AIRBORNE LIDAR SURVEY OF FORT ADAIR:

Applying LiDAR Processing Techniques for the Extraction of Historical Archaeological Features

By Jack Morrison and Gary Shaw

INTRODUCTION

- LiDAR technology is a well-established and effective technique used for archaeological site identification.
- Allows the archaeologist to see features that may be indistinguishable on the ground .
- Helps to develop more informed survey strategies and more cost-effective research designs.
- A wide variety of processing techniques have been developed to further enhance DEMs to assist in the identification of cultural features.
- There is still no widely accepted protocol for the processing of archaeological LiDAR data.

INTRODUCTION

- Objective: to compare the effectiveness of several processing techniques which can be used to enhance DEMs for manual feature extraction.
- The two GIS functions most commonly used for archaeological feature extraction are the basic display operations hillshade and three dimensional (3D) display
- Data filtering methods include directional convolution filters
- Methods discussed: hillshades, 3D display, directional filters, slope contrast method, * Integration of hyperspectral data.

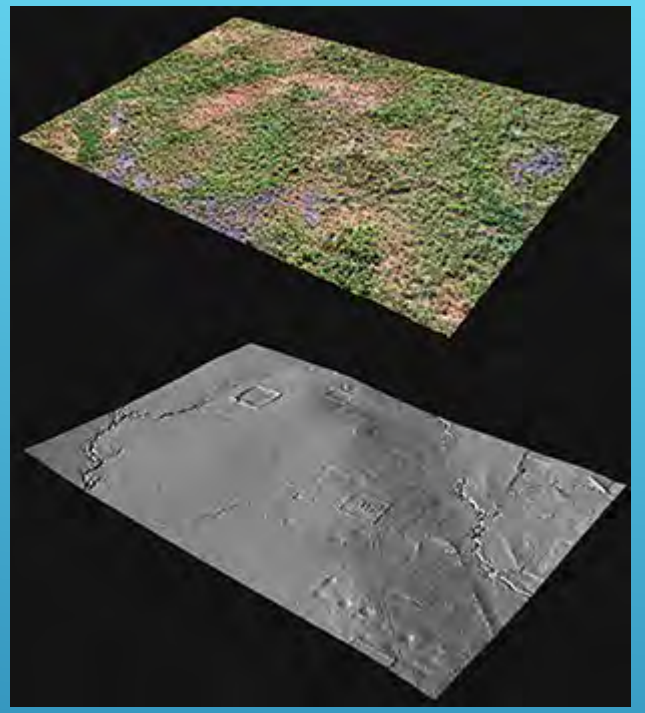


Photo of Angkor Wat courtesy of the University of Sydney

STUDY AREA

- The study area for this project is a 50,000 acre area known as Camp Adair in Benton and Polk Counties, Oregon.
- Also known as “Oregon’s largest ghost town”
- Established in 1942; functioned as a United States Army training facility during World War II
- By September of 1942, the Army had built 1,800 buildings including barracks, machine shops, stores, dining halls, theaters, a post office, hospitals, chapels, and part of the camp served as a prisoner-of-war camp for German and Italian prisoners.
- At the peak of its use, the camp was home to approximately 40,000 soldiers and civilian employees, and at the time constituted the second largest city in Oregon.
- In 1946, at the end of WWII, Camp Adair was decommissioned and many of the buildings were scrapped or relocated.

