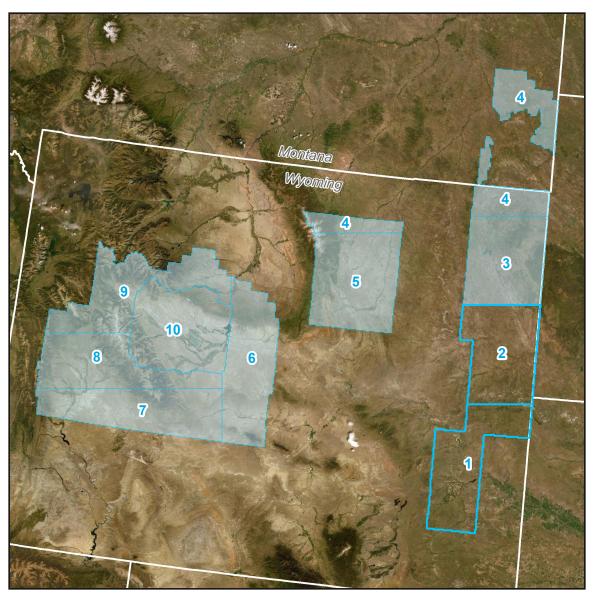
WY FEMA East 2019 D19

Lot 5 Blocks 1 and 2 Airborne Lidar Report

May 2020





Contract # G16PC00022

Task Order # 140G0219F0127



Contractor Woolpert Project # 79935

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1. Overview

About

This project contains a comprehensive outline of the 140G0219F0127 WY FEMA East 2019 D19 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 10 blocks that total approximately 32,466 square miles in Wyoming and Montana.

This report encompasses the Lot 5 Blocks 1 and 2 areas of interest. This AOI totals approximately 6,180 square miles and includes the following counties:

- Platte
- Niobrara
- Weston

Purpose

This project will support the 3DEP mission, and the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment and Planning (MAP) program.

Specifications

Data for this task order was acquired and produced to meet USGS Lidar Base Specification v1.3 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 system.

Table 1-1. Spatial Reference System

Area of Intere	Area of Interest						
Horizontal	EPSG Code	6350					
Datum		NAD83 (2011)					
	Projection	Albers Equal Area					
	Units	Meters					
Vertical	Datum	NAVD88					
	Geoid	GEOID12B					
	Units	Meters					
	Height Type	Orthometric					

Task Order Deliverables

All data products produced as part of this task order are listed below. All tiled deliverables had a tile size of 1,000-meters x 1,000-meters. Tile names are derived from the coordinates of the lower left corner of each tile.

Table 1-2. Deliverables

Lidar Data	
Classified lidar point cloud data	Tiles in .las v1.4 format Classes • 1 – Processed, not Classified • 2 – Ground • 7 – Noise • 9 – Water • 17 – Bridge Decks • 18 – High Noise • 20 – Ignored Ground • 21 – Snow
Breaklines used for hydro- flattening	 Lake and River features as feature classes in an Esri file geodatabase 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	
Tile Index	Esri shapefile format
Snow Polygons	Esri shapefile format
Metadata and Reports	
Metadata	Deliverable-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

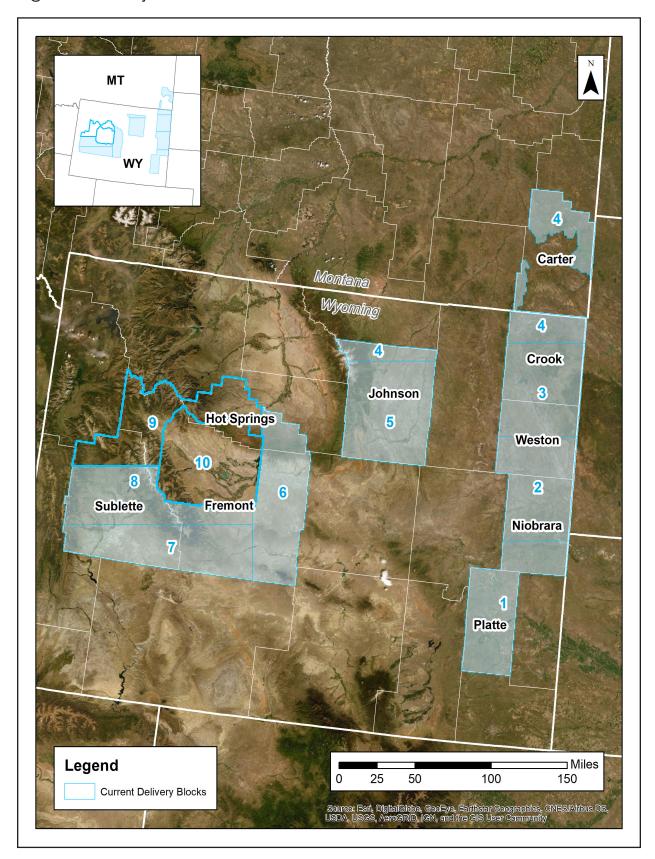
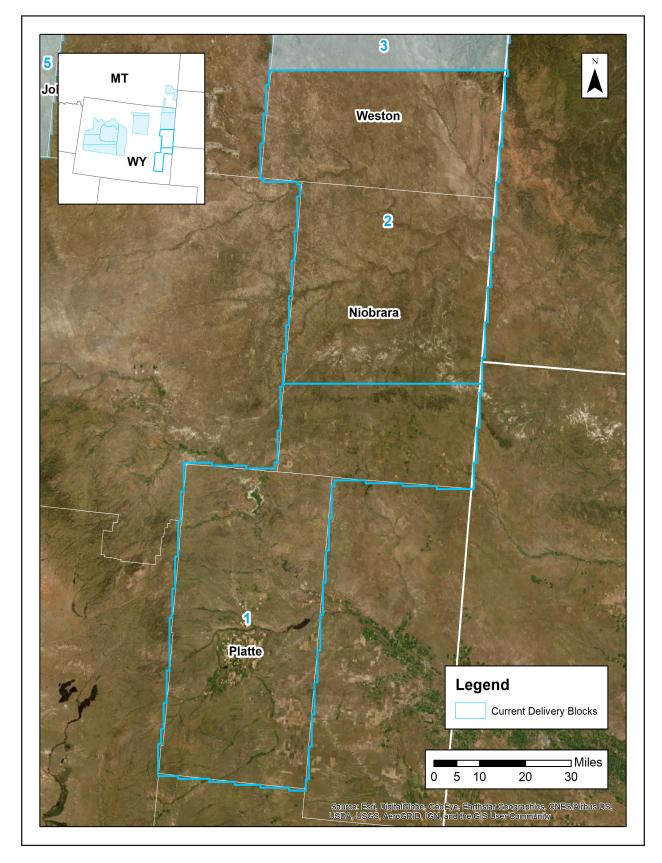


Figure 1-2. Project Area - Blocks 1 and 2



2. Acquisition

Flight Planning

Aerial lidar data was collected using the specifications listed below.

Table 2-1. Acquisition Requirements

Specification	Target
Resolution	2 points per square meter 0.71-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	Fall 2019 leaf off window running through September 15, 2019
Acquisition Conditions	 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 Where caused by water bodies Where caused by areas of low near infra-red (NIR) reflectivity (i.e. asphalt or composition roofing) Where caused by lidar shadowing from buildings or other features; or 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 for this project using the Leica Terrain Mapper and Optech Galaxy PRIME lidar sensor systems. A total of 1,197 flight lines were collected for this project.

Table 2-2. Leica Terrain Mapper Sensor Info

Sensor Specifications	
Operating Altitude (m AGL)	300 - 5,500 at 10% reflective target
Maximum Measurement Rate (kHz)	2,000
Scan Angle	20 - 40
Scan Width	Up to 70% of flight altitude
Scan Frequency	Programmable up to 125 Hz (7,500 RPM), 250 scan lines per second
Number of Returns	15
Number of intensity measurements	15
Pulse Mode(s)	Up to 35 pulses in air
Laser Specifications	
Laser Beam Divergence	0.25 mrad (1/e)
Laser Classification	Class 4 laser product
Accuracy	
Range Resolution	< 1 cm RMS
Elevation Accuracy	< 5 cm 1 σ
Horizontal Accuracy	< 13 cm 1 σ
Physical Specifications	
Size (cm), Weight (kg) • Scanner • Control Electronics	• 37 W x 68 L x 26 H cm, 47 kg • 45 W x 47 D x 25 H cm, 33 kg
Operating Temperature • Scanner • Control Electronics	• 0 - 40°C cabin-side temperature • 0 - 40°C
Flight Management	Leica FlightPro
Power Consumption	922 W @ 22.0 – 30.3 VDC

Source: Leica TerrainMapper Data Sheet

https://leica-geosystems.com/en-US/products/airborne-systems/topographic-lidar-sensors/leica-terrainmapper and the products of the product of the product of the products of the product of

Table 2-3. 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 ≥20%; 99% detection probability

Source: Optech Galaxy PRIME Airborne Lidar Terrain Mapper Specification Sheet http://info.teledyneoptech.com/acton/attachment/19958/f-0278/1/-/-/-Galaxy%20PRIME%20Brochure.pdf

^{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 ≤20°

^{4.} Target size ≥ laser footprint

^{5.} Under Teledyne Optech test conditions, 1 sigma

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 for the whole project.

Table 2-4. GNSS Base Stations

Station Name	Latitude (DMS)	Longitude (DMS)	Ellipsoid Height L1 Phase Center (Meters)
Base2	42° 50′ 00.77963	104° 24′ 50.76535	1550.411
Base1	43° 19′ 21.88533"	105° 02′ 43.56787"	1514.653
WYRF_CORS	42° 49′ 50.36453"	106° 19′ 38.49771"	1634.444
WYLC_CORS	41° 06′ 16.29488"	104° 46′ 31.29307"	1824.826
P042_CORS	42° 03′ 05.40043"	104° 54′ 38.09615"	1423.359
KGCC_Airport	44° 20′ 55.78123"	105° 32′ 00.99884"	1306.038
AutoAnt	44° 20′ 55.78123"	105° 32′ 00.99884"	1306.038
P033_CORS	43° 57′ 10.41596"	107° 23′ 15.12165"	1376.681
KRIW_Airport	43° 03′ 37.92270"	108° 27′ 18.25590"	1648.117
P715_CORS	43° 30′ 02.74785"	109° 41′ 23.41714"	2988.93
BLW2_CORS	42° 46′ 01.63709"	109' 3328.03604"	2216.398
TSWY_CORS	43° 40′ 26.70325"	110° 35′ 50.86433"	2191.496
AHID_CORS	42° 46′ 23.20961"	111° 03′ 49.41574"	1976.311

Timeline

Lidar data for Lot 5 Blocks 1 and 2 was collected from June 14, 2019 through July 10, 2019. 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 2-4. Project Acquisition Specifications

Settings	Leica TerrainMapper Acq. Blocks 1-4, 6-8	Leica TerrainMapper Acq. Block 5	Leica TerrainMapper Acq. Blocks 9, 12-13, 17-19	Leica TerrainMapper Acq. Blocks 10-11, 14-16, 20-21	Optech Galaxy PRIME Acq. Blocks 23 -24
Max. Number of Returns	15	15	15	15	8
Nominal Point Spacing	0.71 m	0.71 m	0.71 m	0.71 m	0.7 m
Nominal Point Density	2 ppsm	2 ppsm	2 ppsm	2 ppsm	2 .73 ppsm
Flying Height Above Ground Level	3,000 m	3,200 m	3,200 m 3,250 m 3,500 m		1,600 m
Flight Speed	150 knots	150 knots	150 knots	150 knots	120 knots
Scan Angle	40°	40°	40°	40°	46°
Scan Rate Used	82 Hz	82 Hz	82 Hz	80 Hz	51 Hz
Pulse Rate Used	600 kHz	650 kHz	650 kHz	670 kHz	250 kHz
Multi-Pulse in Air	Enabled	Enabled	Enabled	Enabled	Enabled
Swath Width	2,184 m	2,329 m	2,366 m	2,548 m	1,358 m
Swath Overlap	25%	25%	25%	25%	20%

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 1.3. 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 $(4 \times ANPS)^2$ exhibited data coverage gaps.

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 17 Bridge Decks
- Class 18 High Noise
- Class 20 Ignored Ground
- Class 21 Snow

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 twenty (20). 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.

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 produced to the full extents of the tile boundaries. 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 produced to the full extents of the tile boundaries.

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 and delivery tile index. 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 Statement

Horizontal Accuracy

The data sets was produced to meet ASPRS "Positional Accuracy Standards for Digital Geospatial Data" (2014) for a 25.9 cm RMSEx / RMSEy Horizontal Accuracy Class which equates to Positional Horizontal Accuracy = +/- 63.6 cm at a 95% confidence level.

