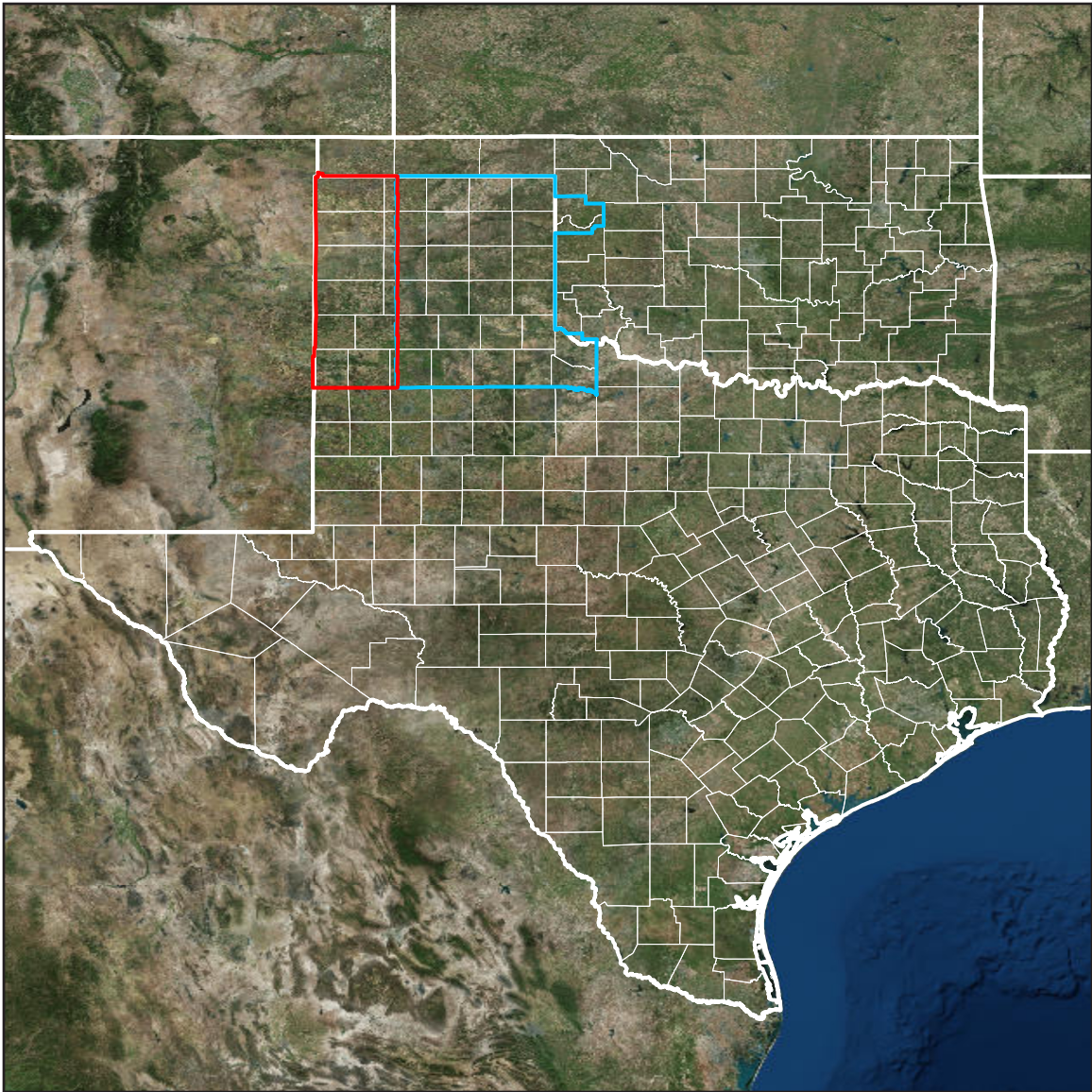


TX Panhandle 2018 D18

Airborne Lidar Report

May 2019



Contract # G16PC00022
Task Order # 140G0218F0070



Contractor Woolpert
Project # 78351

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1. Overview

About

This project contains a comprehensive outline of the 140G0218F0070 TX Panhandle 2018 D18 task order issued by the United States Geological Survey's National Geospatial Technical Operations Center (USGS-NGTOC). This task order called for the acquisition and processing of QL2 data over one area of interest covering approximately 34,005 square miles across 38 partial and full counties in the Texas Panhandle and Red River regions in northern Texas and western Oklahoma.

Data covers the following counties:

Texas

- Armstrong
- Bailey
- Briscoe
- Carson
- Castro
- Childress
- Collingsworth
- Cottle
- Dallam
- Deaf Smith
- Donley
- Floyd
- Foard
- Gray
- Hale
- Hall
- Hansford
- Hardeman
- Hartley
- Hemphill
- Hutchinson
- Lamb
- Lipscomb
- Moore
- Motley
- Ochiltree
- Oldham
- Parmer
- Potter
- Randall
- Roberts
- Sherman
- Swisher
- Wheeler

Oklahoma

- Cimarron
- Ellis
- Harmon
- Roger Mills

Purpose

The purpose of this project includes the following:

- Terrain mapping
- Conservation planning and design
- Support of easement/land stewardship programs
- Support of special emphasis programs
- Support of soil projects
- Fill gaps in existing Lidar
- Water resource management

Specifications

Data for this task order was acquired and produced to meet USGS Lidar Base Specification v1.2 standards and the American Society of Photogrammetry and Remote Sensing (ASPRS) Positional Accuracy Standards for Digital Geospatial Data (Edition 1, Version 1.0).

Spatial Reference

Geospatial data products were produced using the following horizontal and vertical spatial data reference systems.

Table 1-1. Spatial Reference Systems

UTM 13		
Horizontal	EPSG Code	6342
	Datum	NAD83 (2011)
	Projection	UTM Zone 13
	Units	Meters
Vertical	Datum	NAVD88
	Geoid	GEOID12B
	Units	Meters
	Height Type	Orthometric

UTM 14		
Horizontal	EPSG Code	6343
	Datum	NAD83 (2011)
	Projection	UTM Zone 14
	Units	Meters
Vertical	Datum	NAVD88
	Geoid	GEOID12B
	Units	Meters
	Height Type	Orthometric

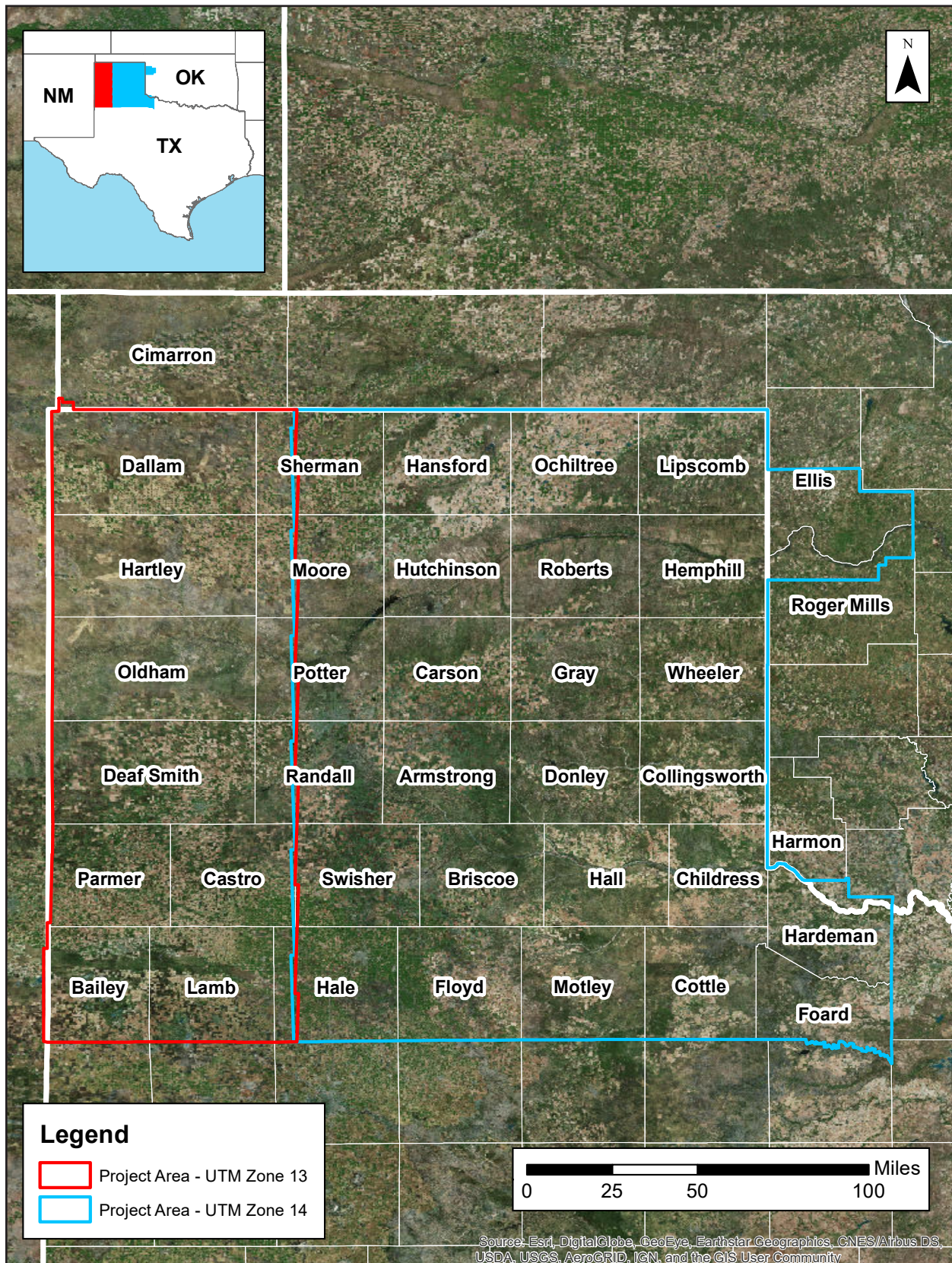
Deliverables

All data products produced as part of this task order are listed below. All tiled deliverables had a tile size of 1,500-meters x 1,500-meters. Tile names are derived from the US National Grid.

Table 1-2. Deliverables

Lidar Data	
Classified lidar point cloud data	Tiles in .las v1.4 format Classes <ul style="list-style-type: none"> • 1 – Processed, not Classified • 2 – Ground • 7 – Noise • 9 – Water • 10 – Ignored Ground • 17 – Bridge Decks • 18 – High Noise
Breaklines used for hydro-flattening	<ul style="list-style-type: none"> • Lake and River features as feature classes in an Esri file geodatabase <ul style="list-style-type: none"> • Water bodies greater than 2 acres as polygon features • Rivers 30.5 meters / 100 feet and greater in width as polyline features • Bridges used in DEM generation as point features in Esri shapefile format
Hydro-flattened bare earth digital elevation model (DEM)	1-meter pixel size, 32-bit floating-point; no bridges or overpass structures ERDAS IMG format
Intensity Imagery	1-meter pixel size, 8-bit gray-scale (linear rescaling from 16-bit intensity) GeoTIFF format
Flight Line Index	Polygon features in an Esri file geodatabase
Control Data	
Lidar calibration points	Esri shapefile format
Lidar NVA checkpoints	Esri shapefile format
Lidar VVA checkpoints	Esri shapefile format
Other Data	
Data Extent	Esri shapefile format
Delivery Diagram	Esri shapefile format
Tile Index	Esri shapefile format
Metadata and Reports	
Metadata	Project-, deliverable-, and lift-level FGDC CSDGM/USGS MetaParser Compliant metadata in .xml format
Lidar Project Report	Project report with flight logs in .pdf format
Survey Report	Survey report in .pdf format

Figure 1-1. Project Area



2. Acquisition

Flight Planning

Aerial lidar data was collected using the specifications listed below.

Table 2-1. Acquisition Requirements

Specification	Target
Resolution	<ul style="list-style-type: none"> • 2 points per square meter • 0.7-meter nominal point spacing
Overlap	At contractor's discretion, but enough to ensure there are no data gaps between usable portions of the swath and nominal point density is achieved
Acquisition Window	Winter 2017/Spring 2018 (April 30, 2018)
Acquisition Conditions	<ul style="list-style-type: none"> • Cloud and fog-free between the aircraft and ground • Ground is snow free • Ground has no unusual flooding or inundation, except in cases where the goal of the collection is to map the inundation • Preference of vegetation is leaf-off
Data Voids	Not allowed except <ul style="list-style-type: none"> • Where caused by water bodies • Where caused by areas of low near infra-red (NIR) reflectivity (i.e. asphalt or composition roofing) • Where appropriately filled-in by another swath
Control	Airborne Global Positioning System (ABGPS) and Inertial Measurement Unit (IMU) data to be used along with differentially-corrected GPS ground control points

Lidar Sensor Information

Aerial lidar data was acquired using the Leica ALS 70 and Leica ALS 80 lidar sensor systems. A total of 1,206 flight lines were collected.

Table 2-2. Leica ALS70 Sensor Info

System Performance	
Maximum Flying Height (m AGL)	3,500
Maximum Measurement Rate (kHz)	500
Field of view (degrees)	0 - 75 (full angle, user adjustable)
Roll stabilization (automatic adaptive, degrees)	70 - active FOV
Scan patterns (user selectable)	sine, triangle raster
Maximum Scan Rate (Hz)	<ul style="list-style-type: none"> • Scan • 200 • Triangle • 158 • Raster • 120
Number of Returns	unlimited
Number of intensity measurements	3 (first, second, third)
Physical Specifications	
Size (cm), Weight (kg)	<ul style="list-style-type: none"> • Scanner • 45 W x 47 D x 36 H • Control Electronics • 45 kg
Operating Temperature Scanner Control Electronics	0 - 40°C
Flight Management	FCMS
Power Consumption	910 W @ 22.0 – 30.3 VDC

Source: Leica ALS70-HP Product Specifications

https://w3.leica-geosystems.com/downloads123/zz/airborne/ALS70/brochures/Leica_ALS70_6P_BRO_en.pdf

Table 2-3. Leica ALS80 Sensor Info

Sensor Specifications	
Operating Altitude (m AGL)	100 - 3,500 at 10% reflective target
Maximum Measurement Rate (kHz)	1,000
Field of view (degrees, full angle, user adjustable)	0 - 72
Roll stabilization (automatic adaptive, degrees)	72 - active FOV
Scan patterns (user selectable)	sine, triangle raster
Maximum Scan Rate (Hz)	<ul style="list-style-type: none"> • Scan • Triangle • Raster
Number of Returns	unlimited
Number of intensity measurements	3 (first, second, third)
Pulse Mode(s)	2 - 6 pulses in air
Laser Specifications	
Laser Beam Divergence	Dual Divergence: 0.20-0.26 mrad (1/e) and 0.8 mrad (1/e) nominal
Laser Classification	Class IV laser product (FDA CFR 21)
Eye Safe Range	400m single shot depending on laser repetition rate
Accuracy	
Range Resolution	Better than 1 cm
Elevation Accuracy	6 - 19 cm single shot (one standard deviation)
Horizontal Accuracy	1/5,500 x altitude (m AGL)
Physical Specifications	
Size (cm), Weight (kg)	<ul style="list-style-type: none"> • Scanner • Control Electronics
Operating Temperature	<ul style="list-style-type: none"> • Scanner • Control Electronics
Flight Management	Leica FlightPro
Power Consumption	922 W @ 22.0 – 30.3 VDC

Source: Leica ALS80-HP Product Specifications

https://w3.leica-geosystems.com/downloads123/zz/airborne/als80/product-specification/leica_als80_hp_productspec_en.pdf

Table 2-4. Optech Orion H300 Sensor Info

Operational envelope ^{1, 2, 3, 4}	150-4000 m AGL, nominal
Effective laser repetition rate	Programmable, 35-300 kHz
Laser wavelength	1064 nm
Elevation accuracy ^{2, 3}	<3-15 cm; 1 σ
Horizontal accuracy ^{2, 3}	1/7500 x altitude; 1 σ
Position and orientation system	POS AV™ AP50 (OEM)
Sensor range precision ⁵	<8 mm, 1 σ
Scan width (FOV)	Programmable, 0-50 degrees
Scan frequency	Programmable, 0-90 Hz
Sensor scan product	1000 maximum
Beam divergence	0.25 mrad (1/e)
Roll compensation	Programmable, $\pm 30^\circ$ (FOV dependent)
Vertical target separation distance	<0.7 m
Multipulse	Yes
Range capture	Up to 4 range measurements, including 1st, 2nd, 3rd, and last returns
Intensity capture	Up to 4 intensity returns for each pulse, including last (12 bit)
Data storage	Internal solid state drive SSD (SATA II); Removable SSD (optional)
Image capture	Compatible with Optech CS-Series digital metric cameras
Full waveform capture	12-bit Optech IWD-2 Intelligent Waveform Recorder (optional)
Gyro-stabilization	SOMAG GSM 3000 integration kit (optional)
Power requirements	28 V; 300 W; 12 A
Dimensions and weight	Sensor: 340 x 340 x 250 mm, 25 kg; PDU: 415 x 328 x 100 mm, 6.5 kg
Operating temperature	0 to +35°C
Relative humidity	0-95% non-condensing

1. Target reflectivity $\geq 20\%$.

2. Dependent on selected operational parameters using nominal FOV of up to 50° and Optech LMS Professional software suite in standard atmospheric conditions (i.e., 23 km visibility).

3. Angle of incidence $\leq 25^\circ$.

4. Target size \geq laser footprint.

5. Under Optech test conditions, 1 sigma.

Source: Optech Orion H300 Airborne Lidar Summary Specification Sheet

<http://info.teledyneoptech.com/acton/attachment/19958/f-02a8/1/-/-/-/ORION-H-Specsheet-140624-WEB.pdf>

Table 2-5. Optech Galaxy PRIME Sensor Info

Sensor Performance	
Performance envelope ^{1, 2, 3, 4}	150-6000 m AGL, nominal
Absolute horizontal accuracy ^{2, 3}	1/10,000 × altitude; 1 σ
Absolute elevation accuracy ^{2, 3}	< 0.03-0.25 m RMSE from 150-6000 m AGL
Laser Configuration	
Topographic laser	1064-nm near-infrared
Laser classification	Class IV (US FDA 21 CFR 1040.10 and 1040.11; IEC/EN 60825-1)
Pulse repetition frequency (effective)	Programmable, 50-1000 kHz
Beam divergence	0.25 mrad (1/e)
Laser range precision ⁵	< 0.008 m, 1 σ
Minimum target separation distance	< 0.7 m (discrete)
Range capture	Up to 8 range measurements, including last
Intensity capture	Up to 8 intensity measurements, including last (12-bit)
Sensor Configuration	
Position and orientation system	POS AV™ AP60 (OEM); 220-channel dual frequency GNSS receiver; GNSS airborne antenna with Iridium filters; high-accuracy AIMU (Type 57); non-ITAR
Scan angle (FOV)	10-60°
Swath width	10-115% of altitude AGL
Scan frequency	0-120 Hz advertised (0-240 scan lines/sec)
Scan product	2000 maximum
Flight management system	Optech FMS (Airborne Mission Manager and Nav) with operator console
SwathTRAK™	Dynamic FOV for fixed-width data swaths in variable terrain
PulseTRAK™	Multipulse tracking algorithm with no density loss across PIA transition zones
Roll compensation	±5° minimum
Data storage	Removable SSD (primary); internal SSD (spare)
Power requirements	28 V; 400 W
Dimensions and weight	Sensor: 0.34 × 0.34 × 0.25 m, 27 kg PDU: 0.42 × 0.33 × 0.10 m, 6.5 kg
Operating temperature	0 to +35°C

1. Target reflectivity $\geq 20\%$; 99% detection probability

2. Dependent on selected operational parameters; assumes nominal FOV of up to 40° in standard atmospheric conditions (i.e. 23-km visibility) and use of Optech LMS Professional software suite

3. Angle of incidence $\leq 20^\circ$

4. Target size \geq laser footprint

5. Under Teledyne Optech test conditions, 1 sigma

Source: Optech Galaxy PRIME Airborne Lidar Terrain Mapper Specification Sheet

<http://info.teledyneoptech.com/acton/attachment/19958/f-0278/1/-/-/-/Galaxy%20PRIME%20Brochure.pdf>

GNSS and IMU Equipment

Prior to mobilizing to the project site, flight crews coordinated with the necessary air traffic control personnel to ensure airspace access. Crews were on-site, operating a Global Navigation Satellite System (GNSS) Base Station for the airborne GPS support.

Flight navigation during acquisition was performed using IGI CCNS (Computer Controlled Navigation System). 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 was used to support the aerial data acquisition. See the table below for stations operated during acquisition.

Table 2-6. GNSS Base Stations

Station Name	Latitude (DMS)	Longitude (DMS)	Ellipsoid Height L1 Phase Center (Meters)
TXWL CORS	34°50'59.03793"	100°12'07.49930"	589.274
TXDL CORS	36°04'40.21171"	102°32'19.13739"	1198.429
P039 CORS	36°26'53.18773"	103°09'14.19422"	1494.687
TXME CORS	34°43'26.02329"	100°31'45.68087"	601.18
TXLU CORS	33°32'07.49089"	101°50'34.16231"	957.188
TXCH CORS	34°27'34.54628"	100°16'41.77274"	565.142
TXBR CORS	35°38'24.99982"	101°23'52.32001"	947.73
TXAM CORS	35°09'12.80505"	101°52'42.43612"	1099.234
KAMA_Airport	35°13'03.01876"	101°42'36.64606"	1073.815
TXPM CORS	35°32'02.61468"	100°55'43.22067"	960.242
TXHR CORS	34°50'44.4848"	102°24'23.86497"	1146.078
TXSL CORS	34°28'26.69173"	101°18'50.68690"	976.869
TXCD CORS	35°06'05.62548"	101°21'45.29305"	1011.844
TXCL CORS	34°57'04.39198"	100°54'48.14988"	822.278
TXFM CORS	35°35'02.61468"	100°55'43.22067"	960.242
TXTU CORS	34°32'01.41966"	101°44'21.63225"	1035.984
TXCO CORS	35°06'05.62548"	101°21'45.29305"	1011.844
TXL1 CORS	33°56'18.22691"	102°20'58.27589"	1072.768
TXPD CORS	34°00'44.28760"	100°17'22.61505"	534.353

Timeline

Lidar data was collected from February 9, 2018 through May 20, 2018. Acquisition specifications are listed in the table below. An initial quality control process was immediately performed on to review the data coverage, airborne GPS data, and trajectory solution.

Table 2-7. Acquisition Specifications

Settings	Leica ALS80 Woolpert	Leica ALS70 Aerial Services, Inc.	Optech Galaxy Aerial Surveys, Int'l.	Optech Orion H300 Aerial Surveys Int'l.	Leica ALS70 PAR, Inc.
Max. Number of Returns	Infinite	4	8	4	###
Nominal Point Spacing	0.7 m	0.6 m	0.7 m	0.7 m	0.64 m
Nominal Point Density	2 ppsm	2 ppsm	2.16 ppsm	2.03 ppsm	2.44 ppsm
Flying Height Above Ground Level	2,377 m	1,500 m	1,550 m	1,900 m	1,981 m
Flight Speed	150 knots	145 knots	150 knots	150 knots	150 knots
Scan Angle	40°	50°	43°	30°	40°
Scan Rate Used	35.5 Hz	47 Hz	56 Hz	55 Hz	46 Hz
Pulse Rate Used	346 kHz	354 kHz	250 kHz	200 kHz	272 kHz
Multi-Pulse in Air	Enabled	Enabled	Enabled	Enabled	Enabled
Swath Width	1,731 m	1,399 m	1,221.12 m	1,018.21 m	1,442.05 m
Swath Overlap	25%	30%	30%	30%	30%

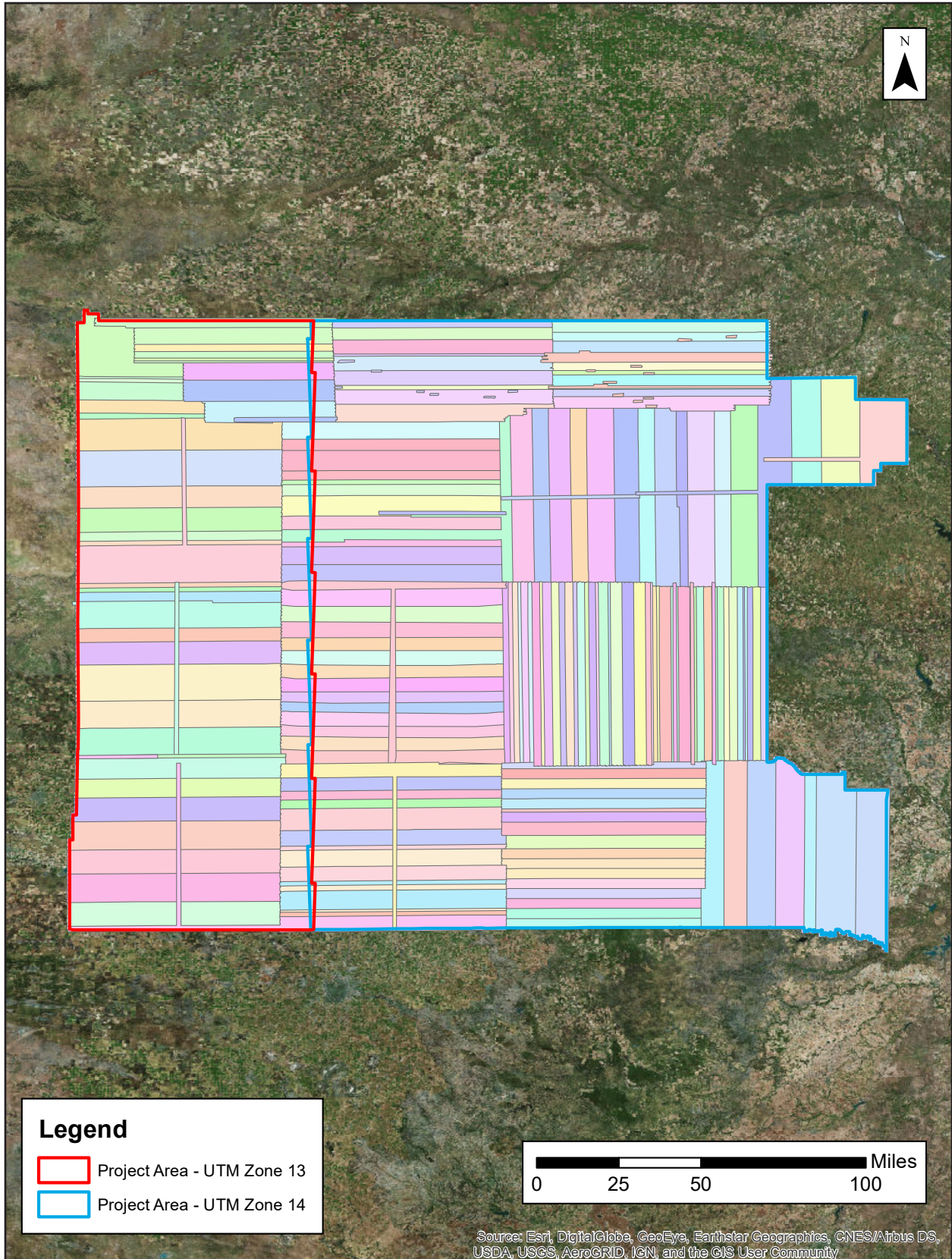
For more information, see the Flight Logs in Appendix 1.

Acquisition Quality Assurance

Woolpert developed a quality assurance and validation plan to ensure the acquired lidar data meets the USGS Base Specification Version 1.2. For quality assurance purposes, the lidar data was processed immediately following acquisition to verify the coverage has appropriate density, distribution, and no unacceptable data voids. Accompanying GPS data was post processed using differential and Kalman filter algorithms to derive a best estimate of trajectory. The quality of the solution was verified to be consistent with the accuracy requirements of the task order. Any required re-flights were scheduled at the earliest opportunity.

The spatial distribution of the geometrically usable first return lidar points was reviewed for density requirements as well as regular and uniform point distribution - verifying the lidar data is spaced so that 90% of the cells in a 2*NPS grid placed over the data contain at least one lidar point. The NPS assessment is made against single swath, first return data located within the geometrically usable center portion (typically ~90%) of each swath. Additionally, the data was reviewed for unacceptable data voids – verifying no area greater than or equal to $(4 \times \text{ANPS})^2$ exhibited data coverage gaps.

Figure 2-1: Flown Flight Lines



3. Processing

Processing Summary

Once the lidar data passed initial QC, the dataset was corrected for aircraft orientation and movement. This process used airborne inertial, orientation, and GPS data collected during acquisition along with ground-based GPS data. The data went through a geometric calibration that further corrected each laser point. This calibrated data set was used to create the LAS point cloud. The LAS point data was initially classified into “ground” and “non-ground”, then further refined using the classes specified in this task order. Breaklines were drawn to denote hydrological features. After the hydro-flattening process, the final deliverables products were created.

GNSS-IMU Trajectory Processing

Kinematic corrections for the aircraft position were resolved using aircraft GPS and static ground GPS (1-Hz) for each geodetic control (base station) for three subsystems: inertial measurement unit (IMU), sensor orientation information, and airborne GPS data.

Post-processing of the IMU system data and aircraft position with attitude data was completed to compute an optimally accurate, blended navigation solution based on Kalman filtering technology, or the smoothed best estimate of trajectory (SBET).

Software: POSPac Software v. 5.3, IPAS Pro v.1.35., Novatel Inertial Explorer v8.60.6129

Trajectory Quality

The GNSS trajectory and 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).

Combination Separation

Combined separation is a measure of the difference between the forward-run and the backward-run solution of the trajectory. The Kalman filter was processed in both directions to remove the combined directional anomalies. In general, when these two solutions match closely, an optimally accurate and reliable solution is achieved.

The data for this task order was processed with a goal to maintain a combined separation difference of less than ten (10) centimeters.

Estimated Positional Accuracy

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.

PDOP

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

The data for this task order was processed with a goal 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.

Geometric Calibration

After the initial phase was complete, a formal reduction process was performed on the data. Laser point position was calculated by associating the SBET position to each laser point return time, scan angle, intensity, etc. Raw laser point cloud data was created for the whole project area 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. Statistical reports were generated for comparison and used to make the necessary adjustments to remove any residual systematic error.

Software: Proprietary Software, TerraMatch v18, Leica CloudPro 1.2.4

Lidar Data Classification

LAS data was 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 of higher accuracy.

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 the following client-specified classes:

- Class 1 – Default / Processed, but not Classified
- Class 2 – Bare Earth Ground
- Class 7 – Low Noise
- Class 9 – Water
- Class 10 – Ignored Ground
- Class 17 – Bridge Decks
- Class 18 – High Noise

Classified LAS files were evaluated through a series of manual QA/QC steps as well as a peer-based review to eliminate remaining artifacts from the ground class. This included a review of the DEM surface to remove artifacts and ensure topographic quality.

Software: Proprietary Software, TerraScan v18

Hydrologic Flattening

The lidar task order required compilation of breaklines defining the following types of water body features:

Lakes, reservoirs, ponds	Minimum of 2-acres or greater Compiled as closed polygons, collected at a constant elevation
Rivers, streams	Nominal width of 30.5 meters / 100 feet Compiled in direction of flow, with both sides maintaining an equal elevation gradient
Bridge breaklines	Breaklines used to enforce a logical terrain surface below a bridge

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. The newly acquired lidar data was utilized to manually compile 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. An integrated software approach was applied 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. All classified ground points from inside the hydrologic feature polygons were reclassified to water, class nine (9).
4. All classified ground points were reclassified from within a buffer along the hydrologic feature breaklines to buffered ground, class ten (10). The buffer distance was approximately the task order designed nominal pulse spacing distance.
5. Breaklines used for bridge removal during the hydrologic flattening were included with the hydrologic breakline geodatabase deliverable. The purpose of these breaklines is for a more aesthetically pleasing DEM appearance.
6. The lidar ground points and breaklines were used to generate a digital elevation model (DEM).
7. QA/QC for this task was performed by reviewing the hydrologically flattened DEM and hydrologic breakline features. Additionally, a combined approach utilizing commercial off the shelf software and proprietary methods were used to review the overall connectivity of the hydrologic breaklines.

TerraScan was used to add the hydrologic breakline vertices and export the lattice models.

Breaklines defining the water bodies greater than 2-acres were provided as polygon features. Rivers and streams with a nominal minimum width of 30.5 meters (100 feet) were provided as polyline features. All lake and river breaklines compiled as part of the flattening process were provided in an Esri file geodatabase. Bridge breaklines were provided as point data in Esri shapefile format.

Breaklines used for DEM generation were provided as point features in Esri shapefile format.

Software: TerraScan v18, TerraModeler v18, Esri ArcMap v10.4, LP360 v2018.1.57.4

Digital Elevation Model

TerraScan was used to add the hydrologic breakline vertices and export the lattice models. Class 2 (ground) lidar points in conjunction with the hydro breaklines and bridge breaklines were used to create 1-meter hydro-flattened bare-earth raster DEM files. Using automated scripting routines within ArcMap, an 32-bit floating point raster ERDAS IMG file was created for each tile. Files were clipped to match the task order tiling scheme. Each surface is reviewed using Global Mapper to check for any surface anomalies or incorrect elevations found within the surface.

Intensity Imagery

Lidar intensity data derived from the acquired lidar data was linearly rescaled from 16-bit intensity and provided as 1-meter pixel, 8-bit, 256 gray scale GeoTIFF format intensity imagery files. Files were clipped to match the task order tiling scheme.

Software: TerraScan v18

Metadata

FGDC CSDGM/USGS MetaParser-compliant metadata was produced in XML format. The metadata includes a complete description of the task order client information, contractor information, project purpose, lidar acquisition and ground survey collection parameters, lidar acquisition and ground survey collection dates, spatial reference system information, data processing including acquisition quality assurance procedures, GPS and base station processing, geometric calibration, lidar classification, hydrologic flattening, intensity imagery development, and final product development.

Other metadata deliverables included Esri shapefiles of the ground control and QA/QC points, delivery tile index, delivery extent, and delivery diagram. A georeferenced, polygonal representation of the detailed extents of each acquired lidar swath was produced as a polygon feature class in an Esri file geodatabase.

4. Accuracy Assessment

Results Summary

The tables below show a summary of all test results. The following sections describe the testing methods used.

Accuracy testing was performed on each UTM Zone's dataset using all points falling within that UTM Zone, resulting in two tables of dZ results. The dZ values were then combined to produce the final accuracy value.

Due to some of the point locations being close to the UTM Zone 13 / Zone 14 boundary, 7 NVA points and 3 VVA points were tested twice, once in each zone. These point names are listed below and are indicated with an asterisk (*) next to their Point ID values in the coordinate tables.

NVA Points tested twice: 2140, 2166, 2293, 2434, 2497, 2519, 2521

VVA Points tested twice: 3039, 3048, 3187

Software: TerraScan v18, Esri ArcMap v10.4

Table 4-1. Vertical Accuracy Summary

Testing Categories	Target	Measured	Minimum Points	Points Used
Raw Swath NVA RMSEz 95% at Confidence Level	0.196 m	0.084 m	571	619 total (612 unique)
DEM NVA RMSEz at 95% Confidence Level	0.196 m	0.072 m	571	619 total (612 unique)
DEM VVA RMSEz at 95th Percentile	0.294 m	0.218 m	389	423 total (420 unique)

Raw Lidar Swath Testing

This project required Non-Vegetated Vertical Accuracy (NVA) to be tested on the raw lidar point cloud swath data. The dataset was required to meet a target value of 19.6 cm at a 95% confidence level using an RMSEz target value of 10 cm x 1.9600. Testing was assessed and reported using guidelines developed by the National Digital Elevation Program (NDEP) and the American Society for Photogrammetry and Remote Sensing (ASPRS).

The raw NVA was to be calculated with a minimum of 571 independent checkpoints that were not used in the calibration or post processing of the lidar point cloud data. Checkpoints were to be distributed throughout the project area and located in bare earth and urban (non-vegetated) land cover classes.

Testing was performed using TINs created from the final calibrated and controlled swath data. For each NVA checkpoint, an elevation value was derived from the TIN at the point's x,y location. This value was compared to the checkpoint's surveyed elevation value.

The raw NVA was tested using 619 checkpoints. These checkpoints were surveyed using GPS techniques. See the survey report for acquisition methodologies. This dataset was tested to be 0.084 meters using an RMSEz of 0.043 meters x 1.9600.

For full checkpoint results, see the tables in Appendix 2.

Digital Elevation Model Testing

This project required Non-Vegetated Accuracy (NVA) and Vegetated Vertical Accuracy (VVA) testing of the digital elevation model (DEM) dataset. The calculated NVA value was required to meet 19.6 cm at a 95% confidence level using an RMSEz target value of 10 cm x 1.9600. VVA was required to meet 0.294 cm at the 95th percentile error. Testing was assessed and reported using guidelines developed by the National Digital Elevation Program (NDEP) and the American Society for Photogrammetry and Remote Sensing (ASPRS).

Testing was performed using the bare earth DEM created as part of this task order. For each checkpoint, an elevation value was derived from the DEM at the point's x,y location. This value was compared to the checkpoint's surveyed elevation value.

The NVA was to be calculated with a minimum of 571 independent checkpoints falling on bare earth and urban (non-vegetated) classes. VVA had a minimum of checkpoints requirement of 389 points falling in brush/tall grass/weeds (vegetated) land cover classes. These points were not used in the calibration or post processing of the lidar point cloud data and distributed throughout the project area. Checkpoints were surveyed using GPS techniques. See the survey report for acquisition methodologies.

The DEM NVA measured 0.072 meters using an RMSEz of 0.037 meters x 1.9600 using 619 checkpoints. VVA tested 0.218 meters at the 95th percentile using 423 checkpoints.

VVA errors larger than the 95th percentile are listed below. All values are in meters.

For full checkpoint results, see the tables in Appendix 3 and 4.

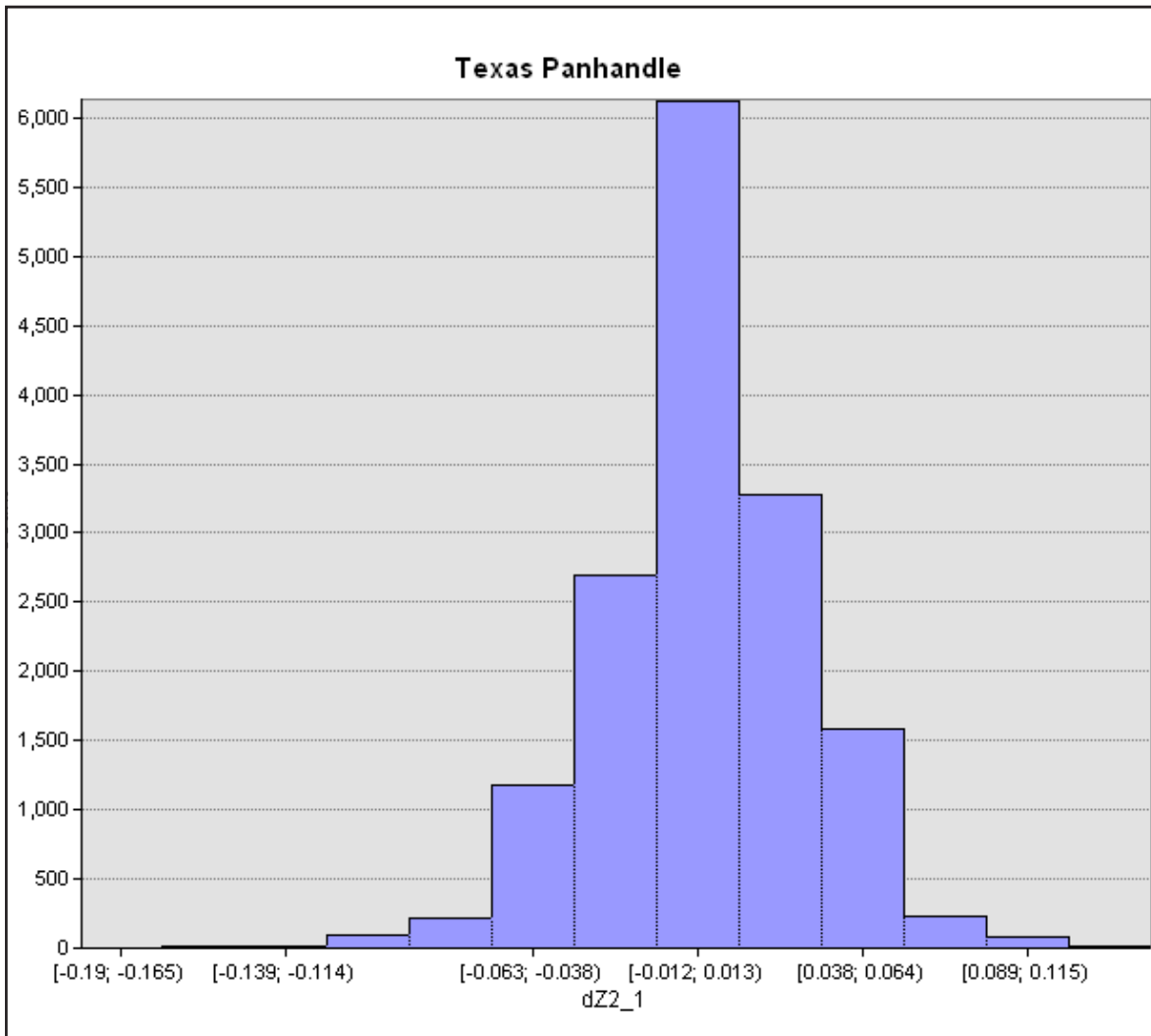
Table 4-2. VVA Errors

Point ID	Easting	Northing	Z-Error
3028	735254.730	3756911.880	0.268
3044	713870.120	3774535.070	0.231
3054	691956.080	3788608.730	0.221
3071	684792.970	3830071.190	0.280
3095	713806.140	3860954.320	0.239
3132	765649.390	3821826.110	0.226
3136	708347.610	3840443.690	0.341
3178	704394.560	3987125.610	0.225
3019	266694.280	3817837.780	0.225
3045	243302.560	3766377.410	0.234
3057	256698.640	3775666.110	0.236
3137	303136.160	3780152.890	0.259
3217	405602.490	3909947.080	0.228
3218	371387.780	3941041.850	0.226

Point ID	Easting	Northing	Z-Error
3247	353310.410	3887406.680	0.284
3279	338731.450	3798785.060	0.219
3366	283505.060	4014855.930	0.260
3371	377102.890	4004540.520	0.276
3388	363509.580	4029969.170	0.250
3397	249572.140	4042465.580	0.258
3401	385454.770	4021571.420	0.287

Inter-Swath Testing

Inter-swath accuracy was tested against well-distributed flight line overlap locations. The relative accuracy for the lidar measured at 0.031 meters RMSE.



Values are in meters.

