Airborne Lidar Report

TN West Central Lidar 2017 B17Lidar

Contract Number: G16PC00022
Task Number: G17PD00241

Contractor: Woolpert, Inc.
Woolpert Project # 77390

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Section 1: Overview

TASK ORDER NAME: TN West Central Lidar 2017 B17

Project: # 77390

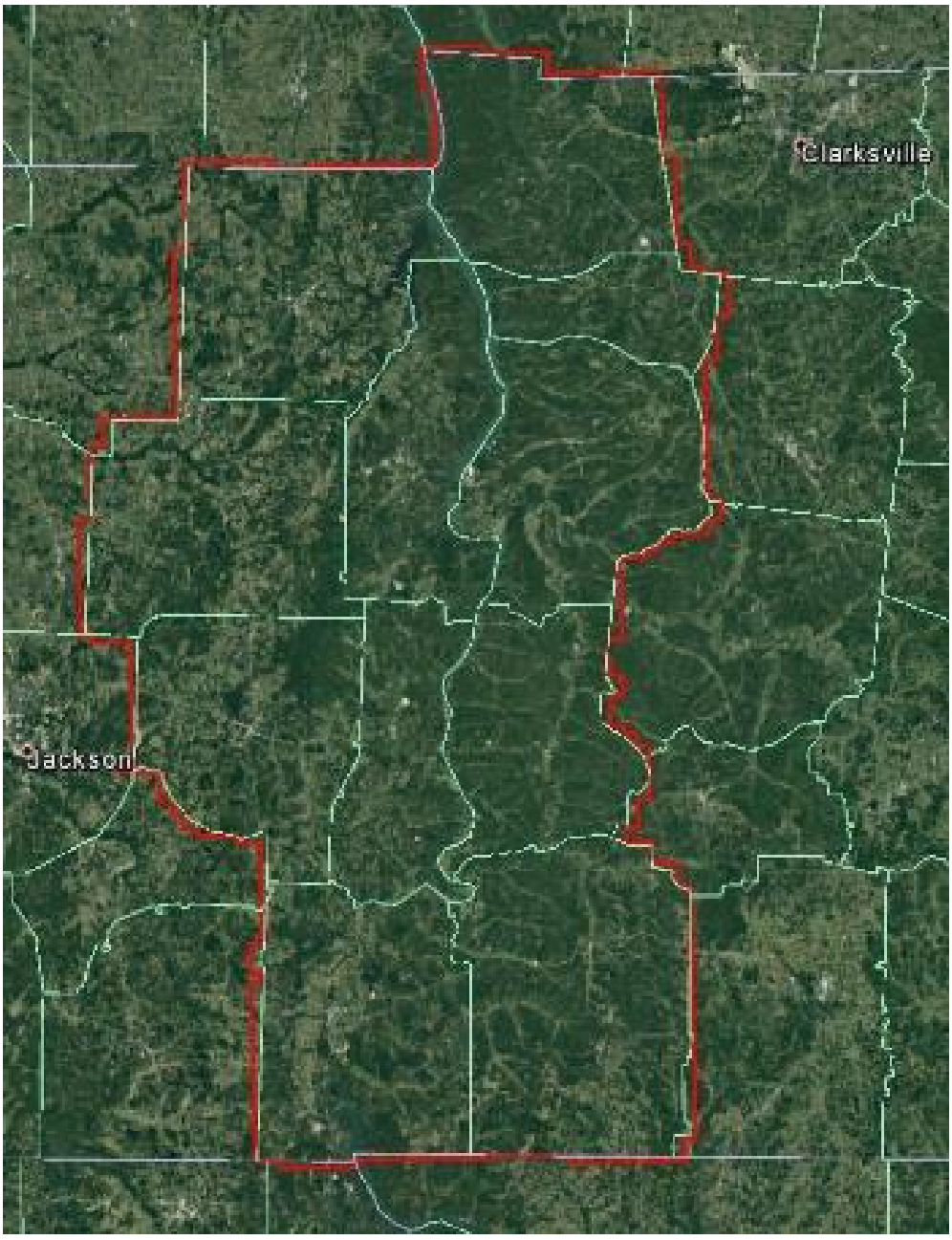
This report contains a comprehensive outline of the TN West Central Lidar 2017 B17 task order. Processing task order for the United States Geological Survey (USGS). This task is issued under USGS Contract No. G16PC00022, Task Order No. G17PD00241 This task order requires lidar data to be acquired over approximately 5,735 square miles square miles in Stewart, Henry, Benton, Houston, Carroll, Humphreys, Henderson, Perry, Decatur, Hardin and Wayne counties in TN. Project specifications are based on the U.S. Geological Survey National Geospatial Program Base Lidar Specification, Version 1.2. The lidar data for this AOI is collected at a nominal pulse spacing (NPS) of 0.7meters. The NPS assessment is made against single swath, first return data located within the geometrically usable center portion (typically ~90%) of each swath.

The aerial lidar was collected at the following sensor specifications:

Table 1.1: Riegl-Q1560 Specifications	
Post Spacing	0.70 m
AGL (Above Ground Level) average flying height	1,950 m
Average Ground Speed:	150 knots
Field of View (full)	58 degrees
Pulse Rate	700 kHz
Side Lap	30%

The horizontal datum used for the task order was referenced to Tennessee State Plane Zone NAD83(2011) Survey Feet. The vertical datum of NAVD88 Geoid12B Survey Feet.

Figure 1.1: TN West Central Lidar 2017 B17 Task Order AOI



Section 2: Acquisition

The lidar data was acquired with a Riegl-Q1560 LiDAR system.

Table 2.1: Airborne Lidar Acquisition Flight Summary

Item	Parameter
Manufacturer	Riegl
Model	LMS Q1560
Platform	Fixed-wing
Scan Angle °	58
Field of view (°)	0 - 58
Maximum Pulse rate (kHz)	800
Maximum Flying height (m AGL)	3300
Pulse Rate (ns)	3
Pulse Wavelength (nM)	1064
Beam Divergence (mrad)	0.25
Number of returns	12
Number of intensity measurements	12
Roll stabilization (automatic adaptive, °)	58 - active FOV
Number of intensity measurements	12
Roll stabilization (automatic adaptive, °)	58 - active FOV
Storage media	removable 800 GB SSD
Storage capacity (hours @ max pulse rate)	5
Weight (kg)	62
Operating Temperature	0 - 40 °C
Flight Management	Ri-Acquire
Power Consumption	18.0v – 32.0v DC

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 seventeen (17) 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. Collection of lidar data took between March 3, 2017 and October 29, 2017.

Table 2.2: Airborne Lidar Acquisition Flight Summary

Date of Acquisition	Lines Flown	Acquisition Time (UTC)
March 3, 2017_M1	**1-8, 135**	**15:49 – 19:27**
March 3, 2017_M2	**9-18**	**21:23 – 0:48**
March 4, 2017_M3	**19-28**	**14:59 – 18:17**
March 4, 2017_M4	**29-40**	**19:46 – 23:39**
March 5, 2017_M5	**41-48**	**13:37 – 16:24**
March 8, 2017_M6	**48-55**	**17:11 – 20:08**
March 8, 2017_M7	**56-61**	**23:29 – 1:35**
March 9, 2017_M8	**62-71**	**14:36 – 18:28**
March 9, 2017_M9	**72, 73, 92-96**	**20:49 – 23:22**
March 10, 2017_M10	**119-134**	**16:26 – 20:19**
March 10, 2017_M11	**109-118**	**22:08 – 1:53**
March 12, 2017_M12	**93-95, 174w-178w, 189w-191w**	**16:52 – 20:10**
March 15, 2017_M13	**179w-188w, 288e-291e**	**17:07 – 20:52**
March 15, 2017_M14	**96, 97, 274e-287e**	**2:47 – 6:37**
March 16, 2017_M15	**98-108**	**14:32 – 18:53**
March 19, 2017_M16	**9-12, 29-31**	**15:06 – 17:15**
October 29, 2017_M1_Reflight	**1-4**	**14:51 – 15:15**

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: 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: Proprietary Software, TerraMatch v. 17.
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.17.
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.17.

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)
AI9822	35° 10' 14.62711"	88° 13 03' 02676"	113.102
GPS-30	36° 00' 43.56507"	88°13' 03.02676"	110.895

GPS / IMU 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.

- 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).

- 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.

- 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.

- The PDOP measures the precision of the GPS solution in regard 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.

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 Processed, but Unclassified (Class 1), Bare Earth Ground (Class 2), Buildings (Class 6), Low Noise (Class 7), Water (Class 9), Ignored Ground (Class 10), Bridge Decks (Class 17) and 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) Survey Feet, and vertical datum of NAVD88 (Geoid12B) Survey Feet.

Section 4: Hydrologic Flattening

HYDROLOGIC FLATTENING OF LIDAR DEM DATA

TN West Central Lidar 2017 B17 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

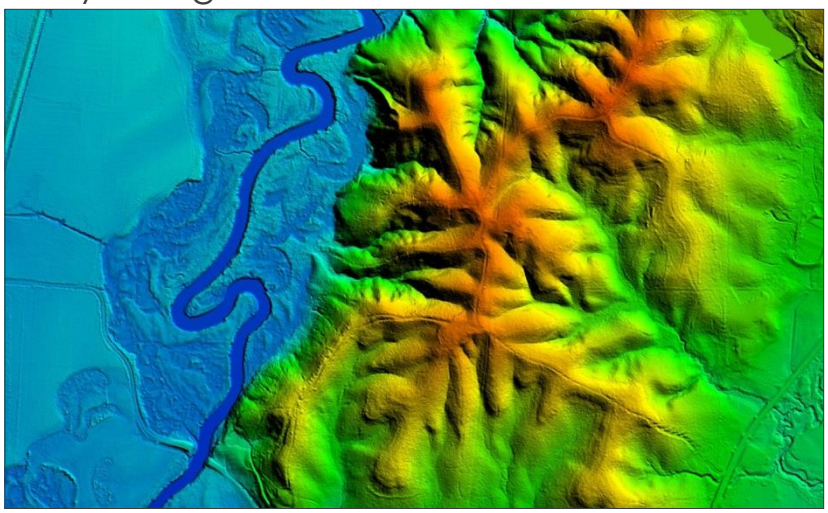


Figure 4.2 reflects a DEM generated from original lidar bare earth point data prior to the hydrologic flattening process. Note the "tinning" across the lake surface.

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.

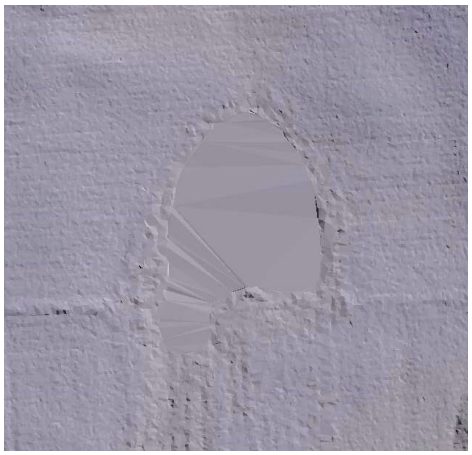


Figure 4.2

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 GDB 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 in geodatabase 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	-0.002	US Feet
Minimum error	-0.436	US Feet
Maximum error	0.471	US Feet
Average magnitude	0.049	US Feet
Root mean square	0.118	US Feet
Standard deviation	0.119	US Feet

Table 5.2: RAW Swath Quality Check Point Analysis NVA

Point ID	Easting (US Feet)	Northing (US Feet)	Elevation (US Feet)	TIN Elevation (US Feet)	Dz (US Feet)
2002	1389393.270	851365.890	391.890	391.898	0.008
2003	1418093.150	843653.010	395.930	396.086	0.156
2005	1442748.320	841371.070	427.520	427.084	-0.436
2006	1451955.140	822441.740	534.520	534.454	-0.066
2007	1467166.950	814139.210	642.810	642.829	0.019
2009	1494755.630	779365.010	684.410	684.451	0.041
2010	1465360.940	262705.210	822.560	822.496	-0.064
2011	1424503.990	251131.830	705.380	705.278	-0.102
2013	1449950.760	310409.630	1056.420	1056.297	-0.123
2015	1292795.410	291572.160	489.840	489.812	-0.028
2016	1302270.710	327709.230	444.380	444.851	0.471
2017	1267613.920	368768.770	467.960	468.022	0.062
2018	1310825.020	387227.710	410.520	410.510	-0.010
2020	1442755.210	359625.160	744.650	744.896	0.246
2021	1277138.990	436026.670	571.820	571.782	-0.038
2022	1300829.690	437630.060	522.410	522.478	0.068
2024	1335431.220	483437.220	506.680	506.827	0.147
2025	1354637.050	487320.050	590.960	590.997	0.037
2027	1471426.210	447726.660	954.520	954.571	0.051
2028	1305539.030	483429.620	476.880	476.984	0.104
2030	1198095.660	470431.540	399.230	399.217	-0.013
2031	1199085.390	550340.630	489.090	489.206	0.116
2032	1259953.840	568501.290	528.370	528.493	0.123

