TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/22/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160322_214500

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	30	LDR160322_220	22:10:15	22:31:08	0:20:53	448	45.9	68000	YES	Y	1809	5935		
	29	LDR160322_223	22:33:55	22:51:03	0:17:08	447.8	45.9	68000	YES	Y	1807	5928		
	28	LDR160322_225	22:54:30	23:15:30	0:21:00	448.1	45.9	68000	YES	Y	1809	5935		
	27	LDR160322_231	23:18:12	23:35:28	0:17:16	447.9	45.9	68000	YES	Y	1810	5938		
	26	LDR160322_233	23:39:12	0:00:36	0:21:24	448.1	45.9	68000	YES	Y	1812	5945		
	25	LDR160323_000	0:03:49	0:21:53	0:18:04	448.1	45.9	68000	YES	Y	1308	4291		
	24	LDR160323_002	0:25:11	0:46:27	0:21:16	448.1	45.9	68000	YES	Y	1924	6312		
	23	LDR160323_004	0:50:03	1:08:23	0:18:20	448.4	46.0	68000	YES	Y	1932	6339		
	22	LDR160323_011	1:11:59	1:33:24	0:21:25	448.1	45.9	68000	YES	Y	1949	6394		
	UL001	LDR160323_014	1:48:48	1:50:57	0:02:09	448.2	46.0	68000	YES	Y	1902	6240		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3096.4
Aircraft IMU Time	4:22:22	Hobbs Stop	3100.9
Sensor Collection Time	2:58:55	Hobbs Total	4.5
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour		#DIV/0!	

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/22/2016	82	76269	2	2016_East_TN_Lidar BLOCK 4

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
GALAMBOS	N111SD	374.5	9:27:00	13:27:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	380.7	3:02:00	19:02:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
Calm	10	Clear	few 250	3	-1	30.29		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed	AGL	MSL	Waveform Used				Waveform Mode	Pre-Trigger Dist.
150 Kts	6500 Ft	Varies Ft	Yes		No	X	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	13:00:00
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
11	N	13:27:23	14:40:15	3:39:17	21	0.6	1.1	SENSOR: 8194/takeoff 1309z	
12	S	13:43:20	13:55:57	0:00:00	20	0.6	1.1	Block 4	
13	N	15:59:31	14:12;20	0:00:00	20	0.6	1.2	Dusting of snow on mountians	
14	S	14:15:11	14:28:04	0:00:00	20	0.6	1.2		
15	N	14:31:32	14:43;15	0:00:00	20	0.6	1		
16	S	14:46:14	14:58:24	0:00:00	20	0.6	1.1		
17	N	15:01:39	15:13:14	0:00:00	20	0.6	1.1		
18	S	15:16:24	15:28:54	0:00:00	20	0.7	1.1		
19	N	15:32:13	15:43:50	0:00:00	21	0.6	1.1		
20	S	15:46:54	15:29:23	0:00:00	20	0.7	1.1		
21	N	16:03:17	16:14:08	0:00:00	20	0.6	1.1		
22	S	16:17:20	16:28:55	0:00:00	20	0.6	1.1		
23	N	16:32:03	16:42:36	0:00:00	18	0.6	1.1		
24	S	16:45:34	16:56:58	0:00:00	16	0.7	1.3		
25	N	16:59:36	17:09:27	0:00:00	17	0.8	1.3		
26	S	17:12:38	17:23:38	0:00:00	17	0.8	1.1		
27	N	17:26:38	17:26:32	0:00:00	18	0.7	1.1	offline begining of line	
28	S	17:40:07	17:51:45	0:00:00	18	0.6	1.1		
29	N	17:55:02	18:05:13	0:00:00	18	0.7	1.2		
30	S	18:08:21	18:20:21	0:00:00	18	0.7	1.2		
31	N	18:23:13	18:33:18	0:00:00	18	0.7	1.2		
32	S	18:36:28	18:48:16	0:00:00	17	0.7	1.2		
33	N	18:51:28	19:01:35	0:00:00	18	0.6	1.2		
				0:00:00				116gb	
				0:00:00				Landing 1924z	
				0:00:00				Static:19:25:45	
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
			Page		1			Verify S-Turns After Mission	Yes X No

Additional Comments:	Drive #
	128

PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 5	

Project #	
Project Description	East TN Block 5
Location	Blountville TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/23/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160323_144214

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	21	LDR160323_152	15:20:39	15:38:52	0:18:13	447.2	45.9	68000	YES	Y	1925	6316		
	20	LDR160323_154	15:41:55	16:04:48	0:22:53	447.4	45.9	68000	YES	Y	1931	6335		
	19	LDR160323_160	16:08:16	16:26:36	0:18:20	447.5	45.9	68000	YES	Y	1903	6243		
	18	LDR160323_163	16:30:32	16:53:41	0:23:09	447.8	45.9	68000	YES	Y	1897	6224		
	17	LDR160323_165	16:56:35	17:14:55	0:18:20	448.3	45.9	68000	YES	Y	1914	6280		
	16	LDR160323_171	17:17:46	17:40:07	0:22:21	448	45.9	68000	YES	Y	1917	6289		
	15	LDR160323_174	17:43:13	18:00:53	0:17:40	447.8	45.9	68000	YES	Y	2145	7037		
	14	LDR160323_180	18:04:22	18:26:19	0:21:57	447.5	45.9	68000	YES	Y	1948	6391		
	13	LDR160323_183	18:30:19	18:49:27	0:19:08	447.4	45.9	68000	YES	Y	1350	4429		
	UL001	LDR160323_185	18:57:05	18:59:06	0:02:01	448	46.0	68000	YES	Y	1982	6503		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3101.3
Aircraft IMU Time	4:30:05	Hobbs Stop	3105.9
Sensor Collection Time	3:04:02	Hobbs Total	4.6
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	Project #	Lever Arm	x	y	z
	Project Description	GPS (m)	-0.110	0.210	-1.220
DRIVE A	East TN Block 5				
	Location				
MISSION 6	Blountville TN				

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/23/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160323_201037

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	12	LDR160323_203	20:36:32	20:59:57	0:23:25	447.7	45.9	68000	YES	Y	1920	6299		
	11	LDR160323_210	21:03:47	21:20:23	0:16:36	448	45.9	68000	YES	Y	1440	4724		
	10	LDR160323_212	21:23:40	21:44:41	0:21:01	447.9	45.9	68000	YES	Y	1972	6470		
	9	LDR160323_214	21:47:32	22:04:07	0:16:35	448.1	45.8	68000	YES	Y	1391	4564		
	8	LDR160323_220	22:07:48	22:27:44	0:19:56	447.8	45.9	68000	YES	Y	1967	6453		
	7	LDR160323_223	22:30:38	22:46:42	0:16:04	447.3	45.9	68000	YES	Y	1962	6437		
	6	LDR160323_224	22:50:13	23:12:02	0:21:49	448	45.9	68000	YES	Y	1958	6424		
	5	LDR160323_231	23:15:08	23:32:48	0:17:40	447.7	45.9	68000	YES	Y	1698	5571		
	4	LDR160323_233	23:36:23	23:57:48	0:21:25	447.9	45.9	68000	YES	Y	1954	6411		
	64	LDR160324_001	0:12:41	0:25:16	0:12:35	447.6	45.9	68000	YES	Y	1881	6171		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3105.9
Aircraft IMU Time	4:30:00	Hobbs Stop	3110.7
Sensor Collection Time	3:07:06	Hobbs Total	4.8
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour		#DIV/0!	

PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 7	

Project #	
Project Description	East TN Block 5
Location	Blountville TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/24/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160324_115933

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed
	65	160324_123304_	12:33:20	12:36:25	0:03:05	446.9	45.9	68000	YES	Y	2138	7014	
	66	160324_124059_	12:41:15	12:44:36	0:03:21	447.1	45.9	68000	YES	Y	2153	7064	
	67	160324_124734_	12:47:50	12:48:46	0:00:56	447.4	45.9	68000	YES	Y	2167	7110	
	UL001	160324_125052_	12:51:08	12:52:21	0:01:13	447.2	45.9	68000	YES	Y	2145	7037	
	68	160324_125701_	12:57:17	13:00:37	0:03:20	447.2	45.9	68000	YES	Y	2136	7008	
	69	160324_130410_	13:04:27	13:09:48	0:05:21	447.3	45.9	68000	YES	Y	2096	6877	
	UL002	160324_131211_	13:12:27	13:13:08	0:00:41	447.4	45.9	68000	YES	Y	2070	6791	
	70	160324_131727_	13:17:43	13:18:47	0:01:04	447.5	45.9	68000	YES	Y	2170	7119	
	71	160324_132149_	13:22:04	13:23:41	0:01:37	447.5	45.9	68000	YES	Y	1838	6030	
	72	160324_132642_	13:26:58	13:28:10	0:01:12	447.6	45.9	68000	YES	Y	1901	6237	
	73	160324_133116_	13:31:32	13:33:17	0:01:45	447.6	45.9	68000	YES	Y	1914	6280	
	74	160324_133751_	13:38:07	13:40:23	0:02:16	447.6	45.9	68000	YES	Y	2160	7087	
	75	160324_134352_	13:44:08	13:48:01	0:03:53	447.7	45.9	68000	YES	Y	1798	5899	
	76	160324_135215_	13:52:31	13:56:08	0:03:37	447.6	45.9	68000	YES	Y	1754	5755	
	77	160324_135902_	13:59:19	14:04:48	0:05:29	447.8	45.9	68000	YES	Y	1727	5666	
	78	160324_140831_	14:08:47	14:12:24	0:03:37	447.8	45.9	68000	YES	Y	1823	5981	
	79	160324_141720_	14:17:37	14:27:23	0:09:46	447.6	45.9	68000	YES	Y	1863	6112	
	80	160324_143133_	14:31:49	14:39:19	0:07:30	447.6	45.9	68000	YES	Y	1953	6407	
	81	160324_144215_	14:42:32	14:52:42	0:10:10	447.8	45.9	68000	YES	Y	2021	6631	
	82	160324_145601_	14:56:18	15:03:55	0:07:37	447.7	45.9	68000	YES	Y	1974	6476	
	UL003	160324_150551_	15:06:07	15:08:40	0:02:33	448	45.9	68000	YES	Y	1824	5984	
	83	160324_151511_	15:15:27	15:24:17	0:08:50	447.7	45.9	68000	YES	Y	1838	6030	
	84	160324_152804_	15:28:20	15:35:42	0:07:22	447.6	45.9	68000	YES	Y	2176	7139	
	85	160324_153757_	15:38:12	15:47:26	0:09:14	447.9	45.9	68000	YES	Y	1915	6283	
	86	160324_155122_	15:51:39	15:58:20	0:06:41	447.8	45.9	68000	YES	Y	2174	7133	
	UL004	160324_160039_	16:00:55	16:02:23	0:01:28	447.8	45.9	68000	YES	Y	1361	4465	

LIDAR FLIGHT SUMMARY

		Hobbs Start	3110.7
Aircraft IMU Time	4:22:58	Hobbs Stop	3115.2
Sensor Collection Time	1:53:38	Hobbs Total	4.5
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour			#DIV/0!

PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	Project #	Lever Arm	x	y	z
	Project Description	GPS (m)	-0.110	0.210	-1.220
DRIVE A	East TN Block 5				
	Location				
MISSION 8	Blountville TN				

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/26/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160326_124242

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed
	3	160326_132809_	13:28:27	13:46:15	0:17:48	446.9	45.9	68000	YES	Y	1536	5039	
	2	160326_134939_	13:49:57	14:10:58	0:21:01	447.4	45.9	68000	YES	Y	1837	6027	
	1	160326_141318_	14:13:36	14:31:24	0:17:48	447.6	45.9	68000	YES	Y	1362	4468	
	UL001	160326_143813_	14:38:31	14:39:19	0:00:48	448.2	45.9	68000	YES	Y	1741	5712	
	87	160326_145430_	14:54:47	15:03:29	0:08:42	447.8	45.9	68000	YES	Y	1523	4997	
	88	160326_150634_	15:06:51	15:13:25	0:06:34	447.8	45.9	68000	YES	Y	1321	4334	
	89	160326_151549_	15:16:06	15:24:48	0:08:42	447.7	45.9	68000	YES	Y	1492	4895	
	90	160326_152741_	15:27:59	15:35:04	0:07:05	447.8	45.9	68000	YES	Y	1738	5702	
	91	160326_153740_	15:37:58	15:47:44	0:09:46	447.7	45.9	68000	YES	Y	1752	5748	
	92	160326_155031_	15:50:49	15:58:50	0:08:01	447.8	45.9	68000	YES	Y	1864	6115	
	93	160326_160141_	16:02:00	16:11:38	0:09:38	448.2	45.9	68000	YES	Y	2097	6880	
	102	160326_161504_	16:15:22	16:20:11	0:04:49	447.7	45.9	68000	YES	Y	2152	7060	
	UL002	160326_162300_	16:23:18	16:25:42	0:02:24	447.9	45.9	68000	YES	Y	2033	6670	

LIDAR FLIGHT SUMMARY

		Hobbs Start	3115.3
Aircraft IMU Time	3:58:46	Hobbs Stop	3119.4
Sensor Collection Time	2:03:06	Hobbs Total	4.1
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour		#DIV/0!	

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/26/2016	86	76269	2	East_TN_Block4_

Operator	Aircraft	HOBBS Start	Local Start Time	Zulu Start Time	Base
SWAIN, J	N1107Q	2966.0	9:59:00	13:59:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
SWAIN, D	ALS-8170	2970.5	14:45:00	18:45:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud		
060/4 kts	>10	clear below 12		11	7	30.13	Slight Haze	Departing	KMOR
								Arriving	KMOR

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain		Mode		Threshold Values	
40	50	272	100%	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi		B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts		Ft	7343	Ft	Yes		No		@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At: 9:07:00
		↕ Times entered are Zulu / GMT ↕							Verify S-Turns Before Mission Yes No
89	188	14:23:34	14:29:40	0:06:06	20	1	150	7262	
88	008	14:32:12	14:37:44	0:05:32	21	1	162	7244	AG% start of line
87	188	14:40:08	14:46:19	0:06:11	21	1	144	7281	Range measure approaching minimum
86	008	14:48:43	14:54:30	0:05:47	19	1.2	155	7298	Range measure approaching minimum
85	188	14:56:53	15:03:19	0:06:26	17	1.3	145	7265	BG % error@ 15:03:04. Range minimun
84	008	15:05:40	15:11:10	0:05:30	16	1.4	156	7258	AG % begin of line
83	188	15:13:51	15:20:53	0:07:02	16	1.4	148	7260	Range min error @15:19
									cloud last mile of line?
82	008	15:23:50	15:30:16	0:06:26	15	1.4	149	7251	BG % error @ 15:25
81	188	15:33:05	15:42:07	0:09:02	16	1.2	141	7262	BG % error @15:39
									Range min error @15:39
									Clouds @ 15:40
									AG% error @15:41
80	008	15:44:40	15:52:34	0:07:54	16	1.2	159	7321	Range min error at beginning of line
79	188	15:55:18	16:04:13	0:08:55	17	1.1	137	7293	AG% error @16:02
									Range min error @16:03
78	008	16:06:02	16:13:52	0:07:50	16	1.2	165	7239	AG% error @ 16:06
77	188	16:16:17	16:24:13	0:07:56	15	1.2	139	7272	AG% error @16:23
									Range min error @16:23
76	008	16:26:19	16:33:35	0:07:16	14	1.5	157	7231	Range min error & AG% error @16:27
75	188	16:35:54	16:44:42	0:08:48	16	1.2	140	7249	Range min / BG % error @16:43
74	008	16:46:53	16:54:44	0:07:51	15	1.4	155	7315	Range min error @ 16:48
73	188	16:57:31	17:06:52	0:09:21	16	1.2	139	7260	Range min error @ 17:05
									AG % Error @17:06
72	008	17:08:28	17:16:23	0:07:55	16	1.2	157	7280	Range min error @ 17:09
71	188	17:18:21	17:27:15	0:08:54	17	1.2	136	7248	AG% error @17:26
									Range min error @ 17:26
70	008	17:33:10	17:41:15	0:08:05	16	1.2	145	7271	Range min error/ AG % error @17:33
									BG % error 17:34
69	188	17:43:49	17:52:58	0:09:09	15	1.4	135	7265	BG % error 17:52
68	008	17:55:28	18:03:33	0:08:05	16	1.4	159	7244	Range min error @ 17:56 & 17:59
↑ Times entered are Zulu / GMT ↑				Page		1			Verify S-Turns After Mission Yes X No

Additional Comments:

Drive #

Continued on page 2.

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name	

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Pilot	Sensor Type	HOBBS END	Local End Time	Zulu End Time	PID

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	
								Arriving	

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
				Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used			Waveform Mode	Pre-Trigger Dist.
	Kts		Ft		Ft	Yes		No X	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At:
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission Yes X No
67	188	18:06:04	18:15:08	0:09:04	16	1.2	136	7250	Range min error @ 18:14
66	008	18:17:15	18:25:19	0:08:04	17	1.1	152	7267	An error appeared on the screen, but I d
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		2			Verify S-Turns After Mission Yes X No

Additional Comments:	Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/26/2016	86	76269	2	2016_East_TN_Lidar BLOCK 4

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
GALAMBOS	N111SD	380.7	9:40:00	13:40:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	384.9	1:03:00	17:03:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
020 5	10	Clear	0	7	4	30.12		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	Varies	Ft	Yes		No	X	@ NS			Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	13:15:24
		↕ Times entered are Zulu / GMT ↕						Verify S-Turns Before Mission	Yes X No
110	E	13:40:26	13:50:50	4:07:35	22	0.7	1.1	SENSOR: 8194/takeoff: 1326Z	
111	S	14:01:02	14:06:33	0:00:00	20	0.7	1.1	Block 4/flightline 110 cross flight line	
112	N	14:05:17	14:06:33	0:00:00	20	0.7	1.2		
113	S	14:10:11	14:11:36	0:00:00	22	0.6	1		
114	N	14:15:39	14:17:26	0:00:00	20	0.6	1		
115	S	14:21:37	14:24:00	0:00:00	20	0.6	1		
116	N	14:28:01	14:30:35	0:00:00	19	0.7	1.1		
41	N	14:45:08	14:58:10	0:00:00	19	0.7	1.2	Block 3	
34	S	15:12:37	15:18:35	0:00:00	21	0.6	1.1	Block 4/TM1B ERROR In air restart	
34	N	15:36:09	15:47:51	0:00:00	16	0.7	1.2	15:23:34/ over MOR Base 15:25:45	
35	S	15:50:32	16:00:30	0:00:00	16	0.7	1.1	2 360'S CMPLT/ 1000' low s. end	
36	N	16:04:10	16:15:48	0:00:00	15	0.7	1.2	Shortened line by 3 miles south end	
37	S	16:32:29	16:29:01	0:00:00	15	0.7	1.2	Shortened line by 5 miles south end	
38	N	16:32:29	16:42:13	0:00:00	15	0.7	1.2	Shortened line by 5 miles south end	
39	S	16:44:55	16:53:08	0:00:00	15	0.7	1.2	Shortened line by 5 miles south end	
136	SW	17:02;17	17:03:13	0:00:00	16	0.7	1.2	Clouds	
				0:00:00				Over MOR Base Station:17:14:37	
				0:00:00					
				0:00:00				Landing: 1739z	
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
				0:00:00					
				Page		1		Verify S-Turns After Mission	Yes X No