Approved By	Name	Signature	Date
Associate Member, Lidar Specialist Certified Photogrammetrist #1381	Qian Xiao		May 2019

Appendix 1: Flight Logs

Woolpert - TX Panhandle Block 8 - M1

		MM/DD/YYYY		Project #		Phase #		Project Name			
		2/9/2018		00113-12				TX Panhandle LiDAR Block 8			
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time		Base	
Parker		N6461Z		5925.8		17:40:00		23:40:10		19820402.T02	
Pilot		Sensor Type		HOBBS END		Local End Time		Zulu End Time		PID	
Griffin		ALS70		5928.5		20:20:00		2:20:05		Shamrock_Nail	
Wind Dir/Speed		Cloud Cover %		Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	Arriving
Scan Angle (FOV)		Scan Frequency (Hz)	Pulse Rate (kHz)		Laser Power %		Fixed Gain		Mode		Threshold Values
40		46	272000				Gain - Course/Up		Single	A	
							Gain - Fine/Down		Multi	B	
Air Speed		AGL	MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.		
			8,000		Ft	Yes	No	X	@	NS	Ft
Line #	Dir.	Time Start	Time End	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test					n/a	n/a	n/a	GPS Began Logging At:		22:35:00	
								Verify S-Turns Before Mission		Yes	No
136	180210_000020	12:00:20 AM									
135	180210_002904	12:29:04 AM									
134	180210_005618	12:56:18 AM									
133	180210_012523	1:25:23 AM									
UL001	180210_015534	1:55:30 AM									
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes	No
Additional Comments:										Drive #	

Woolpert

Leica LIDAR												MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name			
												2/11/2018		42		78351		2		TX Panhandle LIDAR Block 1			
Operator			Aircraft			HOBBES Start		Local Start Time		ZULU Start Time		Base											
Stanton			N6255Q			856.6		13:03:00		19:03:00		NGS											
Pilot			Sensor Type/Number			HOBBES END		Local End Time		Zulu End Time		PID											
Scott			ALS80/ 8170			861.1		17:47		23:47		GL1383											
Wind Dir/Speed		Visibility		Ceiling		Cloud Cover %		Temp		Dew Point		Pressure		Haze/Fire/Cloud		Departing		KDHT					
310/05		10 mi		CLR		0		4		-13		30.12				Arriving		KDHT					
Scan Angle (FOV)		Scan Frequency (Hz)			Pulse Rate (KHz)		Laser Power %			Fixed Gain		Mode		Threshold Values									
40		36			346		100			Gain - Course/Up		Single		A									
										Gain - Fine/Down		Multi		B									
Air Speed		AGL			MSL			Waveform Used			Waveform Mode			Pre-Trigger Dist.									
150		Kts 7800			Ft 11,700			Yes No X			@ NS			Ft									
Line #	Dir.	Line Start Time		Line End Time		Time On Line		SV's	HDOP	PDOP		Line Notes/Comments											
Test	n/a					n/a		n/a	n/a	n/a		GPS Began Logging At:											
		↓ Times entered are Zulu / GMT ↓											Verify S-Turns Before Mission		Yes	X	No						
1	W	19:35:00	19:36:00	0:01:00	15	0.8	1.5	Clear															
2	E	19:38:00	19:39:00	0:01:00	15	0.8	1.5																
3	W	19:42:00	19:43:00	0:01:00	15	0.8	1.5																
4	E	19:46:00	19:48:00	0:02:00	17	0.8	1.3																
5	W	19:50:00	19:51:00	0:01:00	17	0.7	1.1																
6	E	19:54:00	20:00:00	0:06:00	17	0.7	1.2																
7	W	20:02:00	20:07:00	0:05:00	17	0.7	1.2																
8	E	20:09:00	20:15:00	0:06:00	17	0.7	1.2																
9	W	20:17:00	20:22:00	0:05:00	18	0.7	1.2																
10	E	20:25:00	20:31:00	0:06:00	17	0.7	1.2																
11	W	20:33:00	20:38:00	0:05:00	19	0.6	1																
12	E	20:41:00	20:46:00	0:05:00	19	0.6	1.1																
13	W	20:49:00	20:54:00	0:05:00	18	0.7	1.2																
14	E	20:57:00	21:02:00	0:05:00	18	0.7	1.2																
15	W	21:04:00	21:09:00	0:05:00	20	0.6	1.1																
16	E	21:12:00	21:17:00	0:05:00	19	0.6	1																
17	W	21:19:00	21:25:00	0:06:00	21	0.6	1																
18	E	21:27:00	21:32:00	0:05:00	20	0.6	1.1																
19	W	21:35:00	21:40:00	0:05:00	20	0.6	1.1																
20	E	21:42:00	21:47:00	0:05:00	20	0.6	1.1																
21	W	21:53:00	22:03:00	0:10:00	20	0.6	1.2																
22	E	22:05:00	22:15:00	0:10:00	17	0.7	1.4																
23	W	22:17:00	22:26:00	0:09:00	18	0.6	1.3																
24	E	22:29:00	22:38:00	0:09:00	20	0.6	1.2																
25	W	22:40:00	22:49:00	0:09:00	20	0.6	1.2																
26	E	22:52:00	23:01:00	0:09:00	21	0.6	1.1																
27	W	23:03:00	23:13:00	0:10:00	22	0.6	1.1																
28	E	23:15:00	23:25:00	0:10:00	21	0.6	1.2																
		↑ Times entered are Zulu / GMT ↑			Page		1		Verify S-Turns After Mission		Yes	X	No										
Additional Comments:											Drive #												

Woolpert - TX Panhandle Block 8 - M3

MM/DD/YYYY		Project #		Phase #		Project Name					
2/11/2018		00113-12				TX Panhandle LiDAR Block 8					
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time		Base	
Bradley		N6461Z		5931.0		17:34:00		23:34:30		19820421.T02	
Pilot		Sensor Type		HOBBS END		Local End Time		Zulu End Time		PID	
Griffin		ALS70		5933.1		19:37:00		1:37:20		Shamrock_Nail	
Wind Dir/Speed		Cloud Cover %		Temp		Dew Point		Pressure		Haze/Fire/Cloud	
										Departing	
										Arriving	
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain		Mode	
40		46		272000				Gain - Course/Up		Single	
								Gain - Fine/Down		Multi	
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.	
				8,000		Ft Yes No X		@ NS		Ft	
Line #		Dir.		LINE START		SV's		HDOP		PDOP	
Test						n/a		n/a		n/a	
										GPS Began Logging At:	
										18:28:00	
										Verify 5-Turns Before Mission	
										Yes No	
125		180212_003154		0:31:54							
126		180212_005739		0:57:39							
127		180212_012708		1:27:08						Do Not Use, Reflew Line 127 in Mission 5	
↑ Times entered are Zulu / GMT ↑		Page		1						Verify 5-Turns After Mission	
										Yes No	
Additional Comments:										Drive #	

Woolpert - TX Panhandle Block 8 - M2

MM/DD/YEAR		Project #	Phase #	Project Name				
2/11/2018		00113-12		TX Panhandle LiDAR Block 8				
Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base			
Parker	NG461Z	5928.5	13:06:00	19:06:20	19820421.T02			
Pilot	Sensor Type	HOBBS END	Local End Time	Zulu End Time	PID			
Griffin	ALS70	5931.3	15:56:00	21:56:20	Shamrock_Nail			
Wind Dir/Speed	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing		
						Arriving		
Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values		
40	46	272000		Gain - Course/Up	Single	A		
				Gain - Fine/Down	Multi	B		
Air Speed	AGL	MSL	Waveform Used	Waveform Mode			Pre-Trigger Dist.	
		8,000	Ft Yes No X	@ NS			Ft	
Line #	Dir.	LINE START	SV's	HDOP	PDOP	Line Notes/Comments		
Test			n/a	n/a	n/a	GPS Began Logging At: 18:28:00		
						Verify 5-Turns Before Mission <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
132	180211_195303		19:53:03					
131	180211_201803		20:18:03					
130	180211_204740		20:47:40					
129	180211_211211		21:12:11					
UL001	180211_213936		21:39:36					
↑ Times entered are Zulu / GMT ↑		Page		1		Verify 5-Turns After Mission <input type="checkbox"/> Yes <input type="checkbox"/> No		
Additional Comments:						Drive #		

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name								
		2/12/2018	43	78351	2	TX Panhandle LIDAR Block 1								
Operator		Aircraft		HOBBES Start		Local Start Time		ZULU Start Time		Base				
Stanton		N6255Q		861.1		12:00:00		18:00:00		NGS				
Pilot		Sensor Type/Number		HOBBES END		Local End Time		Zulu End Time		PID				
Scott		ALS80/ 8170		864		15:14		21:14		GL1383				
Wind Dir/Speed		Visibility	Ceiling	Cloud Cover %	Temp	Dew Point		Pressure	Haze/Fire/Cloud					
160/18		10 mi	Few 8.5K	0	4	-13		30.22						
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (KHz)		Laser Power %		Fixed Gain	Mode					
40		36		346		100		X						
Air Speed				AGL		MSL		Waveform Used		Waveform Mode				
150		Kts	7800		Ft	11,700		Ft	Yes	No	X			
Line #		Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments					
Test		n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:					
									Verify S-Turns Before Mission	Yes	X	No		
29	E	18:30:00	18:40:00	0:10:00	17	0.7	1.2	Clear						
30	W	18:42:00	18:52:00	0:10:00	17	0.7	1.2							
31	E	18:55:00	19:05:00	0:10:00	16	0.8	1.3							
32	W	19:07:00	19:18:00	0:11:00	17	0.7	1.1							
33	E	19:20:00	19:30:00	0:10:00	16	0.7	1.1							
34	W	19:32:00	19:42:00	0:10:00	14	0.8	1.4							
35	E	19:45:00	19:55:00	0:10:00	17	0.7	1.1							
36	W	19:57:00	20:07:00	0:10:00	17	0.7	1.2							
37	E	20:10:00	20:21:00	0:11:00	17	0.7	1.2							
38	W	20:26:00	20:37:00	0:11:00	19	0.7	1.2							
39	E	20:40:00	20:51:00	0:11:00	19	0.6	1.2	Clouds 2 mi from E end						
										End mission for clouds				
↑ Times entered are Zulu / GMT ↑			Page				1			Verify S-Turns After Mission		Yes	X	No
Additional Comments:											Drive #			

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name					
		2/12/2018	43	78351	2	TX Panhandle Block 1 & 2					
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base			
Kennedy		7079F		1503.8	12:34:00		18:34:00				
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID			
Swain		8194		1506.3	15:03		21:03				
Wind Dir/Speed		Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	CAO		
								Arriving	DHT		
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	Mode		Threshold Values	
40	36		346		100		Gain - Course/Up	Single	A		
							Gain - Fine/Down	Multi	B		
Air Speed	AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.		
150	Kts	7800	Ft	11700	Ft	Yes	No	@	NS	Ft	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
↓ Times entered are Zulu / GMT ↓								Verify 5-Turns Before Mission		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
40	W	18:52:00	19:12:00	0:20:00	16	0.8	1.3	Alt. on sensor incorrect, low returns			
10	E	19:20:00	19:37:00	0:17:00	16	0.8	1.1	Alt. on sensor incorrect, low returns			
46	W	19:51:00	20:04:00	0:13:00	17	0.7	1.1	Block 1			
45	E	20:09:00	20:20:00	0:11:00	17	0.7	1.2				
44	W	20:23:00	20:35:00	0:12:00	17	0.7	1.2				
43	E	20:37:00	20:48:00	0:11:00	19	0.7	1.2	Possible clouds on east end			
		↑ Times entered are Zulu / GMT ↑		Page			1		Verify 5-Turns After Mission		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Additional Comments:								Drive #			

Woolpert - TX Panhandle Block 8 - M4

MM/DD/YEAR												Project #				Phase #				Project Name							
2/13/2018												00113-12								TX Panhandle LiDAR Block 8							
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time		Base																	
Parker		N6461Z		5934.7		12:11:00		18:11:10		19820440.T02																	
Pilot		Sensor Type		HOBBS END		Local End Time		Zulu End Time		PID																	
Hill		ALS70		5938.2		15:08:00		21:08:45		Shamrock_Nail																	
Wind Dir/Speed			Cloud Cover %			Temp	Dew Point		Pressure			Haze/Fire/Cloud			Departing												
														Arriving													
Scan Angle (FOV)			Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain		Mode		Threshold Values														
40			46		272000				Gain - Course/Up		Single		A														
								Gain - Fine/Down		Multi		X		B													
Air Speed		AGL		MSL		Waveform Used			Waveform Mode			Pre-Trigger Dist.															
				8,000		Ft	Yes	No	X	@			NS	Ft													
Line #	Dir.			LINE START				SV's	HDOP	PDOP	Line Notes/Comments																
								n/a	n/a	n/a	GPS Began Logging At:			13:15:00													
												Verify 5-Turns Before Mission		Yes	No												
80	180213_195506			19:55:06																							
81	180213_202618			20:26:18																							
UL001	180213_205045			20:50:45																							
↑ Times entered are Zulu / GMT ↑								Page				1				Verify 5-Turns After Mission		Yes	No								
Additional Comments:										Drive #																	

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name			
		2/13/2018	44	78351		TX Panhandle 2018 Block1/Block2		
Operator		Aircraft		HOBBBS Start	Local Start Time		ZULU Start Time	Base
Denham		N475RC		1503.8	9:50:00		15:50:00	WOOLPERT PIN
Pilot		Sensor Type/Number		HOBBBS END	Local End Time		Zulu End Time	PID
Swain		ALS8194		1512.9	4:41		22:41	KHDT1
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud
200/09	10		CLEAR	1	-9	30.25		
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (KHz)		Laser Power %		Fixed Gain	Mode
40	35.5		346		100		X	
		Gain - Course/Up	Gain - Fine/Down	Single	Multi	Threshold Values	A	B
Air Speed		AGL		MSL		Waveform Used		Waveform Mode
150		Kts		Ft		Yes No		@ NS
				11756/10913				Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At: 9:27:00
		↑ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission
								Yes X No
39	W	16:17:00	16:30:00	0:13:00	20	0.7	1.2	BLOCK 1
40	E	16:32:00	16:43:00	0:11:00	21	0.6	1	BLOCK 1
41	W	16:45:00	16:57:00	0:12:00	21	0.6	1.1	BLOCK 1
42	E	16:59:00	17:10:00	0:11:00	21	0.6	1.1	BLOCK 1
43	W	17:13:00	17:25:00	0:12:00	20	0.6	1.1	BLOCK 1
1	E	17:37:00	17:55:00	0:18:00	20	0.6	1.1	BLOCK 2
2	W	17:57:00	18:16:00	0:19:00	18	0.6	1.2	BLOCK2
3	E	18:18:00	18:36:00	0:18:00	17	0.7	1.3	BLOCK2
4	W	18:38:00	18:57:00	0:19:00	17	0.7	1.2	BLOCK2
5	E	18:59:00	19:16:00	0:17:00	18	0.8	1.3	BLOCK2
6	W	19:19:00	19:38:00	0:19:00	17	0.7	1.2	BLOCK2
7	E	19:40:00	19:57:00	0:17:00	18	0.7	1.1	BLOCK2
8	W	19:59:00	20:18:00	0:19:00	18	0.7	1.2	BLOCK2
9	E	20:21:00	20:39:00	0:18:00	18	0.7	1.2	BLOCK2
10	W	20:41:00	21:00:00	0:19:00	19	0.7	1.2	BLOCK2
11	E	21:02:00	21:19:00	0:17:00	19	0.6	1.1	BLOCK2
12	W	21:21:00	21:41:00	0:20:00	19	0.7	1.3	BLOCK2
13	E	21:43:00	22:00:00	0:17:00	18	0.7	1.3	BLOCK2
14	W	22:02:00	22:21:00	0:19:00	17	0.7	1.4	BLOCK2
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission
								Yes X No
Additional Comments:								Drive #

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name					
		2/14/2018	45	78351	92	TX Panhandle 2018 Block1/Block2					
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base			
Denham		N475RC		1512.9	9:09:00		15:09:00	WOOLPERT PIN			
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID			
Swain		ALS8194		1519.3	3:48		21:48	KDHT1			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KDHT		
200/07	10		CL	7	-6	30.12		Arriving	KDHT		
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %	Fixed Gain	X	Mode	Threshold Values		
40	35.5		346		100	Gain - Course/Up		Single	A		
						Gain - Fine/Down		Multi	B		
Air Speed	AGL			MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.	
150	Kts	Ft		11756/10913	Ft	Yes	NO	@	NS	Ft	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	8:35:00		
		↓ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission	Yes	X	No
15	E	15:40:00	15:57:00	0:17:00	21	0.6	1.1				
16	W	16:00:00	16:21:00	0:21:00	20	0.7	1.3				
17	E	16:23:00	16:40:00	0:17:00	23	0.6	1				
18	W	16:43:00	17:04:00	0:21:00	23	0.6	1.1				
19	E	17:06:00	17:24:00	0:18:00	21	0.6	1.1				
20	W	17:26:00	17:47:00	0:21:00	21	0.6	1.1				
21	E	17:49:00	18:06:00	0:17:00	20	0.6	1.1				
22	W	18:09:00	18:30:00	0:21:00	17	0.7	1.2				
23	E	18:32:00	18:49:00	0:17:00	16	0.8	1.3				
24	W	18:52:00	19:14:00	0:22:00	16	0.8	1.3				
25	E	19:17:00	19:34:00	0:17:00	15	0.8	1.4				
26	W	19:37:00	19:58:00	0:21:00	17	0.7	1.3				
27	E	20:01:00	20:18:00	0:17:00	17	0.7	1.2				
28	W	20:20:00	20:42:00	0:22:00	18	0.7	1.1				
29	E	20:45:00	21:03:00	0:18:00	19	0.6	1.1				
30	W	21:05:00	21:26:00	0:21:00	21	0.6	1.1				
		↑ Times entered are Zulu / GMT ↑			Page	1		Verify S-Turns After Mission	Yes	X	No
Additional Comments:								Drive #			
Windy. Pushed by tailwind. Sink Holes.											

Woolpert

Woolpert											
Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name					
		2/14/2018	45	78351	2	TX Panhandle LIDAR Block 2, Lift 1					
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base			
Stanton		N6255Q		864.0	10:00:00		16:00:00	NGS			
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID			
Scott		ALS80/ 8170		868.7	14:53		20:53	GL1383			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud	Departing	KDHT	
230/09	10 mi	CLR	0	11	-6	30.11			Arriving	KDHT	
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	X	Mode	Threshold Values	
40	36		346		100		Gain - Course/Up		Single	A	
							Gain - Fine/Down		Multi	X	B
Air Speed		AGL		MSL		Waveform Used		Waveform Mode			Pre-Trigger Dist.
150 Kts		7800 Ft		10,830 Ft		Yes No X		@ NS			Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
		⬆ Times entered are Zulu / GMT ⬆						Verify S-Turns Before Mission		Yes	X No
40	E	16:34:00	16:52:00	0:18:00	23	0.6	1	Clear			
41	W	16:55:00	17:15:00	0:20:00	20	0.6	1.2				
42	E	17:18:00	17:35:00	0:17:00	22	0.6	1.1				
43	W	17:38:00	17:58:00	0:20:00	21	0.6	1.1				
44	E	18:01:00	18:18:00	0:17:00	19	0.6	1.1				
45	W	18:21:00	18:41:00	0:20:00	15	0.8	1.5				
46	E	18:44:00	19:01:00	0:17:00	16	0.8	1.3				
47	W	19:04:00	19:25:00	0:21:00	19	0.6	1				
48	E	19:27:00	19:45:00	0:18:00	15	0.8	1.4				
49	W	19:48:00	20:08:00	0:20:00	17	0.7	1.2				
50	E	20:10:00	20:28:00	0:18:00	16	0.7	1.2				
		⬆ Times entered are Zulu / GMT ⬆		Page		1		Verify S-Turns After Mission		Yes	X No
Additional Comments:										Drive #	

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name			
	2/14/2018	45	78351	2	TX Panhandle LIDAR Block 2, Lift 2			
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base
Stanton		N6255Q		868.7	15:36:00		21:36:00	NGS
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID
Scott		ALS80/ 8170		870.7	17:53		23:53	GL1383
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing
230/26 G35	10 mi	CLR	0	22	-9	29.97		KDHT
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values
40		36		346	100	X	Single	A
				Gain - Course/Up		Multi		B
				Gain - Fine/Down		X		
Air Speed		AGL		MSL		Waveform Used		Pre-Trigger Dist.
150		Kts	7800	Ft	10,830	Ft	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	@ NS Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:
				↑ Times entered are Zulu / GMT ↓				Verify S-Turns Before Mission
								Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
51	W	22:05:00	22:26:00	0:21:00	18	0.6	1.3	Clear
52	E	22:28:00	22:46:00	0:18:00	20	0.6	1.1	
53	W	22:49:00	23:09:00	0:20:00	21	0.6	1.2	
54	E	23:11:00	23:29:00	0:18:00	19	0.6	1.4	
				↑ Times entered are Zulu / GMT ↑				Page
								1
							Verify S-Turns After Mission	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Additional Comments:								Drive #

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name						
		2/15/2018	46	78351	92	TX Panhandle 2018 Block2						
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base				
Denham		N475RC		1519.3	9:32:00		15:32:00	WOOLPERT PIN				
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID				
Swain		ALS8194		1526.6	5:15		23:15	KHDT1				
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	KHDT	
230/13	10		CL	12	3	29.94				Arriving	KHDT	
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (KHz)		Laser Power %		Fixed Gain	X	Mode		Threshold Values	
40	35.5		346		100		Gain - Course/Up		Single	A		
							Gain - Fine/Down		Multi	B		
Air Speed	AGL		MSL		Waveform Used		Waveform Mode			Pre-Trigger Dist.		
150	Kts	Ft	10913		Ft	Yes	No	@			NS	Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments				
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:		8:55:00		
				⇅ Times entered are Zulu / GMT ⇅				Verify S-Turns Before Mission		Yes	X	No
74	S	16:02:00	16:20:00	0:18:00	19	0.7	1.3					
73	W	16:30:00	16:53:00	0:23:00	20	0.6	1	Light Cloud - Very Western tip of line				
72	E	16:56:00	X		X	X	X	Wind/Off Track - Reflight				
72	E	17:04:00	17:22:00	0:18:00	21	0.6	1.1					
71	W	17:25:00	17:46:00	0:21:00	20	0.6	1.1					
70	E	17:51:00	18:09:00	0:18:00	18	0.6	1.2					
69	W	18:11:00	18:33:00	0:22:00	16	0.7	1.3					
68	E	18:35:00	18:52:00	0:17:00	15	0.8	1.3					
67	W	18:55:00	19:16:00	0:21:00	17	0.7	1					
66	E	19:19:00	19:36:00	0:17:00	14	0.8	1.5					
65	W	19:38:00	19:58:00	0:20:00	17	0.7	1.2					
64	E	20:02:00	20:19:00	0:17:00	18	0.7	1.2					
63	W	20:21:00	20:42:00	0:21:00	19	0.7	1.2					
62	E	20:45:00	21:02:00	0:17:00	19	0.6	1.1					
61	W	21:05:00	21:26:00	0:21:00	20	0.6	1.1					
60	E	21:28:00	21:45:00	0:17:00	18	0.6	1.2					
59	W	21:47:00	22:09:00	0:22:00	17	0.7	1.3					
58	E	22:11:00	22:28:00	0:17:00	18	0.6	1.2					
57	W	22:30:00	22:52:00	0:22:00	19	0.6	1.1					
		↑ Times entered are Zulu / GMT ↑		Page	1		Verify S-Turns After Mission		Yes	X	No	
Additional Comments:											Drive #	
STRONG WINDS.												

Woolpert - TX Panhandle Block 8 - M5

MM/DD/YEAR		Project #	Phase #	Project Name			
2/15/2018		00113-12		TX Panhandle LiDAR Block 8			
Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base		
Parker	NG461Z	5940.8	7:29:00	13:29:20	19820461.T02		
Pilot	Sensor Type	HOBBS END	Local End Time	Zulu End Time	PID		
Hill	ALS70	5944.2	10:55:00	16:55:20	Shamrock_Nail		
Wind Dir/Speed	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	Arriving
Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values	
40	46	272000		Gain - Course/Up	Single	A	
				Gain - Fine/Down	Multi	X	B
Air Speed	AGL	MSL	Waveform Used	Waveform Mode	Pre-Trigger Dist.		
		8,000	Ft <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> X	@	NS	Ft	
Line #	Dir.	LINE START	SV's	HDOP	PDOP	Line Notes/Comments	
			n/a	n/a	n/a	GPS Began Logging At: 13:18:00	
						Verify 5-Turns Before Mission	Yes <input type="checkbox"/> No <input type="checkbox"/>
128	180215_140956	14:09:56					
127	180215_145004	14:50:04					
124	180215_151511	15:15:11					
123	180215_154953	15:49:53				Do Not Use	
138	180215_161130	16:11:30					
↑ Times entered are Zulu / GMT ↑		Page	1	Verify 5-Turns After Mission	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Drive #
Additional Comments:							

Woolpert - TX Panhandle Block 8 - M6

		MM/DD/YEAR	Project #	Phase #	Project Name					
		2/15/2018	00113-12		TX Panhandle LiDAR Block 8					
Operator		Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base				
Parker		NG461Z	5944.2	12:27:00	18:27:50	19820462.T02				
Pilot		Sensor Type	HOBBS END	Local End Time	Zulu End Time	PID				
Griffin		ALS70	5947.6	16:05:00	22:05:20	Shamrock_Nail				
Wind Dir/Speed		Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing			
							Arriving			
Scan Angle (FOV)		Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values			
40		46	272000		Gain - Course/Up	Single	A			
					Gain - Fine/Down	Multi	X B			
Air Speed		AGL	MSL	Waveform Used	Waveform Mode	Pre-Trigger Dist.				
			8,000	Ft	Yes	No	X	@	NS	Ft
Line #	Dir.		LINE START	SV's	HDOP	PDOP	Line Notes/Comments			
				n/a	n/a	n/a	GPS Began Logging At:		17:53:00	
							Verify S-Turns Before Mission	Yes	No	
121	180215_185429		18:54:29							
120	180215_192853		19:28:53							
119	180215_195445		19:54:45							
118	180215_202807		20:28:07							
117	180215_205302		20:53:02							
			Page		1		Verify S-Turns After Mission	Yes	No	
Additional Comments:									Drive #	

Woolpert - TX Panhandle Block 8 - M8

Woolpert - TX Panhandle Block 8 - M8												
		MM/DD/YEAR	Project #		Phase #		Project Name					
		2/16/2018	00113-12				TX Panhandle LiDAR Block 8					
Operator		Aircraft	HOBBS Start		Local Start Time		ZULU Start Time		Base			
Parker		NG461Z	5950.7		12:46:00		18:46:20		19820472.T02			
Pilot		Sensor Type	HOBBS END		Local End Time		Zulu End Time		PID			
Hill		ALS70	5951.9		14:07:00		20:07:10		Shamrock_Nail			
Wind Dir/Speed		Cloud Cover %		Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing		
										Arriving		
Scan Angle (FOV)		Scan Frequency (Hz)	Pulse Rate (kHz)		Laser Power %		Fixed Gain		Mode		Threshold Values	
40		46	272000				Gain - Course/Up		Single		A	
							Gain - Fine/Down		Multi		X B	
Air Speed		AGL	MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.			
			8,000		Ft	Yes	No	X	@	NS	Ft	
Line #	Dir.	LINE START		SV's	HDOP	PDOP	Line Notes/Comments					
				n/a	n/a	n/a	GPS Began Logging At:		18:30:00			
								Verify 5-Turns Before Mission		Yes	No	
110	180216_190733	19:07:33										
↑ Times entered are Zulu / GMT ↑		Page		1		Verify 5-Turns After Mission		Yes	No			
Additional Comments:										Drive #		

Woolpert - TX Panhandle Block 8 - M9

Woolpert - TX Panhandle Block 8 - M9														
MM/DD/YEAR		Project #		Phase #		Project Name								
2/17/2018		00113-12				TX Panhandle LiDAR Block 8								
Operator		Aircraft		HOBBBS Start		Local Start Time		ZULU Start Time		Base				
Parker		N6461Z		5952.0		7:38:00		13:38:11		19820481.T02				
Pilot		Sensor Type		HOBBBS END		Local End Time		Zulu End Time		PID				
Hill		ALS70		5953.7		9:25:00		15:25:10		Shamrock_Nail				
Wind Dir/Speed			Cloud Cover %			Temp	Dew Point		Pressure		Haze/Fire/Cloud	Departing		
												Arriving		
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)			Laser Power %		Fixed Gain		Mode	Threshold Values		
40		46		272000					Gain - Course/Up		Single	A		
									Gain - Fine/Down		Multi	B		
Air Speed		AGL	MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.			
			8,000		Ft	Yes	No	X	@		NS	Ft		
Line #	Dir.		LINE START			SV's	HDOP	PDOP		Line Notes/Comments				
						n/a	n/a	n/a		GPS Began Logging At:	11:53:00			
Verify 5-Turns Before Mission											<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No		
98	180217_141707		14:17:07											
97	180217_144057		14:40:57											
UL001	180217_151231		15:12:31											
↑ Times entered are Zulu / GMT ↑			Page			1		Verify 5-Turns After Mission					<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Additional Comments:											Drive #			

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name				
		2/17/2018	48	78351	2	TX Panhandle LIDAR Block 3 Lift 1				
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base		
Stanton		N6255Q		875.5	11:14:00		17:14:00	WOOLPERT PIN		
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID		
Scott		ALS80/ 8170		880.2	15:53		21:53	KAMA55Q		
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KAMA	
030/22G28	10 mi	CLR	0	11	-8	30.16		Arriving	KAMA	
Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (KHz)	Laser Power %	Fixed Gain	Mode		Threshold Values			
40	36	346	100	X						
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.
150 Kts		7800 Ft		10,350 Ft		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		@ NS		Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments		
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:		
		↕ Times entered are Zulu / GMT ↕						Verify S-Turns Before Mission		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1	W	17:57:00	18:15:00	0:18:00	17	0.7	1.3	Clear		
2	E	18:18:00	18:36:00	0:18:00	17	0.7	1.2			
3	W	18:39:00	18:58:00	0:19:00	16	0.8	1.4			
4	E	19:00:00	19:19:00	0:19:00	18	0.7	1.1			
5	W	19:21:00	19:40:00	0:19:00	16	0.7	1.3			
6	E	19:43:00	20:01:00	0:18:00	17	0.7	1.2			
7	W	20:03:00	20:22:00	0:19:00	18	0.7	1.2			
8	E	20:25:00	20:43:00	0:18:00	18	0.7	1.2			
9	W	20:46:00	21:05:00	0:19:00	19	0.6	1.1			
74	S	21:15:00	21:32:00	0:17:00	19	0.6	1.2			
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Additional Comments:								Drive #		

Woolpert - TX Panhandle Block 8 - M10

		MM/DD/YEAR	Project #	Phase #	Project Name				
		2/17/2018	00113-12		TX Panhandle LiDAR Block 8				
Operator	Aircraft	HOBBS Start		Local Start Time	ZULU Start Time	Base			
Parker	NG461Z	5953.7		10:07:00	16:07:20	19820481.T02			
Pilot	Sensor Type	HOBBS END		Local End Time	Zulu End Time	PID			
Griffin	ALS70	5957.3		13:51:00	19:51:10	Shamrock_Nail			
Wind Dir/Speed	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	Arriving		
Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)		Laser Power %	Fixed Gain	Mode	Threshold Values		
40	46	272000			Gain - Course/Up	Single	A		
					Gain - Fine/Down	Multi	X	B	
Air Speed	AGL	MSL	Waveform Used		Waveform Mode		Pre-Trigger Dist.		
		8,000	Ft	Yes	No	X	@	NS	Ft
Line #	Dir.	LINE START		SV's	HDOP	PDOP	Line Notes/Comments		
				n/a	n/a	n/a	GPS Began Logging At: 11:53:00		
							Verify 5-Turns Before Mission	Yes	No
96	180217_164655		16:46:55						
95	180217_171216		17:12:16						
94	180217_174235		17:42:35						
93	180217_180802		18:08:02						
92	180217_183650		18:36:50						
91	180217_190142		19:01:42						
UL001	180217_193036		19:30:36						
↑ Times entered are Zulu / GMT ↑				Page		1	Verify 5-Turns After Mission	Yes	No
Additional Comments:								Drive #	

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name		
		2/17/2018	48	78351	2	TX Panhandle LIDAR Block 3 Lift 2		
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base
Stanton		N6255Q		880.2	16:27:00		22:27:00	WOOLPERT PIN
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID
Scott		ALS80/ 8170		882.8	19:19		1:19	KAMA55Q
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing
VRB 5	10 mi	CLR	0	14	-12	30.16		KAMA
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values
40		36		346	100	X	Single	A
						Gain - Course/Up	Multi	B
						Gain - Fine/Down	X	
Air Speed		AGL		MSL		Waveform Used		Waveform Mode
150		Kts	7800	Ft	10,350	Ft	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	@ NS
								Pre-Trigger Dist.
								Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:
		↑ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission
								Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
10	W	17:57:00	18:15:00	0:18:00	19	0.7	1.5	Clear
11	E	18:18:00	18:36:00	0:18:00	20	0.6	1.3	
12	W	18:39:00	18:58:00	0:19:00	21	0.6	1.1	
13	E	19:00:00	19:19:00	0:19:00	20	0.7	1.3	
14	W	19:21:00	19:40:00	0:19:00	22	0.6	1.1	

Additional Comments:	Drive #

Woolpert - TX Panhandle Block 8 - M11

MM/DD/YEAR		Project #		Phase #		Project Name					
2/17/2018		00113-12				TX Panhandle LiDAR Block 8					
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time		Base	
Bradley		N6461Z		5957.3		14:46:00		20:46:20		19820482.T02	
Pilot		Sensor Type		HOBBS END		Local End Time		Zulu End Time		PID	
Griffin		ALS70		5960.9		18:19:00		0:19:20		Shamrock_Nail	
Wind Dir/Speed		Cloud Cover %		Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	
										Arriving	
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	Mode		Threshold Values
40		46		272000				Gain - Course/Up	Single	A	
								Gain - Fine/Down	Multi	X	B
Air Speed		AGL	MSL	Waveform Used		Waveform Mode		Pre-Trigger Dist.			
			8,000	Ft	Yes	No	X	@	NS	Ft	
Line #	Dir.	LINE START		SV's	HDOP	PDOP	Line Notes/Comments				
				n/a	n/a	n/a	GPS Began Logging At:		20:08:00		
							Verify S-Turns Before Mission		Yes	No	
82	180217_211504	21:15:04									
83	180217_214251	21:42:51									
84	180217_221319	22:13:19									
85	180217_224023	22:40:23									
86	180217_230827	23:08:27									
87	180217_233654	23:36:54									
UL001	180218_000401	0:04:01									
↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes	No		
Additional Comments:										Drive #	

Woolpert - TX Panhandle Block 8 - M12

MM/DD/YEAR		Project #	Phase #	Project Name			
2/18/2018		00113-12		TX Panhandle LiDAR Block 8			
Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base		
Parker	NG461Z	5961.0	7:15:00	13:15:20	19820491.T02		
Pilot	Sensor Type	HOBBS END	Local End Time	Zulu End Time	PID		
Hill	ALS70	5963.2	9:24:00	15:24:05	Shamrock_Nail		
Wind Dir/Speed		Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing
							Arriving
Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values	
40	46	272000		Gain - Course/Up	Single	A	
				Gain - Fine/Down	Multi	B	
Air Speed	AGL	MSL	Waveform Used			Waveform Mode	Pre-Trigger Dist.
		8,000	Ft	Yes	No	@	Ft
Line #	Dir.	LINE START	SV's	HDOP	PDOP	Line Notes/Comments	
			n/a	n/a	n/a	GPS Began Logging At: 12:26:00	
						Verify 5-Turns Before Mission <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
123	180218_134219	13:42:19					
122	180218_141658	14:16:58					
116	180218_144110	14:41:10				Do Not Use, Reflew Line 116 in Mission 13	
↑ Times entered are Zulu / GMT ↑		Page		1		Verify 5-Turns After Mission <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Additional Comments:						Drive #	

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name						
	2/18/2018	49	78351	2	TX Panhandle LIDAR Block 3 Lift 1						
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base			
Stanton		N6255Q		882.8	10:34:00		16:34:00	WOOLPERT PIN			
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID			
Scott		ALS80/ 8170		886.9	14:56		20:56	KAMA55Q			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud		Departing	KAMA	
210/20G27	10 mi	CLR	0	9	-1	29.93			Arriving	KAMA	
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (KHz)	Laser Power %		Fixed Gain	X	Mode	Threshold Values		
40	36		346	100		Gain - Course/Up		Single	A		
						Gain - Fine/Down		Multi	X B		
Air Speed	AGL		MSL		Waveform Used			Waveform Mode		Pre-Trigger Dist.	
150 Kts	7800 Ft		10,350 Ft		Yes		NS			Ft	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
		↑ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission	Yes	X	No
15	W	17:09:00	17:30:00	0:21:00	19	0.6	1.2	Clear			
16	E	17:33:00	17:51:00	0:18:00	18	0.6	1.2				
17	W	17:54:00	18:16:00	0:22:00	16	0.7	1.3				
18	E	18:18:00	18:36:00	0:18:00	16	0.7	1.2				
19	W	18:39:00	19:00:00	0:21:00	16	0.8	1.3				
20	E	19:02:00	19:20:00	0:18:00	14	0.9	1.5				
21	W	19:22:00	19:44:00	0:22:00	17	0.8	1.3				
22	E	19:46:00	20:04:00	0:18:00	18	0.7	1.1				
23	W	20:07:00	20:29:00	0:22:00	18	0.6	1.1				

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name		
		2/18/2018	49	78351	92	TX Panhandle 2018 Block 6		
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base
Denham		N7079F		1529.4	10:41:00		16:41:00	WOOLPERT PIN
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID
Genhart		ALS8194						AMA

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	AMA
				9	1	29.93		Arriving	AMA

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	<input checked="" type="checkbox"/>	Mode	Threshold Values
40	36	346	100	Gain - Course/Up	<input type="checkbox"/>	Single	A
				Gain - Fine/Down	<input type="checkbox"/>	Multi	B

Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.
150	Kts		Ft	11017	Ft	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	@	NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At: 10:33:00	
		⇅ Times entered are Zulu / GMT ⇅						Verify S-Turns Before Mission	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

5	W	17:09:00	17:31:00	0:22:00	20	0.6	1.2		
6	E	17:35:00	17:52:00	0:17:00	18	0.6	1.3		
7	W	17:56:00	18:18:00	0:22:00	16	0.7	1.3		
8	E	18:21:00	18:39:00	0:18:00	15	0.8	1.4		
9	W	18:43:00	18:52:00	0:09:00	18	0.8	1.1	18:52 Error/Restart	

Additional Comments:	Drive #
UPDRAFTS and DOWNDRAFTS. STRONG WINDS. System Controller Error on Line 9.	