2033	1282292.340	577055.340	467.150	467.220	0.070
2034	1175853.520	607599.850	441.240	441.310	0.070
2035	1192499.480	620858.440	472.850	472.808	-0.042
2036	1205826.950	612179.780	436.380	436.390	0.010
2037	1251055.060	617829.900	385.860	385.796	-0.064
2038	1290705.590	606025.430	511.060	511.122	0.062
2039	1303905.130	628217.150	430.520	430.455	-0.065
2042	1332495.120	566445.010	475.730	475.759	0.029
2043	1442454.720	601275.960	413.580	413.511	-0.069
2044	1438772.830	527794.030	494.830	494.874	0.044
2045	1437732.940	642087.990	524.900	524.915	0.015
2046	1487219.170	649122.610	809.190	809.152	-0.038
2047	1354233.890	290032.210	544.820	544.932	0.112
2048	1269117.290	535391.890	476.720	476.743	0.023
2049	1258887.650	540207.410	514.990	515.029	0.039
2050	1226049.730	670543.460	473.160	473.262	0.102
2051	1255696.260	689507.830	547.350	547.390	0.040
2052	1293732.250	679055.530	462.290	462.085	-0.205
2054	1352305.980	698604.690	368.080	368.048	-0.032
2055	1426175.580	727961.590	491.430	491.525	0.095
2056	1465218.570	725518.570	460.940	460.986	0.046
2057	1487123.620	752082.330	410.660	410.684	0.024
2058	1471508.190	792518.070	383.890	383.724	-0.166
2059	1427412.460	789071.630	441.820	441.791	-0.029
2060	1319516.720	773112.630	444.130	444.063	-0.067
2062	1284786.260	797010.840	563.200	563.035	-0.165
2063	1238855.400	753952.160	571.640	571.515	-0.125
2064	1215757.040	466487.330	415.230	415.343	0.113
2067	1416026.490	448831.720	744.560	744.727	0.167
2068	1453187.820	462095.460	894.820	895.005	0.185
2069	1449605.260	502784.900	489.240	489.009	-0.231
2071	1346618.750	519265.020	529.990	529.841	-0.149
2072	1258704.640	512923.400	594.200	594.356	0.156
2075	1263991.710	661469.360	412.920	412.892	-0.028
2076	1348548.130	664560.090	423.870	424.057	0.187
2077	1434614.740	689661.280	713.790	713.674	-0.116
2078	1485707.620	693959.900	612.630	612.843	0.213
2079	1458562.430	767572.260	522.960	522.914	-0.046
2080	1407014.110	763586.620	497.270	497.285	0.015
2081	1382139.420	807129.970	381.050	380.982	-0.068
2082	1383014.620	718633.980	417.640	417.657	0.017

2083	1283676.410	733032.360	491.310	491.303	-0.007
2084	1343219.540	601610.060	485.660	485.574	-0.086
2085	1381896.330	274606.910	643.000	642.844	-0.156
2086	1354484.610	263633.950	768.990	769.034	0.044
2087	1392818.220	347350.340	783.770	783.753	-0.017
2088	1417900.320	391925.330	477.630	477.510	-0.120
2089	1471845.000	405149.430	713.830	713.996	0.166
2090	1336978.450	429909.610	531.010	530.880	-0.130
2091	1306798.720	528082.410	594.630	594.558	-0.072
2092	1239712.170	647197.870	485.210	485.183	-0.027
2093	1177716.410	658742.060	358.660	358.886	0.226
2094	1460902.100	677577.340	567.880	567.953	0.073
2095	1480291.830	582618.460	696.290	696.462	0.172
2096	1440881.230	757191.300	680.450	680.317	-0.133
2098	1292516.880	716350.410	422.420	422.445	0.025
2099	1283731.200	761082.750	549.740	549.676	-0.064
2100	1398925.010	832855.260	397.120	397.211	0.091
2101	1436265.990	804969.060	391.860	391.589	-0.271
2102	1415583.850	819829.340	510.620	510.729	0.109
2103	1356832.540	796503.360	397.400	397.120	-0.280
2104	1356365.980	773279.010	364.810	364.744	-0.066
2105	1226931.230	798884.410	466.280	466.171	-0.109
2106	1256854.760	776251.710	468.050	468.140	0.090
2107	1263430.870	751341.400	477.470	477.333	-0.137
2108	1239309.680	717194.170	471.680	471.643	-0.037
2109	1233055.360	688969.210	496.010	496.078	0.068
2110	1285182.480	411627.130	495.670	495.712	0.042
2111	1324754.830	414293.990	506.360	506.507	0.147
2112	1307820.860	366995.540	414.860	414.981	0.121
2113	1313572.350	347863.570	420.260	420.125	-0.135
2114	1306873.330	310697.460	460.500	460.556	0.056
2115	1356007.010	365612.340	695.680	695.714	0.034
2116	1357576.340	338231.250	734.670	734.555	-0.115
2117	1492149.610	365854.640	1036.700	1036.708	0.008
2118	1480787.260	338549.190	754.540	754.484	-0.056
2119	1421323.020	426199.680	553.870	554.089	0.219
2120	1495751.480	277236.470	667.350	667.378	0.028
2123	1460239.260	712934.800	792.610	792.680	0.070
2124	1364997.320	551232.640	415.510	415.474	-0.036
2125	1404471.510	562878.330	387.950	388.052	0.102
2126	1389352.750	599264.610	365.960	365.828	-0.132

2127	1413560.640	660878.840	680.280	680.017	-0.263
2128	1272524.720	645323.850	435.030	435.155	0.125
2129	1294878.630	519560.260	621.770	621.621	-0.149
2130	1196085.740	510422.760	618.150	618.227	0.077
2134	1383472.300	747509.580	392.320	392.226	-0.094
2135	1400466.100	821095.150	380.340	380.357	0.017
2136	1396288.110	497302.260	455.060	455.035	-0.025
2137	1266873.870	332313.370	456.270	456.293	0.023
2138	1282253.530	333280.280	405.410	405.682	0.272
2139	1297748.040	334951.970	440.650	440.625	-0.025
2140	1312888.180	332903.050	412.840	412.847	0.007
2141	1361086.290	348425.710	538.710	538.494	-0.216
2142	1374849.720	351280.980	503.330	503.330	0.000
2143	1405879.220	358530.520	500.750	500.757	0.007
2144	1421386.910	355438.510	574.140	574.075	-0.065
2145	1436626.300	365444.520	960.530	960.565	0.035
2146	1452067.610	365496.770	925.520	925.457	-0.063
2147	1483315.540	366785.120	976.390	976.301	-0.089
2148	1498567.890	362003.130	1001.840	1001.734	-0.106
2149	1180252.340	564379.740	551.090	551.212	0.122
2150	1195907.920	572347.430	513.510	513.368	-0.142
2151	1227107.170	565825.730	487.850	488.067	0.217
2152	1242556.800	566625.570	515.960	515.919	-0.041
2153	1258183.230	558186.760	517.070	517.105	0.035
2154	1289461.500	546518.160	529.640	529.742	0.102
2155	1320697.300	547665.410	517.470	517.420	-0.050
2156	1336705.410	549047.780	545.180	545.017	-0.163
2157	1352017.830	556377.090	580.540	580.604	0.064
2158	1367865.980	565846.850	594.640	594.665	0.025
2159	1383011.040	564821.670	638.310	638.293	-0.017
2160	1398980.970	563834.990	383.980	384.045	0.065
2161	1413793.090	564143.850	456.260	456.251	-0.009
2162	1445255.970	569170.100	613.120	612.948	-0.172
2163	1447218.830	602795.320	430.150	430.093	-0.057
2164	1476684.230	622109.330	502.760	502.796	0.036
2165	1493246.010	620490.250	572.100	572.053	-0.047
2166	1240706.490	721342.700	465.770	465.798	0.028
2167	1256838.750	722550.460	494.610	494.511	-0.099
2168	1272491.950	724598.460	536.070	535.985	-0.085
2169	1288359.570	726317.850	487.420	487.394	-0.026
2170	1336057.830	739969.450	379.030	378.941	-0.089

2171	1351614.580	753294.480	457.150	457.214	0.064
2172	1367958.530	776240.900	433.110	433.084	-0.026
2173	1415323.320	727469.430	428.100	428.083	-0.017
2174	1431198.040	730547.620	667.370	667.378	0.008
2175	1446824.760	725764.180	737.910	737.983	0.073
2176	1463204.710	729527.590	638.720	638.625	-0.095
2177	1522567.560	711794.050	629.250	629.124	-0.126
2178	1445268.080	728568.720	735.360	735.350	-0.010
2179	1344162.270	339318.400	540.790	540.796	0.006

VERTICAL ACCURACY CONCLUSIONS

Raw Swath Non-Vegetated Vertical Accuracy (NVA) Tested 0.070 Meters Non vegetated vertical accuracy at a 95 percent confidence level, derived according to NSSDA, in open terrain using (RMSEz) 0.035 meters 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 against 156 NVA points.

LAS Swath Non-Vegetated Vertical Accuracy (NVA) Tested 0.068 Meters Non vegetated vertical accuracy at a 95 percent confidence level, derived according to NSSDA, in open terrain using (RMSEz) 0.035 meters 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 lidar ground points against 156 NVA points.

Table 5.3: NVA Check Point Analysis DEM

Point ID	Easting (US Feet)	Northing (US Feet)	Elevation (US Feet)	DEM Elevation (US Feet)	Dz (US Feet)
2002	1389393.270	851365.890	391.890	391.841	0.049
2003	1418093.150	843653.010	395.930	396.051	-0.121
2005	1442748.320	841371.070	427.520	427.021	0.499
2006	1451955.140	822441.740	534.520	534.431	0.089
2007	1467166.950	814139.210	642.810	642.771	0.039
2009	1494755.630	779365.010	684.410	684.481	-0.071
2010	1465360.940	262705.210	822.560	822.482	0.078
2011	1424503.990	251131.830	705.380	705.281	0.099
2013	1449950.760	310409.630	1056.420	1056.292	0.128
2015	1292795.410	291572.160	489.840	489.811	0.029
2016	1302270.710	327709.230	444.380	444.721	-0.341
2017	1267613.920	368768.770	467.960	467.991	-0.031
2018	1310825.020	387227.710	410.520	410.511	0.009

2020	1442755.210	359625.160	744.650	744.851	-0.201
2021	1277138.990	436026.670	571.820	571.781	0.039
2022	1300829.690	437630.060	522.410	522.461	-0.051
2024	1335431.220	483437.220	506.680	506.851	-0.171
2025	1354637.050	487320.050	590.960	590.921	0.039
2027	1471426.210	447726.660	954.520	954.502	0.018
2028	1305539.030	483429.620	476.880	477.001	-0.121
2030	1198095.660	470431.540	399.230	399.081	0.149
2031	1199085.390	550340.630	489.090	489.181	-0.091
2032	1259953.840	568501.290	528.370	528.521	-0.151
2033	1282292.340	577055.340	467.150	467.291	-0.141
2034	1175853.520	607599.850	441.240	441.231	0.009
2035	1192499.480	620858.440	472.850	472.881	-0.031
2036	1205826.950	612179.780	436.380	436.381	-0.001
2037	1251055.060	617829.900	385.860	385.801	0.059
2038	1290705.590	606025.430	511.060	511.061	-0.001
2039	1303905.130	628217.150	430.520	430.451	0.069
2042	1332495.120	566445.010	475.730	475.691	0.039
2043	1442454.720	601275.960	413.580	413.531	0.049
2044	1438772.830	527794.030	494.830	494.881	-0.051
2045	1437732.940	642087.990	524.900	525.021	-0.121
2046	1487219.170	649122.610	809.190	809.222	-0.032
2047	1354233.890	290032.210	544.820	544.851	-0.031
2048	1269117.290	535391.890	476.720	476.701	0.019
2049	1258887.650	540207.410	514.990	515.021	-0.031
2050	1226049.730	670543.460	473.160	473.201	-0.041
2051	1255696.260	689507.830	547.350	547.381	-0.031
2052	1293732.250	679055.530	462.290	462.041	0.249
2054	1352305.980	698604.690	368.080	368.041	0.039
2055	1426175.580	727961.590	491.430	491.621	-0.191
2056	1465218.570	725518.570	460.940	460.921	0.019
2057	1487123.620	752082.330	410.660	410.741	-0.081
2058	1471508.190	792518.070	383.890	383.761	0.129
2059	1427412.460	789071.630	441.820	441.791	0.029
2060	1319516.720	773112.630	444.130	444.101	0.029
2062	1284786.260	797010.840	563.200	563.031	0.169
2063	1238855.400	753952.160	571.640	571.481	0.159
2064	1215757.040	466487.330	415.230	415.301	-0.071
2065	1250160.600	450572.450	541.340	541.571	-0.231
2067	1416026.490	448831.720	744.560	744.721	-0.161
2068	1453187.820	462095.460	894.820	895.122	-0.302

2069	1449605.260	502784.900	489.240	489.091	0.149
2071	1346618.750	519265.020	529.990	529.811	0.179
2072	1258704.640	512923.400	594.200	594.291	-0.091
2075	1263991.710	661469.360	412.920	412.891	0.029
2076	1348548.130	664560.090	423.870	424.061	-0.191
2077	1434614.740	689661.280	713.790	713.601	0.189
2078	1485707.620	693959.900	612.630	612.841	-0.211
2079	1458562.430	767572.260	522.960	522.941	0.019
2080	1407014.110	763586.620	497.270	497.291	-0.021
2081	1382139.420	807129.970	381.050	380.961	0.089
2082	1383014.620	718633.980	417.640	417.661	-0.021
2083	1283676.410	733032.360	491.310	491.351	-0.041
2084	1343219.540	601610.060	485.660	485.591	0.069
2085	1381896.330	274606.910	643.000	642.841	0.159
2086	1354484.610	263633.950	768.990	769.042	-0.052
2087	1392818.220	347350.340	783.770	783.892	-0.122
2088	1417900.320	391925.330	477.630	477.461	0.169
2089	1471845.000	405149.430	713.830	713.981	-0.151
2090	1336978.450	429909.610	531.010	530.811	0.199
2091	1306798.720	528082.410	594.630	594.531	0.099
2092	1239712.170	647197.870	485.210	485.261	-0.051
2093	1177716.410	658742.060	358.660	358.941	-0.281
2094	1460902.100	677577.340	567.880	567.801	0.079
2095	1480291.830	582618.460	696.290	696.471	-0.181
2096	1440881.230	757191.300	680.450	680.351	0.099
2098	1292516.880	716350.410	422.420	422.511	-0.091
2099	1283731.200	761082.750	549.740	549.651	0.089
2100	1398925.010	832855.260	397.120	397.251	-0.131
2101	1436265.990	804969.060	391.860	391.661	0.199
2102	1415583.850	819829.340	510.620	510.701	-0.081
2103	1356832.540	796503.360	397.400	397.101	0.299
2104	1356365.980	773279.010	364.810	364.721	0.089
2105	1226931.230	798884.410	466.280	466.191	0.089
2106	1256854.760	776251.710	468.050	467.941	0.109
2107	1263430.870	751341.400	477.470	477.321	0.149
2108	1239309.680	717194.170	471.680	471.631	0.049
2109	1233055.360	688969.210	496.010	496.031	-0.021
2110	1285182.480	411627.130	495.670	495.641	0.029
2111	1324754.830	414293.990	506.360	506.541	-0.181
2112	1307820.860	366995.540	414.860	415.031	-0.171
2113	1313572.350	347863.570	420.260	420.141	0.119

