



AYRES

Ground Control Report

Wisconsin WROC - 3DEP

Grant County Lidar 2020

Ingenuity, Integrity, and Intelligence.

www.AyresAssociates.com



Ground Control Report

Wisconsin WROC - 3DEP | Grant County Lidar 2020

1.1 Ground Control Design and Methodology

The ground control network and design used for the Grant 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 18 locations in and around the Grant 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-Grant County, NAD83 (2011), U.S. survey feet; NAVD88 (Geoid 12B), U.S. survey feet. The field work was conducted by Ayres surveyors. All field work was completed between April 13-14, 2020.

Control Summary and Methodology

Control Summary

Horizontal Datum:	NAD83 (2011)
Vertical Datum:	NAVD88 (2012), Wisconsin Geoid 12B
Rectangular Coordinate System:	WISCRS-Grant County
Used NGS Control?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
List any NGS control points used:	AH2981, DH5256, DH5288
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 where needed.
Equipment Used:	GPS Trimble R10 GNSS S/N 5410456448 (Ayres #74.95) Data Collector Trimble TSC7 S/N DAD184200341 (Seiler Loaner) Trimble S6 Total Station S/N 93410054 (Ayres #75.20) Data Collector Trimble TSC7 S/N DAD183700060 GPS Trimble R10 GNSS S/N 5413460872 (Ayres #72.05)

Survey Methods (continued)

All work was performed in and referenced to NAD83 (2011), NAVD 88(2012), Wisconsin Geoid 12B, Wisconsin Coordinate Reference System-Grant Zone in U.S. Survey Feet.

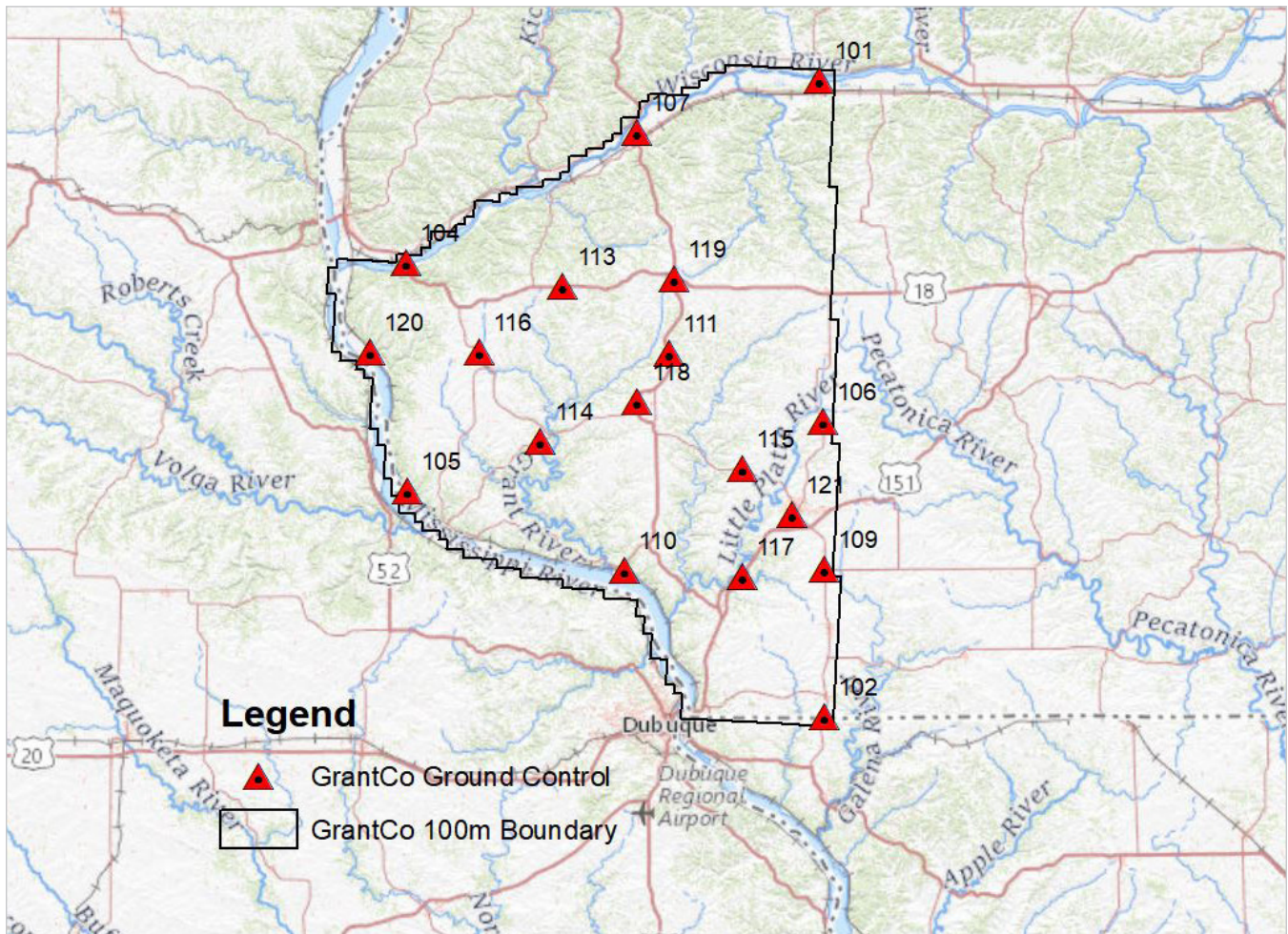
Established horizontal and vertical coordinate values on the points by a minimum of two – 90 epoch observations with separate initializations using RTK GPS and the WISCORS network. The resultant coordinates and elevations provided in the deliverables are an average of the two observations. Check shots were taken on three NGS control points (see above and 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 Grant County Calibration Points