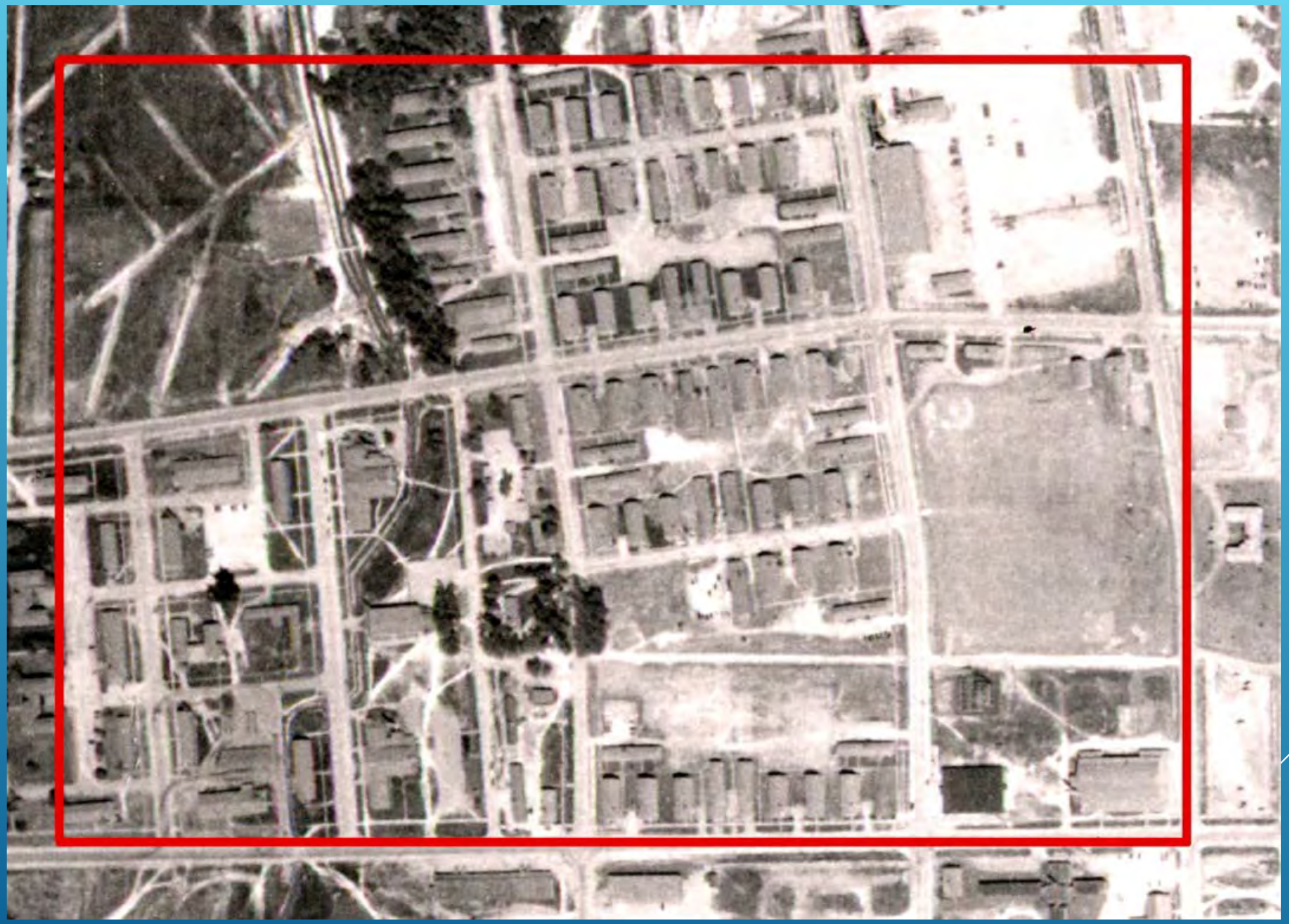
STUDY AREA

- In 1957 a portion of the original Camp Adair site was reconstituted as Adair Air Force Station.
- The Air Force Station housed the 26th Air Division SAGE Support Facility, a Cold War radar defense system, and a missile silo began construction, but was cancelled before it was completed.
- In 1969 the Air Force Station closed and all of its lands and buildings were either deeded or sold off. Today, the area that was Camp Adair makes up the incorporated city of Adair Village and the E. E. Wilson Wildlife Area.
- Why did we select Camp Adair? Based on the size of Camp Adair, the historical significance of the site, the large number of decommissioned and demolished, the availability of historical documents, aerial images, and LiDAR data sets; the Camp Adair site is an ideal location for a study on the application of LiDAR processing techniques for the Extraction of Historical Archaeological Features.
- Our research focused on an area about 0.8 km sq, located about 250 meters north of Camp Adair road and 1.5 km east of Pacific Highway 99.