2114	1306873.330	310697.460	460.500	460.541	-0.041
2115	1356007.010	365612.340	695.680	695.771	-0.091
2116	1357576.340	338231.250	734.670	734.551	0.119
2117	1492149.610	365854.640	1036.700	1036.702	-0.002
2118	1480787.260	338549.190	754.540	754.492	0.048
2119	1421323.020	426199.680	553.870	554.131	-0.261
2120	1495751.480	277236.470	667.350	667.371	-0.021
2123	1460239.260	712934.800	792.610	792.702	-0.092
2124	1364997.320	551232.640	415.510	415.521	-0.011
2125	1404471.510	562878.330	387.950	387.951	-0.001
2126	1389352.750	599264.610	365.960	365.821	0.139
2127	1413560.640	660878.840	680.280	679.971	0.309
2128	1272524.720	645323.850	435.030	435.061	-0.031
2129	1294878.630	519560.260	621.770	621.601	0.169
2130	1196085.740	510422.760	618.150	618.271	-0.121
2134	1383472.300	747509.580	392.320	392.081	0.239
2135	1400466.100	821095.150	380.340	380.341	-0.001
2136	1396288.110	497302.260	455.060	455.141	-0.081
2137	1266873.870	332313.370	456.270	456.261	0.009
2138	1282253.530	333280.280	405.410	405.641	-0.231
2139	1297748.040	334951.970	440.650	440.691	-0.041
2140	1312888.180	332903.050	412.840	412.821	0.019
2141	1361086.290	348425.710	538.710	538.671	0.039
2142	1374849.720	351280.980	503.330	503.331	-0.001
2143	1405879.220	358530.520	500.750	500.871	-0.121
2144	1421386.910	355438.510	574.140	574.121	0.019
2145	1436626.300	365444.520	960.530	960.562	-0.032
2146	1452067.610	365496.770	925.520	925.452	0.068
2147	1483315.540	366785.120	976.390	976.352	0.038
2148	1498567.890	362003.130	1001.840	1001.732	0.108
2149	1180252.340	564379.740	551.090	551.161	-0.071
2150	1195907.920	572347.430	513.510	513.421	0.089
2151	1227107.170	565825.730	487.850	487.991	-0.141
2152	1242556.800	566625.570	515.960	515.931	0.029
2153	1258183.230	558186.760	517.070	517.151	-0.081
2154	1289461.500	546518.160	529.640	529.701	-0.061
2155	1320697.300	547665.410	517.470	517.411	0.059
2156	1336705.410	549047.780	545.180	545.031	0.149
2157	1352017.830	556377.090	580.540	580.581	-0.041
2158	1367865.980	565846.850	594.640	594.681	-0.041
2159	1383011.040	564821.670	638.310	638.281	0.029

2160	1398980.970	563834.990	383.980	384.061	-0.081
2161	1413793.090	564143.850	456.260	456.231	0.029
2162	1445255.970	569170.100	613.120	613.061	0.059
2163	1447218.830	602795.320	430.150	430.091	0.059
2164	1476684.230	622109.330	502.760	502.791	-0.031
2165	1493246.010	620490.250	572.100	572.161	-0.061
2166	1240706.490	721342.700	465.770	465.811	-0.041
2167	1256838.750	722550.460	494.610	494.451	0.159
2168	1272491.950	724598.460	536.070	536.111	-0.041
2169	1288359.570	726317.850	487.420	487.341	0.079
2170	1336057.830	739969.450	379.030	378.971	0.059
2171	1351614.580	753294.480	457.150	457.191	-0.041
2172	1367958.530	776240.900	433.110	433.131	-0.021
2173	1415323.320	727469.430	428.100	428.061	0.039
2174	1431198.040	730547.620	667.370	667.281	0.089
2175	1446824.760	725764.180	737.910	738.021	-0.111
2176	1463204.710	729527.590	638.720	638.531	0.189
2177	1522567.560	711794.050	629.250	629.121	0.129
2178	1445268.080	728568.720	735.360	735.341	0.019
2179	1344162.270	339318.400	540.790	540.801	-0.011

VERTICAL ACCURACY CONCLUSIONS

Bare-Earth DEM Non-Vegetated Vertical Accuracy (NVA) Tested 0.072 Meters Non-Vegetated vertical accuracy at a 95 percent confidence level, derived according to NSSDA, in open terrain using (RMSEz) 0.037 meters 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 against 156 NVA points.

Table 5.4: VVA Quality Check Point Analysis DEM

Point ID	Easting (US Feet)	Northing (US Feet)	Elevation (US Feet)	DEM Elevation (US Feet)	Dz (US Feet)
3001	1375291.970	845149.060	379.450	379.951	-0.501
3002	1389543.170	850890.810	396.570	396.291	0.279
3003	1418016.140	843854.790	415.560	416.001	-0.441
3004	1429110.670	828770.580	415.180	415.271	-0.091
3005	1442792.690	841336.430	421.520	421.501	0.019
3006	1452208.960	822330.960	543.060	543.241	-0.181
3007	1466984.420	814216.240	640.150	640.201	-0.051

3008	1489738.520	808354.910	650.870	651.201	-0.331
3009	1495021.180	779455.770	691.950	692.381	-0.431
3010	1465376.590	262642.160	822.480	822.532	-0.052
3011	1424454.150	251018.710	702.200	702.311	-0.111
3012	1390195.230	303919.070	574.950	575.081	-0.131
3013	1449356.410	309216.200	1036.200	1036.302	-0.102
3014	1288104.250	266286.240	490.930	490.881	0.049
3015	1292877.700	291755.380	492.200	492.251	-0.051
3016	1300198.380	322016.230	455.130	455.521	-0.391
3017	1268005.340	369500.720	401.150	402.001	-0.851
3018	1312068.070	386726.840	380.180	380.561	-0.381
3019	1374685.420	387367.510	389.090	389.251	-0.161
3020	1444011.970	357280.840	727.220	727.831	-0.611
3021	1277165.990	436136.210	564.970	564.941	0.029
3022	1299887.360	437607.570	512.340	512.541	-0.201
3023	1338832.660	462132.600	512.330	512.941	-0.611
3024	1335362.250	483591.330	504.020	504.671	-0.651
3025	1355396.250	487268.980	594.020	594.181	-0.161
3026	1423161.080	471206.980	491.710	491.841	-0.131
3027	1471098.840	447717.820	947.630	947.882	-0.252
3028	1305060.590	483850.800	460.230	460.491	-0.261
3029	1255775.190	487205.380	468.940	469.011	-0.071
3030	1197926.220	470371.270	413.140	413.451	-0.311
3031	1199532.990	550074.150	489.890	490.401	-0.511
3032	1259079.280	568712.860	525.350	525.641	-0.291
3033	1281546.200	575529.390	481.420	481.551	-0.131
3034	1175361.390	607344.920	442.410	442.671	-0.261
3035	1191709.100	618280.330	442.120	442.351	-0.231
3036	1207566.400	612137.270	394.900	394.961	-0.061
3037	1251477.600	614667.930	384.400	384.551	-0.151
3038	1287642.750	602936.770	480.640	480.821	-0.181
3039	1303072.440	629004.750	406.800	407.041	-0.241
3040	1343210.920	632758.450	426.210	426.441	-0.231
3041	1382488.890	620791.270	387.140	387.201	-0.061
3042	1334163.760	567088.460	437.580	437.851	-0.271
3043	1441087.750	601418.180	445.040	445.191	-0.151
3044	1438274.810	527771.070	483.410	483.571	-0.161
3045	1438275.900	640925.000	590.770	591.241	-0.471
3046	1487926.700	648187.230	828.600	828.742	-0.142
3047	1355016.820	291188.370	536.930	537.361	-0.431
3048	1266965.480	535615.280	460.980	461.001	-0.021

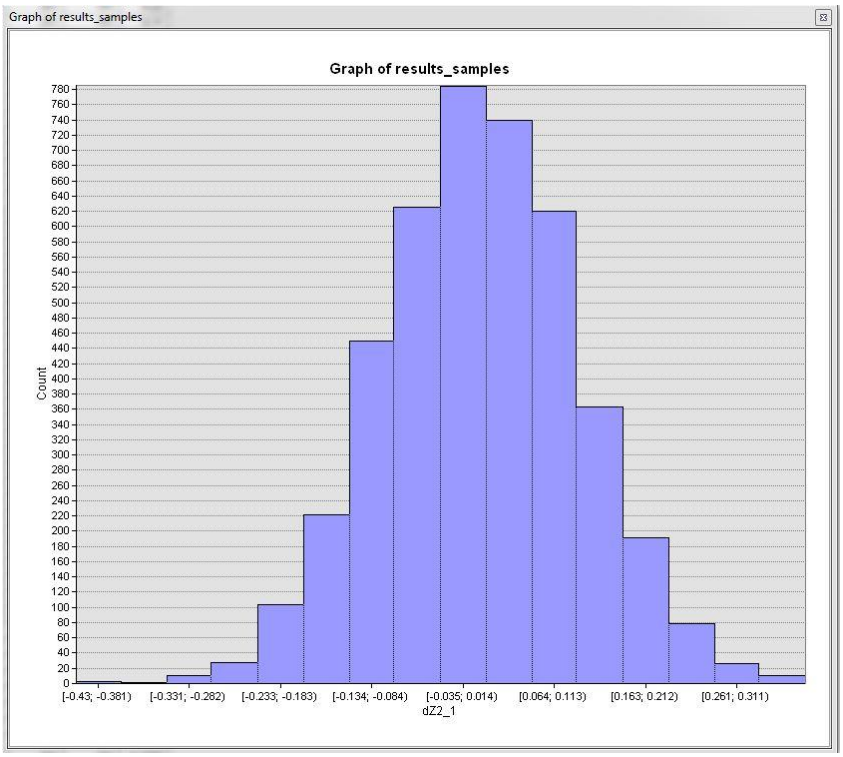
3049	1259264.990	540284.890	530.230	530.241	-0.011
3050	1228023.960	670556.790	477.790	478.131	-0.341
3051	1258104.210	688940.450	503.960	504.231	-0.271
3052	1293618.260	679019.530	461.250	461.521	-0.271
3053	1332897.500	701203.850	478.160	478.491	-0.331
3054	1350795.600	698274.840	383.910	384.041	-0.131
3055	1427246.680	727533.270	501.240	501.421	-0.181
3056	1465077.800	725477.340	465.500	465.941	-0.441
3057	1486728.910	753040.690	381.890	381.931	-0.041
3058	1471545.280	792277.410	383.930	383.861	0.069
3059	1423620.530	787974.380	373.620	373.761	-0.141
3060	1319433.650	773774.010	424.260	424.371	-0.111
3061	1278802.500	776951.740	561.560	561.661	-0.101
3062	1284579.220	796979.730	560.010	559.821	0.189
3063	1238604.540	753983.300	570.180	570.271	-0.091
3064	1215000.270	466266.450	412.380	412.371	0.009
3065	1250013.360	450724.620	534.660	535.271	-0.611
3066	1370932.000	452078.410	394.900	395.231	-0.331
3067	1415940.230	449059.370	741.850	742.151	-0.301
3068	1452937.040	462221.590	888.080	888.402	-0.322
3069	1452048.380	501363.170	479.890	480.491	-0.601
3070	1394676.610	513997.870	417.260	417.721	-0.461
3071	1346681.310	519255.340	541.390	539.821	1.569
3072	1259585.690	512621.860	582.320	582.671	-0.351
3073	1222004.750	526976.000	525.300	525.911	-0.611
3074	1231864.770	591340.570	555.560	555.741	-0.181
3075	1264051.060	661371.410	419.840	419.921	-0.081
3076	1347099.280	664657.230	448.280	448.651	-0.371
3077	1434637.920	689716.540	717.490	717.421	0.069
3078	1485265.770	693940.490	621.970	622.061	-0.091
3079	1458627.550	768240.450	484.760	484.731	0.029
3080	1406900.930	763730.760	495.490	495.671	-0.181
3081	1382811.180	806561.530	374.360	374.391	-0.031
3082	1383318.270	718800.060	427.380	427.861	-0.481
3083	1284086.580	733086.270	494.100	494.151	-0.051
3084	1343280.890	601500.190	491.090	491.441	-0.351
3085	1381845.850	274622.130	642.590	642.901	-0.311
3086	1354440.570	264884.350	755.240	755.372	-0.132
3087	1393244.310	347015.350	847.200	847.272	-0.072
3088	1417917.400	392028.350	491.920	492.171	-0.251
3089	1471961.130	405167.630	710.230	710.161	0.069

3090	1336041.120	430885.060	546.360	546.511	-0.151
3091	1306782.160	527991.620	591.340	591.291	0.049
3092	1238990.860	646846.840	486.490	486.581	-0.091
3093	1179667.650	658084.740	379.140	379.331	-0.191
3094	1460962.810	677575.750	574.880	575.221	-0.341
3095	1480346.310	582618.620	708.310	708.811	-0.501
3096	1440935.280	757222.560	686.280	686.411	-0.131
3097	1384986.150	680778.980	396.030	396.481	-0.451
3098	1293087.180	715711.150	423.180	423.301	-0.121
3099	1284224.660	759431.440	489.580	489.711	-0.131
3100	1399188.900	832968.530	387.320	387.641	-0.321
3101	1438825.840	808267.530	452.160	452.261	-0.101

ERTICAL ACCURACY CONCLUSIONS

Vegetated Vertical Accuracy (VVA) Tested 0.186 Meters at the 95th percentile reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the DEM against 101 VVA points. VVA Errors larger than 95th percentile include:
Point 3017, Easting 1268005.34, Northing 369500.72, Z-Error 0.259 Meters
Point 3020, Easting 1444011.97, Northing 357280.84, Z-Error 0.186 Meters
Point 3023, Easting 1338832.66, Northing 462132.60, Z-Error 0.186 Meters
Point 3024, Easting 1335362.25, Northing 483591.33, Z-Error 0.198 Meters
Point 3071, Easting 1346681.31, Northing 519255.34, Z-Error 0.478 Meters
Point 3073, Easting 1222004.75, Northing 526976.00, Z-Error 0.186 Meters

Figure 5.1: Lidar Relative Accuracy Histogram for TN West Central Lidar 2017 B17



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 TN West Central Lidar 2017 B17 project measured at 0.032 meter RMSDz.

