

Research Summary

Consultant Support for Intelligent Compaction and Paver-Mounted Thermal Profiling Projects in 2022-2023

Since 2017, intelligent compaction (IC) and paver-mounted thermal profiling (PMTP) projects have demonstrated advancements in MoDOT's pavement construction quality. The steady improvement in IC pass count coverage and thermal segregation reduction indicates intelligent construction technologies' positive impact on paving practices.

Under this project, the Consultant performs IC and PMTP support, including assistance with specification and protocol refinement, training, piloting innovative technologies, performance tracking, project support, and reporting.

Continuous improvement to the IC and PMTP specifications is important for refining the program. During 2022-2023, specifications were updated to include alternative methods for boundary collection, such as LiDAR-based alignment files or paver-mounted Global Navigation Satellite System (GNSS) equipment. The classifications for "passing" and "deficient" IC pass count segments were revised based on experience and feedback. Provisions to identify potential areas of GNSS or cellular loss before project start were added to mitigate some common issues with data loss and poor data quality. PMTP thermal classifications and price adjustments were revised, and data verification



methods for contractor PMTP data using infrared cameras and event markers were included in the new specifications.

Significant improvements were made to MoDOT's IC-PMTP training program in 2022. The training program expanded to include personalized annual training workshops for MoDOT project staff and contractors. Each workshop was tailored specifically to the responsibilities of the audience. Just-in-time training (JITT) sessions were implemented to provide immediate, practical training within a few days of the project start, ensuring timely, tailored, and relevant support for project staff and contractors. Lastly, train-the-trainer (TTT) sessions were held to ensure MoDOT's Field Office team had the knowledge and training to support project staff during the construction season.

The successful pilot of truck-mounted LiDAR technology for automated boundary data collection marks a significant advancement in using technology to enhance safety and efficiency in collecting GNSS boundaries for IC data. Other methods that don't require hand-held collection include mounting GNSS receivers to the paver to collect distance-based points. These points can be post-processed to an alignment file



and used as a boundary. In 2023, four contractors went from manual hand-held data collection to one of the safer, alternative methods described.

Ongoing project support and feedback meetings have led to insights for updating the IC and PMTP programs. Challenges such as data loss, GNSS quality issues, and equipment malfunctions have been identified, guiding the focus toward improved data management protocols, equipment verification, and accurate reporting in future projects.

Future directions: MoDOT is focused on expanding IC-PMTP statewide, emphasizing better training, new technologies, industry feedback, and refining protocols. Addressing identified challenges, prioritizing data quality, and providing annual training and project support is pivotal for successful implementation. Future efforts aim to continually increase the number of projects utilizing IC and PMTP, ensuring higher-quality pavements through consistent asphalt temperatures and rolling patterns. By advancing these efforts, MoDOT aims to improve pavement construction significantly, leading to safer and longer-lasting roads.



Figure 1. Piloting alternative methods for boundary collection.

Project Information

PROJECT NAME: TR202221—Consultant Support for Intelligent Compaction and Paver-Mounted Thermal Profiling Projects in 2022-2023

PROJECT START/END DATE: March 2022-March 2024

PROJECT COST: \$418,073

LEAD CONTRACTOR: The Transtec Group, Inc.

PRINCIPAL INVESTIGATOR: Dr. George K. Chang, P.E.

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