Raw Lidar Swath Testing

This project required the lidar point cloud swath to be produced to meet a Non-Vegetated Vertical Accuracy (NVA) value of 19.6 cm at a 95% confidence level using an RMSEz target value of 10 cm x 1.9600.

Digital Elevation Model Testing

This project required DEM data to be produced to meet a Non-Vegetated Vertical Accuracy (NVA) value of 19.6 cm at a 95% confidence level using an RMSEz target value of 10 cm x 1.9600 and a Vegetated Vertical Accuracy (VVA) value of 0.30 cm at the 95th percentile error.

Appendix 1: Flight Logs

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46	E		17:31:00	17:44:00			00:13:00		2	1.1												
45	W		17:47:00	18:03:00			00:16:00				3	1.1	_									
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Ivar	uone		L	eica re	rraiii i	ларрег		onditi	ons	1706.	0	10.1	0.00	15.1	6.00	_	KC13		
Wind Dir	· (°) \	Wind	Speed (kts)	Vis	ibility ((mi)		ng (ft)		oud Cover	Tem	o. (°C)	Dew	, Point	(°C)	Pres	sure ("H		
330	()		7		10	,,		100		Broken		0.6		-2	\ \ \		29.88		
Air Spe	ed (kts)		Altitude	AGL (ft)	Al	titude	MSL (1	ft)	Airfield E	evation	ı (ft)							
1.	50		9,8	342			12,	940		6,	100								
								Settin	gs										
Point Spacir	ng (m)	Poin	t Density (pp	osm)	Sca	an Angl	e/FOV	/ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Las	er Po	wer (%)		
0.7			2			40)			82			600			10	0		
	T			ı		ı		1			Ve	rify S-	Turns E	Before	Missi	on			
Line #	Direct	ion	Start Time (UTC)	(U	Time TC)	Tin On-l	ine	Sate	ellite	PDOP		Line Notes/Comments							
69	W		15:19:00 15:31:		1:00	00:1	2:00	1	6	1.4			Clou	ds 35-!	55 KM	in			
											-								
				_															
											1								
											+								
	-	\dashv									+								
								Page 2					Verify S-Turns After Mission						

			<u>wo</u>	oipe	<u>ert Lid</u>	ar A	cqu	uisitio	1 LO	g				
			Pro	ject In	fo							Da		
Project #			t Name					nique ID						ar Flight
79935		Wyoming					Day1	70_90513_A			/19/20	19	170	А
	ew			Equip						Time				Airports
	ilot				Model / Ta			Hobbs S		Local		UTC Sta	_	Departing
	ocque				tan - N7079			2169.		09:0		15:07:0	_	CPR
	rator				/lodel / Seri			Hobbs E		Loca		UTC En		Arriving
De	Hart	L	eica Ter	rain M	apper - 905			2172.	4	11:0	2:00	17:02:0	00	CPR
			,			Conditio								
Wind Di	r (°) W	ind Speed (kts)	Visil	oility (r		ng (ft)		oud Cover	Temp	o. (°C)	Dew	Point (°	C) Pr	essure ("F
121		12		10	10	,000		Broken	1	3		10		29.96
	eed (kts)	Altitude	AGL (ft	:)	Altitud	e MSL (f	t)	Airfield El	evation	(ft)				
1	.50	13,	000		13	,000		6,0	047					
						Setting								
Point Spaci	ng (m) F	oint Density (p	osm)	Scar	n Angle/FO	V (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Laser I	Power (%)
0.35		10			40			81			600			100
			-						Ve	rify S-T	urns E	efore M	ission	Yes
Line #	Directio	Start Time	End T		Time	Sate	llite	PDOP			Line No	otes/Con	nment	5
		(UTC)	(UT		On-Line									
53	E	15:07:00	15:30		00:23:00	2		1.1				Area 3		
54 55	W E	15:34:00 16:00:00	15:58 16:14		00:24:00 00:14:00	2		1.1						
56	W	16:17:00	16:33		00:14:00	2		1.2						
57	E	16:35:00	16:47		00:12:00	2		1.2						
58	W	16:50:00	17:02		00:12:00	2	2	1		Clc	oud las	t 2 miles	West e	nd
				_										
						Page	1		Ve	orify S	Turns	After Mi	ssion	Yes

							LIG	<u> </u>	109	uisitic		78					
					oject I	nfo									Date		
Project #			Project							nique ID					_	f Year	Flight
79935			Wyomir	ng LiDA					Day	170_90515			/19/20	19	1	70	
	ew					ment						Time					ports
	lot					/ Mode				Hobbs		-	Start		Start		parting
Fi	nn					itan - N				1708			5:00		5:00	k	CYS
•	rator					Model	•			Hobbs			l End		End		riving
Naro	done		Le	eica Te	rrain N	/lapper				1711	L.5	11:2	9:00	17:2	9:00	k	CYS
								Condition								,	
Wind Dir	(°)	Wind	Speed (kts)	Vis	ibility	(mi)	Ceilir	ng (ft)	Clo	ud Cover	Tem	p. (°C)	Dew	Point	: (°C)	Press	ure ("H
270			12		10					Clear		14		8		3	0.04
Air Spe	ed (kts)	Altitude	AGL (ft)	Α	ltitude	MSL (f	t)	Airfield I	Elevatio	n (ft)					
15	50		9,8	342				940		(5,100						
								Settin	gs								
Point Spacir	ng (m)	Poir	nt Density (pp	osm)	Sca	an Ang	le/FOV	/ (°)	Sca	n Frequenc	y (Hz)	Pulse	Rate	(kHz)	Las	ser Pow	ver (%)
0.7			2			4	.0			82			600			100)
											Ve	erify S-1	Turns E	Before	Missi	on	
Line #	Direc	tion	Start Time (UTC)		Time TC)		ne Line	Sate	llite	PDOP			Line N	otes/0	Comm	ents	
68	Direction (UTC) 58 W 14:55:00 15 57 E 15:12:00 15					00:1	2:00	15	5	1.8		Po	ssibly	clouds	50-55	KM in	
67	8 W 14:55:00 15:07 7 E 15:12:00 15:24						2:00	18		1.3						_	
66					1:00		2:00	10		1.5	_				55 KM		
55 55	E W		15:48:00 16:05:00		9:00 7:00		1:00	15 15		1.6 1.5	_	P	ossibly		44 KM		
44	E		16:25:00		7:00		2:00	14		1.8	_		Ciou	u3 4 0 -	77 1(10)	111	
43	V		16:42:00		4:00		2:00	15		1.4			Clou	ds 43-	55 KM	in	
											+						
											+						
											+						
											+						
						<u> </u>					+						
						-					+						
											+						

Verify S-Turns After Mission

				Pro	ject Ir	nfo								D	ate		
Project #			Project		•				11	nique ID		Flight	t Date			f Year	Flight
79935			Wyoming							71 90513	Δ		/20/20		17		A
	ew		vvyorining	LIVIA		mont			Dayı	71_90313	_^	Time	/20/20	119	1/		
			Α:		Equip		L / T=:	1 4		11-66	- 644		C44	LITCO	`a		rports
	lot					Mode					s Start	_	Start	UTC S			parting
	cque					itan - N					72.4	_	1:00	15:01			CPR
Ope	rator		Sei	nsor N	lake / I	Model	/ Seria	al#		Hobb	s End	Loca	l End	UTC	End	Aı	rriving
Del	Hart		Le	eica Te	rrain N	1apper	- 9051	L3		217	78.4	02:0	2:00	20:02	2:00		CPR
							С	onditi	ons								
Wind Dir	· (°)	Wind	Speed (kts)	Vis	ibility (mi)	Ceilir	ng (ft)	Clo	ud Cover	Ter	np. (°C)	Dew	/ Point	(°C)	Press	ure ("H
60	-		6		10			000		Broken		11		7	•		29.87
Air Spe	ed (kts	١	Altitude	ΔGI (f	+)	ΔΙ		MSL (ft)	Δirfield	l Elevati						
	50	,	13,0		-,	A		000	•,	7	6,047	()					
1	50		13,0	000					~c		0,047						
Daint C	/		4 Daniella 1			^		Settin	-	- Fu	/ ! ! `	D. 1	D-:	/I.i.i=\		F	10/1
Point Spacio	ng (m)	Poir	nt Density (pp	ism)	Sca	n Angl		()	Sca	n Frequer	icy (Hz)	Pulse	Rate	(KHZ)	Las		ver (%)
0.35			10			4)			81			600			10	0
											\	erify S-1	Turns E	Before I	Missio	on	Yes
Line #	Direc	tion	Start Time	End	Time	Tin	ne	Sata	ellite	PDOP			Line N	otes/Co	nmm-	nte	
Lille #	Direc	Lion	(UTC)	(U	ГС)	On-l	ine	Sate	inte	PDOP			LIIIE IN	otes/C	Ullille	:1165	
59	E		15:01:00	15:1	2:00	00:1	1:00	2	.4	1.1				Area	3		
60	59 E 15:01:0 50 W 15:16:0				1:00	00:1	5:00	2	:3	1.1							
61	0 W 15:16:00 1 E 15:34:00				7:00	00:0	3:00	2	:5	1.1		Had to	o abor	t due to	grou	nd sp	eed
61	E 15:34:00 1 E 15:46:00 1				7:00	00:1			.4	1.2			Reach	ed spe	ed of :	172	
62	V	/	16:01:00		5:00	00:1			:3	1.2							
63	E		16:19:00		0:00	00:1			2	1.2			Reach	ed spe	ed of :	173	
64	V		16:34:00		9:00	00:1			!5	1	_						
65	E		16:52:00		3:00	00:1			.4	1.1	_						
66	\ \		17:06:00		1:00	00:1			2	1							
42	E		17:30:00		5:00	00:1			.4	0.9	_						
41	W E		17:49:00		7:00	00:1			.6	1.1		Doc	scible b	aliday	12 5 2	nilos i	<u> </u>
39	l W		18:10:00 18:28:00		4:00 6:00	00:14 00:1			.6 .5	1.1	_	P05	sinie (oliday	15.5	iiiles II	11
38	E		18:49:00		3:00	00:1			.5 .6	1.2							
37	W		19:07:00		5:00	00:1			. 0 .5	1.2							
36	E		19:28:00		2:00	00:1			.6	1.2							
35	W		19:45:00		2:00	00:1			.7	1.1							
				2.0													
											_						
								Page				Verify S-					Yes

					oject I				•	<u>uisitio</u>					Date		
Project #			Project		-				U	nique ID		Flight	Date			f Year	Flight
79935			Wyomin							. 171_90515		_	/20/20	•	-	71	<u> </u>
Cr	ew				Equip	ment				_		Time				Air	ports
Pi	lot		Ai	rcraft	Make ,	/ Mode	el / Tai	il #		Hobbs St	tart	Local	Start	UTC	Start	Dep	arting
Fi	nn			Cessna	404 T	itan - N	1475R0	2		1711.	5	08:3	0:00	14:3	0:00	K	CYS
Ope	rator		Se	nsor N	1ake /	Model	/ Seria	al#		Hobbs E	nd	Loca	l End	UTC	End	Arr	riving
Naro	done		Le	eica Te	rrain N	Ларрег	- 9051	15		1715.	5	12:3	5:00	18:3	5:00	K	CYS
							C	Conditi	ions								
Wind Dir	(°)	Wind	Speed (kts)	Vis	ibility ((mi)	Ceilir	ng (ft)	Clo	ud Cover	Tem	p. (°C)	Dew	Point	: (°C)	Pressu	ıre ("H
110			5		10					Clear	_	12		2			9.95
Air Spe	ed (kts)	Altitude	AGL (ft)	A	ltitude	MSL (f	ft)	Airfield El	evatio	n (ft)					
	50	-	9,8				12,	940			100						
								Settin	gs								
oint Spacir	ng (m)	Poir	nt Density (pp	osm)	Sca	an Ang	le/FO\	/ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Las	er Pow	er (%)
0.7	<u> </u>		2			4	0			82			600			100	
											Ve	erify S-1	Turns E	on			
,,			Start Time	End	Time	Tir	ne			22.02							
Line #	Direc	tion	(UTC)	(U	TC)	On-	Line	Sate	ellite	PDOP			Line N	ents			
65	V	V	15:01:00	15:1	5:00	00:1	4:00	1	8	1.6	W	/ Bounc	Lines	good,	E Bou	nd race	track
64	E		15:28:00		8:00	_	0:00	1		1.4	F	lew as	fast as	possi	ble, Ra	ice Trac	king
64	\ \		15:43:00		6:00		3:00	1		1.6	ļ.,	-1	•				
63	E		15:59:00 16:15:00		7:00 28:00		8:00 3:00	1 1		1.6 1.8		-lew as	fast as	possi	ble, Ra	ice Trac	king
62	E		16:42:00		0:00		8:00	1		1.3	-	lew as	fast as	nossi	hle Ra	ice Trac	king
62	W		16:54:00		7:00	00:1		1		1.4	 '	iew as	Tust us	, possi	oic, ite	ice irac	В
61	E		17:13:00		1:00		8:00	1		1.3	F	lew as	fast as	possi	ble, Ra	ice Trac	king
61	V	V	17:25:00		8:00	00:1	3:00	2	0	1.2							
59	E		17:46:00		5:00		9:00	1		1.1	F	lew as	fast as	possi	ble, Ra	ice Trac	king
59	\ \	V	18:02:00	18:1	6:00	00:1	4:00	1	5	1.2	\vdash						
											\vdash						
											\vdash						
						I					1						

