

Ground Control Report

WISCONSIN WROC - 3DEP | CLARK COUNTY LIDAR 2018

1.1 GROUND CONTROL DESIGN AND METHODOLOGY

The ground control network and design used for the Clark 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 Clark 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-Clark 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 May 9, 2018, and June 11, 2018.

CONTROL SUMMARY AND METHODOLOGY

Control Summary

Horizontal Datum:	NAD83 (2011)
Vertical Datum:	NAVD88 (2012), Wisconsin GEOID12B
Rectangular Coordinate System:	WISCRS – Clark Zone
Used NGS Control?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
List any NGS control points used:	AE8639, DJ4461, DJ4463, DJ4520, DK5027, DK5037, DK5039, DK5044, DK5121, DK5285, DK5314, DN7282
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 5220487835– (Ayres #72.36) Total station Trimble S 6 S/N 93410505 – (Ayres #75.53) Data Collector Trimble TSC 3 S/N RS17C22013 (Ayres #75.37)

Crew Chief Notes

Set PK, nails or spikes at control points used for total station measurements and for calibration 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.

Survey methods (continued)

All work was performed in and referenced to NAD83 (2011), NAVD 88(2012), Geoid 12B, Wisconsin State Plane Coordinate System - Wisconsin Central Zone in US Survey Feet. This data was then transformed to WISCRS county coordinate system, Clark Zone.

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.

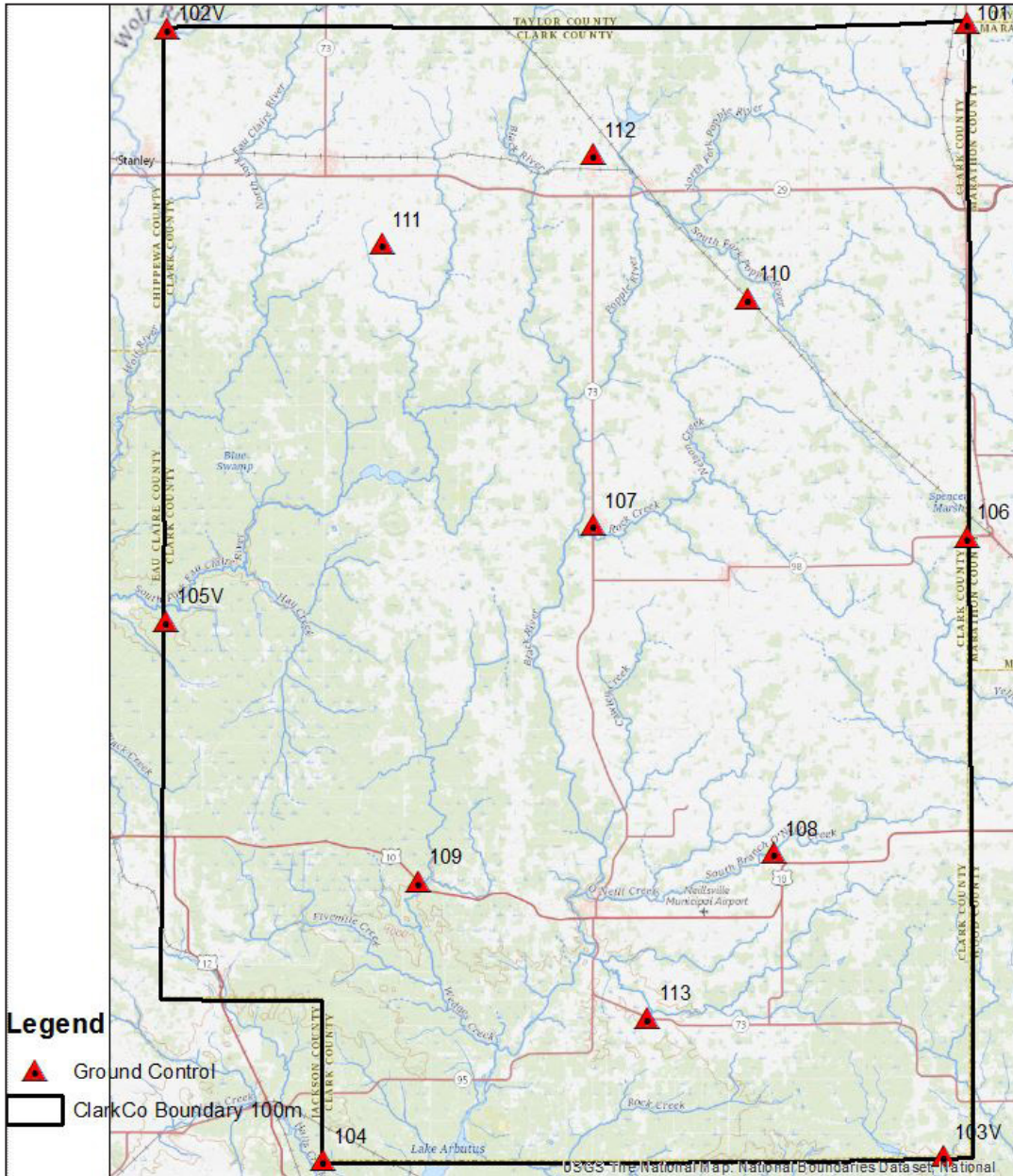
Check shots were taken on numerous NGS control points (see field notes) to verify that the values obtained are consistent with the datum/adjustment as described herein and meet the ± 3 centimeter vertical accuracy requirement at the 95% confidence level.

