Ground Control Report
Oneida County LiDAR mission, May 2013

1.1 Ground Control Design

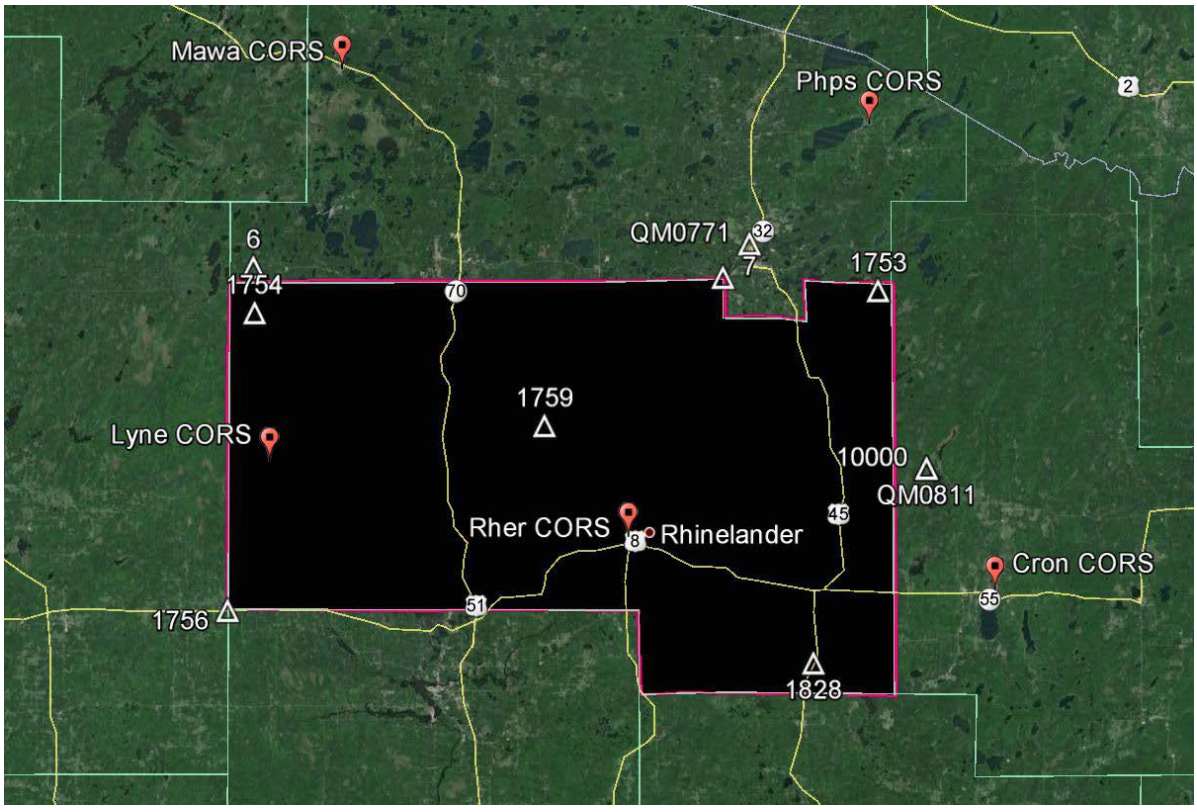
The ground control network and design used for the Oneida County LiDAR project was made up of index points, GPS base stations, NGS monuments, and check points from the vertical accuracy ground control survey. This report will focus on the index points that were collected at eight locations in and around Oneida County. The index points are used for QC checks and calibration of the raw point cloud and for additional vertical checks against the processed bare earth surface. The GPS base station information that was used for this project is outline in the report called 'ABGPS Processing Report'. The checkpoints that were collected for the independent vertical accuracy ground truth report are reported in the 'FEMA Accuracy Report'.

The ground control index survey was done in Wisconsin County Coordinate Reference System (WISCRS) – Oneida County, NAD83 (2011), NAVD88 (Geoid 12A), US Survey Feet. The index survey was conducted by Ayres Associates surveyors in May 2013.

1.1.2 Oneida County Index Point Layout

The locations were selected near the four corners of the county, along with one near the center of the county. This layout design is preferred when the index points will be used to check different areas across a large flight block. The index point survey was conducted with a Trimble R-10 receiver using a WISCORS connection via Verizon wireless. Two NGS points (QN0593, QM0213) were checked and were within 0.1' horizontally.

