

# Phase I Completion Report

## Project U14106

---

# LiDAR Acquisition IL Counties of Perry, Jackson & Franklin

Surdex Corporation Project # 2400314  
June 2014

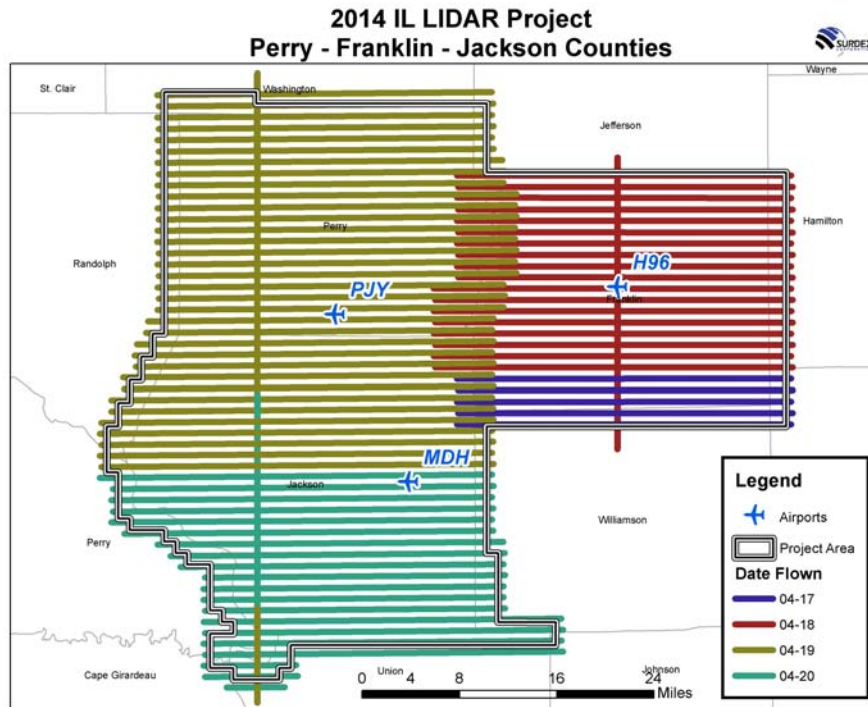


**LIDAR Acquisition:**

The Illinois project areas of Perry, Jackson and Franklin Counties were fully covered by 5,000’ tiles in a layout provided by the University of Illinois. Full tiles covering these counties areas were buffered for flight planning purposes by 1,000’ in both Stateplane IL West and IL East for standalone flight plans. The following parameters were used in preparing the flight plan.

<b>Flight altitude</b>	Approximately 10,180’ MSL (average ground, 460’)
<b>Airspeed</b>	150 knots
<b>Full swath width</b>	2,175 meters
<b>Neat swath width</b>	1,495 meters
<b>Sidelap</b>	30.00%
<b>Field of View</b>	40 degrees
<b>Nominal Post Spacing</b>	0.95 meters
<b>Max Pulse Repetition Rate</b>	185 KHz
<b>Returns per pulse</b>	4 + intensity

LiDAR data was flown in multiple lifts by Surdex Corporation between April 17-20, 2014. Surdex utilized their twin engine Cessna 335 with a Leica ALS70-HP multi-pulse instrument and based their operations at three airports: Benton Municipal (H96), Carbondale/Southern IL (MDH) and Pickneyville/DuQuoin (PJY) in order to keep the baseline distance to a maximum of 25 miles. The graphic below shows areas covered by each flight date. Perpendicular (north-south) lines indicate cross flights flown.



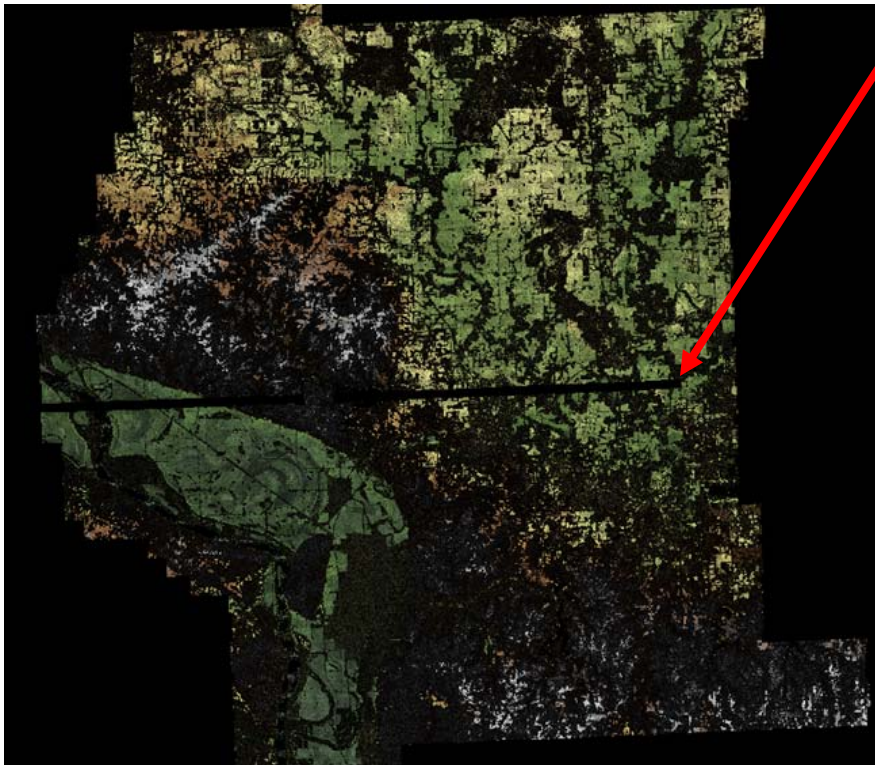
The flight crew was guided by a GPS controlled flight management system, which displayed the flight plan; including altitude, heading, cross track deviation and PDOP. During the flight mission, the system operator monitored flight management data and laser information, to ensure a successful mission.