STUDY AREA: 2015

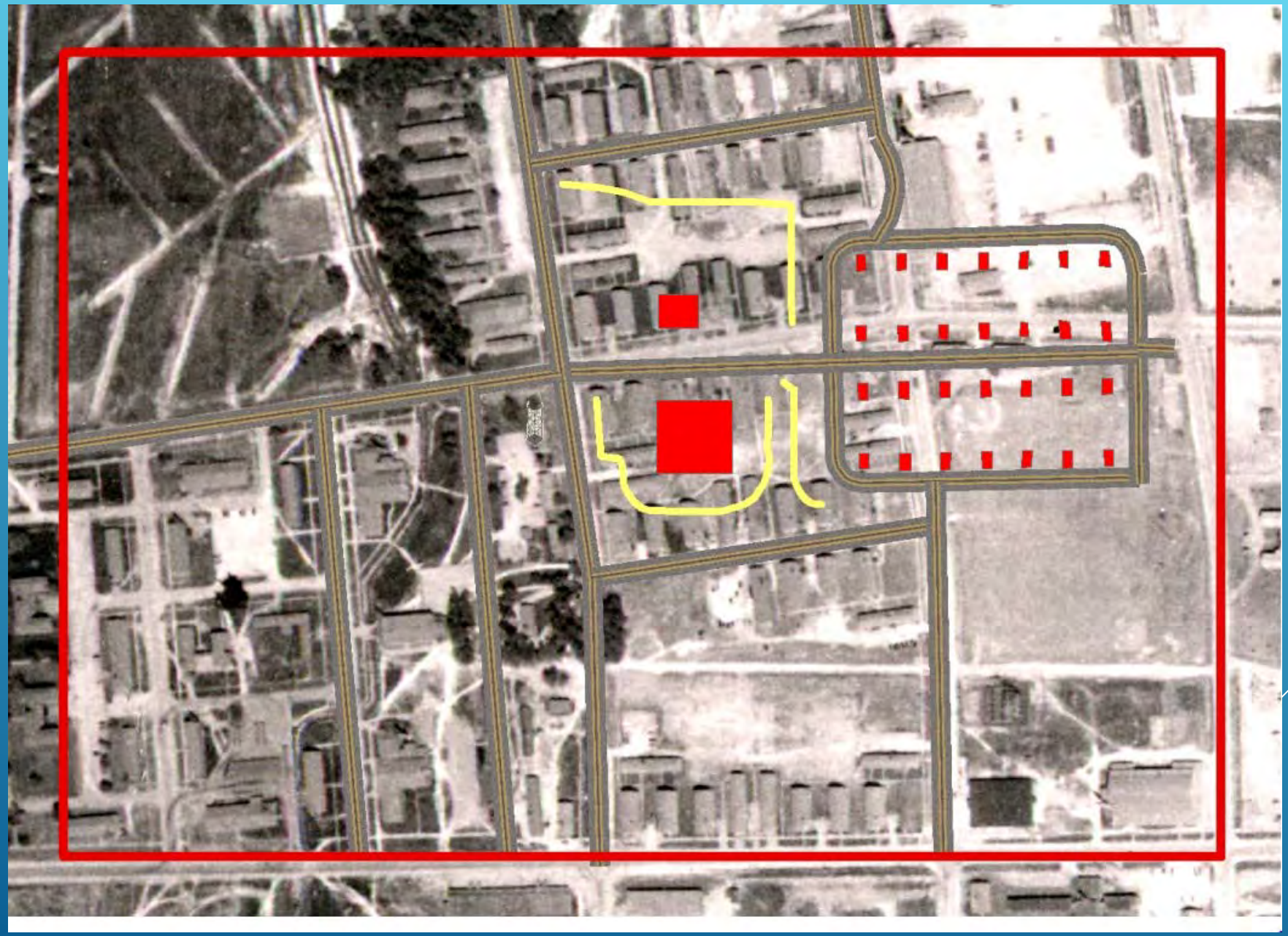
RAW DEM

STUDY AREA: 1944



STUDY AREA 1967

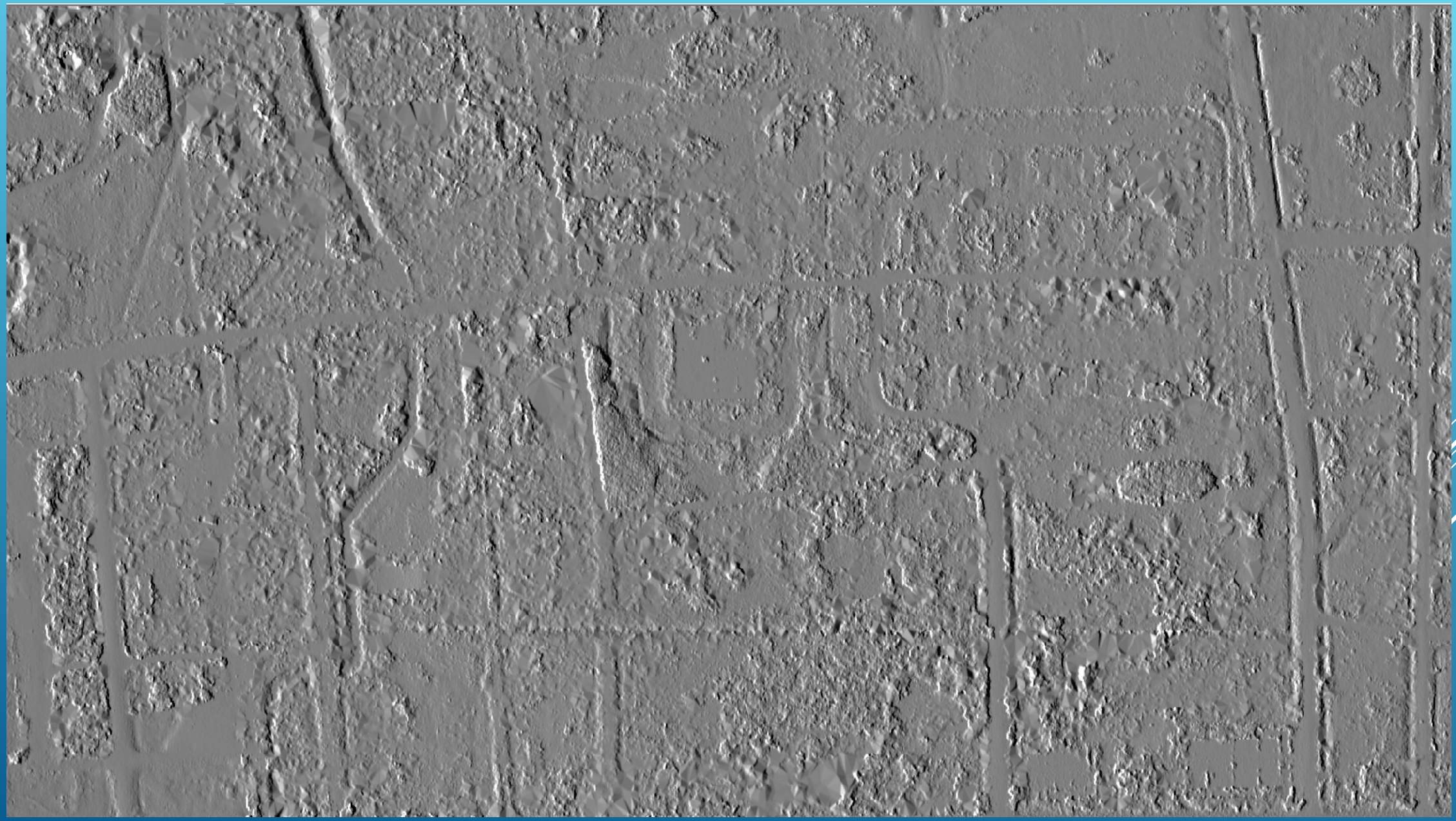
STUDY AREA: 1967



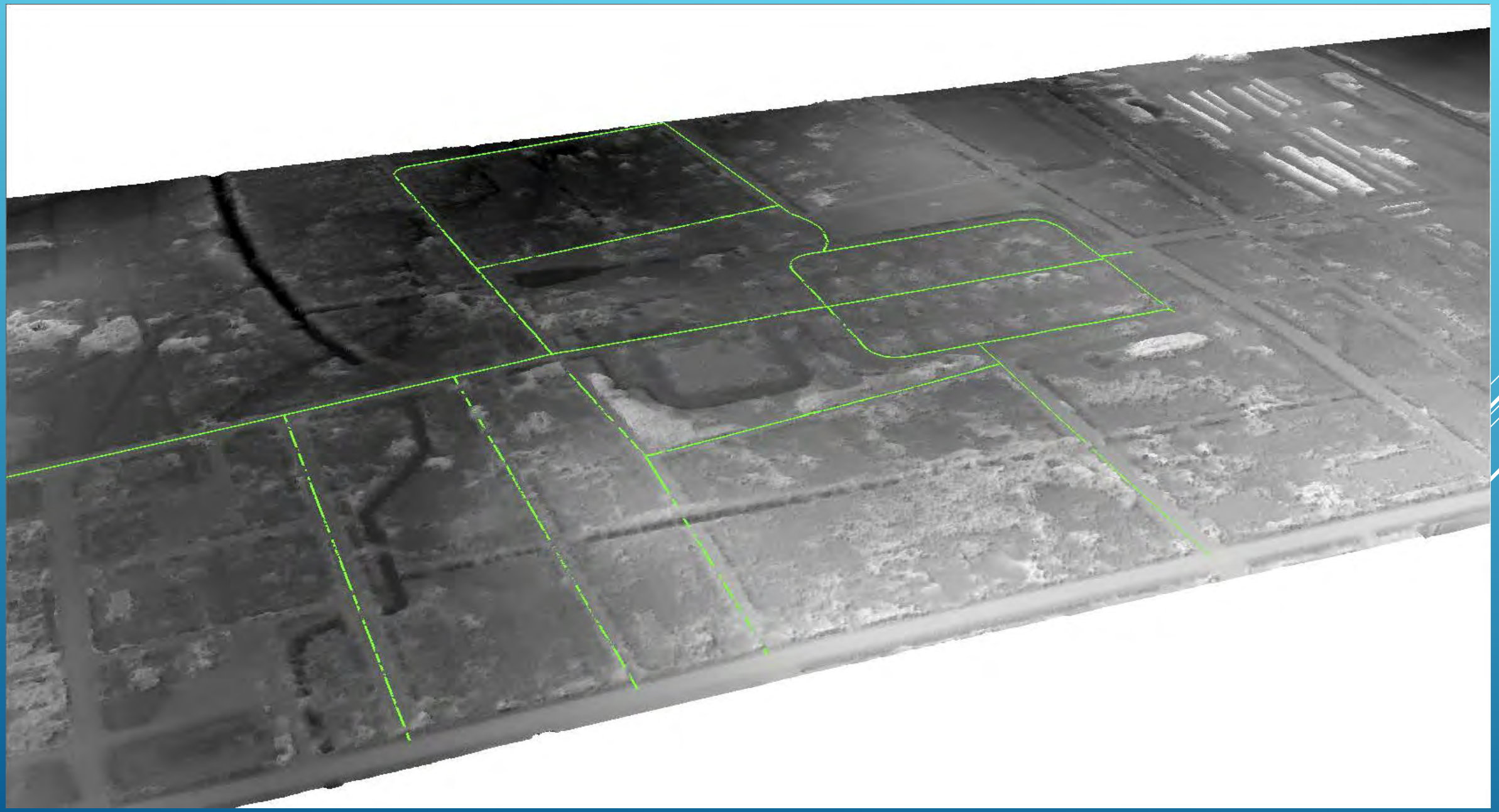
RAW DEM