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name						
		2/18/2018	49	78351	92	TX Panhandle 2018 Block 6						
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base				
Denham		N7079F		1529.4	10:41:00		16:41:00	WOOLPERT PIN				
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID				
Genhart		ALS8194						AMA				
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	AMA			
				9	1	29.93		Arriving	AMA			
Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode		Threshold Values					
40	36	346	100	X	Single		A					
				Gain - Course/Up	Multi		B					
				Gain - Fine/Down								
Air Speed	AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.			
150	Kts	Ft	11017	Ft	Yes	No	@	NS	Ft			
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments				
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:		10:33:00		
		↑ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission		Yes	X	No
9	W	19:01:00	19:15:00	0:14:00	15	0.9	1.5	Manual Mode (UL001)				
10	E	19:23:00	19:41:00	0:18:00	18	0.7	1.2					
11	W	19:45:00	20:06:00	0:21:00	19	0.7	1.1					
12	E	20:10:00	20:27:00	0:17:00	16	0.7	1.2					
13	W	20:31:00	20:53:00	0:22:00	18	0.6	1.1					
14	E	20:57:00	21:14:00	0:17:00	19	0.6	1					
15	W	21:18:00	21:40:00	0:22:00	18	0.6	1.2					
16	E	21:44:00	22:01:00	0:17:00	17	0.6	1.3					
17	W	22:05:00	22:28:00	0:23:00	19	0.6	1.3					
18	E	22:31:00	22:49:00	0:18:00	21	0.6	1					
19	W	22:53:00	23:14:00	0:21:00	20	0.6	1.1					
20	E	23:18:00	23:35:00	0:17:00	20	0.6	1.3					
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes	X	No
Additional Comments:										Drive #		

Woolpert - TX Panhandle Block 8 - M14

Woolpert - TX Panhandle Block 8 - M14															
MM/DD/YYYY			Project #		Phase #		Project Name								
2/21/2018			00113-12				TX Panhandle LiDAR Block 8								
Operator			Aircraft		HOBBS Start		Local Start Time		ZULU Start Time		Base				
Parker			N6461Z		5966.7		7:40:00		13:40:20		19820520.T02				
Pilot			Sensor Type		HOBBS END		Local End Time		Zulu End Time		PID				
Hill			ALS70		5968.6		9:26:00		15:26:10		Shamrock_Nail				
Wind Dir/Speed			Cloud Cover %			Temp	Dew Point		Pressure		Haze/Fire/Cloud		Departing		
													Arriving		
Scan Angle (FOV)			Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %			Fixed Gain		Mode		Threshold Values	
40			46		272000					Gain - Course/Up		Single		A	
										Gain - Fine/Down		Multi		X B	
Air Speed			AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.		
					8,000		Ft	Yes	No	X	@		NS	Ft	
Line #	Dir.		LINE START		SV's	HDOP	PDOP		Line Notes/Comments						
Test					n/a	n/a	n/a		GPS Began Logging At:				13:10:00		
													Verify 5-Turns Before Mission	Yes	No
99	20180221_141644		14:16:44												
100	20180221_144523		14:45:23												
UL001	20180221_150900		15:09:00												
↑ Times entered are Zulu / GMT ↑			Page				1		Verify 5-Turns After Mission					Yes	No
Additional Comments:											Drive #				

Woolpert

Leica LIDAR													
MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name					
2/22/2018		53		78351		2		TX Panhandle LIDAR Block 1 and 3					
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time		Base			
Stanton		N6255Q		895.2		15:59:00		21:59:00		WOOLPERT PIN			
Pilot		Sensor Type/Number		HOBBS END		Local End Time		Zulu End Time		PID			
Brown		ALS80/ 8170		898.5		19:31		1:31		KAMA55Q			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	KAMA		
190/16G19	10 mi	CLR	0	10	-2	30.02				Arriving	KAMA		
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain		Mode	Threshold Values		
40		36		346		100		X		Single	A		
										Multi	X		
Air Speed	AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.				
150	Kts	7800	Ft	11.6 and 10.3	Ft	Yes	No	X	@	NS	Ft		
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments					
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:					
										Verify S-Turns Before Mission	Yes	X	No
Block 1													
30	W	22:44:00	22:56:00	0:12:00	19	0.6	1.3	Clear below 12K, reflight of line 30					
Block 3													
30	E	23:13:00	23:32:00	0:19:00	21	0.6	1.1	reflight of line 30 Block 3					
31	W	23:35:00	23:57:00	0:22:00	19	0.7	1.3						
32	E	0:00:00	0:18:00	0:18:00	21	0.6	1.1						
33	W	0:21:00	0:42:00	0:21:00	20	0.7	1.1						
34	E	0:45:00	1:03:00	0:18:00	20	0.7	1.3						
		↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission	Yes	X	No
Additional Comments:										Drive #			

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	2/22/2018	53	78351	92	TX Panhandle 2018 Block 6

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Denham	N7079F	1545.1	3:44:00	21:44:00	WOOLPERT PIN
Pilot	Sensor Type/Number	HOBBS END	Local End Time	Zulu End Time	PID
Gebhart	ALS8194	1547.9	6:48	0:48	AMA

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	AMA
190/15	10		CL	9	-2	30.33		Arriving	AMA

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values		
40	36	346	100		X	A	B	
				Gain - Course/Up	Single			
				Gain - Fine/Down	Multi			

Air Speed	AGL	MSL	Waveform Used		Waveform Mode	Pre-Trigger Dist.
150	Kts	Ft	11017	Ft	@	NS
		Yes		No		Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments		
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	3:15:00	

↑ Times entered are Zulu / GMT ↓								Verify S-Turns Before Mission	Yes	X	No
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21	W	22:11:00	22:33:00	0:22:00	22	0.6	1.1			
22	E	22:36:00	22:54:00	0:18:00	19	0.6	1.4	Sinking - Downdraft		
23	W	22:58:00	23:19:00	0:21:00	20	0.7	1.4			
24	E	23:22:00	23:39:00	0:17:00	20	0.6	1.1	Pushed - Tailwind		
25	W	23:44:00	0:06:00	0:22:00	19	0.7	1.3			
26	E	0:09:00	0:27:00	0:18:00	20	0.6	1.1			

Additional Comments: Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name			
	2/23/2018		54		78351		2		TX Panhandle LIDAR Block 3 Lift 1			
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time		Base		
Stanton		N6255Q		898.5		10:33:00		16:33:00		WOOLPERT PIN		
Pilot		Sensor Type/Number		HOBBS END		Local End Time		Zulu End Time		PID		
Brown		ALS80/ 8170		902.3		14:41		20:41		KAMA55Q		
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	KAMA	
Calm	10 mi	CLR	0	2	-3	30.11				Arriving	KAMA	
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	Mode		Threshold Values		
40	36		346		100			X				
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.		
150	Kts	7800	Ft	10,350	Ft	Yes	No	X	@	NS	Ft	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments				
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:				
		↑ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission		Yes	X	No
35	E	17:04:00	17:23:00	0:19:00	21	0.6	1.1	Clear, low R1 over Lake throughout				
36	W	17:26:00	17:45:00	0:19:00	17	0.7	1.3	lift				
37	E	17:48:00	18:07:00	0:19:00	16	0.7	1.3					
38	W	18:10:00	18:29:00	0:19:00	16	0.8	1.3					
39	E	18:32:00	18:51:00	0:19:00	18	0.7	1.1					
40	W	18:54:00	19:13:00	0:19:00	17	0.7	1.2					
41	E	19:16:00	19:34:00	0:18:00	18	0.7	1.2					
42	W	19:37:00	19:57:00	0:20:00	19	0.7	1.2	sm clds 6.5 mi from E end				
43	E	20:00:00	20:19:00	0:19:00	19	0.7	1.3	cld 19.5 mi and 2.5 mi to E end				
								low overcast on east edge of block 3				
		↑ Times entered are Zulu / GMT ↑						Verify S-Turns After Mission		Yes	X	No
Additional Comments:						Page		1		Drive #		

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name		
		2/23/2018	54	78351	2	TX Panhandle LIDAR Block 3 Lift 2		
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base
Stanton		N6255Q		902.3	15:16:00		21:16:00	WOOLPERT PIN
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID
Brown		ALS80/ 8170		905.1	18:26		0:26	KAMA55Q
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud
200/06	10 mi	CLR	0	12	-5	29.97		Departing
								KAMA
								Arriving
								KAMA
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %		Fixed Gain	Mode	Threshold Values
40	36		346	100		Gain - Course/Up	Single	A
							Gain - Fine/Down	B
							Multi	X
Air Speed	AGL		MSL		Waveform Used		Waveform Mode	
150	Kts	7800	Ft	10,350	Ft	Yes	No	X
							@	NS
							Pre-Trigger Dist.	
							Ft	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:
								Verify S-Turns Before Mission
								Yes
								X
								No
44	W	21:49:00	22:08:00	0:19:00	21	0.7	1.3	sm cld 2.5 mi from E end
45	E	22:11:00	22:30:00	0:19:00	22	0.6	1.2	low R1 over Lake
46	W	22:33:00	22:53:00	0:20:00	20	0.7	1.6	
47	E	22:55:00	23:15:00	0:20:00	22	0.6	1.3	
48	W	23:17:00	23:37:00	0:20:00	22	0.6	1.2	
49	E	23:40:00	23:59:00	0:19:00	21	0.6	1.3	
			↑ Times entered are Zulu / GMT ↑		Page		1	Verify S-Turns After Mission
								Yes
								X
								No
Additional Comments:								Drive #

Woolpert - TX Panhandle Block 8 - M15

Woolpert - TX Panhandle Block 8 - M15																
			<small>MM/DD/YEAR</small>		<small>Project #</small>	<small>Phase #</small>		<small>Project Name</small>								
			2/24/2018		00113-12				TX Panhandle LiDAR Block 8							
<small>Operator</small>		<small>Aircraft</small>			<small>HOBBS Start</small>		<small>Local Start Time</small>		<small>ZULU Start Time</small>		<small>Base</small>					
Parker		NG461Z			5968.5		13:01:00		19:01:42		19820550.T02					
<small>Pilot</small>		<small>Sensor Type</small>			<small>HOBBS END</small>		<small>Local End Time</small>		<small>Zulu End Time</small>		<small>PID</small>					
Hill		ALS70			5971.2		15:33:00		21:33:10		Shamrock_Nail					
<small>Wind Dir/Speed</small>				<small>Cloud Cover %</small>				<small>Temp</small>	<small>Dew Point</small>		<small>Pressure</small>		<small>Haze/Fire/Cloud</small>		<small>Departing</small>	
															<small>Arriving</small>	
<small>Scan Angle (FOV)</small>			<small>Scan Frequency (Hz)</small>		<small>Pulse Rate (kHz)</small>		<small>Laser Power %</small>			<small>Fixed Gain</small>		<small>Mode</small>		<small>Threshold Values</small>		
40			46		272000					<small>Gain - Course/Up</small>		<small>Single</small>		A		
										<small>Gain - Fine/Down</small>		<small>Multi</small>		X	B	
<small>Air Speed</small>		<small>AGL</small>	<small>MSL</small>		<small>Waveform Used</small>					<small>Waveform Mode</small>			<small>Pre-Trigger Dist.</small>			
			8,000		Ft	<input type="checkbox"/> Yes	<input type="checkbox"/> No	X	@			NS		Ft		
<small>Line #</small>	<small>Dir.</small>			<small>LINE START</small>		<small>SV's</small>	<small>HDOP</small>	<small>PDOP</small>	<small>Line Notes/Comments</small>							
Test						n/a	n/a	n/a	<small>GPS Began Logging At:</small>			18:36:00				
											<small>Verify S-Turns Before Mission</small>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No			
107	20180224_192243			19:22:43												
106	20180224_195310			19:53:10												
105	20180224_202251			20:22:51												
104	20180224_204925			20:49:25												
UL001	20180224_211700			21:17:00												
↑ Times entered are Zulu / GMT ↑				Page				1		<small>Verify S-Turns After Mission</small>		<input type="checkbox"/> Yes	<input type="checkbox"/> No			
<small>Additional Comments:</small>											<small>Drive #</small>					

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name									
	2/25/2018	56	78351	2	TX Panhandle LIDAR Block 3 Lift 1									
Operator		Aircraft		HOBBBS Start		Local Start Time		ZULU Start Time		Base				
Stanton		N6255Q		905.1		10:13:00		16:13:00		WOOLPERT PIN				
Pilot		Sensor Type/Number		HOBBBS END		Local End Time		Zulu End Time		PID				
Brown		ALS80/ 8170		908.6		13:57		19:57		KAMA55Q				
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	KAMA			
240/13	10 mi	CLR	0	11	-15	29.97				Arriving	KAMA			
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	Mode		Threshold Values			
40		36		346		100		<input checked="" type="checkbox"/>	<input type="checkbox"/> Single		<input type="checkbox"/> A			
								<input type="checkbox"/> Multi		<input checked="" type="checkbox"/> X		<input type="checkbox"/> B		
Air Speed		AGL		MSL		Waveform Used		Waveform Mode			Pre-Trigger Dist.			
150		Kts	7800	Ft	10,350	Ft	Yes	No	@		NS	Ft		
Line #	Dir.	Line Start Time		Line End Time		Time On Line		SV's	HDOP	PDOP		Line Notes/Comments		
Test	n/a					n/a		n/a	n/a	n/a		GPS Began Logging At:		
		↕ Times entered are Zulu / GMT ↕								Verify S-Turns Before Mission		Yes	<input checked="" type="checkbox"/> X	No
64	W	16:40:00	17:00:00		0:20:00		21	0.7	1.2		Clear, turbulent			
63	E	17:03:00	17:22:00		0:19:00		20	0.7	1.2					
62	W	17:25:00	17:44:00		0:19:00		17	0.7	1.3					
61	E	17:47:00	18:06:00		0:19:00		17	0.7	1.2					
60	W	18:10:00	18:29:00		0:19:00		16	0.8	1.3					
59	E	18:32:00	18:51:00		0:19:00		15	0.8	1.5					
58	W	18:54:00	19:14:00		0:20:00		17	0.7	1.3					
57	E	19:17:00	19:36:00		0:19:00		18	0.7	1.2					
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes	<input checked="" type="checkbox"/> X	No		
Additional Comments:										Drive #				

Woolpert - TX Panhandle Block 8 - M18

MM/DD/YEAR 2/25/2018		Project # 00113-12	Phase #	Project Name TX Panhandle LiDAR Block 8			
Operator Bradley	Aircraft N6461Z	HOBBS Start 5977.1	Local Start Time 13:16:20	ZULU Start Time 19:16:20	Base 19820562.T02		
Pilot Griffin	Sensor Type ALS70	HOBBS END 5979.1	Local End Time 14:52:20	Zulu End Time 20:52:20	PID Memphis_Nail		
Wind Dir/Speed	Cloud Cover %	Temp	Dew Point	Haze/Fire/Cloud	Departing	Arriving	
Scan Angle (FOV) 40	Scan Frequency (Hz) 46	Pulse Rate (kHz) 272000	Laser Power %	Fixed Gain Gain - Course/Up	Mode Single	Threshold Values A	
				Gain - Fine/Down	Multi	X	B
Air Speed AGL	MSL	Waveform Used 8,000	Ft	SV's YES	NO	X	Pre-Trigger Dist. @ NS Ft
Line #	Dir.	LINE START	SV's	HDOP	PDOP	Line Notes/Comments	
Test			n/a	n/a	n/a	GPS Began Logging At:	16:05:00
						Verify S-Turns Before Mission	Yes No
UL001	180225_200224_UL001	20:02:24					
1	180225_201217_001	20:12:17					
2	180225_203346_002	20:33:46				Do Not Use, Collected only for Opposing Line	
↑ Times entered are Zulu / GMT ↑		Page	1		Verify S-Turns After Mission	Yes	No
Additional Comments:						Drive #	

Woolpert

Leica LIDAR											MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name			
											2/25/2018	56	78351	2	TX Panhandle LIDAR Block 3 Lift 2			
Operator		Aircraft		HOBBSS Start		Local Start Time		ZULU Start Time		Base								
Stanton		N6255Q		908.6		14:27:00		20:27:00		WOOLPERT PIN								
Pilot		Sensor Type/Number		HOBBSS END		Local End Time		Zulu End Time		PID								
Brown		ALS80/ 8170		910.2		16:18		22:18		KAMA55Q								
Wind Dir/Speed		Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	KAMA						
270/10G27		10 mi	CLR	0	14	-15	29.95				Arriving	KAMA						
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	X	Mode		Threshold Values						
40		36		346		100		Gain - Course/Up		Single	A							
								Gain - Fine/Down		Multi	X	B						
Air Speed		AGL		MSL		Waveform Used		Waveform Mode			Pre-Trigger Dist.							
150		Kts	7800	Ft	10,350	Ft	Yes	No	X	@		NS	Ft					
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments										
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:										
		⬇ Times entered are Zulu / GMT ⬇						Verify S-Turns Before Mission		Yes	X	No						
56	W	20:54:00	21:13:00	0:19:00	18	0.6	1.2	Clear, turbulent										
55	E	21:15:00	21:35:00	0:20:00	17	0.7	1.4											
54	W	21:37:00	21:57:00	0:20:00	19	0.6	1.2	clouds drop, 0 - 12 mi from W end										
								end mission for clouds										
		⬆ Times entered are Zulu / GMT ⬆				Page		1		Verify S-Turns After Mission		Yes	X	No				
Additional Comments:											Drive #							

Woolpert

Leica LIDAR																			
MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name											
2/26/2018		57		78351		2		TX Panhandle LIDAR Block 3 and 4 Lift 1											
Operator			Aircraft			HOBBS Start			Local Start Time		ZULU Start Time		Base						
Stanton			N6255Q			910.2			10:33:00		16:33:00		WOOLPERT PIN						
Pilot			Sensor Type/Number			HOBBS END			Local End Time		Zulu End Time		PID						
Brown			ALS80/ 8170			914.3			14:56		20:56		KAMA55Q						
Wind Dir/Speed		Visibility		Ceiling		Cloud Cover %		Temp		Dew Point		Pressure		Haze/Fire/Cloud		Departing		KAMA	
190/20G27		10 mi		CLR		0		7		-13		30.18				Arriving		KAMA	
Scan Angle (FOV)			Scan Frequency (Hz)			Pulse Rate (kHz)			Laser Power %			Fixed Gain		Mode		Threshold Values			
40			36			346			100			X		Single		A			
														X		B			
Air Speed			AGL			MSL			Waveform Used			Waveform Mode			Pre-Trigger Dist.				
150			7800			10.3 and 9.7			Yes No X			@ NS			Ft				
Line #	Dir.	Line Start Time		Line End Time		Time On Line		SV's	HDOP	PDOP		Line Notes/Comments							
Test	n/a					n/a		n/a	n/a	n/a		GPS Began Logging At:							
		↑ Times entered are Zulu / GMT ↓										Verify S-Turns Before Mission		Yes	X	No			
Block 3																			
54	W	16:58:00		17:03:00		0:05:00		19	0.6	1.2		reflew W 15 mi for prev clds, clear							
53	E	17:07:00		17:26:00		0:19:00		18	0.6	1.2									
52	W	17:28:00		17:48:00		0:20:00		17	0.7	1.3									
51	E	17:51:00		18:10:00		0:19:00		16	0.8	1.4									
50	W	18:13:00		18:33:00		0:20:00		17	0.8	1.1									
43	E	18:43:00		18:51:00		0:08:00		16	0.8	1.3		reflew E 23 mi for prev clds							
41	W	18:54:00		18:58:00		0:04:00		17	0.7	1.2		reflew E 10 mi for prev clds							
44	E	19:00:00		19:02:00		0:02:00		17	0.7	1.2		reflew E 6 mi for previous clouds							
Block 4																			
1	N	19:12:00		19:30:00		0:18:00		18	0.7	1.1		clear, smooth							
2	S	19:33:00		19:52:00		0:19:00		21	0.6	1.1									
3	N	19:55:00		20:14:00		0:19:00		20	0.7	1.2									
4	S	20:17:00		20:37:00		0:20:00		23	0.6	1									
		↑ Times entered are Zulu / GMT ↑										Verify S-Turns After Mission		Yes	X	No			
Additional Comments:										Page		1		Drive #					

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name						
	2/26/2018	57	78351	2	TX Panhandle LIDAR Block 4 Lift 2						
Operator	Aircraft	HOBBBS Start		Local Start Time	ZULU Start Time	Base					
Stanton	N6255Q	914.3		15:28:00	21:28:00	WOOLPERT PIN					
Pilot	Sensor Type/Number	HOBBBS END		Local End Time	Zulu End Time	PID					
Brown	ALS80/ 8170	917.7		19:07	1:07	KAMA55Q					
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud		Departing	KAMA	
200/18G29	10 mi	CLR	0	17	-15	30.08			Arriving	KAMA	
Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)		Laser Power %	Fixed Gain	<input checked="" type="checkbox"/>	Mode	Threshold Values			
40	36	346		100	Gain - Course/Up		Single	A			
					Gain - Fine/Down		Multi	B			
								X			
Air Speed	AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.		
150	Kts	7800	Ft	9,730	Ft	Yes	No	X	@	NS	Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
		↓ Times entered are Zulu / GMT ↓					Verify S-Turns Before Mission		Yes	X	No
5	N	21:53:00	22:12:00	0:19:00	22	0.6	1.2	Clear, smooth			
6	S	22:15:00	22:34:00	0:19:00	22	0.6	1.2				
7	N	22:37:00	22:55:00	0:18:00	21	0.6	1.3				
8	S	22:59:00	23:18:00	0:19:00	22	0.6	1.1				
9	N	23:21:00	23:40:00	0:19:00	20	0.6	1.3				
10	S	23:43:00	0:02:00	0:19:00	20	0.6	1.1				
11	N	0:05:00	0:24:00	0:19:00	20	0.6	1.1				
12	S	0:27:00	0:46:00	0:19:00	19	0.7	1.3				

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Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name			
	2/27/2018	58	78351	92	TX Panhandle Block 6			
Operator	Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base	
Kennedy	7079F		1565.1	9:20:00		15:20:00	Woolpert pin	
Pilot	Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID	
Rossiter	8194		1569.9	14:09		20:09	AMA	
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	
210/9	10	12000AGL	100	8	-1	30.01	Departing	
							Arriving	
							AMA	
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		
40		36		346		100		
				Fixed Gain		<input checked="" type="checkbox"/>	Mode	
				Gain - Course/Up		Single	Threshold Values	
				Gain - Fine/Down		Multi	A	
						B	B	
Air Speed		AGL		MSL		Waveform Used		
150		7500		11017		@		
		Kts	Ft	Ft	Yes	No	Waveform Mode	
							NS	
							Ft	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	
Test	n/a			n/a	n/a	n/a	n/a	
							Line Notes/Comments	
							GPS Began Logging At:	
							8:51:00	
		⇅ Times entered are Zulu / GMT ⇅					Verify S-Turns Before Mission	
							Yes	<input checked="" type="checkbox"/>
							No	<input type="checkbox"/>
53	W	15:40:00	15:58:00	0:18:00	23	0.6	1.1	
54	E	16:01:00	16:19:00	0:18:00	20	0.7	1.2	
55	W	16:22:00	16:41:00	0:19:00	22	0.6	1.1	
56	E	16:44:00	17:02:00	0:18:00	21	0.6	1.1	
57	W	17:05:00	17:23:00	0:18:00	18	0.7	1.2	
58	E	17:26:00	17:44:00	0:18:00	17	0.7	1.4	
59	W	17:47:00	18:05:00	0:18:00	16	0.8	1.4	
60	E	18:08:00	18:26:00	0:18:00	19	0.7	1	
61	W	18:29:00	18:47:00	0:18:00	15	0.9	1.5	
62	E	18:51:00	19:09:00	0:18:00	17	0.7	1.2	
63	W	19:12:00	19:30:00	0:18:00	17	0.7	1.2	
64	E	19:34:00	19:51:00	0:17:00	18	0.6	1.1	
		↑ Times entered are Zulu / GMT ↑					Page	
							1	
							Verify S-Turns After Mission	
							Yes	
							<input checked="" type="checkbox"/>	
							No	
							Drive #	
Additional Comments:								

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name						
	2/28/2018	59	78351	2	TX Panhandle LIDAR Block 4 Lift 1						
Operator		Aircraft		HOBBBS Start		Local Start Time		ZULU Start Time		Base	
Stanton		N6255Q		920.5		12:29:00		18:29:00		WOOLPERT PIN	
Pilot		Sensor Type/Number		HOBBBS END		Local End Time		Zulu End Time		PID	
Brown		ALS80/ 8170		924		16:18		22:18		KAMA55Q	
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	KAMA
250/18G24	10 mi	CLR	0	20	-9	29.78				Arriving	KAMA
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	Mode		Threshold Values
40		36		346		100		<input checked="" type="checkbox"/>	Single		A
									Multi		B
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.	
150		Kts	7800	Ft	9,730	Ft	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	@	NS	Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
		↑ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission	Yes	<input checked="" type="checkbox"/>	No
19	N	19:00:00	19:18:00	0:18:00	17	0.7	1.2	Clear, turbulent			
20	S	19:21:00	19:42:00	0:21:00	17	0.7	1.1				
21	N	19:44:00	20:03:00	0:19:00	17	0.6	1.2				
22	S	20:06:00	20:25:00	0:19:00	19	0.6	1	offline 350' 5 mi from N end			
23	N	20:28:00	20:47:00	0:19:00	17	0.6	1.2				
24	S	20:50:00	21:09:00	0:19:00	18	0.6	1.2				
25	N	21:11:00	21:30:00	0:19:00	18	0.6	1.3				
26	S	21:33:00	21:53:00	0:20:00	18	0.6	1.2				

Woolpert

Leica LIDAR																			
MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name											
3/1/2018		60		78351		92		TX Panhandle Blocks 6 & 9											
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time		Base									
Kennedy		7079F		1575.6		8:53:00		14:53:00		Woolpert pin									
Pilot		Sensor Type/Number		HOBBS END		Local End Time		Zulu End Time		PID									
Rossiter		8194		1580.9		14:08		20:08		TDW									
Wind Dir/Speed		Visibility		Ceiling		Cloud Cover %		Temp		Dew Point		Pressure		Haze/Fire/Cloud		Departing		TDW	
340/12		10				CL		-2		-7		30.23				Arriving		TDW	
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain		Mode		Threshold Values							
40		36		346		100		Gain - Course/Up		Single		A							
								Gain - Fine/Down		Multi		B							
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.									
150 Kts		7500 Ft		11017 Ft		Yes No		@ NS		Ft									
Line #	Dir.	Line Start Time		Line End Time		Time On Line	SV's	HDOP	PDOP	Line Notes/Comments									
Test	n/a					n/a	n/a	n/a	n/a	GPS Began Logging At:									
		↑ Times entered are Zulu / GMT ↓								Verify S-Turns Before Mission		Yes	X	No					
82	S	15:15:00					20	0.6	1	TDC error. Line aborted system reboot									
78	W	15:47:00		16:05:00		0:18:00	19	0.6	1.1										
79	E	16:09:00		16:27:00		0:18:00	19	0.7	1.1										
80	W	16:30:00		16:49:00		0:19:00	19	0.6	1.1										
81	E	16:52:00		17:10:00		0:18:00	17	0.7	1.3	End block 6									
1	W	17:15:00		17:33:00		0:18:00	17	0.7	1.3	start block 9									
2	E	17:36:00		17:54:00		0:18:00	16	0.7	1.3										
3	W	17:57:00		18:15:00		0:18:00	17	0.8	1.3										
4	E	18:18:00		18:36:00		0:18:00	16	0.7	1.2										
5	W	18:39:00		18:57:00		0:18:00	18	0.7	1.1										
6	E	19:00:00		19:19:00		0:19:00	18	0.7	1.1										
82	N	19:30:00		19:49:00		0:19:00	20	0.6	1.1	Reflight of aborted block 6 line									
		↑ Times entered are Zulu / GMT ↑								Verify S-Turns After Mission		Yes	X	No					
Additional Comments:										Drive #									

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name	
	3/2/2018		18-6739-02-102		Amarillo 3DEP	
Operator		Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
K. Paschke		N35AS	106.5			NGS
Pilot		Sensor Type	HOBBS END	Local End Time	Zulu End Time	PID
S. Robertson		ALS70	110.4			

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KTDW
190/15	10	clr	0			30.28	N/A	Arriving	KTDW

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values
40	46	272	100			
				Gain - Course/Up	Single	A
				Gain - Fine/Down	Multi	B

Air Speed	AGL	MSL	Waveform Used		Waveform Mode			Pre-Trigger Dist.
150	Kts	Ft	8596	Ft	Yes	No	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:

↓ Times entered are Zulu / GMT ↓

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
101	83.3	9:10:30	9:24:30	0:14:00	16	0.7	1.2	
100	264.4	9:30:30	9:34:30	0:04:00	16	0.7	1.1	
99	83.3	9:40:00	9:54:00	0:14:00	16	0.7	1.1	
98	264.4	10:00:30	10:20:00	0:19:30	18	0.7	1.2	
97	83.3	10:30:00	10:45:00	0:15:00	17	0.7	1.3	
96	264.4	10:50:00	11:00:00	0:10:00	18	0.6	1.1	
95	83.3	11:05:30	11:20:30	0:15:00	17	0.6	1.2	
94	264.4	11:22:00	11:38:30	0:16:30	16	0.7	1.3	

Additional Comments:	Drive #
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Woolpert

Woolpert										
MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name		
3/2/2018				18-6739-02-102				TX_Panhandle		
Operator W.Rose		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time		Base
Other		N35AS		110.4						
Pilot		Sensor Type		HOBBS END		Local End Time		Zulu End Time		PID
B. Viets		ALS70								
Wind Dir/Speed		Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud	Departing
<u>220@15</u>		10	clr	0			30.12			Arriving
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain		Mode
40		46		272		100				Single
								Gain - Course/Up		Multi
								Gain - Fine/Down		Threshold Values
										A
										B
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.
		Kts	Ft	Ft	Yes	No	@		NS	Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments		
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:		
↓ Times entered are Zulu / GMT ↓								Verify S-Turns Before Mission		
								Yes	<input checked="" type="checkbox"/>	No
93	083.3	6:29:30	6:47:30	0:18:00	16	0.7	1.4			
92	264.4	6:51:30	7:12:30	0:21:00	16	0.7	1.3			
91	83.3	7:15:30	7:35:00	0:19:30	17	0.7	1.2			
90	264.4	7:38:30	7:59:00	0:21:00	19	0.6	1			
89	83.2	8:04:30	8:23:30	0:19:00	20	0.6	1			
88	264.4	8:30:30	8:51:00	0:20:30	17	0.7	1.1			
87	83.2	8:53:30	9:12:30	0:19:00	14	0.9	1.4			
↑ Times entered are Zulu / GMT ↑		Page			1			Verify S-Turns After Mission		
								Yes	<input type="checkbox"/>	No
Additional Comments:										Drive #

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name					
		3/2/2018	61	78351	2	TX Panhandle LIDAR Block 4 Lift 2					
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base			
Stanton		N6255Q		935.4	16:14:00		22:14:00	WOOLPERT PIN			
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID			
Brown		ALS80/ 8170		938.4	19:29		1:29	KAMA55Q			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud	Departing	KAMA	
200/21G28	10 mi	CLR	0	20	-3	30.08		fire to SW	Arriving	KAMA	
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	X	Mode	Threshold Values	
40	36		346		100		Gain - Course/Up	Single	A		
							Gain - Fine/Down	Multi	X	B	
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.	
150	Kts	7800	Ft	9,730	Ft	Yes	No	X	@	NS	Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
		↑ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission	Yes	X	No
52	N	22:46:00	23:05:00	0:19:00	21	0.6	1.1	Clear			
53	S	23:08:00	23:27:00	0:19:00	19	0.7	1.3				
54	N	23:30:00	23:50:00	0:20:00	22	0.7	1.1				
55	S	23:53:00	0:13:00	0:20:00	22	0.7	1.1				
56	N	0:16:00	0:36:00	0:20:00	21	0.7	1.3	smoke 0 - 4 mi from S end			
57	S	0:38:00	0:57:00	0:19:00	19	0.7	1.4	smoke 0 - 20 mi from S end			
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission	Yes	X	No
Additional Comments:										Drive #	

Woolpert

Leica LIDAR											
MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name			
3/3/2018		62		78351		92		TX Panhandle Block 9			
Operator		Aircraft		HOBBBS Start		Local Start Time		ZULU Start Time		Base	
Kennedy		7079F		1590.3		9:05:00		15:05:00		Woolpert pin	
Pilot		Sensor Type/Number		HOBBBS END		Local End Time		Zulu End Time		PID	
Rossiter		8194		1593.9		12:43		18:43		TDW	
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	TDW		
210/15	10		CL	10	3	30.09		Arriving	TDW		
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	Mode		Threshold Values	
40	36		346		100			X		A	
								Gain - Course/Up		Single	
								Gain - Fine/Down		Multi	
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.	
150	Kts	7500	Ft	11017	Ft	Yes	No	@		NS	Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:		8:45:00	
		↓ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission		Yes	X No
7	W	15:31:00	15:49:00	0:18:00	19	0.7	1.2				
8	E	15:53:00	16:10:00	0:17:00	21	0.6	1.2				
9	W	16:14:00	16:32:00	0:18:00	21	0.6	1.1				
10	E	16:36:00	16:54:00	0:18:00	20	0.6	1.1				
11	W	16:57:00	17:15:00	0:18:00	18	0.7	1.3				
12	E	17:19:00	17:37:00	0:18:00	18	0.7	1.2				
13	W	17:40:00	17:58:00	0:18:00	17	0.8	1.3				
14	E	18:05:00	18:23:00	0:18:00	18	0.7	1.1	Line restarted for overspeeding			
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes	X No
Additional Comments:										Drive #	

Woolpert

Leica LIDAR												MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name						
												3/3/2018				18-6739-02-102				Amarillo 3DEP						
Operator			Aircraft			HOBBS Start			Local Start Time			ZULU Start Time			Base											
K. Paschke			N35AS			113.8									NG5											
Pilot			Sensor Type			HOBBS END			Local End Time			Zulu End Time			PID											
S. Robertson			ALS70			120.1																				
Wind Dir/Speed		Visibility		Ceiling		Cloud Cover %		Temp		Dew Point		Pressure		Haze/Fire/Cloud		Departing		KTDW								
230/16		10		clr		0		7C		0		30.07		N/A		Arriving		KTDW								
Scan Angle (FOV)		Scan Frequency (Hz)			Pulse Rate (kHz)			Laser Power %			Fixed Gain			Mode		Threshold Values										
40		46			272			100						Single		A										
											Gain - Course/Up			Multi		B										
											Gain - Fine/Down															
Air Speed		AGL		MSL		Waveform Used			Waveform Mode			Pre-Trigger Dist.														
150		Kts		Ft		8596			Ft			Yes			No			@			NS			Ft		
Line #	Dir.	Line Start Time		Line End Time		Time On Line		SV's		HDOP		PDOP		Line Notes/Comments												
Test	n/a					n/a		n/a		n/a		n/a		GPS Began Logging At:												
↓ Times entered are Zulu / GMT ↓													Verify S-Turns Before Mission						Yes	No						
86	83.3	7:21:00	7:42:00	0:21:00	16	0.6	1.2																			
85	264.4	7:44:00	8:04:00	0:20:00	16	0.6	1.1																			
84	83.3	8:07:00	8:26:00	0:19:00	16	0.6	1																			
83	264.4	8:28:00	8:49:00	0:21:00	18	0.6	1.2																			
82	83.3	8:52:00	9:12:00	0:20:00	17	0.7	1.3																			
81	264.4	9:17:00	9:36:00	0:19:00	18	0.6	1.1																			
80	83.3	9:38:00	9:58:00	0:20:00	17	0.7	1.2																			
79	264.4	10:01:00	10:22:00	0:21:00	16	0.7	1.2																			
78	83	11:39:00	11:59:00	0:20:00		0.8	1.4																			
77	263	12:02:00	12:22:00	0:20:00		0.7	1.1																			
76	83	12:25:00	12:44:00	0:19:00		0.7	1.2																			
75	263	12:48:00	1:07:00	0:19:00		0.7	1.3																			
74	83	1:09:00	1:29:00	0:20:00		0.7	1.2																			
73	263	1:31:00	1:51:00	0:20:00		0.7	1.3																			
↑ Times entered are Zulu / GMT ↑													Page			1	Verify S-Turns After Mission			Yes	No					
Additional Comments:													Drive #													

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name			
		3/3/2018		18-6739-02-102		Amarillo 3DEP			
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time		Base
W. Rose		N35AS		120.4					
Pilot		Sensor Type		HOBBS END	Local End Time		Zulu End Time		PID
B. Viets		ALS70		123.4					
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud		Departing
200/15	10	clr	0			30.28			Arriving
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	Mode	Threshold Values
40	46		272		100		Gain - Course/Up	Single	A
						Gain - Fine/Down	Multi	B	
Air Speed	AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.
150	Kts	Ft	8596		Yes	No	@		NS
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	
↓ Times entered are Zulu / GMT ↓								Verify S-Turns Before Mission <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
72	083.3	3:29:00	3:47:00	0:18:00	19	0.6	1.2		
71	264.4	3:51:00	4:09:00	0:18:00	16	0.7	1.4	Moderate turbulance- 2 mins in	
70	083.3	4:13:00	4:31:30	0:18:30	18	0.6	1.2		
69	264.4	4:34:30	4:53:30	0:19:00	19	0.6	1.1		
68	083.2	4:57:00	5:16:00	0:19:00	17	0.6	1.3		
67	264.4	5:19:00	5:38:30	0:19:30	17	0.6	1.2		
66	083.3	5:42:00	6:02:00	0:20:00	18	0.6	1.1	Gap in data at the end of line.	
66	264.4	6:04:30	6:07:00	0:02:30	16	0.6	1.1	reflown for 66.	
↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission <input type="checkbox"/> Yes <input type="checkbox"/> No	
Additional Comments:									Drive #

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name						
		3/5/2018	64	78351	2	TX Panhandle LiDAR Block 4						
Operator		Aircraft		HOBBBS Start		Local Start Time		ZULU Start Time		Base		
Stanton		N6255Q		942.6		11:25:00		17:25:00		WOOLPERT PIN		
Pilot		Sensor Type/Number		HOBBBS END		Local End Time		Zulu End Time		PID		
Scott		ALS80/ 8170		944.9		14:08		20:08		KAMA55Q		
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KAMA			
340/21G30	10 mi	CLR	0	10	-27	30.11		Arriving	KAMA			
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %		Fixed Gain	X	Mode	Threshold Values			
40	36		346	100		Gain - Course/Up		Single	A			
						Gain - Fine/Down		Multi	X			
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.		
150	Kts	7800	Ft	9,730	Ft	Yes	No	X	@	NS		
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments				
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:				
		↑ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission	Yes	X	No	
67	N	18:08:00	18:28:00	0:20:00	17	0.7	1.2	Clear, turbulent				
68	S	18:30:00	18:48:00	0:18:00	18	0.7	1.2					
69	N	18:51:00	19:11:00	0:20:00	19	0.7	1.2					
66	S	19:15:00	19:25:00	0:10:00	20	0.6	1.1	complete N end of line cut previously				
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes	X	No
Additional Comments:										Drive #		

Woolpert

Leica LIDAR														
MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name						
3/5/2018				18-6739-02-102				Amarillo 3DEP						
Operator			Aircraft			HOBBS Start			Local Start Time		ZULU Start Time	Base		
K. Paschke			N35AS			123.4						NGS		
Pilot			Sensor Type			HOBBS END			Local End Time		Zulu End Time	PID		
B. Viets			ALS70			126.8								
Wind Dir/Speed		Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	KTDW		
310/10		10	clr	0	3	-6	30.06		N/A		Arriving	KTDW		
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain		Mode		Threshold Values		
40		46		272		100		Gain - Course/Up		Single	A			
								Gain - Fine/Down		Multi	B			
Air Speed		AGL		MSL		Waveform Used		Waveform Mode			Pre-Trigger Dist.			
150		Kts	Ft	8596		Ft	Yes	No	@			NS	Ft	
Line #	Dir.	Line Start Time		Line End Time		Time On Line	SV's	HDOP	PDOP	Line Notes/Comments				
Test	n/a					n/a	n/a	n/a	n/a	GPS Began Logging At:				
↓ Times entered are Zulu / GMT ↓										Verify S-Turns Before Mission			Yes	No
65	83.3	8:10:00		8:28:00		0:18:00	16	0.6	1					
64	264.4	8:32:00		8:51:00		0:19:00	16	0.7	1.3					
63	83.3	8:54:00		9:15:00		0:21:00	16	0.7	1.3					
62	264.4	9:17:00		9:36:00		0:19:00	18	0.6	1.1					
61	83.3	9:38:00		9:57:00		0:19:00	17	0.8	1.4					
60	264.4	10:00:00		10:19:00		0:19:00	18	0.7	1.1					
59	83.3	10:21:00		10:42:00		0:21:00	17	0.7	1.2					
58	264.4	10:44:00		11:02:00		0:18:00	16	0.8	1.3					
↑ Times entered are Zulu / GMT ↑										Verify S-Turns After Mission			Yes	No
Page								1						
Additional Comments:											Drive #			

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year		Project #		Phase #		Project Name						
		3/5/2018			18-6739-02-102				Amarillo 3DEP						
Operator		Aircraft			HOBBBS Start		Local Start Time		ZULU Start Time		Base				
W. Rose		N35AS			126.6										
Pilot		Sensor Type			HOBBBS END		Local End Time		Zulu End Time		PID				
B. Viets		ALS70			130.1										
Wind Dir/Speed		Visibility	Ceiling	Cloud Cover %	Temp	Dew Point		Pressure		Haze/Fire/Cloud		Departing			
335@16		10	clr	0				30.11				Arriving			
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain		Mode	Threshold Values				
40		46		272		100				Single	A	B			
								Gain - Course/Up		Multi					
								Gain - Fine/Down							
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.					
150		Kts	Ft	8596		Ft	Yes	No	@		NS	Ft			
Line #	Dir.	Line Start Time		Line End Time		Time On Line	SV's	HDOP	PDOP	Line Notes/Comments					
Test	n/a					n/a	n/a	n/a	n/a	GPS Began Logging At:					
↓ Times entered are Zulu / GMT ↓										Verify S-Turns Before Mission			Yes	X	No
57	083.3	12:22:00		12:40:30		0:18:30	16	0.7	1.1						
56	264.4	12:44:00		1:03:00		0:19:00	16	0.7	1.2						
55	083.3	1:06:30		1:26:00		0:19:30	18	0.7	1.2						
54	264.4	1:29:00		1:47:45		0:18:45	18	0.7	1.1						
53	083.3	1:50:30		2:09:30		0:19:00	18	0.7	1.1						
52	264.4	2:14:00		2:33:30		0:19:30	17	0.7	1.2						
51	083.3	2:36:15		2:56:00		0:19:45	16	0.7	1.4						
50	264.4	2:59:00		3:19:00		0:20:00	18	0.7	1.3						
↑ Times entered are Zulu / GMT ↑					Page		1		Verify S-Turns After Mission			Yes	X	No	
Additional Comments:											Drive #				

Woolpert

Leica LIDAR														
MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name						
3/7/2018		66		78351		92		TX Panhandle Block 9						
Operator			Aircraft		HOBBBS Start		Local Start Time			ZULU Start Time		Base		
Kennedy			7079F		1598.4		8:38:00			14:38:00		Woolpert pin		
Pilot			Sensor Type/Number		HOBBBS END		Local End Time			Zulu End Time		PID		
Rossiter			8194		1603.7		13:56			19:56		TDW		
Wind Dir/Speed		Visibility	Ceiling		Cloud Cover %	Temp	Dew Point		Pressure		Haze/Fire/Cloud	Departing	TDW	
220/5		10	10000AGL		50	-4	-13		30.32			Arriving	TDW	
Scan Angle (FOV)		Scan Frequency (Hz)			Pulse Rate (kHz)		Laser Power %		Fixed Gain		<input checked="" type="checkbox"/>	Mode		Threshold Values
40		36			346		100		Gain - Course/Up		<input type="checkbox"/>	Single	A	
									Gain - Fine/Down		<input type="checkbox"/>	Multi	B	
Air Speed		AGL		MSL		Waveform Used				Waveform Mode		Pre-Trigger Dist.		
150		Kts	7500	Ft	11017	Ft	Yes	No	@	NS	Ft			
Line #	Dir.	Line Start Time		Line End Time		Time On Line	SV's	HDOP	PDOP		Line Notes/Comments			
Test	n/a					n/a	n/a	n/a	n/a		GPS Began Logging At:		8:05:00	
		↑ Times entered are Zulu / GMT ↓								Verify S-Turns Before Mission		Yes	<input checked="" type="checkbox"/>	No
25	W	15:06:00		15:25:00		0:19:00	19	0.7	1.2					
26	E	15:28:00		15:47:00		0:19:00	19	0.7	1.2					
27	W	15:49:00		16:08:00		0:19:00	21	0.6	1.1					
28	E	16:11:00		16:29:00		0:18:00	20	0.6	1.1					
29	W	16:33:00		16:52:00		0:19:00	18	0.7	1.2					
30	E	16:55:00		17:14:00		0:19:00	16	0.7	1.4					
31	W	17:17:00		17:36:00		0:19:00	15	0.8	1.1					
32	E	17:39:00		17:58:00		0:19:00	16	0.7	1.2					
33	W	18:01:00		18:21:00		0:20:00	15	0.8	1.2					
34	E	18:24:00		18:42:00		0:18:00	17	0.7	1.2					
35	W	18:45:00		19:05:00		0:20:00	18	0.7	1.2					
36	E	19:08:00		19:27:00		0:19:00	18	0.6	1.2					
		↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission		Yes	<input checked="" type="checkbox"/>	No
Additional Comments:										Drive #				

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Woolpert											
Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name					
		3/7/2018	66	78351	2	TX Panhandle LIDAR Block 4 Lift 1					
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base			
Stanton		N6255Q		944.9	10:07:00		16:07:00	WOOLPERT PIN			
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID			
Scott		ALS80/ 8170		949.3	14:49		20:49	KAMA55Q			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud	Departing	KAMA	
200/09	10 mi	CLR	0	4	-15	30.33			Arriving	KAMA	
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %		Fixed Gain	Mode		Threshold Values		
40	36		346	100			X		A		
						Gain - Course/Up	Single		B		
						Gain - Fine/Down	Multi		X		
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.	
150	Kts	7800	Ft	9,730	Ft	Yes	No	X	@	NS	
										Ft	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
		↓ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission	Yes	X	No
70	N	16:49:00	17:07:00	0:18:00	17	0.7	1.2	Clear			
71	S	17:10:00	17:27:00	0:17:00	15	0.8	1.4				
72	N	17:30:00	17:48:00	0:18:00	15	0.8	1.3				
73	S	17:51:00	18:09:00	0:18:00	15	0.7	1.2				
74	N	18:12:00	18:30:00	0:18:00	15	0.7	1.3				
75	S	18:32:00	18:50:00	0:18:00	17	0.7	1.2				
76	N	18:53:00	19:11:00	0:18:00	18	0.7	1.1				
77	S	19:14:00	19:32:00	0:18:00	19	0.6	1.1				
78	N	19:34:00	19:52:00	0:18:00	19	0.6	1.1				
79	S	19:54:00	20:11:00	0:17:00	20	0.6	1.1				
				0:00:00							
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission	Yes	X	No
Additional Comments:									Drive #		

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name							
		3/8/2018	67	78351	92	TX Panhandle Blocks 9							
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time		Base			
Kennedy		7079F		1603.7		8:28:00		14:28:00		Woolpert pin			
Pilot		Sensor Type/Number		HOBBS END		Local End Time		Zulu End Time		PID			
Rossiter		8194		1608.4		13:11		19:11		TDW			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud	Departing	TDW			
190/13	10	8500AGL	100	4	-9	30.12			Arriving	TDW			
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	<input checked="" type="checkbox"/>	Mode		Threshold Values		
40	36		346		100		Gain - Course/Up		Single		A		
								Gain - Fine/Down		Multi		B	
Air Speed		AGL		MSL		Waveform Used			Waveform Mode		Pre-Trigger Dist.		
150 Kts		7500 Ft		11017 Ft		Yes No			@ NS		Ft		
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments					
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:		8:05:00			
		↓ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission		Yes	<input checked="" type="checkbox"/>	No	
37	W	14:59:00	15:18:00	0:19:00	22	0.6	1						
38	E	15:21:00	15:40:00	0:19:00	19	0.6	1.2						
39	W	15:43:00	16:03:00	0:20:00	22	0.6	1						
40	E	16:06:00	16:24:00	0:18:00	20	0.6	1.1						
41	W	16:28:00	16:48:00	0:20:00	18	0.7	1.2						
42	E	16:52:00	17:10:00	0:18:00	17	0.7	1.2						
43	W	17:14:00	17:33:00	0:19:00	16	0.8	1.3						
44	E	17:37:00	17:55:00	0:18:00	16	0.7	1.2						
45	W	17:59:00	18:19:00	0:20:00	16	0.7	1.2						
46	E	18:22:00	18:40:00	0:18:00	17	0.7	1.2						
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes	<input checked="" type="checkbox"/>	No	
Additional Comments:										Drive #			