Before and after each LiDAR mission, Surdex Corporation collected a perpendicular cross flight over lines collected during that lift. This process ensures the ability to compare point data collected in multiple directions for any indication of problems with the data.

There was one issue encountered on line 45 over Jackson County on Sunday April 20<sup>th</sup>. Multiple crews were working that day and the third lift crossed over the GPS week and the initial GPS processing was failing on that line. Surdex has encountered that issue before and although the current processing software could not handle the data from that flight line, a software patch from Leica allowed Surdex to complete the processing of that line at a later date with no issues.

Surdex performed quality checks against all missions to ensure sufficient point coverage of all collected flight lines, review of intensity data and verification that all collected GPS-IMU data was within expected data quality ranges. All other initial processing yielded no issues and allows Surdex to progress into Phase II for full processing and delivery.

Sample review of intensity data. The initial line 45 gap is noticeable here.

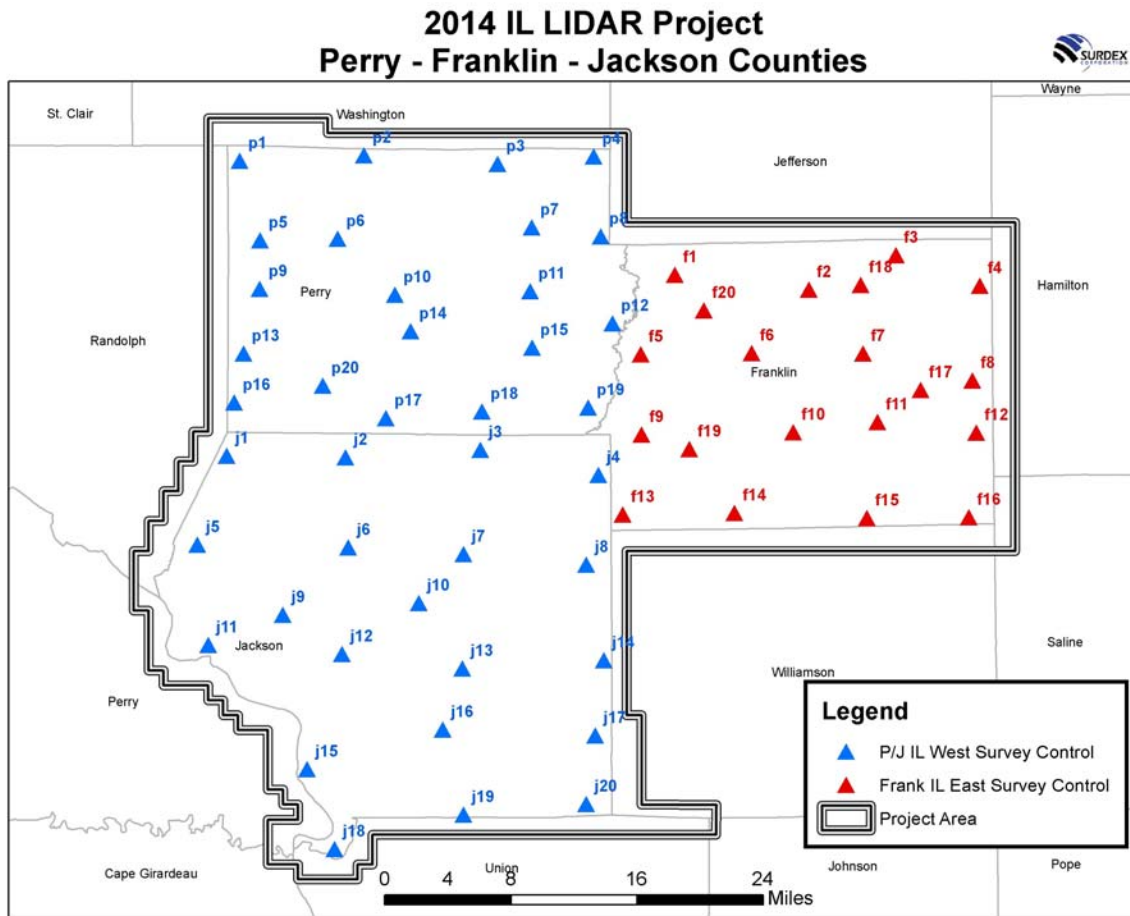


## Ground Survey

Surdex collected 20 survey ground control points in each of the three counties. This data will be used to vertically adjust the LiDAR data, if necessary, once all bare earth classification macros have been successfully run-early in Phase II of this project.

