



By comparing asphalt pavement samples made using two different specifications, Iowa DOT has evidence that its updated pavement specifications will result in longer-lasting roads.

# RESEARCH SOLUTIONS

## Iowa's updated asphalt pavement standards improve road performance

Research completed in 2016 helped Iowa upgrade its asphalt pavement mix designs and construction procedures, but careful analysis was needed to verify that the mixes being produced in the field were meeting performance expectations. A follow-up study comparing pavement samples created with the old and new specifications drew on a variety of performance tests to confirm that the new specifications yielded better-performing pavements. The results indicate that new pavements constructed in Iowa will be more resistant to failures such as rutting and cracking over time.

### THE NEED

Iowa's asphalt pavements are designed and constructed according to exacting specifications. One of the last and most important steps in the road-building process is to carefully and uniformly compact the asphalt mixture after placement. This improves its long-term performance, simultaneously smoothing the

surface and reducing the amount of air in the finished pavement.

When selecting a specific blend of aggregates, binder, and other materials for a particular Iowa road, engineers consider a range of factors, including the amount of traffic the road is expected to support. Traditionally, roads with a

higher volume of traffic need less compaction during construction, since the weight of the vehicles will contribute to the overall compaction within the first few years of use. However, a 2016 Iowa DOT research project found that many of the state's pavements didn't have as much traffic as expected and consequently weren't reaching their

*(continued)*



**“Thanks to this project, local road builders will be able to choose an asphalt pavement mix that is better customized for the road’s traffic volume.”**

**— TIMOTHY HENSLEY,**  
District 4 Materials Engineer, Iowa DOT

intended compaction levels. The excess air voids allowed water to infiltrate and expand in the pavements during freeze-thaw cycles, causing rutting, cracking, and other deteriorations sooner than expected.

In response, Iowa DOT adjusted its pavement specifications in 2016, updating binder and compaction requirements to reflect more realistic traffic volumes across the state. To verify that these new specifications produce more durable pavements as expected, a follow-up research project evaluated and compared pavement samples created using the old and new mix design standards.

## RESEARCH APPROACH

In this project, the researchers had two goals: to compare the older and newer specifications and to verify that the updated specifications produce asphalt pavements that perform as expected.

The team began by obtaining mix samples from three construction projects that were completed using Iowa DOT’s pre-2016 specifications. The three mixes were designed to meet the needs of low-, medium-, and high-volume traffic. Using specialized equipment, the mixes were compacted in the laboratory according to both the old and new specifications to create two sets of specimens for performance testing.

The team subjected both sets of pavement specimens to a variety

of standard stress tests to identify any differences in performance (as shown through rutting, moisture damage, cracking, and other common distresses). Finally, the researchers used AASHTOWare Pavement Mechanistic-Empirical (ME) Design software and data from Iowa DOT’s Pavement Management Information System to forecast the long-term performance of each pavement and determine the impacts of the specification changes.

## WHAT IOWA LEARNED

In every test conducted, the samples produced using the newer specifications performed as well as or better than those made according to the older standards. The specification updates produced the most significant improvements for medium- and high-volume roads, while the old and new specifications showed similar results for low-volume roads. Some disparities between predicted and actual performance when using the new specifications may point to the need for additional research and testing in the future.

## PUTTING IT TO WORK

With evidence showing that the updated specifications more accurately reflect current traffic volumes in the state, Iowa DOT and local roads agencies can be confident that the asphalt pavements they build today are more crack- and water-resistant,

better able to withstand the stresses of extreme temperature fluctuations, and will last longer than their predecessors. As new pavements are constructed over time, agencies can look forward to spending less of their limited resources on maintenance and repair.

## ABOUT THIS PROJECT

**PROJECT NAME:** Validation of Gyrotory Mix Design in Iowa — Phase II  
[Final Report | Technical Brief](#)

**PROJECT NUMBER:** TR-742

**REPORT DATE:** August 2021

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