Woolpert

Leica LIDAR																			
MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name											
3/10/2018		69		78351		92		TX Panhandle Block 9											
Operator			Aircraft			HOBBBS Start			Local Start Time			ZULU Start Time		Base					
Kennedy			7079F			1614.2			8:53:00			14:53:00		Woolpert pin					
Pilot			Sensor Type/Number			HOBBBS END			Local End Time			Zulu End Time		PID					
Rossiter			8194			1619			13:45			19:45		TDW					
Wind Dir/Speed		Visibility		Ceiling		Cloud Cover %		Temp		Dew Point		Pressure		Haze/Fire/Cloud		Departing	TDW		
230/8		10				CL		8		-8		19.81				Arriving	TDW		
Scan Angle (FOV)			Scan Frequency (Hz)			Pulse Rate (kHz)			Laser Power %			Fixed Gain		<input checked="" type="checkbox"/>	Mode		Threshold Values		
40			36			346			100			Gain - Course/Up			Single		A		
										Gain - Fine/Down			Multi			B			
Air Speed			AGL			MSL			Waveform Used			Waveform Mode			Pre-Trigger Dist.				
150			Kts	7500		Ft	11017		Ft	Yes	No			@		NS	Ft		
Line #	Dir.	Line Start Time		Line End Time		Time On Line		SV's	HDOP	PDOP		Line Notes/Comments							
Test	n/a					n/a		n/a	n/a	n/a		GPS Began Logging At:		8:30:00					
		↑ Times entered are Zulu / GMT ↓										Verify S-Turns Before Mission		Yes	<input checked="" type="checkbox"/>	No			
59	W	15:27:00		15:47:00		0:20:00		21	0.6	1.1									
60	E	15:51:00		16:09:00		0:18:00		20	0.6	1.1									
61	W	16:12:00		16:32:00		0:20:00		19	0.7	1.1									
62	E	16:36:00		16:55:00		0:19:00		16	0.8	1.6									
63	W	16:58:00		17:17:00		0:19:00		16	0.8	1.3									
64	E	17:21:00		17:39:00		0:18:00		18	0.7	1.2									
65	W	17:42:00		18:02:00		0:20:00		15	0.9	1.5									
66	E	18:05:00		18:23:00		0:18:00		18	0.7	1.2									
67	W	18:26:00		18:46:00		0:20:00		17	0.7	1.2									
68	E	18:49:00		19:07:00		0:18:00		14	0.8	1.5									
		↑ Times entered are Zulu / GMT ↑												Verify S-Turns After Mission		Yes	<input checked="" type="checkbox"/>	No	
						Page		1											
Additional Comments:														Drive #					

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name						
		3/11/2018	70	78351	2	TX Panhandle LIDAR Block 5 Lift 1						
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base				
Stanton		N6255Q		965.3	10:52:00		15:52:00	WOOLPERT PIN				
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID				
Scott		ALS80/ 8170		969.7	15:38		20:38	KAMA55Q				
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	KAMA	
360/18G25	10 mi	CLR	0	3	-6	30.29				Arriving	KAMA	
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %		Fixed Gain	Mode		Threshold Values			
40	36		346	100		X	Single		A			
						Gain - Course/Up	Multi		B			
						Gain - Fine/Down	X					
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.		
150	Kts	7800	Ft	9,560	Ft	Yes	No	X	@	NS	Ft	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments				
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:				
		↑ Times entered are Zulu / GMT ↓					Verify S-Turns Before Mission		Yes	X	No	
20	N	16:44:00	16:56:00	0:12:00	16	0.8	1.3	Clear				
21	S	16:58:00	17:09:00	0:11:00	15	0.9	1.4					
22	N	17:13:00	17:25:00	0:12:00	17	0.7	1.1					
23	S	17:28:00	17:39:00	0:11:00	16	0.7	1.3					
24	N	17:41:00	17:54:00	0:13:00	16	0.7	1.3					
25	S	17:57:00	18:08:00	0:11:00	16	0.7	1.3					
26	N	18:11:00	18:23:00	0:12:00	18	0.7	1.2					
27	S	18:25:00	18:36:00	0:11:00	19	0.7	1.2					
28	N	18:40:00	18:52:00	0:12:00	21	0.7	1.2					
29	S	18:54:00	19:05:00	0:11:00	20	0.7	1.3					
30	N	19:07:00	19:19:00	0:12:00	20	0.7	1.2					
31	S	19:21:00	19:32:00	0:11:00	22	0.7	1.2					
32	N	19:34:00	19:44:00	0:10:00	19	0.7	1.2					
		↑ Times entered are Zulu / GMT ↑					Page		1		Verify S-Turns After Mission	
									Yes	X	No	
Additional Comments:										Drive #		



P.O. Box 72357
Bossier City, LA 72357

Field Crew		LIDAR Daily Log										GPS Information		AGC		Meteorological Conditions				
Project #		TBA										Base 1	42460720.T02	Auto		Airport	Elevation	Temp		Pressure
Project Description		Woolpert										Base 2				@ Altitude	K3F6	10.0°c	283.15°k	
Location		Childress, TX										Base 3				@ Altitude				
MISSION 1		20180313_160627										IMU Information		GPS Base Station Information						
Sensor		ALS70										Start Time	16:07:54	File Name	42460720.T02	RNX File	Ant Hgt	1.50m	Ant Type	Trimble R7
Aircraft		N85PE										Stop Time	19:18:36	Base 1						
SENSOR NAVIGATION FILE NAME												Base 2								
Flight Date (UTC)		8/13/2018										Base 3								
Pilot		Humphries																		
Operator		Bobby																		
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments		
	99	LDR180313 162823	16:28:41	16:47:41	0:19:00	40	45.9	136000	YES	Y	1933	6342					Bobby	GOOD		
	98	LDR180313 165102	16:51:19	17:12:12	0:20:53	40	45.9	136000	YES	Y	1548	5079					Bobby	GOOD		
	97	LDR180313 171545	17:16:03	17:34:47	0:18:44	40	45.9	136000	YES	Y	1950	6398					Bobby	GOOD		
	96	LDR180313 173913	17:39:31	18:00:32	0:21:01	40	45.9	136000	YES	Y	1544	5066					Bobby	GOOD		
	95	LDR180313 180318	18:03:35	18:22:12	0:18:37	40	45.9	136000	YES	Y	1954	6411					Bobby	GOOD		
	94	LDR180313 182603	18:26:21	18:47:14	0:20:53	40	45.9	136000	YES	Y	1545	5069					Bobby	GOOD		
	UL001	LDR180313 185047	18:51:04	18:54:01	0:02:57	40	45.9	136000	YES	Y	1879	6165					Bobby	GOOD		

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	3:10:42	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	2:02:05	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						



P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log																		
Field Crew						GPS Information						Meteorological Conditions						
Project # TBA						Base 1 42460720.T02						AGC						
Project Description Woolpert						Base 2 Auto						Elevation K3F6						
Location Childress, TX						Base 3						@ Altitude 10.0°c						
MISSION 2						Aero 1						@ Altitude 283.15°k						
SENSOR NAVIGATION FILE NAME 20180313_205107						IMU Information						GPS Base Station Information						
Flight Date (UTC) 8/13/2018						Start Time 22:52:53						File Name 42460720.T02						
Pilot Humphries						Stop Time 0:05:55						Ant Hgt 1.50m						
Operator Bobby						Sensor ALS70						Ant Type Trimble R7						
Aircraft N85PE						GPS (m) x: -0.110, y: 0.130, z: -1.240						Pressure						
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments
	93	LDR180313_212717	21:27:34	21:46:59	0:19:25	40	46.0	136000	YES	Y	1940	6365					Bobby	GOOD
	92	LDR180313_215109	21:51:26	22:12:11	0:20:45	40	46.0	136000	YES	Y	1548	5079					Bobby	GOOD
	91	LDR180313_221510	22:15:27	22:34:28	0:19:01	40	46.0	136000	YES	Y	1967	6453					Bobby	GOOD
	90	LDR180313_223934	22:39:51	23:00:28	0:20:37	40	46.0	136000	YES	Y	1528	5013					Bobby	GOOD
	89	LDR180313_230424	23:04:41	23:23:57	0:19:16	40	46.0	136000	YES	Y	1934	6345					Bobby	GOOD
	88	LDR180313_232803	23:28:20	23:48:41	0:20:21	40	46.0	136000	YES	Y	1548	5079					Bobby	GOOD

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	1:13:02	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	1:59:25	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						

LiDAR Flight Log

Subcontractor:		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name				
		3/14/2018	73			TX Panhandle 2018 D18				
Operator		Aircraft		HOBBSS Start		Local Start Time		ZULU Start Time		Base
David Braun		N7516Q				8:40:00				
Pilot		Sensor Type / Number		HOBBSS END		Local End Time		Zulu End Time		PID
Brian Jones		Optech H300 SEN325				15:45				KLBL R8/KPXY 5700
Wind Dir/Speed		Visibility	Ceiling	Cloud Cover %	Temp	Pressure		Haze/Fire/Cloud		Departing
										Arriving
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain		Mode
30		55		200		High		X		Threshold Values
								Gain - Course/Up		Single
								Gain - Fine/Down		Multi
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.
150		Kts	6232	Ft	10,100	Ft	Yes	No	@	NS
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments		
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:		
	⬇ Times entered are Zulu / GMT ⬇							Verify S-Turns Before Mission		Yes <input checked="" type="checkbox"/> No
156	E	13:55:00	14:15:00	0:20:00	17		1.38			
157	W	14:19:00	14:39:00	0:20:00	20		1.63			
158	E	14:43:00	15:03:00	0:20:00	18		1.12			
159	W	15:07:00	15:27:00	0:20:00	16		1.33			
160	E	15:31:00	15:51:00	0:20:00	18		1.24			
161	W	15:55:00	16:15:00	0:20:00	16		1.31			
162	E	16:19:00	16:38:00	0:19:00	15		1.34			
163	W	16:44:00	17:03:00	0:19:00	15		1.33			
164	E	17:07:00	17:26:00	0:19:00	14		1.8			
208	N	17:34:00	17:38:00	0:04:00	14		1.54	Tie Line		
165	W	17:46:00	18:06:00	0:20:00	16		1.19			
166	E	18:57:00	19:17:00	0:20:00	17		1.2			
167	W	19:22:00	19:43:00	0:21:00	17		1.23			
168	E	19:46:00	20:06:00	0:20:00	15		1.62			
169	W	20:11:00	20:31:00	0:20:00	17		1.27			
170	E	20:34:00	20:35:00	0:01:00	17		1.1	System Froze and shut itself off		
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes <input type="checkbox"/> No
Additional Comments:										Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name		
	3/14/2018		73		78351		2		TX Panhandle LIDAR Blocks 6, 9 and 10		
Operator		Aircraft		HOBBES Start		Local Start Time		ZULU Start Time		Base	
Stanton		N6255Q		975.6		9:57:00		14:57:00		WOOLPERT PIN	
Pilot		Sensor Type/Number		HOBBES END		Local End Time		Zulu End Time		PID	
Scott		ALS80/ 8170		980.3		14:59		19:59		KAMA55Q	
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	KAMA
180/7	10 mi	CLR	0	6	-8	30.26				Arriving	KAMA
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	Mode		Threshold Values	
40	36		346		100			X			
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.	
150		7800		11 & 10.1K		Yes No X		@ NS		Ft	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
		↑ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission		Yes	X No
Block 6											
77	E	15:51:00	15:57:00	0:06:00	20	0.6	1.2	Clear, flew W 20 mi to comp line			
Block 9											
71	S	16:00:00	16:17:00	0:17:00	19	0.6	1.3				
70	W	16:29:00	16:47:00	0:18:00	17	0.7	1.2				
69	E	16:49:00	17:07:00	0:18:00	16	0.8	1.3				
Blk 10											
76	E	17:11:00	17:30:00	0:19:00	16	0.8	1.2				
75	W	17:32:00	17:51:00	0:19:00	15	0.8	1.2				
74	E	17:53:00	18:12:00	0:19:00	17	0.7	1.2				
73	W	18:14:00	18:33:00	0:19:00	18	0.7	1.2				
72	E	18:35:00	18:54:00	0:19:00	19	0.6	1.2				
71	W	18:56:00	19:15:00	0:19:00	20	0.6	1.1				
70	E	19:17:00	19:35:00	0:18:00	21	0.6	1.1				
		↑ Times entered are Zulu / GMT ↑						Verify S-Turns After Mission		Yes	X No
Additional Comments:						Page		1		Drive #	



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LIDAR Daily Log																				
Field Crew		LIDAR Daily Log										GPS Information		Meteorological Conditions						
Project #		TBA										Base 1	42460730.T02	AGC	Elevation		Temp		Pressure	
Project Description		Woolpert										Base 2		Auto	Airport	KCDS	17.0°c	290.15°k		
Location		Childress, TX										Base 3			@ Altitude					
Sensor Navigation File Name		20180314_145402										IMU Information		GPS Base Station Information						
Sensor		ALS70										Start Time	14:55:58	File Name	42460730.T02	RNX File	Ant Hgt	1.50m	Ant Type	Trimble R7
Aircraft		N85PE										Stop Time	17:52:50	Base 1						
Flight Date (UTC)		8/14/2018												Base 2						
Pilot		Humphries												Base 3						
Operator		Bobby																		
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments		
	87	LDR180314_151626	15:16:44	15:36:57	0:20:13	40	45.9	136000	YES	Y	1930	6332					Bobby	GOOD		
	86	LDR180314_154033	15:40:51	16:00:16	0:19:25	40	45.9	136000	YES	Y	1541	5056					Bobby	GOOD		
	85	LDR180314_160356	16:04:13	16:24:34	0:20:21	40	45.9	136000	YES	Y	1958	6424					Bobby	GOOD		
	84	LDR180314_162730	16:27:47	16:47:03	0:19:16	40	45.9	136000	YES	Y	1535	5036					Bobby	GOOD		
	83	LDR180314_165047	16:51:04	17:11:17	0:20:13	40	45.9	136000	YES	Y	1940	6365					Bobby	GOOD		
	82	LDR180314_171419	17:14:37	17:34:01	0:19:24	40	45.9	136000	YES	Y	1545	5069					Bobby	GOOD		
	UL001	LDR180314_173532	17:35:49	17:35:56	0:00:07	40	45.9	136000	YES	Y	1947	6388					Bobby	GOOD		
	UL002	LDR180314_173931	17:39:48	17:44:13	0:04:25	40	45.9	136000	YES	Y	1874	6148					Bobby	GOOD		

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	2:56:52	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear	X
Sensor Collection Time	2:03:24	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0					Fair	
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0					Partly Cloudy	
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0					Cloudy	



P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log																		
Field Crew						GPS Information						Meteorological Conditions						
Project # TBA						Base 1 42460730.T02						AGC						
Project Description Woolpert						Base 2 Auto						Elevation KCDS						
Location Childress, TX						Base 3						Temp 17.0°c						
MISSION 4						Aero 1						@ Altitude						
SENSOR NAVIGATION FILE NAME 20180314_192910						IMU Information						GPS Base Station Information						
Flight Date (UTC) 3/14/2018						Start Time 19:32:09						File Name 42460730.T02						
Pilot Humphries						Stop Time 22:48:44						Ant Hgt 1.50m						
Operator Bobby						Sensor ALS70						Ant Type Trimble R7						
Aircraft N85PE						GPS (m) x: -0.110, y: 0.130, z: -1.240						Pressure						
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments
	81	LDR180314_200552	20:06:11	20:28:19	0:22:08	40	46.0	136000	YES	Y	2442.754	8014					Bobby	GOOD
	80	LDR180314_203052	20:31:10	20:50:01	0:18:51	40	46.0	136000	YES	Y	2435.57	7991					Bobby	GOOD
	79	LDR180314_205402	20:54:20	21:16:11	0:21:51	40	46.0	136000	YES	Y	2447.626	8030					Bobby	GOOD
	78	LDR180314_212013	21:20:32	21:39:19	0:18:47	40	46.0	136000	YES	Y	2451.49	8043					Bobby	GOOD
	77	LDR180314_214258	21:43:16	22:05:01	0:21:45	40	46.0	136000	YES	Y	2453.467	8049					Bobby	GOOD
	76	LDR180314_220838	22:08:56	22:27:40	0:18:44	40	46.0	136000	YES	Y	2446.275	8026					Bobby	GOOD

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	3:16:35	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	2:02:06	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						

LiDAR Flight Log

Subcontractor:		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name			
		3/15/2018	74			TX Panhandle 2018 D18			
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time	Base
David Braun		N7516Q							
Pilot		Sensor Type / Number		HOBBS END		Local End Time		Zulu End Time	PID
Brian Jones		Optech H300 SEN325							KPYX R8 4.77
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud	Departing
									Arriving
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %		Fixed Gain	Mode		Threshold Values
30	55		200	High		X	Single		A
						Gain - Course/Up		Multi	B
						Gain - Fine/Down		X	
Air Speed	AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.
150	Kts	6232	Ft	10,100	Ft	Yes	No	@	NS
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	
		↑ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission	
								Yes	X No
169	E	16:50:00	17:10:00	0:20:00	14		1.33	SA3	
170	W	17:17:00	17:35:00	0:18:00	13		1.63		
171	E	17:39:00	17:58:00	0:19:00	14		1.34		
172	W	18:03:00	18:23:00	0:20:00	14		1.25		
173	E	18:27:00	18:47:00	0:20:00	16		1.18		
174	W	18:51:00	19:11:00	0:20:00	16		1.11		
175	E	19:14:00	19:34:00	0:20:00	17		1.19		
176	W	19:37:00	19:57:00	0:20:00	15		1.49		
177	E	20:00:00	20:19:00	0:19:00	17		1.26		
178	W	20:23:00	20:43:00	0:20:00	17		1.33		
207	S	20:47:00	20:53:00	0:06:00	17		1.28		



P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log																							
Field Crew		LIDAR Daily Log										GPS Information		AGC		Meteorological Conditions							
Project #		TBA										Base 1		42460740.T02		AGC		Elevation		Temp		Pressure	
Project Description		Woolpert										Base 2		Auto		Airport		KCDS		17.0°c		290.15°k	
Location		Childress, TX										Base 3				@ Altitude							
Sensor		MISSION 5										Aero 1				@ Altitude							
Aircraft		N85PE										IMU Information				File Name		RNX File		Ant Hgt		Ant Type	
SENSOR NAVIGATION FILE NAME												Start Time		19:32:09		Base 1		42460740.T02		1.50m		Trimble R7	
Flight Date (UTC)		Pilot		Operator		Sensor		Aircraft		SENSOR NAVIGATION FILE NAME		Stop Time		22:48:44		Base 2							
3/15/2018		Humphries		Bobby		ALS70		N85PE								Base 3							
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments					
	75	180315 145910	14:59:28	15:22:46	0:23:18	40	46.0	136000	YES	Y	2447.115	8029					Bobby	GOOD					
	74	180315 152607	15:26:25	15:44:53	0:18:28	40	46.0	136000	YES	Y	2455.576	8056					Bobby	GOOD					
	73	180315 154914	15:49:32	16:12:28	0:22:56	40	46.0	136000	YES	Y	2452.605	8047					Bobby	GOOD					
	72	180315 161604	16:16:22	16:34:45	0:18:23	40	46.0	136000	YES	Y	2440.422	8007					Bobby	GOOD					
	71	180315 163848	16:39:06	17:02:29	0:23:23	40	46.0	136000	YES	Y	2459.557	8069					Bobby	GOOD					
	70	180315 170654	17:07:12	17:25:12	0:18:00	40	46.0	136000	YES	Y	2436.486	7994					Bobby	GOOD					
	UL001	180315 172958	17:30:16	17:35:05	0:04:49	40	46.0	136000	YES	Y	2449.536	8037					Bobby	GOOD					

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	3:16:35	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	2:09:17	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name						
		3/15/2018	74	78351		Texas Block 12						
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time	Base			
Kat		6255Q		980.3		10:05:00		15:05:00	Woolpert PIN			
Pilot		Sensor Type/Number		HOBBS END		Local End Time		Zulu End Time	PID			
Cody		ALS 8170		984.1		14:09		19:09	KLBB			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		KLBB		
220/15G20	10	170	BKN	11	1	2986				Arriving		
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	Mode			
40		36		346		100		Gain - Course/Up	Single			
								Gain - Fine/Down	Multi			
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.		
150	Kts	7800		Ft		8914		@		NS		
						Yes		No		Ft		
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments				
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:				
		⇕ Times entered are Zulu / GMT ⇕						Verify S-Turns Before Mission				
								Yes	X	No		
1	N	15:50:00	16:07:00	0:17:00	17	0.7	1.2					
2	S	16:09:00	16:26:00	0:17:00	16	0.7	1.2					
3	N	16:28:00	16:45:00	0:17:00	15	0.8	1.4					
4	S	16:47:00	17:04:00	0:17:00	14	0.8	1.4					
5	N	17:06:00	17:23:00	0:17:00	16	0.8	1.3					
6	S	17:25:00	17:43:00	0:18:00	15	0.8	1.3					
7	N	17:45:00	18:02:00	0:17:00	16	0.7	1.2					
8	S	18:04:00	18:22:00	0:18:00	16	0.7	1.2					
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes	X	No
Additional Comments:										Drive #		

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/15/2018	74	78351		Texas Block 10

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Kat	6255Q	984.1	14:51:00	19:51:00	Woolpert PIN
Pilot	Sensor Type/Number	HOBBS END	Local End Time	Zulu End Time	PID
Cody	ALS 8170	985.3	16:20	21:20	KLBB

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	KLBB	
210/19	10					2977		KLBB	KLBB

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values
40	36	346	100			
				Gain - Course/Up	Single	A
				Gain - Fine/Down	Multi	B

Air Speed	AGL	MSL	Waveform Used	Waveform Mode	Pre-Trigger Dist.
150	Kts	Ft	10144	Yes No	@ NS Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:

↑ Times entered are Zulu / GMT ↓	Verify S-Turns Before Mission	Yes	<input checked="" type="checkbox"/>	No
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69	E	20:15:00	20:34:00	0:19:00	22	0.6	1.2	
68	W	20:37:00	20:58:00	0:21:00	21	0.6	1.4	

↑ Times entered are Zulu / GMT ↑	Page	1	Verify S-Turns After Mission	Yes	<input checked="" type="checkbox"/>	No
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Additional Comments:	Drive #

LiDAR Flight Log

Subcontractor:															MM/DD/YEAR	Day of Year	Project #		Phase #		Project Name																
											3/17/2018	76					TX Panhandle 2018 D18																				
Operator			Aircraft			HOBBSS Start			Local Start Time			ZULU Start Time			Base																						
David Braun			N7516Q																																		
Pilot			Sensor Type / Number			HOBBSS END			Local End Time			Zulu End Time			PID																						
Brian Jones			Optech H300 SEN325												KPYX R8 5.11 SFT																						
Wind Dir/Speed		Visibility		Ceiling		Cloud Cover %		Temp		Dew Point		Pressure			Haze/Fire/Cloud			Departing																			
Scan Angle (FOV)		Scan Frequency (Hz)			Pulse Rate (kHz)		Laser Power %			Fixed Gain		Mode			Threshold Values																						
30		55			200		High			X		Single			A																						
										Gain - Course/Up		Gain - Fine/Down			Multi			X			B																
Air Speed			AGL			MSL			Waveform Used			Waveform Mode			Pre-Trigger Dist.																						
150			Kts			6232			Ft			10,100			Ft			Yes			No			@			NS			Ft							
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments																													
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:																													
		⇅ Times entered are Zulu / GMT ⇅												Verify S-Turns Before Mission			Yes		X		No																
179	E	13:56:00	14:16:00	0:20:00	18		1.28	SA3																													
180	W	14:20:00	14:40:00	0:20:00	19		1.07																														
181	E	14:43:00	15:03:00	0:20:00	18		1.2																														
182	W	15:06:00	15:26:00	0:20:00	17		1.32																														
183	E	15:29:00	15:49:00	0:20:00	16		1.23																														
184	W	15:52:00	16:12:00	0:20:00	16		1.32																														
185	E	16:15:00	16:35:00	0:20:00	15		1.28																														
186	W	16:39:00	16:58:00	0:19:00	15		1.27																														
187	E	17:01:00	17:21:00	0:20:00	14		1.42																														
208	N	17:28:00	17:33:00	0:05:00	15		1.22																														
188	W	17:38:00	17:58:00	0:20:00	16		1.12																														
189	E	18:49:00	19:09:00	0:20:00	16		1.21																														
190	W	19:13:00	19:33:00	0:20:00	16		1.21																														
191	E	19:36:00	19:56:00	0:20:00	15		1.32																														
192	W	20:00:00	20:19:00	0:19:00	16		1.25																														
193	E	20:22:00	20:42:00	0:20:00	17		1.21																														
194	W	20:47:00	21:06:00	0:19:00	15		1.47																														
207	S	21:13:00	21:19:00	0:06:00	16		1.34																														
				↑ Times entered are Zulu / GMT ↑				Page		1								Verify S-Turns After Mission			Yes		X		No												
Additional Comments:																		Drive #																			

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name					
		3/17/2018	76	78351		Texas Block 10					
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time	Base		
Kat		6255Q		985.3		11:51:00		16:51:00	Woolpert PIN		
Pilot		Sensor Type/Number		HOBBS END		Local End Time		Zulu End Time	PID		
Cody		ALS 8170		990.2		16:58		21:58	KLBB		
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	
090/11			OVC	10	M02	2998				Arriving	
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	Mode		Threshold Values	
40	36		346		100			Single		A	
								Multi		B	
Air Speed	AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.		
150	Kts	7800	Ft	10144	Ft	Yes	No	@	NS	Ft	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
		⇕ Times entered are Zulu / GMT ⇕					Verify S-Turns Before Mission		Yes	No	
67	E	17:18:00	17:37:00	0:19:00	16	0.7	1.2	thn clouds extreme east end			
58	W	17:41:00	18:00:00	0:19:00	18	0.7	1.1				
57	E	18:02:00	18:22:00	0:20:00	17	0.7	1.3				
56	W	18:23:00	18:42:00	0:19:00	18	0.6	1.1	thn clouds extreme east end			
40	E	18:48:00	19:07:00	0:19:00	18	0.6	1.2				
41	W	19:09:00	19:28:00	0:19:00	19	0.6	1.1				
42	E	19:30:00	19:49:00	0:19:00	17	0.6	1.2				
43	W	19:51:00	20:10:00	0:19:00	17	0.6	1.3				
44	E	20:13:00	20:32:00	0:19:00	17	0.6	1.2				
45	W	20:34:00	20:53:00	0:19:00	17	0.6	1.3				
46	E	20:56:00	21:15:00	0:19:00	16	0.7	1.4				
47	W	21:17:00	21:36:00	0:19:00	18	0.6	1.3				
		↑ Times entered are Zulu / GMT ↑					Page	1	Verify S-Turns After Mission		Yes
Additional Comments:									Drive #		



P.O. Box 72357
 Bossier City, LA 72357

LIDAR Daily Log															GPS Information		Meteorological Conditions							
Field Crew		Project #			Project Description			Lever Arm			GPS (m)		AGC		Elevation		Temp		Pressure					
Block 8		MISSION 20			Texas Panhandle LIDAR			x: -215, y: .848, z: 1.509			Base 1: 19820791.T02		Auto		Airport									
											Base 2		@ Altitude											
											Base 3													
											Aero 1		@ Altitude											
IMU Information															GPS Base Station Information									
Start Time: 15:31:05															File Name		RNx File		Ant Hgt	Ant Type				
Stop Time: 18:17:40															Base 1: 19820791.T02				2.05m	Trimble R10				
															Base 2									
															Base 3									

Flight Date (UTC)			Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME											
3/20/2018			DanHill	Coleman	ALS70-7198	N6461Z	20180320_155342											
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments
	2	180320 163954	16:40:14	17:02:40	0:22:26	40	46.0	136000	YES	Y							Coleman	GOOD
	3	180320 170744	17:08:04	17:31:03	0:22:59	40	46.0	136000	YES	Y							Coleman	GOOD
	4	180320 173447	17:35:07	17:57:06	0:21:59	40	46.0	136000	YES	Y							Coleman	GOOD
UL001	180320 180026		18:00:46	18:01:15	0:00:29	40	46.0	136000	YES	Y							Coleman	GOOD

LIDAR FLIGHT SUMMARY					DATA COLLECTION					Comments			Cloud Cover						
Aircraft IMU Time	2:46:35	Hobbs Start	0		Total Lines	0	Project % Complete	0.0%											
Sensor Collection Time	1:07:53	Hobbs Stop	0		# Reflight Lines	0	Total Flight Lines	0											
Line Miles Flown	0.0	Mission Hobbs	0.0		Reflight Percent	0.0%	Line Complete	0											
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0		Sensor Re-Flight Miles	0.0	Mission Lines	0											
																	Clear	X	
																	Fair		
																	Partly Cloudy		
																	Cloudy		



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LIDAR Daily Log Project # _____ Project Description _____ Texas Panhandle LIDAR Location _____ Childress, TX Sensor Navigation File Name: 2018032018_201433										GPS Information		AGC		Meteorological Conditions											
										Base 1		42460790.T02		Auto		Elevation		Temp		Pressure					
										Base 2						1,954		3.0°C		276.15°k					
										Base 3						@ Altitude		@ Altitude							
DRIVE 004										IMU Information		GPS Base Station Information													
MISSION 8										Start Time		15:20:55		File Name		42460790.T02		Ant Hgt		1.5m		Ant Type		Trimble R7	
Sensor: ALS70-7178 Aircraft: N85PE										Stop Time		18:25:30		Base 1				Base 2				Base 3			

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME													
3/20/2018	Humphries	Pautsch	ALS70-7178	N85PE	2018032018_201433													
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments
	57	180320_204621	20:46:21	21:08:30	0:22:09	40	46.0	136000	YES	Y			118				Pautsch	GOOD
	56	180320_211137	21:11:37	21:30:30	0:18:53	40	46.0	136000	YES	Y			143				Pautsch	GOOD
	55	180320_213457	21:34:57	21:57:30	0:22:33	40	46.0	136000	YES	Y			117				Pautsch	GOOD
	54	180320_220033	22:03:33	22:19:30	0:15:57	40	46.0	136000	YES	Y			139				Pautsch	GOOD
	53	180320_222411	22:24:11	22:46:30	0:22:19	40	46.0	136000	YES	Y			117				Pautsch	GOOD
	52	180320_224932	22:49:32	23:08:30	0:18:58	40	46.0	136000	YES	Y			133				Pautsch	GOOD
Base Station Logging on - 1018 UTC Base Station Logging off - 1825 UTC Base Station location - K3F6																		

LIDAR FLIGHT SUMMARY					DATA COLLECTION					Comments					Cloud Cover	
Aircraft IMU Time	3:04:35	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%						Clear X			
Sensor Collection Time	2:00:49	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0									
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0									
Average Flight Lines Speed	128 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0									

Woolpert

MM/DD/YYYY															Day of Year										Project #										Phase #										Project Name																			
3/20/2018															79										18-6739-02-102																				TX_Panhandle Block 7																			
Operator- W. Rose															Aircraft										HOBBBS Start										Local Start Time										ZULU Start Time										Base									
Other															35A5										211.1																				NG5																			
Pilot															Sensor Type										HOBBBS END										Local End Time										Zulu End Time										PID									
S. Robertson															ALS70										221.6																				FL2072																			
Wind Dir/Speed										Visibility					Ceiling					Cloud Cover %					Temp					Dew Point					Pressure					Haze/Fire/Cloud					Departing					Arriving														
170@20										10					clr					0										30.02																																		
Scan Angle (FOV)					Scan Frequency (Hz)					Pulse Rate (kHz)					Laser Power %					Fixed Gain					Mode					Threshold Values																																		
40					46					272					100					Gain - Course/Up					Single					A																																		
																				Gain - Fine/Down					Multi					B																																		
Air Speed					AGL					MSL					Waveform Used					Waveform Mode					Pre-Trigger Dist.																																							
					Kts					Ft					Yes					NO					@					NS					Ft																													
Line #	Dir.	Line Start Time			Line End Time			Time On Line			SV's			HDOP			PDOP			Line Notes/Comments																																												
Test	n/a							n/a			n/a			n/a			n/a			GPS Began Logging At:																																												
↓ Times entered are Zulu / GMT ↓															Verify S-Turns Before Mission					Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>																																												
13	83	4:52:00			5:11:30			0:19:30			17			0.7			1.4																																															
12	264	5:14:00			5:34:00			0:20:00			19			0.7			1.2																																															
11	83	5:36:30			5:56:00			0:19:30			19			0.7			1.4																																															
10	264	5:58:30			6:18:00			0:19:30			18			0.7			1.3																																															
9	83	6:21:00			6:40:30			0:19:30			16			0.8			1.4																																															
8	264	6:43:00			7:03:00			0:20:00			16			0.7			1.3																																															
7	83	7:05:00			7:25:00			0:20:00			17			0.7			1.2																																															
6	264	7:27:00			7:46:30			0:19:30			20			0.6			1																																															
5	83	7:48:30			8:08:00			0:19:30			17			0.7			1.1																																															
4	264	8:11:00			8:31:00			0:20:00			17			0.7			1.1			Fuel stop																																												
↑ Times entered are Zulu / GMT ↑															Page					1					Verify S-Turns After Mission					Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>																																		
Additional Comments:															3 flight missions for the day.										Drive #																																							



P.O. Box 72357
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LIDAR Daily Log																					
Field Crew		LIDAR Daily Log										GPS Information		AGC			Meteorological Conditions				
		Project #	Project Description			Lever Arm			GPS (m)		Base 1	Base 2	Base 3	Aero 1	Auto	@ Altitude	@ Altitude	Elevation	Temp	Temp	Pressure
			Texas Panhandle LIDAR			x	y	z	-108	.130	-1.240	42460800.T02						1,954	7.0°C	280.15°k	3015.00 inHg
DRIVE 002		Location			MISSION 9		Childress, TX			IMU Information		GPS Base Station Information									
		Childress, TX								Start Time	14:10:07	File Name		RNX File	Ant Hgt	Ant Type					
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME					Stop Time	18:03:20	Base 1	42460800.T02	1.5m	Trimble R7					
3/21/2018		Humphries	Pautsch	ALS70-7178	N85PE	2018032118_140752							Base 2								
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments			
	51	180321 143350	14:33:50	14:56:30	0:22:40	40	46.0	136000	YES	Y			118				Pautsch	GOOD			
	50	180321 150015	15:00:15	15:18:30	0:18:15	40	46.0	136000	YES	Y			143				Pautsch	GOOD			
	49	180321 152236	15:22:36	15:44:30	0:21:54	40	46.0	136000	YES	Y			122				Pautsch	GOOD			
	48	180321 154817	15:48:17	16:06:30	0:18:13	40	46.0	136000	YES	Y			146				Pautsch	GOOD			
	47	180321 161052	16:10:52	16:32:30	0:21:38	40	46.0	136000	YES	Y			118				Pautsch	GOOD			
	46	180321 163639	16:36:39	16:55:30	0:18:51	40	46.0	136000	YES	Y			144				Pautsch	GOOD			
	45	180321 165948	16:59:48	17:21:30	0:21:42	40	46.0	136000	YES	Y			117				Pautsch	GOOD			
	44	180321 172543	17:25:43	17:44:30	0:18:47	40	46.0	136000	YES	Y			143				Pautsch	GOOD			
	UL001	180321 174923	17:49:23	17:51:30	0:02:07	40	46.0	136000	YES	Y			156				Pautsch	GOOD			
																	Base Station Logging on - 1350 UTC				
																	Base Station Logging off - 1912 UTC				
																	Base Station location - KCDS				

LIDAR FLIGHT SUMMARY					DATA COLLECTION					Comments					Cloud Cover					
Aircraft IMU Time	3:53:13	Hobbs Start			Total Lines	0	Project % Complete	0.0%												
Sensor Collection Time	2:44:07	Hobbs Stop			# Reflight Lines	0	Total Flight Lines	0												
Line Miles Flown	0.0	Mission Hobbs	0.0		Reflight Percent	0.0%	Line Complete	0												
Average Flight Lines Speed	151 kts	Reflight Hobbs	0.0		Sensor Re-Flight Miles	0.0	Mission Lines	0												
																	Clear	X		
																	Fair			
																	Partly Cloudy			
																	Cloudy			

Woolpert

MM/DD/YEAR		Day of Year		Project #		Phase #		Project Name	
3/20/2018		79		18-6739-02-102				TX_Panhandle Block 7	
Operator- W. Rose		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time	
Other		35A5		211.1				NG5	
Pilot		Sensor Type		HOBBS END		Local End Time		Zulu End Time	
S. Robertson		ALS70		221.6				FL2072	

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	
170@20	10	clr	0			30.02		Arriving	

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values
40	46	272	100	Gain - Course/Up	Single	A
				Gain - Fine/Down	Multi	B

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

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:
↓ Times entered are Zulu / GMT ↓								Verify S-Turns Before Mission <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

112	264	9:30:30	9:36:30	0:06:00	17	0.7	1.2	
113	354	9:42:00	10:01:30	0:19:30	15	0.7	1.2	
1	264	10:13:30	10:33:00	0:19:30	16	0.6	1.2	
2	83	10:35:30	10:55:00	0:19:30	16	0.7	1.3	
3	264	10:57:00	11:17:00	0:20:00	16	0.7	1.4	

↑ Times entered are Zulu / GMT ↑	Page	1	Verify S-Turns After Mission <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
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Additional Comments: 3 flight missions for the day.	Drive #
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Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name					
		3/21/2018	80	78351		Texas Panhandle Block 10					
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base			
Ryan		6255Q		994.3	10:46:00		15:46:00	Woolpert PIN			
Pilot		Sensor Type/Number		HOBBS END	Local End Time		Zulu End Time	PID			
Scott		ALS 8170		997.8	14:28		19:28	KLBB			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud			
130/10	10	210	BKN	9	M06	3011					
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %		Fixed Gain	Mode	Threshold Values		
40		36		346	100			Single	A		
								Multi	B		
Air Speed	AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.		
150 Kts	7800 Ft		10144 Ft		Yes No		@ NS		Ft		
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
		⇕ Times entered are Zulu / GMT ⇕						Verify S-Turns Before Mission	Yes	No	
53	E	16:12:00	16:31:00	0:19:00	17	0.8	1.4				
52	W	16:33:00	16:53:00	0:20:00	16	0.8	1.3				
51	E	16:55:00	17:14:00	0:19:00	16	0.7	1.3				
50	W	17:16:00	17:35:00	0:19:00	18	0.7	1.2				
49	E	17:38:00	17:57:00	0:19:00	18	0.7	1.2				
48	W	18:00:00	18:19:00	0:19:00	21	0.6	1.1				
39	E	18:23:00	18:41:00	0:18:00	20	0.7	1.2				
38	W	18:43:00	19:02:00	0:19:00	23	0.6	1				
		↑ Times entered are Zulu / GMT ↑		Page	1		Verify S-Turns After Mission		Yes	X	No
Additional Comments:									Drive #		



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LIDAR Daily Log															GPS Information		AGC	Meteorological Conditions											
Field Crew		Project #		Project Description		Lever Arm			GPS (m)		Base 1	Base 2	Base 3	Aero 1	IMU Information	Start Time	Stop Time	GPS Base Station Information	Elevation	Temp	Pressure								
Block 8				Texas Panhandle LIDAR		x	y	z	-215	.848	1.509	19820802.T02	Auto			16:13:55	19:28:13	File Name	RNX File	Ant Hgt	Ant Type								
MISSION 22				Childress, TX														19820802.T02		2.05m	Trimble R10								
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME					IMU Information		Start Time	Stop Time	GPS Base Station Information														
3/21/2018		DanHill	Coleman	ALS70-7198	N6461Z	20180321_161619							16:13:55	19:28:13	Base 1	Base 2	Base 3	File Name	RNX File	Ant Hgt	Ant Type								
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	8	PDOP	Operator	Conditions/Comments											
	7	180321 170047	17:01:06	17:21:36	0:20:30	40	46.0	136000	YES	Y							Coleman	GOOD											
	8	180321 172507	17:25:26	17:51:25	0:25:59	40	46.0	136000	YES	Y							Coleman	GOOD											
	9	180321 180521	18:05:40	18:25:40	0:20:00	40	46.0	136000	YES	Y							Coleman	GOOD											
	10	180321 184344	18:32:21	18:58:03		40	46.0	136000	YES	Y							Coleman	GOOD											
	UL001	180321 190304	19:03:23	19:04:23		40	46.0	136000	YES	Y							Coleman	GOOD											
LIDAR FLIGHT SUMMARY																													
Aircraft IMU Time					3:14:18	Hobbs Start					0	DATA COLLECTION					Comments					Cloud Cover							
Sensor Collection Time					1:06:29	Hobbs Stop					0	Total Lines					0	Project % Complete					0.0%	Clear					X
Line Miles Flown					0.0	Mission Hobbs					0.0	# Reflight Lines					0	Total Flight Lines					0	Fair					
Average Flight Lines Speed					0 kts	Reflight Hobbs					0.0	Reflight Percent					0.0%	Line Complete					0	Partly Cloudy					
						Sensor Re-Flight Miles					0.0	Mission Lines					0							Cloudy					



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LIDAR Daily Log															GPS Information		AGC	Meteorological Conditions							
Field Crew		Project #		Project Description		Lever Arm			GPS (m)		IMU Information		GPS Base Station Information		Elevation		Temp		Pressure						
Block 8				Texas Panhandle LIDAR			x	y	z	-215	.848	1.509	Start Time	16:13:55	Base 1	19820802.T02	2.05m	Trimble R10							
MISSION 22				Childress, TX									Stop Time	19:28:13	Base 2										
Flight Date (UTC)		Pilot		Operator		Sensor		Aircraft		SENSOR NAVIGATION FILE NAME															
3/21/2018		DanHill		Coleman		ALS70-7198		N6461Z		20180321_161619															
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	8	PDOP	Operator	Conditions/Comments							
	7	180321 170047	17:01:06	17:21:36	0:20:30	40	46.0	136000	YES	Y							Coleman	GOOD							
	8	180321 172507	17:25:26	17:51:25	0:25:59	40	46.0	136000	YES	Y							Coleman	GOOD							
	9	180321 180521	18:05:40	18:25:40	0:20:00	40	46.0	136000	YES	Y							Coleman	GOOD							
	10	180321 184344	18:32:21	18:58:03		40	46.0	136000	YES	Y							Coleman	GOOD							
	UL001	180321 190304	19:03:23	19:04:23		40	46.0	136000	YES	Y							Coleman	GOOD							
LIDAR FLIGHT SUMMARY															DATA COLLECTION					Comments				Cloud Cover	
Aircraft IMU Time		3:14:18		Hobbs Start		0		Total Lines		0		Project % Complete		0.0%				Clear		X					
Sensor Collection Time		1:06:29		Hobbs Stop		0		# Reflight Lines		0		Total Flight Lines		0				Fair							
Line Miles Flown		0.0		Mission Hobbs		0.0		Reflight Percent		0.0%		Line Complete		0				Partly Cloudy							
Average Flight Lines Speed		0 kts		Reflight Hobbs		0.0		Sensor Re-Flight Miles		0.0		Mission Lines		0				Cloudy							



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LIDAR Daily Log										GPS Information		AGC	Meteorological Conditions				
Field Crew		Project #	Project Description			Lever Arm			Base 1	Base 2	Base 3	Aero 1	Auto	Airport	Elevation	Temp	Pressure
Block 8			Texas Panhandle LIDAR			x	y	z						@ Altitude			
						-215	.848	1.509						@ Altitude			
MISSION 23		Location			IMU Information		GPS Base Station Information										
		Childress, TX			Start Time	12:46:20		File Name	RNX File	Ant Hgt	Ant Type						
					Stop Time	15:56:55		19820812.T02		2.05m	Trimble R10						

Flight Date (UTC)	Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME	
3/22/2018	DanHill	Coleman	ALS70-7198	N6461Z	20180322_131048	

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	8	PDOP	Operator	Conditions/Comments
	11	180322 133846	13:39:04	14:03:33	0:24:29	40	46.0	136000	YES	Y							Coleman	GOOD
	12	180322 140854	14:09:12	14:31:42	0:22:30	40	46.0	136000	YES	Y							Coleman	GOOD
	13	180322 143725	14:37:42	15:01:12	0:23:30	40	46.0	136000	YES	Y							Coleman	GOOD
	14	180322 150739	15:07:57	15:30:26	0:22:29	40	46.0	136000	YES	Y							Coleman	GOOD
	UL001	180322 153438	15:34:55	15:35:55	0:01:00	40	46.0	136000	YES	Y							Coleman	GOOD

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	3:10:35	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	1:33:58	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						

Woolpert

Leica LIDAR														MM/DD/YEAR 3/22/2018		Day of Year 81		Project # 78351		Phase #		Project Name Texas Panhandle Block 10			
Operator Ryan			Aircraft 6255Q				HOBBSS Start 997.8		Local Start Time 9:21:00			ZULU Start Time 14:21:00		Base Woolpert PIN											
Pilot Scott			Sensor Type/Number ALS 8170				HOBBSS END 1001.1		Local End Time 12:54			Zulu End Time 17:54		PID KLBB											
Wind Dir/Speed 230/08		Visibility 10		Ceiling 250		Cloud Cover % FEW		Temp 12	Dew Point 5		Pressure 3014			Haze/Fire/Cloud		Departing KLBB	Arriving KLBB								
Scan Angle (FOV) 40			Scan Frequency (Hz) 36			Pulse Rate (kHz) 346		Laser Power % 100			Fixed Gain		Mode		Threshold Values										
Air Speed 150				AGL 7800				MSL 10144				Waveform Used				Waveform Mode		Pre-Trigger Dist.							
Kts		Ft		Ft		Yes	No					@		NS	Ft										
Line #	Dir.	Line Start Time		Line End Time		Time On Line		SV's	HDOP	PDOP		Line Notes/Comments													
Test	n/a					n/a		n/a	n/a	n/a		GPS Began Logging At:													
		↑ Times entered are Zulu / GMT ↓										Verify S-Turns Before Mission	Yes	X	No										
37	E	14:52:00	15:11:00	0:19:00	22	0.6	1.2																		
36	W	15:14:00	15:34:00	0:20:00	20	0.6	1.2																		
35	E	15:36:00	15:55:00	0:19:00	18	0.6	1.3																		
34	W	15:58:00	16:17:00	0:19:00	18	0.7	1.2																		
33	E	16:20:00	16:38:00	0:18:00	16	0.8	1.3																		
32	W	16:41:00	17:01:00	0:20:00	16	0.8	1.4																		
31	E	17:04:00	17:22:00	0:18:00	17	0.8	1.3																		
↑ Times entered are Zulu / GMT ↑														Page		1		Verify S-Turns After Mission		Yes	X	No			
Additional Comments:														Drive #											
Landed early due to fuel transfer pump issue. It was resolved on the ground.																									