Approved by:	Name	Signature	Date
Associate Member, Lidar Specialist Certified Photogrammetrist #1381	Qian Xiao		February 2018

Section 6: Flight Logs

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

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	SNH-A		Elevation	Temp		Pressure	
Kelly	Project Description	Base 2		Airport	461.5ft				
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude					
Ken	Location	Aero 2		@ Altitude			#REF!		
	Savannah,TN	IMU Information		GPS Base Station Information					
		Start Time			File Name	RNX File	Ant Hgt	Ant Type	
				Base 1	log0303o.17o		1.8	GR3	
Flight Date: 3/3/2017	Pilot: Bob	Operator: Jonathan	Aircraft: N1107Q	Stop Time		Base 2				
						Base 3			

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
1	270°	15:49:04	16:04:53	0:15:49	6,400					150 kts	173 mph	45.50		x	
2	90°	16:09:30	16:27:06	0:17:36	6,400					150 kts	173 mph	50.63		x	
3	270°	16:31:36	16:48:41	0:17:05	6,400					150 kts	173 mph	49.15		x	
4	90°	16:52:52	17:10:46	0:17:54	6,400					150 kts	173 mph	51.50		x	
5	270°	17:14:32	17:31:46	0:17:14	6,400					150 kts	173 mph	49.58		x	
6	90°	17:35:44	17:53:19	0:17:35	6,400					150 kts	173 mph	50.59		x	
7	270°	17:57:36	18:15:05	0:17:29	6,400					150 kts	173 mph	50.30		x	
135	180°	18:27:43	18:51:58	0:24:15	6,400					150 kts	173 mph	69.77		x	Tieline
8	90°	19:09:19	19:27:11	0:17:52	6,400					150 kts	173 mph	51.40		x	

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:42:49	Miles Flown on Flights:	468.42	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20174400-1	Base 1	SNH-A		Elevation	Temp		Pressure	
Kelly	Project Description	Base 2		Airport	461.5ft				
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude					
Ken	Location	Aero 2		@ Altitude			#REF!		
	Savannah,TN	IMU Information		GPS Base Station Information					
		Start Time	14:28:13		File Name	RNX File	Ant Hgt	Ant Type	
				Base 1	log0303u.17o		1.8	GR3	
		Stop Time	18:09:22	Base 2					
				Base 3					

Flight Date	Pilot	Operator	Aircraft
3/3/2017	Kelly	Jonathan	N1107Q

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
9	270°	21:23:47	21:40:49	0:17:02	6,400					150 kts	173 mph	49.00		x	Good
10	90°	21:45:05	22:02:07	0:17:02	6,400					150 kts	173 mph	49.00		x	Good
11	270°	22:05:22	22:22:37	0:17:15	6,400					150 kts	173 mph	49.63		x	Good
12	90°	22:26:50	22:43:55	0:17:05	6,400					150 kts	173 mph	49.15		x	Good
13	270°	22:47:18	23:04:16	0:16:58	6,400					150 kts	173 mph	48.81		x	Good
14	90°	23:08:48	23:25:56	0:17:08	6,400					150 kts	173 mph	49.29		x	Good
15	270°	23:29:12	23:46:19	0:17:07	6,400					150 kts	173 mph	49.24		x	Good
16	90°	23:50:14	0:07:28	0:17:14	6,400					150 kts	173 mph	49.58		x	Good
17	270°	0:11:05	0:27:56	0:16:51	6,400					150 kts	173 mph	48.48		x	Good
18	90°	0:31:36	0:48:42	0:17:06	6,400					150 kts	173 mph	49.20		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	3:41:09	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:50:48	Miles Flown on Flights:	491.38	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	SNH-A		Elevation	Temp		Pressure
Kelly	Project Description	Base 2		Airport	461.5ft			
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude	6,400			
Ken	Location	Aero 2		@ Altitude		#REF!		
	Savannah,TN	IMU Information		GPS Base Station Information				
		Start Time			File Name	RNX File	Ant Hgt	Ant Type
				Base 1	log0304n.17o		1.8	GR3
		Stop Time		Base 2				
				Base 3				

Flight Date	Pilot	Operator	Aircraft
3/4/2017	Bob	Jonathan	N1107Q

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
19	270°	14:59:29	15:15:22	0:15:53	6,400					150 kts	173 mph	45.70		x	Good
20	90°	15:20:03	15:36:59	0:16:56	6,400					150 kts	173 mph	48.72		x	Good
21	270°	15:40:47	15:56:47	0:16:00	6,400					150 kts	173 mph	46.03		x	Good
22	90°	16:00:57	16:17:51	0:16:54	6,400					150 kts	173 mph	48.62		x	Good
23	270°	16:22:10	16:37:56	0:15:46	6,400					150 kts	173 mph	45.36		x	Good
24	90°	16:41:39	16:58:05	0:16:26	6,400					150 kts	173 mph	47.28		x	Good
25	270°	17:01:36	17:17:20	0:15:44	6,400					150 kts	173 mph	45.26		x	Good
26	90°	17:21:15	17:37:27	0:16:12	6,400					150 kts	173 mph	46.61		x	Good
27	270°	17:41:27	17:57:13	0:15:46	6,400					150 kts	173 mph	45.36		x	Good
28	90°	18:01:31	18:17:36	0:16:05	6,400					150 kts	173 mph	46.27		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:41:42	Miles Flown on Flights:	465.20	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	SNH-A		Elevation	Temp		Pressure	
Kelly	Project Description	Base 2		Airport	461.5ft				
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude					
Ken	Location	Aero 2		@ Altitude			#REF!		
	Savannah,TN	IMU Information		GPS Base Station Information					
		Start Time			File Name	RNX File	Ant Hgt	Ant Type	
				Base 1	log0304n.17o		1.8	GR3	
		Stop Time		Base 2					
				Base 3					

Flight Date	Pilot	Operator	Aircraft
3/4/2017	Kelly	Jonathan	N1107Q

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
29	270°	19:46:52	20:02:37	0:15:45	6,400					150 kts	173 mph	45.31			Good, Slight turbulance
30	90°	20:07:05	20:23:12	0:16:07	6,400					150 kts	173 mph	46.37			Good, Slight turbulance
31	270°	20:27:34	20:43:07	0:15:33	6,400					150 kts	173 mph	44.74			Good, Slight turbulance
32	90°	20:47:51	21:03:22	0:15:31	6,400					150 kts	173 mph	44.64		x	Good, Slight turbulance
33	270°	21:07:11	21:22:53	0:15:42	6,400					150 kts	173 mph	45.17		x	Good, Slight turbulance
34	90°	21:27:36	21:43:12	0:15:36	6,400					150 kts	173 mph	44.88		x	Good, Slight turbulance
35	270°	21:47:19	22:02:34	0:15:15	6,400					150 kts	173 mph	43.87		x	Good, Slight turbulance
36	90°	22:06:54	22:22:03	0:15:09	6,400					150 kts	173 mph	43.59		x	Good, Slight turbulance
37	270°	22:26:01	22:41:11	0:15:10	6,400					150 kts	173 mph	43.63		x	Good, Slight turbulance
38	90°	22:45:51	23:00:04	0:14:13	6,400					150 kts	173 mph	40.90		x	Good, Slight turbulance
39	270°	23:04:46	23:19:56	0:15:10	6,400					150 kts	173 mph	43.63		x	Good, Slight turbulance
40	90°	23:23:57	23:39:47	0:15:50	6,400					150 kts	173 mph	45.55		x	Good, Slight turbulance

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	3:05:01	Miles Flown on Flights:	532.28	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Field Crew	Flight Log		GPS Information		Meteorological Conditions					
Jonathan	Project #	20170044-1	Base 1	SNH-A		Elevation	Temp		Pressure	
Ken	Project Description		Base 2		Airport	461.5ft				
Bob	Woolpert- TN West_Central LiDAR		Base 3		@ Altitude	6,400				
Kelly			Aero 2		@ Altitude			#REF!		
	Location		IMU Information		GPS Base Station Information					
	Savannah, TN		Start Time			File Name	RNX File	Ant Hgt	Ant Type	
Flight Date / Pilot / Operator	Aircraft				Base 1	lpog0305m.17o		1.8	GR3	
3/5/2017 / Kelly / Jonathan	N1107Q		Stop Time		Base 2					
					Base 3					

Line	Dir	Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
41	270°	13:37:20	13:53:52	0:16:32	6,400					150 kts	173 mph	47.57		x	
42	90°	13:58:25	14:14:36	0:16:11	6,400					150 kts	173 mph	46.56		x	
43	270°	14:19:13	14:35:47	0:16:34	6,400					150 kts	173 mph	47.66		x	
44	90°	14:41:53	14:59:03	0:17:10	6,400					150 kts	173 mph	49.39		x	
45	270°	15:03:29	15:20:48	0:17:19	6,400					150 kts	173 mph	49.82		x	
46	90°	15:25:31	15:43:04	0:17:33	6,400					150 kts	173 mph	50.49		x	
47	270°	15:47:26	16:05:15	0:17:49	6,400					150 kts	173 mph	51.26		x	Slight Turbulence far east end of line
48	90°	16:09:05	16:24:08	0:15:03	6,400					150 kts	173 mph	43.30			Stopped at 5 miles on west end because of clouds-Reflew on M6

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:		Total # of Photo's	0	Percent Complete			☑ Clear
DMC Data Collection Time:		Miles Flown on Flights:		Total Flight Lines			☐ Fair
Hobbs Start Time				Lines Complete	48		☐ Partly Cloudy
Hobbs Stop Time		Hobbs Total Time		Lines Completed Today	8		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	SNH-A		Elevation	Temp		Pressure
Kelly	Project Description	Base 2		Airport	457.08ft			
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude				
		Aero 2		@ Altitude		#REF!		
	Location	IMU Information		GPS Base Station Information				
	Savannah, TN	Start Time			File Name	RNX File	Ant Hgt	Ant Type
Flight Date / Pilot / Operator	Aircraft			Base 1	log0308o.17o		1.8	GR3
3/8/2017 / Kelly / Jonathan	N1107Q	Stop Time		Base 2				
				Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
49	270°	17:11:05	17:29:56	0:18:51	6,400					150 kts	173 mph	54.23		x	Good
50	90°	17:33:55	17:53:10	0:19:15	6,400					150 kts	173 mph	55.38		x	Good
51	270°	17:56:33	18:15:06	0:18:33	6,400					150 kts	173 mph	53.37		x	Good
52	90	18:18:39	?		6,400					150 kts	173 mph	0.00			Void
52	90°	18:24:42	18:42:52	0:18:10	6,400					150 kts	173 mph	52.26		x	Good
53	270°	18:45:52	19:03:40	0:17:48	6,400					150 kts	173 mph	51.21		x	Good
54	90°	19:06:52	19:24:15	0:17:23	6,400					150 kts	173 mph	50.01		x	Good
55	270°	19:26:55	19:44:14	0:17:19	6,400					150 kts	173 mph	49.82		x	Second time flying line for missed west end., Whole Line
48	90°	19:49:15	20:08:25	0:19:10	6,400					150 kts	173 mph	55.14		x	

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	41.2%		☑ Clear
DMC Data Collection Time:	2:26:29	Miles Flown on Flights:	421.43	Total Flight Lines	136		☐ Fair
Hobbs Start Time	1000			Lines Complete	56		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	8		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
Kelly	Project Description	Base 2		Airport	457.08ft				
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude					
		Aero 2		@ Altitude			#REF!		
	Location	IMU Information		GPS Base Station Information					
	Camden, TN	Start Time			File Name	RNX File	Ant Hgt	Ant Type	
Flight Date / Pilot / Operator	Aircraft	Stop Time		Base 1	log0308w.17o		1.8	GR3	
3/8/2017 / Bob / Jonathan	N1107Q			Base 2					
				Base 3					