Additional Comments:

Drive #

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Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/26/2016	86	76269	2	2016_East_TN_Lidar BLOCK 4

Operator	Aircraft	HOBBS Start	Local Start Time	Zulu Start Time	Base
GALAMBOS	N111SD	380.7	9:40:00	13:40:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	384.9	1:03:00	17:03:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
020 5	10	Clear	0	7	4	30.12		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	Varies	Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	13:15:24
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
110	E	13:40:26	13:50:50	4:07:35	22	0.7	1.1	SENSOR: 8194/takeoff: 1326Z	
111	S	14:01:02	14:06:33	0:00:00	20	0.7	1.1	Block 4/flightline 110 cross flight line	
112	N	14:05:17	14:06:33	0:00:00	20	0.7	1.2		
113	S	14:10:11	14:11:36	0:00:00	22	0.6	1		
114	N	14:15:39	14:17:26	0:00:00	20	0.6	1		
115	S	14:21:37	14:24:00	0:00:00	20	0.6	1		
116	N	14:28:01	14:30:35	0:00:00	19	0.7	1.1		
41	N	14:45:08	14:58:10	0:00:00	19	0.7	1.2	Block 3	
34	S	15:12:37	15:18:35	0:00:00	21	0.6	1.1	Block 4/TM1B ERROR In air restart	
34	N	15:36:09	15:47:51	0:00:00	16	0.7	1.2	15:23:34/ over MOR Base 15:25:45	
35	S	15:50:32	16:00:30	0:00:00	16	0.7	1.1	2 360'S CMPLT/ 1000' low s. end	
36	N	16:04:10	16:15:48	0:00:00	15	0.7	1.2	Shortened line by 3 miles south end	
37	S	16:32:29	16:29:01	0:00:00	15	0.7	1.2	Shortened line by 5 miles south end	
38	N	16:32:29	16:42:13	0:00:00	15	0.7	1.2	Shortened line by 5 miles south end	
39	S	16:44:55	16:53:08	0:00:00	15	0.7	1.2	Shortened line by 5 miles south end	
136	SW	17:02;17	17:03:13	0:00:00	16	0.7	1.2	Clouds	
				0:00:00				Over MOR Base Station:17:14:37	
				0:00:00					
				0:00:00				Landing: 1739z	
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
				0:00:00					
				Page		1		Verify S-Turns After Mission	Yes X No

Additional Comments:

Drive #: 129

PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 9	

Project #	
Project Description	East TN Block 5
Location	Blountville TN

Lever Arm

	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/28/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160328_205833

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed
	92	160328_213533_	21:35:52	21:44:01	0:08:09	447.8	45.9	68000	YES	Y	2102	6896	
	93	160328_214752_	21:48:10	21:59:01	0:10:51	448	45.9	68000	YES	Y	2130	6988	
	94	160328_220146_	22:02:05	22:10:07	0:08:02	447.8	45.9	68000	YES	Y	2152	7060	
	95	160328_221346_	22:14:05	22:24:47	0:10:42	448	45.9	68000	YES	Y	2077	6814	
	96	160328_222735_	22:27:54	22:35:56	0:08:02	447.5	45.9	68000	YES	Y	1957	6421	
	97	160328_224000_	22:40:17	22:50:52	0:10:35	447.8	45.9	68000	YES	Y	2175	7136	
	98	160328_225332_	22:53:51	23:01:20	0:07:29	447.8	45.9	68000	YES	Y	1968	6457	
	99	160328_230430_	23:04:48	23:14:02	0:09:14	447.8	45.9	68000	YES	Y	1995	6545	
	100	160328_231637_	23:16:55	23:23:53	0:06:58	448	45.9	68000	YES	Y	2096	6877	
	101	160328_232707_	23:27:25	23:36:31	0:09:06	448	45.9	68000	YES	Y	2038	6686	
	102	160328_233949_	23:40:07	23:44:56	0:04:49	447.8	45.9	68000	YES	Y	2109	6919	
	103	160328_234826_	23:48:44	23:55:10	0:06:26	447.6	45.9	68000	YES	Y	1868	6129	
	104	160328_235810_	23:58:28	0:03:17	0:04:49	447.8	45.9	68000	YES	Y	2053	6736	
	105	160329_000616_	0:06:34	0:11:24	0:04:50	448.2	45.9	68000	YES	Y	1794	5886	
	106	160329_001435_	0:14:53	0:18:38	0:03:45	447.9	45.9	68000	YES	Y	2013	6604	
	107	160329_002124_	0:21:42	0:26:39	0:04:57	448.2	45.9	68000	YES	Y	1603	5259	
	UL001	160329_002939_	0:29:57	0:33:58	0:04:01	448	45.9	68000	YES	Y	1860	6102	
	109	160329_004029_	0:40:48	0:41:44	0:00:56	447.5	46.0	68000	YES	Y	1764	5787	
	110	160329_004443_	0:45:01	0:46:54	0:01:53	447.9	45.9	68000	YES	Y	1532	5026	
	UL002	160329_004914_	0:49:32	0:49:34	0:00:02	447.9	45.9	68000	YES	Y	1346	4416	
	UL003	160329_004930_	0:49:48	0:50:36	0:00:48	447.8	45.9	68000	YES	Y	1864	6115	
	108	160329_005641_	0:56:58	0:57:30	0:00:32	447.7	45.9	68000	YES	Y	2065	6775	
	UL004	160329_005934_	0:59:53	1:00:33	0:00:40	447.9	45.9	68000	YES	Y	1921	6302	

LIDAR FLIGHT SUMMARY

		Hobbs Start	3120.9
Aircraft IMU Time	4:22:22	Hobbs Stop	3125.3
Sensor Collection Time	2:07:36	Hobbs Total	4.4
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour		#DIV/0!	

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/28/2016	88	76269	2	East_TN_Block4_Flt3

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
SWAIN, J.	N1107Q	2971.2	18:06:00	22:06:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
SWAIN, D.	ALS-8170	2974.0	21:07:45 AM	1:07:45	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KMOR
300/6kts	>10	clr below 12k	0	15	0	3006		Arriving	KMOR

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts		Ft	7343	Ft	Yes		No	X	@ NS			Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At: 17:56:00
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission: Yes X No
65	187	22:27:23	22:35:29	0:08:06	21	1.1	156	7250	
64	007	22:38:01	22:46:01	0:08:00	21	1.1	152	7275	
63	187	22:48:48	22:57:11	0:08:23	19	1.1	156	7228	
62	007	22:59:37	23:08:10	0:08:33	19	1.2	162	7260	AG% error beginning of line
									BG% error/Range minimum error @ 23:0
61	187	23:10:49	23:19:08	0:08:19	18	1.2	159	7272	Range min error @ 23:16:06
									Range min error @ 23:18:33
									AG% error @ 23:18:54
60	007	23:22:11	23:30:12	0:08:01	18	1.2	153	7265	AG% error @ 23:22:20
									Range min error @ 23:22:34
									BG % error @ 23:23
									Range min error @ 23:24:38
									AG % error @ 23:24:52
59	187	23:32:41	23:40:59	0:08:18	18	1.1	158	7298	Range min error @ 23:38
									Range min error/AG% error/BG% error @
58	007	23:43:25	23:51:13	0:07:48	19	1	148	7229	Range min error/AG% error/BG% error @
57	187	23:53:39	0:01:25	0:08:05	16	1.3	158	7230	
56	007	0:03:47	0:11:52	0:08:05	15	1.4	150	7265	Range min error @ 00:04:00
55	187	0:14:17	0:22:29	0:08:12	15	1.3	156	7273	Range min error @ 00:22:16
54	007	0:25:07	0:33:34	0:08:27	18	1.2	152	7253	Range min error/AG %/BG% error @ 00:
53	187	0:36:15	0:44:42	0:08:27	17	1.3	158	7247	Range min error / AG% error at end of li
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
				0:00:00					
				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		1			Verify S-Turns After Mission: Yes X No

Additional Comments: Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/28/2016	88	76269	2	2016_East_TN_Lidar BLOCK 4

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
GALAMBOS	N111SD	384.9	6:01:00	22:01:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	388.3	8:40:00	0:40:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
140 7	10	Clear	0	17	5	30.12		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed	AGL	MSL	Waveform Used				Waveform Mode	Pre-Trigger Dist.
150 Kts	6500 Ft	Varies Ft	Yes		No	X	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	21:27:36
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
40	S	22:01:38	22:10:46	20:38:17	21	0.6	1	SENSOR: 8194/takeoff: 2139Z	
41	N	22:14:19	22:23:58	0:00:00	21	0.6	1.1		
42	S	22:27:50	22:37:12	0:00:00	21	0.6	1		
43	N	22:40:02	22:49:30	0:00:00	20	0.6	1		
44	S	22:52:56	23:02:14	0:00:00	18	0.7	1.3		
45	N	23:05:10	23:14;45	0:00:00	18	0.7	1.3		
46	S	23:17;52	23:26;48	0:00:00	18	0.6	1		
47	N	23:29:53	23:39:16	0:00:00	18	0.6	1		
48	S	23:42:49	23:51:41	0:00:00	19	0.7	1.3		
49	N	23:54:55	0:03:51	0:00:00	16	0.8	1.3		
50	S	0:06:55	0:15:54	0:00:00	15	0.8	1.4		
51	N	0:18:47	0:28:56	0:00:00	16	0.8	1.3		
52	S	0:31:22	0:40:40	0:00:00	17	0.7	1.2		
				0:00:00				Landing 0103z	
				0:00:00				Static:01:05:06	
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
				0:00:00					
			Page		1			Verify S-Turns After Mission	Yes X No