LiDAR Flight Log

Subcontractor:		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name					
		03/23/18	82			TX Panhandle 2018 D18					
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base			
Shaun		N7516Q		95.8			13:30				
Pilot		Sensor Type / Number		HOBBS END	Local End Time		Zulu End Time	PID			
Mike		Optech H300 SEN325		100.4			18:30				
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud		Departing	KDUX	
									Arriving	KDUX	
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %		Fixed Gain	Mode		Threshold Values		
30	55		200	High		X	Single		A		
							Multi		X	B	
Air Speed	AGL		MSL		Waveform Used		Waveform Mode			Pre-Trigger Dist.	
150	Kts	6232	Ft	10,100	Ft	Yes	No	@		NS	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
		⇅ Times entered are Zulu / GMT ⇅						Verify S-Turns Before Mission		Yes <input checked="" type="checkbox"/> No	
83		13:48:35	13:52:18	0:03:43							
84		13:56:02	14:15:51	0:19:49							
85		14:19:19	14:39:12	0:19:53							
86		14:42:35	15:02:51	0:20:16							
87		15:06:21	15:26:00	0:19:39							
88		15:30:42	15:51:24	0:20:42							
89		15:55:13	16:15:12	0:19:59							
90		16:20:49	16:41:29	0:20:40							
91		16:44:55	17:04:30	0:19:35							
92		17:08:59	17:28:54	0:19:55							
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes <input type="checkbox"/> No	
Additional Comments:										Drive #	

Woolpert

Leica LIDAR		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name						
		3/23/2018	82	78351		Texas Panhandle Block 10						
Operator		Aircraft		HOBBS Start		Local Start Time		ZULU Start Time		Base		
Ryan		6255Q		1005.3		8:49:00		13:49:00		Woolpert PIN		
Pilot		Sensor Type/Number		HOBBS END		Local End Time		Zulu End Time		PID		
Scott		ALS 8170		1009.7		13:35		18:35		KLBB		
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud		Departing	KLBB	
230/12	10	180	BKN	14	11	2997				Arriving	KLBB	
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain		Mode		
40		36		346		100		Gain - Course/Up		Single		
								Gain - Fine/Down		Multi		
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.		
150		Kts 7800		Ft 10144		Yes No		@ NS		Ft		
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments				
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:				
		⇅ Times entered are Zulu / GMT ⇅							Verify S-Turns Before Mission		Yes	X No
20	E	14:26:00	14:45:00	0:19:00	21	0.6	1.2					
19	W	14:48:00	15:08:00	0:20:00	22	0.6	1.1					
18	E	15:11:00	15:30:00	0:19:00	22	0.6	1.1					
17	W	15:32:00	15:52:00	0:20:00	19	0.6	1.2	ALS SOW ERROR at end of line during turn to				
16	E	16:38:00	16:56:00	0:18:00	17	0.7	1.1	rebooted system/flew over base station/				
15	W	16:59:00	17:19:00	0:20:00	15	0.8	1.3	new s turns before start of 16				
14	E	17:22:00	17:40:00	0:18:00	16	0.7	1.2					
13	W	17:43:00	18:04:00	0:21:00	19	0.6	1.1					
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes	X No	

Additional Comments: ALS needed to be rebooted right after completing line 17. No other issues for the remainder of the flight. The error said ALS SOW not being updated.

Drive #



P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log															GPS Information		AGC	Meteorological Conditions			
Field Crew		Project #		Project Description		Lever Arm			GPS (m)		Base 1		Base 2		Base 3		Aero 1	Elevation	Temp		Pressure
DRIVE 002		MISSION 10		Texas Panhandle LIDAR		Childress, TX			-108 .130 -1.240		42460830.T02		Auto					1,954	17.0°c	290.15°k	3000.00 inHg
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME					IMU Information		Start Time	Stop Time	File Name	RNx File	Ant Hgt	Ant Type			
3/24/2018		Humphries	Pautsch	ALS70-7178	N85PE	2018032418_144704					14:49:02		18:41:10	42460830.T02		1.5m	Trimble R7				
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments			
	43	180324 151614	15:16:14	15:39:30	0:23:16	40	46.0	136000	YES	Y			115				Pautsch	GOOD			
	42	180324 154159	15:41:59	16:01:30	0:19:31	40	46.0	136000	YES	Y			141				Pautsch	GOOD			
	41	180324 160507	16:05:07	16:27:30	0:22:23	40	46.0	136000	YES	Y			123				Pautsch	GOOD			
	40	180324 163029	16:30:29	16:49:30	0:19:01	40	46.0	136000	YES	Y			142				Pautsch	GOOD			
	39	180324 165346	16:53:46	17:15:30	0:21:44	40	46.0	136000	YES	Y			126				Pautsch	GOOD			
	38	180324 171847	17:18:47	17:37:30	0:18:43	40	46.0	136000	YES	Y			143				Pautsch	GOOD			
	37	180324 174138	17:41:38	18:04:30		40	46.0	136000	YES	Y			120				Pautsch	GOOD			
	36	180324 180654	18:06:54	18:25:30		40	46.0	136000	YES	Y			146				Pautsch	GOOD			
	UL001	180324 182827	18:28:27	18:31:30		40	46.0	136000	YES	Y			127				Pautsch	GOOD			
																		Base Station Logging on - 0937 UTC			
																		Base Station Logging off - 1412 UTC			
																		Base Station location - KCDS			

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	3:52:08	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	2:04:38	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	148 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						

LiDAR Flight Log

Subcontractor:		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name				
		3/24/2018	83			TX Panhandle 2018 D18				
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base		
Shaun		N7516Q		95.8			14:30:00			
Pilot		Sensor Type / Number		HOBBS END	Local End Time		Zulu End Time	PID		
Mike		Optech H300 SEN325		100.4			16:45:00			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KDUX	
								Arriving	KDUX	
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %		Fixed Gain	X	Mode	Threshold Values	
30	55		200	High		Gain - Course/Up		Single	A	
						Gain - Fine/Down		Multi	X B	
Air Speed	AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.	
150	Kts	6232	Ft	10,100	Ft	Yes	No	@	NS	Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments		
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:		
		↓ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission	Yes	X No
205	N	14:51:00	14:55:00	0:04:00						
93	E	15:02:00	15:22:00	0:20:00						
94	W	15:26:00	15:46:00	0:20:00						
95	E	15:49:00	16:09:00	0:20:00						
96	W	15:06:21	15:26:00	0:19:39						
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission	Yes	No
Additional Comments:										
									Drive #	

Woolpert

Leica LIDAR										MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name			
										3/24/2018	83	78351		Texas Panhandle Block 10			
Operator			Aircraft		HOBBES Start		Local Start Time		ZULU Start Time		Base						
Ryan			6255Q		1012.8		8:47:00		13:47:00		Woolpert PIN						
Pilot			Sensor Type/Number		HOBBES END		Local End Time		Zulu End Time		PID						
Scott			ALS 8170		1016		12:23		17:23		KLBB						
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud			Departing	KLBB						
350/08	10	180	BKN	9	M02	3001				Arriving	KLBB						
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	Mode		Threshold Values						
40		36		346		100			Single		A						
								Gain - Course/Up		Multi		B					
								Gain - Fine/Down									
Air Speed			AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.						
150			7800		10144		Yes <input type="checkbox"/> No <input type="checkbox"/>		@ NS		Ft						
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments									
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:									
		⇕ Times entered are Zulu / GMT ⇕					Verify S-Turns Before Mission					Yes	<input checked="" type="checkbox"/>	No			
77	N	14:16:00	14:33:00	0:17:00	22	0.6	1.2										
1	W	14:40:00	14:54:00	0:14:00	23	0.6	1.1										
2	E	14:58:00	15:16:00	0:18:00	23	0.6	1.1										
3	W	15:19:00	15:39:00	0:20:00	22	0.6	1.1										
4	E	15:42:00	16:00:00	0:18:00	19	0.7	1.2										
5	W	16:03:00	16:24:00	0:21:00	19	0.7	1.1										
6	E	16:26:00	16:45:00	0:19:00	18	0.7	1.1										
		↑ Times entered are Zulu / GMT ↑					Page		1			Verify S-Turns After Mission		Yes	<input checked="" type="checkbox"/>	No	
Additional Comments:											Drive #						

LiDAR Flight Log

Subcontractor:		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name			
		3/24/2018	83			TX Panhandle 2018 D18			
Operator		Aircraft		HOBBS Start	Local Start Time	ZULU Start Time	Base		
Shaun		N7516Q		95.8		17:30:00			
Pilot		Sensor Type / Number		HOBBS END	Local End Time	Zulu End Time	PID		
Mike		Optech H300 SEN325		100.4		22:00:00			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KDUX
								Arriving	KDUX
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values	
30		55		200	High	X		A	
						Gain - Course/Up	Single	B	
						Gain - Fine/Down	Multi	X	
Air Speed		AGL		MSL		Waveform Used		Waveform Mode	
150	Kts	6232	Ft	10,100	Ft	Yes	No	@	NS
								Pre-Trigger Dist.	
								Ft	

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	
		⇅ Times entered are Zulu / GMT ⇅						Verify S-Turns Before Mission	Yes X No
205	N	17:46:00	17:50:00	0:04:00					
96	E	17:58:00	18:18:00	0:20:00					
97	W	18:22:00	18:42:00	0:20:00					
98	E	18:45:00	19:05:00	0:20:00					
99	W	19:09:00	19:29:00	0:20:00					
100	E	19:33:00	19:53:00	0:20:00					
101	W	19:57:00	20:17:00	0:20:00					
102	E	20:21:00	20:40:00	0:19:00					
103	W	20:45:00	21:05:00	0:20:00					
104	E	21:09:00	21:29:00	0:20:00					
105	W	21:32:00	21:52:00	0:20:00					

↑ Times entered are Zulu / GMT ↑	Page	1	Verify S-Turns After Mission	Yes	No
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Additional Comments:	Drive #

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/24/2018	83/84	78351		Texas Panhandle Block 12

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Ryan	6255Q	1016.0	8:47:00	13:47:00	Woolpert PIN

Pilot	Sensor Type/Number	HOBBS END	Local End Time	Zulu End Time	PID
Scott	ALS 8170	1019.8	20:15	1:15	KLBB

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KLBB
350/08	10	180	BKN	26	M01	2994		Arriving	KLBB

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values	
40	36	346	100		Single	A	B
				Gain - Course/Up	Multi	A	B
				Gain - Fine/Down			

Air Speed	AGL	MSL	Waveform Used	Waveform Mode	Pre-Trigger Dist.
150	Kts 7800	Ft 8914	Yes No	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:

⬆ Times entered are Zulu / GMT ⬆								Verify S-Turns Before Mission	Yes	X	No
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9	N	21:55:00	22:11:00	0:16:00	23	0.6	1.1	
10	S	22:14:00	22:31:00	0:17:00	22	0.6	1.1	
11	N	22:34:00	22:51:00	0:17:00	20	0.6	1.1	
12	S	22:53:00	23:10:00	0:17:00	19	0.7	1.3	
13	N	23:13:00	23:30:00	0:17:00	19	0.7	1.2	
14	S	23:32:00	23:49:00	0:17:00	18	0.7	1.2	
15	N	23:52:00	0:09:00	0:17:00	18	0.6	1.1	
16	S	0:11:00	0:28:00	0:17:00	21	0.6	1	

⬆ Times entered are Zulu / GMT ⬆			Page	1	Verify S-Turns After Mission	Yes	X	No
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Additional Comments:	Drive #

LiDAR Flight Log

Subcontractor:		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name				
		3/25/2018	84			TX Panhandle 2018 D18				
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base		
Shaun		N7516Q		95.8			13:35:00			
Pilot		Sensor Type / Number		HOBBS END	Local End Time		Zulu End Time	PID		
Mike		Optech H300 SEN325		100.4			18:10:00			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure		Haze/Fire/Cloud	Departing	KDUX
									Arriving	KDUX
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %		Fixed Gain	Mode		Threshold Values	
30	55		200	High			X			
						Gain - Course/Up	Single			A
						Gain - Fine/Down	Multi	X		B
Air Speed	AGL		MSL		Waveform Used			Waveform Mode		Pre-Trigger Dist.
150	Kts	6232	Ft	10,100	Ft	Yes	No	@ NS		Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments		
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:		
	↓ Times entered are Zulu / GMT ↓								Verify S-Turns Before Mission	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
106	E	13:48:00	14:08:00	0:20:00						
107	W	14:13:00	14:32:00	0:19:00						
108	E	14:36:00	14:56:00	0:20:00						
107x2	W	14:59:00	15:00:00	0:01:00						
109	W	15:05:00	15:25:00	0:20:00						
110	E	15:29:00	15:49:00	0:20:00						
111	W	15:53:00	16:13:00	0:20:00						
112	E	16:17:00	16:37:00	0:20:00						
113	W	16:42:00	17:02:00	0:20:00						
114	E	17:05:00	17:25:00	0:20:00						
115	W	17:29:00	17:49:00	0:20:00						
205	S	17:53:00	17:55:00	0:02:00						
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission		Yes <input type="checkbox"/> No <input type="checkbox"/>
Additional Comments:									Drive #	

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name			
	3/26/2018	86	78351		Texas Panhandle Block 12			
Operator		Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base		
Ryan		6255Q	1024.4	12:17:00	17:17:00	Woolpert PIN		
Pilot		Sensor Type/Number	HOBBS END	Local End Time	Zulu End Time	PID		
Scott		ALS 8170	1028.9	17:04	22:04	KLBB		
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	
300/21	10	140	BKN	19	7	2991		
Scan Angle (FOV)		Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %		Fixed Gain	Mode	Threshold Values
40		36	346	100			Single	A
						Gain - Course/Up	Multi	B
						Gain - Fine/Down		
Air Speed		AGL		MSL		Waveform Used		Waveform Mode
150	Kts	7800	Ft	8914	Ft	Yes	No	@ NS Ft
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:
		⇕ Times entered are Zulu / GMT ⇕						Verify S-Turns Before Mission
								Yes <input checked="" type="checkbox"/> No
27	N	18:05:00	18:22:00	0:17:00	20	0.6	1.1	
28	S	18:25:00	18:43:00	0:18:00	20	0.6	1.1	
29	N	18:46:00	19:04:00	0:18:00	19	0.6	1.2	
30	S	19:06:00	19:24:00	0:18:00	17	0.7	1.3	
31	N	19:26:00	19:43:00	0:17:00	19	0.6	1.2	
32	S	19:45:00	20:02:00	0:17:00	19	0.6	1.2	
33	N	20:05:00	20:21:00	0:16:00	21	0.6	1.1	
34	S	20:24:00	20:40:00	0:16:00	18	0.7	1.5	
35	N	20:42:00	20:58:00	0:16:00	22	0.6	1.3	
36	S	20:59:00	21:16:00	0:17:00	23	0.6	1.2	

		↑ Times entered are Zulu / GMT ↑		Page	1	Verify S-Turns After Mission		Yes	<input checked="" type="checkbox"/>	No
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Additional Comments:	Drive #
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LiDAR Flight Log

Subcontractor:		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name					
		3/28/2018	87			TX Panhandle 2018 D18					
Operator		Aircraft		HOBBS Start	Local Start Time	ZULU Start Time	Base				
Shaun		N7516Q		95.8	9:05:00						
Pilot		Sensor Type / Number		HOBBS END	Local End Time	Zulu End Time	PID				
Mike		Optech H300 SEN325		100.4	14:05						
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing			
								KDUX			
								Arriving	KDUX		
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %	Fixed Gain	X	Mode	Threshold Values			
30	55		200	High	Gain - Course/Up		Single	A			
								B			
								Gain - Fine/Down	Multi		
								X	B		
Air Speed	AGL		MSL		Waveform Used		Waveform Mode				
150	Kts	6232	Ft	10,100	Ft	Yes	No	@ NS			
								Pre-Trigger Dist.	Ft		
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments			
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:			
								Verify S-Turns Before Mission	Yes	X	No
206	N	14:45:00	14:58:00	0:13:00	17		1.36				
116	W	15:04:00	15:24:00	0:20:00	17		1.31				
117	E	15:28:00	15:48:00	0:20:00	16		1.28				
118	W	15:53:00	16:13:00	0:20:00	15		1.35				
119	E	16:16:00	16:36:00	0:20:00	15		1.18				
120	W							No Returns, 100% dropouts, System Broke			
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission			
								Yes			
								No			
Additional Comments:								Drive #			

Woolpert

Leica LIDAR	MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name
	3/29/2018	88	78351		Texas Panhandle Block 12

Operator	Aircraft	HOBBS Start	Local Start Time	ZULU Start Time	Base
Ryan	6255Q	1029.6	19:14:00	0:14:00	Woolpert PIN
Pilot	Sensor Type/Number	HOBBS END	Local End Time	Zulu End Time	PID
Scott	ALS 8170	1031.5	21:24	2:24	KCDS

Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KCDS
050/06	10	50	FEW	17	5	3007		Arriving	KCDS

Scan Angle (FOV)	Scan Frequency (Hz)	Pulse Rate (kHz)	Laser Power %	Fixed Gain	Mode	Threshold Values
40	36	346	100	Gain - Course/Up	Single	A
				Gain - Fine/Down	Multi	B

Air Speed	AGL	MSL	Waveform Used		Waveform Mode	Pre-Trigger Dist.
150 Kts	7800 Ft	8914 Ft	Yes	No	@ NS	Ft

Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:

↑ Times entered are Zulu / GMT ↓				Verify S-Turns Before Mission	Yes	X	No
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37	S	0:39:00	0:55:00	0:16:00	19	0.6	1.1	
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38	N	0:58:00	1:15:00	0:17:00	17	0.7	1.1	
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39	S	1:18:00	1:34:00	0:16:00	16	0.7	1.2	
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40	N	1:37:00	1:54:00	0:17:00	17	0.7	1.1	
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Additional Comments: _____ Drive # _____



P.O. Box 72357
Bossier City, LA 72357

LIDAR Daily Log															GPS Information		AGC	Meteorological Conditions			
Field Crew		Project #		Project Description		Lever Arm			GPS (m)		Base 1		Base 2		Base 3		Aero 1	Elevation	Temp		Pressure
DRIVE 002		MISSION 11		Texas Panhandle LIDAR		Childress, TX			-108 .130 -1.240		42461010.T02		Auto					1,954	29.0°c 302.15°k		2993.00 inHg
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME				IMU Information		GPS Base Station Information		File Name	RNx File	Ant Hgt	Ant Type	Base 1	Base 2	Base 3	
4/11/2018		Humphries	Pautsch	ALS70-7178	N85PE	20180411_134754				Start Time 14:49:15		Stop Time 16:59:59		42461010.T02		1.5m	Trimble R7				
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments			
	35	180411 141513	14:15:13	14:38:30	0:23:17	40	46.0	136000	YES	Y			117				Pautsch	GOOD			
	34	180411 144147	14:41:47	15:00:30	0:18:43	40	46.0	136000	YES	Y			148				Pautsch	GOOD			
	33	180411 150426	15:04:26	15:28:30	0:24:04	40	46.0	136000	YES	Y			114				Pautsch	GOOD			
	32	180411 153208	15:32:08	15:50:30	0:18:22	40	46.0	136000	YES	Y			152				Pautsch	GOOD			
	31	180411 155417	15:54:17	16:18:30	0:24:13	40	46.0	136000	YES	Y			116				Pautsch	GOOD			
	30	180411 162155	16:21:55	16:40:30	0:18:35	40	46.0	136000	YES	Y			148				Pautsch	GOOD			
	UL001	180411 164600	16:46:00	16:50:30	0:04:30	40	46.0	136000	YES	Y			119				Pautsch	GOOD			
																		Base Station Logging on - 1430 UTC			
																		Base Station Logging off - 2055 UTC			
																		Base Station location - KCDS			

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	2:10:44	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	2:11:44	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	152 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						

LiDAR Flight Log

Subcontractor:		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name			
		4/11/2018				TX Panhandle 2018 D18			
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base	
Shaun		N2JJ			7:45:00		12:45:00	KDUX	
Pilot		Sensor Type / Number		HOBBS END	Local End Time		Zulu End Time	PID	
Mike		Optech Galaxy			12:00		17:00:00		
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KDUX
								Arriving	KDUX
Scan Angle (FOV)	Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %		Fixed Gain	X	Mode	Threshold Values
30	55		200	High		Gain - Course/Up		Single	A
						Gain - Fine/Down		Multi	B
Air Speed	AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.
150	Kts	6232	Ft	10,100	Ft	Yes	No	@	NS
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments	
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:	
		⇅ Times entered are Zulu / GMT ⇅						Verify S-Turns Before Mission	Yes <input checked="" type="checkbox"/> No
171	NW	12:56:00	13:08:00	0:12:00	19		1.00	Cross Flight	
54	W	13:18:00	13:36:00	0:18:00	20		1.01		
53	E	13:39:00	13:56:00	0:17:00	20		1.00		
52	W	14:00:00	14:17:00	0:17:00	17		1.00		
51	E	14:21:00	14:38:00	0:17:00	16		1.06		
50	W	14:42:00	15:00:00	0:18:00	16		1.02		
49	E	15:04:00	15:22:00	0:18:00	15		1.09		
48	W	15:26:00	15:42:00	0:16:00	14		1.25		
47	E	15:45:00	16:02:00	0:17:00	14		1.26		
46	W	16:07:00	16:23:00	0:16:00	16		1.03		
45	E	16:27:00	16:45:00	0:18:00	14		1.17		
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission	Yes <input type="checkbox"/> No
Additional Comments:								Drive #	



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LIDAR Daily Log																					
Field Crew										GPS Information			Meteorological Conditions								
Project #										Lever Arm			AGC	Elevation	Temp		Pressure				
Project Description										x	y	z	Base 1	Base 2	Base 3	Airport	@ Altitude	@ Altitude			
DRIVE 002										-108	.130	-1.240	42461010.T02	Auto		1,954	33.0°c	306.15°k	2985.00 inHg		
MISSION 12										GPS (m)	IMU Information	Start Time	Stop Time	File Name	RNx File	Ant Hgt	Ant Type				
Location										Childress, TX	18:07:12	19:38:25	42461010.T02		1.5m	Trimble R7					
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME					Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments						
4/11/2018		Humphries	Pautsch	ALS70-7178	N85PE	20180411_180501								Pautsch	GOOD						
Reflight	Line	Dir		Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed							
	29	180411	183918	18:39:18	19:08:30	0:29:12	40	46.0	136000	YES	Y			117						Pautsch	GOOD
	28	180411	191142	19:11:42	19:29:30	0:17:48	40	46.0	136000	YES	Y			148						Pautsch	GOOD

Base Station Logging on - 1430 UTC
Base Station Logging off - 2055 UTC
Base Station location - KCDS

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	1:31:13	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	0:47:00	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	133 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						

LiDAR Flight Log

Subcontractor:		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name				
		4/11/2018				TX Panhandle 2018 D18				
Operator		Aircraft		HOBBS Start	Local Start Time		ZULU Start Time	Base		
Shaun		N2JJ			13:00:00		18:00:00	KDUX		
Pilot		Sensor Type / Number		HOBBS END	Local End Time		Zulu End Time	PID		
Mike		Optech Galaxy			16:00		21:00:00			
Wind Dir/Speed	Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud	Departing	KDUX	
								Arriving	KDUX	
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)	Laser Power %		Fixed Gain	Mode	Threshold Values	
30		55		200	High		X	Single	A	
							Gain - Course/Up	Multi	B	
							Gain - Fine/Down	X		
Air Speed		AGL		MSL		Waveform Used		Waveform Mode	Pre-Trigger Dist.	
150		Kts	6232	Ft	10,100	Ft	Yes	@	NS	
								No		
									Ft	
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments		
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:		
		↑ Times entered are Zulu / GMT ↓						Verify S-Turns Before Mission	Yes	
								X	No	
171	NW	18:21:00	18:23:00	0:02:00	19		1.00	Cross Flight		
44	W	18:28:00	18:46:00	0:18:00	20		1.01			
43	E	18:49:00	19:07:00	0:18:00	20		1.00			
42	W	19:11:00	19:29:00	0:18:00	17		1.00			
41	E	19:33:00	19:51:00	0:18:00	16		1.06			
40	W	19:55:00						Abort mission- dust clouds- extreme wind		
		↑ Times entered are Zulu / GMT ↑		Page		1		Verify S-Turns After Mission	Yes	No
									X	
Additional Comments:								Drive #		

LiDAR Flight Log														
Subcontractor:		MM/DD/YEAR	Day of Year	Project #	Phase #	Project Name								
		4/11/2018				TX Panhandle 2018 D18								
Operator		Aircraft		HOBBSS Start		Local Start Time		ZULU Start Time	Base					
Shaun		N2JJ				13:00:00		18:00:00	KDUX					
Pilot		Sensor Type / Number		HOBBSS END		Local End Time		Zulu End Time	PID					
Mike		Optech Galaxy				16:00		21:00:00						
Wind Dir/Speed		Visibility	Ceiling	Cloud Cover %	Temp	Dew Point	Pressure	Haze/Fire/Cloud		Departing	KDUX			
										Arriving	KDUX			
Scan Angle (FOV)		Scan Frequency (Hz)		Pulse Rate (kHz)		Laser Power %		Fixed Gain	X	Mode	Threshold Values			
30		55		200		High		Gain - Course/Up	Single		A			
								Gain - Fine/Down	Multi	X	B			
Air Speed		AGL		MSL		Waveform Used		Waveform Mode		Pre-Trigger Dist.				
150 Kts		6232 Ft		10,100 Ft		Yes No		@ NS		Ft				
Line #	Dir.	Line Start Time	Line End Time	Time On Line	SV's	HDOP	PDOP	Line Notes/Comments						
Test	n/a			n/a	n/a	n/a	n/a	GPS Began Logging At:						
		⏶ Times entered are Zulu / GMT ⏷						Verify S-Turns Before Mission		Yes	X	No		
171	N	14:09:00	14:21:00	0:12:00	17		1.00	Cross Flight						
59	W	14:28:00	14:52:00	0:24:00	16		1.01							
58	E	14:56:00	15:17:00	0:21:00	15		1.00							
57	W	15:23:00	15:47:00	0:24:00	14		1.00							
56	E	15:52:00	16:12:00	0:20:00	16		1.06	Intensity dropouts- heavy winds- dust						
55	W	16:18:00	16:38:00	0:20:00	15		1.22							
40	E	16:44:00	17:01:00	0:17:00	15		1.16							
39	W	17:07:00	17:25:00	0:18:00	15		1.15							
38	E	17:29:00	17:46:00	0:17:00	17		1.15	Heacy turbulance- atmospheric particulates causing dropouts						
37	W	17:50:00	18:09:00	0:19:00	16		1.16							
35	E	18:13:00	18:30:00	0:17:00	16		1.15							
		↑ Times entered are Zulu / GMT ↑				Page		1		Verify S-Turns After Mission		Yes	No	
Additional Comments:											Drive #			



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LIDAR Daily Log																					
Field Crew		LIDAR Daily Log										GPS Information		AGC			Meteorological Conditions				
		Project #	Project Description								Lever Arm		Base 1	42461050.T02	Auto	Airport	1,954	4.0°C	277.15°K	3026.00 inHg	Pressure
		DRIVE 002	Texas Panhandle LIDAR								GPS (m)	x	y	z	Base 2		@ Altitude				
		MISSION 14	Location									-108	.130	-1.240	Base 3		@ Altitude				
			Childress, TX								IMU Information		GPS Base Station Information								
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME						Start Time	13:35:20	File Name	RNX File	Ant Hgt	Ant Type				
4/15/2018		Humphries	Pautsch	ALS70-7178	N85PE	20180415_133337						Stop Time	16:44:10	Base 1	42461050.T02	1.5m	Trimble R7				
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments			
	21	180415 140221	14:02:21	14:27:30	0:25:09	40	46.0	136000	YES	Y			107				Pautsch	GOOD			
	20	180415 143009	14:30:09	14:48:30	0:18:21	40	46.0	136000	YES	Y			147				Pautsch	GOOD			
	19	180415 145306	14:53:06	15:17:30	0:24:24	40	46.0	136000	YES	Y			111				Pautsch	GOOD			
	18	180415 152022	15:20:22	15:38:30	0:18:08	40	46.0	136000	YES	Y			149				Pautsch	GOOD			
	17	180415 154303	15:43:03	16:08:30	0:25:27	40	46.0	136000	YES	Y			108				Pautsch	GOOD			
	16	180415 161059	16:10:59	16:28:30	0:17:31	40	46.0	136000	YES	Y			148				Pautsch	GOOD			
	UL001	180415 163324	16:33:24	16:35:30		40	46.0	136000	YES	Y			137				Pautsch	GOOD			
																	Base Station Logging on - 1330 UTC				
																	Base Station Logging off - 1710 UTC				
																	Base Station location - KCDS				

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	3:08:50	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	2:09:00	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	151 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						



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LIDAR Daily Log																				
Field Crew		LIDAR Daily Log										GPS Information		AGC			Meteorological Conditions			
		Project #	Project Description							Lever Arm			Base 1	42461060.T02	Auto	Airport	Elevation	Temp		Pressure
		Texas Panhandle LIDAR							x	y	z	Base 2			@ Altitude	1,954	9.0°C	282.15°k	3015.00 inHg	
		DRIVE 002	Location							GPS (m)			-108	.130	-1.240	Base 3			@ Altitude	
		MISSION 16	Childress, TX										IMU Information			GPS Base Station Information				
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME					Start Time	14:03:30		File Name	RNX File	Ant Hgt	Ant Type			
4/16/2018		Humphries	Pautsch	ALS70-7178	N85PE	20180416_140141					Stop Time	17:01:30		Base 1	42461060.T02	1.5m	Trimble R7			
Base 2													Base 3							
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments		
	9	180416 142915	14:29:15	14:53:30	0:24:15	40	46.0	136000	YES	Y			112				Pautsch	GOOD		
	8	180416 145633	14:56:33	15:14:30	0:17:57	40	46.0	136000	YES	Y			148				Pautsch	GOOD		
	7	180416 151854	15:18:54	15:43:30	0:24:36	40	46.0	136000	YES	Y			111				Pautsch	GOOD		
	6	180416 154641	15:46:41	16:05:30	0:18:49	40	46.0	136000	YES	Y			149				Pautsch	GOOD		
	5	180416 160927	16:09:27	16:34:30	0:25:03	40	46.0	136000	YES	Y			112				Pautsch	GOOD		
	4	180416 163730	16:37:30	16:55:30	0:18:00	40	46.0	136000	YES	Y			147				Pautsch	GOOD		
Base Station Logging on - 1343 UTC																				
Base Station Logging off - 2043 UTC																				
Base Station location - KCDS																				

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	2:58:00	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	2:08:40	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	130 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						



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LIDAR Daily Log										GPS Information		AGC	Meteorological Conditions					
Field Crew		Project #	Project Description			Lever Arm			Base 1	Base 2	Base 3	Aero 1	Auto	Airport	Elevation	Temp	Pressure	
DRIVE 002		MISSION 17	Texas Panhandle LIDAR			x	y	z	42461060.T02					@ Altitude	1,954	32.0°c	305.15°k	2990.00 inHg
			Childress, TX			-108	.130	-1.240	IMU Information				GPS Base Station Information					
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME			Start Time	18:03:45	File Name		RNX File	Ant Hgt	Ant Type			
4/16/2018		Humphries	Pautsch	ALS70-7178	N85PE	20180416_140141			Stop Time	20:50:10	42461060.T02			1.5m	Trimble R7			

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments
	3	180416 183102	18:31:02	18:58:30	0:27:28	40	46.0	136000	YES	Y			100				Pautsch	GOOD
	2	180416 190204	19:02:04	19:20:30	0:18:26	40	46.0	136000	YES	Y			147				Pautsch	GOOD
	1	180416 192507	19:25:07	19:52:30	0:27:23	40	46.0	136000	YES	Y			95				Pautsch	GOOD
	100	180416 200355	20:03:55	20:28:30	0:24:35	40	46.0	136000	YES	Y			107				Pautsch	GOOD
Base Station Logging on - 1343 UTC																		
Base Station Logging off - 2101 UTC																		
Base Station location - KCDS																		

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	2:46:25	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	1:37:52	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	112 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						



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LIDAR Daily Log										GPS Information		AGC	Meteorological Conditions							
Field Crew		Project #	Project Description			Lever Arm			GPS (m)	x	y	z	Base 1	42461130.T0B	Auto	Airport	Elevation	Temp	Pressure	
Block 8		Texas Panhandle LIDAR - Block 8							-108	.130	-1.240	Base 2			@ Altitude	1,954	20.0°c	293.15°k	3017.00 inHg	
MISSION 25		Location			Childress, TX						IMU Information	Start Time	17:13:39	Base 3		GPS Base Station Information	File Name	RNX File	Ant Hgt	Ant Type
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME				Stop Time	19:50:51	Base 1	42461130.T0B			1.5m	Trimble R7			
4/23/2018		McFarland	Pautsch	ALS70-7178	N85PE	20180423_170920						Base 2								

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments
	77	180423 175649	17:56:49	18:21:30	0:24:41	40	46.0	136000	YES	Y			115				Pautsch	GOOD
	76	180423 182407	18:24:07	18:44:30	0:20:23	40	46.0	136000	YES	Y			145				Pautsch	GOOD
	50	180423 185240	18:52:40	19:16:30	0:23:50	40	46.0	136000	YES	Y			123				Pautsch	GOOD
	49	180423 191915	19:19:15	19:41:30	0:22:15	40	46.0	136000	YES	Y			130				Pautsch	GOOD
Base Station Logging on - 1714 UTC																		
Base Station Logging off - 1950 UTC																		
Base Station location - KF21																		

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	2:37:12	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	1:31:09	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	128 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						



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LIDAR Daily Log																											
Field Crew		Project #										GPS Information		AGC		Meteorological Conditions											
Project Description		Lever Arm										Base 1		Auto		Elevation		Temp		Pressure							
DRIVE 002		Texas Panhandle - Block 8 LIDAR										Base 2				Airport		2,833		5.0°C	278.15°K	3000.00 inHg					
MISSION 26		Amarillo, TX										Base 3				@ Altitude											
Flight Date (UTC)		Pilot		Operator		Sensor		Aircraft		SENSOR NAVIGATION FILE NAME							IMU Information		GPS Base Station Information								
4/26/2018		Blake		Pautsch		ALS70-7178		N85PE		2018042618_123532							Start Time		12:35:32		File Name		RNx File		Ant Hgt	Ant Type	
																	Stop Time		15:39:20		Base 1		42461160.T02		1.5m	Trimble R7	
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments									
	17	180426 132509	13:25:09	13:48:30	0:23:21	40	46.0	136000	YES	Y			120				Pautsch	GOOD									
	18	180426 135210	13:52:10	14:14:30	0:22:20	40	46.0	136000	YES	Y			124				Pautsch	GOOD									
	19	180426 141800	14:18:00	14:41:30	0:23:30	40	46.0	136000	YES	Y			131				Pautsch	GOOD									
	20	180426 144511	14:45:11	15:09:30	0:24:19	40	46.0	136000	YES	Y			126				Pautsch	GOOD									
	21	180426 151642	15:16:42	15:38:30	0:21:48	40	46.0	136000	YES	Y			138				Pautsch	GOOD									
																		Base Station Logging on - 1300 UTC									
																		Base Station Logging off - 1615 UTC									
																		Base Station location - KE34									

LIDAR FLIGHT SUMMARY					DATA COLLECTION					Comments					Cloud Cover	
Aircraft IMU Time	3:03:48	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%						Clear X			
Sensor Collection Time	1:55:18	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0									
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0									
Average Flight Lines Speed	128 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0									
													Partly Cloudy			
													Cloudy			



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LIDAR Daily Log															GPS Information		AGC	Meteorological Conditions			
Field Crew		Project #		Project Description		Lever Arm			GPS (m)		IMU Information		GPS Base Station Information		Elevation		Temp		Pressure		
DRIVE 003		MISSION 27		Texas Panhandle - Block 8 LIDAR		Amarillo, TX			-108 .130 -1.240		Start Time 12:49:40		File Name 42461170.T02		Base 1 2,833		18.0°c		291.15°k		
4/27/2018		Blake Pautsch		ALS70-7178 N85PE		2018042718_124715			Stop Time 15:49:48		Base 2 @ Altitude		Base 3 @ Altitude		3022.00 inHg						
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments			
	22	180427 133229	13:32:29	13:53:30	0:21:01	40	46.0	136000	YES	Y			142				Pautsch	GOOD			
	23	180427 135645	13:56:45	14:21:30	0:24:45	40	46.0	136000	YES	Y			121				Pautsch	GOOD			
	24	180427 142441	14:24:41	14:45:30	0:20:49	40	46.0	136000	YES	Y			139				Pautsch	GOOD			
	25	180427 144902	14:49:02	15:13:30	0:24:28	40	46.0	136000	YES	Y			121				Pautsch	GOOD			
	26	180427 151608	15:16:08	15:37:30	0:21:22	40	46.0	136000	YES	Y			136				Pautsch	GOOD			
	UL001	180427 154210	15:42:10	15:44:30	0:02:20	40	46.0	136000	YES	Y			132				Pautsch	GOOD			
																		Base Station Logging on - 0755 Local			
																		Base Station Logging off - 1053 Local			
																		Base Station location - KE34			

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	3:00:08	Hobbs Start		Total Lines	0	Project % Complete						Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	1:54:45	Hobbs Stop		# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs		Reflight Percent		Line Complete	0						
Average Flight Lines Speed	158 kts	Reflight Hobbs		Sensor Re-Flight Miles	0.0	Mission Lines	0						



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Field Crew				LIDAR Daily Log								GPS Information			Meteorological Conditions			
Project #		Project Description		Lever Arm			GPS (m)			Base 1	Base 2	Base 3	Aero 1	AGC	Altitude	Temp	Pressure	
DRIVE 004		Texas Panhandle - Block 8 LIDAR		x	y	z	-108	.130	-1.240	42461241.T02	Auto			2,832	7.0°c	3022.00 inHg		
MISSION 28		Amarillo, TX		IMU Information						Start Time	13:30:40			File Name	RNX File	Ant Hgt	Ant Type	
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME						Stop Time	15:49:21	Base 1	42461241.T02	1.5m	Trimble R7	
5/4/2018		Mcfarland	Wilbanks	ALS70-7178	N85PE	20180504_132913								Base 2				
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments
	27	180504_140211	9:02:00	9:25:30	0:23:30	40	46.0	136000	YES	Y			115				Wilbanks	GOOD
	28	180504_143105	9:31:45	9:51:30	0:19:45	40	46.0	136000	YES	Y			150				Wilbanks	GOOD
	29	180504_145537	9:55:00	10:20:30	0:25:30	40	46.0	136000	YES	Y			119				Wilbanks	GOOD
	30	180504_152500	10:25:00	10:44:30	0:19:30	40	46.0	136000	YES	Y			146				Wilbanks	GOOD
Base Station Logging on - 1322 UTC																		
Base Station Logging off - 2119 UTC																		
Base Station location - KE34																		

LIDAR FLIGHT SUMMARY					DATA COLLECTION					Comments					Cloud Cover	
Aircraft IMU Time	2:18:41	Hobbs Start		Total Lines	0	Project % Complete							Clear X			
Sensor Collection Time	1:28:15	Hobbs Stop		# Reflight Lines	0	Total Flight Lines	0						Fair			
Line Miles Flown	0.0	Mission Hobbs		Reflight Percent		Line Complete	0						Partly Cloudy			
Average Flight Lines Speed	133 kts	Reflight Hobbs		Sensor Re-Flight Miles	0.0	Mission Lines	0						Cloudy			



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LIDAR Daily Log																					
Field Crew		LIDAR Daily Log										GPS Information		AGC	Meteorological Conditions						
		Project #		Lever Arm						Base 1		Auto	Airport	Elevation	Temp	Pressure					
		Project Description						x		y		z		Base 2	@ Altitude	2,832	22.0°c	295.15°k	3024.00 inHg		
DRIVE 004		Texas Panhandle - Block 8 LIDAR						-108		.130		-1.240		Base 3	@ Altitude						
MISSION 29		Amarillo, TX												IMU Information	Start Time	17:57:13	File Name	Ant Hgt	Ant Type		
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME										Stop Time	19:49:41	Base 1	42461241.T02	1.5m	Trimble R7
5/4/2018		Mcfarland	Wilbanks	ALS70-7178	N85PE	20180504_174929										Base 2					
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments			
	31	180504_182326	13:23:00	13:48:00	0:25:00	40	46.0	136000	YES	Y			124				Wilbanks	GOOD			
	32	180504_185423	13:54:45	14:15:45	0:21:00	40	46.0	136000	YES	Y			138				Wilbanks	GOOD			
	33	180504_191956	14:19:00	14:44:00	0:25:00	40	46.0	136000	YES	Y			114				Wilbanks	GOOD			
																		Base Station Logging on - 1322 UTC			
																		Base Station Logging off - 2119 UTC			
																		Base Station location - KE34			

