Evaluation of Intelligent Compaction in Asphalt Pavement Construction in Tennessee (RES2013-42)

Purpose of the project

The Intelligent Compaction (IC) is a relatively new technology for compacting asphalt, base, subbase, and subgrade materials that is gaining attention in the highway construction in the U.S. IC technology consists of an advanced dynamic evaluation device (accelerometer) positioned at the or in roller drums to measure the response of the underlying materials to the compaction forces being applied by the drum. The accelerometer readings are then analyzed by an onboard computer that takes the readings and evaluates the compaction levels and uniformity of the materials. The rollers are also equipped with global positioning system (GPS) technology that establishes the roller drum locations and displays data on the operation and measurements of the rollers in real time. A color-coded display assists the roller operator in achieving the needed coverage over the full pavement area in both daytime and nighttime conditions.

IC technologies offer 100 percent coverage information with real-time data visualization of compaction data, which is a significant improvement over traditional quality acceptance (QA) procedures involving tests at discrete point locations.

The purpose of this project is to evaluate the applicability of intelligent compaction in construction of soil grade, granular bases and/or subbases, and asphalt layers in flexible pavements in Tennessee. Field projects and IC rollers were identified in the study. The selected field projects have been constructed using the latest intelligent compaction technology. At the same time, in-situ testing was conducted to verify the construction quality. Economic analyses were included to show the financial benefits of intelligent compaction.

Scope and significance of the project

The scope of the research work includes:
1. Completing a synthesis of literature review and state DOT survey on the application of IC technologies to compaction of embankment subgrade soils, aggregate base, and asphalt paving materials;

2. Performing intelligent compaction and field testing on embankment subgrade soils, aggregate base, and asphalt paving materials;
3. Developing correlations between IC measurements and results from field testing; and
4. Assessing the feasibility of using IC technologies for QA purpose based on the findings from the study.

Expecting outcomes

Eight field projects have been constructed using the IC technology in Tennessee, and in-situ tests were conducted to verify the construction quality and correlate to the IC data. The study benefits TDOT in the following aspects:
(1). Improved compaction quality of asphalt pavements;
(2). Increased quality control and reduced maintenance cost;
(3). Money-savings;
(4). Safer operations.

Time periods and status of the project

The project started on September 1, 2013 and is scheduled to complete by August 31, 2018. The project is generally on schedule. The research team is writing the draft final report and will submit it to TDOT for comments and feedbacks.

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