



Final Report

Materials Management Section Project

Project 0092-24-53

February 2025

Lidar Change Detection (LCD) Analysis for Unstable Slopes – STH35 Corridor

Objective

- Evaluate unstable slopes using LCD methods.

Benefit

- Analysis could be incorporated into a Geotechnical Asset Management program for slopes along WisDOT highways.

“This project demonstrates the usefulness of publicly available lidar data to help efficiently evaluate geotechnical assets (slopes) adjacent to our highways and provide decision makers with information not previously available” – David Staab, PE, WisDOT

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Interested in finding out more?

Final report is available at:

[WisDOT Research website](#)

Background

The project involved LCD analysis on lidar data collected in 2011 and 2021 for a 30-mile-long corridor along WIS 35 in the southwestern part of Crawford County. BGC Engineering USA, Inc. (BGC) analyzed a 0.6-mile-wide swath along this corridor from approximately mile post 60 to 90. The Mississippi River and a rail line bound the WIS 35 corridor on the west side. To the east of WIS 35 the topography is sloped and in some places near-vertical where bedrock outcrops. The bedrock in the area consists of horizontally bedded sedimentary units involving limestone, dolomite, sandstone, and shale.

Methodology

BGC used publicly available historic airborne lidar survey data from the Wisconsin Cartographer's Office. Because the data collection spans ten years, had different data collection vendors, and covers an area with variable morphology, the bare earth data resolution and quality is different between the two datasets. Therefore, the datasets were processed to determine the limit of detectable change between the two datasets with a statistical confidence of 95%. Change detection results were then displayed using color contouring within the GIS-based program Cambio™.

Results

Change detection results in Cambio show approximately 120 potential ground movement examples of natural topographic changes consistent with slope movement and rock fall within the study area. The results also show evidence of stream channel erosion (scour) and deposition, and anthropogenic topographic changes, such as excavations, stockpiles and new highway structures (retaining walls). The LCD results generally compare favorably with earlier landslide susceptibility mapping completed by BGC in WHP Project G21-06.

Recommendations for Implementation

Airborne lidar data is readily available statewide, and additional lidar data is collected yearly. LCD analysis can be used to identify topographic changes related to slope movement and other ground disturbance events and activities. It can provide valuable information to a Geotechnical Asset Management (GAM) program by identifying, visualizing and monitoring areas of concern, aiding rapid response, and potentially prioritizing mitigation projects. LCD can also provide information on flooding events, channel migration and fluvial processes along with erosion and deposition near other transportation assets.

This report summarizes Project 0092-24-53

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