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	1:52:28	Hobbs Start		Total Lines	0	Project % Complete						Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	1:11:00	Hobbs Stop		# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs		Reflight Percent		Line Complete	0						
Average Flight Lines Speed	125 kts	Reflight Hobbs		Sensor Re-Flight Miles	0.0	Mission Lines	0						



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Field Crew Project # _____ Project Description _____ DRIVE 003 Texas Panhandle - Block 8 LIDAR Location _____ MISSION 30 Amarillo, TX				LIDAR Daily Log Lever Arm x y z GPS (m) -108 .130 -1.240				GPS Information Base 1 42461241.T02 Base 2 _____ Base 3 _____ Aero 1 _____		AGC Auto	Meteorological Conditions Elevation 2,832 Temp 7.0°C 280.15°k 3025.00 inHg Pressure _____			
								IMU Information Start Time 12:46:17 Stop Time 14:56:35		GPS Base Station Information File Name 42461250.T02 RNX File _____ Ant Hgt 1.5m Ant Type Trimble R7				
								Base 1 Base 2 Base 3						

Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME									
5/5/2018		Mcfarland	Wilbanks	ALS70-7178	N85PE	20180505_124436									

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments
	34	180505 130924	8:09:00	8:33:30	0:24:30	40	46.0	136000	YES	Y			119				Wilbanks	GOOD
	35	180505 133657	8:37:45	8:58:30	0:20:45	40	46.0	136000	YES	Y			137				Wilbanks	GOOD
	36	180505 140103	9:00:00	9:25:30	0:25:30	40	46.0	136000	YES	Y			121				Wilbanks	GOOD
	37	180505 142745	9:27:00	9:48:30	0:21:30	40	46.0	136000	YES	Y			137				Wilbanks	GOOD
																		Base Station Logging on - 1235 UTC
																		Base Station Logging off - 0151 UTC
																		Base Station location - E34

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover						
Aircraft IMU Time	2:10:18	Hobbs Start		Total Lines	0	Project % Complete												
Sensor Collection Time	1:32:15	Hobbs Stop		# Reflight Lines	0	Total Flight Lines	0											
Line Miles Flown	0.0	Mission Hobbs		Reflight Percent		Line Complete	0											
Average Flight Lines Speed	129 kts	Reflight Hobbs		Sensor Re-Flight Miles	0.0	Mission Lines	0											
Clear X Fair Partly Cloudy Cloudy																		



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Field Crew		LIDAR Daily Log												GPS Information		AGC	Meteorological Conditions				
Project #		Project Description						Lever Arm			Base 1	Base 2	Base 3	Aero 1	Auto	Airport	Elevation	Temp	Pressure		
DRIVE 002		Texas Panhandle - Block 8 LIDAR						GPS (m)	x	y	z	IMU Information				GPS Base Station Information					
MISSION 31		Amarillo, TX									Start Time	Stop Time	File Name	RNX File	Ant Hgt	Ant Type					
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME						Start Time	Stop Time	Base 1	Base 2	Base 3					
5/5/2018		Mcfarland	Wilbanks	ALS70-7178	N85PE	20180505_160139						16:03:25	16:52:33	42461250.T02		1.5m	Trimble R7				
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments			
	38	20180505_160139	11:27:00	11:50:30	0:23:30	40	46.0	136000	YES	Y			122				Wilbanks	GOOD			
Base Station Logging on - 1235 UTC Base Station Logging off - 0151 UTC Base Station location - E34																					

LIDAR FLIGHT SUMMARY				DATA COLLECTION						Comments				Cloud Cover			
Aircraft IMU Time	0:49:08	Hobbs Start		Total Lines	0	Project % Complete		Sensor Re-Flight Miles					Clear	X			
Sensor Collection Time	0:23:30	Hobbs Stop		# Reflight Lines	0	Total Flight Lines	0										
Line Miles Flown	0.0	Mission Hobbs		Reflight Percent		Line Complete	0								Fair	Partly Cloudy	Cloudy
Average Flight Lines Speed	122 kts	Reflight Hobbs		Sensor Re-Flight Miles	0.0	Mission Lines	0										



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Field Crew					LIDAR Daily Log											GPS Information		AGC		Meteorological Conditions										
Project # TBA					Lever Arm											Base 1	7924_0510_07120	Auto	Airport	Elevation	Temp			Pressure						
Project Description Woolpert					GPS (m)											Base 2			@ Altitude	4,199	23.0°C	296.15°k	29.94 inHg	101388 Pa						
Location					Mission 32 E34											Base 3			@ Altitude			27.0°C	300.15°k	29.92 inHg	101321 Pa					
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME											IMU Information		GPS Base Station Information											
5/10/2018		Joe	Jane	ALS70	N8647Q	20180510_131304											Start Time	13:14:53	File Name	7924_0510_071202.m00	Ant Hgt	2.05m	Ant Type	Trimble R10	Base 1		Base 2		Base 3	
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments												
	38	180510 135314	13:53:34	14:16:44	0:23:11	40	46.0	136000	YES	Y	2449.855	8038					Jane	GOOD												
	39	180510 142400	14:24:20	14:53:48	0:29:28	40	46.0	136000	YES	Y	2437.278	7996					Jane	GOOD												

LIDAR FLIGHT SUMMARY						DATA COLLECTION					Comments					Cloud Cover	
Aircraft IMU Time	2:03:55	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%								Clear X		
Sensor Collection Time	0:52:38	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0										
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0										
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0										



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LIDAR Daily Log																														
Field Crew		LIDAR Daily Log										GPS Information		AGC			Meteorological Conditions													
Project #		TBA										Base 1		7924_0510_07120		Auto			Elevation		Temp		Pressure							
Project Description		Woolpert										Base 2							Airport		4,199		23.0°c		296.15°k		29.94 inHg		101388 Pa	
Location		MISSION 33 E34										Base 3							@ Altitude		3800AGL		27.0°c		300.15°k		29.92 inHg		101321 Pa	
Sensor		SENSOR NAVIGATION FILE NAME										Aero 1							@ Altitude											
Flight Date (UTC)		Pilot		Operator		Sensor		Aircraft		SENSOR NAVIGATION FILE NAME		IMU Information		Start Time		15:48:32		File Name		RNX File		Ant Hgt		Ant Type						
5/10/2018		Joe		Jane		ALS70		N8647Q		20180510_154637		Stop Time		18:47:49		Base 1		7924_0510_071202.m00		2.05m		Trimble R10								
Base 2																Base 3														
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments												
	40	180510 162418	16:24:37	16:45:57	0:21:20	40	46.0	136000	YES	Y	2380.272	7809					Jane	GOOD												
	41	180510 165153	16:52:13	17:22:40	0:30:27	40	46.0	136000	YES	Y	2500.364	8203					Jane	GOOD												
	42	180510 172813	17:28:33	17:49:51	0:21:19	40	46.0	136000	YES	Y	2391.253	7845					Jane	GOOD												
	43	180510 175625	17:56:45	18:24:20	0:27:35	40	46.0	136000	YES	Y	2429.879	7972					Jane	GOOD												

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	2:59:17	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X	
Sensor Collection Time	1:40:41	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						



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				LIDAR Daily Log										GPS Information		AGC		Meteorological Conditions											
				Project #		TBA				Lever Arm GPS (m) x: -0.058, y: -0.001, z: -1.205				Base 1		_7924_0510_07120		Auto		Elevation		23.0°C		296.15°K		29.94 inHg		101388 Pa	
				Project Description				Base 2								@ Altitude		3800AGL		27.0°C		300.15°K		29.92 inHg		101321 Pa			
				Woolpert				Aero 1								@ Altitude													
				Location				MISSION 34				E34				IMU Information						GPS Base Station Information							
				SENSOR NAVIGATION FILE NAME				20180510_191813				Start Time		19:20:08		File Name		7924_0510_071202.m00		Ant Hgt		2.05m		Ant Type		Trimble R10			
Flight Date (UTC)		Pilot		Operator		Sensor		Aircraft		SENSOR NAVIGATION FILE NAME		Stop Time		21:18:24		Base 1		Base 2		Base 3									
5/10/2018		Joe		Jane		ALS70		N8647Q		20180510_191813																			

Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments
	44	180510 195157	19:52:17	20:12:58	0:20:41	40	46.0	136000	YES	Y	2397.061	7864					Jane	GOOD
	45	180510 202010	20:20:29	20:53:25	0:32:56	40	46.0	136000	YES	Y	2448.327	8033					Jane	GOOD

LIDAR FLIGHT SUMMARY						DATA COLLECTION										Comments				Cloud Cover			
Aircraft IMU Time						Hobbs Start		0		Total Lines				0		Project % Complete				0.0%		Clear X	
Sensor Collection Time						Hobbs Stop		0		# Reflight Lines				0		Total Flight Lines				0		Fair	
Line Miles Flown						Mission Hobbs		0.0		Reflight Percent				0.0%		Line Complete				0		Partly Cloudy	
Average Flight Lines Speed						Reflight Hobbs		0.0		Sensor Re-Flight Miles				0.0		Mission Lines				0		Cloudy	



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Field Crew		LIDAR Daily Log										GPS Information		Meteorological Conditions				
Project #		TBA				Lever Arm			GPS (m)		AGC		Elevation		Temp		Pressure	
Project Description		Woolpert				x y z			-0.058 -0.001 -1.205		Base 1		3800AGL		23.0°C		101388 Pa	
Location		E34				IMU Information		Start Time		15:47:33		@ Altitude		300.15°K		29.92 inHg		
MISSION 35		SENSOR NAVIGATION FILE NAME				Stop Time		18:07:49		GPS Base Station Information		File Name		Ant Hgt		Ant Type		
5/11/2018		20180511_154537				Base 1				7924_0511_094447.m00		2.05m		Trimble R10				
Pilot		Operator		Sensor		Aircraft		SENSOR NAVIGATION FILE NAME		Base 2								
Joe		Jane		ALS70		N8647Q		20180511_154537		Base 3								
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments
	46	180511 162154	16:22:13	16:45:21	0:23:08	40	46.0	136000	YES	Y	2387.603	7833					Jane	GOOD
	47	180511 165209	16:52:28	17:19:12	0:26:44	40	46.0	136000	YES	Y	2432.587	7981					Jane	GOOD
	48	180511 172440	17:24:59	17:46:50	0:21:51	40	46.0	136000	YES	Y	2494.895	8185					Jane	GOOD

LIDAR FLIGHT SUMMARY					DATA COLLECTION				Comments			Cloud Cover	
Aircraft IMU Time	2:20:16	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%				Clear X Fair Partly Cloudy Cloudy		
Sensor Collection Time	1:11:43	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						



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LIDAR Daily Log																						
Field Crew		Project Information										GPS Information		AGC	Meteorological Conditions							
		Project #	TBA								Lever Arm		Base 1	X_7924_0514_074	Auto	Airport	Elevation	Temp	Pressure			
		Project Description									x	y	z	Base 2			@ Altitude	4,199	23.0°c	296.15°k	29.94 inHg	101388 Pa
		Woolpert									-0.058	-0.001	-1.205	Base 3			@ Altitude	3800AGL	27.0°c	300.15°k	29.92 inHg	101321 Pa
		Location									IMU Information		GPS Base Station Information									
		MISSION 36	2F1								Start Time	13:31:33	File Name	RNX File	Ant Hgt	Ant Type						
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME						Stop Time	16:48:58	Base 1	X_7924_0514_074846.m00	1.215m	AX 1202 GG					
5/14/2018		Joe	Jane	ALS70	N8647Q	20180514_132942						Base 2										
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments				
	51	180514 140744	14:08:03	14:32:44	0:24:41	40	46.0	136000	YES	Y	2438.28	8000					Jane	GOOD				
	52	180514 143835	14:38:54	15:00:36	0:21:42	40	46.0	136000	YES	Y	2440.821	8008					Jane	GOOD				
	53	180514 150502	15:05:21	15:29:47	0:24:25	40	46.0	136000	YES	Y	2440.484	8007					Jane	GOOD				
	54	180514 153412	15:34:31	15:56:44	0:22:13	40	46.0	136000	YES	Y	2464.996	8087					Jane	GOOD				
	55	180514 160200	16:02:19	16:27:58	0:25:39	40	46.0	136000	YES	Y	2435.519	7991					Jane	GOOD				

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	3:17:25	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X	
Sensor Collection Time	1:58:41	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						



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				LIDAR Daily Log									GPS Information		AGC	Meteorological Conditions							
				Field Crew	Project #	Project Description			Lever Arm			Base 1	X_7924_0514_074	Base 2	Base 3	Aero 1	AGC	Airport	Elevation	Temp	Temp	Pressure	
				Woolpert				GPS (m)			x	y	z	IMU Information					GPS Base Station Information				
				MISSION 37				Location			Start Time	Stop Time	GPS Base Station Information					GPS Base Station Information					
				Sensor	Aircraft	SENSOR NAVIGATION FILE NAME			Start Time	Stop Time	GPS Base Station Information					GPS Base Station Information							
				5/14/2018	Joe	Jane	ALS70	N8647Q	20180514_173413			17:35:55	19:49:05	GPS Base Station Information					GPS Base Station Information				
Refight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	File Name	RNX File	Ant Hgt	Ant Type	Conditions/Comments	
	56	180514 180807	18:08:28	18:29:44	0:21:16	40	46.0	136000	YES	Y	2429.07	7969					Jane					GOOD	
	57	180514 183427	18:34:47	18:59:28	0:24:41	40	46.0	136000	YES	Y	2431.283	7977					Jane					GOOD	
	58	180514 190343	19:04:03	19:25:35	0:21:32	40	46.0	136000	YES	Y	2389.893	7841					Jane					GOOD	

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	2:13:10	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	1:07:30	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Refight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	0 kts	Refight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						



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Bossier City, LA 72357

LIDAR Daily Log																					
Field Crew		LIDAR Daily Log										GPS Information		AGC		Meteorological Conditions					
		Project #	TBA								Lever Arm		Base 1	X_7924_0518_065	Auto	Airport	4,199	23.0°C	296.15°K	29.94 inHg	101388 Pa
		Project Description									GPS (m)		Base 2			@ Altitude	3800AGL	27.0°C	300.15°K	29.92 inHg	101321 Pa
		Woolpert											Base 3			@ Altitude					
		Location											GPS Base Station Information								
		MISSION 39	2F1										Start Time	12:22:48		File Name	RNX File	Ant Hgt	Ant Type		
Flight Date (UTC)		Pilot	Operator	Sensor	Aircraft	SENSOR NAVIGATION FILE NAME					IMU Information		Stop Time	16:00:36		Base 1	X_7924_0518_065015.m00	1.327m	AX 1202 GG		
5/18/2018		Joe	Jane	ALS70	N8647Q	20180518_122109										Base 2					
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments			
	63	180518 125032	12:50:53	13:19:07	0:28:15	40	46.0	136000	YES	Y	2427.063	7963					Jane	GOOD			
	64	180518 132256	13:23:16	13:43:01	0:19:46	40	46.0	136000	YES	Y	2423.957	7953					Jane	GOOD			
	65	180518 134834	13:48:54	14:16:23	0:27:29	40	46.0	136000	YES	Y	2429.201	7970					Jane	GOOD			
	66	180518 142106	14:21:26	14:41:43	0:20:18	40	46.0	136000	YES	Y	2462.764	8080					Jane	GOOD			
	67	180518 144726	14:47:46	15:15:29	0:27:42	40	46.0	136000	YES	Y	2450.616	8040					Jane	GOOD			
	68	180518 151841	15:19:01	15:39:06	0:20:05	40	46.0	136000	YES	Y	2487.364	8161					Jane	GOOD			

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	3:37:48	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X	
Sensor Collection Time	2:23:34	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						



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LIDAR Daily Log										GPS Information			AGC	Meteorological Conditions									
Field Crew		Project #		Project Description		Lever Arm		GPS (m)			Base 1	Base 2	Base 3	Aero 1	AGC	Airport	Elevation	Temp		Pressure			
		TBA				x y z		-0.058 -0.001 -1.205			X_7924_0519_064				Auto		4,199	23.0°C	296.15°K	29.94 inHg	101388 Pa		
		Woolpert													@ Altitude	3800AGL	27.0°C	300.15°K	29.92 inHg	101321 Pa			
		MISSION 41		2F1								IMU Information			GPS Base Station Information								
Flight Date (UTC)		Pilot		Operator		Sensor		Aircraft		SENSOR NAVIGATION FILE NAME		Start Time		Stop Time		File Name		RNx File		Ant Hgt		Ant Type	
5/19/2018		Joe		Jane		ALS70		N8647Q		20180519_123223		12:34:05		15:44:25		X_7924_0519_064135.m00		1.258m		AX 1202 GG			
Reflight	Line	Dir	Start	Stop	Total Time	FOV	Scan Rate	Pulse Rate Hz	Roll Comp	Muti Pulse (Y,N)	Altitude ellipsoid (m)	Altitude ellipsoid (ft)	Speed	Nautical Miles Flown	Void "Y"	PDOP	Operator	Conditions/Comments					
	98	180519 125939	12:59:59	13:27:15	0:27:16	40	46.0	136000	YES	Y	2441.01	8009					Jane	GOOD					
	76	180519 133603	13:36:22	13:57:33	0:21:11	40	46.0	136000	YES	Y	2439.139	8002					Jane						
	75	180519 140041	14:01:01	14:25:53	0:24:53	40	46.0	136000	YES	Y	2414.876	7923					Jane						
	137	180519 144022	14:40:41	14:55:50	0:15:09	40	46.0	136000	YES	Y	2443.082	8015					Jane						
	21	180519 150841	15:09:00	15:10:55	0:01:55	40	46.0	136000	YES	Y	2432.609	7981					Jane						

LIDAR FLIGHT SUMMARY				DATA COLLECTION				Comments				Cloud Cover	
Aircraft IMU Time	3:10:20	Hobbs Start	0	Total Lines	0	Project % Complete	0.0%					Clear X Fair Partly Cloudy Cloudy	
Sensor Collection Time	1:30:24	Hobbs Stop	0	# Reflight Lines	0	Total Flight Lines	0						
Line Miles Flown	0.0	Mission Hobbs	0.0	Reflight Percent	0.0%	Line Complete	0						
Average Flight Lines Speed	0 kts	Reflight Hobbs	0.0	Sensor Re-Flight Miles	0.0	Mission Lines	0						

Appendix 2: Raw Swath NVA Checkpoint Results

Coordinate values are listed in the following spatial reference systems:

Horizontal: NAD83 (2011) UTM Zones 13 and 14, meters (see note below)

Vertical: NAVD88 GEOID12B, meters

Accuracy testing was performed on each UTM Zone's dataset using all points falling within that UTM Zone, resulting in two tables of dZ results. The dZ values were then combined to produce the final accuracy value.

Due to some of the point locations being close to the UTM Zone 13 / Zone 14 boundary, 7 NVA points were tested twice, once in each zone. These point names are listed below and are indicated with an asterisk (*) next to their Point ID values in the coordinate tables.

NVA Points tested twice: 2140, 2166, 2293, 2434, 2497, 2519, 2521

Summary	
Point Count	619 tested (612 unique points, 7 "duplicates")
Average dZ	0.010 m
Minimum dZ	-0.215 m
Maximum dZ	0.202 m
Root Mean Square	0.043 m
Standard Deviation	0.042 m

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2001A	678991.433	3948562.875	1270.146	1270.160	0.014
2002	727317.046	3954379.248	1054.148	1054.180	0.032
2006	748201.652	3981972.820	1185.844	1185.880	0.036
2012	699173.720	3878464.230	1287.151	1287.100	-0.051
2013	768684.461	3935349.683	1022.934	1022.910	-0.024
2015	749587.379	3804008.908	1135.596	1135.650	0.054
2020	689510.042	3898529.734	1178.547	1178.540	-0.007
2022	710187.707	3964939.031	1200.425	1200.460	0.035
2024	693568.086	3761901.624	1207.115	1207.070	-0.045
2027	682259.419	3951579.031	1284.518	1284.550	0.032
2027C	701335.304	3978029.199	1251.329	1251.350	0.021
2029	687053.468	3854643.965	1316.536	1316.580	0.044
2030	771798.983	3775416.257	1071.210	1071.210	0.000
2031	700185.638	3846216.803	1260.411	1260.450	0.039
2033	703114.222	3898575.441	1292.611	1292.590	-0.021
2035	763395.417	3819176.535	1144.804	1144.830	0.026
2038	736790.488	3904195.980	1208.433	1208.470	0.037
2042	709221.381	3866198.972	1267.118	1267.150	0.032
2047	730432.196	3836735.572	1193.924	1193.970	0.046
2051	736451.712	3986371.807	1193.561	1193.610	0.049
2055	773581.789	3856824.453	1149.081	1149.080	-0.001
2057	706949.065	3950089.591	1195.072	1195.050	-0.022
2061	748201.773	3787466.790	1118.708	1118.690	-0.018
2066	725010.667	3843622.850	1199.794	1199.820	0.026
2068	774615.567	3767099.172	1063.282	1063.320	0.038
2069	691727.141	3859217.034	1280.145	1280.160	0.015
2069A	691627.808	3862453.790	1315.333	1315.400	0.067
2076	683332.885	3952566.505	1272.707	1272.690	-0.017
2080	750271.784	3972711.003	1173.597	1173.550	-0.047
2084	746474.707	3795481.685	1131.960	1131.990	0.030
2085	759667.714	3765006.833	1081.282	1081.270	-0.012
2090	712855.900	3793296.604	1153.722	1153.740	0.018
2092	691367.773	3990513.258	1303.381	1303.390	0.009

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2095	709128.387	3869108.527	1273.451	1273.460	0.009
2096	757540.673	3875137.203	1157.284	1157.290	0.006
2097	681340.803	3895153.937	1173.889	1173.930	0.041
2099	761348.284	3970916.586	1155.594	1155.630	0.036
2100	687940.942	3956407.616	1248.977	1248.960	-0.017
2104	694919.616	3784843.568	1183.588	1183.590	0.002
2110A	695733.727	3954830.817	1225.225	1225.210	-0.015
2111	735242.523	3756899.564	1080.398	1080.430	0.032
2113	764654.490	3915215.566	1019.273	1019.310	0.037
2116	769809.863	3838912.695	1137.824	1137.800	-0.024
2126	705649.956	3904847.307	1268.656	1268.620	-0.036
2132	760439.014	3788657.478	1108.169	1108.260	0.091
2138	695623.117	3764692.415	1192.479	1192.500	0.021
2139	730608.752	3820627.840	1180.642	1180.700	0.058
2140*	775144.453	3825003.556	1112.855	1112.820	-0.035
2141	728268.754	3789171.487	1136.325	1136.380	0.055
2142	770134.065	3752962.125	1056.918	1056.940	0.022
2147	714203.975	3995420.416	1226.218	1226.230	0.012
2148	697655.903	3779128.306	1196.416	1196.440	0.024
2152	713884.450	3774540.585	1189.014	1189.070	0.056
2165	724417.588	3807070.442	1187.110	1187.170	0.060
2166*	778255.515	3748435.525	1031.237	1031.240	0.003
2167	757257.863	3816002.877	1141.740	1141.760	0.020
2168	767460.077	3893686.983	1161.594	1161.580	-0.014
2169	759923.636	3751873.262	1054.273	1054.260	-0.013
2170	741632.196	3916941.685	1154.242	1154.260	0.018
2171	766011.397	3769584.352	1072.699	1072.690	-0.009
2172	697197.563	3966495.321	1245.486	1245.430	-0.056
2174	722830.693	3847143.448	1206.871	1206.890	0.019
2175	691980.134	3788619.350	1186.411	1186.440	0.029
2188	727422.956	3869790.151	1228.896	1228.880	-0.016
2191	714551.946	3949186.617	1136.900	1136.870	-0.030
2193	751503.807	3783727.196	1108.251	1108.270	0.019

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2194	719532.993	3977134.779	1199.655	1199.610	-0.045
2197	743955.256	3901189.667	1217.462	1217.490	0.028
2201	699770.755	3953728.214	1208.738	1208.740	0.002
2202	752616.453	3864643.996	1157.842	1157.860	0.018
2214	751271.038	3798075.463	1131.208	1131.250	0.042
2217	736990.074	3774918.579	1112.775	1112.840	0.065
2219	765473.877	3835770.640	1153.579	1153.670	0.091
2222	724679.046	3820034.889	1195.883	1195.930	0.047
2223	678610.436	3995020.391	1358.598	1358.580	-0.018
2225	756440.075	3764101.967	1090.884	1090.840	-0.044
2228	691401.428	3986327.295	1295.602	1295.640	0.038
2229	683025.318	3838458.138	1322.254	1322.280	0.026
2231	697521.306	3901834.151	1210.651	1210.640	-0.011
2232	684796.002	3830091.316	1306.145	1306.190	0.045
2233	716042.575	3986865.072	1222.316	1222.310	-0.006
2236	717161.112	3783171.046	1161.035	1161.010	-0.025
2237	691371.594	4011864.786	1331.262	1331.240	-0.022
2245	705411.399	3817206.350	1223.267	1223.280	0.013
2246	761164.928	3812327.372	1125.570	1125.570	0.000
2248	729125.967	3775359.259	1129.373	1129.410	0.037
2250	713620.620	3879237.649	1255.251	1255.190	-0.061
2251	719829.585	3969970.118	1187.048	1187.070	0.022
2252	744342.333	3869445.678	1168.388	1168.370	-0.018
2255	738258.796	3783717.347	1120.221	1120.190	-0.031
2256	696551.683	3858378.925	1266.998	1266.990	-0.008
2260	744032.415	3799140.713	1140.397	1140.460	0.063
2262	755967.423	3899887.492	1192.401	1192.470	0.069
2263	707300.673	3879040.099	1273.595	1273.540	-0.055
2268	750592.984	3841122.010	1162.025	1162.060	0.035
2271	721646.311	3949349.907	1117.669	1117.690	0.021
2271C	721548.270	3949347.247	1121.644	1121.640	-0.004
2271D	722144.889	3949360.698	1126.772	1126.800	0.028
2275	687616.889	4019655.302	1355.534	1355.560	0.026

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2279	717499.693	3754871.851	1157.272	1157.260	-0.012
2280	730428.585	3962329.108	1147.707	1147.740	0.033
2289	694294.382	3808939.154	1248.891	1248.870	-0.021
2291	763514.557	3925745.294	980.432	980.430	-0.002
2293*	773779.859	3915785.580	1051.125	1051.080	-0.045
2302	768125.835	3982785.174	1119.192	1119.220	0.028
2303	735973.880	3768023.357	1117.333	1117.350	0.017
2307	708096.572	3846863.296	1238.338	1238.420	0.082
2309	741188.530	3819402.386	1167.064	1167.140	0.076
2311	690856.814	3830355.083	1290.263	1290.280	0.017
2313	773463.772	3842321.431	1131.042	1131.110	0.068
2316	728993.225	3904188.132	1230.220	1230.230	0.010
2320	680113.896	3949576.483	1277.062	1277.010	-0.052
2324	743697.078	3968508.273	1185.459	1185.440	-0.019
2325	749854.445	3754837.392	1074.042	1074.020	-0.022
2327	718420.635	3997785.484	1233.873	1233.840	-0.033
2329	712848.222	3983394.462	1228.936	1228.920	-0.016
2330	682101.636	4006335.843	1355.158	1355.150	-0.008
2333	714305.682	3860954.539	1228.333	1228.360	0.027
2334	705407.963	4003487.732	1273.913	1273.930	0.017
2338	743492.787	3779559.651	1109.498	1109.550	0.052
2344	724152.568	4001451.504	1227.249	1227.270	0.021
2348	708289.205	3844649.654	1240.740	1240.770	0.030
2355	756850.718	3778290.405	1101.645	1101.630	-0.015
2360	705588.198	3987171.675	1257.646	1257.680	0.034
2368	709933.652	3810523.000	1212.623	1212.630	0.007
2371	744840.519	3943638.080	1070.145	1070.140	-0.005
2372	755596.794	3990552.844	1157.857	1157.830	-0.027
2373	737623.565	3836961.060	1185.104	1185.160	0.056
2374	682160.232	3855711.575	1333.658	1333.620	-0.038
2375	746101.581	3921700.934	1106.629	1106.660	0.031
2376	745880.069	3851652.898	1171.490	1171.520	0.030
2377	704209.609	3835493.693	1236.939	1236.910	-0.029

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2378	754965.363	3885555.277	1167.102	1167.080	-0.022
2380	724654.060	3834752.691	1210.413	1210.460	0.047
2381	762724.991	3945528.152	1054.120	1054.130	0.010
2383	715972.758	3874925.043	1254.633	1254.700	0.067
2384	685803.360	3896527.068	1180.013	1180.000	-0.013
2385	758842.960	3930539.303	989.321	989.360	0.039
2386	722550.980	3756171.355	1154.168	1154.150	-0.018
2387	729022.919	3785291.411	1127.770	1127.740	-0.030
2390	714978.398	3905800.923	1234.275	1234.330	0.055
2391	769932.730	3993523.841	1102.629	1102.600	-0.029
2393	687821.923	3881655.163	1320.933	1320.950	0.017
2399	712912.423	3971255.431	1203.441	1203.490	0.049
2401	752546.248	3953586.864	1128.008	1128.020	0.012
2402	759233.581	3799683.579	1117.013	1117.120	0.107
2406	691865.375	3965697.859	1263.229	1263.280	0.051
2408	734271.098	3812437.165	1164.710	1164.690	-0.020
2410	764723.261	3755992.488	1061.870	1061.910	0.040
2412	730942.871	3762629.021	1119.429	1119.410	-0.019
2416	716050.781	3869513.253	1255.120	1255.140	0.020
2419	699420.400	3870700.969	1288.120	1288.080	-0.040
2421	704545.047	3861259.788	1263.067	1263.110	0.043
2425	694000.025	3962794.246	1239.034	1239.050	0.016
2429	712140.789	4002489.112	1250.869	1250.800	-0.069
2431	747563.962	3938386.372	1013.572	1013.560	-0.012
2434*	771008.653	3968384.084	1117.207	1117.200	-0.007
2436	708889.859	3766221.917	1182.017	1181.970	-0.047
2437	705049.769	3886791.575	1276.101	1276.080	-0.021
2445	747771.069	3768551.427	1082.722	1082.760	0.038
2447	745026.109	3880449.637	1187.907	1187.910	0.003
2452	693528.944	3795778.522	1200.124	1200.100	-0.024
2453	714060.226	3759116.418	1156.371	1156.380	0.009
2454	700067.915	3969426.251	1243.241	1243.230	-0.011
2462	743485.619	3974142.434	1183.367	1183.440	0.073

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2463	756188.967	3984134.068	1160.920	1160.940	0.020
2464	730956.084	3970186.382	1179.569	1179.560	-0.009
2468	760028.910	3958555.454	1152.488	1152.450	-0.038
2469	765669.806	3821822.742	1146.391	1146.400	0.009
2473	713147.472	3806999.374	1209.099	1209.130	0.031
2494	713406.211	3895274.771	1274.288	1274.180	-0.108
2495	749022.766	3926826.634	1076.834	1076.830	-0.004
2496	708392.710	3840428.412	1224.481	1224.520	0.039
2497*	772454.790	3906589.858	1076.972	1077.030	0.058
2498	745376.546	3758724.102	1085.449	1085.450	0.001
2501	692882.277	4015969.590	1328.007	1328.050	0.043
2502	704700.848	3974628.793	1233.351	1233.370	0.019
2503	709164.610	3979415.479	1232.684	1232.680	-0.004
2519*	770959.067	3973209.408	1124.319	1124.290	-0.029
2520	765118.388	3973069.202	1140.477	1140.460	-0.017
2521*	770684.103	3990811.024	1103.441	1103.450	0.009
2531	688922.031	4040224.100	1394.743	1394.710	-0.033
2532	711089.485	4042001.598	1283.383	1283.360	-0.023
2533	701325.173	4029457.921	1323.052	1323.090	0.038
2534	720752.507	4041858.994	1254.489	1254.500	0.011
2535	720433.222	4037171.870	1249.859	1249.880	0.021
2536	712452.536	4037063.665	1274.567	1274.570	0.003
2550	733442.890	4002074.796	1212.503	1212.540	0.037
2551	748153.367	4013629.521	1164.265	1164.310	0.045
2552	721194.995	4017889.429	1260.924	1260.980	0.056
2553	739528.713	4025175.021	1190.361	1190.390	0.029
2577	763069.596	4042775.204	1125.858	1125.890	0.032
2579	734913.546	4016977.629	1219.184	1219.200	0.016
2580	712420.963	4030372.195	1285.484	1285.490	0.006
2581	729292.056	4037076.454	1241.367	1241.360	-0.007
2591	748269.376	4004524.350	1173.935	1173.900	-0.035
2598	747276.346	4033478.130	1168.697	1168.710	0.013
2600	754083.086	4022415.389	1143.203	1143.240	0.037

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2003	407588.834	3974408.232	698.556	698.540	-0.016
2004	232672.786	3912382.410	1018.362	1018.420	0.058
2005	281455.452	3862244.103	854.004	854.020	0.016
2007	403356.999	3932550.305	719.842	719.820	-0.022
2008	245899.544	3849619.170	1087.018	1087.040	0.022
2009	292539.728	3945496.504	943.928	943.890	-0.038
2010	348031.759	3977912.188	764.320	764.290	-0.030
2011	264855.258	3972964.171	1024.608	1024.610	0.002
2014	376865.429	3990016.226	819.464	819.490	0.026
2016A	381510.690	3789060.037	549.438	549.380	-0.058
2017	377820.184	3814106.574	562.917	562.930	0.013
2018	377964.189	3911530.898	713.317	713.370	0.053
2019	303154.597	3780170.102	959.168	959.270	0.102
2021	252322.810	3910723.254	1092.283	1092.310	0.027
2023	267554.648	3989688.262	1007.937	1007.960	0.023
2025	293549.308	3793179.946	973.254	973.270	0.016
2026	341054.246	3973214.115	831.901	831.890	-0.011
2028	332809.583	3858320.918	844.764	844.790	0.026
2032	289635.121	3842427.895	795.612	795.590	-0.022
2034	240517.482	3993672.802	1078.393	1078.320	-0.073
2036	245527.380	3836516.559	1072.046	1072.090	0.044
2037	439844.204	3972732.953	693.883	693.900	0.017
2039	299666.623	3911195.699	1023.103	1023.070	-0.033
2040	278639.315	3874295.642	1039.662	1039.700	0.038
2041	347209.311	3983859.843	750.456	750.290	-0.166
2043	261978.395	3941826.572	989.419	989.410	-0.009
2044	280769.984	3908460.347	1057.570	1057.530	-0.040
2045	430659.983	3984897.298	721.630	721.660	0.030
2046	320442.486	3901523.255	979.715	979.750	0.035
2048	338913.636	3798718.126	659.131	659.150	0.019
2049	404075.485	3840672.166	519.248	519.290	0.042
2050	400905.976	3843916.775	539.544	539.520	-0.024
2052	310619.558	3901670.972	994.740	994.760	0.020

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2053	382297.971	3761542.957	551.377	551.420	0.043
2054	287001.167	3778207.386	970.148	970.170	0.022
2056	281426.645	3892539.952	1048.457	1048.530	0.073
2058	420376.509	3789151.854	488.404	488.410	0.006
2059	390772.152	3908493.538	661.126	661.160	0.034
2060	325467.198	3802507.898	706.605	706.620	0.015
2062	227427.360	3849282.122	1133.489	1133.500	0.011
2063	451170.786	3998446.026	736.944	736.970	0.026
2064	299119.520	3941700.637	973.129	973.180	0.051
2065	272705.253	3942338.231	986.270	986.330	0.060
2067	296583.865	3898338.110	1028.977	1028.980	0.003
2070	244318.831	3890608.893	1100.173	1100.140	-0.033
2071	294973.048	3769803.140	958.632	958.620	-0.012
2072	393488.927	3777544.940	537.827	537.850	0.023
2073	459243.977	3980832.373	633.995	634.010	0.015
2074	239538.859	3817036.785	1074.752	1074.760	0.008
2075	394495.634	3964941.909	751.829	751.750	-0.079
2077	266986.916	3817994.736	1016.806	1016.760	-0.046
2078	429842.472	3751813.387	449.547	449.550	0.003
2079	270930.695	3762121.073	983.908	983.910	0.002
2081	358882.207	3948832.522	889.733	889.730	-0.003
2082	239499.840	3859243.716	1109.546	1109.580	0.034
2083	268112.949	3940654.144	986.760	986.790	0.030
2086	363741.010	3942842.941	902.783	902.790	0.007
2087	353644.505	3936798.965	922.245	922.240	-0.005
2088	439535.826	3792403.121	461.449	461.480	0.031
2089	326095.450	3845310.007	699.944	699.960	0.016
2091	301259.316	3754700.595	941.724	941.770	0.046
2093	401920.017	3766355.647	537.068	537.080	0.012
2094	418613.676	3985828.139	687.083	687.040	-0.043
2098	344047.244	3958081.109	940.233	940.270	0.037
2101	381046.692	3936054.164	811.165	811.270	0.105
2102	253176.706	3822501.621	1043.555	1043.570	0.015

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2103	238094.677	3953408.305	1083.122	1083.140	0.018
2105	379253.364	3874796.462	641.996	642.030	0.034
2106	405585.519	3909941.069	649.679	649.730	0.051
2107	235733.202	3947674.333	1099.438	1099.450	0.012
2108	336002.265	3841863.556	681.954	681.990	0.036
2109	402576.978	3944983.683	773.915	773.980	0.065
2112	422372.294	3799609.307	464.011	463.980	-0.031
2114	372684.989	3843382.052	611.397	611.500	0.103
2115	371367.793	3941048.139	831.832	831.810	-0.022
2117	263517.422	3750012.399	983.384	983.420	0.036
2118	278635.583	3857374.598	757.454	757.560	0.106
2119	382661.866	3886932.373	682.008	681.940	-0.068
2120	268912.419	3806687.196	1014.936	1014.900	-0.036
2121	325398.148	3960227.627	928.779	928.720	-0.059
2122	440161.864	3751194.514	427.741	427.750	0.009
2123	276210.790	3811340.177	1009.012	1009.020	0.008
2124	289955.083	3866044.062	1023.371	1023.410	0.039
2125	271137.484	3893601.711	1062.336	1062.480	0.144
2127	246156.837	3751842.865	1011.118	1011.150	0.032
2128	393672.218	3990629.847	828.789	828.790	0.001
2129	276559.933	3852734.224	1013.132	1013.270	0.138
2130	354881.707	3872678.544	687.543	687.600	0.057
2131	397158.154	3899717.613	697.296	697.370	0.074
2133	302268.001	3919594.778	1024.182	1024.170	-0.012
2134	380293.837	3784937.928	513.882	513.900	0.018
2135	286358.055	3866110.265	1030.216	1030.320	0.104
2136	326662.057	3964594.659	910.285	910.280	-0.005
2137	360185.500	3912666.031	814.593	814.570	-0.023
2140*	224431.579	3825016.150	1112.855	1112.830	-0.025
2143	347589.666	3841820.102	666.977	666.840	-0.137
2144	355002.366	3879856.592	715.802	715.960	0.158
2145	331372.072	3896045.597	962.316	962.340	0.024
2146	422122.452	3978654.678	715.900	715.860	-0.040

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2149	340525.839	3964534.074	908.447	908.460	0.013
2150	256553.030	3798461.988	1029.244	1029.220	-0.024
2151	377145.470	3745566.728	559.350	559.360	0.010
2153	353291.045	3887428.942	762.585	762.690	0.105
2154	249005.651	3953005.805	1022.904	1022.950	0.046
2155	243717.441	3766380.199	1019.550	1019.540	-0.010
2156	338286.599	3912755.755	923.271	923.270	-0.001
2157	232278.620	3941669.447	1085.959	1085.940	-0.019
2158	252682.153	3874806.174	1054.294	1054.330	0.036
2159	414231.262	3803512.803	497.030	497.070	0.040
2159A	414201.492	3802754.823	489.501	489.530	0.029
2160	336620.875	3995667.186	915.518	915.520	0.002
2161	268584.721	3851508.610	1033.172	1033.190	0.018
2162	320602.044	3826595.895	714.818	714.850	0.032
2163	268547.308	3979996.238	1024.247	1024.270	0.023
2164	303589.460	3991553.521	962.196	962.170	-0.026
2166*	223031.902	3748397.952	1031.237	1031.240	0.003
2173	248661.412	3855118.825	1084.457	1084.560	0.103
2176	229119.782	3896331.143	1145.842	1145.770	-0.072
2177	375624.615	3817936.618	544.161	544.160	-0.001
2178	351203.710	3830600.042	583.514	583.440	-0.074
2179	311396.778	3810825.952	792.000	792.040	0.040
2180	443512.056	3782632.963	462.677	462.710	0.033
2181	343251.978	3893715.814	857.855	857.850	-0.005
2182	267916.488	3797262.794	1012.941	1012.920	-0.021
2183	401281.204	3850134.439	585.671	585.620	-0.051
2184	285372.140	3770176.266	971.489	971.540	0.051
2185	353433.733	3893487.750	848.636	848.660	0.024
2186	256065.532	3775768.195	1013.766	1013.770	0.004
2187	461689.604	4000072.256	705.123	705.130	0.007
2189	436720.380	3996971.067	749.849	749.880	0.031
2190	228509.570	3780489.755	1067.421	1067.420	-0.001
2192	365692.166	3829654.069	556.159	556.280	0.121

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2195	351566.323	3868676.742	761.618	761.600	-0.018
2196	401670.358	3863033.936	613.369	613.470	0.101
2198	281345.235	3964099.669	946.663	946.680	0.017
2199	315438.181	3820429.775	750.739	750.780	0.041
2200	351408.910	3762958.202	670.714	670.730	0.016
2200A	351405.051	3762949.618	670.792	670.820	0.028
2203	434747.847	3752366.288	443.887	443.880	-0.007
2204	287533.651	3814430.847	994.494	994.510	0.016
2205	370426.959	3854360.233	632.014	632.080	0.066
2206	323509.197	3838092.692	658.343	658.400	0.057
2207	299275.017	3954827.866	895.033	895.040	0.007
2208	432137.133	3757062.086	444.128	444.090	-0.038
2209	401934.981	3788298.682	470.266	470.290	0.024
2210	354764.347	3931696.173	908.780	908.790	0.010
2211	255064.087	3884448.715	1080.538	1080.590	0.052
2212	241464.387	3867150.055	1109.172	1109.170	-0.002
2213	422538.884	3750048.833	463.850	463.800	-0.050
2215	363927.245	3988829.461	784.754	784.750	-0.004
2216	390464.597	3988875.157	818.828	818.900	0.072
2218	379379.813	3886068.311	693.343	693.390	0.047
2220	283812.752	3924826.226	1040.520	1040.540	0.020
2221	297306.465	3880003.144	970.441	970.500	0.059
2224	460834.608	3972911.963	666.282	666.290	0.008
2226	431860.297	3981847.795	716.904	716.880	-0.024
2227	261419.703	3798519.536	1019.627	1019.620	-0.007
2230	355642.018	3876913.972	743.669	743.780	0.111
2234	446322.504	3987502.171	669.968	669.980	0.012
2235	367817.659	3837870.247	610.528	610.600	0.072
2238	400379.724	3756762.418	487.456	487.420	-0.036
2239	382959.266	3926384.865	762.471	762.390	-0.081
2240	409099.857	3949238.358	751.612	751.640	0.028
2241	319607.180	3830441.358	671.562	671.710	0.148
2242	390635.721	3950475.539	775.739	775.770	0.031