Additional Comments:	Drive #
	127

PAR LLC
PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	Project #	Lever Arm	x	y	z
		GPS (m)	-0.110	0.210	-1.220
DRIVE A	Project Description: East TN Block 4				
MISSION 1	Location: Morristown, TN				

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/29/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160329_172205

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	117	LDR160329_175	17:53:22	17:54:18	0:00:56	447.5	45.9	68000	YES	Y	2096	6877		
	118	LDR160329_175	17:57:34	17:59:11	0:01:37	447.3	45.9	68000	YES	Y	2130	6988		
	119	LDR160329_180	18:02:02	18:03:14	0:01:12	447.9	45.9	68000	YES	Y	2176	7139		
	120	LDR160329_180	18:06:33	18:07:38	0:01:05	447.6	45.9	68000	YES	Y	2063	6768		
	121	LDR160329_181	18:11:41	18:13:49	0:02:08	447.6	45.9	68000	YES	Y	1987	6519		
	122	LDR160329_181	18:17:17	18:19:50	0:02:33	447.6	45.9	68000	YES	Y	1958	6424		
	123	LDR160329_182	18:24:18	18:26:18	0:02:00	447.8	45.9	68000	YES	Y	2048	6719		
	124	LDR160329_182	18:29:24	18:31:33	0:02:09	447.6	45.9	68000	YES	Y	2164	7100		
	125	LDR160329_183	18:34:31	18:36:15	0:01:44	447.5	45.9	68000	YES	Y	2175	7136		
	126	LDR160329_183	18:39:54	18:41:30	0:01:36	447.4	45.9	68000	YES	Y	2168	7113		
	127	LDR160329_184	18:44:44	18:45:57	0:01:13	447.6	45.9	68000	YES	Y	2152	7060		
	UL001	LDR160329_184	18:48:42	18:51:14	0:02:32	447.7	45.9	68000	YES	Y	2147	7044		
	128	LDR160329_185	18:54:25	18:55:05	0:00:40	447.6	45.9	68000	YES	Y	2172	7126		
	129	LDR160329_185	18:58:19	18:59:31	0:01:12	447.4	45.9	68000	YES	Y	2177	7142		
	UL002	LDR160329_190	19:01:45	19:01:46	0:00:01	447.3	45.9	68000	YES	Y	2116	6942		
	UL003	LDR160329_190	19:02:04	19:02:36	0:00:32	448	45.5	68000	YES	Y	2067	6781		
	UL004	LDR160329_190	19:05:24	19:05:57	0:00:33	447.5	45.9	68000	YES	Y	2099	6886		
	130	LDR160329_190	19:10:00	19:10:48	0:00:48	447.6	45.9	68000	YES	Y	2166	7106		
	UL005	LDR160329_191	19:12:49	19:13:38	0:00:49	447.6	45.9	68000	YES	Y	2157	7077		
	131	LDR160329_191	19:15:55	19:16:35	0:00:40	447.7	45.9	68000	YES	Y	2145	7037		
	132	LDR160329_191	19:19:31	19:20:03	0:00:32	447.6	45.9	68000	YES	Y	2134	7001		
	UL006	LDR160329_192	19:22:14	19:23:02	0:00:48	447.4	45.9	68000	YES	Y	2132	6995		
	133	LDR160329_192	19:25:07	19:26:19	0:01:12	447.7	45.9	68000	YES	Y	2149	7051		
	134	LDR160329_192	19:29:29	19:31:05	0:01:36	447.6	45.9	68000	YES	Y	2130	6988		
	135	LDR160329_193	19:34:27	19:36:03	0:01:36	447.5	45.9	68000	YES	Y	2124	6968		
	UL007	LDR160329_193	19:38:38	19:39:50	0:01:12	447.5	45.9	68000	YES	Y	2115	6939		
	136	LDR160329_194	19:44:39	19:46:32	0:01:53	447.6	45.9	68000	YES	Y	2080	6824		
	137	LDR160329_194	19:49:27	19:51:20	0:01:53	447.4	45.9	68000	YES	Y	2094	6870		
	138	LDR160329_195	19:54:53	19:56:46	0:01:53	447.7	45.9	68000	YES	Y	2079	6821		
	139	LDR160329_195	19:59:56	20:01:32	0:01:36	448.1	45.9	68000	YES	Y	2074	6804		
	138	LDR160329_200	20:05:00	20:06:52	0:01:52	447.5	45.9	68000	YES	Y	2089	6854		
	UL008	LDR160329_200	20:09:48	20:11:24	0:01:36	447.4	45.9	68000	YES	Y	2097	6880		
	140	LDR160329_201	20:19:54	20:21:54	0:02:00	447.7	45.9	68000	YES	Y	2103	6900		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3128
Aircraft IMU Time	4:51:27	Hobbs Stop	3132.9
Sensor Collection Time	0:45:39	Hobbs Total	4.9
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PAR LLC
PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 1	

Project #:
Project Description: East TN Block 4
Location: Morristown, TN

Lever Arm

	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/29/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160329_172205

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	141	LDR160329_202	20:25:00	20:27:24	0:02:24	447.4	45.9	68000	YES	Y	2121	6959		
	142	LDR160329_203	20:30:25	20:32:49	0:02:24	447.5	45.9	68000	YES	Y	2063	6768		
	143	LDR160329_203	20:36:19	20:39:08	0:02:49	447.4	45.9	68000	YES	Y	1945	6381		
	144	LDR160329_204	20:42:16	20:44:48	0:02:32	447.5	45.9	68000	YES	Y	1988	6522		
	UL009	LDR160329_204	20:47:31	20:48:44	0:01:13	447.8	45.9	68000	YES	Y	2083	6834		
	156	LDR160329_205	20:54:15	21:06:02	0:11:47	447.6	45.9	68000	YES	Y	1780	5840		
	157	LDR160329_211	21:10:58	21:16:59	0:06:01	447.7	45.9	68000	YES	Y	1857	6093		
	158	LDR160329_211	21:19:53	21:27:55	0:08:02	447.5	45.9	68000	YES	Y	1915	6283		
	159	LDR160329_213	21:31:33	21:39:19	0:07:46	447.6	45.9	68000	YES	Y	1763	5784		
	160	LDR160329_214	21:45:08	21:49:41	0:04:33	448	45.9	68000	YES	Y	1623	5325		
	UL010	LDR160329_215	21:54:19	21:55:40	0:01:21	447.6	45.9	68000	YES	Y	1515	4970		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3128
Aircraft IMU Time	4:51:27	Hobbs Stop	3132.9
Sensor Collection Time	0:50:52	Hobbs Total	4.9
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/29/2016	89	76269	2	East_TN_Block4_Flt #4

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
SWAIN, J.	N1107Q	2974.6	10:03:00	14:03:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
SWAIN, D.	ALS-8170	2979.2	14:53:00	18:53:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KMOR
040/9kts/gust to 15	>10	clr below 12k	20	10	0	30.22		Arriving	KMOR

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts		Ft	11342	Ft	Yes		No	X	@ NS			Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At: 9:59:00
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission: Yes X No
				0:00:00					Take off @ 10:15 AM
226	277	14:34:11	14:37:40	0:03:29	18	1.2	136	11251	See notes below.
225	097	14:41:13	14:45:07	0:03:54	18	1.2	163	11353	
224	277	14:47:51	14:52:27	0:04:36	17	1.3	134	11253	
223	097	14:55:01	14:58:18	0:03:17	16	1.4	156	11261	
222	277	15:00:41	15:04:29	0:03:48	16	1.4	132	11236	
221	097	15:07:26	15:10:39	0:03:13	16	1.3	154	11248	
220	277	15:13:31	15:15:38	0:02:07	15	1.4	137	11257	
219	097	15:18:17	15:20:18	0:02:01	16	1.2	155	11275	
218	277	15:22:57	15:25:27	0:02:30	16	1.2	136	11284	
217	097	15:28:06	15:30:53	0:02:47	16	1.2	155	11260	
216	277	15:33:16	15:36:27	0:03:11	16	1.1	139	11281	
215	097	15:39:14	15:41:09	0:01:55	17	1	150	11268	
214	277	15:45:08	15:49:23	0:04:15	18	1	126	11273	
213	097	15:53:07	15:57:27	0:04:20	18	1	158	11280	
212	277	16:00:12	16:05:01	0:04:49	15	1.2	133	11236	
211	097	16:07:53	16:12:16	0:04:23	15	1.2	153	11276	
210	277	16:15:56	16:20:21	0:04:25	14	1.4	142	11236	
209	097	16:23:16	16:27:02	0:03:46	16	1.1	156	11268	
208	277	16:32:25	16:35:31	0:03:06	15	1.3	143	11238	
207	097	16:38:50	16:41:30	0:02:40	15	1.3	157	11256	
206	277	16:44:19	16:46:16	0:01:57	16	1.3	144	11245	
205	097	16:49:05	16:50:51	0:01:46	16	1.2	163	11264	
204	277	16:52:57	16:55:05	0:02:08	16	1.2	142	11261	
203	097	16:58:14	17:00:14	0:02:00	16	1.2	156	11284	
202	277	17:02:52	17:05:07	0:02:15	16	1.2	144	11213	
201	097	17:08:01	17:10:40	0:02:39	17	1.1	156	11246	
200	277	17:13:10	17:15:08	0:01:58	16	1.2	141	11253	
199	097	17:17:51	17:18:43	0:00:52	17	1.2	159	11296	
198	277	17:22:08	17:23:06	0:00:58	16	1.2	148	11229	
				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		1			Verify S-Turns After Mission: Yes X No

Additional Comments: Drive #

AG% / BG% / Range min errors occurred throughout the lines at multiple intervals/times. See the tabs below at bottom of worksheet.