Verify S-Turns After Mission

			1	Wo	olp	ert	Lid	ar A	cqı	uisitio	n Lo	g					
				Pro	ject Ir	nfo								Da	ate		
Project #			Project	Name	!				U	nique ID		Flight	Date	(UTC) D	ay of	Year	Flight #
79935			Wyoming	FEMA E	East				Day1	72_90513_A	ı	06,	/21/20	19	17	2	Α
Cr	ew				Equip	ment						Time				Ai	rports
Pi	lot		Ai	rcraft I	Make /	′ Mode	el / Tai	I #		Hobbs S	tart	Local	Start	UTC St	art	De	parting
Laro	cque			Cessna	404 Ti	itan - N	N7079F			2178.	4	10:1	9:00	16:19:	00		CPR
Ope	rator		Se	nsor M	ake / I	Model	/ Seria	al#		Hobbs	End	Loca	l End	UTC E	nd	Aı	riving
Del	Hart		L	eica Tei	rrain M	1apper	r - 9051	L3		2180	5	11:3	3:00	17:33:	00		CPR
							С	onditi	ons								
Wind Dir	(°)	Wind	Speed (kts)	Visi	bility (mi)	Ceilir	ng (ft)	Clo	oud Cover	Tem	o. (°C)	Dew	Point (°C)	Press	ure ("Hg)
250			19		10		10,	000		Broken	1	.0		-2		2	9.91
Air Spe	ed (kts)		Altitude	AGL (f	t)	Α	ltitude	MSL (f	t)	Airfield E	evation	ո (ft)					
1.	50		13,	000			13,	000		6,	047						
								Settin	gs								
Point Spacin	ng (m)	Poir	nt Density (pp	sm)	Sca	n Ang	le/FO\	/ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Lase	er Pov	ver (%)
0.35			10			4	10			81			600			100)
											Ve	rify S-T	urns E	Before N	/lissio	n	Yes
line#	Direc	tion.	Start Time	End 1	Гime	Tir	me	Sate	II:to	PDOP			Lina Ni	atas/Ca			
Line #	Direc	tion	(UTC)	(UT	Г С)	On-	Line	Sate	ilite	PDOP			Line iv	otes/Co	mme	nts	
34	E		16:19:00	16:3			6:00	2		1.2				Area 3			
33	W		16:38:00	16:5			7:00	2		1	<u> </u>						
32	E		16:58:00	17:13			5:00	2		1	-	1:-1-	4 -1	11		- £ 1:	
31	W		17:16:00	17:3	3:00	00:1	7:00		4	1		Lign	t cloud	d layer a	t ena	ot iin	<u>e</u>
											<u> </u>						
											-						
											+						
											1						
											-						
											+						
											+						
		$\neg \neg$									+						
											+						
								D-	1			-uie - c	T	A.C	las!		V
A d d!+! - ! C								Page	1		V	erity S-	iurns	After M	ISSIOI	1	Yes
Additional C	ommen	τs															

				Woo	olp	ert	Lid	ar A	cqı	uisitio	n Lo	g					
				Pro	ject Ir	nfo								Da	te		
Project #			Project	t Name					U	nique ID		Flight	Date	(UTC) D	ay of	Year	Flight #
79935			Wyoming	FEMA E	ast				Day1	75_90513_A		06,	/24/20	19	175	5	Α
Cr	ew			l	Equip	ment						Time				Air	ports
Pi	lot		Ai	rcraft N	/lake /	/ Mode	el / Tai	l #		Hobbs S	tart	Local	Start	UTC St	art	Dep	parting
Laro	cque			Cessna						2181.			0:00	15:10:	_	(CPR
	rator			nsor Ma			-			Hobbs E		Loca		UTC E	_		riving
Del	Hart		L	eica Ter	rain N	1apper				2184.	9	11:3	7:00	17:37:	00	(CPR
								onditio									
Wind Dir	(°)	Wind	Speed (kts)	Visik	oility (mi)		ng (ft)	Clo	oud Cover	_	p. (°C)	Dew	Point (°	C)		ure ("Hย
240			7		10			000		Clear		L 6		4		2	9.91
	ed (kts)		Altitude)	Α		MSL (f	t)	Airfield El		າ (ft)					
1.	50		13,	000				000		5,	350						
								Setting									
Point Spacin	ng (m)	Poin	nt Density (pp	osm)	Sca	n Ang		/ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Lase		ver (%)
0.35			10			4	0			81			600			100	
		_								ı	Ve	rify S-1	urns E	Before M	issio	n	Yes
Line #	Direct	tion	Start Time	End T			ne	Sate	llite	PDOP		ı	Line N	otes/Co	nme	nts	
20	г		(UTC) 15:10:00	(UT 15:27		On-	7:00	2.	3	1 1				Aron 2			
30 29	E W		15:10:00	15:27			6:00	23		1.1				Area 3			
28	E		15:48:00	16:04			6:00	22		1.1							
27	W		16:07:00	16:23			6:00	23		1							
26	Е		16:26:00	16:41	:00	00:1	5:00	2:	1	1.1							
25	W		16:44:00	17:00			6:00	22		1							
24	E		17:03:00	17:19			6:00	22		1	-						
23	W		17:22:00	17:37	':00	00:1	5:00	22	2	1	-		Clo	ouds on	line		
		-															
											-						
					$\neg \neg$												
											-						
					$\neg \neg$												
			'					Page	1		V	erify S-	Turns	After M	ssion		Yes
Additional C	ommen	ts															

					olpo	<u>ert</u>	LIQ	ar <i>F</i>	vcd	<u>uisitio</u>	n L	og					
				Proj	ect Ir	nfo								١	Date		
Project #			Project	Name					U	nique ID		Flight	: Date ((UTC)	Day o	f Year	Flight #
79935			Wyomin	g Block	4				Day	175_90515		06	/24/20	19	1	75	
Cr	ew				quip	ment						Time				Aiı	ports
Pi	lot		Ai	rcraft N	1ake /	Mode	l / Tai	l #		Hobbs S	tart	Local	Start	UTC	Start	De	parting
Fi	nn			Cessna 4	404 Ti	tan - N	475RC	;		1715.	5	09:0	1:00	15:0	1:00	ŀ	(CYS
Ope	rator		Se	nsor Ma	ke / N	Model	/ Seria	al#		Hobbs E	nd	Loca	l End	UTC	End	Ar	riving
Naro	done		Le	eica Ter	rain M	lapper	- 9051	L5		1719.	9	01:3	0:00	19:2	9:00	ŀ	(CYS
							C	onditi	ons								
Wind Dir	(°)	Wind	Speed (kts)	Visik	ility (mi)	Ceilir	ng (ft)	Clo	ud Cover	Tem	p. (°C)	Dew	Point	(°C)	Press	ure ("H
270	• •		15		10			J.,		Clear	+	19		5	• •		0.01
	ed (kts)	Altitude	AGL (ft		Al	titude	MSL (f	t)	Airfield El							
		,	9,8		,			940	-,		100	\-\-\-					
			- 7-	-				Settin	σς	-,							
Point Spacir	ng (m)	Poir	nt Density (pr	sm)	Sca	n Angl				n Frequency	(Hz)	Pulse	Rate	(kHz)	Las	er Pov	ver (%)
	,			,		4		,		82	(/	1 4.151	600	(100	
0.7										02	V	erify S-1		Refore	Missi		,
			Start Time	End T	ima	Tin	20				Ť	ciny 5	ruiii3 L	CIOIC	1411331	J11	
Line #	Direc	tion	(UTC)	(UT		On-l		Sate	llite	PDOP			Line N	otes/0	Comm	ents	
58	Finn Operator S Nardone d Dir (°) Wind Speed (kts) 270 15 r Speed (kts) Altitud 150 9 pacing (m) Point Density (p 0.7 2 # Direction (UTC) W 15:23:00 E 15:42:00 W 15:58:00 E 16:18:00 W 16:34:00 E 16:53:00 W 17:10:00 E 17:34:00 W 17:51:00 E 18:06:00 W 18:23:00 E 18:39:00				:00	00:1	4:00	1	8	1.4							
57	E		15:42:00	15:54	:00	00:1	2:00	1	8	1.3							
56	v	V		16:11		00:1		1		1.7							
54				16:30		00:1		1		1.4	-						
53				16:47		00:1		1		1.2							
52 51				17:07 17:24		00:1		2		1.1							
50				17:48		00:1		1		1.1							
49				18:03	_	00:1		1		1.3	+						
48				18:18		00:1		1		1.4							
47	V	V	18:23:00	18:36	:00	00:1	3:00	1	7	1.5							
46				18:51		00:1		1		1.6							
45		V	18:55:00	19:08	:00	00:1	3:00	1	5	1.5	_						
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	Direction Start Time (UTC) W 15:23:00 E 15:42:00 W 15:58:00 E 16:18:00 W 16:34:00 E 16:53:00 W 17:10:00 E 17:34:00 W 17:51:00 E 18:06:00 W 18:23:00 E 18:39:00 E				- 1			I			1						