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2243	295008.541	3773288.138	958.007	957.980	-0.027
2244	233578.087	3987582.935	1099.112	1099.100	-0.012
2247	368377.892	3785403.556	581.999	581.990	-0.009
2249	407868.017	3988959.579	775.346	775.360	0.014
2253	356769.899	3944836.420	923.406	923.400	-0.006
2254	231948.178	3960463.027	1098.233	1098.250	0.017
2257	362333.758	3821879.787	582.975	583.060	0.085
2258	387352.017	3752073.656	526.920	526.900	-0.020
2259	353581.892	3903637.097	853.918	853.960	0.042
2261	390813.178	3769258.963	534.894	534.870	-0.024
2264	330842.099	3972142.382	827.769	827.810	0.041
2265	268365.093	3891014.338	1057.944	1057.960	0.016
2266	326363.106	3851355.412	785.287	785.270	-0.017
2267	245729.725	3790214.467	1039.958	1039.970	0.012
2269	328304.153	3859198.704	862.438	862.480	0.042
2270	260788.849	3925678.088	1056.159	1056.110	-0.049
2272	392565.809	3944001.623	803.063	803.020	-0.043
2273	284432.088	3875694.467	1036.193	1036.250	0.057
2274	333707.592	3992957.996	902.872	902.900	0.028
2276	391504.862	3966881.813	728.226	728.300	0.074
2277	316988.778	3898129.039	983.206	983.300	0.094
2278	432533.825	3775872.438	448.327	448.380	0.053
2281	240635.481	3775647.737	1038.611	1038.620	0.009
2282	329729.538	3969926.065	846.958	846.950	-0.008
2283	381842.929	3842541.732	578.751	578.700	-0.051
2284	230277.544	3940727.558	1064.450	1064.460	0.010
2285A	324114.482	3778698.971	742.451	742.460	0.009
2285B	319804.960	3773907.714	790.325	790.370	0.045
2285C	321442.954	3781202.496	752.423	752.480	0.057
2286	412412.112	3825933.030	474.907	474.960	0.053
2287	362262.395	3979498.613	731.368	731.400	0.032
2288	438165.346	3817911.573	438.408	438.430	0.022
2290	320289.902	3805900.698	748.272	748.340	0.068

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2292	319679.482	3937887.918	987.316	987.340	0.024
2293*	228513.989	3915716.030	1051.125	1051.090	-0.035
2294	276539.997	3829611.653	1005.558	1005.620	0.062
2295	442053.126	3767695.161	414.216	414.220	0.004
2296	413996.211	3963626.608	739.557	739.580	0.023
2297	404725.377	3974422.966	731.594	731.590	-0.004
2298	258522.785	3937943.322	967.620	967.650	0.030
2299	419661.169	3970610.865	759.842	759.860	0.018
2300	296296.386	3906480.404	1025.791	1025.840	0.049
2301	430337.292	4009728.052	713.290	713.300	0.010
2304	244897.802	3898775.353	1104.159	1104.190	0.031
2305	318774.936	3762908.894	892.588	892.610	0.022
2306	431851.422	3979357.491	697.836	697.860	0.024
2308	363684.092	3937215.921	840.918	840.930	0.012
2310	275495.570	3756421.257	972.973	972.990	0.017
2312	391263.673	3846723.596	571.423	571.480	0.057
2314	322876.502	3815142.651	727.784	727.840	0.056
2315	407411.184	3944188.278	770.440	770.480	0.040
2317	242885.413	3953244.349	1052.288	1052.290	0.002
2318	282017.436	3776912.220	993.614	993.640	0.026
2319	288796.758	3985817.167	991.654	991.640	-0.014
2321	421128.299	3794315.436	476.759	476.790	0.031
2322	431829.597	3787495.084	483.877	483.900	0.023
2323	243876.571	3806597.012	1068.067	1068.110	0.043
2326	401779.718	3768768.365	547.434	547.470	0.036
2328	264673.325	3796457.527	1014.771	1014.790	0.019
2331A	306593.819	3786857.934	940.199	940.260	0.061
2332	239613.724	3863285.800	1112.879	1112.880	0.001
2335	281311.416	3934411.590	1004.847	1004.840	-0.007
2336	432790.272	3771840.376	420.919	420.930	0.011
2337	347301.213	3764660.369	646.807	646.890	0.083
2337A	347005.682	3764761.420	650.858	650.890	0.032
2339	428038.276	3745387.768	432.708	432.670	-0.038

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2340	323579.078	3987595.436	840.544	840.590	0.046
2341	356268.218	3848174.565	670.413	670.500	0.087
2342	387107.143	3746085.935	559.090	559.120	0.030
2343	368322.217	3826825.233	541.504	541.530	0.026
2345	231816.511	3819547.945	1092.145	1092.080	-0.065
2346	412358.463	3992328.598	724.530	724.520	-0.010
2347	328736.208	3811982.099	680.358	680.410	0.052
2349	232454.374	3842903.312	1104.604	1104.670	0.066
2350	367999.725	3843600.143	619.360	619.390	0.030
2351	451580.975	3768208.823	400.022	400.100	0.078
2352	298839.724	3816164.597	982.621	982.610	-0.011
2353	288691.822	3919701.514	1049.916	1049.870	-0.046
2354	361890.091	3800397.064	588.740	588.760	0.020
2356	341101.569	3881766.139	834.682	834.730	0.048
2357	281953.056	3753215.570	920.630	920.600	-0.030
2357A	281913.464	3754579.032	960.288	960.320	0.032
2358	363298.278	3997691.590	865.754	865.720	-0.034
2359	353117.550	3841253.513	628.603	628.610	0.007
2361	274129.180	3961320.396	961.245	961.230	-0.015
2362	283583.011	3981131.471	1011.448	1011.440	-0.008
2363	413567.212	3766263.363	501.995	502.040	0.045
2364	243987.906	3914230.022	1034.098	1034.060	-0.038
2365	262870.843	3966382.198	1021.850	1021.840	-0.010
2366	408609.702	3770651.267	532.756	532.740	-0.016
2367	289733.980	3961798.717	831.462	831.480	0.018
2369	246496.733	3777576.591	1027.347	1027.290	-0.057
2370	444816.017	3739900.625	391.845	391.840	-0.005
2379	297273.998	3983434.264	979.440	979.450	0.010
2382	240675.530	3784204.139	1046.393	1046.400	0.007
2382A	240851.720	3784199.162	1046.009	1046.000	-0.009
2388	258939.638	3851452.690	1055.802	1055.840	0.038
2389	235618.996	3961647.385	1054.916	1054.940	0.024
2392	376707.823	3979581.600	731.856	731.870	0.014

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2394	254618.403	3780696.272	1017.606	1017.580	-0.026
2395	398577.973	3785434.001	515.300	515.330	0.030
2396	305870.074	3765120.851	945.353	945.370	0.017
2397	295701.997	3871194.870	944.324	944.330	0.006
2398	341288.963	3887924.580	856.787	856.790	0.003
2400	260808.308	3975415.879	1034.473	1034.520	0.047
2403	302983.281	3765144.140	947.757	947.740	-0.017
2404	383712.933	3987632.638	808.514	808.490	-0.024
2405	323503.039	3985809.144	807.266	807.300	0.034
2407	360540.722	3952032.954	853.145	853.160	0.015
2409	294038.102	3864706.755	1005.599	1005.600	0.001
2411	448302.001	3774816.579	436.322	436.390	0.068
2413	266703.737	3841290.772	1037.162	1037.250	0.088
2414	328322.787	3982849.686	775.370	775.380	0.010
2415	359363.027	3866803.113	723.885	723.880	-0.005
2417	356124.251	3763338.553	595.793	595.870	0.077
2418	432985.143	3768616.241	443.304	443.330	0.026
2420	341356.821	3867210.076	799.974	799.950	-0.024
2422	284344.027	3869954.862	1027.361	1027.350	-0.011
2423	302166.882	3948210.355	913.810	913.810	0.000
2424	260480.553	3757506.399	995.256	995.300	0.044
2426	224193.453	3778217.629	1067.351	1067.360	0.009
2427	265755.539	3915254.555	1088.797	1088.800	0.003
2428	444095.889	3969660.624	667.694	667.730	0.036
2430	376793.034	3970960.501	748.905	748.880	-0.025
2432	401034.265	3799166.326	521.931	521.960	0.029
2432A	400997.649	3798132.566	521.628	521.680	0.052
2433	370893.456	3760767.258	607.993	607.970	-0.023
2434*	228953.121	3968385.257	1117.207	1117.200	-0.007
2435	241315.767	3803396.752	1069.681	1069.700	0.019
2438	235115.694	3775435.825	1051.205	1051.180	-0.025
2439	377628.340	3843103.944	583.166	583.130	-0.036
2440	443964.207	3750425.179	407.098	407.060	-0.038

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2441	283986.831	3808054.790	998.945	998.960	0.015
2442	422225.366	3989021.029	699.054	699.030	-0.024
2443	258830.642	3991523.663	1036.356	1036.350	-0.006
2444	331442.446	3782569.925	704.118	704.070	-0.048
2446	446902.499	3983269.320	654.256	654.290	0.034
2448	382355.953	3975891.425	706.075	706.080	0.005
2449	229844.843	3760240.192	1046.396	1046.340	-0.056
2450	364606.866	3833934.246	585.911	585.970	0.059
2451	264129.535	3764160.475	991.995	991.980	-0.015
2455	339843.309	3920540.578	864.904	864.890	-0.014
2456	322257.389	3834407.837	629.653	629.670	0.017
2457	280305.619	3912694.464	1060.077	1059.990	-0.087
2458	314139.758	3857167.456	749.090	749.170	0.080
2459	342477.814	3962253.022	925.285	925.270	-0.015
2460	387232.741	3887832.752	690.939	690.920	-0.019
2461	455894.881	3790016.096	435.096	435.140	0.044
2465	455775.785	3738549.751	391.707	391.740	0.033
2466A	289631.257	3791626.537	977.297	977.310	0.013
2466B	290432.774	3791007.053	973.616	973.530	-0.086
2467	374807.036	3919396.700	760.334	760.350	0.016
2470	357188.796	3837413.823	657.686	657.750	0.064
2471	322868.639	3912845.038	989.605	989.580	-0.025
2472	393871.878	3752018.606	520.828	520.850	0.022
2474	399175.240	3956541.811	752.188	752.190	0.002
2475	310166.529	3896787.724	997.039	997.020	-0.019
2476	392849.054	3984018.836	788.157	788.150	-0.007
2476A	392864.452	3984051.062	788.713	788.700	-0.013
2477	325341.763	3945246.731	977.840	977.780	-0.060
2478	404252.702	3953326.835	728.427	728.440	0.013
2479	376040.992	3894172.391	791.396	791.420	0.024
2480	387756.528	3829521.813	532.201	532.230	0.029
2481	436210.333	3763398.719	447.644	447.700	0.056
2482	350583.643	3866515.234	774.933	774.890	-0.043

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2483	253930.652	3772542.266	1010.727	1010.740	0.013
2484	274872.756	3889544.368	1054.709	1054.750	0.041
2485	232583.548	3965535.137	1068.823	1068.850	0.027
2486	265067.603	3887595.918	1065.556	1065.550	-0.006
2487	346611.068	3782559.673	665.457	665.470	0.013
2488	284608.968	3887942.567	1038.156	1038.160	0.004
2489	237429.286	3977678.830	1091.115	1091.140	0.025
2490	395885.202	3926050.587	689.737	689.750	0.013
2491	287242.594	3793260.502	982.740	982.730	-0.010
2492	259494.794	3848345.444	1057.715	1057.740	0.025
2493	286870.931	3918420.507	1050.626	1050.640	0.014
2497*	226634.802	3906617.406	1076.972	1077.030	0.058
2499	419097.562	3762990.867	516.115	516.150	0.035
2500	316437.265	3873814.868	878.742	878.720	-0.022
2504	374849.030	3923863.100	792.115	792.130	0.015
2505	328064.511	3999272.173	925.840	925.840	0.000
2506	272977.589	3968068.808	964.813	964.840	0.027
2507	261453.379	3962120.546	996.984	996.950	-0.034
2508	260915.304	3970553.002	1031.310	1031.280	-0.030
2509	257874.971	3970652.369	1040.012	1040.020	0.008
2510	254178.767	3970749.813	1049.679	1049.660	-0.019
2511	250518.406	3971933.613	1062.252	1062.230	-0.022
2512	249002.837	3972718.908	1059.750	1059.710	-0.040
2513	247007.891	3972859.077	1067.327	1067.290	-0.037
2514	244926.360	3972584.596	1080.299	1080.270	-0.029
2515	242427.466	3972655.520	1088.987	1088.930	-0.057
2516	238417.764	3972848.331	1098.264	1098.220	-0.044
2517	235352.015	3972965.176	1101.559	1101.530	-0.029
2518	232225.266	3973104.412	1113.642	1113.630	-0.012
2519*	229199.520	3973204.538	1124.319	1124.290	-0.029
2521*	230007.042	3990789.721	1103.441	1103.450	0.009
2522	230084.256	3986158.822	1110.289	1110.330	0.041
2523	230586.057	3982271.385	1104.863	1104.860	-0.003

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2524	230923.642	3979273.777	1104.170	1104.170	0.000
2525	231283.492	3976407.270	1113.648	1113.640	-0.008
2526	231978.485	3951154.500	1124.153	1124.180	0.027
2527	231872.674	3947017.465	1115.904	1115.940	0.036
2528	234169.040	3937239.201	1036.904	1036.820	-0.084
2529	236794.065	3932364.847	996.521	996.510	-0.011
2530	239924.368	3898683.689	1116.346	1116.340	-0.006
2537	409945.110	4032428.328	736.594	736.650	0.056
2538	406402.978	4009587.763	721.405	721.380	-0.025
2539	411069.387	4003632.571	757.951	757.950	-0.001
2540	385208.393	4003823.079	776.214	776.240	0.026
2541	385453.300	4021553.283	811.158	811.360	0.202
2542	362932.982	4029992.682	861.273	861.280	0.007
2543	349651.411	4035408.925	884.375	884.160	-0.215
2544	350311.458	4001248.643	876.396	876.410	0.014
2545	336221.690	4003122.889	908.960	908.950	-0.010
2546	316681.822	4006455.025	933.226	933.270	0.044
2547	320390.433	4033843.785	912.030	912.040	0.010
2548	263392.519	4042140.572	1011.812	1011.770	-0.042
2549	250375.052	4042457.170	1068.838	1068.850	0.012
2554	266346.216	4017064.596	1029.661	1029.570	-0.091
2555	318286.731	4018442.036	919.492	919.520	0.028
2558	351428.678	4023798.018	880.661	880.750	0.089
2559	375618.477	4016875.955	794.284	794.290	0.006
2560	396842.717	4018206.743	761.342	761.270	-0.072
2561	407380.114	4018082.155	723.426	723.370	-0.056
2562	398597.182	4027829.020	757.465	757.480	0.015
2563	396833.387	4039998.671	771.977	772.020	0.043
2564	409810.101	4039840.880	759.366	759.380	0.014
2565	382606.438	4040197.976	806.639	806.670	0.031
2566	380412.190	4034216.263	787.111	787.070	-0.041
2567	385407.104	4015090.700	770.566	770.660	0.094
2568	378835.806	4010405.249	740.374	740.340	-0.034

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2569	338148.884	4019216.269	901.378	901.350	-0.028
2570	309114.396	4013214.553	938.741	938.650	-0.091
2571	319721.509	4041313.322	909.328	909.360	0.032
2572	292356.413	4041651.779	938.134	938.150	0.016
2573	297488.901	4020989.712	941.562	941.600	0.038
2574	293698.825	4008256.037	919.614	919.610	-0.004
2575	260530.137	4002750.323	1033.729	1033.730	0.001
2576	246186.954	4014584.663	1066.810	1066.810	0.000
2578	233891.418	4031805.124	1076.179	1076.140	-0.039
2582	252591.888	4009101.452	1054.841	1054.880	0.039
2583	254687.846	3999689.400	1048.668	1048.670	0.002
2584	272420.709	4000783.269	1006.732	1006.750	0.018
2585	330015.324	4014556.993	907.000	906.930	-0.070
2586	310628.143	4027402.592	920.080	920.020	-0.060
2587	338466.088	4039778.165	897.551	897.570	0.019
2588	354443.596	4017227.865	866.726	866.720	-0.006
2589	304158.786	4035090.919	917.026	917.010	-0.016
2590	260016.108	4034823.723	1035.812	1035.780	-0.032
2592	234307.101	4008320.489	1086.692	1086.670	-0.022
2593	280336.219	4010175.446	981.005	981.020	0.015
2594	397018.200	4003667.310	761.549	761.540	-0.009
2595	352764.213	4010001.453	814.929	814.940	0.011
2596	328215.052	4036595.851	912.109	911.990	-0.119
2597	274418.286	4028214.925	987.414	987.380	-0.034
2599	244893.974	4024082.207	1071.323	1071.300	-0.023

Appendix 3: DEM NVA Checkpoint Results

Coordinate values are listed in the following spatial reference systems:

Horizontal: NAD83 (2011) UTM Zones 13 and 14, meters (see note below)

Vertical: NAVD88 GEOID12B, meters

Accuracy testing was performed on each UTM Zone's dataset using all points falling within that UTM Zone, resulting in two tables of dZ results. The dZ values were then combined to produce the final accuracy value.

Due to some of the point locations being close to the UTM Zone 13 / Zone 14 boundary, 7 NVA points were tested twice, once in each zone. These point names are listed below and are indicated with an asterisk (*) next to their Point ID values in the coordinate tables.

NVA Points tested twice: 2140, 2166, 2293, 2434, 2497, 2519, 2521

Summary	
Point Count	619 tested (612 unique points, 7 tested twice)
Root Mean Square Error	0.037 m
95% Confidence Level	0.072 m
Mean of Residuals	0.001 m
Standard Deviation	0.041 m

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2001A	678991.433	3948562.875	1270.146	1270.150	0.004
2002	727317.046	3954379.248	1054.148	1054.160	0.012
2006	748201.652	3981972.82	1185.844	1185.900	0.056
2012	699173.72	3878464.23	1287.151	1287.100	-0.051
2013	768684.461	3935349.683	1022.934	1022.910	-0.024
2015	749587.379	3804008.908	1135.596	1135.650	0.054
2020	689510.042	3898529.734	1178.547	1178.550	0.003
2022	710187.707	3964939.031	1200.425	1200.460	0.035
2024	693568.086	3761901.624	1207.115	1207.060	-0.055
2027	682259.419	3951579.031	1284.518	1284.530	0.012
2027C	701335.304	3978029.199	1251.329	1251.360	0.031
2029	687053.468	3854643.965	1316.536	1316.580	0.044
2030	771798.983	3775416.257	1071.21	1071.240	0.030
2031	700185.638	3846216.803	1260.411	1260.440	0.029
2033	703114.222	3898575.441	1292.611	1292.580	-0.031
2035	763395.417	3819176.535	1144.804	1144.830	0.026
2038	736790.488	3904195.98	1208.433	1208.470	0.037
2042	709221.381	3866198.972	1267.118	1267.140	0.022
2047	730432.196	3836735.572	1193.924	1193.910	-0.014
2051	736451.712	3986371.807	1193.561	1193.610	0.049
2055	773581.789	3856824.453	1149.081	1149.070	-0.011
2057	706949.065	3950089.591	1195.072	1195.030	-0.042
2061	748201.773	3787466.79	1118.708	1118.730	0.022
2066	725010.667	3843622.85	1199.794	1199.830	0.036
2068	774615.567	3767099.172	1063.282	1063.310	0.028
2069	691727.141	3859217.034	1280.145	1280.140	-0.005
2069A	691627.808	3862453.79	1315.333	1315.410	0.077
2076	683332.885	3952566.505	1272.707	1272.690	-0.017
2080	750271.784	3972711.003	1173.597	1173.460	-0.137
2084	746474.707	3795481.685	1131.96	1131.990	0.030
2085	759667.714	3765006.833	1081.282	1081.300	0.018
2090	712855.9	3793296.604	1153.722	1153.680	-0.042
2092	691367.773	3990513.258	1303.381	1303.410	0.029

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2095	709128.387	3869108.527	1273.451	1273.450	-0.001
2096	757540.673	3875137.203	1157.284	1157.270	-0.014
2097	681340.803	3895153.937	1173.889	1173.930	0.041
2099	761348.284	3970916.586	1155.594	1155.630	0.036
2100	687940.942	3956407.616	1248.977	1248.960	-0.017
2104	694919.616	3784843.568	1183.588	1183.590	0.002
2110A	695733.727	3954830.817	1225.225	1225.210	-0.015
2111	735242.523	3756899.564	1080.398	1080.440	0.042
2113	764654.49	3915215.566	1019.273	1019.260	-0.013
2116	769809.863	3838912.695	1137.824	1137.810	-0.014
2126	705649.956	3904847.307	1268.656	1268.620	-0.036
2132	760439.014	3788657.478	1108.169	1108.260	0.091
2138	695623.117	3764692.415	1192.479	1192.510	0.031
2139	730608.752	3820627.84	1180.642	1180.680	0.038
2140*	775144.453	3825003.556	1112.855	1112.820	-0.035
2141	728268.754	3789171.487	1136.325	1136.370	0.045
2142	770134.065	3752962.125	1056.918	1056.920	0.002
2147	714203.975	3995420.416	1226.218	1226.230	0.012
2148	697655.903	3779128.306	1196.416	1196.440	0.024
2152	713884.45	3774540.585	1189.014	1189.070	0.056
2165	724417.588	3807070.442	1187.11	1187.170	0.060
2166*	778255.515	3748435.525	1031.237	1031.240	0.003
2167	757257.863	3816002.877	1141.74	1141.750	0.010
2168	767460.077	3893686.983	1161.594	1161.580	-0.014
2169	759923.636	3751873.262	1054.273	1054.260	-0.013
2170	741632.196	3916941.685	1154.242	1154.260	0.018
2171	766011.397	3769584.352	1072.699	1072.690	-0.009
2172	697197.563	3966495.321	1245.486	1245.430	-0.056
2174	722830.693	3847143.448	1206.871	1206.880	0.009
2175	691980.134	3788619.35	1186.411	1186.450	0.039
2188	727422.956	3869790.151	1228.896	1228.860	-0.036
2191	714551.946	3949186.617	1136.9	1136.880	-0.020
2193	751503.807	3783727.196	1108.251	1108.280	0.029

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2194	719532.993	3977134.779	1199.655	1199.630	-0.025
2197	743955.256	3901189.667	1217.462	1217.490	0.028
2201	699770.755	3953728.214	1208.738	1208.750	0.012
2202	752616.453	3864643.996	1157.842	1157.820	-0.022
2214	751271.038	3798075.463	1131.208	1131.240	0.032
2217	736990.074	3774918.579	1112.775	1112.820	0.045
2219	765473.877	3835770.64	1153.579	1153.660	0.081
2222	724679.046	3820034.889	1195.883	1195.900	0.017
2223	678610.436	3995020.391	1358.598	1358.580	-0.018
2225	756440.075	3764101.967	1090.884	1090.850	-0.034
2228	691401.428	3986327.295	1295.602	1295.640	0.038
2229	683025.318	3838458.138	1322.254	1322.300	0.046
2231	697521.306	3901834.151	1210.651	1210.620	-0.031
2232	684796.002	3830091.316	1306.145	1306.180	0.035
2233	716042.575	3986865.072	1222.316	1222.320	0.004
2236	717161.112	3783171.046	1161.035	1161.010	-0.025
2237	691371.594	4011864.786	1331.262	1331.250	-0.012
2245	705411.399	3817206.35	1223.267	1223.300	0.033
2246	761164.928	3812327.372	1125.57	1125.570	0.000
2248	729125.967	3775359.259	1129.373	1129.410	0.037
2250	713620.62	3879237.649	1255.251	1255.190	-0.061
2251	719829.585	3969970.118	1187.048	1187.080	0.032
2252	744342.333	3869445.678	1168.388	1168.380	-0.008
2255	738258.796	3783717.347	1120.221	1120.200	-0.021
2256	696551.683	3858378.925	1266.998	1266.950	-0.048
2260	744032.415	3799140.713	1140.397	1140.450	0.053
2262	755967.423	3899887.492	1192.401	1192.460	0.059
2263	707300.673	3879040.099	1273.595	1273.530	-0.065
2268	750592.984	3841122.01	1162.025	1162.020	-0.005
2271	721646.311	3949349.907	1117.669	1117.680	0.011
2271C	721548.27	3949347.247	1121.644	1121.620	-0.024
2271D	722144.889	3949360.698	1126.772	1126.790	0.018
2275	687616.889	4019655.302	1355.534	1355.550	0.016

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2279	717499.693	3754871.851	1157.272	1157.290	0.018
2280	730428.585	3962329.108	1147.707	1147.750	0.043
2289	694294.382	3808939.154	1248.891	1248.860	-0.031
2291	763514.557	3925745.294	980.432	980.440	0.008
2293*	773779.859	3915785.58	1051.125	1051.050	-0.075
2302	768125.835	3982785.174	1119.192	1119.230	0.038
2303	735973.88	3768023.357	1117.333	1117.350	0.017
2307	708096.572	3846863.296	1238.338	1238.410	0.072
2309	741188.53	3819402.386	1167.064	1167.140	0.076
2311	690856.814	3830355.083	1290.263	1290.280	0.017
2313	773463.772	3842321.431	1131.042	1131.060	0.018
2316	728993.225	3904188.132	1230.22	1230.240	0.020
2320	680113.896	3949576.483	1277.062	1277.020	-0.042
2324	743697.078	3968508.273	1185.459	1185.430	-0.029
2325	749854.445	3754837.392	1074.042	1074.020	-0.022
2327	718420.635	3997785.484	1233.873	1233.830	-0.043
2329	712848.222	3983394.462	1228.936	1228.920	-0.016
2330	682101.636	4006335.843	1355.158	1355.150	-0.008
2333	714305.682	3860954.539	1228.333	1228.370	0.037
2334	705407.963	4003487.732	1273.913	1273.920	0.007
2338	743492.787	3779559.651	1109.498	1109.560	0.062
2344	724152.568	4001451.504	1227.249	1227.200	-0.049
2348	708289.205	3844649.654	1240.74	1240.740	0.000
2355	756850.718	3778290.405	1101.645	1101.620	-0.025
2360	705588.198	3987171.675	1257.646	1257.700	0.054
2368	709933.652	3810523	1212.623	1212.600	-0.023
2371	744840.519	3943638.08	1070.145	1070.140	-0.005
2372	755596.794	3990552.844	1157.857	1157.810	-0.047
2373	737623.565	3836961.06	1185.104	1185.170	0.066
2374	682160.232	3855711.575	1333.658	1333.640	-0.018
2375	746101.581	3921700.934	1106.629	1106.650	0.021
2376	745880.069	3851652.898	1171.49	1171.500	0.010
2377	704209.609	3835493.693	1236.939	1236.910	-0.029

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2378	754965.363	3885555.277	1167.102	1167.080	-0.022
2380	724654.06	3834752.691	1210.413	1210.480	0.067
2381	762724.991	3945528.152	1054.12	1054.110	-0.010
2383	715972.758	3874925.043	1254.633	1254.700	0.067
2384	685803.36	3896527.068	1180.013	1180.020	0.007
2385	758842.96	3930539.303	989.321	989.280	-0.041
2386	722550.98	3756171.355	1154.168	1154.160	-0.008
2387	729022.919	3785291.411	1127.77	1127.750	-0.020
2390	714978.398	3905800.923	1234.275	1234.330	0.055
2391	769932.73	3993523.841	1102.629	1102.620	-0.009
2393	687821.923	3881655.163	1320.933	1320.960	0.027
2399	712912.423	3971255.431	1203.441	1203.490	0.049
2401	752546.248	3953586.864	1128.008	1128.000	-0.008
2402	759233.581	3799683.579	1117.013	1117.100	0.087
2406	691865.375	3965697.859	1263.229	1263.270	0.041
2408	734271.098	3812437.165	1164.71	1164.720	0.010
2410	764723.261	3755992.488	1061.87	1061.920	0.050
2412	730942.871	3762629.021	1119.429	1119.430	0.001
2416	716050.781	3869513.253	1255.12	1255.140	0.020
2419	699420.4	3870700.969	1288.12	1288.070	-0.050
2421	704545.047	3861259.788	1263.067	1263.100	0.033
2425	694000.025	3962794.246	1239.034	1239.070	0.036
2429	712140.789	4002489.112	1250.869	1250.780	-0.089
2431	747563.962	3938386.372	1013.572	1013.540	-0.032
2434*	771008.653	3968384.084	1117.207	1117.190	-0.017
2436	708889.859	3766221.917	1182.017	1181.980	-0.037
2437	705049.769	3886791.575	1276.101	1276.080	-0.021
2445	747771.069	3768551.427	1082.722	1082.770	0.048
2447	745026.109	3880449.637	1187.907	1187.900	-0.007
2452	693528.944	3795778.522	1200.124	1200.090	-0.034
2453	714060.226	3759116.418	1156.371	1156.380	0.009
2454	700067.915	3969426.251	1243.241	1243.260	0.019
2462	743485.619	3974142.434	1183.367	1183.430	0.063

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2463	756188.967	3984134.068	1160.92	1160.960	0.040
2464	730956.084	3970186.382	1179.569	1179.570	0.001
2468	760028.91	3958555.454	1152.488	1152.440	-0.048
2469	765669.806	3821822.742	1146.391	1146.390	-0.001
2473	713147.472	3806999.374	1209.099	1209.140	0.041
2494	713406.211	3895274.771	1274.288	1274.190	-0.098
2495	749022.766	3926826.634	1076.834	1076.850	0.016
2496	708392.71	3840428.412	1224.481	1224.530	0.049
2497*	772454.79	3906589.858	1076.972	1077.000	0.028
2498	745376.546	3758724.102	1085.449	1085.460	0.011
2501	692882.277	4015969.59	1328.007	1328.040	0.033
2502	704700.848	3974628.793	1233.351	1233.380	0.029
2503	709164.61	3979415.479	1232.684	1232.690	0.006
2519*	770959.067	3973209.408	1124.319	1124.290	-0.029
2520	765118.388	3973069.202	1140.477	1140.420	-0.057
2521*	770684.103	3990811.024	1103.441	1103.460	0.019
2531	688922.031	4040224.1	1394.743	1394.720	-0.023
2532	711089.485	4042001.598	1283.383	1283.360	-0.023
2533	701325.173	4029457.921	1323.052	1323.080	0.028
2534	720752.507	4041858.994	1254.489	1254.500	0.011
2535	720433.222	4037171.87	1249.859	1249.880	0.021
2536	712452.536	4037063.665	1274.567	1274.570	0.003
2550	733442.89	4002074.796	1212.503	1212.540	0.037
2551	748153.367	4013629.521	1164.265	1164.300	0.035
2552	721194.995	4017889.429	1260.924	1260.990	0.066
2553	739528.713	4025175.021	1190.361	1190.370	0.009
2577	763069.596	4042775.204	1125.858	1125.890	0.032
2579	734913.546	4016977.629	1219.184	1219.190	0.006
2580	712420.963	4030372.195	1285.484	1285.510	0.026
2581	729292.056	4037076.454	1241.367	1241.370	0.003
2591	748269.376	4004524.35	1173.935	1173.890	-0.045
2598	747276.346	4033478.13	1168.697	1168.720	0.023
2600	754083.086	4022415.389	1143.203	1143.230	0.027

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2003	407588.834	3974408.232	698.556	698.600	0.044
2004	232672.786	3912382.410	1018.362	1018.420	0.058
2005	281455.452	3862244.103	854.004	853.930	-0.074
2007	403356.999	3932550.305	719.842	719.810	-0.032
2008	245899.544	3849619.170	1087.018	1087.010	-0.008
2009	292539.728	3945496.504	943.928	943.880	-0.048
2010	348031.759	3977912.188	764.320	764.300	-0.020
2011	264855.258	3972964.171	1024.608	1024.620	0.012
2014	376865.429	3990016.226	819.464	819.480	0.016
2016A	381510.690	3789060.037	549.438	549.380	-0.058
2017	377820.184	3814106.574	562.917	562.940	0.023
2018	377964.189	3911530.898	713.317	713.400	0.083
2019	303154.597	3780170.102	959.168	959.250	0.082
2021	252322.810	3910723.254	1092.283	1092.290	0.007
2023	267554.648	3989688.262	1007.937	1007.950	0.013
2025	293549.308	3793179.946	973.254	973.280	0.026
2026	341054.246	3973214.115	831.901	831.880	-0.021
2028	332809.583	3858320.918	844.764	844.740	-0.024
2032	289635.121	3842427.895	795.612	795.580	-0.032
2034	240517.482	3993672.802	1078.393	1078.320	-0.073
2036	245527.380	3836516.559	1072.046	1072.070	0.024
2037	439844.204	3972732.953	693.883	693.890	0.007
2039	299666.623	3911195.699	1023.103	1023.050	-0.053
2040	278639.315	3874295.642	1039.662	1039.660	-0.002
2041	347209.311	3983859.843	750.456	750.250	-0.206
2043	261978.395	3941826.572	989.419	989.410	-0.009
2044	280769.984	3908460.347	1057.570	1057.530	-0.040
2045	430659.983	3984897.298	721.630	721.660	0.030
2046	320442.486	3901523.255	979.715	979.710	-0.005
2048	338913.636	3798718.126	659.131	659.090	-0.041
2049	404075.485	3840672.166	519.248	519.290	0.042
2050	400905.976	3843916.775	539.544	539.560	0.016
2052	310619.558	3901670.972	994.740	994.760	0.020

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2053	382297.971	3761542.957	551.377	551.410	0.033
2054	287001.167	3778207.386	970.148	970.160	0.012
2056	281426.645	3892539.952	1048.457	1048.510	0.053
2058	420376.509	3789151.854	488.404	488.400	-0.004
2059	390772.152	3908493.538	661.126	661.150	0.024
2060	325467.198	3802507.898	706.605	706.600	-0.005
2062	227427.360	3849282.122	1133.489	1133.460	-0.029
2063	451170.786	3998446.026	736.944	736.950	0.006
2064	299119.520	3941700.637	973.129	973.150	0.021
2065	272705.253	3942338.231	986.270	986.330	0.060
2067	296583.865	3898338.110	1028.977	1028.950	-0.027
2070	244318.831	3890608.893	1100.173	1100.130	-0.043
2071	294973.048	3769803.140	958.632	958.590	-0.042
2072	393488.927	3777544.940	537.827	537.830	0.003
2073	459243.977	3980832.373	633.995	634.010	0.015
2074	239538.859	3817036.785	1074.752	1074.760	0.008
2075	394495.634	3964941.909	751.829	751.780	-0.049
2077	266986.916	3817994.736	1016.806	1016.780	-0.026
2078	429842.472	3751813.387	449.547	449.520	-0.027
2079	270930.695	3762121.073	983.908	983.900	-0.008
2081	358882.207	3948832.522	889.733	889.720	-0.013
2082	239499.840	3859243.716	1109.546	1109.560	0.014
2083	268112.949	3940654.144	986.760	986.770	0.010
2086	363741.010	3942842.941	902.783	902.780	-0.003
2087	353644.505	3936798.965	922.245	922.210	-0.035
2088	439535.826	3792403.121	461.449	461.470	0.021
2089	326095.450	3845310.007	699.944	699.940	-0.004
2091	301259.316	3754700.595	941.724	941.710	-0.014
2093	401920.017	3766355.647	537.068	537.080	0.012
2094	418613.676	3985828.139	687.083	687.070	-0.013
2098	344047.244	3958081.109	940.233	940.220	-0.013
2101	381046.692	3936054.164	811.165	811.230	0.065
2102	253176.706	3822501.621	1043.555	1043.560	0.005

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2103	238094.677	3953408.305	1083.122	1083.120	-0.002
2105	379253.364	3874796.462	641.996	642.020	0.024
2106	405585.519	3909941.069	649.679	649.660	-0.019
2107	235733.202	3947674.333	1099.438	1099.430	-0.008
2108	336002.265	3841863.556	681.954	681.980	0.026
2109	402576.978	3944983.683	773.915	773.960	0.045
2112	422372.294	3799609.307	464.011	463.980	-0.031
2114	372684.989	3843382.052	611.397	611.400	0.003
2115	371367.793	3941048.139	831.832	831.820	-0.012
2117	263517.422	3750012.399	983.384	983.420	0.036
2118	278635.583	3857374.598	757.454	757.560	0.106
2119	382661.866	3886932.373	682.008	681.910	-0.098
2120	268912.419	3806687.196	1014.936	1014.910	-0.026
2121	325398.148	3960227.627	928.779	928.740	-0.039
2122	440161.864	3751194.514	427.741	427.750	0.009
2123	276210.790	3811340.177	1009.012	1009.010	-0.002
2124	289955.083	3866044.062	1023.371	1023.420	0.049
2125	271137.484	3893601.711	1062.336	1062.460	0.124
2127	246156.837	3751842.865	1011.118	1011.140	0.022
2128	393672.218	3990629.847	828.789	828.840	0.051
2129	276559.933	3852734.224	1013.132	1013.150	0.018
2130	354881.707	3872678.544	687.543	687.560	0.017
2131	397158.154	3899717.613	697.296	697.330	0.034
2133	302268.001	3919594.778	1024.182	1024.160	-0.022
2134	380293.837	3784937.928	513.882	513.880	-0.002
2135	286358.055	3866110.265	1030.216	1030.200	-0.016
2136	326662.057	3964594.659	910.285	910.280	-0.005
2137	360185.500	3912666.031	814.593	814.560	-0.033
2140*	224431.579	3825016.150	1112.855	1112.810	-0.045
2143	347589.666	3841820.102	666.977	666.810	-0.167
2144	355002.366	3879856.592	715.802	715.840	0.038
2145	331372.072	3896045.597	962.316	962.340	0.024
2146	422122.452	3978654.678	715.900	715.850	-0.050

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2149	340525.839	3964534.074	908.447	908.440	-0.007
2150	256553.030	3798461.988	1029.244	1029.230	-0.014
2151	377145.470	3745566.728	559.350	559.320	-0.030
2153	353291.045	3887428.942	762.585	762.670	0.085
2154	249005.651	3953005.805	1022.904	1022.930	0.026
2155	243717.441	3766380.199	1019.550	1019.530	-0.020
2156	338286.599	3912755.755	923.271	923.210	-0.061
2157	232278.620	3941669.447	1085.959	1085.940	-0.019
2158	252682.153	3874806.174	1054.294	1054.360	0.066
2159	414231.262	3803512.803	497.030	497.050	0.020
2159A	414201.492	3802754.823	489.501	489.530	0.029
2160	336620.875	3995667.186	915.518	915.530	0.012
2161	268584.721	3851508.610	1033.172	1033.170	-0.002
2162	320602.044	3826595.895	714.818	714.800	-0.018
2163	268547.308	3979996.238	1024.247	1024.260	0.013
2164	303589.460	3991553.521	962.196	962.120	-0.076
2166*	223031.902	3748397.952	1031.237	1031.210	-0.027
2173	248661.412	3855118.825	1084.457	1084.510	0.053
2176	229119.782	3896331.143	1145.842	1145.760	-0.082
2177	375624.615	3817936.618	544.161	544.160	-0.001
2178	351203.710	3830600.042	583.514	583.430	-0.084
2179	311396.778	3810825.952	792.000	792.040	0.040
2180	443512.056	3782632.963	462.677	462.700	0.023
2181	343251.978	3893715.814	857.855	857.810	-0.045
2182	267916.488	3797262.794	1012.941	1012.900	-0.041
2183	401281.204	3850134.439	585.671	585.600	-0.071
2184	285372.140	3770176.266	971.489	971.540	0.051
2185	353433.733	3893487.750	848.636	848.650	0.014
2186	256065.532	3775768.195	1013.766	1013.770	0.004
2187	461689.604	4000072.256	705.123	705.120	-0.003
2189	436720.380	3996971.067	749.849	749.890	0.041
2190	228509.570	3780489.755	1067.421	1067.420	-0.001
2192	365692.166	3829654.069	556.159	556.150	-0.009

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2195	351566.323	3868676.742	761.618	761.560	-0.058
2196	401670.358	3863033.936	613.369	613.440	0.071
2198	281345.235	3964099.669	946.663	946.680	0.017
2199	315438.181	3820429.775	750.739	750.750	0.011
2200	351408.910	3762958.202	670.714	670.710	-0.004
2200A	351405.051	3762949.618	670.792	670.800	0.008
2203	434747.847	3752366.288	443.887	443.880	-0.007
2204	287533.651	3814430.847	994.494	994.510	0.016
2205	370426.959	3854360.233	632.014	632.090	0.076
2206	323509.197	3838092.692	658.343	658.360	0.017
2207	299275.017	3954827.866	895.033	895.080	0.047
2208	432137.133	3757062.086	444.128	444.130	0.002
2209	401934.981	3788298.682	470.266	470.300	0.034
2210	354764.347	3931696.173	908.780	908.760	-0.020
2211	255064.087	3884448.715	1080.538	1080.600	0.062
2212	241464.387	3867150.055	1109.172	1109.160	-0.012
2213	422538.884	3750048.833	463.850	463.800	-0.050
2215	363927.245	3988829.461	784.754	784.750	-0.004
2216	390464.597	3988875.157	818.828	818.900	0.072
2218	379379.813	3886068.311	693.343	693.330	-0.013
2220	283812.752	3924826.226	1040.520	1040.510	-0.010
2221	297306.465	3880003.144	970.441	970.490	0.049
2224	460834.608	3972911.963	666.282	666.310	0.028
2226	431860.297	3981847.795	716.904	716.870	-0.034
2227	261419.703	3798519.536	1019.627	1019.620	-0.007
2230	355642.018	3876913.972	743.669	743.720	0.051
2234	446322.504	3987502.171	669.968	669.980	0.012
2235	367817.659	3837870.247	610.528	610.480	-0.048
2238	400379.724	3756762.418	487.456	487.430	-0.026
2239	382959.266	3926384.865	762.471	762.380	-0.091
2240	409099.857	3949238.358	751.612	751.610	-0.002
2241	319607.180	3830441.358	671.562	671.680	0.118
2242	390635.721	3950475.539	775.739	775.750	0.011

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2243	295008.541	3773288.138	958.007	957.990	-0.017
2244	233578.087	3987582.935	1099.112	1099.090	-0.022
2247	368377.892	3785403.556	581.999	581.970	-0.029
2249	407868.017	3988959.579	775.346	775.370	0.024
2253	356769.899	3944836.420	923.406	923.390	-0.016
2254	231948.178	3960463.027	1098.233	1098.240	0.007
2257	362333.758	3821879.787	582.975	582.940	-0.035
2258	387352.017	3752073.656	526.920	526.880	-0.040
2259	353581.892	3903637.097	853.918	853.880	-0.038
2261	390813.178	3769258.963	534.894	534.830	-0.064
2264	330842.099	3972142.382	827.769	827.790	0.021
2265	268365.093	3891014.338	1057.944	1057.940	-0.004
2266	326363.106	3851355.412	785.287	785.270	-0.017
2267	245729.725	3790214.467	1039.958	1039.960	0.002
2269	328304.153	3859198.704	862.438	862.450	0.012
2270	260788.849	3925678.088	1056.159	1056.140	-0.019
2272	392565.809	3944001.623	803.063	803.020	-0.043
2273	284432.088	3875694.467	1036.193	1036.180	-0.013
2274	333707.592	3992957.996	902.872	902.870	-0.002
2276	391504.862	3966881.813	728.226	728.280	0.054
2277	316988.778	3898129.039	983.206	983.220	0.014
2278	432533.825	3775872.438	448.327	448.350	0.023
2281	240635.481	3775647.737	1038.611	1038.620	0.009
2282	329729.538	3969926.065	846.958	846.960	0.002
2283	381842.929	3842541.732	578.751	578.670	-0.081
2284	230277.544	3940727.558	1064.450	1064.460	0.010
2285A	324114.482	3778698.971	742.451	742.430	-0.021
2285B	319804.960	3773907.714	790.325	790.340	0.015
2285C	321442.954	3781202.496	752.423	752.500	0.077
2286	412412.112	3825933.030	474.907	474.920	0.013
2287	362262.395	3979498.613	731.368	731.400	0.032
2288	438165.346	3817911.573	438.408	438.440	0.032
2290	320289.902	3805900.698	748.272	748.280	0.008

