



November 18, 2016

FEMA Topographic Data Aerial LiDAR Data Collection & Processing Branch County, MI Project Plan (Pre-flight)

Purpose

The Strategic Alliance For Risk Reduction (STARR II) has been tasked to provide the Federal Emergency Management Agency (FEMA) with topographic data for Branch county, Michigan. For this effort, Continental Mapping Consultants (Continental) collected, processed, and classified high accuracy LiDAR data.

The area of interest (AOI) covers approximately five hundred twenty (520) square miles and is located in south central Michigan.

Planned Schedule

Data Acquisition- November 18, 2016 – April 30, 2017
Data Processing-May 1, 2017-July 27, 2017
Data Delivery-July 28, 2017

Project Personnel

Project Manager- (Project POC)	Benjamin Leonard Continental Mapping Consultants Inc Continental Building 121 South Bristol Street Sun Prairie, WI 53590 Phone #-> (608) 501.1561 Email-> bleonard@continentalmapping.com
Survey Crew	Compass Data Inc.

Prior to the survey or aerial lidar acquisition, Continental will contact the STARR II POC of the specific dates in which staff and/or aircraft will be onsite.

Aircraft & Sensor Information

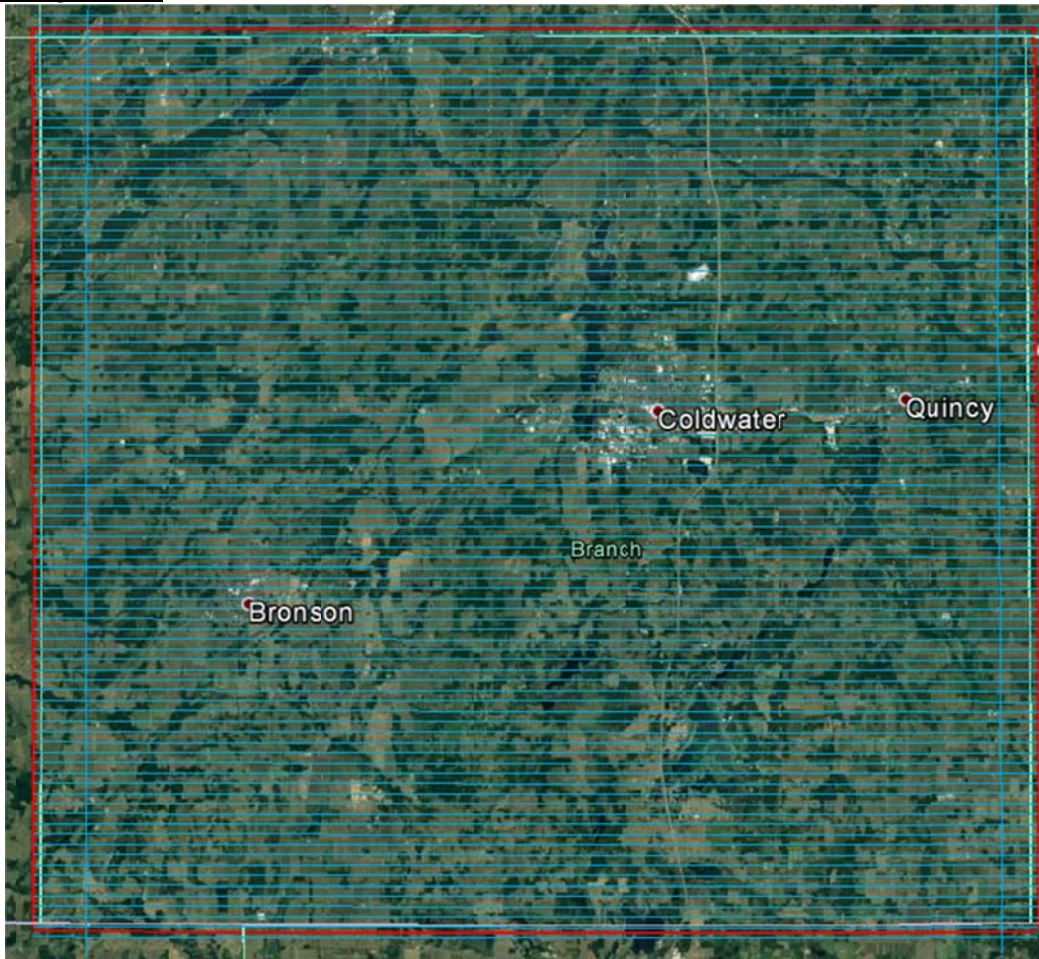
Aircraft-> Cessna 206 Tail #N85PE
Registration/Ownership->GRW Aerial Surveys, Inc.
Sensor->Optech Gemini System Settings (SN246)
Planning Software-> ALTM-Nav Planner

