

**LiDAR MAPPING DATA COLLECTION
 Pacific Northwest Research Station**

ITEM NO.	DESCRIPTION	UNIT OF ISSUE	EST. QTY. acres	UNIT PRICE	TOTAL AMOUNT
1	H J Andrews Experimental Forest Willamette National Forest Lane & Linn Counties, OR	Acre	16,700	\$ _____	\$ _____
2	Biscuit Fire Study Area Rogue/Siskiyou National Forest Josephine & Curry Counties, OR	Acre	37,000	\$ _____	\$ _____

SECTION C--DESCRIPTION/SPECIFICATIONS/STATEMENT OF WORK

SCOPE OF CONTRACT/LOCATION AND DESCRIPTION

This project includes furnishing labor, equipment, supervision, transportation, operating supplies, and incidentals, in compliance with its terms, specifications, and provisions necessary to provide LiDAR data collection for:

1. H.J. Andrews Experimental Forest located within the Willamette National Forest, consisting of approximately 16,700 acres in Lane and Linn Counties, Oregon. LiDAR data collection for the H.J. Andrews area will occur during leaf off and no snow cover conditions in weather windows agreed upon by the USDA Forest Service and Contractor. Processed LiDAR deliverables will be distributed 30-60 days after acquisition.

2. Biscuit Fire Study Area located within the Rogue River - Siskiyou National Forest, consisting of approximately 37,000 acres distributed over six sites in Josephine and Curry Counties, Oregon. LiDAR data collection for the Biscuit Fire Study will occur during leaf on and no snow cover conditions in weather windows agreed upon by the USDA Forest Service and Contractor. Processed LiDAR deliverables will be distributed 30-60 days after acquisition.

TECHNICAL SPECIFICATIONS

Lidar Survey Specifications

Data acquisition	<i>Survey Design</i>	<i>Minimum requirements</i>
Laser pulse rate	Up to 116,000 pulses per second or ~99,000kHz	≥ 70,000 pulses per second
Returns per pulse	Up to 4	First and last (up to 2)
On-ground laser beam diameter	approx 25 cm	Between 10 cm and 40 cm
Scan angle	±16 degrees from nadir	≤ ±16 degrees
Aircraft altitude	Contractors discretion	
Aircraft speed	Contractors discretion	
Ground swath width	<580 meters	
Swath overlap	50% sidelap (100% overlap)	No voids between swaths. No voids because of cloud cover or instrument failure. <20% no-overlap area per project. No arbitrary 1 km x 1 km square with >50% no-overlap area

Aggregate pulse density	>8/m	Barring non-reflective areas (e.g., open water, wet asphalt): <ul style="list-style-type: none"> • ≥85% design pulse density for entire project area. • Within areas of swath overlap, no 30m x 30m area with <50% design pulse density
Flight line direction	Opposing	
GPS base-line length	≤24 km	
GPS PDOP	≤3.0, ≥6 satellites in view	≤3.5, ≥6 satellites in view
Survey conditions	Leaf-off and no significant snow cover (HJ Andrews) Full Leaf-on (Biscuit Fire)	
Accuracy	<i>Survey Design</i>	<i>Minimum requirements</i>
Absolute accuracy	<13 cm vertical, <10 cm horizontal (RMSE)	≤20 cm vertical (RMSE)
Between-swath reproducibility	≤15 cm vertical on horizontal surfaces (RMSE)	
Reproducibility of range measurements	≤5 cm (RMSE)	

Spatial reference framework	
Vertical Datum	NAVD88, Geoid03
Horizontal Datum	NAD83
Projection	UTM zone 10
Units	SI

Deliverables	
Report of Survey	Text report that describes survey methods; results; vendor's accuracy assessments, including internal consistency and absolute accuracy; and metadata <i>.pdf, .doc, or .odt format</i>
MetaData for all GIS compatible imagery and files	Metadata shall follow the Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata. As such, the metadata will include, but not be limited to: a. an abstract summarizing the dataset, b. spatial information (i.e. geographic projection), c. description of acquisition parameters and general methods, d. pixel/cell value content and assessed accuracy.
Aircraft trajectories (SBET files)	Aircraft position (easting, northing, elevation) and attitude (heading, pitch, roll) and GPS time recorded at regular intervals of 1 second or less. May include additional attributes. <i>ASCII text or shapefile format</i>
All-return point cloud	List of all valid returns. For each return: GPS week, GPS second, easting, northing, elevation, intensity, return#, return classification. May include additional attributes. No duplicate entries. <i>ASCII text and LAS version 1.1 format</i> <i>1/64th USGS 7.5-minute quadrangle (0.9375 minute by 0.9375 minute) tiles</i>

Ground point list	List of X,Y,Z coordinates of all identified ground points. <i>ASCII text.</i> <i>1/4th USGS 7.5-minute quadrangle (0.375 minute by 0.375 minute) tiles</i>
Ground surface model	Raster of ground surface, interpolated via triangulated irregular network from identified ground points. No unavoidable point misclassification ESRI GRIDs of LiDAR dataset Ground Modeled Points (DTM) Fusion v2.1 Vegetation Surface Modeled Points (DEM) <i>ESRI floating point grid, 1m cell size, snapped to (0,0), 1/4th USGS 7.5-minute quadrangle (0.375 minute by 0.375 minute) tiles</i>
First-return (highest-hit) surface model	Raster of first return surface. Internal voids may be present. <i>ESRI floating point grid, 1m cell size, snapped to (0,0), 1/4th USGS 7.5-minute quadrangle (0.375 minute by 0.375 minute) tiles</i>
Surface models shall have no tiling artifacts and no gaps at tile boundaries. Areas outside survey boundary shall be coded as NoData. Internal voids (e.g., open water areas, shadowed areas in first-return surface) may be coded as NoData.	
Intensity image	<i>GeoTIFF, 3 ft (1m) pixel size, 1/4th USGS 7.5-minute quadrangle (0.375 minute by 0.375 minute) tiles</i>
Metadata	Metadata GIS compatible imagery and files shall follow the Federal Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata. As such, the metadata will include, but not be limited to: a. an abstract summarizing the dataset, b. spatial information (i.e. geographic projection), c. description of acquisition parameters and general methods, d. pixel/cell value content and assessed accuracy.

CONTRACT TIME AND REQUIRED RATE OF PROGRESS

The Contractor will complete each item within the time allowed per item. Due to normal variations in seasonal weather conditions, it is mutually agreed that the starting date may be adjusted for the item(s) with no adjustment in contract time or price.

<u>Item No.</u>	<u>District</u>	<u>Contract Period</u>	<u>Estimated Start Work Date</u>
1.	H.J. Andrews Experimental Forest	9 months	October 15, 2007

LiDAR data collection at the H.J. Andrews Experimental Forest should occur during leaf off and no snow conditions in weather windows agreed upon by the USDA Forest Service and Contractor

<u>Item No.</u>	<u>District</u>	<u>Contract Period</u>	<u>Estimated Start Work Date</u>
2.	Chetco Ranger District	2 months	July 15, 2007

LiDAR data collection at Biscuit Fire Study Area, Rogue River-Siskiyou National Forest should occur during leaf on in weather windows agreed upon by USDA Forest Service and Contractor