

Ground Control Report

Wisconsin WROC – 3DEP | Taylor County LiDAR 2016-17

1.1 Ground Control Design and Methodology

The ground control network and design used for the Taylor County LiDAR acquisition was made up of calibration points, GPS base stations, NGS base stations, and independent check points from the vertical accuracy ground control survey. This report will focus on the LiDAR calibration points that were collected at 13 locations in and around the Taylor County project area. The control 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 ground control calibration survey was done in WISCRS Taylor County, NAD83 (2011), US survey feet; NAVD88 (Geoid 12A), US survey feet. The field work was conducted by Ayres Associates surveyors.

Control Summary and Methodology

Control Summary

Horizontal Datum:	NAD83 (2011)
Vertical Datum:	NAVD88 (2012), Wisconsin GEOID12A
Rectangular Coordinate System:	Wisconsin Coordinate Reference System (WISCRS)-Taylor County
Used NGS Control?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Summary of control checks and calibration (if applicable):	(See Field Notes for control checks on NGS monuments – No calibration was needed)
Survey Methods Used:	RTK GNSS Base and RTK-GPS using WISCORS Network through VRS connection were used for direct observations and to set control pairs for Robotic Total Station shots under canopy, etc. (Survey Methods continued below)
Equipment Used:	GPS Trimble R8-3 GNSS S/N 5220487835 – (Ayres #75.37), Base-GPS Trimble R8-3 GNSS S/N 5126468515 – (Ayres #75.23), Robotic Total Station Trimble S6 S/N 93410505 - (Ayres #75.53), Data Collector Trimble TSC3 S/N RS17C22013

Survey Methods

All work was performed in and referenced to NAD83 (2011), NAVD 88(2012), Geoid 12A, Wisconsin Coordinate Reference System (WISCRS) Taylor County in US Survey Feet.

Established horizontal and vertical coordinate values on the points by a minimum of two – 180 epoch observations with separate initializations using RTK GNSS BASE or RTK GPS and the WISCORS network. The resultant coordinates and elevations provided in the deliverables are an average of the two observations.

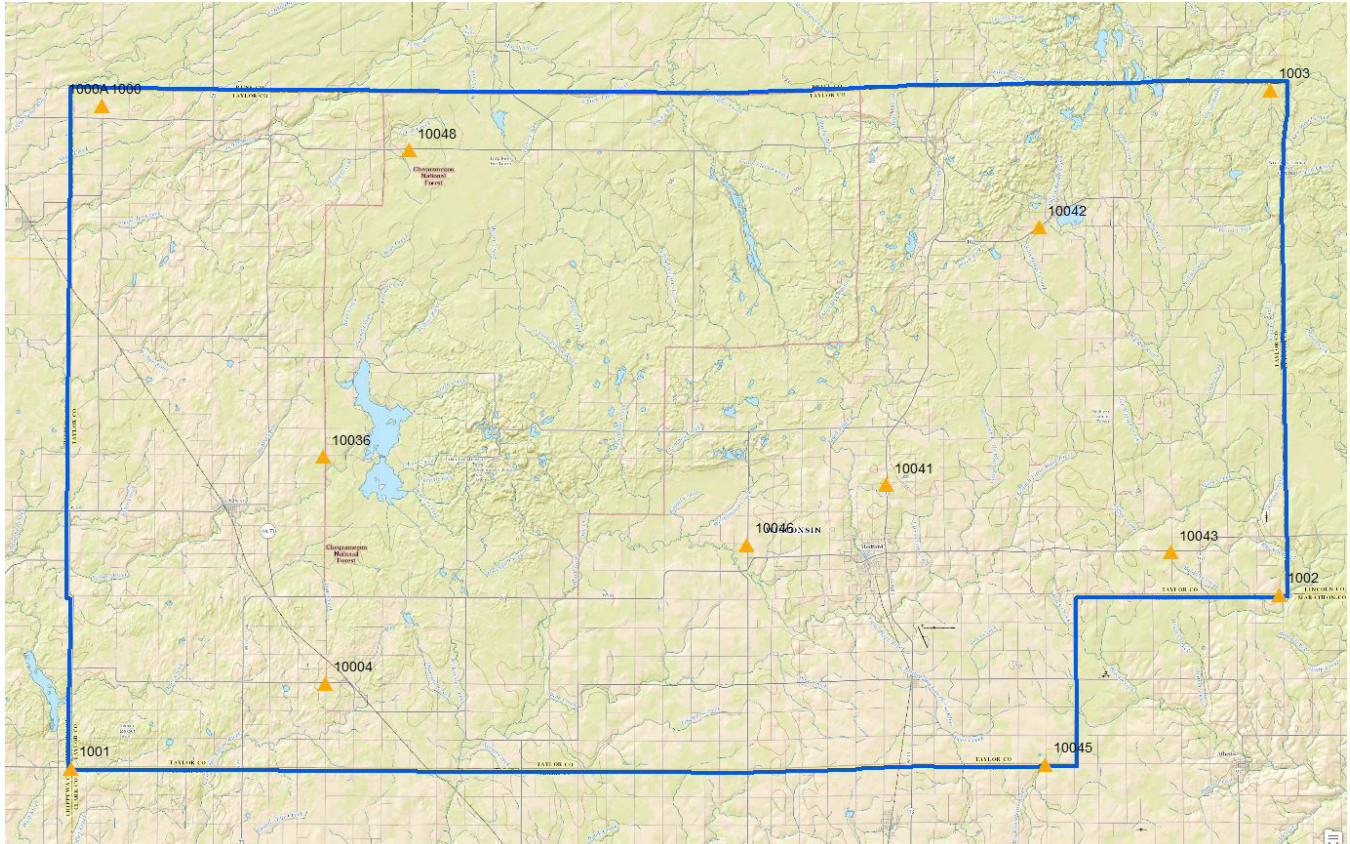
Check shots were taken on numerous NGS control points (see field notes) to verify that the values obtained are consistent with the datum/adjustment as described herein and meet the ± 3 centimeter vertical accuracy requirement at the 95% confidence level.

