

Ground Control Report

Wisconsin WROC - 3DEP | Adams County Lidar 2019

1.1 Ground Control Design and Methodology

The ground control network and design used for the Adams 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 14 locations in and around the Adams 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 Wisconsin County Coordinate System-Adams County, NAD83 (2011), US survey feet; NAVD88 (Geoid 12B), US survey feet. The field work was conducted by Ayres surveyors. All field work was completed between April 25, 2019, and May 3, 2019.

Control Summary and Methodology

Control Summary

Horizontal Datum:	NAD83 (2011)
Vertical Datum:	NAVD88 (2012), Wisconsin GEOID12B
Rectangular Coordinate System:	WISCRS Adams County
Used NGS Control?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
List any NGS control points used:	DH5642, DH5655, DH5662, DH5695, DH8634, DH5660, DH5645
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-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
Equipment Used:	GPS Trimble R10 GNSS S/N 5731470616 – (Ayres #70.57) Total station Trimble S7 S/N 37210519 – (Ayres #70.55) Data Collector Trimble TS7 3 S/N DAD181100955

Crew Chief Notes

Set mag nails or hubs at control points used for total station measurements

Survey Methods (continued)

All work was performed in and referenced to NAD83 (2011), NAVD 88(2012), Geoid 12B, Wisconsin County Coordinate System – Adams County Zone 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 GPS and the WISCORS network. The resultant coordinates and elevations provided in the deliverables are an average of the two observations.

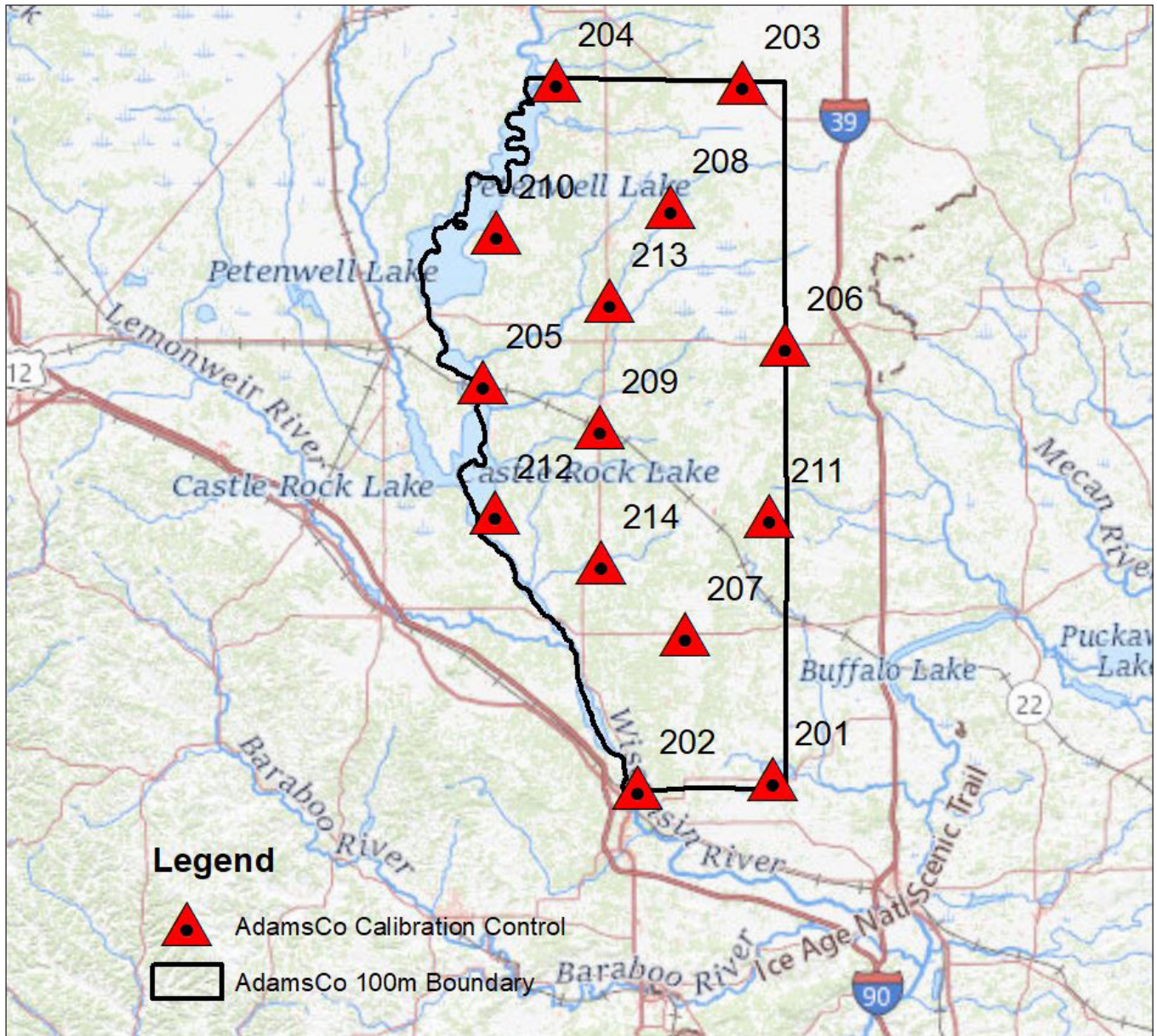
Check shots were taken on numerous NGS control points (see field notes) to verify that the values obtained are consistent with the datum/adjustment as described herein and meet the ± 3 centimeter vertical accuracy requirement at the 95% confidence level.

