



A PRACTICE FOR INCLUDING INTELLIGENT CONSTRUCTION EQUIPMENT IN QUALITY ASSURANCE PROGRAMS

Real-time tests to evaluate asphalt pavement consistency and mat density across the entire width and length of a paving lot are available now and has growing interest for implementation. Two devices that have emerged for use in evaluating the uniformity and density of asphalt mixtures are the paver-mounted thermal profiler (PMTTP) and the dielectric profiling system (DPS). Both technologies generate a significant amount of real-time data using hardware and software with spatial referencing sources. A third innovative technology referred to as intelligent compaction (IC) is used to map roller coverage of the mat during construction. The use of these devices has the

ability to positively impact pavement performance and are most effective when used in quality control (QC).

The purpose of this report is to provide information and suggestions for using intelligent construction equipment in Quality Assurance (QA) programs conforming to 23 CFR part 637, subpart B. A main challenge to implementation is including results from these devices in an agency's QA program. Many agencies are interested in relying on the contractor to collect this data due to staffing and resource limitations. When using the contractor's data in the acceptance decision, some challenges include:

ACCEPTANCE. The agency needs to perform independent verification. Validation of the agency's and contractor's test results are needed.

DISPUTE RESOLUTION (DR). A DR procedure is needed to resolve conflicts resulting from discrepancies between the agency's and contractor's results.

INDEPENDENT ASSURANCE (IA). The agency's and contractor's personnel and equipment need to be included in the IA Program.

QUALIFICATION. The agency's and contractor's equipment and personnel need to be qualified.



Figure Source: FHWA

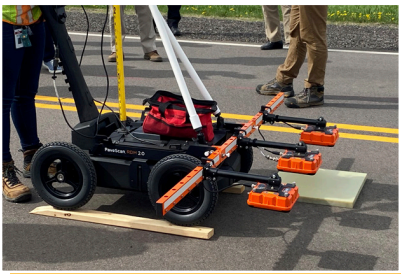


Figure Source: FHWA

States have reported some general challenges encountered during the implementation journey of these technologies. During implementation, agencies may need to consider data management, data integrity, training, global positioning system (GPS) connectivity, and work zone safety.

THERE ARE CURRENTLY OPPORTUNITIES FOR USING THESE DEVICES IN AN AGENCY'S QA PROGRAM.

- **AGENCY ACCEPTANCE.** If the agency or its designated agent owns and operates the DPS, the results can be used in the acceptance decision. Of course, the process must be part of the IA Program with qualified personnel and equipment.
- **QUALITY CONTROL (QC).** The PMTTP, DPS and IC (for roller pass monitoring) could be used for QC activities or as process control. Examples of contractors finding benefits of using these tools to improve the quality of the pavement are in the report.
- **Management of real-time, continuous data with map-based viewing (e.g., Veta¹)** is a tool for agencies and contractors to assess the uniformity of placement and compaction processes to achieve quality.

Reference. Von Quintus, H., Nabizadeh, H., Hand, A., and Hajj, E. *A Practice for Including Intelligent Construction Equipment in Quality Assurance Programs*. Publication Number FHWA-HIF-23-007, Federal Highway Administration, Washington, DC, 2023.

¹Veta is a data management and analysis software tool for intelligent construction; it is a map-based tool for viewing and analyzing geospatial data: <https://www.dot.state.mn.us/materials/amt/veta.html>

Non-Binding Contents: Except for the statutes and regulations cited, the contents of this document do not have the force and effect of law and are not meant to bind the States or the public in any way. This document is intended only to provide information regarding existing requirements under the law or agency policies.