

LiDAR Check Point Survey Report

New Jersey Highlands LiDAR Data & Mapping Project

Passaic, Sussex, Bergen, Morris, Hunterdon, & Somerset Counties,
New Jersey

Contract No. W912P9-06-D-0507

PSI Project # 7537-003

Revised January 21, 2008

RETTEW was contracted by Photo Science, Inc. to locate a total of 35 LiDAR check points in five (5) different vegetation types in approximately 1,675 square miles in New Jersey and a portion of Orange County New York.

For this project RETTEW followed closely to the FEMA requirements. These requirements can be found in FEMA's "Guidelines and Specifications for Flood Hazard Mapping Partners, Appendix A: Guidance for Aerial Mapping and Surveying". specific reference is found in Section A.6.4 – Check point surveys of February 2002.

The 35 check points were collected in the following five (5) different land cover types.

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|---|----|---|
| 1 | BE | Bare earth and low grass (e.g. plowed fields, lawns, golf courses) |
| 2 | HG | High grass, weeds, and crops (e.g. hay fields, corn fields, wheat fields) |
| 3 | BR | Brush land and low trees (e.g. scrubby low trees and bushes) |
| 4 | FF | Forested, fully covered by trees (e.g. hardwoods, evergreens, mixed forest) |
| 5 | UA | Urban areas (e.g. high, dense man-made structures) |

The naming convention used for the checkpoints is a 2 letter project identifier HI for Highlands followed by a 2 letter cover type designation followed by a number. An example being HIBE6 would be the sixth point taken in this project on a cover type of bare earth.

At each check point a dock spike with RETTEW cap or mag nail was set. Two digital images of the point were taken. The first is a close-up view of the point and the second from about 20 feet away to show the surrounding area. A field sketch was also created showing the relationship of surrounding control points.

The control points were set in clusters where you could get 3 to 5 of the different cover types near each other. GPS was used to locate 2 to 3 points in the cluster. Then a conventional survey total station was used to locate the remaining points of the cluster using the points located with GPS as control.

The GPS was performed using RTK (Real Time Kinematic) techniques. The GPS base station was set up on a NGS (National Geodetic Survey) Three dimensional control point. That is a control point with a horizontal and vertical order. The list of control points is as follows:

| POINT NAME | COUNTY | STATE | HORIZONTAL ORDER | VERTICAL ORDER |
|------------|---------|-------|------------------|----------------|
| 21 K 1 | Warren | NJ | A | 1 |
| 19 R 1 | Sussex | NJ | B | 2 |
| 16 J 1 | Passaic | NJ | A | 2 |
| 21 U 1 | Warren | NJ | B | 2 |
| HOPATCONG | Morris | NJ | B | 2 |
| 14 K 1 | Morris | NJ | 1 | 2 |
| Z 13 | Sussex | NJ | 1 | 1 |

All GPS located check points were within 12 miles of the HARN point the base station was occupying. Trimble 4700 dual frequency GPS receivers with Geodetic antennas were used for the base station and the rover unit. Each point that was located using GPS was occupied twice with a minimum of 2 hours between occupations. After the second occupation the 2 coordinates were compared to make sure the difference was less than 5 cm or 0.164 feet. If the difference was larger a 3rd or 4th observation was performed until the final two observations were under 0.164 feet different and over 2 hours apart. See the point deviation section for comparisons. The final 2 sets of coordinates were then averaged for the final GPS coordinate of that point.

The field work for this project was performed during December 2006. No major problems were encountered in the field. In January of 2008 it was found that the crew set cluster 3 outside the LiDAR collection area. The crew went out and created a new cluster 3 with the 5 different cover types and this is called HI—3A.

The photographs for each LiDAR check point can be found on the CD sent with this report. For this project the coordinates were reported horizontally in the North American Datum of 1983 with a 1996 adjustment (NAD-83/96). In the New Jersey State Plane Coordinate system (SPCS NJ) and vertically in the North American Vertical Datum of 1988 (NAVD-88) with GEOID 03 as the Geoid model..