

ABSTRACT

Celik, Naime. M.S.E., Purdue University, December 2013. Identifying Ditch Geometry and Top of the Bank Location using Airborne LiDAR Point Cloud, Major Professors: Jane Frankenberger, Melba Crawford.

The geometry of agricultural drainage ditches is very important in crop production as it impacts drainage of cropland and affects vegetation and soil erosion along the banks of the ditches. Thus, implementation of water conservation and management practices in engineered and natural ditches necessitates determination of ditch geometry along the reach of the ditch. This study explores the use of airborne commercial Light Detection and Ranging (LiDAR) technology to identify the top of the ditch banks. The method was developed to obtain the normalized cross sectional shape of the ditch using two-dimensional spline fits to ground classified points from the extracted LiDAR points in the cross sectional area and to determine the tops of corresponding banks. The method was applied iteratively along the length of the ditch or ditches. RTK GPS point validation data were collected from cross sections of seven ditches in Howard, Clinton and Boone County, Indiana. The Indiana Statewide LiDAR data products and NASA Goddard's LiDAR (G-LiHT) data were used in the study. The impacts of vegetation along the ditch and LiDAR point density on the top of the bank results, as well as improvement from using the LiDAR cloud data instead of the Digital Elevation Model (DEM) were explored.