Surdex has found the most success with ground control adjustment when evaluated exclusively against bare earth data. Although all points would receive the adjustment, performing the assessment at this stage ensures that low lying vegetation is not used to assess the vertical accuracy of the LiDAR data when determining how much of a vertical adjustment should be applied.

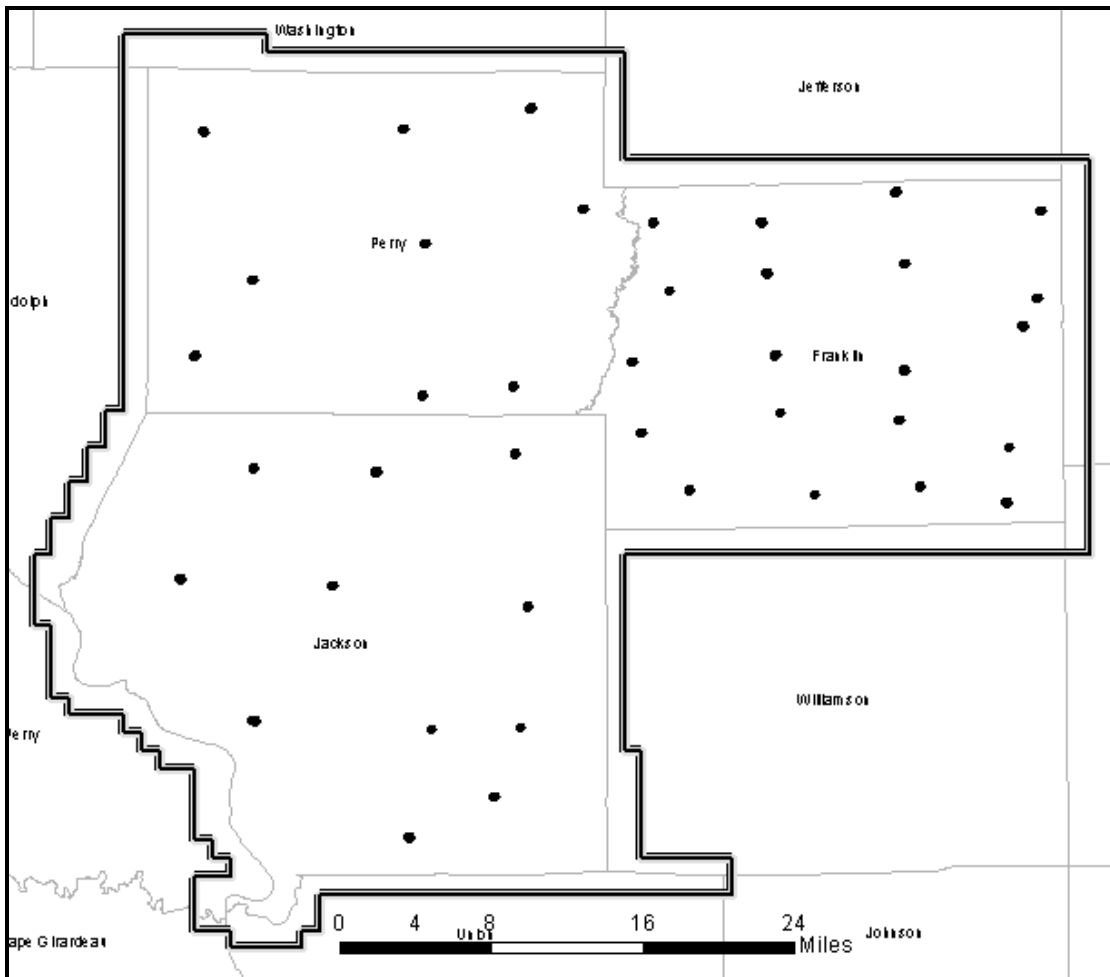
Here is an overview of the survey control collected for the project.



**Quality Control Points**

Surdex has also completed field collection of 200 QC points – 20 clusters of 5 points in both Stateplane IL West and IL East zones. This data will perform an independent evaluation of the processed LiDAR against all five ground cover classes - Hard Surfaces (HS), Short grass (SG), Tall grass (TG), Brush (B) and Forested (F). This process included collection of ground photos when possible, samples of ground photos in the various classes are included below. This data will be used in Phase II for final completion of all project deliverables.

Overview of the point “clusters” – each cluster has 5 points for each of the ground cover classes.





Sample of QC point cluster in Perry County.



Sample ground photos of QC points by groundcover:

### SHORT GRASS





## TALL GRASS



## HARD SURFACE





## BRUSH



## FORESTED

