

Measuring and Mapping Bridge Vertical Clearance Using Laser Scanning Technology

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The vertical clearance of a bridge over a highway is important in preventing oversized vehicles from hitting the bridge. The vertical clearance of a bridge is traditionally measured by using surveying equipment such as leveling rods and total stations. Typically, measurements are taken at multiple locations in order to determine the minimum vertical clearance under the bridge. This process is time and labor consuming. Also, these measurements may not be accurate because of the traffic, the uneven surface, and the reading error caused by the surveyor. Additionally, when one is faced with a multitude of reports especially in large projects with multiple ramps and bridges, it is not easy and it often takes a long time to find the bridge under study.

This research provides a highly accurate measurement of the vertical bridge clearance by using terrestrial laser scanners. The clearance can be measured in the office by processing the collected point cloud data. The minimum vertical clearance is easily identified and the measurement is visualized and geo-referenced. An approach to reduce data noise caused by traffic is also introduced in this study. In addition, to help reduce the confusion of finding the bridge under study and to facilitate access to the clearance data, the clearance measurements are geo-referenced to an online mapping system. This system allows access to the final deliverable very easily through a single web portal. Finally, Illinois Department of Transportation's Circle Interchange is used to demonstrate this new method.

Key words: Laser Scanning, Bridge Clearance, Geo-referenced, Mapping