Woolpert

Leica LIDAR

MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
3/29/2016	89	76269	2	East TN Block 4 Flight 4

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
SWAIN, J	N1107Q	2974.6	10:03:00	14:03:00	WOOLPERT PIN

Pilot	Sensor Type	HOBBS END	Local End Time	Zulu End Time	PID
SWAIN, D	ALS-8170	2979.2	14:53:00	18:53:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud		
040/9kts/gust 15	>10	clr below 12k	10	10	0	30.22		Departing	KMOR
								Arriving	KMOR

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain		Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi		B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode	Pre-Trigger Dist.
150	Kts		Ft	9344	Ft	Yes		No		@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At:	9:59:00
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission	Yes ☐ No ☐
145	098	17:32:31	17:34:47	0:02:16	15	1.4	143	9356	Range min error at beginning of line an	
146	278	17:38:17	17:40:41	0:02:24	15	1.2	144	9309	BG % error / Range min error at beginn	
147	098	17:43:21	17:45:35	0:02:14	16	1.2	153	9292	BG % error / Range min error at beginn	
148	278	17:48:43	17:51:26	0:02:43	17	1.2	149	9270	BG % error / Range min error at beginn	
149	098	17:54:37	17:57:50	0:03:13	16	1.2	164	9246	Range min error at beginning of line an	
150	278	18:00:43	18:03:17	0:02:34	16	1.2	145	9256	AG% / BG%/ Range min errors @ 18:02	
151	098	18:06:33	18:09:21	0:02:48	18	1.1	159	9271	AG% / BG%/ Range min errors at begin	
152	278	18:12:14	18:15:14	0:03:00	19	1.1	148	9284	Range min error / AG % error @ 18:14:	
153	098	18:17:59	18:21:10	0:03:11	18	1.1	162	9280	Range min error @ 18:19	
154	278	18:24:04	18:27:41	0:03:37	19	1.1	141	9263	Range min error at beginning of line an	
155	098	18:30:08	18:33:35	0:03:27	21	1.1	157	9244	AG % error @ 18:30	
				0:00:00						
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↑ Times entered are Zulu / GMT ↑				Page		2			Verify S-Turns After Mission	Yes ☐ No ☐

Additional Comments:	Drive #
Indicated errors listed above occurred throughtout the lines at multiple intervals/times.	

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/29/2016	89	76269	2	East_TN_Block4_Flt #5

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
SWAIN, J.	N1107Q	2979.2	18:36:00	22:36:00	WOOLPERT PIN
Pilot	Sensor Type	HOBBS END	Local End Time	Zulu End Time	PID
SWAIN, D.	ALS-8170	2980.3	19:52:00	23:52:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KMOR
090/3kts	>10	clr below 12k	0	16	-1	30.16		Arriving	KMOR

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used				Waveform Mode	Pre-Trigger Dist.
150	Kts		Ft	9344	Ft	Yes		No	x	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At:	9:59:00
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission	Yes X No
				0:00:00					Take off 22:43	
161	097	23:00:42	23:04:52	0:04:10	17	1.3	150	9249	See notes below.	
162	277	23:07:53	23:12:13	0:04:20	17	1.2	159	9231		
163	097	23:15:21	23:20:04	0:04:43	17	1.2	160	9286		
164	277	23:22:33	23:26:26	0:03:53	17	1.2	155	9247		
165	097	23:29:24	23:33:29	0:04:05	00:00.0	1.2	156	9250		
				0:00:00						
				0:00:00						
				0:00:00						
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				0:00:00						
↑ Times entered are Zulu / GMT ↑				Page		1			Verify S-Turns After Mission	Yes X No

Additional Comments:	Drive #
AG% / BG% / Range minimum errors occurred throughout lines at multiple intervals/times.	

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/29/2016	89	76269	2	2016_East_TN_Lidar BLOCK 4

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
GALAMBOS	N111SD	388.3	9:00:00	13:00:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER				KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud		
0101 8	10	Clear	0	6	3	30.18		Departing	KTYS
								Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	Varies	Ft	Yes		No	X	@ NS		Ft	

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a	13:00:00	13:15:00	n/a	n/a	n/a	n/a	GPS Began Logging At:	12:31:40
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes X No
				2:00:15	21	0.6	1	SENSOR: 8194/takeoff: 1241Z	
191	E	13:00:00	13:00:15	0:00:00	21	0.6	1.1	Auto Start fail, manual start/stop	
191	E	13:05:39	13:09:46	0:00:00	19	0.7	1.2	very small thin clouds on some of	
190	W	13;13;49	13:18:43	0:00:00	20	0.6	1	the flight lines	
189	E	13:22:25	13:26:36	0:00:00	18	0.7	1.3		
188	W	13:30:51	13:35;53	0:00:00	18	0.7	1.3		
187	E	13:39:27	13:44:00	0:00:00	19	0.7	1.2		
186	W	13:48:16	13:52:45	0:00:00	18	0.6	1.2		
185	E	13:56:19	14:01:48	0:00:00	19	0.6	1.2		
184	W	14:06:02	14:11:39	0:00:00	19	0.6	1.2		
183	E	14:15:16	14:21:00	0:00:00	19	0.6	1.2		
182	W	14:25:47	14:32:20	0:00:00	18	0.6	1.2		
181	E	14:35:53	14:42:05	0:00:00	17	0.7	1.2		
180	W	14:46:32	14:53:00	0:00:00	17	0.7	1.2		
179	E	14:56:16	15:02:41	0:00:00	17	0.7	1.2		
178	W	15:07:56	15:16:25	0:00:00	16	0.8	1.4		
177	E	15:19:40	15:27:48	0:00:00	16	0.7	1.2		
176	W	15:31:29	15:38:27	0:00:00	16	0.7	1.2		
175	E	15:42:00	15:48:47	0:00:00	16	0.7	1.2		
174	W	15:52:54	15:59:30	0:00:00	16	0.7	1.2		
173	E	16:03;52	16:08:49	0:00:00	15	0.7	1.2		
172	W	16:11;26	16:17:46	0:00:00	15	0.7	1.2		
197	SW	16:20:43	16:22:45	0:00:00	16	0.8	1.1		
196	NE	16:25:36	16:27:41	0:00:00	16	0.8	1.1		
195	SW	16:30:45	16:32:45	0:00:00	16	0.8	1.1		
194	NE	16:36:21	16:38;29	0:00:00	16	0.8	1.1		
193	E	16:41;56	16;43:40	0:00:00	16	0.8	1.1		
192	W	16:46;39	16:47:34	0:00:00	16	0.8	1.1		
171	E	16:52;24	16:57;43	0:00:00	16	0.8	1.1		
170	W	17:01:13	17:06:46	0:00:00	16	0.8	1.1		
169	E	17:09:56	17:15:00	0:00:00	16	0.8	1.1	Go to Page #2	
				Page		1		Verify S-Turns After Mission	Yes X No

Additional Comments:	Drive #
	127

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/29/2016	89	76269	2	2016_East_TN_Lidar BLOCK 4

Operator	Aircraft	HOBBS Start	Local Start Time	Zulu Start Time	Base
GALAMBOS	N111SD	388.3	9:00:00	13:00:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	394.5	2:35:00	18:35:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
010 8	10	CLEAR		6	3	30.18		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi		B	

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts	6500	Ft	VARIES	Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a	13:00:00	13:00:15	n/a	n/a	n/a	n/a	GPS Began Logging At:	12:31;40
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes / No
168	W	17:18:30	17:23;30	10:56:46	15	0.8	1.4	Page #2	
167	E	17:26:43	17:30:03	0:00:00	15	0.8	1.4		
166	W	17:33:52	17:33:30	0:00:00	15	0.8	1.4		
39	N	17:44:58	17:47:42	0:00:00	15	0.7	1.2	Reflight 5 miles souithern end	
38	S	17:51:40	17:54:54	0:00:00	16	0.7	1.2	Reflight 5 miles souithern end	
37	N	17:59:17	18:02:11	0:00:00	15	0.7	1.2	Reflight 5 miles souithern end	
36	S	18:05;24	18:08:04	0:00:00	17	0.7	1.2	Reflight 5 miles souithern end	
139	NE	18:14:26	18:15:59	0:00:00	17	0.7	1.2		
138	SW	18:18:37	18:20:14	0:00:00	18	0.7	1.2		
137	NE	18:23:03	18:24:45	0:00:00	17	0.7	1.2		
136	SW	18:27:25	18:29:02	0:00:00	17	0.7	1.2		
39	N	18:32:46	18:35:32	0:00:00	19	0.6	1.1	NORTH END REFLIGHT	
				0:00:00					
				0:00:00					
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				0:00:00					
↑ Times entered are Zulu / GMT ↑			Page		2			Verify S-Turns After Mission	Yes / No

Additional Comments: Drive #

PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew		Project #		Lever Arm	x	y	z
		Project Description		GPS (m)	-0.110	0.210	-1.220
DRIVE A		East TN Block 6					
		Location					
MISSION 1		Blountville TN					

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/30/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160330_001246