Verify S-Turns After Mission

Project Project Notinger					<u>Wo</u>	olp	<u>ert</u>	LId	ar A	/cd	uisitio	<u>n Lo</u>	og				
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Pilot Aircraft Make / Model / Tail # Hobbs Start Local Start UTC Start Departing	Project #								U	nique ID		Flight	Date	(UTC)	Day o	f Year Fli	
Pilot Aircraft Make / Model / Tail # Hobbs Start Local Start UTC Start	79935			Wyomin	g Block	4				Day	176_90515		06,	/25/20	19	1	76
Finn	Cr	ew				Equip	ment						Time				Airpo
Operator Nardone Sensor Make / Model / Serial # Hobbs End Local End UTC End Arriving Arriving 1724.9 Q2:24:00 Acriving Arriving Nardone Nardone Leica Terrain Mapper - 90515 1724.9 Q2:24:00 Acriving Arriving Arriving NCVs Wind Dir (*) Wind Speed (kts) Visibility (mi) Ceiling (ft) Cloud Cover Temp. (*C) Dew Point (*C) Pressure (*P Altitude AGL (ft) Altitude MSL (ft) </td <td>Pi</td> <td>lot</td> <td></td> <td>Ai</td> <td>rcraft</td> <td>Make /</td> <td>/ Mode</td> <td>el / Tai</td> <td>il#</td> <td></td> <td>Hobbs St</td> <td>art</td> <td>Local</td> <td>Start</td> <td>UTC</td> <td>Start</td> <td>Depart</td>	Pi	lot		Ai	rcraft	Make /	/ Mode	el / Tai	il#		Hobbs St	art	Local	Start	UTC	Start	Depart
Nardone Leica Terrain Mapper - 90515 1724.9 02:24:00 20:24:00 KCYS	Fi	nn			Cessna	404 Ti	itan - N	1475RC	2		1719.9)	09:2	0:00	15:2	0:00	KCYS
Wind Dir (*)	Ope	rator		Se	nsor N	lake /	Model	/ Seria	al#		Hobbs E	nd	Local	l End	UTC	End	Arrivi
Wind Dir (*) Wind Speed (kts) Visibility (mi) Ceiling (ft) Cloud Cover Temp. (*C) Dew Point (*C) Pressure (*Pt 280 10 10 Clear 17 5 30.11	Nar	done		Le	eica Te	rrain N	/lapper	- 9051	15		1724.9)	02:2	4:00	20:2	4:00	KCYS
Air Speed (kts) Altitude AGL (ft) Altitude MSL (ft) Airfield Elevation (ft)							С	Conditi	ons								
Air Speed (kts) Altitude AGL (ft) Altitude MSL (ft) Airfield Elevation (ft) 150 9,842 12,940 6,100 Settings Settings Settings Settings One Spacing (m) Point Density (ppsm) Scan Angle/FOV (*) Scan Frequency (Hz) Pulse Rate (kHz) Laser Power (%) 0.7 2 40 82 600 100 Verify S-Turns Before Mission 42 W 15:42:00 15:55:00 00:13:00 15 1.5 41 E 16:00:00 16:12:00 00:12:00 15 1.7 40 W 16:18:00 16:31:00 00:13:00 18 1.4 39 E 16:37:00 16:50:00 00:13:00 17 1.4 37 E 17:11:00 17:22:00 00:13:00 15 1.2 35 E 17:44:00 17:56:00 00:12:00 <td< td=""><td>Wind Dir</td><td>· (°)</td><td>Wind</td><td>Speed (kts)</td><td>Vis</td><td>ibility (</td><td>mi)</td><td>Ceilir</td><td>ng (ft)</td><td>Clo</td><td>oud Cover</td><td>Tem</td><td>o. (°C)</td><td>Dew</td><td>Point</td><td>(°C)</td><td>Pressure</td></td<>	Wind Dir	· (°)	Wind	Speed (kts)	Vis	ibility (mi)	Ceilir	ng (ft)	Clo	oud Cover	Tem	o. (°C)	Dew	Point	(°C)	Pressure
Settings Settings	280			10		10					Clear	1	.7		5		30.1
Setting Sint Spacing Main Point Density (ppsm) Scan Angle/FOV (°) Scan Frequency (Hz) Pulse Rate (kHz) Laser Power (%)	Air Spe	ed (kts)	Altitude	AGL (f	ft)	Al	titude	MSL (f	t)	Airfield Ele	evation	ı (ft)				
Note Point Spacing Point Density (ppsm) Scan Angle/FOV (°) Scan Frequency (Hz) Pulse Rate (kHz) Laser Power (%)	1.	150 9,842						12,	940		6,1	100					
Direction Start Time (UTC) End Time (UTC) On-Line Satellite PDOP Line Notes/Comments									Settin	gs							
Line # Direction (UTC) Start Time (UTC) End Time (UTC) Satellite On-Line PDOP Line Notes/Comments 42 W 15:42:00 15:55:00 00:13:00 15 1.5 41 E 16:00:00 16:12:00 00:12:00 15 1.7 40 W 16:18:00 16:31:00 00:13:00 18 1.4 39 E 16:37:00 16:50:00 00:13:00 17 1.3 38 W 16:54:00 17:07:00 00:13:00 17 1.4 37 E 17:11:00 17:22:00 00:11:00 18 1.1 36 W 17:26:00 17:39:00 00:13:00 15 1.2 35 E 17:44:00 17:56:00 00:12:00 15 1.3 34 W 17:59:00 18:12:00 00:13:00 15 1.4 33 E 18:16:00 18:27:00 00:11:00 14 1.6 32 <	oint Spacir	ng (m)	Poir	nt Density (pp	osm)	Sca	ın Angl	e/FOV	/ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Las	ser Power
Line # Direction Start Time (UTC) End Time (UTC) Satellite On-Line PDOP Line Notes/Comments 42 W 15:42:00 15:55:00 00:13:00 15 1.5 41 E 16:00:00 16:12:00 00:12:00 15 1.7 40 W 16:18:00 16:31:00 00:13:00 18 1.4 39 E 16:37:00 16:50:00 00:13:00 17 1.3 38 W 16:54:00 17:07:00 00:13:00 17 1.4 37 E 17:11:00 17:22:00 00:11:00 18 1.1 36 W 17:26:00 17:39:00 00:13:00 15 1.2 35 E 17:44:00 17:56:00 00:12:00 15 1.3 34 W 17:59:00 18:12:00 00:13:00 15 1.4 33 E 18:16:00 18:27:00 00:11:00 14 1.6 32 W </td <td>0.7</td> <td colspan="4"></td> <td></td> <td>4</td> <td>0</td> <td></td> <td></td> <td>82</td> <td></td> <td></td> <td>600</td> <td></td> <td></td> <td>100</td>	0.7						4	0			82			600			100
Line # Direction (UTC) On-Line Satellite PDOP Line Notes/Comments 42 W 15:42:00 15:55:00 00:13:00 15 1.5 41 E 16:00:00 16:12:00 00:12:00 15 1.7 40 W 16:18:00 16:31:00 00:13:00 18 1.4 39 E 16:37:00 16:50:00 00:13:00 17 1.3 38 W 16:54:00 17:07:00 00:13:00 17 1.4 37 E 17:11:00 17:22:00 00:11:00 18 1.1 36 W 17:26:00 17:39:00 00:13:00 15 1.2 35 E 17:44:00 17:56:00 00:12:00 15 1.3 34 W 17:59:00 18:12:00 00:13:00 15 1.4 33 E 18:16:00 18:27:00 00:12:00 14 1.6 32 W 18:33:00 </td <td></td> <td>Ve</td> <td>rify S-1</td> <td>Turns E</td> <td>Before</td> <td>Missi</td> <td>on</td>												Ve	rify S-1	Turns E	Before	Missi	on
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Verify S-Turns After Mission

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79935			Wyoming	FEMA E	ast				Day1	76_90513_A		06,	/25/20	19	176		Α
Cr	ew				Equip	ment						Time				Airp	orts
Pi	lot		Ai	rcraft N	/lake /	['] Mode	l / Tai	l #		Hobbs S	tart	Local	Start	UTC Sta	ırt	Depa	arting
Laro	cque			Cessna	404 Ti	itan - N	17079F			2184.	9	10:0	3:00	16:03:0	00	С	PR
Ope	rator		Se	nsor M	ake / I	Model	/ Seria	al#		Hobbs I	End	Loca	l End	UTC En	d	Arri	iving
Del	Hart		Le	eica Ter	rain N	1apper	- 9051	L3		2189.	6	12:2	3:00	18:23:0	00	С	PR
							С	onditio	ons								
Wind Dir	(°)	Wind	Speed (kts)	Visil	oility (mi)	Ceilir	ng (ft)	Clo	oud Cover	Tem	p. (°C)	Dew	Point (°	C) Pi	ressu	re ("Hg
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Air Spe	ed (kts)		Altitude	AGL (ft	:)	Al	titude	MSL (f	t)	Airfield El	evation	า (ft)					
1.	50		13,	000			13,	000		5,	350						
								Setting									
Point Spacir	ng (m)	Poir	nt Density (pp	sm)	Sca	n Angl	e/FOV	/ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Laser	Powe	er (%)
0.35			10			4	0			81			600			100	
											Ve	rify S-T	urns E	Before M	ission	Υ	'es
Line#	Direc	tion	Start Time	End T		Tin		Sate	llite	PDOP			Line N	otes/Cor	nmeni	ts	
_			(UTC)	(UT	•	On-l	_										
23	E		16:03:00	16:19		00:1		2		1.2				Area 3			
22	W E		16:22:00 16:41:00	16:38 16:56		00:1 00:1		2		1							
20	W		16:59:00	17:15		00:1		2		0.9							
19	E		17:18:00	17:33		00:1		2		1							
18	W	'	17:36:00	17:52	2:00	00:1		1	9	1.1							
17	Е		17:55:00	18:10		00:1		1	9	1.2							
16	W	'	18:12:00	18:23	3:00	00:1	1:00	1	9	1.2				T0's wit			
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Additional C	ommen	ts										•					

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				Pro	ject l	nfo								ı	Date		
Project #			Project	t Name	!				U	nique ID		Flight	: Date ((UTC)	Day o	f Year	Flight
79935			Wyomin	g Block	4				Day	179_90515		06,	/28/20	19	1	79	
Cro	ew				Equip	ment						Time				Air	ports
Pi	ot		Ai	rcraft I	Make ,	/ Mode	el / Tai	l #		Hobbs 9	tart	Local	Start	UTC	Start	Dep	arting
Fi	nn			Cessna	404 T	itan - N	1475RC	;		1726	2	11:3	0:00	17:3	0:00	k	CYS
Ope	rator		Sei	nsor M	ake /	Model	/ Seria	al#		Hobbs	End	Loca	l End	UTC	End	Ar	riving
Naro	done		Le	eica Tei	rrain N	/lapper	· - 9051	 15		1730)	03:2	0:00	21:2	0:00		CYS
								Conditi	ons								
Wind Dir	(°)	Wind	Speed (kts)	Visi	bility (mi)		ng (ft)		oud Cover	Tem	p. (°C)	Dew	Point	(°C)	Pressi	ure ("H
280	()			- 131	10	,,		.6 ()		Clear	_	29		3	, ,		0.11
	ad (kts	١		VCI (t		Λ.	 titudo	MSL (f	÷1	Airfield E		_		<u> </u>		J	0.11
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aint Coasin	- ()	D = !	at Damaitus Ima		Car			Settin			. /1.1=\	Dulas	Data /	(1-1-1-1		D	(0/)
	Spacing (m) Point Density (ppsm) 0.7 2						le/FOV	<i>(</i> ()	Sca	n Frequency	/ (HZ)	Puise	Rate	(KHZ)	Las	er Pow	
0.7						4	0			82			600			100)
										V	erify S-1	Turns E	Betore	Missi	on		
Line #	Direc	ction					me	Sate	llite	PDOP			Line N	otes/0	Commo	ents	
	Speed (kts) Altitude AGL (f 150 9,842						Line										
71	0 10 peed (kts) Altitude AGL (150 9,842 cing (m) Point Density (ppsm) 7 2 Direction Start Time (UTC) (U N 17:51:00 17:5 W 18:08:00 18:2 E 18:24:00 18:3 W 18:40:00 18:5 E 18:59:00 19:1 W 19:20:00 19:2 W 19:52:00 20:0						8:00	1		1.5	-						
27	Direction Start Time (UTC) (UTC)						2:00	1		1.6							
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24							.2:00	1		1.7							
23							2:00	1		1.6							
22							2:00	1		1.7	+						
21	V	V					2:00	1		1.5							
20	E			20:2	0:00		2:00	1	4	1.5							
19							2:00	1		1.3							
18	E		20:42:00	20:5	3:00	00:1	1:00	1	2	1.9	1						
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		Wind Speed (kts) Visibility															

Verify S-Turns After Mission

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			Pro	ject Info)								ate		
Project #			t Name					nique ID				(UTC)			Flight
79935		Wyomin					Day	180_90515			/29/20	19	18		
Cr	ew			Equipm						Time					rports
Pi	lot			-	lodel / Tai			Hobbs St	tart	Local	Start	UTC S			parting
	nn				n - N475R0			1730			5:00	16:3			KCYS
Ope	rator				del / Seri			Hobbs E		Loca		UTC		Ar	rriving
Naro	done	L	eica Ter	rain Map	per - 905:			1732.	5	01:0	3:00	19:0	3:00	I	KCYS
			,			Conditi									
Wind Dir	(°) W	ind Speed (kts)	Visil	oility (mi) Ceili	ng (ft)	Clo	oud Cover	_	o. (°C)	Dew	Point	(°C)	Press	ure ("H
250		8		10				Clear		:9		8		3	30.11
Air Spe	ed (kts)	Altitude	AGL (ft	:)	Altitude		t)	Airfield El		າ (ft)					
1.	50	9,8	342		12,	,940		6,	100						
						Settin									
Point Spacir	ng (m) P	oint Density (pr	osm)	Scan /	Angle/FO\	/ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Las		wer (%)
0.7		2			40			82			600			100)
									Ve	rify S-1	Turns E	Before	Missic	n	
Line #	Directio	Start Time	End T		Time	Sate	llite	PDOP			Line N	otes/C	omme	ents	
		(UTC)	(UT	-	On-Line										
70	N	16:56:00	17:05		00:09:00	1		1.2							
2	E W	17:16:00 17:32:00	17:28 17:45		00:12:00	1		1.3 1.3							
3	E	17:48:00	18:01		00:13:00	1		1.5							
4	W	18:04:00	18:17		00:13:00	1		1.5							
5	E	18:20:00	18:32		00:12:00	1		1.7							
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A -1 -12: 1 -						Page			V	erify S	urns	Atter I	VIISSIOI	П	
Additional C	omments														