Points not able to be directly occupied by GPS means were measured using Total Station methods from control point pairs set utilizing GPS methods outlined above.

1.1.2 Control Layout

The locations were selected around the outer geometry of the project boundary and on major roads within the project area. This layout design is preferred when the calibration points will be used to check different areas across a large flight block. The control survey was conducted with a Trimble R-8 GPS receiver and a VRS connection with a TSC3 data collector.

1.1.2.1 Map of Taylor County Calibration Points



1.1.3 Taylor County LiDAR, Calibration Point Statistics

The final step in using the calibration 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 calibration points is 0.149'. This is a separate check as compared to the Vertical Accuracy Survey QA/QC report. These 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 vertical accuracy testing.

1.1.3.1 Statistical Report for Calibration Points

NUMBER	EASTING	NORTHING	KNOWN Z	LASER Z	Dz
1000	506027.930	424263.446	1186.693	1186.530	-0.163
1001	500246.467	300318.267	1161.825	1161.850	+0.025
1002	726472.394	332834.628	1417.707	1417.810	+0.103
1003	724753.799	427191.055	1626.770	1626.580	-0.190
10004	547867.325	316142.690	1303.870	1303.690	-0.180
A	506027.930	424263.446	1186.693	1186.530	-0.163
10036	547484.359	358640.981	1291.712	1291.870	+0.158
10041	652890.022	353346.371	1490.735	1490.920	+0.185
10042	681556.143	401567.091	1568.788	1568.660	-0.128
10043	706137.597	340768.623	1466.681	1466.590	-0.091
10045	682658.816	301073.956	1419.203	1419.080	-0.123
10046	626810.958	342104.735	1378.724	1378.960	+0.236
10048	563631.058	416000.770	1329.167	1329.120	-0.047

Average Dz -0.029 ft
Minimum Dz -0.190 ft
Maximum Dz +0.236 ft
Average Magnitude 0.138 ft
Root Mean Square 0.149 ft
Std Deviation 0.152 ft

1.1.4 Field Notes

10042	CP	2M	EAST QUAD OF W RIB LAKE & STH 102 SW END OF FOG LINE
-------	----	----	--

10041	CP	2M	SE QUAD OF STH 13 & JOLLY AVE, NORTH END OF FOG LINE
-------	----	----	--

10046	CP	2M	BROOK DR & CTH E, SOUTH END OF FOG LINE, NE QUAD
-------	----	----	--

10043	CP	2M	SW QUAD OF STH 64 & MARTIN DR, EAST END OF FOG LINE
-------	----	----	---

10036	CP	2M	250' W/2 CTH G & RIVER RD, WEST END OF SOLID YELLOW E
-------	----	----	---

10045	CP	2M	NE QUAD, MAPLE AVE & CTH F NORTH END OF FOG LINE
-------	----	----	--

Field Notes (Continued)

PN	CODE	LOCATION (APPRX.)
1000	CB	CL CTY LN 1550' N CTY LN

1001	CB	CL COUNTY LINE RD @ W COUNTY LIMITS.
------	----	---

1002	CB	490' W NEHRGRASS RD + 30' N WILLOW AVE
1003	CB	20' E N LOOP RD @ 13,130' N CUTOFF RD.

Field Notes (Continued)

PNT	CORE	TH	LOCATION
10047	XYZ	2M	@ 1000, 1000 IS A 1" IP, ABOVE GRADE
"JUMP RIVER E M" = CK OF JUMP RIVER. AN 0.57 AE 0.04 AV 0.14			
10048	CP	2M	7570' E/O SPUR RD of CTH D, EAST END OF SOLID YELLOW E