

A CIVIL GROUP

CIVIL ENGINEERING - PLANNING - SURVEYING

June 4, 2015

Jason Warzinik
GIS Manager
Boone County
801 E. Walnut, Room 220
Columbia, MO 65201

RE: LiDAR Validation Survey Report

Dear Mr. Warzinik,

Thank you for the opportunity to provide the attached survey report and information. Due to the amount and various types of documents included in this report, all of the attachments have been provided as part of an electronic package to accompany this report. Please let us know if you would like the information in additional file formats, or if you have problems accessing the data. Hard copies of any of the referenced documents will be provided upon request.

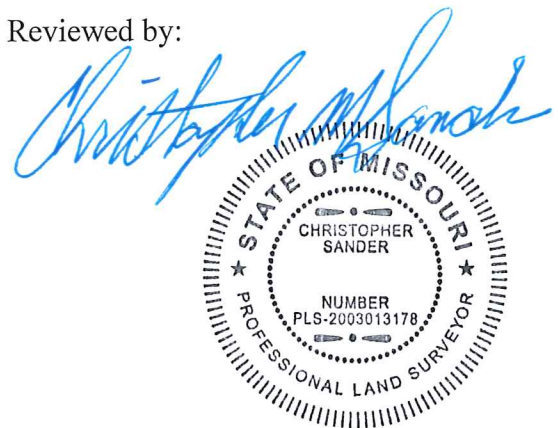
If you have any further questions regarding this report please feel free to contact me at the number below.

Sincerely,
A Civil Group



Cody Darr, PE

Reviewed by:



Christopher Sander, PE, PLS

1.1 Purpose

A Civil Group was retained by Boone County GIS department to perform surveying in order to be a third party verification of LiDAR data previously commissioned by the department. Work was intended to meet the requirements of the RFP sent out by the Boone County GIS department, dated February 26, 2015, SUBJECT: LiDAR Validation Survey, GPS XYZ Coordinates Quote Request. Work was to include shooting various ground types at 44 Locations in and around Boone County with GPS MoDOT CORS VRS Network.

1.2 Process

Using shapefiles provided from Boone County GIS department we created a base map in AutoCAD C3D. From this information we created field calculation points for upload into the survey crew's data collectors. With this information, overlaid with road maps, we also made regional maps for general location and to provide easy route planning (attached as Appendix A and B). Individual Site Maps were provided by Boone County with location number and Aerial photography (attached with Appendix C).

A Civil Group surveyors visited each location and using a Trimble R6 GPS System with a TSC3 Data Collector took minimum 10 second shots for the various required ground types. Where shots were required in areas with heavy tree cover a Trimble S6 Robotic Total Station was utilized by setting up on newly established State Plane Coordinate (SPC) GPS control points by the R6 GPS System. At each location the surveyor filled out a Field Note Sketch, indicating details of the site visit (attached as Appendix C). Also, at each location the surveyor took two pictures of each shot, a close up, and an area view (attached as Appendix D). The labeling of the shots has the following naming convention:

e.g. 1_XX_AA (Site Number)_(Ground Shot Type)_(Picture Type)

Key:

1 = Site Number (1 – 44)

XX = Ground Shot Type (1-Hard Surface, 2-Grass, 3-Trees, 4-Urban Area)

AA = Picture Type (A-Close Up, B-Area view)

Also, throughout the obtaining of the location data, intermittent independent accuracy checks were performed on NGS monuments throughout the County. Vertical accuracy determined by checking our data against the published data has been attached with the NGS Datasheets (attached as Appendix F).

Alternate Site Locations: Two sites were relocated due to poor accuracy and/or poor cell phone reception in the area.

Site 2: Site 2 was relocated from the intersection of Hicks St. and Harris St. to the intersection of Wall St and Wentz St., near the center of Sturgeon. (See exhibit attached as Appendix G)

Site 16: Site 16 was relocated from the intersection of Rte Y and Clinkenbeard Rd, to the intersection of Rte Y and Bob Veach Rd, approximately a mile to the West. (See exhibit attached as Appendix H)

Data from the GPS system has been attached which provides detailed analysis of each shot, including mathematical accuracy computations based on conditions at the time of observation (attached as Appendix E).

All coordinates are in Missouri State Plane Coordinates 1983. All elevations were found using Geoid 12a.

All applicable data used in preparing this report and the final point results has been provided in the appendices.

1.3 Results

Final results of this report have been provided in two forms, an excel .csv file and as a shapefile, both provided in the attached electronic package. The excel file has 7 columns, with the following data types, Point Number, Northing, Easting, Elevation, Surface Type, Close Up Picture, Area Picture. The shapefile contains all of the points and attributes shown in the excel file (except for picture columns) and is available so they may be imported graphically into compatible software.

APPENDIX

APPENDIX A	OVERALL COUNTY MAP
APPENDIX B	REGION SITE MAPS
APPENDIX C	INDIVIDUAL SITE MAPS & FIELD NOTES
APPENDIX D	SITE PICTURES
APPENDIX E	GPS METADATA
APPENDIX F	NGS DATASHEETS & ACCURACY CALCULATIONS
APPENDIX G	SITE 2 RELOCATION MAP
APPENDIX H	SITE 16 RELOCATION MAP