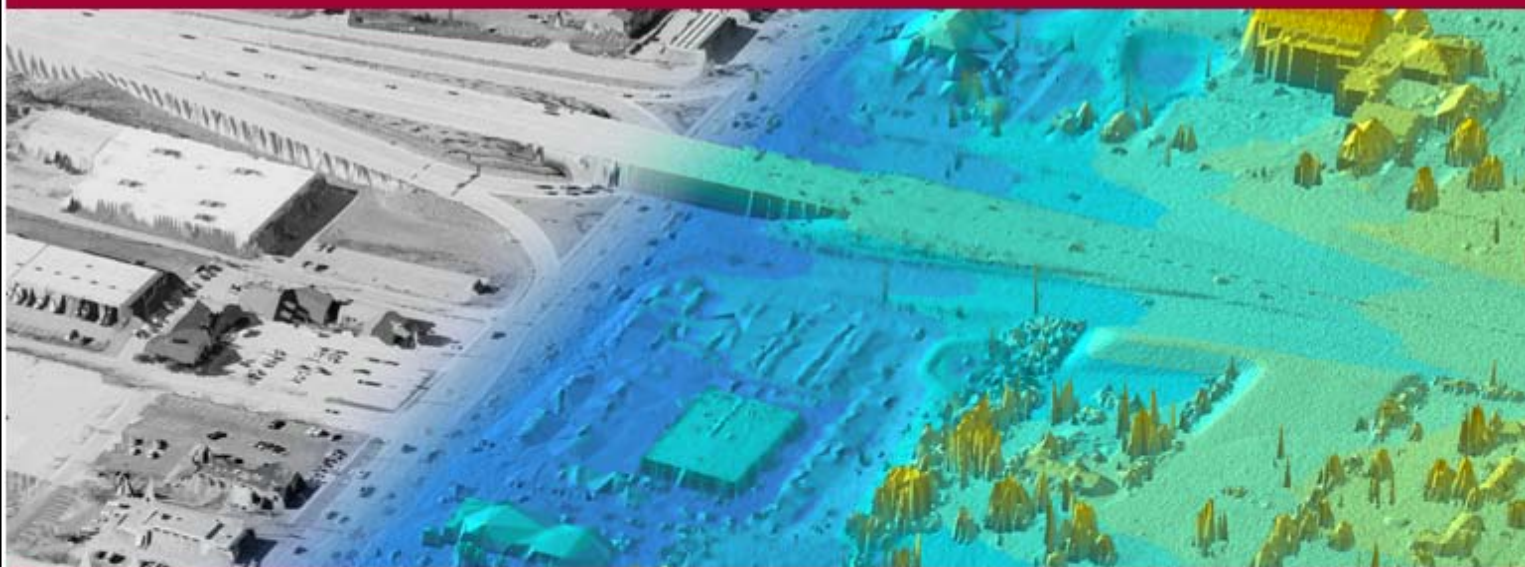


LiDAR ACCURACY REPORT

Project: 2012 LiDAR Project
Report Area: Area1-D
URS Contract No.: 259352
Date: 18-June-2012
Submitted by: Wade Williams, Project Manager



Oklahoma NRCS

Project Overview

URS Group Inc. contracted with Surdex Corporation in the fall of 2011 to collect high resolution LiDAR elevation data over portions of east-central Oklahoma. The Oklahoma Natural Resources Conservation Service (NRCS) required an area totaling approximately 11,100 square miles of coverage. Surdex tested that the deliverables meet or exceed accuracy as stated in NDEP Guidelines for digital elevation data, Version 1.0 for NSSDA of 95% confidence for 2' contours and ASPRS Class I Standards. Survey points were collected on hard surface features such as concrete, pavement, gravel or dirt roads for each delivery area. The survey ground truth points were compared to the LAS bare-earth surface developed from the LiDAR data and the differences have been outlined in this report. The overall vertical accuracy of these points will be 18.5 centimeters RMSEz or less. The RMSE was calculated as the square root of the average of the set of squared differences between the bare-earth and the survey points collected. Also, the bare-earth grid model accuracy will be 37cm RMSEz or less.

Project Area

This report covers the collection and processing of LiDAR elevation data over Area1-D. The project limits are presented in the graphics below. The project area consisted of approximately 2,238 square miles of elevation data.

