



U.S. Department
of Transportation

Federal Highway
Administration

Spotlight on Pavement Uniformity: Texas Department of Transportation—Abilene District

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Using the Paver-Mounted Thermal Profiler (PMTP) For Asphalt Uniformity

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For more information on PMTPs and related technology, contact Stephen Cooper, Pavements & Materials Engineer, FHWA Resource Center, stephen.j.cooper@dot.gov

This equipment and more are available for loan by the MATC. Learn more at <https://www.fhwa.dot.gov/pavement/asphalt/matc/equipment-loan-program.cfm>

The PMTP series shares information on pavement testing programs. To access the full series, visit <https://www.fhwa.dot.gov/pavement/asphalt/matc/technical-documents.cfm>

Background

In 2014, the Texas Department of Transportation (TxDOT) began encouraging the use of thermal profiling systems Statewide to identify localized coarse texture and insufficient compaction during pavement construction. The systems, commonly called paver-mounted thermal profilers (PMTPs), provide continuous two-dimensional infrared thermal maps of newly laid asphalt pavement. Segregated, or nonuniform, areas tend to show up as having colder temperature than the surrounding hot-mix asphalt (HMA) mat. Nonuniform areas signal low density, which potentially causes earlier distress in pavement.

TxDOT's Abilene District began using PMTPs in 2015 or so. Abilene District Director of Construction Casey McGee says PMTPs are being applied to most of the District's asphalt paving projects, or about 50 to 60 paving projects per year. The result has been "a better mat, better product—I think the quality has increased because of it."



A PMTP in use in central Texas.
Photo: TxDOT Abilene

Observations from PMTP Use

One way that TxDOT encourages PMTPs among its districts is to allow paving at lower surface temperatures when using the equipment; that is, the allowable surface temperatures can be lowered to at least 32°F compared to 45°F or higher, depending on the asphalt binder used on the project.

The Abilene District encompasses 13 Counties in central Texas, where temperatures are often mild and dry. However, in winter, freezing rain and some snowfall can negatively affect paving schedules. The potential to extend work hours in cooler weather by employing a PMTP has significant benefits, McGee says. He says completing paving jobs faster saves time and reduces costs associated with travel delays and longer construction schedules.

McGee cites other benefits to PMTP use, such as:

- Ability to quickly check for overall temperature uniformity and spot issues on asphalt pavement surface. Alternatively, an inspector walks the pavement mat on-site with a hand-held thermal camera, which makes it more difficult to pinpoint problem areas.
- Opportunity to troubleshoot problem areas in real time during paving.
- Better safety for crews from earlier removal of work zone traffic control. Using a PMTP also avoids safety risks of personnel with a thermal camera adjacent to traffic.
- Paving operators use PMTPs to provide higher quality materials and placement on the first try. PMTPs can help identify emerging placement problems and encourage adjustments to avoid, or minimize, segregation on completed work.
- An end-product of more uniform pavement surface that results in a smoother road for the traveling public.

Example Projects

The flexibility to pave in cooler temperatures when using a PMTP was demonstrated in a January 2023 resurfacing project on Farm-to-Market (FM) 604 in Callahan County. The paving operator had hot mix, personnel, and equipment available, and wanted to get ahead of even colder weather forecast for later in the week. The contractor paved two miles in one day—even into the evening—avoiding lost time and associated costs of delaying the project. Without a PMTP, the project might have been postponed until the weather was warmer, according to McGee.

TxDOT has the authority to seek remove-and-replace remediation or a financial penalty if thermal profiles show areas of segregation. The Abilene District asked for a 2,000 foot section to be removed-and-replaced on Interstate 20 in Howard County, when resurfacing the highway in 2022.

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