

Ground Control Report

Wisconsin WROC - 3DEP | Langlade County Lidar 2017

1.1 Ground Control Design and Methodology

The ground control network and design used for the Langlade 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 15 locations in and around the Langlade 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-Langlade County, NAD83 (2011), US survey feet; NAVD88 (Geoid 12B), US survey feet. The field work was conducted by Ayres Associates surveyors. All field work was completed between April 25, 2017, and May 5, 2017.

Control Summary and Methodology

Control Summary

Horizontal Datum:	NAD83 (2011)
Vertical Datum:	NAVD88 (2011), Wisconsin GEOID12B
Rectangular Coordinate System:	Wisconsin County Coordinate System-Langlade Co
Used NGS Control?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
List any NGS control points used:	DP1752, DP2817, DP2804, DP1703, DP1692, DP1858, DP6654
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 R8-3 GNSS S/N 5220487439 – (Ayres #75.37) Total station Trimble S 6 S/N 93410182 – (Ayres #75.38) Data Collector Trimble TSC 3 S/N RSOAC02617 (Ayres #74.48)

Crew Chief Notes

Set Hubs at control points used for total station measurements. Set PK nails for calibration points and at horizontal accuracy points.

Recorded appropriate: NVA (Bare Earth & Urban) and VVA (Forested, Swamp/Wetland, Tall Weed/Crop). Took (4) pictures of each point – one from each cardinal direction.

All work was performed in and referenced to NAD83 (2011), NAVD 88(2011), Geoid 12B, Wisconsin County Coordinate System – Langlade County Zone in US Survey Feet.

Established horizontal and vertical coordinate values on the points by a minimum of two – 90 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.

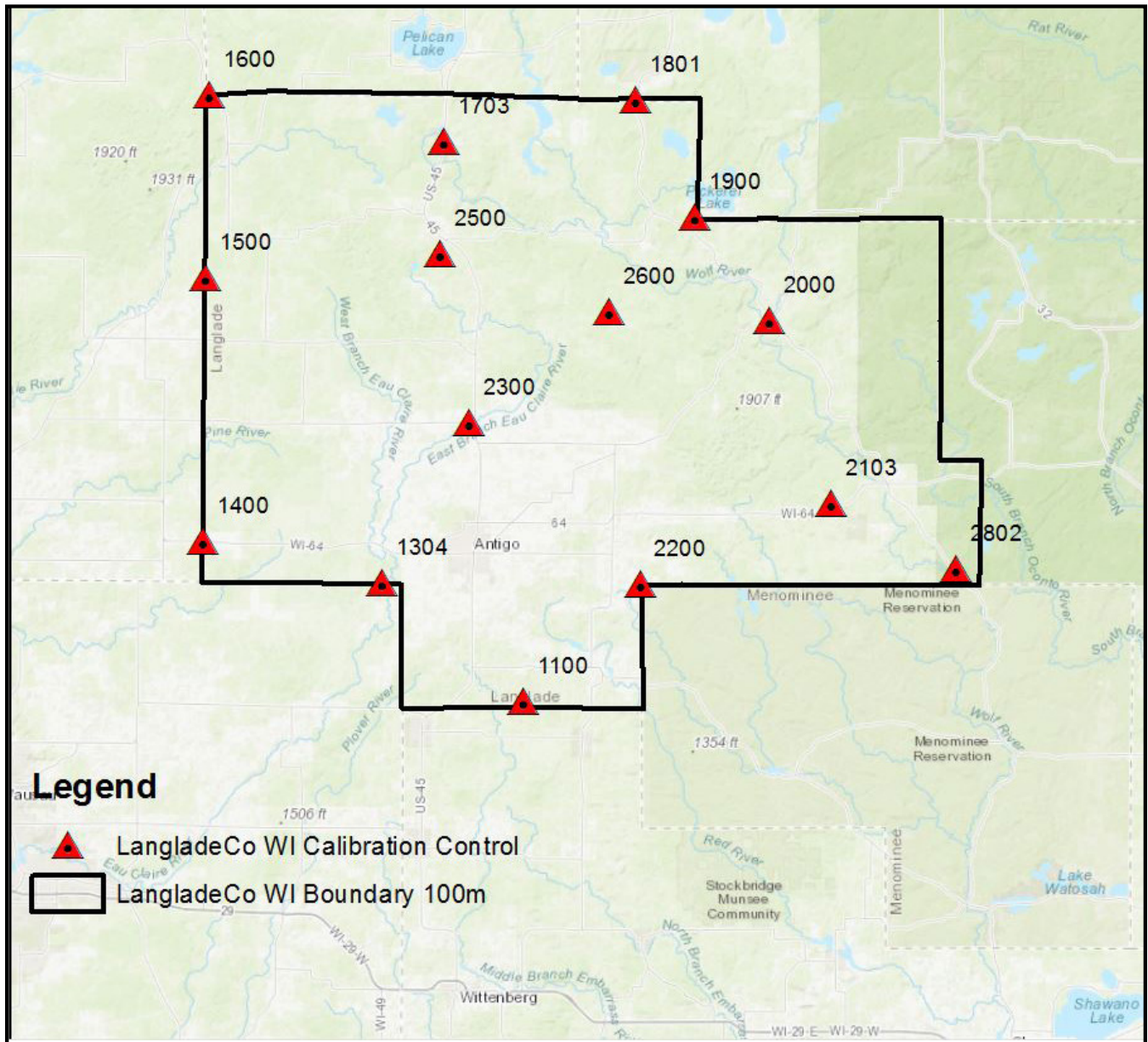
Check shots were taken on numerous NGS control points (see field notes) to verify that the values obtained are consistent with the datum/adjustment as described herein and meet the ± 3 centimeter vertical accuracy requirement at the 95% confidence level.