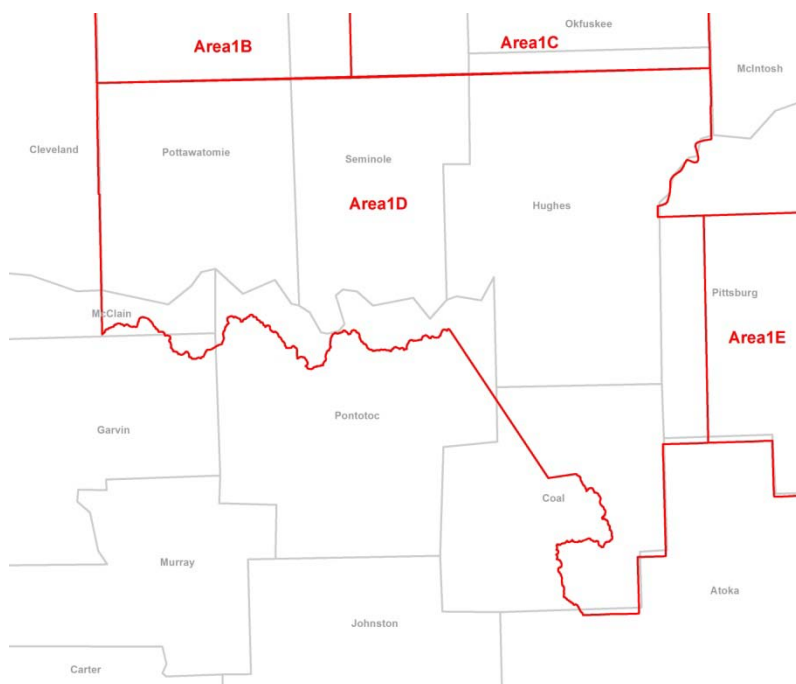


Figure 1 Area1-D. Project Area

LiDAR Data Collection Scenario

The LiDAR elevation data for this project was collected with a Leica ALS-50II MPIA aerial LiDAR sensor system. The project design called for acquisition of LiDAR data with lines flown north-south. The nominal collection scenario called for the acquisition of nominal point spacing of 1.4 meter on the ground.

Area1-D LiDAR Evaluation

The field survey for this delivery consisted of 101 hard surface points. Of these 42 points were used for controlling the LiDAR data and 59 points were used for the final accuracy check. The graphic below presents these points on the delivery area map.

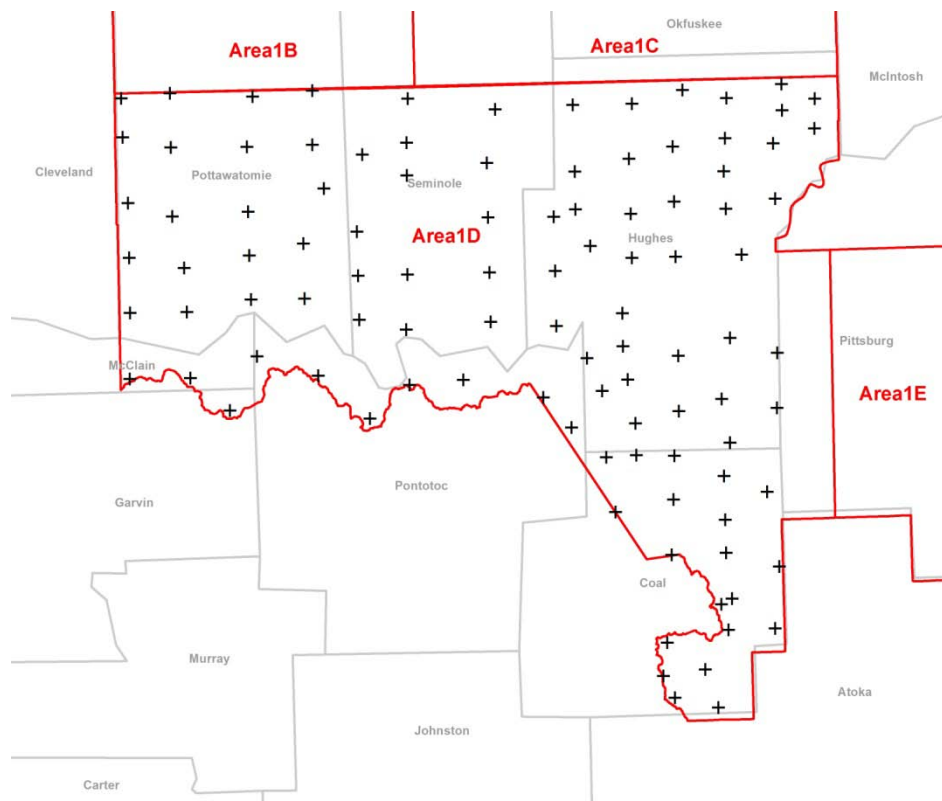


Figure 2 Area1-D Control

These points consisted of various types of hard surface features including concrete, asphalt, gravel and dirt roads. Examples to the types of points surveyed are included below.





Accuracy Assessment

The required LiDAR elevation data values were derived within ArcGIS from the bare earth LAS files. For each control point location a LiDAR elevation value was derived and exported and the surface value subtracted from the survey elevation. These derived values were imported into Excel and comparisons were performed to generate statistics for the overall dataset.

Results

The table below presents the results of the accuracy analysis for Area1-D. All values are in meters.

Stat	All Points	Control Points	Check Points
Count	101	42	59
Average	-0.002	-0.001	-0.003
RMSE	0.129	0.135	0.123
95% Confidence Level	0.252	0.266	0.242

As indicated above the LiDAR surface meets project specifications of RMSEz less than or equal to 18.5 cm, with an overall RMSEz of 12.9 cm. The 95% confidence level (36.3 cm or less) was also meet with an overall value of 25.2 cm.