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	1	LDR160330_004	0:47:04	1:00:59	0:13:55	447.4	45.9	68000	YES	Y	1459	4787		
	2	LDR160330_010	1:04:01	1:19:09	0:15:08	447.4	45.9	68000	YES	Y	1864	6115		
	3	LDR160330_012	1:22:32	1:35:39	0:13:07	448.1	45.9	68000	YES	Y	1872	6142		
	4	LDR160330_013	1:38:48	1:53:15	0:14:27	447.9	45.9	68000	YES	Y	1876	6155		
	5	LDR160330_015	1:57:01	2:10:56	0:13:55	448	45.9	68000	YES	Y	1474	4836		
	6	LDR160330_021	2:14:33	2:29:41	0:15:08	447.9	45.9	68000	YES	Y	1891	6204		
	7	LDR160330_023	2:33:09	2:47:13	0:14:04	447.8	45.9	68000	YES	Y	1867	6125		
	8	LDR160330_025	2:51:02	3:03:53	0:12:51	447.8	45.9	68000	YES	Y	1865	6119		
	9	LDR160330_030	3:07:29	3:19:47	0:12:18	447.8	45.9	68000	YES	Y	1327	4354		
	10	LDR160330_032	3:22:59	3:37:34	0:14:35	447.8	45.9	68000	YES	Y	1869	6132		
	UL001	LDR160330_034	3:41:42	3:43:42	0:02:00	447.9	45.9	68000	YES	Y	1643	5390		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3133.7
Aircraft IMU Time	3:48:40	Hobbs Stop	3137.5
Sensor Collection Time	2:21:28	Hobbs Total	3.8
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PAR LLC
PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 2	

Project #	
Project Description	East TN Block 6
Location	Blountville TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/30/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160330_122446

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	158	160330_130303_	13:03:22	13:04:18	0:00:56	446.7	45.9	68000	YES	Y	1317	4321		
	159	160330_130750_	13:08:09	13:10:41	0:02:32	446.9	45.9	68000	YES	Y	1453	4767		
	160	160330_131333_	13:13:52	13:16:24	0:02:32	447.1	45.9	68000	YES	Y	1489	4885		
	161	160330_132002_	13:20:21	13:23:09	0:02:48	446.8	45.9	68000	YES	Y	1632	5354		
	UL001	160330_132516_	13:25:35	13:27:11	0:01:36	447.1	45.9	68000	YES	Y	1687	5535		
	162	160330_133022_	13:30:41	13:31:05	0:00:24	447.1	45.9	68000	YES	Y	1777	5830		
	UL002	160330_133253_	13:33:12	13:33:36	0:00:24	447.4	45.9	68000	YES	Y	1915	6283		
	163	160330_134157_	13:42:15	13:42:55	0:00:40	447.4	45.9	68000	YES	Y	2175	7136		
	164	160330_134518_	13:45:36	13:46:00	0:00:24	448.8	45.9	68000	YES	Y	2127	6978		
	UL003	160330_134924_	13:49:43	13:50:55	0:01:12	447.3	45.9	68000	YES	Y	2017	6617		
	11	160330_140327_	14:03:46	14:18:05	0:14:19	447.5	45.9	68000	YES	Y	1924	6312		
	12	160330_142119_	14:21:37	14:35:56	0:14:19	447.7	45.9	68000	YES	Y	1864	6115		
	13	160330_143855_	14:39:14	14:53:49	0:14:35	447.7	45.9	68000	YES	Y	1865	6119		
	14	160330_145705_	14:57:24	15:11:35	0:14:11	447.7	45.9	68000	YES	Y	1866	6122		
	15	160330_151430_	15:14:49	15:28:52	0:14:03	448.1	45.9	68000	YES	Y	1864	6115		
	16	160330_153220_	15:32:39	15:47:14	0:14:35	447.9	45.9	68000	YES	Y	1842	6043		
	17	160330_155010_	15:50:29	16:04:56	0:14:27	447.9	46.0	68000	YES	Y	1894	6214		
	18	160330_160755_	16:08:14	16:22:01	0:13:47	447.4	45.9	68000	YES	Y	1897	6224		
	19	160330_162449_	16:25:07	16:39:02	0:13:55	448.1	45.9	68000	YES	Y	1900	6234		
	UL004	160330_164154_	16:42:12	16:44:37	0:02:25	447.8	45.9	68000	YES	Y	1907	6257		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3137.5
Aircraft IMU Time	4:34:01	Hobbs Stop	3142.3
Sensor Collection Time	2:24:04	Hobbs Total	4.8
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PAR LLC
PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 3	

Project #	
Project Description	
East TN Block 6	
Location	
Blountville TN	

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/30/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160330_174321

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	20	LDR160330_181	18:13:44	18:28:43	0:14:59	447.7	45.9	68000	YES	Y	1887	6191		
	21	LDR160330_183	18:31:49	18:45:20	0:13:31	447.6	45.9	68000	YES	Y	1886	6188		
	22	LDR160330_184	18:48:58	19:03:34	0:14:36	447.4	45.9	68000	YES	Y	1857	6093		
	23	LDR160330_190	19:06:37	19:19:36	0:12:59	447.5	45.9	68000	YES	Y	1862	6109		
	24	LDR160330_192	19:23:56	19:38:40	0:14:44	447.6	45.9	68000	YES	Y	1874	6148		
	25	LDR160330_194	19:41:40	19:54:39	0:12:59	447.7	45.9	68000	YES	Y	1880	6168		
	26	LDR160330_195	19:58:16	20:13:23	0:15:07	447.9	45.9	68000	YES	Y	1881	6171		
	27	LDR160330_201	20:16:41	20:29:48	0:13:07	447.6	45.9	68000	YES	Y	1894	6214		
	28	LDR160330_203	20:34:11	20:56:08	0:21:57	447.7	45.9	68000	YES	Y	1896	6220		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3142.3
Aircraft IMU Time	2:59:19	Hobbs Stop	3145.5
Sensor Collection Time	2:13:59	Hobbs Total	3.2
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PAR LLC
PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 4	

Project #	
Project Description	East TN Block 6
Location	Blountville TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
3/30/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160330_213559

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	28	LDR160330_220	22:06:39	22:23:15	0:16:36	447.7	45.9	68000	YES	Y	1876	6155		
	29	LDR160330_222	22:26:02	22:40:38	0:14:36	447.7	45.9	68000	YES	Y	1922	6306		
	30	LDR160330_224	22:44:26	22:59:01	0:14:35	447.6	45.9	68000	YES	Y	1930	6332		
	31	LDR160330_230	23:02:13	23:14:23	0:12:10	446.7	45.9	68000	YES	Y	1865	6119		
	32	LDR160330_231	23:18:39	23:33:31	0:14:52	447.6	45.9	68000	YES	Y	1812	5945		
	33	LDR160330_233	23:36:30	23:48:32	0:12:02	447.9	45.9	68000	YES	Y	1863	6112		
	34	LDR160330_235	23:52:19	0:06:31	0:14:12	447.3	45.9	68000	YES	Y	1877	6158		
	35	LDR160331_000	0:10:03	0:21:41	0:11:38	447.4	45.9	68000	YES	Y	1310	4298		
	36	LDR160331_002	0:25:17	0:38:00	0:12:43	447.7	45.9	68000	YES	Y	1884	6181		
	37	LDR160331_004	0:41:17	0:51:44	0:10:27	447.7	45.9	68000	YES	Y	1628	5341		
	38	LDR160331_005	0:55:54	1:08:37	0:12:43	447.7	45.9	68000	YES	Y	1875	6152		
	39	LDR160331_011	1:11:53	1:22:19	0:10:26	448.1	45.9	68000	YES	Y	1675	5495		
	UL001	LDR160331_012	1:26:37	1:31:34	0:04:57	447.5	45.9	68000	YES	Y	1661	5449		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3145.6
Aircraft IMU Time	4:13:57	Hobbs Stop	3150
Sensor Collection Time	2:41:57	Hobbs Total	4.4
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/30/2016	90	76269	2	East_TN_Block 6_Flt-1

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
SWAIN, J.	N1107Q	2980.6	9:39:00	13:39:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
SWAIN, D.	ALS-8170	2985.3	14:41:00	18:41:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTRI
calm	10	clear	0	7	2.1	30.39		Arriving	KTRI

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.	
150	Kts		Ft	7917	Ft	Yes		No	X	@	NS		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At: 9:26:00
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission: Yes X No
				0:00:00					TAKE OFF: 13:53:09 z
40	009	14:14:12	14:22:36	0:08:24	22	1	159	7838	R1 below 50% @14:20z. See add'l notes
41	189	14:25:36	14:33:59	0:08:23	22	1	160	7844	Min Range error @ 14:26:34
42	009	14:36:41	14:44:05	0:07:24	21	1.1	156	7856	Min Range error @ 14:37:19 AG% and B
43	189	14:46:46	14:54:29	0:07:43	20	1.2	161	7829	Min Range error @14:48 and 14:53
44	009	14:57:07	15:04:30	0:07:23	18	1.3	158	7834	Min Range error @ 14:57, 14:58, 15:02
45	189	15:07:13	15:14:37	0:07:24	16	1.3	158	7841	Min Range/AG%/BG% errors @ 15:09, 1
46	009	15:17:13	15:24:43	0:07:30	17	1.1	160	7877	Min Range error 15:17, 15:18, 15:23
47	189	15:27:31	15:34:32	0:07:01	17	1.1	160	7829	Min Range/AG%/BG% errors @15:33:49
48	009	15:37:22	15:44:17	0:06:55	17	1.1	160	7861	Min Range/AG%/BG% errors @ 15:43:06
49	189	15:46:53	15:52:45	0:05:52	18	1	159	7886	Min Range error @ 15:52:34
50	009	15:56:01	16:02:32	0:06:31	17	1.1	159	7806	AG%/BG%/Min. Range errors @ 15:56
51	189	16:05:17	16:12:02	0:06:45	16	1.1	156	7849	Min Range/AG% errors @ 16:09:02
52	009	16:15:30	16:22:55	0:07:25	17	1.2	160	7838	Min Range @ 16:16:12, BG% & AG% @ 1
53	189	16:25:41	16:33:05	0:07:24	17	1.1	155	7841	Min Range error @ 16:28:41 / AG% & BG
54	009	16:35:47	16:43:14	0:07:27	17	1.1	159	7826	Min Range error @ 16:38:14
				0:00:00					AG% & BG% errors @ 16:40:10
				0:00:00					Min Range error @ 16:42:24
55	189	16:46:01	16:53:29	0:07:28	17	1.1	162	7835	Min Range / AG / BG errors @ 16:48:28
				0:00:00					Min Range errors @ 16:51:10 & 16:51:59
56	009	16:55:54	17:03:09	0:07:15	17	1.1	156	7852	AG% / Min Range errors at beginning of
				0:00:00					AG% / Min Range errors @ 16:58 & 17:0
57	189	17:06:15	17:12:48	0:06:33	17	1.1	156	7833	Min Range error @ 17:08:28 / AG% erro
58	009	17:15:18	17:21:29	0:06:11	16	1.3	158	7829	AG & BG % errors at beginning of line. C
59	189	17:24:25	17:29:24	0:04:59	17	1.3	158	7822	Min Range / BG % errors @ 17:25; AG%
60	009	17:31:53	17:36:47	0:04:54	18	1.3	159	7818	Min Range error @ 17:32, 17:33, 17:34 B
61	189	17:39:23	17:44:27	0:05:04	18	1.2	157	7815	Min Range error at beginning. 0% R1 @
62	009	17:47:03	17:51:57	0:04:54	18	1.2	160	7872	Min Range error at beginning / AG & BG
63	189	17:54:39	17:59:35	0:04:56	18	1.2	152	7822	Min Range error at beginning / AG & BG
64	009	18:05:11	18:06:06	0:00:55	19	1.1	153	7831	BG%/AG%/Min Range errors at beginnin
65	189	18:08:30	18:09:26	0:00:56	19	1.2	155	7797	Min Range/AG%/BG% errors at end of li
↑ Times entered are Zulu / GMT ↑				Page		1			Verify S-Turns After Mission: Yes X No