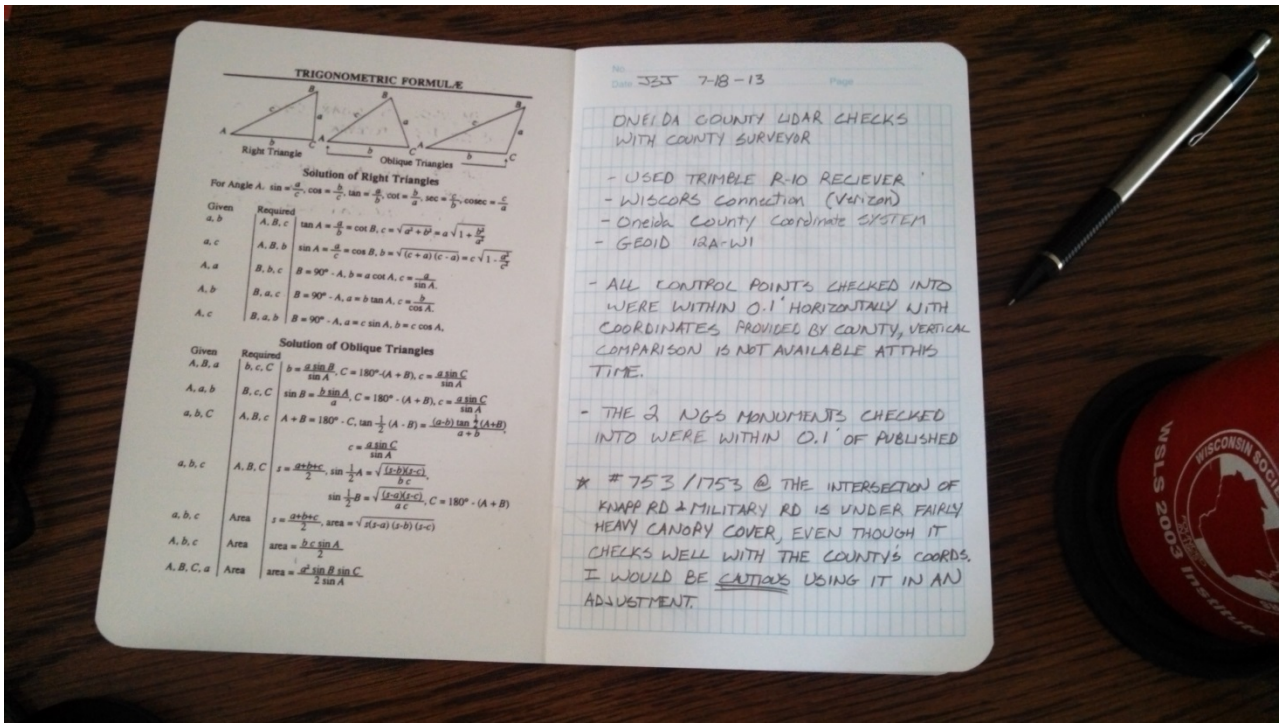
1.1.2.1 Map of index points and GPS base stations