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
56	90°	23:29:05	23:47:22	0:18:17	6,400					150 kts	173 mph	52.60		x	Good
57	270°	23:50:55	0:08:41	0:17:46	6,400					150 kts	173 mph	51.11		x	Good
58	90°	0:12:29	0:30:46	0:18:17	6,400					150 kts	173 mph	52.60		x	Good
59	270°	0:34:14	0:51:59	0:17:45	6,400					150 kts	173 mph	51.07		x	Good
60	90°	0:55:39	1:14:12	0:18:33	6,400					150 kts	173 mph	53.37		x	Good
61	270°	1:18:08	1:35:30	0:17:22	6,400					150 kts	173 mph	49.96		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	45.6%		☑ Clear
DMC Data Collection Time:	1:48:00	Miles Flown on Flights:	310.71	Total Flight Lines	136		☐ Fair
Hobbs Start Time	1000			Lines Complete	62		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	6		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
Kelly	Project Description	Base 2		Airport	457.08ft				
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude					
		Aero 2		@ Altitude			#REF!		
	Location	IMU Information		GPS Base Station Information					
	Camden, TN	Start Time			File Name	RNX File	Ant Hgt	Ant Type	
Flight Date / Pilot / Operator	Aircraft	Stop Time		Base 1	log0309n.17o		1.8	GR3	
3/9/2017 / Kelly / Jonathan	N1107Q			Base 2					
				Base 3					

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
62	90°	14:36:51	14:55:53	0:19:02	6,400					150 kts	173 mph	54.76		x	Good
63	270°	14:59:21	15:16:57	0:17:36	6,400					150 kts	173 mph	50.63		x	Good
64	90°	15:21:01	15:42:14	0:21:13	6,400					150 kts	173 mph	61.04		x	Good
65	270°	15:46:28	16:05:59	0:19:31	6,400					150 kts	173 mph	56.15		x	Good
66	90°	16:10:05	16:30:59	0:20:54	6,400					150 kts	173 mph	60.13		x	Good
67	270°	16:34:42	16:53:47	0:19:05	6,400					150 kts	173 mph	54.90		x	Good
68	90°	16:57:36	17:18:27	0:20:51	6,400					150 kts	173 mph	59.98		x	Good
69	270°	17:21:49	17:40:57	0:19:08	6,400					150 kts	173 mph	55.05		x	Good
70	90°	17:44:58	18:05:43	0:20:45	6,400					150 kts	173 mph	59.70		x	Good
71	270°	18:08:55	18:28:18	0:19:23	6,400					150 kts	173 mph	55.76		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	3:17:28	Miles Flown on Flights:	568.10	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

			Field Crew	Flight Log		GPS Information		Meteorological Conditions				
			Jonathan Kelly Bob	Project #	20170044-1	Base 1	GPS 30-GD1866	Elevation	Temp		Pressure	
				Project Description		Base 2		Airport	457.08ft			
				Woolpert- TN West_Central LiDAR		Base 3		@ Altitude				
						Aero 2		@ Altitude		#REF!		
				Location		IMU Information		GPS Base Station Information				
						Start Time			File Name	RNX File	Ant Hgt	Ant Type
								Base 1			1.8	GR3
Flight Date		Pilot	Operator	Aircraft		Stop Time		Base 2				
3/9/2017		Bob	Jonathan	N1107Q				Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
72	90°	20:49:58	21:11:18	0:21:20	6,400					150 kts	173 mph	61.37		x	Good
73	270°	21:15:04	21:35:48	0:20:44	6,400					150 kts	173 mph	59.65		x	Good
92	90°	21:44:03	22:03:45	0:19:42	6,400					150 kts	173 mph	56.68		x	Good
93	270°	22:07:03	22:26:18	0:19:15	6,400					150 kts	173 mph	55.38		x	Good
94	90°	22:31:09	22:44:25	0:13:16	6,400					150 kts	173 mph	38.17		x	west end small forest fire. Stopped with 16 1/2 left
94	90°	22:48:55	22:49:02	0:00:00	6,400					150 kts	173 mph	0.00		y	Disregard
94	90°	22:53:34	22:56:28	0:00:00	6,400					150 kts	173 mph	0.00		y	Disregard
95	270°	23:00:00	23:11:10	0:11:10	6,400					150 kts	173 mph	32.13		x	started 31 miles away from east end,
96	90°	23:14:42	23:22:03	0:07:21	6,400					150 kts	173 mph	21.15		x	Stopped before reaching river due to clouds

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	1:52:48	Miles Flown on Flights:	324.52	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

				Field Crew	Flight Log					GPS Information		Meteorological Conditions					
				Jonathan	Project #	2017004-1				Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
				Kelly	Project Description					Base 2		Airport	457.08ft				
				Bob	Woolpert- TN West_Central LiDAR					Base 3		@ Altitude					
				Ken						Aero 2		@ Altitude			#REF!		
					Location					IMU Information		GPS Base Station Information					
					Camden, TN					Start Time			File Name	RNX File	Ant Hgt	Ant Type	
Flight Date		Pilot	Operator		Aircraft							Base 1	log0310p.17o		1.8	GR3	
3/10/2017		Bob	Jonathan		N1107Q					Stop Time		Base 2					
												Base 3					

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
134	0°	16:26:33	16:48:03	0:21:30	6,400					150 kts	173 mph	61.85		x	Good
133	270°	16:55:58	16:58:42	0:02:44	6,400					150 kts	173 mph	7.86		x	Good
132	90°	17:05:10	17:10:05	0:04:55	6,400					150 kts	173 mph	14.15		x	Good
131	270°	17:13:48	17:18:58	0:05:10	6,400					150 kts	173 mph	14.86		x	Good
130	90°	17:23:35	17:28:36	0:05:01	6,400					150 kts	173 mph	14.43		x	Good
129	270°	17:33:26	17:42:21	0:08:55	6,400					150 kts	173 mph	25.65		x	Good
128	90°	17:46:35	17:55:26	0:08:51	6,400					150 kts	173 mph	25.46		x	Good
127	270°	17:59:19	18:08:08	0:08:49	6,400					150 kts	173 mph	25.37		x	Good
126	90°	18:12:23	18:20:56	0:08:33	6,400					150 kts	173 mph	24.60		x	Good
125	270°	18:24:49	18:33:06	0:08:17	6,400					150 kts	173 mph	23.83		x	Good
124	90°	18:37:13	18:45:49	0:08:36	6,400					150 kts	173 mph	24.74		x	Good
123	270°	18:49:09	18:52:08	0:00:00	6,400					150 kts	173 mph	0.00		y	Stopped due to Restriction area
123	270°	19:01:05	19:09:19	0:08:14	6,400					150 kts	173 mph	23.69		x	Good,Reflew line
122	90°	19:14:06	19:22:51	0:08:45	6,400					150 kts	173 mph	25.17		x	Good
121	270°	19:26:46	19:35:15	0:08:29	6,400					150 kts	173 mph	24.41		x	Good
120	90°	19:39:53	19:57:55	0:18:02	6,400					150 kts	173 mph	51.88		x	Good
119	270°	20:02:18	20:19:48	0:17:30	6,400					150 kts	173 mph	50.35		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:32:21	Miles Flown on Flights:	438.30	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Flight Log

Field Crew	Project #	20170044-1
Jonathan Kelly Bob Ken	Project Description	Woolpert- TN West_Central LiDAR
	Location	Camden,TN
	Aircraft	N1107Q

Flight Date	Pilot	Operator
3/10/2017	Kelly	Jonathan

GPS Information		Meteorological Conditions				
Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
Base 2		Airport	457.08ft				
Base 3		@ Altitude					
Aero 2		@ Altitude			#REF!		

IMU Information		GPS Base Station Information				
Start Time			File Name	RNX File	Ant Hgt	Ant Type
		Base 1	log0310v.17o		1.8	GR3
Stop Time		Base 2				
		Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
118	90°	22:08:43	22:27:42	0:18:59	6,400					150 kts	173 mph	54.61		x	Good
117	270°	22:31:53	22:49:47	0:17:54	6,400					150 kts	173 mph	51.50		x	Good
116	90°	22:54:23	23:13:12	0:18:49	6,400					150 kts	173 mph	54.13		x	Good
115	270°	23:17:31	23:35:23	0:17:52	6,400					150 kts	173 mph	51.40		x	Good
114	90°	23:40:50	23:59:21	0:18:31	6,400					150 kts	173 mph	53.27		x	Good
113	270°	0:03:18	0:21:22	0:18:04	6,400					150 kts	173 mph	51.98		x	Good
112	90°	0:25:54	0:43:59	0:18:05	6,400					150 kts	173 mph	52.02		x	Good
111	270°	0:49:31	1:07:49	0:18:18	6,400					150 kts	173 mph	52.65		x	Good
110	90°	1:11:31	1:30:14	0:18:43	6,400					150 kts	173 mph	53.85		x	Good
109	270°	1:33:33	1:53:13	0:19:40	6,400					150 kts	173 mph	56.58		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	3:04:55	Miles Flown on Flights:	532.00	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

				Field Crew	Flight Log					GPS Information		Meteorological Conditions							
				Jonathan	Project #	20170044-1				Base 1	GPS 30-GD1866		Elevation	Temp		Pressure			
				Bob	Project Description					Base 2		Airport	457.08ft						
					Woolpert- TN West_Central LiDAR					Base 3		@ Altitude							
										Aero 2		@ Altitude			#REF!				
					Location					IMU Information		GPS Base Station Information							
					Camden, TN					Start Time			File Name	RNX File	Ant Hgt	Ant Type			
Flight Date		Pilot	Operator		Aircraft					Stop Time		Base 1	log0312q.17o		1.8	GR3			
3/12/2017		Bob	Jonathan		N1107Q							Base 2							
												Base 3							

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
93	90°	16:52:04	17:03:39	0:11:35	6,400					150 kts	173 mph	33.32		x	Reflew line by mistake, Not needed
95	270°	17:05:47	17:19:02	0:13:15	6,400					150 kts	173 mph	38.12		x	flew 36nm, remainder of line from M9
174W=74	90°	17:33:00	17:46:36	0:13:36	6,400					150 kts	173 mph	39.13		x	Lines cut in half from original plan, Flew west side
191W=91	270°	17:53:39	18:06:30	0:12:51	6,400					150 kts	173 mph	36.97		x	Lines cut in half from original plan, Flew west side
190W=90	90°	18:10:50	18:23:52	0:13:02	6,400					150 kts	173 mph	37.50		x	Lines cut in half from original plan, Flew west side
189W=89	270°	18:27:29	18:40:23	0:12:54	6,400					150 kts	173 mph	37.11		x	Lines cut in half from original plan, Flew west side
94	90°	18:45:56	18:57:14	0:11:18	6,400					150 kts	173 mph	32.51		x	Flew remainder of line from M9
175W=75	270°	19:06:43	19:20:04	0:13:21	6,400					150 kts	173 mph	38.41		x	Lines cut in half from original plan, Flew west side
176W=76	90°	19:23:13	19:36:52	0:13:39	6,400					150 kts	173 mph	39.27		x	Lines cut in half from original plan, Flew west side
177W=77	270°	19:40:00	19:53:37	0:13:37	6,400					150 kts	173 mph	39.17		x	Lines cut in half from original plan, Flew west side
178W=78	90°	19:57:13	20:10:51	0:13:38	6,400					150 kts	173 mph	39.22		x	Lines cut in half from original plan, Flew west side

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:22:46	Miles Flown on Flights:	410.73	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Flight Log

Field Crew	Project #	20170044-1
Jonathan	Project Description	
Justin	Woolpert- TN West_Central LiDAR	
Daniel	Location	Camden,TN
	Aircraft	N1107Q

Flight Date	Pilot	Operator
3/15/2017	Justin	Jonathan

GPS Information		Meteorological Conditions				
Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
Base 2		Airport	457.08ft				
Base 3		@ Altitude					
Aero 2		@ Altitude			#REF!		

IMU Information		GPS Base Station Information				
Start Time			File Name	RNX File	Ant Hgt	Ant Type
		Base 1	log0315q.17o		1.8	GR3
Stop Time		Base 2				
		Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
179W	270°	17:07:03	17:20:28	0:13:25	6,400					150 kts	173 mph	38.60		x	
180W	90°	17:23:50	17:37:20	0:13:30	6,400					150 kts	173 mph	38.84		x	5.3nm left going west, small possible cloud
181W	270°	17:41:29	17:54:53	0:13:24	6,400					150 kts	173 mph	38.55		x	
182W	90°	17:58:46	18:12:12	0:13:26	6,400					150 kts	173 mph	38.65		x	
183W	270°	18:16:08	18:29:09	0:13:01	6,400					150 kts	173 mph	37.45		x	
184W	90°	18:32:13	18:45:39	0:13:26	6,400					150 kts	173 mph	38.65		x	
185W	270°	18:48:34	19:01:38	0:13:04	6,400					150 kts	173 mph	37.59		x	
186W	90°	19:05:23	19:18:30	0:13:07	6,400					150 kts	173 mph	37.74		x	
187W	270°	19:21:40	19:34:52	0:13:12	6,400					150 kts	173 mph	37.98		x	
188W	90°	19:38:05	19:51:05	0:13:00	6,400					150 kts	173 mph	37.40		x	
291E	270°	20:04:03	20:13:29	0:09:26	6,400					150 kts	173 mph	27.14		x	
290E	90°	20:17:31	20:27:16	0:09:45	6,400					150 kts	173 mph	28.05		x	
289E	270°	20:30:02	20:39:30	0:09:28	6,400					150 kts	173 mph	27.24		x	
288E	90°	20:42:51	20:52:38	0:09:47	6,400					150 kts	173 mph	28.15		x	

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:51:01	Miles Flown on Flights:	492.01	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