							LIG	ar <i>F</i>	<u> </u>	uisitio	n LC	g					
				Pro	oject li	nfo									ate		
Project #			Project	Name	:				U	nique ID		Flight	Date	(UTC) I	Day of	Year	Flight
79935			FEMA W	/yomir	g				Day1	83_90513_A		07,	/02/20	19	18	3	Α
Cr	ew				Equip	ment						Time				Ai	rports
Pi	lot		Ai	rcraft	Make /	/ Mode	el / Tai	l #		Hobbs S	tart	Local	Start	UTC S	tart	De	parting
LaRo	cque					itan - N				2205.	 7	08:5	3:00	14:53	3:00		CPR
	rator					Model				Hobbs I		Loca		UTC			riving
						1apper				2210.			9:00	20:09			CPR
Sta	nton		L	eica re	II alli iv	паррег		onditi	0100	2210.	0	14.0	9.00	20.05	.00		CPK
Mind Di	. (0)	VA/: al	Conned (late)	\/:-	: : : :	:\				and Carran	T	- (%C)	Danie	Daint	(%C)	Dunne	/!!!!
Wind Dir	(')	wina	Speed (kts)	VIS	bility (mı)		ng (ft)		ud Cover	+	p. (°C)	Dew	Point	('C)		ure ("H
0		. 1	0		10			000		cattered		L7		11		3	30.07
Air Spe	ed (kts)	Altitude	AGL (1	t)	A	ltitude	MSL (ft)	Airfield El	evatio	n (ft)					
1	50		7,5	00			12,	900		5,	300						
								Settin	gs								
Point Spaci	ng (m)	Poir	nt Density (pp	sm)	Sca	ın Ang	le/FOV	(°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Las	er Pov	ver (%)
0.35			10			4	0			81			600			100)
											Ve	rify S-T	Turns E	Before I	Missic	n	Yes
			Start Time	End	Time	Tir	ne				1	-					
Line #	Direc	ction	(UTC)	(U.		On-		Sate	ellite	PDOP		l	Line N	otes/Co	omme	ents	
80	F	•	9:00		2:00	1	.9	1.2				clear	ì				
79	0 E 15:27:00 9 W 15:42:00						2:00		.9	1.1				Cicai			
78	9 W 15:42:00 3 8 E 15:57:00 3						1:00		1	1							
77	9 W 15:42:00 1 3 E 15:57:00 1						1:00		:0	1.1							
76	Е		16:25:00		7:00		2:00		1	1							
75	V	V	16:40:00	16:5	1:00	00:1	1:00	2	2	0.9							
74	Е		16:54:00	17:0	6:00	00:1	2:00	2	1	1							
73	V	V	17:09:00	17:2	1:00	00:1	2:00	2	2	1							
72	E		17:24:00		6:00		2:00	2	.0	1.1							
71	V		17:38:00		0:00		2:00		.8	1.2							
70	E		17:53:00		5:00		2:00		.8	1.3	1						
69	V		18:07:00		9:00	00:1			.9	1.3	1						
68	E		18:22:00		3:00		1:00		0	1.1	1						
67 62	V		18:36:00		8:00 3:00		2:00		.9	1.2 1.1	-		rofi:	ght of l	inc 61)	
82	E		18:51:00 19:11:00		2:00		2:00 1:00		2 2	1.1	+			gnt of i			
58	V		19:11:00		1:00		1:00		:3	1.2	+			ght of I		₹	
30	-	•	13.30.00	19.4	2.00	55.1	2.00	-		1.2	1			ission f			
											1			3 fully			
											1				-		
											1						
											1						
											Ĺ						
								Page	1		V	erify S-	Turns	After N	/lissio	n	Yes
Additional C																	

			1	Wo	olpe	ert	Lid	ar A	\cq	uisitio	n Lo	og					
				Pro	ject In	fo								D	ate		
Project #			Project	Name					U	nique ID		Flight	Date	(UTC)	Day of	f Year	Flight #
79325			WY_F	EMA					Day1	83_90511_A	ı	07,	/02/20	19	18	3	Α
Cr	ew				Equipr	ment						Time				Ai	rports
Pi	lot				Make /					Hobbs S	tart	Local	Start	UTC S		De	parting
	nn				404 Tit					1733.			1:00	15:21			KCYS
•	rator				ake / N		•			Hobbs I	End	Loca	l End	UTC E			rriving
Gala	mbos		Le	eica Ter	rrain M	apper				1735	;	10:0	9:00	16:09	:00		KCYS
						-		onditi									
Wind Dir	(°) V	Vind	Speed (kts)	Visi	bility (n	ni)		g (ft)	Clo	oud Cover	+	o. (°C)	Dew	Point (°C)		ure ("Hg)
90			6		10			000				.6		14		3	30.08
	ed (kts)	_	Altitude		t)	Α		MSL (ft)	Airfield El		ı (ft)					
1.	50		9,8	342				940		3,	091						
	, , ,	<u> </u>		, ,				Settin		_	44.5			(1.1.)			100
Point Spacir	ng (m)	Poin	t Density (pp	sm)	Scar		le/FOV	(~)	Sca	n Frequency	(Hz)	Pulse	Rate	(KHZ)	Las		wer (%)
0.7						4	0			82	1/2		600	2-6	4::-	10	
			Chart Time	F	rima s						ve	тту 5-	ıurns E	Before I	VIISSIC	n	Yes
Line #	Direction	on	Start Time (UTC)	End 1 (UT		On-	ne Line	Sate	ellite	PDOP			Line N	otes/Co	omme	ents	
			, ,	•								١	NEED F	LIGHT L	INES	6-17	
6	W												MFaile	d to act	ivate	TM	
6	W	_	15:20:56						5	1.6	1	Pilot Di	isplay e	erros/sv	vitchii	ng to (CCNS
6	W	_	15:25:43	15:3		00:1			5	1.7	-						
7 8	E W	\dashv	15:42:17 15:58:07	15:53 16:09			1:40 1:14		7 7	1.2 1.2							
		\dashv	13.30.07	10.0.	7.21	00.1	1.17			1.2			Circl	les and	reboc	t	
		\neg															
		_															
		\dashv			-						-						
		\dashv															
		\dashv															
		\Box															
		\dashv									-						
		\dashv			-+						+						
		\dashv			\dashv						+						
		\dashv									1						
		\dashv			-+						-						
								Page	1		V	erify S.	Turns	After N	lissin	n	Yes
Additional C	omments							i uge	_		. ,	city 3	1 41113	AILEI IV	.,,,,,,,,,,	•	163
. Idantional C	J.I.IIIEIIC																

									uisitio							
				ject In	fo									ate		
Project #		Project		!					nique ID				(UTC)			Fligh
79325		WY_I	FEMA					Day1	83_90511_B			/02/20	19	183		В
	ew			Equip							Time	_				rport
	lot			Make /					Hobbs S		Local		UTC S			partin
	nn			404 Tit					1735		10:2		16:24	_		KCYS
	rator	_		ake / N		•			Hobbs		Loca		UTC E			riving
Gala	mbos	L	eica Te	rrain M	apper				1738	3	12:5	3:00	18:53	:00		KCYS
	(0)				• • • • • • • • • • • • • • • • • • • •		Conditi		1.0	T_	(0.0)		- • • •	0.01		/!!
Wind Dir	r (°) W	/ind Speed (kts)	Visi	bility (r	mi)		ng (ft)	Clo	ud Cover	_	p. (°C)	Dew	Point (°C)		ure ("
260		6		10			000				22		12	_	3	30.23
	ed (kts)	Altitude		t)	Al		MSL (f	t)	Airfield E		າ (ft)					
1	50	9,8	342				940		3,	.091						
	, , , ,		,				Settin	_		/ı. `			/I		_	
oint Spacii	ng (m)	Point Density (pp	osm)	Scar		le/FOV	/ (°)	Sca	n Frequency	/ (Hz)	Pulse	Rate	(KHZ)	Lase		ver (%
0.7	_				4	0		_	82			600			100	
	_	I c		T	<u></u>					Ve	erity S-	urns E	Before I	VIISSIOI	1	Yes
Line #	Directio	on Start Time (UTC)	End [*] (U)		I Ir On-l	ne Line	Sate	llite	PDOP			Line N	otes/Co	mmei	nts	
8	E	16:24:03	16:3		00:1		1		1.1	-						
9	W	16:39:03	16:5		00:1		1		1.1	-						
10 11	E W	16:54:30 17:10:23	17:0 17:2		00:1 00:1		1		1.1	+						
12	E	17:10:23	17:3			1:50	1		1.3	+						
13	W	17:40:44	17:5		00:1		1		1.3							
14	E	17:55:28	18:0	7:14	00:1		1	6	1.5							
15	W	18:10:51	18:2	2:49	00:1	1:58	1	6	1.6							
16	E	18:25:49	18:3		00:1		1		1.8							
17	W	18:40:30	18:5	2:31	00:1	2:01	1	6	1.6							
				$\overline{}$												
				\rightarrow						+						
							Page	1		V	erifv S	Turns	After N	lission		Yes
							. აგა	_		<u> </u>	Jy J		18			

			•	Wo	olp	ert	Lid	ar A	\cq	uisitio	n Lo	og					
				Pro	oject lı	nfo								D	ate		
Project #			Project	Name	e				U	nique ID		Flight	Date	(UTC)	Day o	f Year	Flight #
79935			WY_F	EMA					Day1	91_90515_A		07,	/10/20	19	19	91	Α
	ew				Equip							Time					rports
	lot				Make /					Hobbs S		_	Start	UTC S			parting
	arlo				404 Ti					1754.			7:00	14:07			KGCC
-	rator				1ake / I					Hobbs I		Loca		UTC			rriving
Gala	mbos		Le	eica Te	rrain N	1appei				1756.	6	08:4	6:00	14:46	5:00		KGCC
I D.	(0)		6 1/1.		/	-,		Conditi		1.0	Τ_	(9.0)	_	<u> </u>	(0.0)	_	/!!
Wind Dir	(*)	Wind	Speed (kts)	Vis	ibility (mı)	_	ng (ft)	Cic	oud Cover		p. (°C)	Dew	Point	(°C)	Press	sure ("Hg
250	1/1.		9	101 /	10			000		A: C: 115		13		10			30.3
	ed (kts)		Altitude		rt)	А	ltitude		t)	Airfield E		n (ft)					
1.	50		9,8	342				940		4,	405						
Point Spacii	ng (m)	Do:	t Donaite /	icm)	C	n A==	le/FOV	Settin		n Frequency	(U-)	Dulas	Rate	(ku-)	1	or Do	wer (%)
0.7	ig (m)	POIN	t Density (pp	osmj	Sca		10 10	<i>(</i> ()	Sca	82	(П2)	Puise	600	(КП2)	Las	10	
0.7						-	,0			02	Ve	rify S_7		Before I	Missic		Yes
		_	Start Time	End	Time	Ti	me				1	:111y 3-1	i ui ii 3 L	Jeiore I	WIISSIC	,,,	163
Line #	Direct	ion	(UTC)		TC)		Line	Sate	llite	PDOP			Line N	otes/C	omme	ents	
			(0.0)	(0	,	<u> </u>							Block	4/GPS	13:05	:42	
71	S		14:07:20	14:1	5:40	00:0	08:20	1	9	1.3				MOUN			
66	Е		14:26:44	14:3	88:23	00:1	L1:39	1	8	1.3		(adir Ma			
60	W		14:41:30	14:4	16:00	00:0	04:30	1	8	1.7				1C not A			
														30 devi t/1756			
													Neboo	11/1/30	.0110	003	
											-						
		\neg															
											1						
		-									+						
											-						
											+						
								Page	5		V	erify S-	Turns	After N	/lissio	n	Yes
Additional C	ommen	ts						- 3-				, ,					
ı																	