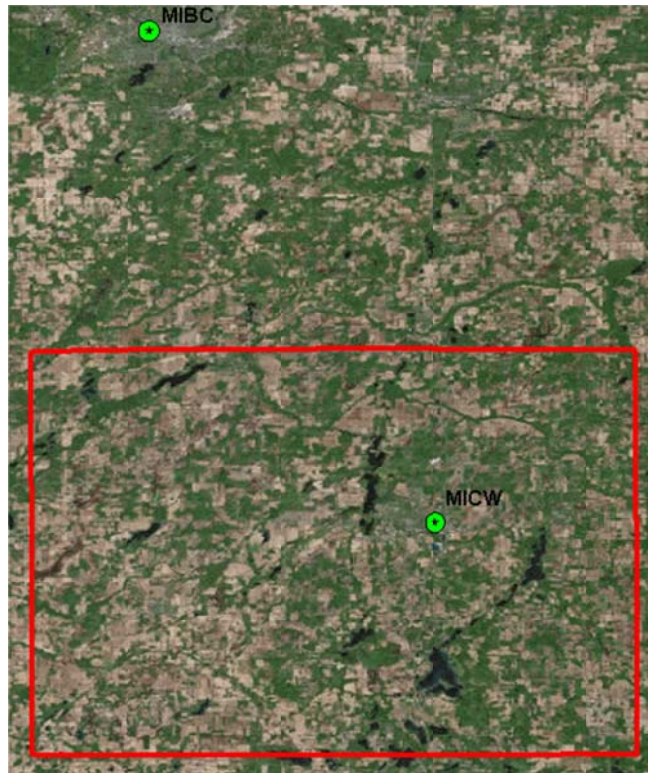


Acquisition Parameters

Parameters	10 cm RMSEz (non-vegetated)
Flying Height	5500' AMSL
Aircraft Ground Speed (knots)	120
Pulse Rate (Hz)	70000
Scan Rate (Hz)	43.6
Full Field of View (degrees)	16
Multi-Pulse	Yes
Full Swath Width (meters)	802
Swath Overlap (percentage)	50%
Average point density (pts/m ²)	2

Proposed Flight Lines





Base Stations

Battle Creek- MIBC (Michigan Department of Transportation)

Coldwater – MICW (Michigan Department of Transportation)

Risk

In the occurrence that an issue arises with the primary aircraft or sensor, Continental’s partner has a Leica ALS 80 and aircraft stationed in Willoughby OH, that will be utilized. If re-flights are determined to necessary, re-flights will occur as soon as weather permits.

Calibration Processing/Testing Methodology

The team will utilize a number of software packages to complete the calibration process. Below are the individual tasks and software packages.

PosPac v7.1 software to process the sbet and precision files. Optech Lidar Mapping Suite v2.4.1.14540 used for LAS creation. TerraMatch will then be used to refine the calibration of the LiDAR dataset. The trajectory files and point cloud swaths are imported into GeoCue to perform project setup and calibration QC. This project set up phase sets the project parameters, tiling scheme, and is the platform for initial macro runs. After the LiDAR boresite calibration is checked, the flight lines are then adjusted using a z-bump method to each other to within projection specifications for relative accuracy. Control values are run against the point cloud to verify the accuracy of the data prior to classification. Flightline



separation images are created to confirm the LiDAR dataset is within project specifications for relative accuracy. A final overall z adjustment is performed to the ground survey control.

Internal Verification Quality Control

Continental will utilize various software packages and techniques to verify the accuracy of the data. Utilizing QCoherent's LP360, Continental will run a survey to las check, followed by seamline analysis. The survey to las check will calculate the deviation between the survey point elevation and the point cloud elevation and export a Non-Vegetated Vertical Accuracy (NVA) report. The second check will check the seamlines of the point cloud swaths. The third check, the Vegetated Vertical Accuracy (VVA) testing will occur after the ground classification has been completed. Other software like Terra Solid and Global Mapper will be utilized to verify the results of LP360. Once all of the deliverables have been produced and verified, the data will move to the Quality office for final review. The Quality office will verify that the correct procedures were followed, test the data, and will verify that all of the deliverables in the SOW are finished.