			Field Crew	Flight Log		GPS Information		Meteorological Conditions				
			Jonathan	Project #	20170044-1	Base 1	GPS 30-GD1866	Elevation	Temp		Pressure	
			Justin	Project Description		Base 2		Airport				
			Daniel	Woolpert- TN West_Central LiDAR		Base 3		@ Altitude				
						Aero 2		@ Altitude		#REF!		
				Location		IMU Information		GPS Base Station Information				
				Camden,TN		Start Time			File Name	RNX File	Ant Hgt	Ant Type
Flight Date	Pilot	Operator		Aircraft				Base 1	log0316c.17.o		1.8	GR3
3/15/2017	Justin	Jonathan		N1107Q		Stop Time		Base 2				
								Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
274E	90°	2:47:40	2:57:32	0:09:52	6,400					150 kts	173 mph	28.39		x	
275E	270°	3:02:33	3:12:03	0:09:30	6,400					150 kts	173 mph	27.33		x	
276E	90°	3:15:38	3:25:49	0:10:11	6,400					150 kts	173 mph	29.30		x	
277E	270°	3:28:47	3:38:36	0:09:49	6,400					150 kts	173 mph	28.24		x	
278E	90°	3:44:41	3:54:51	0:10:10	6,400					150 kts	173 mph	29.25		x	
279E	270°	3:57:39	4:07:27	0:09:48	6,400					150 kts	173 mph	28.19		x	
280E	90°	4:10:34	4:20:33	0:09:59	6,400					150 kts	173 mph	28.72		x	
281E	270°	4:23:23	4:32:47	0:09:24	6,400					150 kts	173 mph	27.04		x	
282E	90°	4:36:02	4:45:48	0:09:46	6,400					150 kts	173 mph	28.10		x	
283E	270°	4:48:43	4:58:05	0:09:22	6,400					150 kts	173 mph	26.95		x	
284E	90°	5:01:19	5:11:03	0:09:44	6,400					150 kts	173 mph	28.00		x	
285E	270°	5:14:30	5:23:50	0:09:20	6,400					150 kts	173 mph	26.85		x	
286E	90°	5:27:10	5:36:43	0:09:33	6,400					150 kts	173 mph	27.47		x	
287E	270°	5:40:43	5:50:06	0:09:23	6,400					150 kts	173 mph	27.00		x	
96	90°	5:55:18	6:16:00	0:20:42	6,400					150 kts	173 mph	59.55		x	
97	270°	6:18:56	6:37:43	0:18:47	6,400					150 kts	173 mph	54.04		x	

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:55:20	Miles Flown on Flights:	504.43	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
Justin	Project Description	Base 2		Airport					
Daniel	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude					
		Aero 2		@ Altitude			#REF!		
	Location	IMU Information		GPS Base Station Information					
	Camden,TN	Start Time			File Name	RNX File	Ant Hgt	Ant Type	
Flight Date / Pilot / Operator	Aircraft			Base 1			1.8	GR3	
3/16/2017 / Daniel / Jonathan	N1107Q	Stop Time		Base 2					
				Base 3					

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
98	90°	14:32:11	14:52:48	0:20:37	6,400					150 kts	173 mph	59.31		x	
99	270°	14:55:55	15:15:16	0:19:21	6,400					150 kts	173 mph	55.67		x	
100	90°	15:19:25	15:40:38	0:21:13	6,400					150 kts	173 mph	61.04		x	
101	270°	15:43:29	16:03:03	0:19:34	6,400					150 kts	173 mph	56.29		x	
102	90°	16:07:41	16:29:26	0:21:45	6,400					150 kts	173 mph	62.57		x	
103	270°	16:32:40	16:52:27	0:19:47	6,400					150 kts	173 mph	56.92		x	
104	90°	16:56:19	17:18:15	0:21:56	6,400					150 kts	173 mph	63.10		x	
105	270°	17:22:00	17:41:27	0:19:27	6,400					150 kts	173 mph	55.96		x	
106	90°	17:44:43	18:06:30	0:21:47	6,400					150 kts	173 mph	62.67		x	
107	270°	18:09:33	18:28:29	0:18:56	6,400					150 kts	173 mph	54.47		x	
108	90°	18:32:05	18:53:18	0:21:13	6,400					150 kts	173 mph	61.04		x	

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	3:45:36	Miles Flown on Flights:	649.04	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Flight Log

Field Crew	GPS Information		Meteorological Conditions				
Jonathan	Base 1	SNH-A		Elevation	Temp		Pressure	
Justin	Base 2		Airport	461.5ft				
	Base 3		@ Altitude					
	Aero 2		@ Altitude			#REF!		

Project #	20170044-1
Project Description	Woolpert- TN West_Central LiDAR
Location	Savannah,TN
Aircraft	N1107Q

IMU Information		GPS Base Station Information				
Start Time			File Name	RNX File	Ant Hgt	Ant Type
Stop Time		Base 1	log0319o.17o		1.8	GR3
		Base 2				
		Base 3				

Flight Date	Pilot	Operator
3/19/2017	Justin	Jonathan

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
9	270°	15:06:58	15:22:52	0:15:54	6,400					150 kts	173 mph	45.74		x	redos M2
10	90°	15:26:17	15:44:10	0:17:53	6,400					150 kts	173 mph	51.45		x	redos M2
11	270°	15:47:19	16:03:13	0:15:54	6,400					150 kts	173 mph	45.74		x	redos M2
12	90°	16:07:27	16:24:39	0:17:12	6,400					150 kts	173 mph	49.48		x	redos M2
29	270°	16:31:41	16:47:03	0:15:22	6,400					150 kts	173 mph	44.21		x	redos M4
30	90°	16:50:43	17:07:22	0:16:39	6,400					150 kts	173 mph	47.90		x	redos M4
31	270°	17:15:35	17:30:51	0:15:16	6,400					150 kts	173 mph	43.92		x	redos M4

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	5.2%		☑ Clear
DMC Data Collection Time:	1:54:10	Miles Flown on Flights:	328.45	Total Flight Lines	135		☐ Fair
Hobbs Start Time	1000			Lines Complete	7		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	7		☐ Cloudy

Flight Log

Field Crew	Project #	20170044:1
Jonathan Justin	Project Description	
	Location	Camden, TN
	Aircraft	N1107Q

Flight Date	Pilot	Operator
10/29/2017	Justin	Jonathan

GPS Information	
Base 1	
Base 2	
Base 3	
Aero 2	
IMU Information	
Start Time	
Stop Time	

Meteorological Conditions				
	Elevation	Temp		Pressure
Airport				
@ Altitude				
@ Altitude			#REF!	

GPS Base Station Information				
	File Name	RNX File	Ant Hgt	Ant Type
Base 1			1.8	GR3
Base 2				
Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
1	270°	14:51:19	14:51:52	0:00:33	2,100					150 kts	173 mph	1.58			
2	90°	14:55:57	14:56:32	0:00:35	2,100					150 kts	173 mph	1.68			
3	60°	15:07:35	15:09:31	0:01:56	2,100					150 kts	173 mph	5.56			
4	240°	15:13:03	15:14:59	0:01:56	2,100					150 kts	173 mph	5.56			

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	0:05:00	Miles Flown on Flights:	14.38	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	SNH-A		Elevation	Temp		Pressure	
Kelly	Project Description	Base 2		Airport	461.5ft				
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude					
Ken	Location	Aero 2		@ Altitude			#REF!		
	Savannah,TN	IMU Information		GPS Base Station Information					
		Start Time			File Name	RNX File	Ant Hgt	Ant Type	
				Base 1	log0303o.17o		1.8	GR3	
	Aircraft	Stop Time		Base 2					
	N1107Q			Base 3					

Flight Date	Pilot	Operator
3/3/2017	Bob	Jonathan

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
1	270°	15:49:04	16:04:53	0:15:49	6,400					150 kts	173 mph	45.50		x	
2	90°	16:09:30	16:27:06	0:17:36	6,400					150 kts	173 mph	50.63		x	
3	270°	16:31:36	16:48:41	0:17:05	6,400					150 kts	173 mph	49.15		x	
4	90°	16:52:52	17:10:46	0:17:54	6,400					150 kts	173 mph	51.50		x	
5	270°	17:14:32	17:31:46	0:17:14	6,400					150 kts	173 mph	49.58		x	
6	90°	17:35:44	17:53:19	0:17:35	6,400					150 kts	173 mph	50.59		x	
7	270°	17:57:36	18:15:05	0:17:29	6,400					150 kts	173 mph	50.30		x	
135	180°	18:27:43	18:51:58	0:24:15	6,400					150 kts	173 mph	69.77		x	Tieline
8	90°	19:09:19	19:27:11	0:17:52	6,400					150 kts	173 mph	51.40		x	

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:42:49	Miles Flown on Flights:	468.42	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20174400-1	Base 1	SNH-A		Elevation	Temp		Pressure	
Kelly	Project Description	Base 2		Airport	461.5ft				
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude					
Ken		Aero 2		@ Altitude			#REF!		
	Location	IMU Information		GPS Base Station Information					
	Savannah,TN	Start Time	14:28:13		File Name	RNX File	Ant Hgt	Ant Type	
Flight Date / Pilot / Operator	Aircraft	Stop Time	18:09:22	Base 1	log0303u.17o		1.8	GR3	
3/3/2017 / Kelly / Jonathan	N1107Q			Base 2					
				Base 3					

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
9	270°	21:23:47	21:40:49	0:17:02	6,400					150 kts	173 mph	49.00		x	Good
10	90°	21:45:05	22:02:07	0:17:02	6,400					150 kts	173 mph	49.00		x	Good
11	270°	22:05:22	22:22:37	0:17:15	6,400					150 kts	173 mph	49.63		x	Good
12	90°	22:26:50	22:43:55	0:17:05	6,400					150 kts	173 mph	49.15		x	Good
13	270°	22:47:18	23:04:16	0:16:58	6,400					150 kts	173 mph	48.81		x	Good
14	90°	23:08:48	23:25:56	0:17:08	6,400					150 kts	173 mph	49.29		x	Good
15	270°	23:29:12	23:46:19	0:17:07	6,400					150 kts	173 mph	49.24		x	Good
16	90°	23:50:14	0:07:28	0:17:14	6,400					150 kts	173 mph	49.58		x	Good
17	270°	0:11:05	0:27:56	0:16:51	6,400					150 kts	173 mph	48.48		x	Good
18	90°	0:31:36	0:48:42	0:17:06	6,400					150 kts	173 mph	49.20		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	3:41:09	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:50:48	Miles Flown on Flights:	491.38	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	SNH-A		Elevation	Temp		Pressure
Kelly	Project Description	Base 2		Airport	461.5ft			
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude	6,400			
Ken	Location	Aero 2		@ Altitude		#REF!		
	Savannah,TN	IMU Information		GPS Base Station Information				
		Start Time			File Name	RNX File	Ant Hgt	Ant Type
				Base 1	log0304n.17o		1.8	GR3
		Stop Time		Base 2				
				Base 3				

Flight Date	Pilot	Operator	Aircraft
3/4/2017	Bob	Jonathan	N1107Q

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
19	270°	14:59:29	15:15:22	0:15:53	6,400					150 kts	173 mph	45.70		x	Good
20	90°	15:20:03	15:36:59	0:16:56	6,400					150 kts	173 mph	48.72		x	Good
21	270°	15:40:47	15:56:47	0:16:00	6,400					150 kts	173 mph	46.03		x	Good
22	90°	16:00:57	16:17:51	0:16:54	6,400					150 kts	173 mph	48.62		x	Good
23	270°	16:22:10	16:37:56	0:15:46	6,400					150 kts	173 mph	45.36		x	Good
24	90°	16:41:39	16:58:05	0:16:26	6,400					150 kts	173 mph	47.28		x	Good
25	270°	17:01:36	17:17:20	0:15:44	6,400					150 kts	173 mph	45.26		x	Good
26	90°	17:21:15	17:37:27	0:16:12	6,400					150 kts	173 mph	46.61		x	Good
27	270°	17:41:27	17:57:13	0:15:46	6,400					150 kts	173 mph	45.36		x	Good
28	90°	18:01:31	18:17:36	0:16:05	6,400					150 kts	173 mph	46.27		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:41:42	Miles Flown on Flights:	465.20	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Flight Log

Field Crew	Project #	20170044-1
Jonathan Kelly Bob Ken	Project Description	Woolpert- TN West_Central LiDAR
	Location	Savannah,TN
	Aircraft	N1107Q

Flight Date	Pilot	Operator
3/4/2017	Kelly	Jonathan

GPS Information	
Base 1	SNH-A
Base 2	
Base 3	
Aero 2	
IMU Information	
Start Time	
Stop Time	

Meteorological Conditions					
	Elevation	Temp		Pressure	
Airport	461.5ft				
@ Altitude					
@ Altitude			#REF!		