1.1.3 Grant 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 0.075'. 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	891222.762	650897.136	682.72	682.74	0.02
102	893024.732	400027.391	939.725	939.87	0.145
104	727860.682	578999.589	651.735	651.68	-0.055
105	728577.511	489166.887	621.328	621.19	-0.138
106	892273.337	516358.61	1124.267	1124.3	0.033
107	819206.179	630255.217	666.225	666.18	-0.045
109	892985.202	458066.575	1012.734	1012.78	0.046
110	813988.533	457669.382	617.121	617.09	-0.031
111	831729.031	543183.614	1144.308	1144.31	0.002
113	789855.951	569646.122	1178.573	1178.58	0.007
114	780938.863	508604.069	955.587	955.51	-0.077
115	860450.221	497550.821	1013.606	1013.56	-0.046
116	756793.907	543891.28	945.5	945.44	-0.06
117	860545.476	454957.636	644.478	644.53	0.052
118	819195.381	524011.518	1089.387	1089.56	0.173
119	833663.924	572814.025	1183.75	1183.74	-0.01
120	713872.116	543786.221	626.132	626.1	-0.032
121	880287.479	479607.021	906.509	906.59	0.081

Average Dz	0.004
Minimum Dz	-0.138
Maximum Dz	0.173
Average Magnitude	0.058
Root Mean Square	0.075
Std Deviation	0.077

1.1.4 Field Notes

101	CP	2m	✓	☉ MAIN HOLE
LID IN ☉☉ INTERSECTION OF E RIVER RD				
+ 4TH STREET				

102	CP	2m	X	CORNER
OF FOG LINE NORTH BOND 80				
@ STATE HISTORICAL MARKER 172				
POINT OF BEGINNING, MOVED ABOUT				
230' NORTH FOR CLEARER FOG LINE				

104	CP	2m	✓	☉ OF FOG
LINE FOR NB HWY 35 @ INTERSECTION				
W/ S'LY EDGE OF BRIDGE DECK FOR HWY				
35 CROSSING OVER WISCONSIN RIVER				

105	CP	2m	✓	(MOVED)
N'LY N'LY END OF FOG LINE, NB				
CO HWY "VV" @ DRIVEWAY ON EAST				
SIDE OF HWY "VV", JUST NE OF HWY				
"VV" INTERSECTION W/ CLOSING DAM RD				
SAID FOG LINE IS ON N'LY CORNER OF				
DRIVEWAY APRON TO HWY "VV"				

106	CP	2m	X	CORNER
OF FOG LINE NORTH BOND 80				
@ INTERSECTION WITH WILD CAT ROAD				

107	CP	2m	✓	☉ OF VALVE
COVER DIRECTLY NW OF MOST ☉☉ E'LY PAINTED				
VALVE COVERS IN BANK OF VALVES @ SE				
CORNER OF KWIK TRIP GAS STATION				

1.1.4 Field Notes (Continued)

109	CP	2m	X	CORNER OF FOG LINE / TURN LANE SOUTH BOUND 80 @ INTERSECTION WITH PATCH ROAD
-----	----	----	---	--

110	CP	2m	X	CORNER OF FOG LINE TURN LANE NORTH BOUND MAIN STREET @ INTERSECTION WITH RIVER LAKE RD
-----	----	----	---	---

111	CP	2m	X	CORNER OF STOP STRIPE WHERE IT MEETS DOUBLE YELLOW @ INTERSECTION OF 61 + E MOVED PAINT IS DIFFERENT
-----	----	----	---	--

113	CP	2m	✓ (MOVED)	END OF FOG LINE @ SE CORNER OF IRISH RIDGE RD + HWY 18 INTERSECTION. FOGLINE IS FOR EB HWY 18
-----	----	----	-----------	---

114	CP	2m	X	CORNER OF DOUBLE YELLOW PAINT STRIPE MOVED DUE TO CELL COVERAGE 1/2 MILE SOUTH ON 81
-----	----	----	---	---

115	CP	2m	X	CORNER OF FOG LINE NORTH BOUND 81 @ INTERSECTION WITH JENTZ BAKER DR
-----	----	----	---	--

1.1.4 Field Notes (Continued)

116	CP	2m	✓	E OF FOG
				LINE @ INTERSECTION W/ N'LY LINE ^{EDGE}
				OF BRIDGE DECK, BRIDGE IS HWY 35
				(GREAT RIVER RD) OVER BLAKE FORK RIVER
				SAID FOG LINE IS FOR NB HWY 35

117	CP	2m	X	CORNER
				OF FOG LINE SOUTH BOUND 151
				@ INTERSECTION WITH LITTLE PLATTE LN

118	CP	2m	X	CENTER
				OF MANHOLE LID EAST BOUND
				HICKORY STREET @ INTERSECTION
				OF N MADISON STREET

119	CP	2m	✓	E OF MANHOLE
				LID IN NB LINCOLN AVE, E'LY
				SIDE OF LINCOLN AVE + 10 TH
				STREET INTERSECTION

120	CP	2m	✓	(MOVED)
				E OF MANHOLE LID IN E OF S BAGLEY
				AVE, JUST NORTH OF RAILROAD CROSSING

121	CP	2m	X	CENTER
				OF MANHOLE LID @ E E
				INTERSECTION OF STALEY AVE +
				RICHARD STREET

1.1.5 Field Photos



Point 101



Point 102



Point 104



Point 105

1.1.5 Field Photos (Continued)



Point 106



Point 107



Point 109



Point 110

1.1.5 Field Photos (Continued)



Point 111



Point 113



Point 114



Point 115

1.1.5 Field Photos (Continued)



Point 116



Point 117



Point 118



Point 119

1.1.5 Field Photos (Continued)



Point 120



Point 121