



RESEARCH SOLUTIONS

Geotextiles used in road rehab may help extend pavement life

Iowa DOT has implemented a newer technique for road construction that incorporates a layer of geotextile fabric between the original concrete and the newly poured overlay, an alternative to using an asphalt cement concrete (ACC) layer. Although previous studies have demonstrated positive performance results for the roads built with geotextile fabric, questions remain about their long-term performance. Researchers conducted load tests on sections of a road in Buchanan County built with a geotextile fabric interlayer, demonstrating a new method for on-site road performance assessment and generating comparison data for different thicknesses and manufacturers of geotextiles.

THE NEED

Innovations in road construction promise greater durability and longevity, and potentially delay the need for costly repair or replacement while improving the driver's safety and comfort. Newer alternative construction techniques, including the use of geotextile

interlayers, still merit testing at different points in the lifespan of a road. In use for more than a decade in the United States, geotextiles have demonstrated improved performance in tests of stress and permanent deformation. Additional characteristics of the fabric have not been tested but would provide a

more complete understanding of the performance advantages.

RESEARCH APPROACH

A multistate pooled fund project led by Iowa DOT commissioned a research project to address the gaps in understanding geotextile

(continued)



“These results help us assess the potential advantages of using geotextile interlayers for improving the performance of our portland cement concrete overlays.”

— TODD HANSON,
Iowa DOT PCC Materials Engineer, Construction Materials

performance. The two-phase study evaluated the properties and performance of three geotextile samples alongside an asphalt sample used as a control. Two of the geotextiles were produced by one manufacturer; both were black in color and one was thicker than the other. The third textile, which was white in color, came from a second manufacturer.

For the first phase in the laboratory, heat and elasticity tests generated comparison data for the performance characteristics of each sample. The second phase tested pavement sections of Buchanan County Highway D-16, constructed in July 2020. In the second phase, field tests performed in September 2020 and September 2021 evaluated stress and deformation of the concrete and compared road sections constructed with each of the geotextile fabrics and ACC.

The field study deployed a new on-site method that uses Automated Plate Load Tests (APLTs) to evaluate the properties of pavement after construction, simulating aspects of road stress. In accordance with previously published findings, the APLT executed a cyclic test, which delivers a controlled load pulse for a specified length of time. This approach avoids the shortcoming of other methods with fewer load pulses applied to the pavement. Also, the on-site APLT device eliminates the potential drawbacks associated with laboratory testing while also ensuring

consistent operation due to its automated mechanism.

WHAT IOWA LEARNED

In phase one of testing, laboratory results confirmed the geotextile's capacity to serve as a buffer for temperature and load deflection. Even after concrete started to show deflection, the geotextile still absorbed strain. In fact, all three geotextiles performed better than the asphalt layer for energy storage and transfer. The thicker geotextiles insulated against heat transfer more than the thinner layers as expected. Both measurements also indicated that the white geotextile material was denser to a degree than the black material.

Evaluations of the geotextile layers through the on-site APLTs indicated lower storage and transfer of energy into a concrete mixture as compared with the asphalt. Overall, the geotextiles performed at least as well as the control section with an asphalt interlayer, and in some measurements possibly better.

PUTTING IT TO WORK

The research outcomes provided comparison data for Iowa DOT to evaluate its use of geotextile fabrics in road construction and assessed the potential for extended road performance and higher driver satisfaction. This research effort also demonstrated the operation and validity of the on-site APLTs to reliably test

sections of road at different locations and times and track the performance of pavement construction methods over the roads' functional lifetime. Continued use of the on-site technique will allow for data collection at regular intervals to confirm the best materials for future road construction and to measure new materials and methods.

ABOUT THIS PROJECT

PROJECT NAME: *In Situ Cyclic Loading of Concrete Pavement Overlays Supported on Geotextile and Asphalt Interlayers: Buchanan County Road D-16 Final Report*

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