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 Langlade County Calibration Points



1.1.3 Langlade 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 0.123'. 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
1100	633272.043	301374.911	1351.580	1351.639	+0.059
1304	596542.825	332438.139	1456.129	1456.096	-0.033
1400	549666.699	343398.973	1485.590	1485.675	+0.085
1500	550347.319	412175.463	1542.180	1542.302	+0.122
1600	551299.688	460055.788	1682.230	1682.423	+0.193
1703	612610.816	447777.902	1632.960	1633.124	+0.164
1801	662725.557	458689.107	1556.670	1556.782	+0.112
1900	678168.470	428030.275	1554.690	1554.688	-0.002
2000	697663.690	401151.846	1443.450	1443.360	-0.090
2103	713787.258	353117.628	1350.120	1350.245	+0.125
2200	663949.352	332198.893	1431.280	1431.012	-0.268
2300	619352.230	374204.060	1530.510	1530.426	-0.084
2500	611738.061	418576.108	1692.150	1692.227	+0.077
2600	655945.647	403331.914	1653.170	1653.045	-0.125
2802	746555.952	336051.408	1102.291	1102.309	+0.018

Average Dz +0.024
Minimum Dz -0.268
Maximum Dz +0.193
Average magnitude 0.104
Root Mean Square 0.123
Std Deviation 0.125

1.1.4 Field Notes

CALIBRATION POINTS

PNT	CODE	HEIGHT	LOCATION
1100	CP(S08)	2M	E S ROLLWOOD DR + E DRIVEWAY N201
1400	CP(S10)	2M	SE CORNER END OF FOG LINE E SIDE OF ACKLEY RD ON STH 64
1500	CP(S11)	2M	SE CORNER END OF FOG LINE S SIDE CTH CC W SIDE COUNTY LINE RD
1600	CP(S01)	2M	NW CORNER END OF SOLID & STRIPE STH 17 ±250' NW OF STILLWELL RD
1801	CP(S03)	2M	CENTER OF E FOG LINE ⊗ ASPHALT JOINT
1900	CP(S04)	2M	NE CORNER DRIVEWAY N9783
2000	CP(S13)	2M	SW CORNER CONCRETE DRIVEWAY N7760

Field Notes (Continued)

PNT	CODE	HEIGHT	LOCATION
2103	CP(514)	2M	NW CORNER END OF FOG LINE N SIDE STH 64 E SIDE OF GLEN HILL TRAIL
2200	CP(507)	2M	E/E HILL RD + DRIVEWAY W6716
2300	CP(512)	2M	SW CORNER CURB E SIDE CTH E @ CTH C
2500	CP(516)	2M	SE CORNER CONCRETE DRIVEWAY W10660
2600	CP(515)	2M	SW CORNER END OF FOG LINE NE QUAD CTH A + CTH S
1703	CP(502)	2M	CENTER OF MH @ INT. OF ALLEY ST + COLE ST
2802	CP(506)	2M	NW END OF E STRIPE CTH WW @ STH 55
1304	CP(509)	2M	SE CORNER OF OLD ASPHALT @ BEATTIE RD + CTH Y

1.15 Field Photos



Point 1100



Point 1304



Point 1400



Point 1500



Point 1600



Point 1703

Field Photos (Continued)



Point 1801



Point 1900



Point 2000



Point 2103



Point 2200



Point 2300

Field Photos (Continued)



Point 2500



Point 2600



Point 2802