

New tests help highway agencies better assess the quality and durability of concrete and optimized mixtures, leading to cost savings and more resilient concrete pavements.

Recent developments in testing technologies are providing better predictors of long-term concrete pavement performance. A nationwide PEM for Concrete effort is underway to help bring these newer technologies to State agencies and assist them in adopting test methods that will better meet their paving needs.

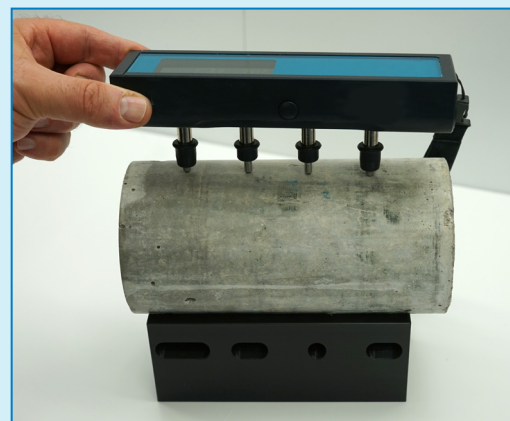
AVAILABLE FUNDING

The Federal Highway Administration's State Transportation Innovation Council (STIC) Incentive program can help agencies standardize new concrete testing technologies and interact with national leaders moving toward performance specifications for concrete. STIC funds may be used for the following activities supporting implementation of PEM and American Association of State Highway and Transportation Officials (AASHTO) specification PP 84, *Standard Practice for Developing Performance Engineered Concrete Pavement Mixtures*.

- ▶ **Purchase and evaluate new equipment for tests in AASHTO PP 84.** This includes the Super Air Meter® and equipment to conduct the Surface Resistivity Test, Box Test, and V-Kelly Test. FHWA provides training on these tests through its Mobile Concrete Trailer Program.



The Super Air Meter® evaluates concrete freeze-thaw durability by measuring the air system and distribution of air in fresh concrete.



The Surface Resistivity Test assesses concrete vulnerability to chloride attack by measuring the resistance to electrical flow.

- ▶ **Conduct a peer exchange with States leading the national implementation efforts.** These include New York, Michigan, Minnesota, Iowa, Wisconsin, and North Carolina.
- ▶ **Host a one-day training session.** States not currently participating in [Transportation Pooled Fund TPF-5\(368\)](#), *Performance Engineered Concrete Paving Mixtures*, are eligible.



The V-Kelly evaluates concrete workability by measuring the rate that a steel mass penetrates into concrete as it is vibrated.



The Box Test is used to assess the workability of slip formed concrete mixtures. In the photos above, a sample is being prepared for assessment.

WHY IMPLEMENT PEM FOR CONCRETE?

Concrete paving specifications have not kept pace with advancements in concrete science and innovations in testing technologies. Current specifications are largely based on strength, slump, and air content—as they have been for the past 50 years. While these traditional parameters are important, other parameters, which are not currently being measured, offer better indicators of long-term durability.

Exciting new technologies have emerged in the last few years that allow agencies to better assess the quality and durability of their concrete. Many of these same technologies can be readily incorporated into contractor/supplier quality control (QC) programs as well. Including these tests in an agency quality assurance (QA) program will result in longer-lasting concrete infrastructure.

FHWA partnered with States, academia, and industry on PEM for Concrete as part of its move toward a performance-based approach to carrying out the Federal-Aid Highway Program. The initiative produced AASHTO PP 84, which is an approach to mixture design that involves removing unnecessarily prescriptive requirements from specifications. It includes new and emerging testing technologies that better assess the long-term performance of concrete. PP 84 also includes real-time QC activities by the contractor, with oversight by agency personnel, to guide production activities, providing contractors the opportunity to proactively address quality issues on a project.

STATE OF PRACTICE

Deployment and implementation efforts for PEM technologies is occurring nationwide. In 2018, FHWA awarded a Cooperative Agreement to the National Concrete Pavement Technology Center, located at Iowa State University. A priority work item in that agreement is to develop guidance for agencies and contractors, such as sample specification language, suggested testing frequencies, and information on how to incorporate the new technologies into agency QA and contractor QC programs.

In 2017, FHWA sponsored TPF-5(368) to support implementation of performance concepts into concrete specifications. Pooled fund participants include FHWA, 17 States, and industry organizations such as the American Concrete Pavement Association, Portland Cement Association, and National Ready Mixed Concrete Association.

Further information is available at:

STIC Incentive Program Guidance: <https://www.fhwa.dot.gov/innovation/stic/guidance.cfm>

Concrete Pavement Technology: <https://cptechcenter.org>

Transportation Pooled Fund-5(368): <https://www.pooledfund.org/Details/Study/620>

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