

performance testing

NCAT's new report on performance testing for hot-mix asphalt offers objective data and recommendations for procedures and equipment.

THERE IS A NEW REPORT available that should be of interest to all major producers of hot-mix asphalt (HMA) in the United States and Canada...and in Latin America, for that matter.

The report is entitled *Performance Testing for Hot Mix Asphalt (NCAT Report No. 01-05A)* and it was published in November 2001 by the National Center for Asphalt Technology (NCAT) at Auburn University in Alabama.

The new NCAT report is being greeted with enthusiasm in most sectors of the industry, mainly because it offers some vital, long-awaited information about which method of performance testing you might want to select for your quality-control/quality-assurance (QC/QA) program.

The background section of the report provides the reason that NCAT tackled this research project in the first place. It seems that the

Superpave design method for HMA mixes originally consisted of three proposed phases: materials selection; aggregate blending; and volumetric analysis of specimens compacted using the Superpave Gyratory Compactor.

There was originally supposed to be a fourth phase: a method that would analyze the mix properties to determine its performance potential. But this fourth phase is not yet available for adoption—

which is somewhat problematic to producers in the HMA industry. The NCAT report summarizes the nature of the problem:

“Considering that approximately two million tons of HMA is placed in the U.S. during a typical construction day, contractors and state agencies must have some means as soon as possible to better evaluate performance potential of HMA...The HMA industry needs a simple performance test to help

| TEST METHOD | ADVANTAGES | DISADVANTAGES |
|--------------------------------------|--|--|
| Asphalt Pavement Analyzer | <ul style="list-style-type: none"> <input type="checkbox"/> Simulates field traffic and temperature conditions <input type="checkbox"/> Modified and improved from Georgia Loaded-Wheel Tester <input type="checkbox"/> Simple to perform <input type="checkbox"/> Three to six samples can be tested at the same time <input type="checkbox"/> Most widely used Loaded-Wheel Tester used in the United States <input type="checkbox"/> Guidelines (criteria) are available <input type="checkbox"/> Cylindrical specimens use Superpave Gyratory Compactor | <ul style="list-style-type: none"> <input type="checkbox"/> Relatively expensive except for new table-top version |
| Hamburg Wheel-Tracking Device | <ul style="list-style-type: none"> <input type="checkbox"/> Widely used in Germany <input type="checkbox"/> Capable of evaluating moisture-induced damage <input type="checkbox"/> Two samples can be tested at the same time | <ul style="list-style-type: none"> <input type="checkbox"/> Less potential to be accepted widely in the United States |
| French Rutting Tester | <ul style="list-style-type: none"> <input type="checkbox"/> Successfully used in France <input type="checkbox"/> Two HMA slabs can be tested at the same time | <ul style="list-style-type: none"> <input type="checkbox"/> Not widely available in the United States |

The recently released NCAT report that evaluated the primary methods of performance testing for HMA mixtures concluded that the Asphalt Pavement Analyzer (APA) from Pavement Technology, Inc. (PTI) is superior to other test methods, such as the Hamburg wheel-tracking device and the French rutting tester. Other current test methods (such as the PUR wheel, the Model mobile load simulator, and the Wessex device) fell short of the top three.

ensure that a quality product is being produced.”

The basic objective of the research project outlined in NCAT’s report was “...to evaluate available information on permanent deformation, fatigue cracking, low-temperature cracking, moisture susceptibility, and friction properties, and as appropriate recommend performance test(s) that can be adopted immediately to ensure improved performance. Emphasis is placed on permanent deformation.”

The NCAT report then goes on to provide comparative assessments of six different types of tests: diametral tests; uniaxial tests; tri-axial tests; shear tests; empirical tests; and simulative tests. According to the report, most of these tests either do not have the ability to predict performance or they are considered to be too complicated or expensive for day-to-day QC/QA testing.

But the simulative tests do have some practical applications. The simulative tests evaluated by NCAT included wheel-tracking tests involving the Asphalt Pavement Analyzer (APA) from Pavement Technology, Inc. (PTI), the Hamburg Wheel-Tracking Device (HWTd), and the French Rutting Tester (FRT). “Although the wheel-tracking tests are not mechanistic,” concluded the NCAT report, “they do seem to simulate what happens in the field.”

The chart on the facing page shows NCAT’s comments about the three leading wheel-tracking tests as they relate to permanent deformation and performance testing. The report said the tests that appear ready for immediate adoption include the three tests shown in the chart: the APA, the HWTd, and the FRT.

“The tests are listed in order of priority for recommended use,” said the report. It also offered several caveats, including the statement that “...these recommended criteria are developed in general for higher traffic so they are not necessarily applicable for lower traffic areas.”

The Asphalt Pavement Analyzer (APA) is ranked in first place by the NCAT report, with a total of seven significant advantages over the other, lower-ranked methods.

Among the APA’s advantages are its ability to simulate field traffic and temperature conditions and the fact that the test itself is very simple to perform.

In addition, the report points out that a number of samples (between three and six) can be tested at the same time on the APA. And the APA is acknowledged to be the most widely used loaded-wheel tester in the United States—which means that performance-test results on various mixes can be shared and compared by producers and departments of transportation in different parts of the country.

The NCAT report includes a note about how the APA might be used:

“One recommended approach is to use the APA with cylinders compacted in the Superpave Gyrotory Compactor. Samples compacted for volumetric testing could be tested, thus minimizing (the) number of samples required. This will allow QC/QA tests to be quickly conducted without requiring additional compacted specimens.”

The NCAT report on performance testing mentioned in this article was prepared by E. Ray Brown, director of NCAT; Prithvi S. Kandhal, associate director emeritus at NCAT; and Jingna Zhang, visiting scholar at NCAT.

TO GET A COPY OF THE NCAT REPORT ON PERFORMANCE TESTING,

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PERSPECTIVE



Our nation’s highway system was built to endure both natural and manmade catastrophes. This winter scene of an Arkansas highway was photographed by John Jackson of the Arkansas Highway and Transportation Department.

When things go right ...or when things go horribly wrong... we know we can always count on our remarkable highway system.

On September 11 of last year, the airline industry was grounded because of the terrorist attack. It has still not fully recovered.

But on that very same day, the highway system in the United States stayed entirely open and active. The nation’s 3.9 million miles (6.3 million kilometers) of roads and highways continued to carry commuters to work and children to school. It helped Americans visit their grocery stores, shopping centers, hospitals, sports events, and doctors. Imagine viewing all that movement from high above the earth’s surface: millions of cars, vans, trucks, and motorcycles...traveling more than 7 billion miles (11.3 billion kilometers) in a single day!

It almost boggles the imagination.

Our remarkable highway system is a key element in our nation’s ability to produce goods, ensure growth, and provide security. It is essential to our continued day-to-day economic growth. Did you know that 84 percent of the \$7-trillion worth of commodities that are delivered annually in the United States are transported on our nation’s highways?

These are just statistics, of course. But they should help us keep the importance of our highway system in sharp focus. ▼▲▼