

2019 Research
ShowcaseImplementation of Intelligent Compaction
for Pavement Construction in
Vermont& STIC Annual
Meeting**PROJECT TITLE**

Implementation of Intelligent
Compaction for Pavement
construction in Vermont

STUDY TIMELINE

January 2108 – December 2019

INVESTIGATORS

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Showcase & STIC Annual
Meeting held at the Dill Building in
Berlin, VT, on September 11,
2019 from 8:30 am– 1:00 pm.

Fact sheets can be found for
additional projects featured at the
2019 Symposium at

[http://vtrans.vermont.gov/planning/
research/2019showcase](http://vtrans.vermont.gov/planning/research/2019showcase)

Additional information about the
VTrans Research Program can be
found at

[http://vtrans.vermont.gov/planning/
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[http://vtrans.vermont.gov/boards-
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Problem Statement

Inadequate compaction causes different types of pavement deterioration such as raveling, rutting, reducing fatigue life, and moisture damaging. There are many problems associated with the conventional (point-wise) quality control (QC) methods. The point-wise measurement covers less than 1% of the compacted area and the results cannot be representative of the entire compacted area. In addition, there is no way to provide the roller operator with real-time data on compaction quality. Intelligent compaction (IC) is an innovative technique, which is superior to the conventional QC methods. The IC roller records the northing and easting coordinates of the compacted areas and provides the roller operator with the real-time measurements. The results from the previous projects indicated that IC roller can potentially improve the compaction uniformity and identify the weak spots. The main objective of this study is to implement the IC technology in Vermont and provide the contractors with guidelines for using the IC technology.

Action Taken

The IC performance was evaluated during the first construction season from the Route 117 reclaimed base project. At this stage, the IC data was collected and the correlations between the IC compaction measurements values (ICMV) and the point-wise density measurements (nuclear gauge density, dynamic cone penetration, pavement quality indicator) were investigated. The results indicated weak correlations between the ICMVs and point-wise measurements. The variation of material properties and changing the roller parameters at different sections were identified to be the potential sources of the weak correlation.



Fig 1. IC roller testing



Fig 2. PQI testing

Conclusions and Next Steps

The aforementioned issues were addressed in the new field test plan, where the roller parameters were calibrated at different sections based on the material type. Furthermore, a new field test plan was designed to investigate the feasibility of using IC as a QC tool and investigate the consistency and uniformity of the IC compaction. According to the preliminary results, the correlations between ICMVs and the spot test measurements is significantly improved and IC roller can be utilized as a reliable QC tool.

Potential Impacts and VTrans Benefits

The proposed study will provide VTrans with (1) better understanding of IC performance in pavement construction projects in Vermont (2) more quantitative measures for implementing IC in future construction projects; and (3) 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.