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2292	319679.482	3937887.918	987.316	987.330	0.014
2293*	228513.989	3915716.030	1051.125	1051.060	-0.065
2294	276539.997	3829611.653	1005.558	1005.510	-0.048
2295	442053.126	3767695.161	414.216	414.230	0.014
2296	413996.211	3963626.608	739.557	739.530	-0.027
2297	404725.377	3974422.966	731.594	731.570	-0.024
2298	258522.785	3937943.322	967.620	967.690	0.070
2299	419661.169	3970610.865	759.842	759.840	-0.002
2300	296296.386	3906480.404	1025.791	1025.820	0.029
2301	430337.292	4009728.052	713.290	713.300	0.010
2304	244897.802	3898775.353	1104.159	1104.180	0.021
2305	318774.936	3762908.894	892.588	892.600	0.012
2306	431851.422	3979357.491	697.836	697.870	0.034
2308	363684.092	3937215.921	840.918	840.900	-0.018
2310	275495.570	3756421.257	972.973	972.980	0.007
2312	391263.673	3846723.596	571.423	571.410	-0.013
2314	322876.502	3815142.651	727.784	727.810	0.026
2315	407411.184	3944188.278	770.440	770.470	0.030
2317	242885.413	3953244.349	1052.288	1052.280	-0.008
2318	282017.436	3776912.220	993.614	993.630	0.016
2319	288796.758	3985817.167	991.654	991.640	-0.014
2321	421128.299	3794315.436	476.759	476.790	0.031
2322	431829.597	3787495.084	483.877	483.900	0.023
2323	243876.571	3806597.012	1068.067	1068.080	0.013
2326	401779.718	3768768.365	547.434	547.470	0.036
2328	264673.325	3796457.527	1014.771	1014.790	0.019
2331A	306593.819	3786857.934	940.199	940.250	0.051
2332	239613.724	3863285.800	1112.879	1112.840	-0.039
2335	281311.416	3934411.590	1004.847	1004.840	-0.007
2336	432790.272	3771840.376	420.919	420.950	0.031
2337	347301.213	3764660.369	646.807	646.890	0.083
2337A	347005.682	3764761.420	650.858	650.870	0.012
2339	428038.276	3745387.768	432.708	432.630	-0.078

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2340	323579.078	3987595.436	840.544	840.580	0.036
2341	356268.218	3848174.565	670.413	670.490	0.077
2342	387107.143	3746085.935	559.090	559.130	0.040
2343	368322.217	3826825.233	541.504	541.440	-0.064
2345	231816.511	3819547.945	1092.145	1092.100	-0.045
2346	412358.463	3992328.598	724.530	724.510	-0.020
2347	328736.208	3811982.099	680.358	680.390	0.032
2349	232454.374	3842903.312	1104.604	1104.660	0.056
2350	367999.725	3843600.143	619.360	619.370	0.010
2351	451580.975	3768208.823	400.022	400.060	0.038
2352	298839.724	3816164.597	982.621	982.620	-0.001
2353	288691.822	3919701.514	1049.916	1049.870	-0.046
2354	361890.091	3800397.064	588.740	588.730	-0.010
2356	341101.569	3881766.139	834.682	834.720	0.038
2357	281953.056	3753215.570	920.630	920.650	0.020
2357A	281913.464	3754579.032	960.288	960.340	0.052
2358	363298.278	3997691.590	865.754	865.710	-0.044
2359	353117.550	3841253.513	628.603	628.610	0.007
2361	274129.180	3961320.396	961.245	961.210	-0.035
2362	283583.011	3981131.471	1011.448	1011.410	-0.038
2363	413567.212	3766263.363	501.995	502.030	0.035
2364	243987.906	3914230.022	1034.098	1034.100	0.002
2365	262870.843	3966382.198	1021.850	1021.870	0.020
2366	408609.702	3770651.267	532.756	532.720	-0.036
2367	289733.980	3961798.717	831.462	831.470	0.008
2369	246496.733	3777576.591	1027.347	1027.280	-0.067
2370	444816.017	3739900.625	391.845	391.830	-0.015
2379	297273.998	3983434.264	979.440	979.430	-0.010
2382	240675.530	3784204.139	1046.393	1046.380	-0.013
2382A	240851.720	3784199.162	1046.009	1045.990	-0.019
2388	258939.638	3851452.690	1055.802	1055.820	0.018
2389	235618.996	3961647.385	1054.916	1054.960	0.044
2392	376707.823	3979581.600	731.856	731.850	-0.006

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2394	254618.403	3780696.272	1017.606	1017.560	-0.046
2395	398577.973	3785434.001	515.300	515.280	-0.020
2396	305870.074	3765120.851	945.353	945.350	-0.003
2397	295701.997	3871194.870	944.324	944.370	0.046
2398	341288.963	3887924.580	856.787	856.750	-0.037
2400	260808.308	3975415.879	1034.473	1034.520	0.047
2403	302983.281	3765144.140	947.757	947.720	-0.037
2404	383712.933	3987632.638	808.514	808.480	-0.034
2405	323503.039	3985809.144	807.266	807.300	0.034
2407	360540.722	3952032.954	853.145	853.140	-0.005
2409	294038.102	3864706.755	1005.599	1005.600	0.001
2411	448302.001	3774816.579	436.322	436.390	0.068
2413	266703.737	3841290.772	1037.162	1037.190	0.028
2414	328322.787	3982849.686	775.370	775.380	0.010
2415	359363.027	3866803.113	723.885	723.820	-0.065
2417	356124.251	3763338.553	595.793	595.860	0.067
2418	432985.143	3768616.241	443.304	443.320	0.016
2420	341356.821	3867210.076	799.974	799.910	-0.064
2422	284344.027	3869954.862	1027.361	1027.290	-0.071
2423	302166.882	3948210.355	913.810	913.780	-0.030
2424	260480.553	3757506.399	995.256	995.300	0.044
2426	224193.453	3778217.629	1067.351	1067.370	0.019
2427	265755.539	3915254.555	1088.797	1088.780	-0.017
2428	444095.889	3969660.624	667.694	667.730	0.036
2430	376793.034	3970960.501	748.905	748.910	0.005
2432	401034.265	3799166.326	521.931	521.940	0.009
2432A	400997.649	3798132.566	521.628	521.660	0.032
2433	370893.456	3760767.258	607.993	607.940	-0.053
2434*	228953.121	3968385.257	1117.207	1117.200	-0.007
2435	241315.767	3803396.752	1069.681	1069.700	0.019
2438	235115.694	3775435.825	1051.205	1051.170	-0.035
2439	377628.340	3843103.944	583.166	583.100	-0.066
2440	443964.207	3750425.179	407.098	407.060	-0.038

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2441	283986.831	3808054.790	998.945	998.960	0.015
2442	422225.366	3989021.029	699.054	699.030	-0.024
2443	258830.642	3991523.663	1036.356	1036.330	-0.026
2444	331442.446	3782569.925	704.118	704.070	-0.048
2446	446902.499	3983269.320	654.256	654.270	0.014
2448	382355.953	3975891.425	706.075	706.070	-0.005
2449	229844.843	3760240.192	1046.396	1046.330	-0.066
2450	364606.866	3833934.246	585.911	585.880	-0.031
2451	264129.535	3764160.475	991.995	991.980	-0.015
2455	339843.309	3920540.578	864.904	864.900	-0.004
2456	322257.389	3834407.837	629.653	629.640	-0.013
2457	280305.619	3912694.464	1060.077	1059.990	-0.087
2458	314139.758	3857167.456	749.090	749.160	0.070
2459	342477.814	3962253.022	925.285	925.250	-0.035
2460	387232.741	3887832.752	690.939	690.880	-0.059
2461	455894.881	3790016.096	435.096	435.120	0.024
2465	455775.785	3738549.751	391.707	391.690	-0.017
2466A	289631.257	3791626.537	977.297	977.300	0.003
2466B	290432.774	3791007.053	973.616	973.530	-0.086
2467	374807.036	3919396.700	760.334	760.340	0.006
2470	357188.796	3837413.823	657.686	657.740	0.054
2471	322868.639	3912845.038	989.605	989.550	-0.055
2472	393871.878	3752018.606	520.828	520.840	0.012
2474	399175.240	3956541.811	752.188	752.180	-0.008
2475	310166.529	3896787.724	997.039	997.010	-0.029
2476	392849.054	3984018.836	788.157	788.120	-0.037
2476A	392864.452	3984051.062	788.713	788.740	0.027
2477	325341.763	3945246.731	977.840	977.760	-0.080
2478	404252.702	3953326.835	728.427	728.440	0.013
2479	376040.992	3894172.391	791.396	791.390	-0.006
2480	387756.528	3829521.813	532.201	532.230	0.029
2481	436210.333	3763398.719	447.644	447.700	0.056
2482	350583.643	3866515.234	774.933	774.850	-0.083

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2483	253930.652	3772542.266	1010.727	1010.730	0.003
2484	274872.756	3889544.368	1054.709	1054.670	-0.039
2485	232583.548	3965535.137	1068.823	1068.850	0.027
2486	265067.603	3887595.918	1065.556	1065.590	0.034
2487	346611.068	3782559.673	665.457	665.430	-0.027
2488	284608.968	3887942.567	1038.156	1038.150	-0.006
2489	237429.286	3977678.830	1091.115	1091.120	0.005
2490	395885.202	3926050.587	689.737	689.720	-0.017
2491	287242.594	3793260.502	982.740	982.730	-0.010
2492	259494.794	3848345.444	1057.715	1057.750	0.035
2493	286870.931	3918420.507	1050.626	1050.630	0.004
2497*	226634.802	3906617.406	1076.972	1076.960	-0.012
2499	419097.562	3762990.867	516.115	516.130	0.015
2500	316437.265	3873814.868	878.742	878.750	0.008
2504	374849.030	3923863.100	792.115	792.160	0.045
2505	328064.511	3999272.173	925.840	925.840	0.000
2506	272977.589	3968068.808	964.813	964.830	0.017
2507	261453.379	3962120.546	996.984	996.940	-0.044
2508	260915.304	3970553.002	1031.310	1031.270	-0.040
2509	257874.971	3970652.369	1040.012	1040.010	-0.002
2510	254178.767	3970749.813	1049.679	1049.670	-0.009
2511	250518.406	3971933.613	1062.252	1062.230	-0.022
2512	249002.837	3972718.908	1059.750	1059.740	-0.010
2513	247007.891	3972859.077	1067.327	1067.260	-0.067
2514	244926.360	3972584.596	1080.299	1080.270	-0.029
2515	242427.466	3972655.520	1088.987	1088.930	-0.057
2516	238417.764	3972848.331	1098.264	1098.210	-0.054
2517	235352.015	3972965.176	1101.559	1101.530	-0.029
2518	232225.266	3973104.412	1113.642	1113.650	0.008
2519*	229199.520	3973204.538	1124.319	1124.300	-0.019
2521*	230007.042	3990789.721	1103.441	1103.450	0.009
2522	230084.256	3986158.822	1110.289	1110.320	0.031
2523	230586.057	3982271.385	1104.863	1104.880	0.017

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2524	230923.642	3979273.777	1104.170	1104.170	0.000
2525	231283.492	3976407.270	1113.648	1113.640	-0.008
2526	231978.485	3951154.500	1124.153	1124.170	0.017
2527	231872.674	3947017.465	1115.904	1115.960	0.056
2528	234169.040	3937239.201	1036.904	1036.820	-0.084
2529	236794.065	3932364.847	996.521	996.450	-0.071
2530	239924.368	3898683.689	1116.346	1116.310	-0.036
2537	409945.110	4032428.328	736.594	736.660	0.066
2538	406402.978	4009587.763	721.405	721.360	-0.045
2539	411069.387	4003632.571	757.951	757.940	-0.011
2540	385208.393	4003823.079	776.214	776.240	0.026
2541	385453.300	4021553.283	811.158	811.370	0.212
2542	362932.982	4029992.682	861.273	861.290	0.017
2543	349651.411	4035408.925	884.375	884.210	-0.165
2544	350311.458	4001248.643	876.396	876.410	0.014
2545	336221.690	4003122.889	908.960	908.960	0.000
2546	316681.822	4006455.025	933.226	933.270	0.044
2547	320390.433	4033843.785	912.030	912.040	0.010
2548	263392.519	4042140.572	1011.812	1011.770	-0.042
2549	250375.052	4042457.170	1068.838	1068.860	0.022
2554	266346.216	4017064.596	1029.661	1029.580	-0.081
2555	318286.731	4018442.036	919.492	919.560	0.068
2558	351428.678	4023798.018	880.661	880.750	0.089
2559	375618.477	4016875.955	794.284	794.290	0.006
2560	396842.717	4018206.743	761.342	761.270	-0.072
2561	407380.114	4018082.155	723.426	723.360	-0.066
2562	398597.182	4027829.020	757.465	757.470	0.005
2563	396833.387	4039998.671	771.977	772.020	0.043
2564	409810.101	4039840.880	759.366	759.390	0.024
2565	382606.438	4040197.976	806.639	806.660	0.021
2566	380412.190	4034216.263	787.111	787.080	-0.031
2567	385407.104	4015090.700	770.566	770.650	0.084
2568	378835.806	4010405.249	740.374	740.330	-0.044

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
2569	338148.884	4019216.269	901.378	901.360	-0.018
2570	309114.396	4013214.553	938.741	938.640	-0.101
2571	319721.509	4041313.322	909.328	909.360	0.032
2572	292356.413	4041651.779	938.134	938.150	0.016
2573	297488.901	4020989.712	941.562	941.610	0.048
2574	293698.825	4008256.037	919.614	919.600	-0.014
2575	260530.137	4002750.323	1033.729	1033.690	-0.039
2576	246186.954	4014584.663	1066.810	1066.830	0.020
2578	233891.418	4031805.124	1076.179	1076.150	-0.029
2582	252591.888	4009101.452	1054.841	1054.880	0.039
2583	254687.846	3999689.400	1048.668	1048.670	0.002
2584	272420.709	4000783.269	1006.732	1006.740	0.008
2585	330015.324	4014556.993	907.000	906.950	-0.050
2586	310628.143	4027402.592	920.080	920.050	-0.030
2587	338466.088	4039778.165	897.551	897.560	0.009
2588	354443.596	4017227.865	866.726	866.720	-0.006
2589	304158.786	4035090.919	917.026	917.010	-0.016
2590	260016.108	4034823.723	1035.812	1035.790	-0.022
2592	234307.101	4008320.489	1086.692	1086.680	-0.012
2593	280336.219	4010175.446	981.005	981.030	0.025
2594	397018.200	4003667.310	761.549	761.570	0.021
2595	352764.213	4010001.453	814.929	814.940	0.011
2596	328215.052	4036595.851	912.109	911.980	-0.129
2597	274418.286	4028214.925	987.414	987.380	-0.034
2599	244893.974	4024082.207	1071.323	1071.280	-0.043

Appendix 4: DEM VVA Checkpoint Results

Coordinate values are listed in the following spatial reference systems:

Horizontal: NAD83 (2011) UTM Zones 13 and 14, meters (see note below)

Vertical: NAVD88 GEOID12B, meters

Accuracy testing was performed on each UTM Zone's dataset using all points falling within that UTM Zone, resulting in two tables of dZ results. The dZ values were then combined to produce the final accuracy value.

Due to some of the point locations being close to the UTM Zone 13 / Zone 14 boundary, 3 VVA points were tested twice, once in each zone. These point names are listed below and are indicated with an asterisk (*) next to their Point ID values in the coordinate tables.

VVA Points tested twice: 3039, 3048, 3187

Summary	
Point Count	423 tested (420 unique points, 3 tested twice)
95th Percentile	0.218 m
Mean of Residuals	0.077 m
Standard Deviation	0.071 m

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3002	699187.046	3878459.753	1286.717	1286.77	0.053
3003	749847.201	3804030.34	1135.402	1135.55	0.148
3005	687082.161	3854684.396	1315.733	1315.83	0.097
3006	771789.107	3775391.432	1072.396	1072.42	0.024
3007	700238.371	3845188.964	1271.003	1271.19	0.187
3008	763372.384	3819188.032	1144.954	1145.05	0.096
3011	709255.403	3865290.576	1266.14	1266.22	0.080
3012	730365.736	3836758.085	1193.422	1193.46	0.038
3013	773585.349	3856100.72	1147.481	1147.5	0.019
3015	724963.267	3844564.116	1200.892	1201.02	0.128
3016	774651.651	3767121.069	1063.609	1063.58	-0.029
3017	691719.574	3859254.975	1279.673	1279.71	0.037
3017A	691654.819	3862420.521	1315.009	1315.14	0.131
3021	746459.904	3795482.885	1130.852	1130.93	0.078
3022	759657.637	3765008.816	1081.948	1082.06	0.112
3023	712837.183	3793243.989	1154.112	1154.17	0.058
3024	709117.828	3869083.508	1273.413	1273.44	0.027
3025	757549.305	3875152.475	1156.779	1156.81	0.031
3027	694644.733	3784823.346	1184.362	1184.41	0.048
3028	735254.732	3756911.881	1080.412	1080.68	0.268
3029	770355.266	3838927.944	1137.879	1137.91	0.031
3035	760433.015	3788673.942	1108.776	1108.92	0.144
3037	695605.143	3764696.442	1192.416	1192.5	0.084
3038	730595.504	3820608.872	1179.944	1180.06	0.116
3039*	775195.985	3825025.449	1112.743	1112.82	0.077
3040	728263.757	3789186.843	1136.892	1136.99	0.098
3041	770040.843	3752944.015	1058.023	1058.06	0.037
3042	697650.336	3779110.371	1196.175	1196.29	0.115
3044	713870.116	3774535.068	1190.079	1190.31	0.231
3047	724431.851	3807377.473	1186.183	1186.29	0.107
3048*	778232.167	3748443.762	1031.327	1031.36	0.033
3049	757267.427	3816015.539	1141.564	1141.7	0.136
3050	759935.354	3751874.157	1054.875	1055.04	0.165

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3051	766023.805	3769398.651	1073.235	1073.27	0.035
3053	722815.188	3847137.322	1207.38	1207.57	0.190
3054	691956.084	3788608.73	1185.869	1186.09	0.221
3058	727444.683	3870005.455	1228.412	1228.45	0.038
3060	751484.211	3783743.669	1108.809	1108.9	0.091
3061	753597.573	3865221.735	1160.53	1160.6	0.070
3064	751265.044	3797924.204	1131.581	1131.67	0.089
3065	736991.197	3774907.018	1112.964	1113.17	0.206
3066	765464.646	3835531.626	1153.349	1153.39	0.041
3067	724647.295	3819978.503	1196.556	1196.64	0.084
3068	756453.014	3764090.12	1090.576	1090.74	0.164
3070	682999.96	3838380.687	1321.673	1321.75	0.077
3071	684792.968	3830071.19	1306.14	1306.42	0.280
3072	717134.487	3783171.059	1160.516	1160.63	0.114
3073	705405.388	3816895.392	1229.319	1229.4	0.081
3074	761182.835	3812289.134	1125.179	1125.31	0.131
3075	729147.547	3775575.922	1128.8	1128.91	0.110
3076	712055.433	3879201.38	1257.471	1257.48	0.009
3077	743532.142	3869383.402	1169.221	1169.37	0.149
3078	738281.401	3783716.665	1119.954	1120.02	0.066
3079	696063.436	3859384.822	1275.394	1275.41	0.016
3080	744026.569	3799152.6	1140.406	1140.5	0.094
3081	707306.064	3879054.497	1273.168	1273.25	0.082
3082	750578.941	3841155.762	1162.208	1162.25	0.042
3084	717488.25	3754874.284	1157.526	1157.64	0.114
3085	694275.517	3808930.671	1248.552	1248.58	0.028
3087	708369.799	3846853.592	1239.178	1239.32	0.142
3088	741208.707	3819193.031	1167.197	1167.41	0.213
3090	690855.921	3830341.99	1290.52	1290.62	0.100
3091	773496.702	3842319.099	1130.612	1130.74	0.128
3095	713806.137	3860954.316	1231.431	1231.67	0.239
3096	743524.503	3778703.616	1113.786	1113.940	0.154
3098	708293.298	3844654.632	1240.506	1240.580	0.074

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3100	756865.624	3778292.581	1100.930	1101.020	0.090
3101	709938.906	3810506.341	1212.683	1212.780	0.097
3102	737629.961	3836898.128	1184.776	1184.810	0.034
3103	682132.593	3855693.395	1333.161	1333.290	0.129
3104	745680.005	3851661.335	1171.234	1171.330	0.096
3105	704194.353	3835487.787	1236.611	1236.630	0.019
3106	724668.306	3834729.465	1210.927	1211.030	0.103
3108	715986.752	3874848.162	1255.678	1255.740	0.062
3109	722564.684	3756164.474	1154.866	1154.920	0.054
3112	758975.251	3799670.324	1118.492	1118.640	0.148
3113	734298.663	3812448.088	1164.537	1164.570	0.033
3115	764735.800	3756004.006	1062.276	1062.390	0.114
3116	730940.641	3763432.141	1123.141	1123.220	0.079
3118	716067.197	3869564.043	1254.670	1254.820	0.150
3119	699408.480	3870681.484	1287.537	1287.680	0.143
3120	704617.199	3859610.179	1253.819	1253.940	0.121
3125	708916.369	3766237.896	1181.419	1181.490	0.071
3127	747758.087	3768550.035	1082.122	1082.210	0.088
3129	693515.924	3795776.281	1200.514	1200.600	0.086
3130	714070.595	3759113.064	1156.939	1156.970	0.031
3132	765649.394	3821826.112	1146.274	1146.500	0.226
3133	713163.680	3807031.241	1209.542	1209.580	0.038
3136	708347.608	3840443.689	1226.319	1226.660	0.341
3142A	679004.241	3948552.429	1270.187	1270.290	0.103
3143	727215.265	3954631.124	1056.288	1056.350	0.062
3144	748211.148	3982303.473	1184.349	1184.530	0.181
3147	702885.651	3898560.162	1292.831	1293.000	0.169
3150	736455.788	3986351.052	1193.285	1193.370	0.085
3153A	695709.650	3954835.874	1225.065	1225.240	0.175
3155	714223.666	3995285.591	1225.515	1225.630	0.115
3158	719544.626	3977104.369	1198.397	1198.480	0.083
3159	699790.643	3953710.322	1208.239	1208.300	0.061
3161	691386.775	3986320.561	1295.654	1295.740	0.086

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3162	691352.460	4011883.126	1330.804	1330.870	0.066
3164	719813.394	3969954.779	1186.686	1186.800	0.114
3166	721639.441	3949361.453	1117.549	1117.580	0.031
3169	767522.512	3982785.898	1120.294	1120.330	0.036
3171	718408.865	3997779.732	1233.002	1233.150	0.148
3172	712885.998	3983375.987	1228.285	1228.380	0.095
3173	681565.465	4006311.830	1361.186	1361.230	0.044
3174	705379.809	4003510.894	1274.543	1274.580	0.037
3176	724167.372	4001475.038	1227.543	1227.620	0.077
3178	704394.564	3987125.610	1253.925	1254.150	0.225
3181	755467.470	3990526.478	1158.586	1158.660	0.074
3182	754997.345	3884473.260	1156.129	1156.300	0.171
3183	762844.459	3945528.826	1060.759	1060.750	-0.009
3184	712911.088	3971236.931	1204.108	1204.260	0.152
3187*	771064.731	3968373.409	1116.911	1116.920	0.009
3188	705041.936	3887358.273	1273.384	1273.480	0.096
3191	756211.143	3984131.463	1161.228	1161.380	0.152
3192	730967.648	3970174.909	1180.304	1180.380	0.076
3197	713422.688	3895300.435	1273.974	1274.030	0.056
3198	704695.649	3974613.962	1233.144	1233.180	0.036
3199	709142.394	3979428.137	1233.076	1233.280	0.204
3210	765103.903	3973043.380	1140.462	1140.560	0.098
3233	745074.307	3880850.738	1185.782	1185.830	0.048
3332	768676.513	3935382.214	1024.355	1024.420	0.065
3338	739983.623	3914800.477	1173.106	1173.190	0.084
3341	762461.881	3927633.438	951.269	951.340	0.071
3351	690929.239	3958674.718	1216.332	1216.390	0.058
3373	688924.706	4040243.311	1394.930	1394.960	0.030
3374	720107.856	4037157.205	1250.853	1250.920	0.067
3379	763072.920	4043097.501	1125.400	1125.540	0.140
3380	760026.119	4036969.131	1138.480	1138.560	0.080
3381	765915.235	4017977.108	1110.262	1110.330	0.068
3382	729729.339	3999222.640	1212.369	1212.440	0.071

UTM Zone 13 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3385	739467.162	4025155.658	1190.842	1190.930	0.088
3394	747906.026	4014162.266	1161.631	1161.720	0.089
3395	701163.648	4029471.023	1326.116	1326.170	0.054
3396	747005.083	4042749.576	1173.393	1173.470	0.077
3402	763612.188	4005053.603	1111.165	1111.220	0.055
3403	742672.668	3994920.960	1181.325	1181.470	0.145
3404	721072.833	4024198.031	1261.869	1262.000	0.131
3405	757645.700	4030881.784	1137.639	1137.770	0.131

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3001	245910.698	3849704.797	1087.001	1087.03	0.029
3004	292887.754	3793180.022	975.581	975.7	0.119
3009	244706.195	3837351.947	1073.050	1073.08	0.030
3010	279543.038	3874295.134	1038.210	1038.22	0.010
3014	227473.869	3849268.392	1133.940	1133.94	0.000
3018	239524.742	3817318.697	1073.546	1073.61	0.064
3019	266694.280	3817837.778	1018.535	1018.76	0.225
3020	270907.655	3761955.430	979.021	979.05	0.029
3026	253218.268	3822403.727	1043.797	1043.86	0.063
3030	263385.229	3750031.224	983.839	983.9	0.061
3031	268950.916	3806670.177	1014.610	1014.66	0.050
3032	276187.734	3811368.011	1008.758	1008.88	0.122
3033	290029.113	3866059.990	1022.584	1022.64	0.056
3034	246195.931	3751850.794	1010.735	1010.84	0.105
3036	286371.637	3866132.731	1029.787	1029.89	0.103
3039*	224484.320	3825034.947	1112.743	1112.81	0.067
3043	256527.270	3797918.419	1030.013	1030.01	-0.003
3045	243302.558	3766377.406	1020.646	1020.88	0.234
3046	268574.116	3851413.566	1033.191	1033.11	-0.081
3048*	223009.074	3748407.537	1031.327	1031.37	0.043
3052	248495.016	3855133.703	1084.665	1084.65	-0.015
3055	267904.303	3797247.351	1012.498	1012.52	0.022
3056	285357.775	3770091.571	971.442	971.48	0.038
3057	256698.638	3775666.113	1010.534	1010.77	0.236
3059	228301.019	3780482.308	1064.676	1064.69	0.014
3062	287528.431	3814377.598	994.025	994.07	0.045
3063	241438.551	3866579.986	1111.161	1111.26	0.099
3069	261552.832	3798536.491	1020.021	1020.11	0.089
3083	284444.791	3875673.811	1036.009	1036.01	0.001
3086	276531.043	3829678.838	1005.876	1005.85	-0.026
3089	275481.695	3756463.547	972.851	972.87	0.019
3092	282485.953	3776884.775	990.489	990.5	0.011
3093	243919.841	3806612.530	1067.775	1067.81	0.035

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3094	264700.492	3796502.697	1014.608	1014.65	0.042
3097	231826.488	3819691.827	1090.869	1090.86	-0.009
3099	232433.530	3842786.638	1103.448	1103.43	-0.018
3107	240864.859	3784218.698	1046.083	1046.12	0.037
3110	258951.553	3851615.534	1055.897	1055.96	0.063
3111	254618.680	3780751.642	1016.795	1016.91	0.115
3111A	254625.804	3780658.909	1017.531	1017.58	0.049
3114	294032.296	3864648.883	1004.835	1004.98	0.145
3117	266683.335	3841663.881	1038.054	1038.02	-0.034
3121	284355.768	3869946.315	1027.324	1027.4	0.076
3122	260502.519	3757431.555	994.934	994.95	0.016
3123	224306.954	3778166.539	1066.981	1067.11	0.129
3124	241297.203	3803416.116	1069.954	1070.05	0.096
3126	235130.580	3775420.088	1051.639	1051.64	0.001
3128	229829.581	3760215.340	1046.927	1046.9	-0.027
3131A	289640.382	3791655.277	977.596	977.63	0.034
3131B	290416.721	3790998.388	973.564	973.7	0.136
3134	254350.786	3772541.644	1010.789	1010.83	0.041
3135	259276.184	3848340.798	1057.652	1057.65	-0.002
3137	303136.161	3780152.888	958.491	958.75	0.259
3138	404091.020	3840668.749	520.177	520.24	0.063
3139	301234.209	3754427.665	941.610	941.78	0.170
3140	434766.844	3752368.219	443.802	443.82	0.018
3141	305890.292	3765092.681	945.278	945.44	0.162
3145	264835.673	3972973.148	1024.402	1024.54	0.138
3146	253355.714	3910668.931	1092.292	1092.34	0.048
3148	240518.722	3993628.661	1077.679	1077.64	-0.039
3149	280592.146	3908470.378	1058.120	1058.12	0.000
3151	281433.391	3892524.979	1048.144	1048.21	0.066
3152	244318.658	3890619.783	1100.166	1100.17	0.004
3154	271152.214	3893610.759	1061.939	1061.95	0.011
3156	268538.973	3979981.441	1023.854	1024.030	0.176
3157	229110.578	3896384.762	1145.669	1145.640	-0.029

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3160	254953.487	3884459.691	1080.714	1080.750	0.036
3163	233588.692	3987589.056	1099.123	1099.180	0.057
3165	268346.598	3890314.510	1065.339	1065.500	0.161
3167	230073.832	3940756.577	1068.801	1068.880	0.079
3168	296321.454	3906788.000	1024.840	1024.890	0.050
3170	289299.977	3985769.664	989.537	989.630	0.093
3175	281299.655	3934444.083	1003.271	1003.290	0.019
3177	288541.257	3919684.636	1050.240	1050.230	-0.010
3179	283576.268	3981154.300	1010.786	1010.810	0.024
3180	262950.321	3966232.862	1016.715	1016.780	0.065
3185	260796.024	3975410.910	1033.458	1033.560	0.102
3186	265707.584	3915246.976	1088.360	1088.410	0.050
3187*	229008.439	3968371.164	1116.911	1116.900	-0.011
3189	259602.273	3991516.541	1033.337	1033.390	0.053
3190	280327.925	3912767.955	1059.877	1059.880	0.003
3193	274879.281	3889528.687	1054.663	1054.720	0.057
3194	265053.449	3887497.969	1065.312	1065.380	0.068
3195	237428.354	3977627.483	1090.931	1091.010	0.079
3196	286879.171	3918136.521	1050.749	1050.720	-0.029
3200	261442.920	3962265.179	997.775	997.810	0.035
3201	260461.294	3970561.268	1033.404	1033.520	0.116
3202	257821.841	3970629.984	1039.130	1039.210	0.080
3203	254097.596	3970728.709	1049.362	1049.470	0.108
3204	250438.120	3971946.506	1061.362	1061.380	0.018
3205	249046.131	3972712.738	1060.405	1060.500	0.095
3206	246983.878	3972867.347	1066.710	1066.800	0.090
3207	244900.185	3972600.693	1079.971	1080.030	0.059
3208	242442.700	3972668.711	1088.535	1088.560	0.025
3209	238438.132	3972863.084	1097.954	1098.050	0.096
3211	376879.299	3990039.725	819.440	819.510	0.070
3212	439855.259	3972728.960	693.606	693.710	0.104
3213	430663.036	3984884.098	721.503	721.700	0.197
3214	320327.979	3901533.408	979.299	979.390	0.091

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3215	310623.089	3901733.281	994.306	994.380	0.074
3216	390773.294	3908503.957	661.248	661.440	0.192
3217	405602.485	3909947.083	649.952	650.180	0.228
3218	371387.780	3941041.850	831.424	831.650	0.226
3219	301981.550	3919584.915	1024.183	1024.210	0.027
3220	360191.604	3912648.392	815.086	815.220	0.134
3221	340487.734	3964584.713	909.038	909.030	-0.008
3222	338300.615	3912759.351	923.285	923.300	0.015
3223	319697.671	3937657.243	987.454	987.480	0.026
3224	404710.647	3974410.263	731.690	731.700	0.010
3225	376726.051	3979558.383	730.395	730.440	0.045
3226	328175.471	3982806.056	774.129	774.180	0.051
3227	422242.756	3989031.936	699.369	699.430	0.061
3228	446863.019	3983526.626	647.405	647.380	-0.025
3228A	446754.414	3984759.358	645.305	645.470	0.165
3228B	445705.652	3988884.215	704.328	704.530	0.202
3229	322924.110	3912853.513	989.207	989.230	0.023
3230	325450.563	3945260.246	977.764	977.820	0.056
3231	404265.206	3953306.380	729.276	729.380	0.104
3232	297354.395	3880047.110	970.116	970.220	0.104
3234	407482.941	3975840.863	703.263	703.310	0.047
3235	281559.668	3862435.765	858.081	858.080	-0.001
3236A	381620.580	3792757.854	497.452	497.490	0.038
3237	377866.003	3815268.038	571.217	571.190	-0.027
3238	287940.341	3842585.788	948.081	948.000	-0.081
3239	420360.139	3788308.516	497.922	497.890	-0.032
3240	427643.301	3770570.473	448.707	448.740	0.033
3241	418670.628	3985843.740	684.215	684.220	0.005
3242	278820.439	3857509.657	756.443	756.310	-0.133
3243	382789.810	3887446.047	664.286	664.220	-0.066
3244	276886.501	3853312.616	955.412	955.420	0.008
3245	379705.471	3784289.424	524.482	524.610	0.128
3246	347579.538	3841821.923	667.676	667.570	-0.106

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3247	353310.413	3887406.684	762.726	763.010	0.284
3248	252998.567	3874818.016	1055.110	1055.230	0.120
3249	323636.783	3826177.219	673.762	673.840	0.078
3250	351393.920	3832249.957	585.711	585.770	0.059
3251	311420.210	3811036.320	791.026	791.130	0.104
3252	353243.067	3891414.333	794.201	794.110	-0.091
3253	310201.304	3816860.563	788.747	788.840	0.093
3254	400688.422	3787771.768	463.411	463.470	0.059
3255	424035.101	3750001.190	465.787	465.840	0.053
3256	460794.207	3973438.627	666.007	666.170	0.163
3257	332683.120	3857550.155	829.718	829.750	0.032
3258A	320991.769	3773908.756	796.214	796.210	-0.004
3259	331198.806	3764942.924	728.120	728.170	0.050
3260	324836.251	3810444.873	731.867	731.930	0.063
3261	407439.833	3943895.437	767.362	767.400	0.038
3262A	306179.086	3785488.539	954.549	954.720	0.171
3263	432719.246	3772372.938	410.014	410.100	0.086
3264	368020.259	3824422.116	542.859	542.890	0.031
3265	353263.866	3841351.795	625.827	625.960	0.133
3266	341088.969	3867200.417	801.827	801.770	-0.057
3267	430664.380	3795265.640	477.597	477.690	0.093
3268A	430848.485	3771070.075	423.952	423.960	0.008
3269	446632.509	3984936.868	641.883	642.040	0.157
3270	364132.444	3837946.441	595.828	595.960	0.132
3271	336347.040	3838728.724	656.123	656.240	0.117
3272	357897.346	3843691.932	631.578	631.570	-0.008
3273	395877.496	3926051.688	689.455	689.590	0.135
3274	289789.168	3842422.628	795.506	795.450	-0.056
3275	277479.008	3855535.009	768.614	768.530	-0.084
3276	295705.601	3871185.974	944.472	944.480	0.008
3277A	380832.010	3790192.051	528.576	528.660	0.084
3278	376020.158	3815202.952	561.058	561.080	0.022
3279	338731.446	3798785.057	659.771	659.990	0.219

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3280	382264.429	3760251.190	541.259	541.250	-0.009
3281	420388.280	3789259.234	487.309	487.330	0.021
3282	393371.596	3777281.061	539.847	539.870	0.023
3283	402023.575	3766874.876	546.654	546.830	0.176
3284	372697.015	3843396.948	611.081	611.270	0.189
3285	377163.437	3745524.867	558.137	558.110	-0.027
3286	414220.271	3802790.213	488.929	488.960	0.031
3287	320182.470	3829352.367	671.994	672.040	0.046
3288	376606.239	3816958.599	558.943	558.950	0.007
3289	310012.702	3810366.969	802.270	802.330	0.060
3290	401669.625	3863055.994	614.026	614.120	0.094
3291	316082.577	3821740.229	738.850	738.920	0.070
3292	351507.147	3762964.242	667.963	667.920	-0.043
3292A	353960.777	3763072.882	618.099	618.170	0.071
3293	370434.405	3854238.419	636.145	636.280	0.135
3294	432214.009	3757412.381	443.152	443.230	0.078
3295	402184.132	3788912.615	496.844	496.910	0.066
3296	355669.819	3876624.666	738.407	738.470	0.063
3297	401891.592	3754218.318	496.693	496.800	0.107
3298	387362.876	3751831.629	520.987	521.060	0.073
3299	389028.329	3768716.000	528.439	528.410	-0.029
3300	326469.295	3851724.987	794.385	794.480	0.095
3301	381835.160	3842556.253	578.450	578.540	0.090
3302A	321472.310	3773920.905	786.620	786.780	0.160
3302B	321398.382	3781191.706	754.126	754.260	0.134
3303	412803.186	3825224.558	488.417	488.530	0.113
3304	438155.443	3817838.150	438.216	438.260	0.044
3305	313715.202	3761027.875	923.323	923.330	0.007
3305A	312332.337	3760374.384	930.849	930.890	0.041
3306	322817.153	3815625.158	717.764	717.730	-0.034
3307	421134.054	3794286.070	476.621	476.710	0.089
3308	431861.838	3787710.524	479.160	479.200	0.040
3309	401918.507	3768337.047	551.030	551.070	0.040

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3310A	437300.154	3773366.734	407.558	407.570	0.012
3311	348225.200	3764278.267	650.610	650.710	0.100
3312	428032.181	3745474.343	433.842	433.880	0.038
3313	385487.345	3745190.278	563.186	563.210	0.024
3314	368410.738	3827054.277	541.268	541.410	0.142
3315	367799.262	3843609.222	617.469	617.590	0.121
3316	413418.364	3766391.431	505.251	505.330	0.079
3317	408148.026	3770299.467	530.715	530.780	0.065
3318	444802.645	3740148.426	390.615	390.640	0.025
3318A	444802.027	3740133.707	390.570	390.610	0.040
3319	398590.664	3785416.394	514.855	514.920	0.065
3320	356016.952	3763309.467	595.876	595.920	0.044
3321	432986.834	3768602.649	443.242	443.340	0.098
3322	370849.554	3761301.973	604.602	604.620	0.018
3323	377622.625	3843088.114	582.580	582.560	-0.020
3324	437342.349	3775790.094	439.101	439.140	0.039
3325	327577.887	3839358.242	652.442	652.520	0.078
3326	314080.524	3857195.522	749.533	749.620	0.087
3327	455634.465	3738678.118	392.971	393.100	0.129
3328	357148.191	3836112.668	649.926	650.040	0.114
3329	393772.159	3751996.446	520.679	520.690	0.011
3330	388103.168	3829507.377	526.979	527.010	0.031
3331	419662.805	3762718.622	510.595	510.660	0.065
3333	399059.919	3858591.284	602.918	603.060	0.142
3334	262178.273	3940910.227	993.831	993.880	0.049
3335	272295.212	3945908.717	994.436	994.560	0.124
3336	382988.323	3929368.777	731.335	731.430	0.095
3337	387685.256	3916331.401	733.981	734.000	0.019
3339	281153.141	3964225.117	948.686	948.760	0.074
3340	353881.571	3862427.306	752.883	752.950	0.067
3342	258522.741	3937927.127	968.336	968.450	0.114
3343	369073.690	3899211.281	809.295	809.440	0.145
3344	385773.582	3961809.584	809.462	809.510	0.048

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3345	289906.186	3961865.413	829.677	829.760	0.083
3346	369987.383	3931388.200	801.944	802.040	0.096
3347	361159.255	3931695.939	856.398	856.440	0.042
3348	384569.619	3881162.212	681.109	681.250	0.141
3349	378751.575	3944181.995	816.210	816.130	-0.080
3350	386995.840	3868264.965	624.362	624.470	0.108
3352	318650.762	3982838.544	805.231	805.320	0.089
3353	377970.224	3911398.419	713.126	713.270	0.144
3354	382326.962	3885742.456	692.497	692.620	0.123
3355	353348.281	3889641.710	779.262	779.440	0.178
3356	407395.125	3942406.013	774.652	774.810	0.158
3357	379355.804	3955199.312	763.702	763.730	0.028
3358	382451.819	3975828.086	706.750	706.820	0.070
3359	387199.599	3886732.984	679.798	679.970	0.172
3360	376031.468	3894175.270	791.580	791.680	0.100
3361	374849.462	3922426.919	772.336	772.410	0.074
3362	373840.644	3966001.004	821.404	821.560	0.156
3363	358575.894	4008359.801	784.497	784.530	0.033
3363A	358520.615	4008365.887	784.939	784.880	-0.059
3364	383068.214	4034274.502	762.232	762.200	-0.032
3365A	405674.243	4018100.240	737.180	737.290	0.110
3366	283505.059	4014855.928	961.880	962.140	0.260
3367	306467.831	4025261.327	907.188	907.270	0.082
3368	398098.947	4032684.825	782.440	782.620	0.180
3369	398365.723	4012485.614	702.948	703.030	0.082
3370	385340.952	4010922.400	728.288	728.420	0.132
3371	377102.894	4004540.522	764.464	764.740	0.276
3372	362815.375	4013392.185	783.979	784.040	0.061
3375	247404.943	4024011.681	1069.319	1069.360	0.041
3376	337329.200	4039786.559	896.846	896.910	0.064
3377	336252.602	4003140.706	908.247	908.280	0.033
3378	263420.621	4041637.116	1009.382	1009.490	0.108
3383	283141.941	4032736.016	971.951	971.990	0.039

UTM Zone 14 Points					
Point ID	Easting	Northing	Known Z	Laser Z	dZ
3384	242125.829	4000035.128	1084.274	1084.300	0.026
3386	302025.726	3995248.298	963.144	963.180	0.036
3387	338739.210	4027516.623	890.197	890.190	-0.007
3388	363509.582	4029969.165	854.380	854.630	0.250
3389	319786.866	4041295.969	909.169	909.330	0.161
3390	398124.773	4003612.585	744.838	744.940	0.102
3391	368957.123	4002432.490	853.496	853.620	0.124
3392	324169.650	4027370.380	912.531	912.530	-0.001
3393	272067.791	4000765.698	1007.167	1007.220	0.053
3397	249572.135	4042465.579	1066.132	1066.390	0.258
3398	267256.611	4013795.196	1021.819	1021.870	0.051
3399	304158.050	4037222.193	919.297	919.250	-0.047
3400	349745.638	4035468.110	883.965	883.970	0.005
3401	385454.774	4021571.419	811.103	811.390	0.287
3406	263290.400	4033333.332	1017.453	1017.490	0.037
3407	320264.044	4011886.218	920.390	920.410	0.020
3408	374247.922	4024949.483	830.494	830.450	-0.044
3409	256689.283	4010757.629	1044.861	1044.930	0.069
3410	354675.342	4023738.234	868.351	868.510	0.159