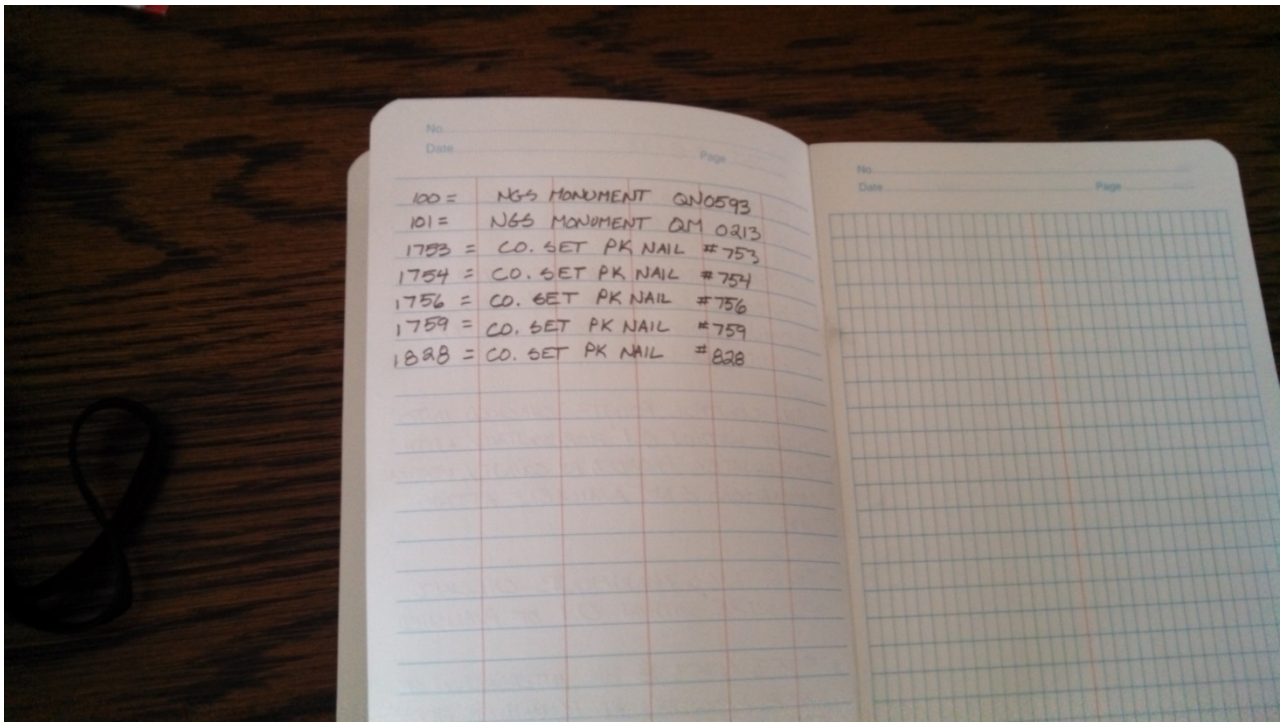
1.1.2.2 Oneida Co LiDAR index points

Index Name	X	Y	Z
6	111955.78	265654.05	1596.830
7	292044.91	261686.57	1635.083
10000	370090.68	188886.58	1674.942
1753	351472.27	256637.60	1675.072
1754	112490.02	248218.79	1578.116
1756	102142.55	134444.55	1569.025
1759	223702.83	205097.60	1579.753
1828	326819.61	114483.64	1604.579

1.1.3 Field Notes



1.1.3 Field Notes (continued)



1.1.4 Oneida County LiDAR, index point statistics

The final step in using the index points is to run a statistical comparison against the bare earth ground surface to confirm that the vertical accuracy is within specification. The follow results indicate that the overall RMSEz of the index points is .273'. This is a separate check as compared to the FEMA Accuracy Report. The index points are used in the calibration of the raw point cloud, and therefore are not an independent set of checkpoints like those used in the FEMA reporting.

The following page shows the statistical report for the index points. Note that points 6 and 1000 do not report a 'surface Z' and therefore no 'Delta Z'. This is because both points fall outside the Oneida Co LiDAR buffer and do not have LiDAR coverage. The 'control Z' values were collected using the Trimble receiver and were used in the LiDAR block calibration.

1.1.4.1 Statistical Report for index points

```
                                        Oneida CP Results formatted.txt
Control Point Report (LP360, QCoherent Software, LLC)
Generated by mv322 (12/22/14 14:09:32)

--------- Report Disclaimer ---------

This report does not guarantee accuracy. The report
only reflects one statistical representation of the
control points, LIDAR data and surface used. This report
does not replace a thorough quality control process.

--------- Report Summary ---------

Vertical Error Mean *:              0.156
Vertical Error Range:             [-0.112,0.574]
Vertical Skew **:                   0.734
Vertical RMSE:                  0.273
Vertical NMAS/VMAS Accuracy (90% CI):   ±0.449
Vertical ASPRS/NSSDA Accuracy (95% CI):   ±0.535
Vertical Accuracy Class:   0.28
Vertical Min Contour Interval:   0.84


Point Counts
Horizontal Measured:  0
Vertical Measured:  6
Withheld:  0 of 8

--------- End Report Summary ---------

--------- Surface Definition ---------

Surface Method: Triangulation (TIN)

Classification Filter Used:

        2-Ground

        Return Combination Filter Used:
        -ALL return combinations used in filter

--------- End Surface Definition ---------

--------- Control Points ---------

Name    Control X  Control Y  Control Z  Surface Z  Delta Z
6       111955.780 265654.050 1596.830   No-Data    ---
7       292044.910 261686.570 1635.083   1635.038   0.045
10000   370090.680 188886.580 1674.942   No-Data    ---
1753    351472.270 256637.600 1675.072   1674.498   0.574
1754    112490.020 248218.790 1578.116   1578.037   0.079
1756    102142.550 134444.550 1569.025   1568.982   0.043
1759    223702.830 205097.600 1579.753   1579.447   0.306
1828    326819.610 114483.640 1604.579   1604.691  -0.112


--------- End Control Points ---------
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