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 Adams County Calibration Points



1.1.3 Adams 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 following results indicate that the overall RMSEz of the calibration points is 0.076'. 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
201	584949.159	103900.565	805.645	805.630	-0.015
202	542849.024	101031.018	962.418	962.400	-0.018
203	575564.279	320891.285	1056.843	1056.770	-0.073
204	517513.347	321853.879	928.222	928.400	0.178
205	494810.680	227716.899	917.242	917.270	0.028
206	588679.758	239214.532	1066.466	1066.550	0.084
207	557727.380	148760.434	1024.859	1024.760	-0.099
208	553100.007	282272.982	1017.611	1017.740	0.129
209	531104.732	213537.387	962.574	962.530	-0.044
210	498904.761	274244.474	932.244	932.270	0.026
211	583931.197	185956.553	980.710	980.700	-0.010
212	498271.120	186963.688	869.012	869.050	0.038
213	534183.922	253178.189	970.728	970.690	-0.038
214	531330.783	171445.274	908.550	908.490	-0.060

Average Dz	+0.009 ft
Minimum Dz	-0.099 ft
Maximum Dz	+0.178 ft
Average Magnitude	0.060 ft
Root Mean Square	0.076 ft
Std Deviation	0.078 ft

1.1.4 Field Notes

PT#	CODE	PID's		COLLECTION TYPE	DESCRIPTION
		HEIGHT	PHOTOS		
204	PID	2M	TIPNESW	GPS	CTH Z
210	PID	2M	TIPNESW	TS	CTH Z / RIGHORN DR
213	PID	2M	TIPNESW	GPS	CHICAGO DR / STA 13
203	PID	2M	TIPNESW	GPS	STA 73 / CTH F
208	PID	2M	TIPNESW	GPS	777 BEAVER
206	PID	2M	TIPNESW	GPS	STA 21 / CTH V
211	PID	2M	TIPNESW	GPS	CTH E / 2 ND AVE
207	PID	2M	TIPNESW	GPS	STA 82 / CTH B
201	PID	2M	TIPNESW	GPS	1 ST LN / STA 23
202	PID	2M	TIPNESW	GPS	975 GROUSE LN
214	PID	2M	TIPNESW	GPS	STA 13 / CTH A
212	PID	2M	TIPNESW	GPS	1919 LAKES EDGE LN
205	PID	2M	TIPNESW	TS	SCROCH CT / W 1 ST LN
209	PID	2M	TIPNESW	GPS	STA 13 / E ANN ST

1.1.5 Field Photos



Point 201



Point 202



Point 203



Point 204



Point 205



Point 206

1.1.5 Field Photos (Continued)



Point 207



Point 208



Point 209



Point 210



Point 211



Point 212

1.1.5 Field Photos (Continued)



Point 213



Point 214