Additional Comments: Drive #

Line 40: Min Range error @ 14:15:30. BG% error @ 14:15:46. Min Range & BG% errors @ 14:17:53. Min Range error @ 14:21:57. Throughout the day, AG% / BG% / Minimum Range errors occurred on the lines at multiple intervals/times. Continue to page 2.

Woolpert

Leica LIDAR

MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
3/30/2016	90	76269	2	East_TN_Block 6_Flt-1

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
SWAIN, J.	N1107Q	2980.6	9:39:00	13:39:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
SWAIN, D.	ALS-8170	2985.3	14:41:00	18:41:00	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTRI
calm	10	clear	0	7	2.1	30.39		Arriving	KTRI

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	215
				Gain - Fine/Down		Multi	X	B	195

Air Speed		AGL		MSL		Waveform Used				Waveform Mode	Pre-Trigger Dist.
150	Kts		Ft	7917	Ft	Yes		No	X	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	PDOP	Kts	Alt.	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	n/a	GPS Began Logging At: 9:26:00
↕ Times entered are Zulu / GMT ↕									Verify S-Turns Before Mission Yes X No
66	009	18:12:05	18:13:00	0:00:55	19	1.1	159	7809	AG%/BG%/Min Range errors at beginni
				0:00:00					Same errors @ 18:12:57
67	189	18:15:24	18:15:23	0:00:00	19	1.1	160	7823	AG%/BG%/Min Range errors at beginni
				0:00:00					Errors continued throughout line.
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
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				0:00:00					
				0:00:00					
↑ Times entered are Zulu / GMT ↑				Page		2			Verify S-Turns After Mission Yes No

Additional Comments:	Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/30/2016	90	76269	2	2016_East_TN_Lidar BLOCK 6

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
GALAMBOS	N111SD	394.5	10:00:00	14:00:00	WOOLPERT PIN
Pilot	**Sensor Type**	**HOBBS END**	**Local End Time**	**Zulu End Time**	**PID**
FLOYD	OTHER	399.4	1:16:00	17:16:00	KTYS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTYS
320 4	10	few 50	few 150	6	3	30.32		Arriving	KTYS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	255	Mode		Threshold Values	
40	50	272	100	Gain - Course/Up		Single		A	
				Gain - Fine/Down		Multi	X	B	

Air Speed	AGL	MSL	Waveform Used				Waveform Mode	Pre-Trigger Dist.
150 Kts	6500 Ft	Varies Ft	Yes		No	X	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	13:07:00
↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission	Yes No
68	S	14:00:47	14:02:38	#VALUE!	21	0.6	1	SENSOR: 8194/takeoff: 1316z	
69	N	14:06;15	14:08:09	0:00:00	22	0.6	0.9	Base Station east end KTRI	
70	S	14:13;18	14:16:39	0:00:00	22	0.6	0.9	Over base @ 13:49:42	
71	N	14:20:23	14:23:56	0:00:00	23	0.6	0.9	We forgot to do 360's	
72	S	14:28:14	14:30:26	0:00:00	21	0.7	1.1		
73	N	14:34:19	14:37:54	0:00:00	21	0.7	1.1		
74	S	14:50:36	14:55:16	0:00:00	18	0.7	1.3		
75	N	14:58:36	15:01:55	0:00:00	17	0.6	1.3		
76	S	15:06:55	15:12:00	0:00:00	17	0.6	1.3		
77	N	15:15;28	15:20:36	0:00:00	19	0.6	1.2		
78	S	15:24:11	15:29:18	0:00:00	19	0.6	1.2		
79	N	15:32:37	15:38:12	0:00:00	18	0.6	1.2		
80	S	15:41;42	15:47:16	0:00:00	17	0.7	1.2		
81	N	15:50:38	15:26:21	0:00:00	17	0.7	1.2		
82	S	15:59:41	16:05:00	0:00:00	17	0.7	1.2		
83	N	16:08:17	16:13:29	0:00:00	17	0.7	1.2		
84	S	16:16:55	16:22;24	0:00:00	17	0.7	1.2		
85	N	16:25:30	16:31:19	0:00:00	16	0.7	1.2		
86	S	16:34:38	16:39:40	0:00:00	16	0.7	1.2		
87	N	16:42;59	16:47:43	0:00:00	16	0.7	1.2		
88	S	16:50:54	16:54:48	0:00:00	15	0.7	1.2		
89	N	16:57:49	17:01:41	0:00:00	17	0.6	1.1		
90	S	17:05:12	17:08:38	0:00:00	17	0.6	1.1		
91	N	17:12:20	17:16:00	0:00:00	17	0.6	1.1	(2) 360's opposite direction	
				0:00:00				Over base @ 17:30:35	
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
				0:00:00					
			Page		1			Verify S-Turns After Mission	Yes X No

Additional Comments:

Drive #

127

PAR LLC
PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 5	

Project #	
Project Description	East TN Block 6
Location	Blountville TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
4/3/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160403_140647

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	92	160403_143610_	14:36:28	14:39:57	0:03:29	447.2	45.9	68000	YES	Y	2023	6637		
	93	160403_144337_	14:43:56	14:49:25	0:05:29	446.9	45.9	68000	YES	Y	1833	6014		
	94	160403_145223_	14:52:41	14:55:46	0:03:05	447.1	45.9	68000	YES	Y	2163	7096		
	95	160403_145854_	14:59:12	15:02:41	0:03:29	447.2	45.9	68000	YES	Y	1823	5981		
	96	160403_150842_	15:09:01	15:13:26	0:04:25	447.4	45.9	68000	YES	Y	1896	6220		
	97	160403_151937_	15:19:56	15:23:08	0:03:12	447.4	45.9	68000	YES	Y	1919	6296		
	98	160403_152558_	15:26:17	15:28:25	0:02:08	447.6	45.9	68000	YES	Y	2176	7139		
	99	160403_153104_	15:31:23	15:34:19	0:02:56	447.4	45.9	68000	YES	Y	1843	6047		
	100	160403_153701_	15:37:20	15:39:28	0:02:08	447.6	45.9	68000	YES	Y	1821	5974		
	101	160403_154225_	15:42:44	15:45:09	0:02:25	447.6	46.0	68000	YES	Y	1745	5725		
	UL001	160403_154704_	15:47:23	15:49:15	0:01:52	447.3	45.9	68000	YES	Y	1962	6437		
	UL002	160403_155046_	15:51:04	15:52:33	0:01:29	447.9	45.9	68000	YES	Y	1874	6148		
	102	160403_155734_	15:57:53	16:00:41	0:02:48	447.5	45.9	68000	YES	Y	2025	6644		
	103	160403_160338_	16:03:56	16:05:57	0:02:01	447.5	45.9	68000	YES	Y	2037	6683		
	104	160403_160916_	16:09:35	16:11:35	0:02:00	447.5	45.9	68000	YES	Y	2119	6952		
	105	160403_161423_	16:14:41	16:15:45	0:01:04	447.5	45.9	68000	YES	Y	2041	6696		
	106	160403_161830_	16:18:49	16:19:37	0:00:48	447.4	45.9	68000	YES	Y	2071	6795		
	UL003	160403_162135_	16:21:54	16:23:54	0:02:00	447.6	45.9	68000	YES	Y	2077	6814		
	107	160403_162800_	16:28:19	17:00:18	0:31:59	447.4	45.9	68000	YES	Y	2081	6827		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3151.3
Aircraft IMU Time	2:50:28	Hobbs Stop	3154.3
Sensor Collection Time	1:18:47	Hobbs Total	3.0
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PRECISION AERIAL RECONNAISSANCE
P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 6	

Project #	
Project Description	East TN Block 6
Location	Blountville TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
4/3/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160403_172531

