MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 18-356 (project 462) | July 2018

Implementation of Aerial LiDAR Technology to Update Highway Feature Inventory

the **ISSUE**

Highway inventory data collection is a complicated and repetitive work that requires a lot of manpower and resources. The main goal of the project was to analyze and demonstrate the feasibility of the airborne LiDAR inventory technique for collecting and recording highway inventory data.

the **RESEARCH**

The focus of this project is to analyze the capability and strengths of an airborne data collection system in highway inventory data collection. A field experiment was conducted to collect both light detection and ranging (LiDAR) point cloud data and high-resolution aerial imagery data. An ArcGIS-based algorithm was developed to analyze and process LiDAR data as well as extract desirable features from raw LiDAR point clouds. In addition, a MATLAB-based drainage grate detection algorithm was proposed to demonstrate the effectiveness and economic efficiency of the airborne data collection system. The detection results were compared with a Mandli dataset. Economic comparison between airborne LiDAR and mobile LiDAR was also provided. From the results of this project, we can conclude that airborne LiDAR technology is a promising method for road inventory data collection.

MOUNTAIN-PLAINS CONSORTIUM REGION 8

A University Transportation Center sponsored by the U.S. Department of Transportation serving the Mountain-Plains Region. Consortium members:

Colorado State University
North Dakota State University
South Dakota State University
University of Colorado Denver
University of Denver
University of Utah
Utah State University
University of Wyoming

Lead Investigator(s)

Ziqi Song, PhD

Utah State University
ziqi.cong@usu.edu

Research Assistant(s)

Yi He, GRA, MS
Zhaocai Liu, GRA, MS

Project Title

Implementation of Aerial LiDAR Technology to Update Highway Feature Inventory

Sponsors | Partners

USDOT, Research and Innovative Technology Administration

the FINDINGS

Airborne LiDAR is much faster in data collection than conventional surveying methods. This study further demonstrated that the point density of airborne LiDAR data is sufficient for most of highway assets. Also, airborne LiDAR has the advantage over ground-based inventory technologies of being able to provide a different perspective, as a result, it can detect objects like bridges and culverts that may have been hidden from the mobile platform. In addition, the data processing procedure proposed in this study improved the efficiency of airborne LiDAR. We conclude that airborne LiDAR is a very promising technique that can serve as a complement to other techniques for highway inventory data collection.

the IMPACT

The findings of this research can be used as a reference for state DOTs to choose proper methodologies to collect highway inventory data. Also, the LiDAR-data-based method may provide a stepping-stone for future researchers to develop more effective and efficient methods for highway assets detection.

For more information on this project, download the entire report at http://www.ugpti.org/resources/reports/details.php?id=940

For more information or additional copies, visit the Web site at www.mountain-plains.org, call (701) 231-7767 or write to Mountain-Plains Consortium, Upper Great Plains Transportation Institute, North Dakota State University, Dept. 2880, PO Box 6050, Fargo, ND 58108-6050.