

JOINT TRANSPORTATION RESEARCH PROGRAM

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SPR-3706

2016

Laser Mobile Mapping Standards and Applications in Transportation

Introduction

The objective of this project was to develop a draft INDOT Manual for laser mobile mapping. One urban street test site and one rural highway test site were selected and reference control points were established. The test sites were mapped by four commercial mobile mapping vendors. From the test site scanning results, a performance-based process for evaluating vendor results was demonstrated, and quality assurance and quality control procedures were developed and incorporated in a proposed manual for laser mobile mapping.

Findings

Our findings include specifications and procedures for performance-based evaluation of mobile mapping vendors, both design-grade and asset-grade scanning systems, and processes for measuring and evaluating absolute accuracy and relative accuracy.

The table below summarizes the accuracies obtained by both design and asset grade mobile mapping systems (at the 95% probability level). Be aware of this 95% value when comparing our results with others in the literature, which may be in terms of Root Mean

Squares Error (RMSE) or standard deviation (68% probability level).

In addition, components of a quality assurance and quality control plan for a mobile scanning project are discussed. Other specific findings, too numerous to fully discuss here, include absolute and relative accuracy statistics for each of the four vendors, accuracy statistics for a bridge clearance measurement, effects of different scanning rate settings, and driving techniques.

Implementation

One or more test sites may be established by INDOT with known mapping project control points and known validation checkpoints, or INDOT could continue to use the project test sites in West Lafayette. The vendors would then scan the test site and deliver a final point cloud that is adjusted to the project control. The coordinates of the validation points withheld from the adjustment would be extracted from the point cloud and tested for accuracy. Painted targets on the roadway or geometric target objects mounted on tripods along the roadway or other feature points may be used. Algorithms and computer code have been developed for INDOT to accurately and semi-automatically extract the validation point coordinates.

95% Critical values for testing MMS results.

MMS Grade	Absolute Accuracy		Relative Accuracy (over small area)
	Horizontal (cm)	Vertical (cm)	Vertical (cm)
Design	<8	<5	<5
Asset	<18	<24	<6

Recommended Citation for Report

Johnson, S. D., Bethel, J. S., Supunyachotsakul, C., & Peterson, S. (2016). *Laser mobile mapping standards and applications in transportation* (Joint Transportation Research Program Publication No. FHWA/IN/JTRP-2016/01). West Lafayette, IN: Purdue University. <http://dx.doi.org/10.5703/1288284316164>

View the full text of this publication here: <http://dx.doi.org/10.5703/1288284316164>

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