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	107	160403_175926_	17:59:45	18:00:57	0:01:12	447.6	45.9	68000	YES	Y	2091	6860		
	108	160403_180357_	18:04:15	18:05:52	0:01:37	447.7	45.9	68000	YES	Y	2102	6896		
	109	160403_180842_	18:09:00	18:10:36	0:01:36	447.5	45.9	68000	YES	Y	2136	7008		
	110	160403_181312_	18:13:30	18:15:39	0:02:09	447.3	45.9	68000	YES	Y	2134	7001		
	111	160403_181853_	18:19:12	18:21:13	0:02:01	447.5	45.9	68000	YES	Y	2044	6706		
	112	160403_182410_	18:24:29	18:27:18	0:02:49	447.8	45.9	68000	YES	Y	2056	6745		
	113	160403_183029_	18:30:47	18:32:40	0:01:53	447.7	45.9	68000	YES	Y	1953	6407		
	114	160403_183547_	18:36:05	18:38:54	0:02:49	447.6	45.9	68000	YES	Y	1906	6253		
	115	160403_184148_	18:42:07	18:44:31	0:02:24	447.6	45.9	68000	YES	Y	1986	6516		
	116	160403_184740_	18:47:58	18:51:26	0:03:28	447.8	45.9	68000	YES	Y	2050	6726		
	117	160403_185422_	18:54:40	18:57:45	0:03:05	447.9	45.9	68000	YES	Y	2104	6903		
	118	160403_190049_	19:01:08	19:04:29	0:03:21	447.8	45.9	68000	YES	Y	2131	6991		
	119	160403_190805_	19:08:24	19:11:37	0:03:13	447.6	45.9	68000	YES	Y	2163	7096		
	120	160403_191430_	19:14:48	19:18:57	0:04:09	448	45.9	68001	YES	Y	2073	6801		
	121	160403_192237_	19:22:55	19:27:04	0:04:09	447.7	45.9	68002	YES	Y	2135	7005		
	122	160403_192951_	19:30:09	19:39:56	0:09:47	447.8	45.9	68003	YES	Y	1908	6260		
	123	160403_194311_	19:43:29	19:51:55	0:08:26	447.9	45.9	68004	YES	Y	2174	7133		
	124	160403_195438_	19:54:56	20:05:22	0:10:26	447.9	45.9	68005	YES	Y	1602	5256		
	125	160403_200758_	20:08:17	20:17:31	0:09:14	447.9	45.9	68006	YES	Y	1982	6503		
	126	160403_202020_	20:20:38	20:31:36	0:10:58	447.6	45.9	68007	YES	Y	1790	5873		
	127	160403_203415_	20:34:33	20:43:39	0:09:06	447.7	45.9	68008	YES	Y	1942	6371		
	128	160403_204621_	20:46:39	20:57:13	0:10:34	447.7	45.9	68009	YES	Y	1878	6161		
	130	160403_210151_	21:02:09	21:03:22	0:01:13	448.2	45.9	68010	YES	Y	1880	6168		
	131	160403_210617_	21:06:36	21:08:04	0:01:28	447.8	45.9	68011	YES	Y	1949	6394		
	132	160403_211051_	21:11:10	21:13:02	0:01:52	447.4	45.9	68012	YES	Y	1941	6368		
	133	160403_211536_	21:15:54	21:17:23	0:01:29	447.9	45.9	68013	YES	Y	1898	6227		
	UL001	160403_212034_	21:20:52	21:22:05	0:01:13	447.8	45.9	68014	YES	Y	1958	6424		
	129	160403_212428_	21:24:45	21:33:51	0:09:06	448	45.9	68015	YES	Y	2090	6857		
	UL002	160403_213631_	21:36:49	21:42:51	0:06:02	447.9	45.9	68016	YES	Y	1700	5577		
	152	160403_214614_	21:46:32	21:48:40	0:02:08	447.8	45.9	68017	YES	Y	1463	4800		
	151	160403_215054_	21:51:12	21:54:49	0:03:37	447.8	45.9	68018	YES	Y	1369	4491		
	150	160403_215658_	21:57:16	22:00:20	0:03:04	448	45.9	68019	YES	Y	1322	4337		
	UL003	160403_220157_	22:02:15	22:03:19	0:01:04	447.7	45.9	68020	YES	Y	2177	7142		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3154.3
Aircraft IMU Time	4:57:45	Hobbs Stop	3159.5
Sensor Collection Time	2:20:42	Hobbs Total	5.2
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PAR LLC
PRECISION AERIAL RECONNAISSANCE

P.O. Box 72357
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LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 7	

Project #	
Project Description	East TN Block 6
Location	Blountville TN

Lever Arm

	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
4/3/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160403_225908

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	153	160403_232903_	23:29:21	23:33:14	0:03:53	447.7	45.9	68000	YES	Y	2020	6627		
	154	160403_233613_	23:36:32	23:40:08	0:03:36	447.9	45.9	68000	YES	Y	2094	6870		
	155	160403_234248_	23:43:07	23:45:56	0:02:49	447.7	45.9	68000	YES	Y	1978	6489		
	156	160403_234913_	23:49:32	23:51:24	0:01:52	448.1	45.9	68000	YES	Y	1812	5945		
	157	160403_235410_	23:54:29	23:55:33	0:01:04	447.8	45.9	68000	YES	Y	2128	6982		
	UL001	160403_235746_	23:58:06	0:00:06	0:02:00	447.7	45.9	68000	YES	Y	2050	6726		
	147	160404_000243_	0:03:02	0:10:47	0:07:45	447.6	45.9	68000	YES	Y	2065	6775		
	148	160404_001316_	0:13:35	0:15:35	0:02:00	447.9	45.9	68000	YES	Y	2140	7021		
	149	160404_001839_	0:18:58	0:20:27	0:01:29	447.8	45.9	68000	YES	Y	2171	7123		
	UL002	160404_002222_	0:22:41	0:23:29	0:00:48	447.9	45.9	68000	YES	Y	1318	4324		
	146	160404_002634_	0:26:53	0:36:15	0:09:22	447.7	45.9	68000	YES	Y	2174	7133		
	145	160404_003901_	0:39:20	0:50:02	0:10:42	447.8	45.9	68000	YES	Y	2165	7103		
	144	160404_005225_	0:52:44	1:00:22	0:07:38	447.9	45.9	68000	YES	Y	2171	7123		
	143	160404_010306_	1:03:25	1:11:35	0:08:10	447.8	45.9	68000	YES	Y	2170	7119		
	142	160404_011410_	1:14:28	1:20:46	0:06:18	447.9	45.9	68000	YES	Y	2124	6968		
	141	160404_012838_	1:28:57	1:30:17	0:01:20	448.3	45.9	68000	YES	Y	2122	6962		
	140	160404_013238_	1:32:58	1:34:02	0:01:04	448.1	45.9	68000	YES	Y	2174	7133		
	139	160404_013625_	1:36:44	1:38:36	0:01:52	447.8	45.9	68000	YES	Y	2160	7087		
	138	160404_014341_	1:44:00	1:48:09	0:04:09	448	45.9	68000	YES	Y	2164	7100		
	137	160404_015412_	1:54:31	2:04:57	0:10:26	448	45.9	68000	YES	Y	1969	6460		
	136	160404_020726_	2:07:46	2:16:44	0:08:58	447.8	45.9	68000	YES	Y	2167	7110		
	135	160404_021905_	2:19:24	2:30:47	0:11:23	447.9	45.9	68000	YES	Y	2152	7060		
	134	160404_023334_	2:33:54	2:42:28	0:08:34	447.8	45.9	68000	YES	Y	2123	6965		
	147	160404_024804_	2:48:23	2:55:45	0:07:22	447.8	45.9	68000	YES	Y	2107	6913		
	UL003	160404_030105_	3:01:23	3:05:08	0:03:45	447.5	45.9	68000	YES	Y	2105	6906		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3159.5
Aircraft IMU Time	4:25:22	Hobbs Stop	3164
Sensor Collection Time	2:08:19	Hobbs Total	4.5
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

PAR LLC
PRECISION AERIAL RECONNAISSANCE
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Bossier City, LA 72357

LIDAR Daily Log

Field Crew	
DRIVE A	
MISSION 2	

Project #	
Project Description	East TN Block 4
Location	Morristown, TN

Lever Arm	x	y	z
GPS (m)	-0.110	0.210	-1.220

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME
4/4/2016	Fischer.P	Fischer.E	ALS70	N799AC	20160404_131839

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	
	34	LDR160404_135	13:55:06	14:08:13	0:13:07	447	45.9	68000	YES	Y	2103	6900		
	UL001	LDR160404_141	14:14:41	14:15:37	0:00:56	447.4	45.9	68000	YES	Y	1974	6476		

LIDAR FLIGHT SUMMARY

		Hobbs Start	3164.9
Aircraft IMU Time	1:13:42	Hobbs Stop	3166.2
Sensor Collection Time	0:14:03	Hobbs Total	1.3
Line Miles Flown	0.0	Mission Hobbs	#DIV/0!
Average Flight Lines Speed	0 kts	Reflight Hobbs	#DIV/0!
Average Nautical Line miles Per Mission Hour			#DIV/0!

DATA COLLECTION

Total Lines	0	Project % Complete	#DIV/0!
# Reflight Lines	0	Total Flight Lines	0
Reflight Percent	#DIV/0!	Line Complete	0
Sensor Re-Flight Miles	0.0	Mission Lines	0
Average Nautical Line Miles Per Re-Flight Hour	#DIV/0!		

Section 7: Final Deliverables

The final lidar deliverables are listed below.

- LAS v1.4 classified point cloud
- LAS v1.4 raw unclassified point cloud flight line strips.
- Hydro Breaklines as ESRI shapefile
- Bridge Breaklines as ESRI shapefile
- Digital Elevation Model in ERDAS .IMG format
- 8-bit intensity images in .TIF format
- 2D Building polygons as ESRI Geodatabase
- Tile layout provided as ESRI shapefile
- Control Points provided as ESRI shapefile
- FGDC compliant metadata per product in XML format
- Lidar processing report in pdf format
- Survey report in pdf format