GPS Base Station Information				
	File Name	RNX File	Ant Hgt	Ant Type
Base 1	log0304n.17o		1.8	GR3
Base 2				
Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
29	270°	19:46:52	20:02:37	0:15:45	6,400					150 kts	173 mph	45.31			Good, Slight turbulance
30	90°	20:07:05	20:23:12	0:16:07	6,400					150 kts	173 mph	46.37			Good, Slight turbulance
31	270°	20:27:34	20:43:07	0:15:33	6,400					150 kts	173 mph	44.74			Good, Slight turbulance
32	90°	20:47:51	21:03:22	0:15:31	6,400					150 kts	173 mph	44.64		x	Good, Slight turbulance
33	270°	21:07:11	21:22:53	0:15:42	6,400					150 kts	173 mph	45.17		x	Good, Slight turbulance
34	90°	21:27:36	21:43:12	0:15:36	6,400					150 kts	173 mph	44.88		x	Good, Slight turbulance
35	270°	21:47:19	22:02:34	0:15:15	6,400					150 kts	173 mph	43.87		x	Good, Slight turbulance
36	90°	22:06:54	22:22:03	0:15:09	6,400					150 kts	173 mph	43.59		x	Good, Slight turbulance
37	270°	22:26:01	22:41:11	0:15:10	6,400					150 kts	173 mph	43.63		x	Good, Slight turbulance
38	90°	22:45:51	23:00:04	0:14:13	6,400					150 kts	173 mph	40.90		x	Good, Slight turbulance
39	270°	23:04:46	23:19:56	0:15:10	6,400					150 kts	173 mph	43.63		x	Good, Slight turbulance
40	90°	23:23:57	23:39:47	0:15:50	6,400					150 kts	173 mph	45.55		x	Good, Slight turbulance

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	3:05:01	Miles Flown on Flights:	532.28	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Field Crew	Flight Log		GPS Information		Meteorological Conditions					
Jonathan	Project #	20170044-1	Base 1	SNH-A		Elevation	Temp		Pressure	
Ken	Project Description		Base 2		Airport	461.5ft				
Bob	Woolpert- TN West_Central LiDAR		Base 3		@ Altitude	6,400				
Kelly			Aero 2		@ Altitude			#REF!		
	Location		IMU Information		GPS Base Station Information					
	Savannah, TN		Start Time			File Name	RNX File	Ant Hgt	Ant Type	
Flight Date / Pilot / Operator	Aircraft				Base 1	lpog0305m.17o		1.8	GR3	
3/5/2017 / Kelly / Jonathan	N1107Q		Stop Time		Base 2					
					Base 3					

Line	Dir	Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
41	270°	13:37:20	13:53:52	0:16:32	6,400					150 kts	173 mph	47.57		x	
42	90°	13:58:25	14:14:36	0:16:11	6,400					150 kts	173 mph	46.56		x	
43	270°	14:19:13	14:35:47	0:16:34	6,400					150 kts	173 mph	47.66		x	
44	90°	14:41:53	14:59:03	0:17:10	6,400					150 kts	173 mph	49.39		x	
45	270°	15:03:29	15:20:48	0:17:19	6,400					150 kts	173 mph	49.82		x	
46	90°	15:25:31	15:43:04	0:17:33	6,400					150 kts	173 mph	50.49		x	
47	270°	15:47:26	16:05:15	0:17:49	6,400					150 kts	173 mph	51.26		x	Slight Turbulence far east end of line
48	90°	16:09:05	16:24:08	0:15:03	6,400					150 kts	173 mph	43.30			Stopped at 5 miles on west end because of clouds-Reflew on M6

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:		Total # of Photo's	0	Percent Complete			☑ Clear
DMC Data Collection Time:		Miles Flown on Flights:		Total Flight Lines			☐ Fair
Hobbs Start Time				Lines Complete	48		☐ Partly Cloudy
Hobbs Stop Time		Hobbs Total Time		Lines Completed Today	8		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	SNH-A		Elevation	Temp		Pressure
Kelly	Project Description	Base 2		Airport	457.08ft			
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude				
		Aero 2		@ Altitude		#REF!		
	Location	IMU Information		GPS Base Station Information				
	Savannah, TN	Start Time			File Name	RNX File	Ant Hgt	Ant Type
Flight Date / Pilot / Operator	Aircraft			Base 1	log0308o.17o		1.8	GR3
3/8/2017 / Kelly / Jonathan	N1107Q	Stop Time		Base 2				
				Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
49	270°	17:11:05	17:29:56	0:18:51	6,400					150 kts	173 mph	54.23		x	Good
50	90°	17:33:55	17:53:10	0:19:15	6,400					150 kts	173 mph	55.38		x	Good
51	270°	17:56:33	18:15:06	0:18:33	6,400					150 kts	173 mph	53.37		x	Good
52	90	18:18:39	?		6,400					150 kts	173 mph	0.00			Void
52	90°	18:24:42	18:42:52	0:18:10	6,400					150 kts	173 mph	52.26		x	Good
53	270°	18:45:52	19:03:40	0:17:48	6,400					150 kts	173 mph	51.21		x	Good
54	90°	19:06:52	19:24:15	0:17:23	6,400					150 kts	173 mph	50.01		x	Good
55	270°	19:26:55	19:44:14	0:17:19	6,400					150 kts	173 mph	49.82		x	Second time flying line for missed west end., Whole Line
48	90°	19:49:15	20:08:25	0:19:10	6,400					150 kts	173 mph	55.14		x	

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	41.2%		☑ Clear
DMC Data Collection Time:	2:26:29	Miles Flown on Flights:	421.43	Total Flight Lines	136		☐ Fair
Hobbs Start Time	1000			Lines Complete	56		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	8		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
Kelly	Project Description	Base 2		Airport	457.08ft				
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude					
		Aero 2		@ Altitude			#REF!		
	Location	IMU Information		GPS Base Station Information					
	Camden, TN	Start Time			File Name	RNX File	Ant Hgt	Ant Type	
Flight Date / Pilot / Operator	Aircraft	Stop Time		Base 1	log0308w.17o		1.8	GR3	
3/8/2017 / Bob / Jonathan	N1107Q			Base 2					
				Base 3					

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
56	90°	23:29:05	23:47:22	0:18:17	6,400					150 kts	173 mph	52.60		x	Good
57	270°	23:50:55	0:08:41	0:17:46	6,400					150 kts	173 mph	51.11		x	Good
58	90°	0:12:29	0:30:46	0:18:17	6,400					150 kts	173 mph	52.60		x	Good
59	270°	0:34:14	0:51:59	0:17:45	6,400					150 kts	173 mph	51.07		x	Good
60	90°	0:55:39	1:14:12	0:18:33	6,400					150 kts	173 mph	53.37		x	Good
61	270°	1:18:08	1:35:30	0:17:22	6,400					150 kts	173 mph	49.96		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	45.6%		☑ Clear
DMC Data Collection Time:	1:48:00	Miles Flown on Flights:	310.71	Total Flight Lines	136		☐ Fair
Hobbs Start Time	1000			Lines Complete	62		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	6		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
Kelly	Project Description	Base 2		Airport	457.08ft				
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude					
		Aero 2		@ Altitude			#REF!		
	Location	IMU Information		GPS Base Station Information					
	Camden, TN	Start Time			File Name	RNX File	Ant Hgt	Ant Type	
Flight Date / Pilot / Operator	Aircraft	Stop Time		Base 1	log0309n.17o		1.8	GR3	
3/9/2017 / Kelly / Jonathan	N1107Q			Base 2					
				Base 3					

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
62	90°	14:36:51	14:55:53	0:19:02	6,400					150 kts	173 mph	54.76		x	Good
63	270°	14:59:21	15:16:57	0:17:36	6,400					150 kts	173 mph	50.63		x	Good
64	90°	15:21:01	15:42:14	0:21:13	6,400					150 kts	173 mph	61.04		x	Good
65	270°	15:46:28	16:05:59	0:19:31	6,400					150 kts	173 mph	56.15		x	Good
66	90°	16:10:05	16:30:59	0:20:54	6,400					150 kts	173 mph	60.13		x	Good
67	270°	16:34:42	16:53:47	0:19:05	6,400					150 kts	173 mph	54.90		x	Good
68	90°	16:57:36	17:18:27	0:20:51	6,400					150 kts	173 mph	59.98		x	Good
69	270°	17:21:49	17:40:57	0:19:08	6,400					150 kts	173 mph	55.05		x	Good
70	90°	17:44:58	18:05:43	0:20:45	6,400					150 kts	173 mph	59.70		x	Good
71	270°	18:08:55	18:28:18	0:19:23	6,400					150 kts	173 mph	55.76		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	3:17:28	Miles Flown on Flights:	568.10	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

			Field Crew	Flight Log					GPS Information		Meteorological Conditions							
			Jonathan	Project #	20170044-1				Base 1	GPS 30-GD1866		Elevation	Temp		Pressure			
			Kelly	Project Description					Base 2		Airport	457.08ft						
			Bob	Woolpert- TN West_Central LiDAR					Base 3		@ Altitude							
									Aero 2		@ Altitude			#REF!				
				Location					IMU Information		GPS Base Station Information							
									Start Time			File Name	RNX File	Ant Hgt	Ant Type			
											Base 1			1.8	GR3			
Flight Date		Pilot	Operator		Aircraft				Stop Time		Base 2							
3/9/2017		Bob	Jonathan		N1107Q						Base 3							

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
72	90°	20:49:58	21:11:18	0:21:20	6,400					150 kts	173 mph	61.37		x	Good
73	270°	21:15:04	21:35:48	0:20:44	6,400					150 kts	173 mph	59.65		x	Good
92	90°	21:44:03	22:03:45	0:19:42	6,400					150 kts	173 mph	56.68		x	Good
93	270°	22:07:03	22:26:18	0:19:15	6,400					150 kts	173 mph	55.38		x	Good
94	90°	22:31:09	22:44:25	0:13:16	6,400					150 kts	173 mph	38.17		x	west end small forest fire. Stopped with 16 1/2 left
94	90°	22:48:55	22:49:02	0:00:00	6,400					150 kts	173 mph	0.00		y	Disregard
94	90°	22:53:34	22:56:28	0:00:00	6,400					150 kts	173 mph	0.00		y	Disregard
95	270°	23:00:00	23:11:10	0:11:10	6,400					150 kts	173 mph	32.13		x	started 31 miles away from east end,
96	90°	23:14:42	23:22:03	0:07:21	6,400					150 kts	173 mph	21.15		x	Stopped before reaching river due to clouds

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	1:52:48	Miles Flown on Flights:	324.52	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 2017004-1	Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
Kelly	Project Description	Base 2		Airport	457.08ft				
Bob	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude					
Ken		Aero 2		@ Altitude			#REF!		
	Location	IMU Information		GPS Base Station Information					
	Camden, TN	Start Time			File Name	RNX File	Ant Hgt	Ant Type	
Flight Date / Pilot / Operator	Aircraft	Stop Time		Base 1	log0310p.17o		1.8	GR3	
3/10/2017 / Bob / Jonathan	N1107Q			Base 2					
				Base 3					

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
134	0°	16:26:33	16:48:03	0:21:30	6,400					150 kts	173 mph	61.85		x	Good
133	270°	16:55:58	16:58:42	0:02:44	6,400					150 kts	173 mph	7.86		x	Good
132	90°	17:05:10	17:10:05	0:04:55	6,400					150 kts	173 mph	14.15		x	Good
131	270°	17:13:48	17:18:58	0:05:10	6,400					150 kts	173 mph	14.86		x	Good
130	90°	17:23:35	17:28:36	0:05:01	6,400					150 kts	173 mph	14.43		x	Good
129	270°	17:33:26	17:42:21	0:08:55	6,400					150 kts	173 mph	25.65		x	Good
128	90°	17:46:35	17:55:26	0:08:51	6,400					150 kts	173 mph	25.46		x	Good
127	270°	17:59:19	18:08:08	0:08:49	6,400					150 kts	173 mph	25.37		x	Good
126	90°	18:12:23	18:20:56	0:08:33	6,400					150 kts	173 mph	24.60		x	Good
125	270°	18:24:49	18:33:06	0:08:17	6,400					150 kts	173 mph	23.83		x	Good
124	90°	18:37:13	18:45:49	0:08:36	6,400					150 kts	173 mph	24.74		x	Good
123	270°	18:49:09	18:52:08	0:00:00	6,400					150 kts	173 mph	0.00		y	Stopped due to Restriction area
123	270°	19:01:05	19:09:19	0:08:14	6,400					150 kts	173 mph	23.69		x	Good,Reflew line
122	90°	19:14:06	19:22:51	0:08:45	6,400					150 kts	173 mph	25.17		x	Good
121	270°	19:26:46	19:35:15	0:08:29	6,400					150 kts	173 mph	24.41		x	Good
120	90°	19:39:53	19:57:55	0:18:02	6,400					150 kts	173 mph	51.88		x	Good
119	270°	20:02:18	20:19:48	0:17:30	6,400					150 kts	173 mph	50.35		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:32:21	Miles Flown on Flights:	438.30	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Flight Log

Field Crew	Project #	20170044-1
Jonathan	Project Description	
Kelly	Woolpert- TN West_Central LiDAR	
Bob	Location	
Ken	Camden,TN	
	Aircraft	
	N1107Q	

Flight Date	Pilot	Operator
3/10/2017	Kelly	Jonathan

GPS Information		Meteorological Conditions				
Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
Base 2		Airport	457.08ft				
Base 3		@ Altitude					
Aero 2		@ Altitude			#REF!		