	_							<u> </u>	<u> </u>	<u>u</u> 13	itioı		<u> </u>					
				Pro	ject Ir	nfo									D	ate		
Project #			Project	Name					U	nique	ID		Flight	Date ((UTC)	Day of	f Year	Flight
79935			WY_F	EMA					Day1	91_90	515_B		07,	/10/20	19	19	91	В
Cr	ew				Equip	ment							Time				Ai	rports
Pi	ilot		Ai	rcraft N	∕lake /	Mode	l / Tai	l #		Н	obbs St	art	Local	Start	UTC S	tart	De	parting
Gib	iarlo			Cessna	404 Ti	tan - N	475RC				1756.6		09:1	7:00	15:17	7:00		KGCC
Ope	rator		Sei	nsor M	ake / ľ	Model	/ Seria	al#		н	lobbs Eı	nd	Local	End	UTC	End	A	rriving
	mbos			eica Ter			•				1761.3		13:1		19:16			KGCC
								onditi	ons									
Wind Dir	r (°)	Wind	Speed (kts)	Visil	bility (mi)	Ceilin			oud Co	ver	Temr	o. (°C)	Dew	Point	(°C)	Pres	sure ("Hg
250	. ()		9		10	,		000					3		10	(-,		30.3
	ed (kts	١	Altitude	AGI (fi		ΔΙ		MSL (1	F+ \	Airf	field Ele		_		10			30.3
	.50	,	9,8		.,	A	12,		,	AIII	4,4		1 (11)					
1	.50		9,0	14Z					ac.		4,4	.03						
Daint Cuasi	()	D = :	A Damaitus Ima	\	C			Settin				/1.1-\	Dulas	Data	11-11-1		D	(0/)
Point Spacio	ng (m)	Poir	nt Density (pp	ism)	Sca	n Angl		()	Sca		quency	(П2)	Puise	Rate	КПZ)	Las		wer (%)
0.7						4	U			`	82	1/-		600	\ - f	N 4 ! ! -	10	_
	T				. 1							Ve	rify S-1	urns E	etore	IVIISSIO	n	Yes
Line #	Direc	tion	Start Time	End T		Tin		Sate	llite	PE	OOP			Line N	otes/C	omme	nts	
			(UTC)	(UT	C)	On-l	Ine							DI I	4 /CDC	42.05	42	
															4/GPS MOUN			
														KULL	IVIOUN	11 1550	JE	
														Re	ooot in	flight		
															Circle			
60	V	V	15:17:05	15:29	9:17	00:1	2:12	1	8	1	L.4				Reflig			
19	E		15:40:22	15:52	2:11	00:1	1:49	1	9	1	1.2							
16	V	V	15:54:49	16:06	5:45	00:1	1:56	1	9	1	l.1							
	<u> </u>																	
43	N		16:53:02	17:06		00:1			4		L.3		ВІ	OCK / -	- 13,5	33 FE :	3,691	
42 41	S		17:09:05 17:25:15	17:22 17:38		00:1			3 2		L.4 L.5							
40	S		17:41:38	17:54		00:1			1		L.6							
39	N		17:57:45	18:10		00:1			1		L.7							
38	S		18:13:53	18:26		00:1			2		L.5							
37	N	J	18:30:00	18:43	3:00	00:1	3:00	1	2	2	2.2							
36	S		18:46:00	18:58		00:1			2		L.7							
35	N	I	19:02:28	19:15	5:45	00:1	3:17	1	4	1	L.8							
								Page	5			V	erify S-	Turns	After N	/lissio	n	Yes
11::: 14	Commer	nts											-					

				Woo	olp	ert	Lid	ar A	cqı	uisitio	n Lo	g					
				Pro	ject Ir	nfo								Da	te		
Project #			Project	t Name					U	nique ID		Flight	Date	(UTC) Da	y of Y	ear F	light #
79935			Wyoming	FEMA E	ast				Day1	65_90513_	4	06,	/14/20	19	165		Α
Cr	ew				Equip	ment						Time				Airp	orts
Pi	lot			rcraft N						Hobbs		Local		UTC Sta	_	Depa	
	cque			Cessna						2160		_	2:00	17:32:0		CY	
-	rator			nsor M						Hobbs		_	l End	UTC Er		Arriv	
Del	Hart		L	eica Ter	rain N	1apper				2164	.1	01:0	3:00	19:03:0	00	CY	'S
								onditio									
Wind Dir	(°)	Wind	Speed (kts)	Visil	bility (mi)		ng (ft)		oud Cover	_	p. (°C)	Dew	Point (°	C) Pi		e ("Hg)
280			16		10			500		Broken		27		17		300) 7
Air Spe)	Altitude		t)	Α		MSL (f	t)	Airfield I		n (ft)					
1.	50		13,	000				000		(,047						
								Setting									
Point Spacin	ng (m)	Poir	nt Density (pp	osm)	Sca		le/FO\	/ (°)	Sca	n Frequenc	y (Hz)	Pulse	Rate	(kHz)	Laser	Powe	r (%)
0.35			10			4	10			81			600			100	
										1	Ve	erify S-1	urns E	Before M	ission	Ye	<u>!</u> S
Line #	Direc	tion	Start Time	End T			me	Sate	llite	PDOP		I	Line N	otes/Cor	nment	ts	
1			(UTC) 17:32:00	(UT 17:48	_		Line 16:00	2	1	1 1				Aros 2			
2	E W		17:32:00	18:07			16:00	2		1.1	+			Area 3			
3	E		18:10:00	18:26			6:00	2		1							
4	V	1	18:28:00	18:44			6:00	1		1.2							
5	E		18:47:00	19:03	3:00	00:1	6:00	1	7	1.2			Clo	uds move	ed in		
											_						
											_						
											+						
											\top						
											+						
											+-						
											1						
								Page	1		٧	erify S-	Turns	After Mi	ssion	Ye	es
Additional C	ommer	nts															
ı																	

				Woo	olp	ert	Lid	ar A	cqı	uisitio	n Lo	g					
				Pro	ject Ir	nfo								Da	te		
Project #			Project	t Name					U	nique ID		Flight	Date	(UTC) D	ay of	Year	Flight #
79935			Wyoming	FEMA E	ast				Day1	75_90513_A		06,	/24/20	19	175	5	Α
Cr	ew			l	Equip	ment						Time				Air	ports
Pi	lot		Ai	rcraft N	/lake /	/ Mode	el / Tai	l #		Hobbs S	tart	Local	Start	UTC St	art	Dep	parting
Laro	cque			Cessna						2181.			0:00	15:10:	_	(CPR
	rator			nsor Ma			-			Hobbs E		Loca		UTC E	_		riving
Del	Hart		L	eica Ter	rain N	1apper				2184.	9	11:3	7:00	17:37:	00	(CPR
								onditio									
Wind Dir	(°)	Wind	Speed (kts)	Visik	oility (mi)		ng (ft)	Clo	oud Cover	_	p. (°C)	Dew	Point (°	C)		ure ("Hย
240			7		10			000		Clear		L 6		4		2	9.91
	ed (kts)		Altitude)	Α		MSL (f	t)	Airfield El		າ (ft)					
1.	50		13,	000				000		5,	350						
								Setting									
Point Spacin	ng (m)	Poin	nt Density (pp	osm)	Sca	n Ang		/ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Lase		ver (%)
0.35			10			4	0			81			600			100	
		_								ı	Ve	rify S-1	urns E	Before M	issio	n	Yes
Line #	Direct	tion	Start Time	End T			ne	Sate	llite	PDOP		ı	Line N	otes/Co	nme	nts	
20			(UTC) 15:10:00	(UT 15:27		On-	7:00	2.	.	1 1				Aron 2			
30 29	E W		15:10:00	15:27			6:00	23		1.1				Area 3			
28	E		15:48:00	16:04			6:00	22		1.1							
27	W		16:07:00	16:23			6:00	23		1							
26	Е		16:26:00	16:41	:00	00:1	5:00	2:	1	1.1							
25	W		16:44:00	17:00			6:00	22		1							
24	E		17:03:00	17:19			6:00	22		1	-						
23	W		17:22:00	17:37	':00	00:1	5:00	22	2	1	-		Clo	ouds on	line		
		-															
											-						
					$\neg \neg$												
											-						
					$\neg \neg$												
			'					Page	1		V	erify S-	Turns	After M	ssion		Yes
Additional C	ommen	ts															

				Woo	olp	ert	Lid	ar A	cqı	uisitio	n Lo	g					
				Pro	ject Ir	nfo								Da	te		
Project #			Project	Name					U	nique ID		Flight	Date	(UTC) Da	y of Y	ear	Flight #
79935			Wyoming	FEMA E	ast				Day1	76_90513_A		06,	/25/20	19	176		Α
Cr	ew				Equip	ment						Time				Airp	orts
Pi	lot		Ai	rcraft N	/lake /	['] Mode	l / Tai	l #		Hobbs S	tart	Local	Start	UTC Sta	ırt	Depa	arting
Laro	cque			Cessna	404 Ti	itan - N	17079F			2184.	9	10:0	3:00	16:03:0	00	С	PR
Ope	rator		Se	nsor M	ake / I	Model	/ Seria	al#		Hobbs I	End	Loca	l End	UTC En	d	Arri	iving
Del	Hart		Le	eica Ter	rain N	1apper	- 9051	L3		2189.	6	12:2	3:00	18:23:0	00	С	PR
							С	onditio	ons								
Wind Dir	(°)	Wind	Speed (kts)	Visil	oility (mi)	Ceilir	ng (ft)	Clo	oud Cover	Tem	p. (°C)	Dew	Point (°	C) Pi	ressu	re ("Hg
249			4		10		12,	000		Clear	1	<u>.</u> 4		8		30	.02
Air Spe	ed (kts)		Altitude	AGL (ft	:)	Al	titude	MSL (f	t)	Airfield El	evation	າ (ft)					
1.	50		13,	000			13,	000		5,	350						
								Setting									
Point Spacir	ng (m)	Poir	nt Density (pp	sm)	Sca	n Angl	e/FOV	/ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Laser	Powe	er (%)
0.35			10			4	0			81			600			100	
											Ve	rify S-T	urns E	Before M	ission	Υ	'es
Line#	Direc	tion	Start Time	End T		Tin		Sate	llite	PDOP			Line N	otes/Cor	nmeni	ts	
_			(UTC)	(UT	•	On-l	_										
23	E		16:03:00	16:19		00:1		2		1.2				Area 3			
22	W E		16:22:00 16:41:00	16:38 16:56		00:1 00:1		2		1							
20	W		16:59:00	17:15		00:1		2		0.9							
19	E		17:18:00	17:33		00:1		2		1							
18	W	'	17:36:00	17:52	2:00	00:1		1	9	1.1							
17	E		17:55:00	18:10		00:1		1	9	1.2							
16	W	'	18:12:00	18:23	3:00	00:1	1:00	1	9	1.2				T0's wit			
											_			ton press			
											Ken	ootea		n, emerge been pus		reake	r nau
													1100	been put	nicu.		
											-						
											-						
								Page	1		V	erify S-	Turns	After Mi	ssion	Υ	es
Additional C	ommen	ts										•					

			1	Wo	olp	ert	Lid	ar A	cqı	uisitio	n Lc	g					
				Pro	ject Ir	nfo								Da	ate		
Project #			Project	t Name					U	nique ID		Flight	Date	(UTC) D	ay o	f Year	Flight #
79935			Wyoming	FEMA E	ast				Day1	76_90513_E	3	06,	/25/20	19	17	'6	В
Cr	ew				Equip	ment						Time				Ai	rports
Pi	lot		Ai	rcraft I	Make /	′ Mode	el / Tai	l #		Hobbs 9	Start	Local	Start	UTC St	art	De	parting
Laro	cque			Cessna	404 Ti	itan - N	17079F	-		2184	.9	12:3	4:00	18:34:	00		CPR
Ope	rator		Se	nsor M	ake / I	Model	/ Seria	al#		Hobbs	End	Loca	l End	UTC E	nd	Aı	riving
Del	Hart		L	eica Tei	rain N	1apper	- 9051	L3		2189	.6	01:4	7:00	19:47:	00		CPR
							С	onditi	ons				·				
Wind Dir	(°)	Wind	Speed (kts)	Visi	bility (mi)	Ceilir	ng (ft)	Clo	oud Cover	Tem	p. (°C)	Dew	Point (°C)	Press	ure ("Hg)
249			4		10		12,	000		Clear	1	<u>.</u> 4		8		3	30.02
Air Spe	ed (kts)		Altitude	AGL (f	t)	Al	ltitude	MSL (1	ft)	Airfield E	levatio	ո (ft)					
	<u> </u>			000	_			000	-		,350	• •					
			-,					Settin	gs								
Point Spacir	ng (m)	Poir	nt Density (pp	sm)	Sca	n Angl				n Frequency	/ (Hz)	Pulse	Rate	(kHz)	Las	er Pov	ver (%)
0.35	0 ()		10				0			81	, , ,		600	, ,		100	
											Ve	rify S-T	urns E	Before N	/lissic		Yes
			Start Time	End 1	ime	Tir	ne										
Line #	Direc	tion	(UTC)	(UT		On-		Sate	ellite	PDOP		l	Line No	otes/Co	mme	ents	
16	E		18:34:00	18:49	_	00:1	5:00	2	0	1.1				Area 3			
15	W	1	18:52:00	19:09	9:00	00:1	7:00	2	2	1.1							
14	E		19:12:00	19:2		00:1			2	1.1							
13	W	/	19:31:00	19:4	7:00	00:1	6:00	2	2	1.3	_						
											+						
											-						
					-						+						
											+						
	-				-						+						
					-						+						
			'					Page	1		V	erify S-	Turns	After M	issio	n	Yes
Additional C	ommer	its									_						
1																	