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 CLARK COUNTY CALIBRATION POINTS



1.1.3 CLARK 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 0.122'. 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
101	757664.088	522934.007	1452.421	1452.610	+0.189
102V	601058.774	521842.101	1162.217	1162.230	+0.013
103V	753261.660	300715.509	1005.115	1005.330	+0.215
104	631652.231	299874.911	924.152	923.950	-0.202
105V	600804.383	405633.578	1000.064	1000.070	+0.006
106	757601.249	422150.800	1321.062	1321.150	+0.088
107	684595.962	424458.207	1174.102	1174.080	-0.022
108	719911.385	360082.440	1131.844	1131.820	-0.024
109	650264.594	354620.236	1013.264	1013.220	-0.044
110	714793.867	468908.546	1294.300	1294.220	-0.080
111	643053.294	479541.198	1223.118	1223.130	+0.012
112	684542.585	497058.236	1278.824	1278.870	+0.046
113	695158.440	327882.279	992.593	992.370	-0.223
Average Dz		-0.002			
Minimum Dz		-0.223			
Maximum Dz		+0.215			
Root Mean Square		0.122			
Std Deviation		0.127			

1.1.4 FIELD NOTES

CALIBRATION POINTS

PNT	CODE	TH	PK	LOCATION
101	CP	2M	✓	NORTH END OF FOG LINE, SW QUAD OF STH 13 & COUNTY LINE RD.

102V	CP	2M	✓	E OF COUNTY LINE RD, 2,144' W/2 E JUNCTION AVE
------	----	----	---	--

103V	CP	500	✓	E CTH Z, E FIELD ENTRANCE
------	----	-----	---	---------------------------

104	CP	2M	✓	NORTHWEST END OF FOG LINE, SOUTH QUAD CTH K + FLOOR RD
-----	----	----	---	--

105V	CP	500	✓	E OF CAMP GLOBE RD 287' E/2 E HORSE CREEK LN.
------	----	-----	---	---

106	CP	2M	✓	NW CORNER OF FLAG LINE, SOUTHWEST QUAD OF STH 98 + FAIRHAVEN AVE
-----	----	----	---	--

107	CP	2M	✓	SOUTHEAST CORNER OF INLET GRATE, WEST SIDE OF STH 73, 275' E/2 E CENTRAL AVE
-----	----	----	---	--

108	CP	2M	✓	SW + DRIVEWAY INTERSECT 26' N/2 E W 2 ND ST, 128' W/2 E MAPLES
-----	----	----	---	---

109	CP	2M	✓	NW END OF FOG LINE, SOUTH QUAD OF STH 10 + CTH B
-----	----	----	---	--

1.1.4 FIELD NOTES (CONTINUED)

PNT	CODE	TH	PIC	LOCATION
110	CP	2M	✓	WEST END OF FOG LINE, 12' N/0 E CTH N, 1094' E/0 E SPARROW AVE
111	CP	2M	✓	SOUTH EAST CORNER OF CONCRETE, 42' N/0 E CTH N, 524' E/0 E GORMAN AVE
112	CP	2M	✓	INTERSECTIONS OF SIDEWALK + ENTRANCE WALK; 938' S/0 E EXTENDED BRUCKSHLAGER RD, 44' N/0 E CTH O
113	CP	2M	✓	NW END OF FOG LINE, NORTH EAST QUAD OF STH 73 + OWEN AVE

1.15 FIELD PHOTOS



Point 101



Point 102V



Point 103V



Point 104

FIELD PHOTOS (CONTINUED)



Point 105V



Point 106



Point 107



Point 108

FIELD PHOTOS (CONTINUED)



Point 109



Point 110



Point 111



Point 112



Point 113