IMU Information		GPS Base Station Information				
Start Time			File Name	RNX File	Ant Hgt	Ant Type
		Base 1	log0310v.17o		1.8	GR3
Stop Time		Base 2				
		Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
118	90°	22:08:43	22:27:42	0:18:59	6,400					150 kts	173 mph	54.61		x	Good
117	270°	22:31:53	22:49:47	0:17:54	6,400					150 kts	173 mph	51.50		x	Good
116	90°	22:54:23	23:13:12	0:18:49	6,400					150 kts	173 mph	54.13		x	Good
115	270°	23:17:31	23:35:23	0:17:52	6,400					150 kts	173 mph	51.40		x	Good
114	90°	23:40:50	23:59:21	0:18:31	6,400					150 kts	173 mph	53.27		x	Good
113	270°	0:03:18	0:21:22	0:18:04	6,400					150 kts	173 mph	51.98		x	Good
112	90°	0:25:54	0:43:59	0:18:05	6,400					150 kts	173 mph	52.02		x	Good
111	270°	0:49:31	1:07:49	0:18:18	6,400					150 kts	173 mph	52.65		x	Good
110	90°	1:11:31	1:30:14	0:18:43	6,400					150 kts	173 mph	53.85		x	Good
109	270°	1:33:33	1:53:13	0:19:40	6,400					150 kts	173 mph	56.58		x	Good

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	3:04:55	Miles Flown on Flights:	532.00	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

			Field Crew	Flight Log		GPS Information		Meteorological Conditions					
			Jonathan Bob	Project #	20170044-1	Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
				Project Description		Base 2		Airport	457.08ft				
				Woolpert- TN West_Central LiDAR		Base 3		@ Altitude					
						Aero 2		@ Altitude			#REF!		
				Location		IMU Information		GPS Base Station Information					
				Camden, TN		Start Time			File Name	RNX File	Ant Hgt	Ant Type	
Flight Date	Pilot	Operator		Aircraft		Stop Time		Base 1	log0312q.17o		1.8	GR3	
3/12/2017	Bob	Jonathan		N1107Q				Base 2					
								Base 3					

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
93	90°	16:52:04	17:03:39	0:11:35	6,400					150 kts	173 mph	33.32		x	Reflew line by mistake, Not needed
95	270°	17:05:47	17:19:02	0:13:15	6,400					150 kts	173 mph	38.12		x	flew 36nm, remainder of line from M9
174W=74	90°	17:33:00	17:46:36	0:13:36	6,400					150 kts	173 mph	39.13		x	Lines cut in half from original plan, Flew west side
191W=91	270°	17:53:39	18:06:30	0:12:51	6,400					150 kts	173 mph	36.97		x	Lines cut in half from original plan, Flew west side
190W=90	90°	18:10:50	18:23:52	0:13:02	6,400					150 kts	173 mph	37.50		x	Lines cut in half from original plan, Flew west side
189W=89	270°	18:27:29	18:40:23	0:12:54	6,400					150 kts	173 mph	37.11		x	Lines cut in half from original plan, Flew west side
94	90°	18:45:56	18:57:14	0:11:18	6,400					150 kts	173 mph	32.51		x	Flew remainder of line from M9
175W=75	270°	19:06:43	19:20:04	0:13:21	6,400					150 kts	173 mph	38.41		x	Lines cut in half from original plan, Flew west side
176W=76	90°	19:23:13	19:36:52	0:13:39	6,400					150 kts	173 mph	39.27		x	Lines cut in half from original plan, Flew west side
177W=77	270°	19:40:00	19:53:37	0:13:37	6,400					150 kts	173 mph	39.17		x	Lines cut in half from original plan, Flew west side
178W=78	90°	19:57:13	20:10:51	0:13:38	6,400					150 kts	173 mph	39.22		x	Lines cut in half from original plan, Flew west side

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:22:46	Miles Flown on Flights:	410.73	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Flight Log

Field Crew	Project #	20170044-1
Jonathan	Project Description	
Justin	Woolpert- TN West_Central LiDAR	
Daniel	Location	Camden,TN
	Aircraft	N1107Q

Flight Date	Pilot	Operator
3/15/2017	Justin	Jonathan

GPS Information		Meteorological Conditions				
Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
Base 2		Airport	457.08ft				
Base 3		@ Altitude					
Aero 2		@ Altitude			#REF!		

IMU Information		GPS Base Station Information				
Start Time			File Name	RNX File	Ant Hgt	Ant Type
		Base 1	log0315q.17o		1.8	GR3
Stop Time		Base 2				
		Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
179W	270°	17:07:03	17:20:28	0:13:25	6,400					150 kts	173 mph	38.60		x	
180W	90°	17:23:50	17:37:20	0:13:30	6,400					150 kts	173 mph	38.84		x	5.3nm left going west, small possible cloud
181W	270°	17:41:29	17:54:53	0:13:24	6,400					150 kts	173 mph	38.55		x	
182W	90°	17:58:46	18:12:12	0:13:26	6,400					150 kts	173 mph	38.65		x	
183W	270°	18:16:08	18:29:09	0:13:01	6,400					150 kts	173 mph	37.45		x	
184W	90°	18:32:13	18:45:39	0:13:26	6,400					150 kts	173 mph	38.65		x	
185W	270°	18:48:34	19:01:38	0:13:04	6,400					150 kts	173 mph	37.59		x	
186W	90°	19:05:23	19:18:30	0:13:07	6,400					150 kts	173 mph	37.74		x	
187W	270°	19:21:40	19:34:52	0:13:12	6,400					150 kts	173 mph	37.98		x	
188W	90°	19:38:05	19:51:05	0:13:00	6,400					150 kts	173 mph	37.40		x	
291E	270°	20:04:03	20:13:29	0:09:26	6,400					150 kts	173 mph	27.14		x	
290E	90°	20:17:31	20:27:16	0:09:45	6,400					150 kts	173 mph	28.05		x	
289E	270°	20:30:02	20:39:30	0:09:28	6,400					150 kts	173 mph	27.24		x	
288E	90°	20:42:51	20:52:38	0:09:47	6,400					150 kts	173 mph	28.15		x	

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:51:01	Miles Flown on Flights:	492.01	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Field Crew	Flight Log	GPS Information		Meteorological Conditions				
Jonathan	Project # 20170044-1	Base 1	GPS 30-GD1866	Elevation	Temp		Pressure	
Justin	Project Description	Base 2		Airport				
Daniel	Woolpert- TN West_Central LiDAR	Base 3		@ Altitude				
		Aero 2		@ Altitude		#REF!		
	Location	IMU Information		GPS Base Station Information				
	Camden,TN	Start Time			File Name	RNX File	Ant Hgt	Ant Type
Flight Date / Pilot / Operator	Aircraft			Base 1	log0316c.17.o		1.8	GR3
3/15/2017 / Justin / Jonathan	N1107Q	Stop Time		Base 2				
				Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
274E	90°	2:47:40	2:57:32	0:09:52	6,400					150 kts	173 mph	28.39		x	
275E	270°	3:02:33	3:12:03	0:09:30	6,400					150 kts	173 mph	27.33		x	
276E	90°	3:15:38	3:25:49	0:10:11	6,400					150 kts	173 mph	29.30		x	
277E	270°	3:28:47	3:38:36	0:09:49	6,400					150 kts	173 mph	28.24		x	
278E	90°	3:44:41	3:54:51	0:10:10	6,400					150 kts	173 mph	29.25		x	
279E	270°	3:57:39	4:07:27	0:09:48	6,400					150 kts	173 mph	28.19		x	
280E	90°	4:10:34	4:20:33	0:09:59	6,400					150 kts	173 mph	28.72		x	
281E	270°	4:23:23	4:32:47	0:09:24	6,400					150 kts	173 mph	27.04		x	
282E	90°	4:36:02	4:45:48	0:09:46	6,400					150 kts	173 mph	28.10		x	
283E	270°	4:48:43	4:58:05	0:09:22	6,400					150 kts	173 mph	26.95		x	
284E	90°	5:01:19	5:11:03	0:09:44	6,400					150 kts	173 mph	28.00		x	
285E	270°	5:14:30	5:23:50	0:09:20	6,400					150 kts	173 mph	26.85		x	
286E	90°	5:27:10	5:36:43	0:09:33	6,400					150 kts	173 mph	27.47		x	
287E	270°	5:40:43	5:50:06	0:09:23	6,400					150 kts	173 mph	27.00		x	
96	90°	5:55:18	6:16:00	0:20:42	6,400					150 kts	173 mph	59.55		x	
97	270°	6:18:56	6:37:43	0:18:47	6,400					150 kts	173 mph	54.04		x	

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	2:55:20	Miles Flown on Flights:	504.43	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Flight Log

Field Crew	Project #	20170044-1
Jonathan Justin Daniel	Project Description	Woolpert- TN West_Central LiDAR
	Location	Camden,TN
	Aircraft	N1107Q

Flight Date	Pilot	Operator
3/16/2017	Daniel	Jonathan

GPS Information		Meteorological Conditions				
Base 1	GPS 30-GD1866		Elevation	Temp		Pressure	
Base 2		Airport					
Base 3		@ Altitude					
Aero 2		@ Altitude			#REF!		

IMU Information		GPS Base Station Information				
Start Time			File Name	RNX File	Ant Hgt	Ant Type
		Base 1			1.8	GR3
Stop Time		Base 2				
		Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
98	90°	14:32:11	14:52:48	0:20:37	6,400					150 kts	173 mph	59.31		x	
99	270°	14:55:55	15:15:16	0:19:21	6,400					150 kts	173 mph	55.67		x	
100	90°	15:19:25	15:40:38	0:21:13	6,400					150 kts	173 mph	61.04		x	
101	270°	15:43:29	16:03:03	0:19:34	6,400					150 kts	173 mph	56.29		x	
102	90°	16:07:41	16:29:26	0:21:45	6,400					150 kts	173 mph	62.57		x	
103	270°	16:32:40	16:52:27	0:19:47	6,400					150 kts	173 mph	56.92		x	
104	90°	16:56:19	17:18:15	0:21:56	6,400					150 kts	173 mph	63.10		x	
105	270°	17:22:00	17:41:27	0:19:27	6,400					150 kts	173 mph	55.96		x	
106	90°	17:44:43	18:06:30	0:21:47	6,400					150 kts	173 mph	62.67		x	
107	270°	18:09:33	18:28:29	0:18:56	6,400					150 kts	173 mph	54.47		x	
108	90°	18:32:05	18:53:18	0:21:13	6,400					150 kts	173 mph	61.04		x	

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	100.0%		☑ Clear
DMC Data Collection Time:	3:45:36	Miles Flown on Flights:	649.04	Total Flight Lines	1491		☐ Fair
Hobbs Start Time	1000			Lines Complete	1491		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	1112		☐ Cloudy

Flight Log

Field Crew	Project #	20170044-1
Jonathan Justin	Project Description	Woolpert- TN West_Central LiDAR
	Location	Savannah,TN
	Aircraft	N1107Q

GPS Information	
Base 1	SNH-A
Base 2	
Base 3	
Aero 2	
IMU Information	
Start Time	
Stop Time	

Meteorological Conditions					
	Elevation	Temp		Pressure	
Airport	461.5ft				
@ Altitude					
@ Altitude			#REF!		

GPS Base Station Information				
	File Name	RNX File	Ant Hgt	Ant Type
Base 1	log0319o.17o		1.8	GR3
Base 2				
Base 3				

Flight Date	Pilot	Operator
3/19/2017	Justin	Jonathan

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
9	270°	15:06:58	15:22:52	0:15:54	6,400					150 kts	173 mph	45.74		x	redos M2
10	90°	15:26:17	15:44:10	0:17:53	6,400					150 kts	173 mph	51.45		x	redos M2
11	270°	15:47:19	16:03:13	0:15:54	6,400					150 kts	173 mph	45.74		x	redos M2
12	90°	16:07:27	16:24:39	0:17:12	6,400					150 kts	173 mph	49.48		x	redos M2
29	270°	16:31:41	16:47:03	0:15:22	6,400					150 kts	173 mph	44.21		x	redos M4
30	90°	16:50:43	17:07:22	0:16:39	6,400					150 kts	173 mph	47.90		x	redos M4
31	270°	17:15:35	17:30:51	0:15:16	6,400					150 kts	173 mph	43.92		x	redos M4

DMC FLIGHT SUMMARY				Data Collection		Comments	Weather
Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0	Percent Complete	5.2%		☑ Clear
DMC Data Collection Time:	1:54:10	Miles Flown on Flights:	328.45	Total Flight Lines	135		☐ Fair
Hobbs Start Time	1000			Lines Complete	7		☐ Partly Cloudy
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3	Lines Completed Today	7		☐ Cloudy

Flight Log

Field Crew	Project #	20170044:1
Jonathan Justin	Project Description	
	Location	Camden, TN
	Aircraft	N1107Q

Flight Date	Pilot	Operator
10/29/2017	Justin	Jonathan

GPS Information	
Base 1	
Base 2	
Base 3	
Aero 2	
IMU Information	
Start Time	
Stop Time	

Meteorological Conditions				
	Elevation	Temp		Pressure
Airport				
@ Altitude				
@ Altitude			#REF!	

GPS Base Station Information				
	File Name	RNX File	Ant Hgt	Ant Type
Base 1			1.8	GR3
Base 2				
Base 3				

Line/Dir		Start	Stop	Total Time	Altitude	First Photo #	Last Photo #	Invalidated Photos	# of Photos	Speed		Miles (Calc)	Miles (Actual)	Void "Y"	Conditions/Comments
1	270°	14:51:19	14:51:52	0:00:33	2,100					150 kts	173 mph	1.58			
2	90°	14:55:57	14:56:32	0:00:35	2,100					150 kts	173 mph	1.68			
3	60°	15:07:35	15:09:31	0:01:56	2,100					150 kts	173 mph	5.56			
4	240°	15:13:03	15:14:59	0:01:56	2,100					150 kts	173 mph	5.56			

DMC FLIGHT SUMMARY

Approximate Aircraft Flight Time:	0:00:00	Total # of Photo's	0
DMC Data Collection Time:	0:05:00	Miles Flown on Flights:	14.38
Hobbs Start Time	1000		
Hobbs Stop Time	1003.3	Hobbs Total Time	3.3

Data Collection	
Percent Complete	100.0%
Total Flight Lines	1491
Lines Complete	1491
Lines Completed Today	1112

Comments

Weather

- [x] Clear
- [ ] Fair
- [ ] Partly Cloudy
- [ ] Cloudy

Section 7: Final Deliverables

The final lidar deliverables are listed below.

- LAS v1.4 classified point cloud
- Hydro Breaklines as ESRI GDB
- Bridge Breaklines as ESRI GDB
- Digital Elevation Model in ERDAS .IMG format
- 8-bit gray scale intensity images in .TIF format
- Tile layout provided in ESRI GDB
- Control Points provided in ESRI GDB
- Flight line in ESRI GDB
- FGDC compliant metadata per product in XML format
- Lidar processing report in pdf format
- Survey report in pdf format
- Building footprint polygons as ESRI shapefile