HILLSHADE

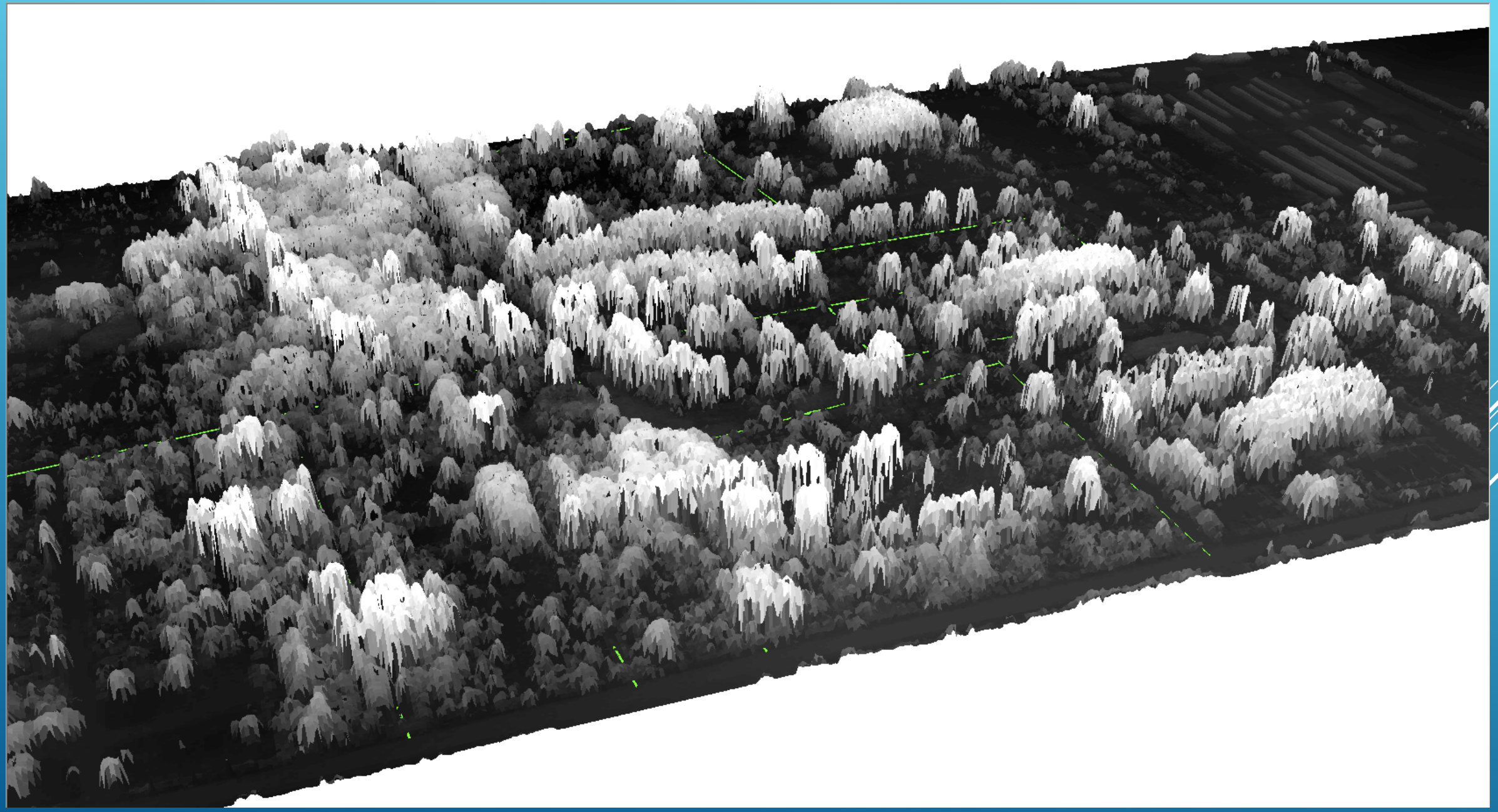
DIRECTIONAL CONVOLUTION FILTER



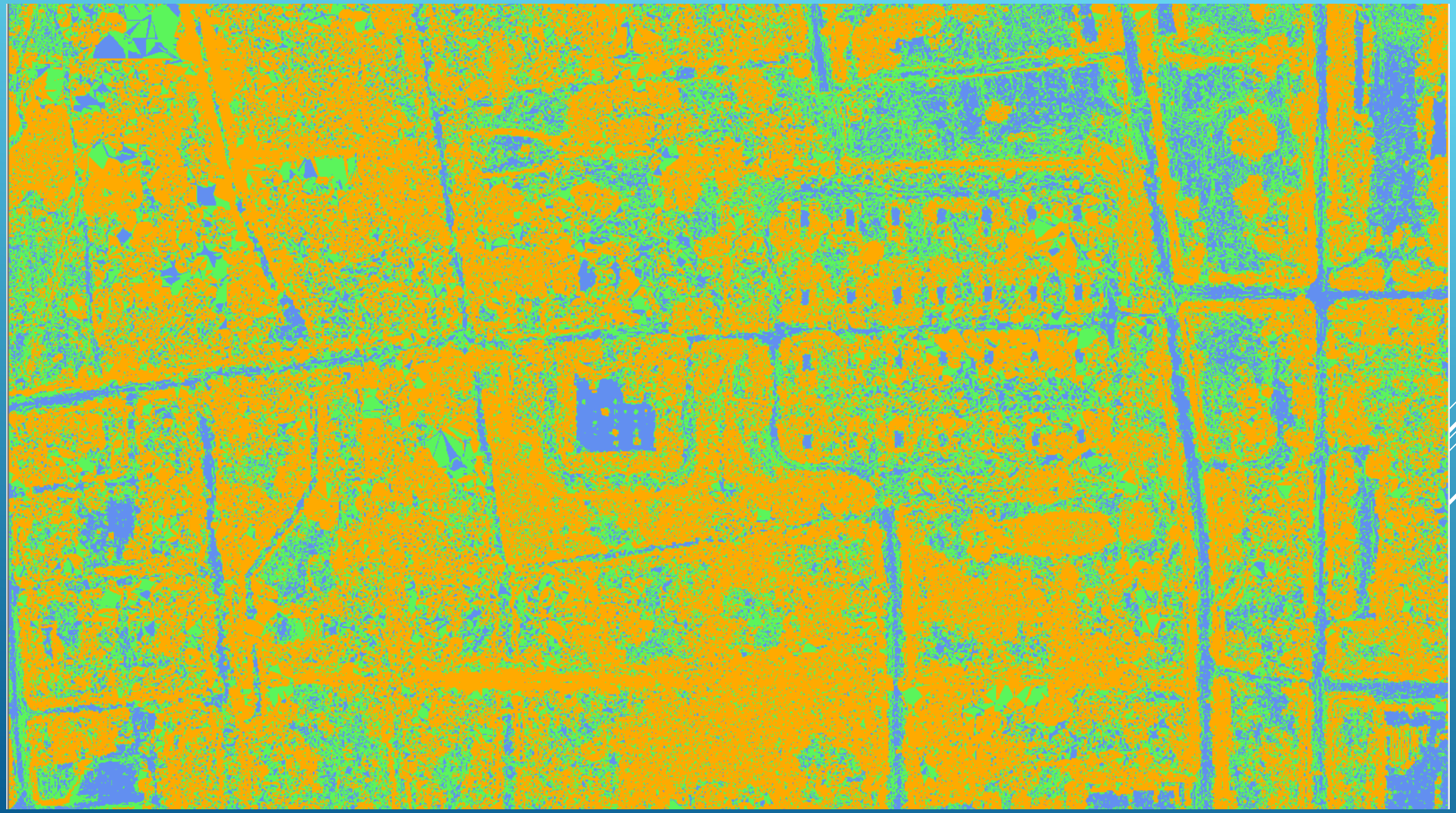
3D DISPLAY: DEM



3D DISPLAY: DSM



SLOPE CONTRAST



RESULTS

- Raw DEM: Roads are present in DEM, Building footprints are not readily identifiable.
- Hillshade: Building footprints and surface depressions are enhanced. Surface contrast is increased.
- Directional Convolution Filter: Roads and linear features are enhanced with depth.
- 3D display: Least amount of apparent enhancement due to low levels of topographic relief.
- Slope Contrast: Best results; highlighting building footprints that were identified and classified accurately.
- Manual visual feature identification was enhanced to varying degrees by each of the image processing methods.

THANK YOU

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