			Woo	olpe	<u>ert</u>	Lida	<u>ar <i>P</i></u>	cqı	uisiti	on	LO	<u>g</u>					
			Pro	ject In	fo									D	ate		
Project #		Project	Name					U	nique ID			Flight	Date	(UTC)	Day of	Year	Flight
79935		Wyoming	FEMA E	ast				Day1	77_9051	3_A		06/	/26/20	19	17	7	Α
Cr	ew			Equipr	ment	·					٦	Гime				Ai	rports
Pi	lot	Ai	rcraft N	<u> </u>		l / Tail	#		Hob	bs Sta	rt	Local	Start	UTC S	tart		parting
	cque		Cessna							189.6		08:4		14:48			CPR
	rator		nsor Ma				1#			bs End	1	Local		UTC			riving
•						•					,						
Dei	Hart	Le	eica Ter	rain ivi	apper				2.	195.1		01:1	9:00	19:19	9:00		CPR
							onditi					45.13					
Wind Dir	· (°) Wind	d Speed (kts)	Visil	oility (n	ni)	Ceilin		Clo	oud Cove	r '	Temp.		Dew	Point	(°C)		ure ("F
0		0		10		12,0	000		Clear		12	2		9		3	30.07
Air Spe	ed (kts)	Altitude	AGL (ft	:)	Al	titude	MSL (ft)	Airfiel	ld Elev	ation	(ft)					
1	50	13,0	000			13,0	000			5,35	0						
		•				9	Settin	gs									
Point Spacii	ng (m) Poi	nt Density (pp	sm)	Scar	n Angl	e/FOV		_	n Freque	ency (H	Iz)	Pulse	Rate	(kHz)	Lase	r Pov	ver (%)
0.35	<u> </u>	10			4		•		81				600	` /		100	
0.55		10							01		Ver	ify S ₋ T		Before	Missin		Yes
		Start Time	End T	imo	Tin						VCI	y 5 .	uiii3 L	CIOIC	V113310		163
Line #	Direction	(UTC)	(UT		On-l		Sate	ellite	PDO	Р		l	Line N	otes/C	omme	nts	
12	E	14:48:00	15:02	2:00	00:1	4:00	2	:3	1.1					Area	3		
11	W	15:05:00	15:21	L:00	00:1	6:00	2	.4	1.1								
10	E	15:23:00	15:39	9:00	00:1	6:00	2	.4	1.1								
9	W	15:42:00	15:58		00:1	6:00		2	1.3								
8	Е	16:01:00	16:16		00:1			:3	1.1								
7	W	16:19:00	16:34		00:1			:3	1.1								
6	E	16:37:00	16:53		00:1			2	1.2								
81	S	17:05:00	17:17	7:00	00:1	2:00	2	.4	0.9	_				Xched	:k		
	_	47.22.00	47.4	7.00	00.4	5.00			1.1					•			
80	E	17:32:00	17:47		00:1			.8	1.1					Area	2		
79 78	W E	17:50:00 18:08:00	18:05 18:24		00:1			.5 .5	1.3 1.3								
	W	18:27:00	18:42		00:1			.5 .6	1.3								
76	E	18:45:00	19:01		00:1			.5	1.3	_							
75	W	19:04:00	19:19		00:1			.6	1.3								
										-+							
										\dashv							
				\neg						\neg							
	1			\rightarrow						\dashv							
	1																
						•	Page	1			Ve	rify S-	Turns	After N	/lission)	Yes
dditional C	omments					•	Page	1			Ve	rify S-	Turns	After N	/lission)	Yes

			Wool	oert	Lid	ar Acc	וג	uisitior	ı Lo	g					
			Project	Info								Da	te		
Project #		Projec	t Name				Uı	nique ID		Flight	Date	(UTC) Da	y of \	'ear	Flight
79935		Wyoming	FEMA East			Da	y17	78_90513_A		06	/27/20)19	178		Α
Cr	ew		Equ	ipment						Time				Air	ports
Pi	lot	А	ircraft Mak	e / Mod	el / Tai	l #		Hobbs St	art	Local	Start	UTC Sta	art	Dep	arting
Laro	cque		Cessna 404	Titan - I	N7079F			2195.1	L	09:3	0:00	15:30:0	00	(CPR
Ope	rator	Se	nsor Make	/ Model	/ Seria	al#		Hobbs E	nd	Loca	l End	UTC Er	ıd	Ar	riving
Del	Hart	L	eica Terrain.	Марре	r - 9051	L3		2199.8	3	01:0	7:00	19:07:0	00	(CPR
					С	onditions									
Wind Dir	(°) V	/ind Speed (kts)	Visibility	y (mi)	Ceilir	ng (ft)	Clo	ud Cover	Tem	o. (°C)	Dew	Point (°	C) P	ressu	ure ("H
140		3	10		12,	000	ı	Broken	1	.4		12		3	0.11
Air Spe	ed (kts)	Altitude	AGL (ft)	А	ltitude	MSL (ft)		Airfield Ele	vation	ո (ft)					
1.	50	13,	,000		13,	000		5,3	350						
						Settings									
Point Spacir	ng (m)	Point Density (p	psm) S	can Ang			caı	n Frequency	(Hz)	Pulse	Rate	(kHz)	Laser	Pow	ver (%)
0.35		10			10			81			600			100)
									Ve	rify S-1	Turns E	Before M	ission	,	Yes
		Start Time	End Time	Ti	me		П								
Line #	Direction	On (UTC)	(UTC)		Line	Satellite		PDOP			Line N	otes/Cor	nmen	ts	
74	Е	15:30:00	15:45:00	00:1	L5:00	24		1.2				Area 2			
73	W	15:48:00	16:03:00	00:1	L5:00	22		1.3							
72	E	16:06:00	16:22:00		L6:00	23		1							
71	W	16:25:00	16:41:00	_	L6:00	22	4	1.1							
70	E	16:43:00	16:58:00		15:00	22	\dashv	1							
69 68	W E	17:01:00 17:20:00	17:17:00 17:35:00		L6:00 L5:00	22 21	\dashv	1 1							
67	W	17:39:00	17:55:00		L6:00	16	\dashv	1.2							
66	E	17:57:00	18:12:00	_	L5:00	15	\dashv	1.3			Exce	eded rol	l limit		
65	W	18:15:00	18:31:00	_	L6:00	16	╗	1.2							
64	E	18:34:00	18:49:00	_	L5:00	15		1.2							
63	W	18:51:00	19:07:00	00:1	L6:00	16	_	1.2							
							4								
							\dashv								
							\dashv								
				+			\dashv								
							_		<u> </u>						
				_			_								
				+			\dashv		_						
		+		+			\dashv								
			1			Page 1			V	erify S-	Turns	After Mi	ssion	,	Yes
Additional C	omments					0				, -					

								7	uisit			_			ot-		
5 • • • • •				oject li	пто				•			-I' I .			ate		-11 1
Project #		Project							nique ID					-			Flight
79935		Wyoming	FEMA					Day1	80_9051	L3_A		_	/29/20	19	18		A
	ew				ment							Time					rports
Pi	lot	Ai	ircraft	Make /	/ Mode	el / Tai	l #		Hob	bs Sta	ırt	Local	Start	UTC S	tart	De	parting
Laro	cque		Cessna	404 T	itan - N	17079F			2	199.8		08:5	8:00	14:58	3:00		CPR
Ope	rator	Se	nsor N	lake /	Model	/ Seria	al#		Hol	bbs En	d	Loca	l End	UTC	End	Ar	riving
Del	Hart	L	eica Te	rrain N	/lapper	- 9051	.3		2	205.7		01:4	3:00	19:43	3:00		CPR
						C	onditi	ons									
Wind Dir	(°) Win	d Speed (kts)	Vis	ibility (mi)	Ceilir	ng (ft)	Clo	ud Cove	er	Temp	o. (°C)	Dew	Point	(°C)	Press	ure ("I
210	**	17		10	•		000		Broken		2			5	` '		30.14
	ed (kts)	Altitude	AGI (f		Δ	ltitude				ld Ele							
	50		000	٠,			000	,	7.11110	5,3!		(1.0)					
1		13,	550					αc		٠,٥.	,,,						
oint Crast	ng (m) D-	int Donaite /	acma)	C	νn Λ		Settin		n E====	one: 1	U-\	D.J	Dot-	(I ₂ L1=)	les	or D	No= /0/
Point Spacio	ig (III) PO	int Density (pp)SIII)	Sca	n Ang		()	Sca	n Freque		П2)	Puise	Rate	(KIIZ)	Las		ver (%)
0.35		10			4	0			81	_			600			100	
											Vei	rity S-T	urns E	Before	Wissic	n	Yes
Line #	Direction	Start Time (UTC)	End [·]		Tir On-	ne Line	Sate	ellite	PDO	P		I	Line N	otes/C	omme	nts	
62	Е	14:58:00	15:1	4:00	00:1	6:00	2	26	1					Area	2		
61	W	15:17:00	15:3	2:00	00:1	5:00	2	24	1.1	L							
60	E	15:35:00	15:5	0:00	00:1	5:00	2	23	1.1	L							
59	W	15:53:00	16:1	2:00	00:1	9:00	2	22	1.1	L							
58	E	16:15:00		3:00		8:00		23	1.1	L							
57	W	16:36:00		4:00		8:00		23	1								
56	E	16:57:00		6:00	00:1			24	0.9)							
55	W	17:18:00		6:00	00:1			22	1	.							
54	E	17:39:00		7:00		8:00		20	1.2								
53 52	W E	18:00:00 18:22:00		9:00 0:00		9:00 8:00		.8 !0	1.3 1.1								
52 51	W	18:42:00		2:00		0:00		20	1.1				Pns	sible h	olidav		
50	E	19:04:00		2:00	00:2			20	1.1	_			1 03	SIDIC II	Jiiday		
49	W	19:25:00		3:00		8:00		.9	1.2	_							
							Page	1			Ve	erify S-	Turns	After N	/lissio	n	Yes
dditional C																	

			<u>Woolp</u>	<u>ert L</u>	ıdar <i>l</i>	4cq	uisitio	n Lo)g					
			Project	Info							D	ate		
Project #		Projec	t Name			U	nique ID		Flight	Date	(UTC)	Day o	f Year	Flight
79935		WY_	FEMA			Day1	87_90515_A		07,	/06/20)19	18	87	А
Cr	ew		Equi	pment					Time				Α	irports
Pi	lot	А	ircraft Make	/ Model /	Tail #		Hobbs St	art	Local	Start	UTC S	Start	De	parting
Gib	ilaro		Cessna 404	Titan - N47	'5RC		1742.4	1	08:0	1:00	14:01	1:00		KGCC
Ope	rator	Se	nsor Make	/ Model / S	Serial #		Hobbs E	nd	Loca	l End	UTC	End	Α	rriving
Gala	mbos	L	eica Terrain	Mapper - 9	90515		1748.1	1	12:4	6:00	18:46	5:18		KGCC
		•			Condit	ions								
Wind Dir	(°) V	Vind Speed (kts)	Visibility	(mi) C	eiling (ft)	Clo	oud Cover	Temp	o. (°C)	Dew	/ Point	(°C)	Pres	sure ("H
130		4	10		12,000			1	5		13			30.06
Air Spe	ed (kts)	Altitude	AGL (ft)	Altit	ude MSL (ft)	Airfield Ele	evation	(ft)					
	50	_	842	1	12,940			405	` '					
					Settir	ngs	,							
Point Spacii	ng (m)	Point Density (p	osm) So	an Angle/			n Frequency	(Hz)	Pulse	Rate	(kHz)	Las	er Po	wer (%)
0.7				40			82			600			10	0
								Ve	rify S-	Turns I	Before	Missi	on	Yes
,,	5: ::	Start Time	End Time	Time			22.02							
Line #	Direction	On (UTC)	(UTC)	On-Lin	e Sate	ellite	PDOP			Line N	otes/C	omm	ents	
									Е	Block 6	/ STATI	C 13:1	14:04	
1	S	14:01:54	14:15:25	00:13:3		18	1.4				keoff: 1			
2	N	14:18:18	14:31:32	00:13:1	_	18	1.4				o inital			l. C
3 4	S N	14:34:25 14:50:26	14:47:41 15:03:29	00:13:1	_	19 20	1.5 1.5		GPS.	Aititud	le 14,34	47 Tee	t bloc	КЬ
5	S	15:06:35	15:19:32	00:13:0		18	1.6							
6	N	15:22:23	15:35:32	00:13:0		.7	1.5							
7	S	15:38:27	15:51:41	00:13:1		<u>.</u> 9	1.3							
8	N	15:54:02	16:07:00	00:12:5	58 1	L9	1.2							
											2 Fligh			
2.		46 10 1-	10.50.1:	00.15			4.2			12,	940 GP	S MSI	-'	
24	E W	16:40:15	16:58:14	00:17:5	_	L7	1.3							
23	E VV	17:01:15 17:23:14	17:20:25 17:41:17	00:19:1		L6 L5	1.5							
21	W	17:44:27	18:03:25	00:18:5		.3 .3	1.5							
20	E	18:06:24	18:24:44	00:18:2	_	1	1.7							
19	W	18:27:22	18:46:18	00:18:5		1	2.1							
		1	1					-						
					Page	4		, .	:c c	T	After N	a: - :	_	Yes

