VERMONT
AGENCY OF TRANSPORTATION

FACT SHEET

2017 Research Symposium & STIC Annual Meeting

Suitability of Intelligent Compaction for Relatively Smaller-Scale Projects in Vermont

RESEARCH PROJECT TITLE

Suitability of Intelligent Compaction for Relatively Smaller-Scale Projects in Vermont

STUDY TIMELINE

April, 2015 – August, 2016

PRINCIPAL INVESTIGATOR

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MORE INFORMATION

link to the final report:

http://vtrans.vermont.gov/sites/aot/files/highway/documents/materialsandresearch/completedprojects/Intelligent%20Compaction_Final%20Report%20%28VTrans%20Approved%29.pdf

This fact sheet was prepared for the 2017 VTrans Research Symposium & STIC Annual Meeting held **on September 28, 2017** at National Life in Montpelier, VT. 8:00 am– 12:00 pm.

Fact sheets can be found for additional projects featured at the 2017 Symposium at http://vtrans.vermont.gov/planning/research/2017symposium

Additional information about the **VTrans Research Program** can be found at http://vtrans.vermont.gov/planning/research

Additional information about the **VTrans STIC Program** can be found at http://vtrans.vermont.gov/boards-councils/stic

Introduction or What was the Problem?

Intelligent Compaction (IC) is an innovative technology that has the potential to overcome problems encountered in conventional compaction techniques. IC uses rollers equipped with accelerometers, highly accurate GPS, onboard computer, and infrared thermometers. The use of IC rollers (1) increases the compaction uniformity; (2) provides a system wide (i.e. global) stiffness-based inspection practice; (3) allows for real-time monitoring, identification of weak areas, and making informed decisions on proper course of action during compaction; and (4) leads to potential savings in maintenance costs and extended service life [NCHRP report 676]. Although IC has shown significant promise for earthwork and asphalt pavement construction projects over the past few years, most IC-related research and case studies are available for large-scale projects, and more information on the use of IC would be needed to gain confidence and experience in the technology. In addition, it is necessary to develop robust Quality Assurance/Control (QA/QC) specifications for IC implementation in Vermont projects.

Methodology or What was done?

In-depth literature review was performed to identify the most efficient and cost-effective IC techniques suitable for Vermont based on the availability of equipment, contractors, required resources, and for project sizes typical for Vermont. In addition, different field QA techniques currently available for intelligent compaction were identified. Moreover, the degree of uncertainty associated with the measurement values were evaluated using available data in the literature.

Conclusion or What are the next steps?

IC was found to be a promising technology that can be implemented for both asphalt and soil compaction. Although the upfront costs of IC are higher than conventional density-based spot-test measurement methods, the possibility of 100% compaction coverage of the roadway along with more reliable stiffness measurements makes the IC a viable option to be used in earthwork construction. Generally, spot-test measurements correlate better with roller measurements in soil compared to asphalt. Based on the literature review performed in this study, it was found that IC measured stiffness correlates weakly with spot-test measurements for layered soil profiles compared to homogeneous soils. The next step is to implement IC technology in some of the projects in Vermont, collect data, develop IC guidelines and robust QA/QC specifications for future IC implementation in Vermont projects, and evaluate the improvements in the pavement performance.

What are potential impacts? What is the benefit to VTrans?

The outcomes of the project provide the Agency with (1) better understanding of IC implementation in pavement construction; (2) gaining confidence and experience in the technology; (3) more quantitative measures for implementing IC in future construction projects; (4) better assessment of improved pavement performance over time; and (5) a framework to incentivize contractors to use IC as a QC tool to improve the end product, which in turn helps the Agency to better serve the public.