				Wo	olp	ert	Lid	ar A	\cq	uisitior	1 Lo	g								
Project Info													Date							
Project #			Project	Name	•				U	nique ID		Flight Date (UTC) Day of Year Flig								
79935 FEMA Wyoming Block 6 and 2									Day1	88_90513_A		07/07/2019 188					Α			
Cr					-			Time				Airports								
Pilot Aircraft N						ment Mode	el / Tai	1#		Hobbs St	art	Local	Start	UTC S	Start					
					essna 404 Titan - N7079F					2216.7				13:1			GCC			
		Sensor Make / Mo						Hobbs E		Local End UTC					riving					
Operator Stanton							-					14:1		20:1						
Sta	Le	eica re	rrain iv	lapper				2223.5)	14:1	5:00	20:1	5:00		GCC					
	(0)							onditio			I _	/a = 1			10 ->					
Wind Dir	· (°)	Wind	Speed (kts)	Vis	ibility (mi)		ng (ft)	Clo	oud Cover	Temp		Dew	/ Point	(°C)		ure ("Hยู			
130			4		10		25,	000		Clear	1	6		13			30.06			
Air Spe	ed (kts)		Altitude	AGL (f	ft)	Al	titude	MSL (f	ft)	Airfield Ele	evation	(ft)								
1	50		8,0	00			14,	340		4,3	364									
								Setting	gs											
Point Spacii	ng (m)	Poir	nt Density (pp	sm)	Sca	an Angle/FOV		/ (°) Sca		n Frequency	(Hz)	Pulse	e Rate (kHz)		Las	er Po	Power (%)			
0.35			10			4	0			81			600			10	0			
											Ve	rify S-T	urns E	Before	Missi	on	Yes			
	$\overline{}$		Start Time	Fnd '	Time	Tir	ne					10, 0 14 10								
Line #	Direct	ion	(UTC)		(UTC)		On-Line		llite	PDOP	Line Notes/Comments									
Block 6			(0.0)	(0	. 0,	0														
9a			13:54:00					2	4	1.1	Clear. n			natch	oatch for line 9					
10a	N		14:03:00	14:08:00		00:0			5	1.1			Cicary	patc						
11a	S		14:12:00	14:16:00				2		1.1				patc						
12a	N		14:21:00	14:29:00		00:0		2		1.1				patc						
13a	S		14:31:00	14:3	9:00	00:08:00		2	4	1.2				patc						
14a	N		14:45:00	14:51:00		00:06:00		25		1.1	pa	patch, Auto IT adjusted for dark sha				hadow				
15a	S		14:55:00	14:58:00		00:03:00		24		1.2	pa	tch, Au	uto IT adjusted for dark shadow							
16a	N		15:01:00	15:0	3:00	00:0	2:00	2	4	1.1				patc	h					
17a	S		15:06:00			00:02:00		23		1.2				patc						
18a	N		15:11:00	15:1	4:00	00:03:00		22		1.2		fly patch for 475RC possible? Cloud					oud			
	1		45 40 00	400	0.00	00.1	0.00	_		4.1										
Block 2				15:49:00 16:08:00 16:10:00 16:28:00				21		1.1				clear	all					
48			16.40.00		.ช:บบ	00:18:00		23		1										
48 47			16:10:00				0.00	n	,	1 1 1										
48 47 46			16:30:00	16:4	8:00	00:1														
48 47 46 45			16:30:00 16:50:00	16:4 17:0	8:00 8:00	00:1 00:1	8:00	1	9	1.1										
48 47 46 45 44			16:30:00 16:50:00 17:11:00	16:4 17:0 17:2	8:00 8:00 9:00	00:1 00:1 00:1	8:00 8:00	1	9 0	1.1 1.1										
48 47 46 45 44 43			16:30:00 16:50:00 17:11:00 17:31:00	16:4 17:0 17:2 17:5	8:00 8:00 9:00 0:00	00:1 00:1 00:1 00:1	8:00 8:00 9:00	1 2 2	9 0 0	1.1 1.1 1.2										
48 47 46 45 44 43 42			16:30:00 16:50:00 17:11:00 17:31:00 17:52:00	16:4 17:0 17:2 17:5 18:1	8:00 8:00 9:00 0:00	00:1 00:1 00:1 00:1 00:1	8:00 8:00 9:00 8:00	1 2 2 1	9 0 0 5	1.1 1.1 1.2 1.4										
48 47 46 45 44 43			16:30:00 16:50:00 17:11:00 17:31:00	16:4 17:0 17:2 17:5 18:1 18:3	8:00 8:00 9:00 0:00	00:1 00:1 00:1 00:1	8:00 8:00 9:00 8:00	1 2 2 1 1	9 0 0	1.1 1.1 1.2										
48 47 46 45 44 43 42 41			16:30:00 16:50:00 17:11:00 17:31:00 17:52:00 18:12:00	16:4 17:0 17:2 17:5 18:1 18:3 18:5	8:00 8:00 9:00 0:00 0:00	00:1 00:1 00:1 00:1 00:1 00:1	8:00 8:00 9:00 8:00 8:00	1 2 2 1 1 1	9 0 0 5 8	1.1 1.1 1.2 1.4 1.1										
48 47 46 45 44 43 42 41 40			16:30:00 16:50:00 17:11:00 17:31:00 17:52:00 18:12:00 18:32:00	16:4 17:0 17:2 17:5 18:1 18:3 18:5 19:1	8:00 8:00 9:00 0:00 0:00 0:00 0:00	00:1 00:1 00:1 00:1 00:1 00:1	8:00 8:00 9:00 8:00 8:00 8:00	1 2 2 1 1 1	9 0 0 5 8 9	1.1 1.1 1.2 1.4 1.1										
48 47 46 45 44 43 42 41 40 39			16:30:00 16:50:00 17:11:00 17:31:00 17:52:00 18:12:00 18:32:00 18:53:00	16:4 17:0 17:2 17:5 18:1 18:3 18:5 19:1 19:3	8:00 8:00 9:00 0:00 0:00 0:00 0:00 1:00	00:1 00:1 00:1 00:1 00:1 00:1 00:1	8:00 8:00 9:00 8:00 8:00 8:00 8:00	1 2 2 1 1 1 1	9 0 0 5 8 9	1.1 1.1 1.2 1.4 1.1 1.1										

				Woo	olp	ert	Lid	ar A	cqu	uisitio	n Lo	g					
	Date																
Project #			Project	Name					U	nique ID		Flight	Flight #				
79935 FEMA Wyoming Block 2									Day1	88_90513_B		07/07/2019 188					В
Crew Equipme												Time				Ai	rports
Pi	lot		Ai	rcraft N	1ake /	/ Mod	el / Tai	I # Hobbs S			tart	Local	Start	UTC St	Start Dep		parting
Sw	ain		Cessna 404 Titan - N7079F							2223.	5	15:2	0:00	21:20:	1:20:00		GCC
Ope	rator		Se	nsor Ma	ake / I	Model	/ Seria	al#		Hobbs I	Local End UTC End				A	rriving	
Star	nton		Leica Terrain Mapper - 90513 2225.7										17:47:00 23:47:00				
								onditio									
Wind Dir	(°)	Wind	Speed (kts)	Visik	oility (mi)	_	ng (ft) Clo		ud Cover	_	p. (°C) Dew		Point (°C)			ure ("Hg
130			18		10		25,	000		Clear	2	19		14		2	29.93
Air Spe	ed (kts))	Altitude	AGL (ft)	А	ltitude	MSL (f	t)	Airfield El	evation	ո (ft)					
1.	50		8,0	000				940		4,	364						
								Setting									
Point Spacir	ng (m) Poi		nt Density (pp	sm)	Scan Angle/FOV			/ (°) Sca		n Frequency	(Hz)	Pulse	se Rate (kHz)		Laser Power (%)		
0.35			10		40					81		600 100					
											Ve	rify S-1	urns E	Before N	lissic	n	Yes
Line #	Direc	tion	Start Time	End T			me	Sate	llite	PDOP		ı	Line No	otes/Co	mme	nts	
DI 10			(UTC) (U		C) On-Line		Line										
Block 2 36	E 21:51:00 22:0		22:09	··00	00 00:18:00		20		1.2	Clo	ar roll	out of	limit eri	or 13) nmi	from \/\	
35	W		22:11:00	22:30:00		00:18:00		21		1.2	Cie	ai, ioii	out or	minic en	01 12	2 111111	IIOIII VV
34	E		22:32:00	22:50:00		00:18:00		22		1.3							
33	V	1	22:53:00	23:11:00		00:18:00		22		1.2							
36a	Е		23:15:00	23:19	:00	:00 00:04:0		2	1	1.2				roll erro			
					-						-	end for rain moving onto block			ck		
											-						
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					$\neg \neg$						+						
								Page	1		V	erify S-	Turns	After M	issio	n	Yes
Additional C	ommer	its									-						

				<u>Wo</u>	olp	<u>ert</u>	Lid	ar <i>F</i>	/cq	<u>uisit</u>	<u>tio</u>	<u>1 Lo</u>	g							
Project Info													Date							
Project #			Project	Name)				U	nique IC		Flight Date (UTC) Day of Year Flight								
79935	79935 FEMA Wyoming East Lidar Block 1								Day1	89_9051	11_1		07,	/08/20	19	18	39	1		
Crew Equipment													Time				Ai	rports		
Pilot Aircraft Make / Mod								1#		Hob	bs St	art	Local	Start	UTC S	tart		parting		
	Perl				404 Ti					211.1		08:4		14:45			GTF			
															riving					
Operator Kennedy							Hobbs End Local End UTC End Apper - 90511 7217.1 14:46:00 20:43:0													
Ken	nedy		Le	eica re	rrain iv	iapper				/	217.1		14:4	6:00	20:43	3:00		GCC		
Wind Dir	· (°)	Wind	Speed (kts)	Visi	bility (mi)		onditing (ft)		oud Cove	er	Temp	(°C)	Dev	Point	(°C)	Dress	ure ("F		
330	()	vviiiu	5	VISI	10	,	Ceiiii	18 (11)	Cic		-			Dew	13	()		29.9		
	1/1.	,	_							Few			17		13			29.9		
Air Spe)	Altitude		τ)	Al		MSL (f	τ)	Airtie		vation	(It)							
1	50		9,8	342				940			4,3	64								
								Settin												
Point Spacir	ng (m)	Poir	nt Density (ppsm)		Sca	n Angl	n Angle/FOV		/ (°) Sca		ency	(Hz)	Pulse	Rate	(kHz)	Las	aser Power (%			
0.7			2			4	0			82				600			100)		
												Ve	rify S-1	Turns E	Before	Missic	n	Yes		
Line #	D:	otion	Start Time	End ⁻	Гime	Tir	ne	Sate	lli+-	PDC)D			Lina N	otes/C	0 100 100	nto			
Line #	Direction		(UTC)	(UTC)		On-	Line	Sate	ilite	PDC)P	Line Notes/Comments								
40	Е	E 16:55:00		17:13:00		00:1	8:00	22		1.1	1	Airfield elevation based on KGCC					CC			
41	٧	V	17:16:00	17:35:00		00:1	9:00 22		2	1.1	1		E	Base ov	erfligh	t at 16	:36z			
												Reposition for clouds								
50	E	Ξ	17:39:00	17:5			8:00	24		1.2	2									
51	V		18:00:00	18:19:00			19:00 2			1.2										
52	E		18:22:00	18:40:00		00:18:00		25		1.1										
53	V		18:43:00	19:01:00		00:18:00		21		1.3										
54	E		19:04:00					2		1.2										
55	V		19:25:00							1.2								•1		
56	E	-	19:47:00	20:0	5:00	00:1	8:00			1.1	L		overex	posure	e, cloud	is on i	ast 2 m	niies		
62	V	W	20:08:00 20:2		26:00 00:		8:00	23		1.2				Ponor	sition fo	or clos	ıdc			
02	, v	v	20.08.00	20.2	0.00	00.1	8.00		3	1.2	<u> </u>			пероз	SILIOII IC	JI CIOC	ius			
											-									
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								Dess	1			11.	wife · C	Turns	∧fta= ª	Aiceis:		Vos		
								Page	T			Ve	erity 5	urns	After N	/1155101	n .	Yes		
dditional C																				